

Murray Brothers Tarmacadam Ltd

ARDCAHAN QUARRY SECTION 37L  
ENVIRONMENTAL IMPACT ASSESSMENT  
REPORT (EIAR)

**VOLUME III**  
APPENDICES

April 2026

## VOLUME III – APPENDICES

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Murray Brothers Tarmacadam Ltd



**APPENDIX 1.1**  
**CONSULTATION RESPONSES**

**VOLUME III**  
APPENDICES



APRIL 2026



## Martina Keenan Rivero

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**From:** Geraldine O'Mahony <Geraldine.OMahony@CorkCoCo.ie>  
**Sent:** Friday 29 November 2024 16:31  
**To:** Martina Keenan Rivero; Cora Savage  
**Subject:** EIAR Consultation - Ardcahan Quarry, Dunmanway, Co. Cork

**NOTE:** This email originated from outside the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Dear Ms. Keenan Rivero,

I refer to your email received on 29/11/24 and your request for pre-application consultations and scoping opinion regarding Ardcahan Quarry, Dunmanway.

I note from your email that it is intended to apply to An Bord Pleanála for Substitute Consent for historical quarrying and future expansion of the existing quarry. This will include the submission of a remedial EIAR and remedial NIS, in addition to an EIAR and an NIS, to the Board.

As such, the Board is the consenting authority in this case and not the Planning Authority. Requests for pre-application consultations and scoping proposals should, therefore, be made to the Board under s. 177E & s.177F of the Planning and Development Act, 2000 (as amended).

Yours sincerely,

Geraldine O'Mahony  
Senior Planner

**Gearóidín Ní Mhathúna** | Pleanálaí Sinsearach | **Pleanáil agus Forbairt**

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**Geraldine O'Mahony** | Senior Planner | **Planning and Development**

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[www.corkcoco.ie](http://www.corkcoco.ie)



**From:** INFO <Information@tii.ie>  
**Sent:** Monday 2 December 2024 09:19  
**To:** Martina Keenan Rivero  
**Subject:** TII Ref: TII24-129669 - EIAR for continued quarrying operations, Ardcahan Quarry, Dunmanway, Co. Cork

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Dear Ms. Keenan Rivero,

Thank you for your correspondence of 29 November 2024 regarding the above. Transport Infrastructure Ireland's (TII's) position in relation to your enquiry is as follows.

TII wishes to advise that it is not in a position to engage directly with planning applicants with respect to proposed developments. TII will endeavour to consider and respond to planning applications referred to it, given its status and duties as a statutory consultee under the Planning Acts. The approach to be adopted by TII in making such submissions or comments will seek to uphold official policy and guidelines, as outlined in the Section 28 Ministerial Guidelines 'Spatial Planning and National Roads Guidelines for Planning Authorities' (DoECLG, 2012) and TII publications. Regard should also be had to other relevant guidance available at [www.tii.ie](http://www.tii.ie).

The issuing of this correspondence is provided as best practice guidance only and does not prejudice TII's statutory right to make any observations, requests for further information, objections or appeals, following the examination of any valid planning application referred.

TII notes the stated intention that the remedial EIAR (rEIAR) to be prepared is for substitute consent application.

With respect to rEIAR Scoping issues, the recommendations indicated below provide only general guidance for the preparation of an EIAR, which may affect national roads network.

The project promoter should have regard, *inter alia*, to the following:

Having regard to the EPA's 'Guidelines on the information to be contained in Environmental Impact Assessment Reports' (2022), it is recommended as appropriate that the national road and light rail networks are recognised as strategic transport assets under "material assets". EIAR assessment and mitigation should have regard to the following:

- **National Roads:** Official policy for development at or near national roads is set out in the DoECLG's 'Spatial Planning and National Roads Guidelines for Planning Authorities' (2012), available at <https://www.gov.ie/en/collection/85b83-planning-guidelines-standards/>
- **TII Publications:** In addition, as part of TII's responsibilities for managing and improving the Country's national road and light rail networks, the Authority sets development guidance and standards for traffic and road assessments and construction, which may be necessary by reason of proposed development location, scale or typology, to be prepared to accompany applications for developments or works. Technical guidance and standards are contained in TII Publications, available at <https://www.tiipublications.ie/>.

In addition, the EIAR should have regard to, *inter alia*, to the following:

**National Road Network:**

- TII would be specifically concerned as to potential significant impacts the development would have on the national road network (and junctions with national roads), in the proximity of the proposed development.
- TII notes that the subject site adjoins the N63, national secondary road. Therefore, there are official policy and road safety considerations that would need to be resolved in relation to access to national roads as outlined above.
- Consultations should be had with the relevant Local Authority/National Roads Design Office, with regard to the locations of existing and future national road schemes.
- The EIAR should have regard to any prior Environmental Impact Statement or Assessment Report and all conditions and/or modifications imposed by An Bord Pleanála regarding road schemes in the area. The developer should, in particular, have regard to any potential cumulative impacts.
- The EIAR should have regard to the provisions of Chapter 3 of the DoECLG 's 'Spatial Planning and National Roads Guidelines for Planning Authorities', in the assessment.

**TII Publications:**

- It would be important that, where appropriate, subject to meeting the appropriate thresholds and criteria and having regard to best practice, a Traffic and Transport Assessment (TTA) be carried out in accordance with relevant guidelines, noting traffic volumes attending

the site and traffic routes to/from the site, with reference to impacts on the national road network and junctions of lower category roads with national roads. In relation to national roads, TII's 'Traffic and Transport Assessment Guidelines' (2014) should be referred to in relation to proposed development, with potential impacts on the national road network. The scheme promoter is also advised to have regard to Section 2.2 of TII's TTA Guidelines, which addresses requirements for sub-threshold TTA.

- The designers are asked to consult TII Publications to determine whether a Road Safety Audit is required.

**TII environmental assessment guidance:**

- The EIAR should have regard to TII's Environmental Assessment and Construction Guidelines, including the 'Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes' (National Road Authority (NRA), 2014).
- The EIAR should consider the European Communities '(Environmental Noise) Regulations 2018' (S.I. No. 549 of 2018)) and, in particular, how the development will affect future action plans by the relevant competent authority. The developer may need to consider the incorporation of noise barriers to reduce noise impacts (see 'Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes' (NRA, 2014)).

**Haul routes utilising the national road network:**

- Elements of the national road network are operated and managed by a combination of (Public Private Partnerships) PPP Concessions, Motorway Maintenance and Renewal Contracts (MMaRC) and local road authorities, in association with TII. In relation to haul route identification, the applicant/developer should clearly identify haul routes proposed and fully assess the network to be traversed to ascertain any operational requirements, including delivery timetabling, etc., to ensure that the strategic function of the national road network is safeguarded.
- Separate structure approvals/permits and other licences and works specific deeds of indemnity may be required in connection with the proposed haul route, including where temporary modification to the road network may be required. Consultation with all relevant local authorities, PPP Companies and MMaRC Contractors, may also be required.
- All structures on the haul route should be checked by the applicant/developer to confirm their capacity to accommodate any abnormal load proposed, including abnormal weight load. Additionally, any damage caused to the pavement on the existing national road arising from any temporary works due to the turning movement of abnormal loads (e.g. tearing of the surface course, etc.) shall be rectified in accordance with TII Pavement Standards and details in this regard shall be agreed with the Road Authority prior to the commencement of any development on site.

Notwithstanding any of the above, the developer should be aware that this list is non-exhaustive, thus site and development specific issues should be addressed in accordance with best practice.

I hope that this information is of assistance to you.

Yours sincerely,

---

**Suzanne Cahill**  
**Regulatory & Administration Executive**

---

**From:** Martina Keenan Rivero <[mrivero@mhplanning.ie](mailto:mrivero@mhplanning.ie)>  
**Sent:** Friday 29 November 2024 11:26  
**To:** Landuse Planning <[LandUsePlanning@tii.ie](mailto:LandUsePlanning@tii.ie)>  
**Subject:** EIAR Consultation

You don't often get email from [mrivero@mhplanning.ie](mailto:mrivero@mhplanning.ie). [Learn why this is important](#)

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Dear Sir/Madam,

Please find attached correspondence in connection with:

Pre-application consultation on the preparation of: (1) a Remedial Environmental Impact Assessment Report (rEIAR) for quarrying development that took place between 1990 and 2014, and (2) an Environmental Impact Assessment Report (EIAR) for continued quarrying operations.

Location: Ardcahan Quarry, Dunmanway, Co. Cork

To assist the EIAR Team in scoping the extent of information required about the Project and its likely environmental effects, we are seeking comments from statutory authorities and other stakeholders. Your early input will greatly assist in preparing the EIAR. All

comments should be sent to McCutcheon Halley Planning by COB Friday, 17th January 2025.

Comments or queries can be directed to Martina Keenan Rivero at [mrivero@mhplanning.ie](mailto:mrivero@mhplanning.ie) or Cora Savage at [csavage@mhplanning.ie](mailto:csavage@mhplanning.ie)

Kind regards,  
Martina

**Martina Keenan Rivero**

Associate Director

**McCutcheon Halley**

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[www.mhplanning.ie](http://www.mhplanning.ie)

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Martina Keenan Rivero / Cora Savage  
McCutcheon Halley Planning  
4th Floor, Kreston House  
Arran Court, Arran Quay  
Dublin 7, D07 K271

16 December 2024

**Re: rEIAR for quarrying development and EIAR for continued quarrying operations at Ardcahan Quarry, Dunmanway, Co. Cork**

**Your Ref: n/a**  
**Our Ref: 24/414**

Dear Martina, Cora,

Geological Survey Ireland is the national earth science agency and is a division of the Department of the Environment, Climate and Communications. We provide independent geological information and interpretation and gather various data for that purpose. Please see our [website](#) for data availability.

With reference to your email received on the 02 December 2024, concerning the consultation for the rEIAR for quarrying development and EIAR for continued quarrying operations at Ardcahan Quarry, Dunmanway, Co. Cork, we recommend using our various data sets when conducting the EIAR, SEA, planning and scoping processes for developments, plans and policies. For more detailed information on how to access this data please access 'Data and Maps' [Data & Maps \(gsi.ie\)](#) on our 'Geoscience for planning' webpage. Use of our data or maps should be attributed correctly (please refer to each individual dataset's metadata for correct attribution).

For specific data available for Environmental Assessment and Planning topics please follow this link [[Data by Environmental Assessment and Planning Topic \(gsi.ie\)](#)], where you will find our data arranged by environmental assessment topic as illustrated below:

<p><b>Land and soils</b></p> <p><i>Soil</i></p> <ul style="list-style-type: none"> <li>• Subsoils (Quaternary Geology)</li> <li>• Tellus Geochemistry</li> <li>• Geotechnical</li> </ul> <p><i>Geology</i></p> <ul style="list-style-type: none"> <li>• Bedrock</li> <li>• Geophysics</li> <li>• Bedrock &amp; Quaternary 3D</li> </ul>	<p><b>Water</b></p> <p><i>Groundwater</i></p> <ul style="list-style-type: none"> <li>• Aquifers GW vulnerability, GWPSs (GWPPs)</li> </ul> <p><i>Surface water</i></p> <ul style="list-style-type: none"> <li>• Tellus Geochemistry</li> </ul> <p><i>Estuarine &amp; marine waters</i></p> <ul style="list-style-type: none"> <li>• Marine and coastal</li> </ul> <p><i>Flooding</i></p> <ul style="list-style-type: none"> <li>• GWClimate</li> <li>• Karst</li> </ul>	<p><b>Climate Change</b></p> <p><i>Carbon accounting / Carbon balance</i></p> <ul style="list-style-type: none"> <li>• Geothermal</li> <li>• Carbon capture and storage</li> </ul> <p><i>Climate change trends</i></p> <ul style="list-style-type: none"> <li>• National coastal change assessment</li> </ul>
<p><b>Cultural Heritage</b></p> <p><i>Archaeology</i></p> <ul style="list-style-type: none"> <li>• Cherish</li> </ul> <p><i>Underwater Archaeology</i></p> <ul style="list-style-type: none"> <li>• Shipwrecks</li> </ul>	<p><b>Material Assets</b></p> <p><i>Built Services</i></p> <ul style="list-style-type: none"> <li>• Natural resources (Minerals &amp; Aggregates)</li> <li>• Active quarries</li> </ul>	<p><b>The Landscape</b></p> <p><i>Landscape Appearance &amp; Character</i></p> <ul style="list-style-type: none"> <li>• Physiographic units</li> </ul> <p><i>Historical landscapes</i></p> <ul style="list-style-type: none"> <li>• Historic mines</li> </ul>
<p><b>Other Relevant Data</b></p>		



<i>Natural (Geo) hazards</i> <ul style="list-style-type: none"><li>• Landslide Susceptibility Mapping</li><li>• Groundwater flooding</li><li>• Coastal vulnerability</li><li>• Subsidence</li><li>• Radon</li></ul>	<i>Natural heritage</i> <ul style="list-style-type: none"><li>• Geoheritage (County Geological Sites)</li><li>• Dimension Stone/Stone Built Ireland</li></ul>	
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### **Other Comments**

Should development go ahead, all other factors considered, Geological Survey Ireland would much appreciate a copy of reports detailing any site investigations carried out. The data would be redacted for confidentiality and added to Geological Survey Ireland's national database of site investigation boreholes, implemented to provide a better service to the civil engineering sector. Data can be sent to the Geological Mapping Unit, at <mailto:GeologicalMappingInfo@gsi.ie>.

If we can be of any further help, please do not hesitate to contact me Clare Glanville, or my colleague Trish Smullen at [GSIPlanning@gsi.ie](mailto:GSIPlanning@gsi.ie).

Yours sincerely,

Dr. Clare Glanville  
**Senior Geologist**  
**Geoheritage and Planning Programme**  
**Geological Survey Ireland**

Trish Smullen  
**Geologist**  
**Geoheritage and Planning Programme**  
**Geological Survey Ireland**

The publicly available data referenced/presented here, should in no way be construed as Geological Survey Ireland support for or objection to the proposed development or plan. The data are made freely available to all and can be used as independent scientific data in assessments, plans or policies. It should be noted that in many cases these data are a baseline or starting point for further site specific assessments.

**From:** planning applications <planning.applications@failteireland.ie>  
**Sent:** Tuesday 14 January 2025 16:43  
**To:** Martina Keenan Rivero  
**Cc:** Cora Savage  
**Subject:** rEIAR Ardcahan Quarry, Dunmanway, Co. Cork  
**Attachments:** Fáilte Ireland EIAR Guidelines 2023.pdf

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Hello Martina,

Thank you for letter regarding the rEIAR and the EIAR regarding Ardcahan Quarry, Dunmanway, Co. Cork.

Please see attached a copy of the updated Fáilte Ireland's Guidelines (2023) for the Treatment of Tourism in an EIA, which you may find informative for the preparation of the Environmental Impact Assessment for the proposed project. The purpose of this report is to provide guidance for those conducting Environmental Impact Assessment and compiling an Environmental Impact Assessment Reports (EIAR), or those assessing EIARs, where the project involves tourism or may have an impact upon tourism. These guidelines are non-statutory and act as supplementary advice to the EPA EIAR Guidelines outlined in section 2.

Also for your information Fáilte Ireland has a dedicated mailbox for all planning notifications/applications and consultations [planning.applications@failteireland.ie](mailto:planning.applications@failteireland.ie). By using this email address, it will ensure the information/notifications will go direct to the Manager of Environment & Planning (Shane Dineen) and the Planning Team and will be reviewed and responded to in a timely manner by the Manager and the Environment & Planning Team. Please use this email address for all future planning notifications/applications and consultations.

Regards,

Yvonne

**Yvonne Jackson**

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# EIAR Guidelines for the Consideration of Tourism and Tourism Related Projects



July 2023

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## 1. Introduction

Tourism is a growing sector and substantial part of the Irish Economy. It contributes to both urban and rural economies in every part of the country. The impact and interaction of tourism with the environment is complex and the assessment of environmental impacts is of utmost importance to creating a sustainable tourism economy and protecting the natural resources that are so often a tourism attraction.

The purpose of this report is to provide guidance for those conducting Environmental Impact Assessment and compiling an Environmental Impact Assessment Reports (EIAR), or those assessing EIARs, where the project involves tourism or may have an impact upon tourism. These guidelines are non-statutory and act as supplementary advice to the EPA EIAR Guidelines outlined in section 2.

This guidance document has been prepared by Fáilte Ireland to update their EIA guidelines in line with changes in legislative and guidance requirements.

## 2. Background to this Document

Tourism is one of the largest and most important sectors of the economy, providing employment for approximately **260,000 people**, an economic contribution of **€9.5 billion**, and exchequer revenue of **€1.8 billion** in 2019, which helps fund other key public services.

In 2019 Ireland welcomed **9.7 million overseas visitors**.

Fáilte Ireland is the National Tourism Development Authority established by the Irish Government in May 2003. Fáilte Ireland's role is to support the tourism industry and work to sustain Ireland as a high-quality and competitive tourism destination. They provide a range of practical business supports to help tourism businesses better manage and market their products and services.

Fáilte Ireland also work with other state agencies and representative bodies, at local and national levels, to implement and champion positive and practical strategies that will benefit Irish tourism and the Irish economy.

Fáilte Ireland promotes Ireland as a holiday destination through a domestic marketing campaign (DiscoverIreland.ie) and manage a network of nationwide tourist information centres that provide help and advice for visitors to Ireland.

Tourism related projects cover a broad range of plans, programmes and developments, from the Wild Atlantic Way to a single hotel conversion. These guidelines apply to projects involving or impacting upon tourism. A tourism plan, strategy or programme where it is part of the statutory plan making process under the Planning and Development Acts (as amended), may be more appropriately assessed by a Strategic Environmental Assessment (SEA) as discussed in the next section.

It should be borne in mind that EIA is required where there is anticipated to be a significant impact on the environment, where tourism projects are of a prescribed type or meet thresholds identified below.

Where Natura 2000 Designated Sites are potentially affected by tourism development Appropriate Assessment must be carried out by the appropriate authority in accordance with Article 6(3) of the EU Habitats Directive.

### **3. Legislation and Statutory Guidance**

Environmental Impact Assessment is a procedure that ensures that the environmental implications of decisions are taken into account before planning based decisions are made. The assessment results in a report, called an Environmental Impact Assessment Report (EIAR).

#### ***Legislation***

These guidelines are produced under current EIAR legislative requirements, having regard to Directive 2011/92/EU (known as 'Environmental Impact Assessment' – EIA Directive), as amended by Directive EU 2014/52 which came into effect in May of 2017. These requirements were transposed into Irish Law on 1 September 2018 as most of the provisions of the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018) came into effect. The principle of both Directives is to ensure that plans, programmes and projects likely to have significant effects on the environment are made subject to an environmental assessment, prior to their approval or authorisation.

#### ***Statutory Guidance***

In response to the changes to the EIAR requirements under Directive EU 2014/52, the Environmental Protection Agency (EPA) developed Guidelines on the information to be contained in Environmental Impact Assessment Reports in May 2022. The Guidelines are a statutory document to be regarded by those preparing EIARs and the decision makers considering the EIARs.

Some of the key changes to the EIA Directive introduced by Directive 2014/52/EU are as follows:

- Additional information to be provided in the project description to describe the location of the project, the technologies and substances used, the construction of the project and required demolition;
- The requirement for consideration of alternatives has changed from a requirement to provide 'An outline of the main alternatives studied by the developer and an indication of the main reasons for this choice, taking into account the environmental effects' to 'a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment';
- A refinement of the environmental factors to be considered in the assessment with an increased focus on resource efficiency, climate change, biodiversity and disaster prevention;
- Changes to Prescribed Environmental Factors with 'Land' being added, 'Human Beings' replaced by 'Population & Human Health' and 'Flora & Fauna' replaced by 'Biodiversity';

- The developer is required to have competent experts to prepare the EIAR and the Board is required to have access to sufficient expertise to assess the EIAR;
- Requirement for the incorporation of mitigation and monitoring measures in consents and ensuring that developers deliver these measures;
- The requirements for the assessment of cumulative effects with existing and/or approved projects, taking into account existing environmental issues to be considered; and
- Reasoned decisions made with regard to the EIA outcomes must be provided.

In addition to the EPA statutory guidance, the Department of Housing has produced Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment in August 2018.

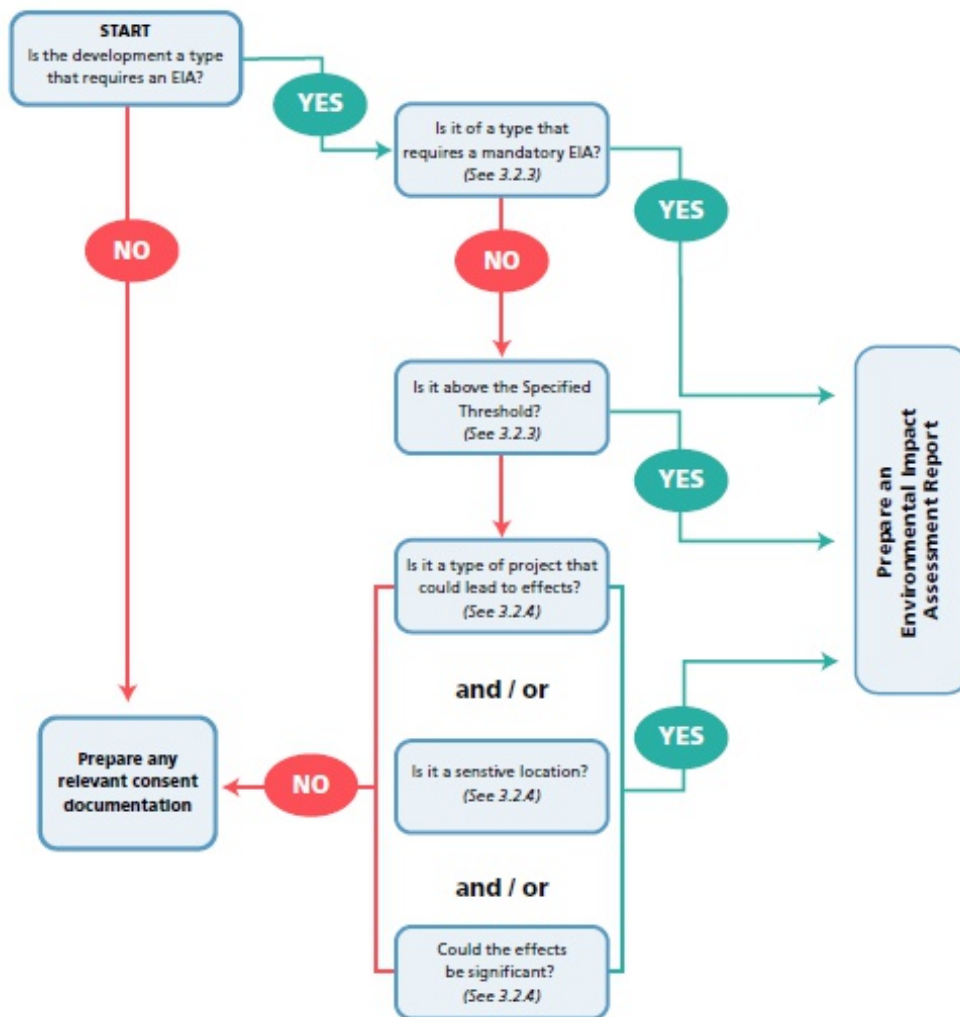
The process of EIA is set out in the EPA EIAR Guidelines, this document should be read in conjunction with and used as supplementary guidance to the EPA EIAR Guidelines. The process for ascertaining whether an EIAR is required is known as ‘screening’ and the process to determine the breadth and scope of an EIAR is known as ‘scoping’. Guidance on this can be found in Section 3.2 of the EPA Guidelines.

### **Screening**

Through EIA Screening, developments are either considered as requiring an EIAR due to the project type or because they exceed a threshold level. The screening process begins by establishing whether the proposal is a ‘project’ as understood by the Directive (as amended).

The prescribed development types and thresholds are set out in Annex I and II of the EIA Directive as transposed into Schedule 5 of the Planning and Development Regulations 2010-2018 (as amended). Development which does not exceed these thresholds but may require an EIAR are called sub threshold. Sub-Threshold considerations are outlined in Schedule 7 of European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018) as transposed from Annex III of the Directive. The Guidelines on Environmental Impact Assessment Reports note that projects at first glance may not appear to come under the Schedule but on closer examination when the process is further examined, they may do so because of the sensitivity or significance of the receiving environment etc. Sub threshold developments require an EIAR if they are likely to have significant environmental impacts and must undergo assessment for likely significant impacts through an EIAR screening report. The contents of a screening report for subthreshold development are contained in Annex III of the EIA Directive.

Figure 1: EIAR Screening Process



(Taken from Fig 3.2 of the EPA Guidelines)

Tourism locations should be identified as sensitive receptors in screening assessments for particular impacts, depending on scale and sensitivity, as they would in a full EIAR. Section 6 below can act as guidance for Screening Reports as well as for full EIAR.

The screening process for considering where an EIAR is necessary, is summarised above in Figure 1 (excerpted from Figure 3.2 of the EPA Guidelines).

Strategic Environmental Assessment (SEA) is a more strategic level of environmental assessment that examines plans, policies, objectives and programmes specifically rather than projects. For some tourism developments it may be more appropriate that they be examined through SEA, while individual projects or specific proposals are likely to be more assessed through EIAR. If a project is part of a plan, programme or policy/objective assessed by SEA there may still be a requirement for an EIAR for that development (subject to EIA Screening assessment).

## *EIAR Scoping*

Scoping an EIAR is an opportunity to look at the breadth of issues and ensure that any areas of possible significant impact are assessed. Identifying sensitivities and stakeholders should take account of tourism facilities and consider Fáilte Ireland in scoping requests where necessary.

### **4. Assessing Tourism**

There is no legal definition of 'tourism' in Irish legislation. The UNWTO definition of sustainable tourism is "*Tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment and host communities*". This is widely accepted as a key definition of tourism as we move to a more sustainable future.

Tourism assessments are frequently carried out by economic consultants and by specific tourism consultants. It is always advisable, particular for tourism projects, that suitably qualified and experienced personnel are used to determine the impact of tourism related projects or to assess the impact of more general proposals on a tourism asset identified in a particular location. There is a requirement for EIAR under current legislation to contain a statement of competency within all EIAR documents, including screening and scoping reports.

#### ***Projects which involve a tourism element***

Tourism projects are wide ranging and diverse. While there are some projects which cater to tourism and are easily identified as such - Hotels, Museums, etc. there are other projects where tourism is a key service or element, but which may not be immediately obvious – walking/cycling/forest trails, greenways, blueways, community facilities and others. EIAR conducted for developments containing tourist elements should be completed in accordance with the current guidance from the EPA.

Projects which include a tourism element can have potential for particular environmental effects which differ from a non-tourism development. These impacts can be intermittent, event related, inconsistent, dependent on weather, temporal, temporary or seasonal. This is considered within the prescribed environmental topics for EIAR outlined in Section 7 below.

#### ***Projects which may have an impact upon tourism***

While tourism projects may be diverse, the projects which can impact tourism are considerably more wide ranging, from large infrastructural developments to local energy developments. Disruption to or suppression of a tourist resource or amenity can have very local or more strategic impacts, directly or indirectly- for example energy projects in a rural area can have both a negative and positive impact in different regards. There can be temporary, periodic or even seasonal impacts occurring during construction or operational periods.

According to the Fáilte Ireland Tourism Facts 2019 Report, the most important factors in determining the attractiveness of tourism destinations for visitors to Ireland are;

- Beautiful Scenery and Unspoiled Environment
- Hospitality
- Safety
- Nature, Wildlife and Natural Attractions
- History and Culture

- Pace of Life

These factors used for the promotion of tourism in Ireland are also barometers of sensitivity to change in tourism sensitive or dominant locations where development may have an impact upon the tourism asset. The potential for development to impact these sensitivities, and the environmental criteria under which they can be considered, are identified in section 7 of the guidelines.

## **5. Guiding Principles of EIAR**

As outlined in the EPA EIAR Guidelines, the fundamental principles to be followed when preparing an EIAR, including screening and scoping, are:

- Anticipating, avoiding and reducing significant effects
- Assessing and mitigating effects
- Maintaining objectivity
- Ensuring clarity and quality
- Providing relevant information to decision makers
- Facilitating better consultation.

Environmental assessment should be undertaken in accordance with the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018.

## **6. Consideration of Competency and Qualifications**

As per Section 2.5 of the EPA Guidelines, EIAR is required to be completed by '*competent experts*'.

Contributors to the preparation of environmental impact assessment reports, including screening and scoping assessments, should be qualified and competent. Sufficient expertise, in the relevant field of the project concerned, is required for the purpose of its examination by the competent authorities in order to ensure that the information provided by the developer is complete and of a high level of quality so that a full and proper assessment can be undertaken.

For tourism related projects, or projects likely to affect tourism assets, competent experts in the area of tourism should be utilised in the environmental assessment.

The competency of all involved in the production of an EIAR or any related report (e.g. Screening and scoping) is required to be stated at the beginning of the EIAR report with further details as necessary in each following chapter.

Where tourism projects involve for example heritage or cultural components, input from heritage consultants, conservation architects, or historians may be required.

## **7. EIAR Requirements**

The following are the key requirements for an EIAR under the current guidance. This is not a definitive list and should be read in conjunction with regulations.

- project description;
- assessment of alternatives considered;
- baseline assessment;
- assessment of effects;
- cumulative impact;
- interaction of impacts;
- mitigation & monitoring; and
- residual impacts

### ***Project Description***

Project descriptions are required to describe the whole project including site, scale, design and key factors. It is important that the EIAR and design team have a consistent understanding of the development description in full. The key requirements are outlined in section 3.5 of the EPA Guidelines however they identify the following;

- the location of the project
- the physical characteristics of the whole project
- the main characteristics of the operational phase of the project
- an estimate, by type and quantity, of the expected residues and emissions

The location of the project should include identifying key sensitive receptors (including tourism receptors). In the operational phase of the project any tourism based, or potentially tourism related activity, should be identified.

### ***Assessment of Alternatives***

The assessment of the various reasonable alternatives is an important requirement of the EIA process.

Where tourism projects are location dependent the assessment of reasonable alternatives should consider alternative methods, layouts, technologies and mitigations, detail the key considerations culminating in the selection of the option/design, the reasoning for these and the environmental effect of these decisions. This is particularly important for tourism projects which are often location tied. The EPA EIAR Guidelines indicate that it is generally sufficient to provide a broad description of each main alternatives and the key issues associated with each, showing how environmental considerations were taken into account in deciding on the selected option.

### ***Baseline Assessment***

Baseline descriptions are evidence based, current descriptions of environmental characteristics with consideration of likely changes to the baseline environment evidenced in planning histories, unimplemented permissions, and applications pending determination. Baseline assessments should identify any tourism sensitivities in the zone of influence of a development. This zone of influence of a development is highly dependent on its **Context, Character, Significance, and Sensitivity**, as outlined in the EPA EIAR Guidelines. These characteristics apply to both the development and the environment.

For example, in a tourism context;

The location of sensitive tourism resources that are likely to be directly affected should be highlighted, and other premises which although located elsewhere, may be the subject of in combination impacts such as alteration of traffic flows or increased urban development.

The character of an area from a tourism perspective should be described and the principal types of tourism in the area. Where relevant, the specific environmental resources or attributes in the existing environment which each group uses or values should be stated and where relevant, indicate the time, duration or seasonality of any of those activities.

The significance of the tourism assets or activities likely to be affected should be highlighted. Reference to any existing formal or published designation or recognition of such significance should be included. Where possible the value of the contribution of such tourism assets and activities to the local economy should also be provided.

If there are any significant concerns or opposition to the development known to exist among tourism stakeholders and interest groups, this should be highlighted. Identify, where possible, the particular aspect of the development which is of concern, together with the part of the existing tourism resource which may be threatened or impacted.

In addition, the baseline should include any methodologies employed in the study to obtain information, if particular databases are used to locate sensitive receptors they should be acknowledged. In relation to tourism information, the suggested information sources at the end of this document are a non-exhaustive list which may be of assistance in identifying tourism receptors.

### ***Impact Assessment***

The topics for consideration of impact are prescribed in the EIA Directive and transcribed into Irish law by the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018). Impact assessment should contain the likely significant effects of a development arising from both construction and operation of a development. Advice on describing the effects is contained within the EPA EIAR Guidelines and includes the **quality, significance, extent, probability, type** and **duration** of the effect, with particular descriptors for each. In describing effects upon tourism receptors these descriptors should take account of the particular aspects and sensitivities of tourism, for example a temporary annual effect from a development may have different impacts upon tourism if it falls at peak season rather than off-peak.

Impact assessment should be carried out as per EPA guidelines and the best practice for that prescribed topic. It may be considered appropriate to consider impact on tourism under the 'Population and Human Health' and / or 'Landscape' topics as suggested below.

#### Population and Human Health

The consideration of tourism projects within the Population and Human Health is extensive, with impacts ranging from rural employment population impacts of seasonal tourism, to the health impact of air pollution from increased traffic in urban areas.

The impact upon tourism can be considered within this section through the sensitivities of Hospitality, Safety and Pace of Life. Changes in population can impact the perception of pace of life or safety in a particular location. Impacts upon these issues in areas which rely heavily on tourism or have a particular sensitive tourism generator should be considered in this section. The EPA guidelines makes reference to amenity “..which may be relevant under 'Population and Human Health' and 'Landscape'”.

#### Biodiversity

Particular tourist activities can have a significant impact upon biodiversity. Landscapes which are 'unspoiled' can be attractors of tourism. However, the disturbance to ecology must be managed to minimise impacts.

Biodiversity is also a tourism asset and should be protected as such from other development and should be provided for in proposals where possible.

The assessment should also consider current Government policy on nature conservation as outlined in the National Biodiversity Action Plan 2017-2021 (NBAP) (and subsequent iterations (Including draft NBAP recently open for public consultation, to cover 2023 to 2027) which also includes Ireland's vision for biodiversity below.

*'That biodiversity and ecosystems in Ireland are conserved and restored, delivering benefits essential for all sectors of society and that Ireland contributes to efforts to halt the loss of biodiversity and the degradation of ecosystems in the EU and globally.'*

#### Land, Soils and Geology

A link between tourism and this prescribed environmental factor, beyond the normal development impacts, is rare, however particular activities or facilities which use geological features may have an impact upon soils and geology, such as mountain biking trails, recreational uses of old quarries etc.

The impact upon Geotourism related to geoh heritage within the natural environment, e.g., any impacts on UNESCO Global Geoparks, of which we currently have three on the island of Ireland; Copper Coast in Co. Waterford, Burren and Cliffs of Moher in Co. Clare, and Cuilcagh Lakelands in Cavan and Fermanagh should be considered (where applicable) in this section.

Indirect impacts such as material use for extensive landscaping and public realm should also be considered.

#### Water

Tourism uses can be water intense, depending on development type. Recreational use of a surface water feature, water-based leisure centres etc have different impacts to standard development.

#### Air Quality and Climate

Tourism impact upon air quality is dependent on the activity proposed and sensitivity of the location. If the tourism project includes a large increase in transportation services, collection of baseline air emission data is advised. Transportation emissions affect not only air quality, but also greenhouse gases. Changing climatic patterns due to climate change should be factored into this analysis.

#### Noise and Vibration

A link between tourism and this prescribed environmental factor, beyond the normal development impacts, is rare, however the impact upon tourism of issues of noise and vibration can be significant. Construction adjoining hotels for example should consider the sensitivity of the development and ensure mitigation is in place.

#### Material Assets; Traffic and Transport

The different transport patterns associated with tourism activities is a key impact of tourism and should be considered especially for tourism projects. These produce temporal and seasonal changes on the norm and specialist consideration and interpretation should be given. Tourism proposals should, where possible, be well served by public transport and should be accessible by modes other than the car. The impact of traffic on tourism assets can be substantial and can vary in severity according to season, the weather, etc. The impact of construction traffic can be a particular concern in tourism sensitive areas in terms of noise pollution and visual impact. The construction programme of developments should work to

avoid peak tourism periods in tourism areas and should consider planned or anticipated tourism events and festivals.

#### Cultural Heritage

Cultural heritage can be a key component of tourism projects and the impact of tourism on the maintenance of cultural heritage should be given the utmost consideration, whether positive or negative. As a tourism attraction, cultural heritage should be strongly considered in non-tourism developments and the impact upon tourism considered as a potential impact.

#### Archaeology

Archaeology can be of tourism interest and can be an attractive or key component of tourism projects. Archaeology can be a tourism attractor and given that national policy emphasis on the non-renewable nature of the archaeology and archaeological heritage, focus should be a presumption in favour of its preservation in-situ or where preservation in-situ is not the option chosen, there must be preservation by record (i.e. archaeological excavation and recording must take place) in line with statutory requirements.

#### Material Assets; Waste Management

Tourism is a resource heavy activity and can impact waste streams and waste segregation. Impacts here should be considered strongly and with knowledge of the variation that arises from the particular tourist activity. Waste and Waste disposal issues can also impact the perception of an unspoiled environment, effecting tourism, which should be considered.

#### Material Assets

Material assets outside of the material assets already referenced that should be considered are built services (utilities) and infrastructure. Tourism development should include impact assessment on built services (utilities) and infrastructure while non tourism related development should consider the effect on tourism, which should be considered.

#### Landscape

The visual impact of a tourism development, especially in locations which are visually sensitive or renowned for their scenic or landscape beauty, should be considered carefully. A development intended to utilise or enjoy a particular vista or environment should minimise impact upon that environment.

#### ***Major Accident and Natural Disaster***

There is a requirement for tourist developments to describe expected significant effects on the environment of the proposed development's vulnerability to major accidents and/or natural disasters relevant to it. Where appropriate measures should be identified to prevent or mitigate the significant adverse effects of such accidents or disasters, including resulting from climate change, on the environment and detail the preparedness for the proposed response.

#### ***Interaction of Impacts***

Where two or more environmental impacts combine or interact they should be considered under the prescribed topics. It is best practice to provide a table of interactions within an EIAR or EIA Screening Report.

#### ***Cumulative Impact***

The cumulative impact is that of the project combined with any known likely project which will interact or compound an environmental impact.

### **Transboundary Impact**

Transboundary impacts should be included in EIAR. In the case of tourism, especially international travel, the transboundary impacts may not be proximate to the EIAR site.

### **Mitigation & Monitoring**

Mitigation should follow the hierarchy of minimisation in descending order of preference- Avoid, Reduce, Remedy.

*Avoid* sensitive tourism resources- such as views, access and amenity areas including habitats as well as historical or cultural sites and structures.

*Reduce* the exposure of sensitive resources to excessive environmental impact.

*Reduce* the adverse effects to tourism land uses and patterns of activities, especially through interactions arising from significant changes in the intensity of use or contrasts of character or appearance.

*Remedy* any unavoidable significant residual adverse effects on tourism resources or activities.

Mitigation measures must be measurable and achievable within the bounds of the project.

With regard to Monitoring, Article 8a of the EIA Directive requires that:

*1. 'The decision to grant development consent shall incorporate at least the following information ...*

*(b) any environmental conditions attached to the decision, a description of any features of the project and/or measures envisaged to avoid, prevent or reduce and, if possible, offset significant adverse effects on the environment as well as, where appropriate, monitoring measures. ... 4 Member States shall ensure that the features of the project and/or measures envisaged to avoid, prevent or reduce and, if possible, offset significant adverse effects on the environment are implemented by the developer, and shall determine the procedures regarding the monitoring of significant adverse effects on the environment. The type of parameters to be monitored and the duration of the monitoring shall be proportionate to the nature, location and size of the project and the significance of its effects on the environment. Existing monitoring arrangements resulting from Union legislation other than this Directive and from national legislation may be used if appropriate, with a view to avoiding duplication of monitoring.'*

### **Residual Impacts**

The residual impacts are the final predicted or intended impacts which occur after the proposed mitigation measures have been implemented.

## 8. Sources of information on Tourism

### *Information available online*

#### *Fáilte Ireland*

Fáilte Ireland offers detailed research analysis and insights into the Irish Tourism Industry. The National Tourism Development Authority has a portfolio of research across a number of areas including facts and figures, Environmental Surveying and Monitoring, briefing papers and reports and visitor feedback. The Fáilte Ireland website has a dedicated research library which can be accessed [here](#)

Fáilte Ireland also manages an environmental surveying and monitoring database as part of the Wild Atlantic Way Operational Programme which can be accessed [here](#). The purpose of this is to work with and demonstrate to our stakeholders and partners that we are committed to the sustainable development of the Wild Atlantic Way, and to be able to pre-empt and avoid environmental effects in the future should they occur.

#### *Discover Ireland:*

Operated by Fáilte Ireland, the Discover Ireland website includes comprehensive information on tourist attractions in destinations all around Ireland, including listings for activities, accommodation, events and experiences for every county, major town and region in Ireland. The website features elements from the four destination brands – Wild Atlantic Way, Ireland's Ancient East, Ireland's Hidden Heartlands and Visit Dublin and can be accessed [here](#).

#### *Tourism Ireland*

Tourism Ireland is responsible for marketing the island of Ireland overseas as a holiday and business tourism destination. Tourism Ireland publishes a range of research documents including; visitor facts and figures, seasonal updates and industry insights which are accessible [here](#)

#### *Local Authorities*

Local Authorities are an invaluable source of information. They produce tourism strategies and audits of tourism assets within their jurisdiction. Local authorities will also produce landscape and seascape studies. Protected views and prospects as well as the record of protected structures and other designated protected buildings are contained within the Statutory Development Plans.

#### *Regional Assemblies*

Regional Assemblies can also be consulted on high level strategic tourism and potential Regional Spatial and Economic Strategies (RSEs) should be consulted.

#### *Central Statistics Office*

The Central Statistics Office (CSO) is Ireland's national statistical office and their purpose is to impartially collect, analyse and make available statistics about Ireland's people, society and economy. The Tourism and Travel Section of the Central Statistics Office is the major source for tourism statistics in Ireland and is updated regularly.

**From:** Michael McPartland <Michael.McPartland@fisheriesireland.ie>  
**Sent:** Wednesday 15 January 2025 11:39  
**To:** Martina Keenan Rivero  
**Subject:** Environmental Impact Assessment Report (EIAR) for continued quarrying operations- Ardcahan Quarry, Dunmanway, Co. Cork

**NOTE:** This email originated from outside the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Martina

Thank you for your email regarding the above-mentioned.

The site of the proposed development encompasses the Bandon River catchment and tributaries, significant salmonid fisheries. In this context IFI would ask that the following requirements should be taken into consideration.

There should be no drainage or other physical interference with the bed or bank of any watercourse without prior consultation with IFI.

Suspended solids and or hydrocarbon contaminated site run-off waters must be controlled adequately so that no pollution of surface waters can occur.

In the event of any watercourse crossings being bridged or culverted the following general criteria should apply,

- (i) The free passage of fish must not be obstructed.
- (ii) The original slope of the river bed should be maintained with no sudden drops on the downstream side. Design details on any proposed crossing should be incorporated at planning stage
- (iii) Bridges are preferable to culverts.
- (iv) All instream works should be carried out only in the July-September period.

Full cognisance should be given to IFI "Guidelines on protection of fisheries during construction works in and adjacent to waters"

<https://www.fisheriesireland.ie/media/guidelines-on-protection-of-fisheries-during-construction-works-in-and-adjacent-to-waters>

Michael Mc Partland  
Senior Fisheries Environmental Officer.

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Iascach Intíre Éireann  
Inland Fisheries Ireland

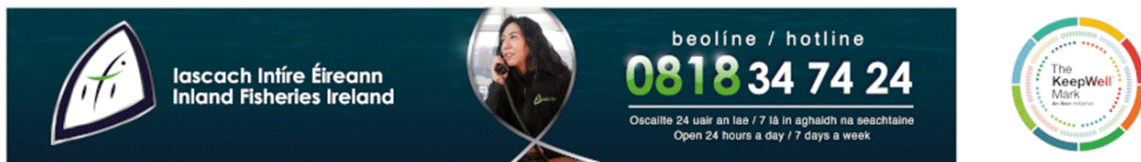
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Help Protect Ireland's Inland Fisheries

**Michael McPartland**  
**Senior Fisheries Environmental Officer**

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The banner contains the Inland Fisheries Ireland logo on the left, a central image of a woman on a phone, and the KeepWell Mark logo on the right. Text in the center includes the hotline number 0818 34 74 24 and the text 'beolíne / hotline' and 'Oscailte 24 uair an lae / 7 lá in aghaidh na seachtaine / Open 24 hours a day / 7 days a week'.

Help us protect Ireland's rivers, lakes and coastlines by reporting illegal fishing, water pollution or invasive species.  
Our confidential phone number is 0818 34 74 24, which is open 24 hours a day / 7 days a week.

To read our Privacy Policy and Email Disclaimer Notice, Please visit [www.fisheriesireland.ie](http://www.fisheriesireland.ie)

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**From:** Macroom Info <Macroom@fisheriesireland.ie>  
**Sent:** Friday 29 November 2024 12:11  
**To:** Michael McPartland <Michael.McPartland@fisheriesireland.ie>  
**Subject:** FW: EIAR Consultation

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**From:** Martina Keenan Rivero <[mrivero@mhplanning.ie](mailto:mrivero@mhplanning.ie)>  
**Sent:** Friday 29 November 2024 11:32  
**To:** Macroom Info <[Macroom@fisheriesireland.ie](mailto:Macroom@fisheriesireland.ie)>  
**Subject:** EIAR Consultation

Dear Sir/Madam,

Please find attached correspondence in connection with:

Pre-application consultation on the preparation of: (1) a Remedial Environmental Impact Assessment Report (rEIAR) for quarrying development that took place between 1990 and 2014, and (2) an Environmental Impact Assessment Report (EIAR) for continued quarrying operations.

Location: Ardcahan Quarry, Dunmanway, Co Cork

To assist the EIAR Team in scoping the extent of information required about the Project and its likely environmental effects, we are seeking comments from statutory authorities and other stakeholders. Your early input will greatly assist in preparing the EIAR. All comments should be sent to McCutcheon Halley Planning by COB Friday, 17th January 2025.

Comments or queries can be directed to Martina Keenan Rivero at [mrivero@mhplanning.ie](mailto:mrivero@mhplanning.ie) or Cora Savage at [csavage@mhplanning.ie](mailto:csavage@mhplanning.ie)

Kind regards,  
Martina

**Martina Keenan Rivero**

Associate Director

**McCutcheon Halley**

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For the attention of Martina Keenan Rivero/Cora Savage

McCutcheon Halley

6 Joyce House,  
Barrack Square,  
Ballincollig,  
Cork,  
P31 YX97

13<sup>th</sup> January, 2024

By Email: [mrivero@mhplanning.ie](mailto:mrivero@mhplanning.ie) & [csavage@mhplanning.ie](mailto:csavage@mhplanning.ie)

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**[www.water.ie](http://www.water.ie)**

Re: EIA Scoping Request – Pre-application consultation on the preparation of: (1) a Remedial Environmental Impact Assessment Report (rEIAR) for quarrying development that took place between 1990 and 2014, and (2) an Environmental Impact Assessment Report (EIAR) for continued quarrying operations at Ardcahan Quarry, Dunmanway, Co. Cork

Dear Martina Keenan Rivero/Cora Savage,

Uisce Éireann has received notification of your Environmental Impact Assessment (EIA) scoping request in relation to substitute consent application for historical quarrying activity that took place at Ardcahan Quarry, Dunmanway, Co. Cork between 1990 and 2014.

Please see attached, Uisce Éireann's scoping opinion in relation to Water Services. On receipt of the planning referral, Uisce Éireann will review the finalised Environmental Impact Assessment Report (EIAR) as part of the planning process.

Queries relating to the terms and observations above should be directed to [planning@water.ie](mailto:planning@water.ie)

Yours sincerely,

PP Ali Robinson

Signed on behalf of Dermot Phelan  
Connection & Developer Services

## Uisce Éireann's Response to EIA Scoping Requests

At present, Uisce Éireann does not have the capacity to advise on the scoping of individual projects. However, in general the following aspects of Water Services should be considered in the scope of an EIA where relevant;

- a) Where the development proposal has the potential to impact an Uisce Éireann Drinking Water Source(s), the applicant shall provide details of measures to be taken to ensure that there will be no negative impact to Uisce Éireann's Drinking Water Source(s) during the construction and operational phases of the development. Hydrological / hydrogeological pathways between the applicant's site and receiving waters should be identified as part of the report.
- b) **Stormwater Run Off and Hydrocarbons**  
The potential impacts arising from run off and hydrocarbon during construction, operational and decommissioning phases should be addressed to include mitigations against contaminants entering groundwater and surface waters via hydrological and hydrogeological pathways.
- c) Where the development proposes the backfilling of materials, the applicant is required to include a waste sampling strategy to ensure the material is inert.
- d) Mitigations should be proposed for any potential negative impacts on any water source(s) which may be in proximity and included in the environmental management plan and incident response.
- e) Any and all potential impacts on the nearby reservoir as public water supply water source(s) are assessed, including any impact on hydrogeology and any groundwater/ surface water interactions.
- f) Impacts of the development on the capacity of water services (*i.e. do existing water services have the capacity to cater for the new development*). This is confirmed by Uisce Éireann in the form of a Confirmation of Feasibility (COF). If a development requires a connection to either a public water supply or sewage collection system, the developer is advised to submit a Pre-Connection Enquiry (PCE) enquiry to Uisce Éireann to determine the feasibility of connection to the Uisce Éireann network. All pre-connection enquiry forms are available from <https://www.water.ie/connections/connection-steps/>.
- g) The applicant shall identify any upgrading of water services infrastructure that would be required to accommodate the proposed development.
- h) In relation to a development that would discharge trade effluent – any upstream treatment or attenuation of discharges required prior to discharging to an Uisce Éireann collection network.
- i) In relation to the management of surface water; the potential impact of surface water discharges to combined sewer networks and potential measures to minimise and or / stop surface waters from combined sewers.

- j) Any physical impact on Uisce Éireann assets – reservoir, drinking water source, treatment works, pipes, pumping stations, discharges outfalls etc. including any relocation of assets.
- k) When considering a development proposal, the applicant is advised to determine the location of public water services assets, possible connection points from the applicant's site / lands to the public network and any drinking water abstraction catchments to ensure these are included and fully assessed in any pre-planning proposals. Details, where known, can be obtained by emailing an Ordnance Survey map identifying the proposed location of the applicant's intended development to [datarequests@water.ie](mailto:datarequests@water.ie)
- l) Other indicators or methodologies for identifying infrastructure located within the applicant's lands are the presence of registered wayleave agreements, visible manholes, vent stacks, valve chambers, marker posts etc. within the proposed site.
- m) Any potential impacts on the assimilative capacity of receiving waters in relation to Uisce Éireann discharge outfalls including changes in dispersion / circulation characterises. Hydrological / hydrogeological pathways between the applicant's site and receiving waters should be identified within the report.
- n) Any potential impact on the contributing catchment of water sources either in terms of water abstraction for the development (*and resultant potential impact on the capacity of the source*) or the potential of the development to influence / present a risk to the quality of the water abstracted by Uisce Éireann for public supply should be identified within the report.
- o) Where a development proposes to connect to an Uisce Éireann network and that network either abstracts water from or discharges wastewater to a "protected"/ sensitive area, consideration as to whether the integrity of the site / conservation objectives of the site would be compromised should be identified within the report.
- p) Mitigation measures in relation to any of the above ensuring a zero risk to any Uisce Éireann drinking water sources (Surface and Ground water).

*This is not an exhaustive list.*

**Please note;**

- Where connection(s) to the public network is required as part of the development proposal, applicants are advised to complete the Pre-Connection Enquiry process and have received a Confirmation of Feasibility letter from Uisce Éireann ahead of any planning application.
- Uisce Éireann will not accept new surface water discharges to combined sewer networks.



**Ref: G Pre Planning-CK-Ardcahan Quarry**

19 February 2024

McCutcheon Halley Walsh  
6 Joyce House  
Barrack Square  
Ballincollig  
Co Cork

**Development: Murray Brothers Tarmacadam Ltd. (1) a Remedial Environmental Impact Assessment Report (rEIAR) for quarrying development that took place between 1990 and 2014, and (2) an Environmental Impact Assessment Report (EIAR) for continued quarrying operations.**

A Chara,

I refer to correspondence received in connection with the above.

Outlined below are heritage-related observations/recommendations of the Department co-ordinated by the Development Applications Unit under the stated heading:

**Nature Conservation**

The proposed Ardcahan Quarry application area lies directly adjacent to a tributary of and is hydrologically connected to the River Bandon, Co. Cork located 320m away from the application area. The tributary of the River Bandon runs along the eastern boundary of the proposed development, this tributary flows into the main Bandon River channel, c 320m away. Consideration should be given to the siting and proximity of additional quarry operations in close proximity to ecologically sensitive aquatic habitats and species. In this regard the following information should be included in any assessment of the proposed development.

The River Bandon Special Area of Conservation (SAC) (Site Code 002171) is located downstream of the proposed development. The qualifying interests (QI) for the SAC are the following EU Habitats Directive Annex I/II habitats and species;

- Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitriche-Batrachion* vegetation [3260]
- Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0]
- *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029]
- *Lampetra planeri* (Brook Lamprey) [1096]



A dedicated Freshwater Pearl Mussel (FWPM) Survey and a Brook Lamprey Survey in accordance with best practice methodology at the appropriate time of year by appropriately qualified, experienced specialist aquatic ecologist (s) (>10 years surveying experience) is recommended to fully inform an accurate assessment of the potential for adverse impacts upon Bandon River SAC.

The Bandon River and its tributaries are also particularly important for Annex II protected species, Atlantic Salmon *Salmo salar* and Otter *Lutra lutra* which is present within the receiving watercourses (River Bandon and its tributaries) of the proposed development site. In addition to the aforementioned species and habitats the surrounding area also includes the following ecologically sensitive receptors;

- i. **Annex I Peregrine Falcon *Falco peregrinus*** – the quarry is a long established breeding site for Peregrine falcon who nest in the quarry face of the existing quarry. The NPWS ranger C. Deasy recorded two Peregrine chicks at Ardcahan Quarry during the breeding season of 2024. The site is also used by Peregrine falcon outside the bird breeding season as a year round roosting and feeding site.
- ii. **Common Kestrel *Falco tinnunculus***- a red listed species of ‘High conservation concern’ (BoCCI, 2021) was recorded by the NPWS Ranger C. Deasy to be breeding within the Ardcahan Quarry in 2024. The nest site was located within a crevice of the quarry face.
- iii. **Sparrowhawk *Accipiter nisus*** – currently green listed this raptor species was recorded breeding onsite in woodland adjacent to the quarry operations.
- iv. **Annex II & IV Bat species**- which are strictly protected and listed in Annex IV of the EU Habitats Directive (Council Directive 92/43/EEC). A full assessment of site usage by bats should be carried out as part of the proposed development including breeding and wintering usage of the site. There is potential for bats to be using the crevices of the quarry face, local buildings, bridges and trees as roosting and/or breeding sites. There is good quality bat foraging habitats onsite and in the surrounding area along the local tributary of the Bandon River, the Bandon River itself and over the native Oak-Birch-Holly woodland onsite and over the quarry ponds which have become naturalised over time. The Annex II and II Lesser Horse Shoe Bat *Rhinolophus hipposideros* is known to occur in the local area, bat surveys should include and specifically take account of the potential for this species within the application area and in the surrounding zone of potential impact. The potential impact of the proposed development on both roosting and foraging bats should be fully assessed.
- v. **Annex I Habitats**- The site of the quarry was originally an area of old native woodland as can be seen from an examination of the historical 6 Inch mapping for this area and from an examination of the remnant woodland onsite and in the adjacent area. This native woodland type is likely to have been Oak-Birch Holly woodland (WN1). The existing quarry site supports habitat of existing or potential Annex I quality e.g Annex I European dry heaths 4030. There are also areas of the worked quarry which have become naturalised over time with aquatic habitats and semi-natural grassland habitat present onsite. The following



habitats should be included but not limited to a full assessment of the potential impacts from the proposed development;

- a. **Annex I European dry heaths 4030**- Dry siliceous heath HH1 Habitat located in the north east of the site corresponds to the broader annexed habitat, 'European dry heaths 4030';
- b. **Oak Birch Holly Native Woodland(WN1) and potential for the occurrence of Annex I quality Old sessile oak woods with Ilex and Blechnum 910A**- located in the north west of the quarry site and along the tributary of the Bandon River;
- c. Aquatic habitats- local watercourses and naturalised quarry ponds;
- d. Semi-natural grassland, Marsh and Reedbed habitats;
- e. An area of Blanket Bog (PB2)/Wet Heath HH3 is located to the north of the proposed development, if any works are proposed for this area a full assessment of the potential impacts on the habitat and species it supports is required;
- vi. **Whooper swan**- a species listed on Annex I of the EU Birds Directive (Council Directive 2009/147/EC) have been recorded in good numbers (c 100 individuals)foraging and roosting in the vicinity of the proposed development along the Bandon River floodplains. The closest flock (c 40 individuals) forage in fields along the Bandon River c 5km to the south east of the proposed development. While diurnal Whooper Swan flight paths are not thought to occur over the proposed development area there may be potential migratory flight paths at certain times of the year (Autumn and Spring). Consideration of same should be included in the proposed development application particularly if new overhead lines are proposed.
- vii. **Annex II Otter** are known to be present in the area and are thought to breed along the River Bandon and its tributaries upstream and downstream of the proposed development site;
- viii. **Snipe**, a red listed species of high conservation concern (BoCCI, 2021) for both its breeding and wintering populations.
- ix. **Invertebrates**- based on the ecologicalall sensitive habitats present onsite (Dry heath, Aquatic habitats, Old established Native Oak- Birch-Holly Woodland) and adjacent to the proposed development an invertebrate survey is required to be carried out to identify any sensitive species present e.g. dragonflies, Lepidoptera surveys;
- x. **Bandon River flood plain**- is an area of biodiversity importance for aquatic/riparian habitats and the species they support (including Dipper, Grey wagtail, Sand Marten, Swift, Otter, Brook lamprey, Salmon, Trout amongst others). Wintering water birds including Lapwing, Golden Plover, Tufted duck, Green sandpiper, Common Coot, Mallard, Mute Swan, Little Grebe and Annex I Whooper Swans.



### Freshwater Pearl Mussel

The proposed Ardcahan Quarry development lies directly adjacent to and is hydrologically connected to the River Bandon which is within a **sensitive Freshwater Pearl Mussel Zone** (See Figure 1.0) or '**Margaritifera Sensitive Area**' containing '**Catchments of other extant populations**' of Freshwater Pearl Mussel. The proposed Ardcahan Quarry application area lies directly adjacent to a tributary of and is hydrologically connected to the River Bandon, Co. Cork located 320m away from the application area. The tributary of the River Bandon runs along the eastern boundary of the proposed development, this tributary flows into the main Bandon River channel, c 320m away. Consideration should be given to the siting and proximity of additional quarry operations in close proximity to ecologically sensitive aquatic habitats and species. In this regard the following information should be included in any assessment of the proposed development.

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- *Lampetra planeri* (Brook Lamprey) [1096]

A dedicated Freshwater Pearl Mussel (FWPM) Survey and a Brook Lamprey Survey in accordance with best practice methodology at the appropriate time of year by appropriately qualified, experienced specialist aquatic ecologist (s) (>10 years surveying experience) is recommended to fully inform an accurate assessment of the potential for adverse impacts upon Bandon River SAC.

The Bandon River and its tributaries are also particularly important for Annex II protected species, Atlantic Salmon *Salmo salar* and Otter *Lutra lutra* which is present within the receiving watercourses (River Bandon and its tributaries) of the proposed development site. In addition to the aforementioned species and habitats the surrounding area also includes the following ecologically sensitive receptors;



- xi. **Annex I Peregrine Falcon *Falco peregrinus*** – the quarry is a long established breeding site for Peregrine falcon who nest in the quarry face of the existing quarry. The NPWS ranger C. Deasy recorded two Peregrine chicks at Ardcahan Quarry during the breeding season of 2024. The site is also used by Peregrine falcon outside the bird breeding season as a year round roosting and feeding site.
- xii. **Common Kestrel *Falco tinnunculus***- a red listed species of 'High conservation concern' (BoCCI, 2021) was recorded by the NPWS Ranger C. Deasy to be breeding within the Ardcahan Quarry in 2024. The nest site was located within a crevice of the quarry face.
- xiii. **Sparrowhawk *Accipiter nisus*** – currently green listed this raptor species was recorded breeding onsite in woodland adjacent to the quarry operations.
- xiv. **Annex II & IV Bat species**- which are strictly protected and listed in Annex IV of the EU Habitats Directive (Council Directive 92/43/EEC). A full assessment of site usage by bats should be carried out as part of the proposed development including breeding and wintering usage of the site. There is potential for bats to be using the crevices of the quarry face, local buildings, bridges and trees as roosting and/or breeding sites. There is good quality bat foraging habitats onsite and in the surrounding area along the local tributary of the Bandon River, the Bandin Rive itself and over the native Oak-Birch-Holly woodland onsite and over the quarry ponds which have become naturalised over time. The Annex II and II Lesser Horse Shoe Bat *Rhinolophus hipposideros* is known to occur in the local area, bat surveys should include and specifically take account of the potential for this species within the application area and in the surrounding zone of potential impact. The potential impact of the proposed development on both roosting and foraging bats should be fully assessed.
- xv. **Annex I Habitats**- The site of the quarry was originally an area of old native woodland as can be seen from an examination of the historical 6 Inch mapping for this area and from an examination of the remnant woodland onsite and in the adjacent area. This native woodland type is likely to have been Oak-Birch Holly woodland (WN1). The existing quarry site supports habitat of existing or potential Annex I quality e.g Annex I European dry heaths 4030. There are also areas of the worked quarry which have become naturalised over time with aquatic habitats and semi-natural grassland habitat present onsite. The following habitats should be included but not limited to a full assessment of the potential impacts from the proposed development;



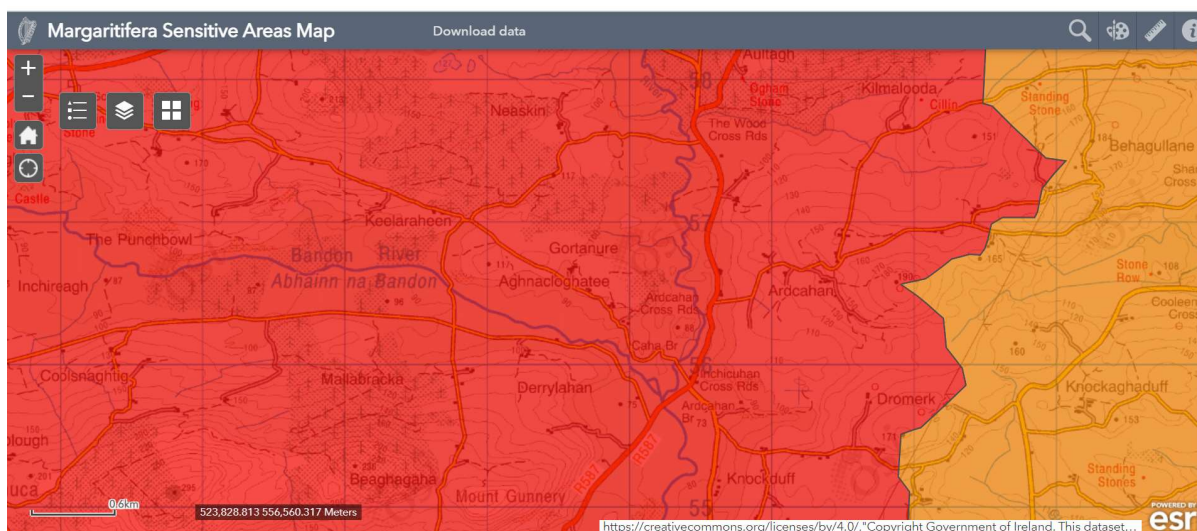
- a. **Annex I European dry heaths 4030-** Dry siliceous heath HH1 Habitat located in the north east of the site corresponds to the broader annexed habitat, 'European dry heaths 4030';
  - b. **Oak Birch Holly Native Woodland(WN1) and potential for the occurrence of Annex I quality Old sessile oak woods with Ilex and Blechnum 910A-** located in the north west of the quarry site and along the tributary of the Bandon River;
  - c. Aquatic habitats- local watercourses and naturalised quarry ponds;
  - d. Semi-natural grassland, Marsh and Reedbed habitats;
  - e. An area of Blanket Bog (PB2)/Wet Heath HH3 is located to the north of the proposed development, if any works are proposed for this area a full assessment of the potential impacts on the habitat and species it supports is required;
- xvi. **Whooper swan-** a species listed on Annex I of the EU Birds Directive (Council Directive 2009/147/EC) have been recorded in good numbers (c 100 individuals)foraging and roosting in the vicinity of the proposed development along the Bandon River floodplains. The closest flock (c 40 individuals) forage in fields along the Bandon River c 5km to the south east of the proposed development. While diurnal Whooper Swan flight paths are not thought to occur over the proposed development area there may be potential migratory flight paths at certain times of the year (Autumn and Spring). Consideration of same should be included in the proposed development application particularly if new overhead lines are proposed.
- xvii. **Annex II Otter** are known to be present in the area and are thought to breed along the River Bandon and its tributaries upstream and downstream of the proposed development site;
- xviii. **Snipe**, a red listed species of high conservation concern (BoCCI, 2021) for both its breeding and wintering populations.
- xix. **Invertebrates-** based on the ecological sensitive habitats present onsite (Dry heath, Aquatic habitats, Old established Native Oak- Birch-Holly Woodland) and adjacent to the proposed development an invertebrate survey is required to be carried out to identify any sensitive species present e.g. dragonflies, Lepidoptera surveys;



- xx. **Bandon River flood plain**- is an area of biodiversity importance for aquatic/riparian habitats and the species they support (including Dipper, Grey wagtail, Sand Marten, Swift, Otter, Brook lamprey, Salmon, Trout amongst others). Wintering water birds including Lapwing, Golden Plover, Tufted duck, Green sandpiper, Common Coot, Mallard, Mute Swan, Little Grebe and Annex I Whooper Swans.

### Freshwater Pearl Mussel

The proposed Ardcahan Quarry development lies directly adjacent to and is hydrologically connected to the River Bandon which is within a **sensitive Freshwater Pearl Mussel Zone** (See Figure 1.0) or **'Margaritifera Sensitive Area'** containing **'Catchments of other extant populations'** of Freshwater Pearl Mussel.



**Figure 1 Margaritifera Sensitive Areas Map**

The Freshwater Pearl Mussel is one of Ireland's most endangered species and for which Ireland supports up to 46% of the EU population. The River Bandon in this area contains extant populations of the EU Habitats Directive Annex II protected species the Freshwater Pearl Mussel. NPWS hold Freshwater Pearl Mussel records both upstream and downstream (Baxters Bridge) of the proposed quarry development. The decline of the freshwater pearl mussel has resulted from failure to recruit young mussels to populations. The cause of these recruitment failures is damage to the species' habitat, specifically through hydrological, sedimentation, other morphological and enrichment impacts.

The species is extremely sensitive to environmental perturbations, owing to its complex life-cycle and vulnerable habitat. Juvenile and young freshwater pearl mussels are even more sensitive than adult mussels, as they live buried in the substratum for five or more



years. Subtle changes in hydrology can lead to erosion and permanent loss of juvenile substratum, as well as damage through habitat exposure during low-flow. Hydrological changes can also exacerbate sedimentation and enrichment impacts. Sediment settling on and in the river bed creates a physical barrier to water circulation, depriving buried mussels of an oxygen supply. By clogging interstitial spaces, fine sediment may also prevent new juveniles from moving into the substratum. Increased nutrient loads promote growth of filamentous algae, diatoms and other algae that also act as physical barriers between the open water and the river bed. Where mussel habitat is impacted by increases in both fine sediment and nutrients, rooted plants expand and tend to further exacerbate the problem. Respiration of rooted plants and algae causes night-time drops in oxygen in mussel habitats.

### **Recommendations**

Dedicated Freshwater Pearl Mussel surveys by appropriately qualified, experienced (>10 years fresh water pearl mussel surveying experience) and fully licenced surveyors is recommended to fully map the distribution and abundance of Freshwater Pearl Mussel in the Bandon River and its tributaries upstream and downstream in the zone of influence of the proposed development. Adhering to the mitigation hierarchy by implementing mitigation by avoidance in the first instance based on the results of the survey should be undertaken.

### **Annex II Otter *Lutra lutra***

The Bandon River and its tributaries that lie adjacent to the proposed development site support habitats that are particularly important to the Annex II protected species, Otter *Lutra lutra* which are known to breed within the receiving watercourses in and around the proposed development site.

### **Recommendations**

A dedicated Otter survey at the appropriate time of year by appropriately qualified, experienced (>10 years Otter surveying experience) aquatic ecologist (s) is recommended to fully map the distribution and abundance of Otter holts and areas of importance to Otter on the Bandon River and its tributaries upstream and downstream in the zone of influence of the proposed development. As Otter breeding and resting sites are sensitive information any records such as these will not be put in a public report but will be treated as confidential and only shared with NPWS and the Cork County Council Planning Department. Adhering to the mitigation hierarchy by implementing **mitigation by avoidance** in the first instance when looking at site location and site design based on the results of the survey should be undertaken.



### **Bat and mammal surveys**

Potential for bat usage or transiting through the proposed development site should be assessed fully given the habitats of high potential for foraging and roosting bat species including native woodland, aquatic habitats (Bandon River and tributary, Riparian habitat, naturalised quarry ponds) present and roost potential in quarry face, trees and local bridges/dwellings. Mammal surveys should also be conducted based on habitats onsite (Woodland, scrub).

### **Recommendations**

A baseline bat survey should be conducted in line with best practice and for key periods of the bat life cycle including the breeding and wintering/hibernation season. Active and passive bat surveys are required including the use of Thermal technology to fully quantify bat usage of this proposed development site and surrounding area as appropriate including the Bandon River and its tributary. Local bridges and trees with potential for bat usage in the zone of impact shall also be included in the bat survey. Bat surveys shall be carried out by an appropriately qualified and experienced bat ecologist and surveyed for the breeding and winter/hibernation season to fully establish bat usage throughout the year.

### **Aquatic Surveys**

The proposed development lies in close proximity to ecologically sensitive and significant aquatic habitats. The River Bandon and its tributaries are zoned as a Freshwater Pearl Mussel sensitive area, these aquatic habitats also support breeding Atlantic salmon and other Salmonids, as well as Annex II listed Brook Lamprey and Otter. Bird species such as the Annex I Kingfisher, Dipper, Grey wagtail, Grey Heron also rely on the aquatic habitats for food, shelter and breeding sites. Specialist aquatic surveys (flora, fauna (birds, mammals, invertebrate, fish) are required in this regard. Aquatic ecological surveys shall be carried out by specialist aquatic ecologists with appropriate qualifications and experience in accordance with best practice to inform a baseline aquatic ecological assessment which can be used to inform location and design of the proposed development.

### **Hydrological Impacts, Water Quality & Water Abstraction**

The potential for adverse ex-situ impacts on the QI of Bandon River SAC and more generally to ecological receptors in the receiving environment as a result of the potential changes to hydrology and water quality as a result of water abstraction and potential pollution events from the proposed development should be assessed in detail to fully identify any direct or indirect impacts which may arise alone or in combination with other pressures on NATURA



2000 sites and its qualifying features. This should be adequately assessed in the current application.

### **Recommendations**

A detailed ecohydrological assessment (surface and groundwater) is required for the proposed development and an assessment of changes in hydrology/water quality/water levels in relation to the QI of Bandon River SAC as well as all other aquatic and ecological receptors in the area is required as part of the updated Ecological Impact assessment for the proposed development. The potential impacts on surface and groundwater should be fully assessed in detail with abstraction volumes clarified. Future scenarios/models incorporating the potential impacts from climate change (extreme weather events/flooding, drought, low water levels) are to form part of any assessment of potential adverse impacts in the Appropriate Assessment reporting and the Ecological Impact Assessment.

### **Mitigation Hierarchy- Mitigation by Avoidance**

The EU Biodiversity strategy 2020<sup>1</sup> which was subsequently built upon by the EU Biodiversity Strategy 2030 aimed to halt and reverse the loss of biodiversity and ecosystem services. Among its targets and actions was Target 2, Action 7: **Ensure no net loss of biodiversity and ecosystem services (NNL)**. A Guidance document entitled “Guidance on achieving no net loss or net gain of biodiversity and ecosystem services”<sup>2</sup> has been published to support EU 2030 Biodiversity Strategy’s objective of putting EU biodiversity on the track to recovery for the benefit of people, climate and the planet by 2030.

In this guidance the mitigation hierarchy is outlined as follows;

*‘A fundamental and universally held principle is that appropriate actions to achieve NNL (or preferably a net gain) should be carried out in the following order of priority in accordance with the mitigation hierarchy:*

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<sup>1</sup> Communication on our life insurance, our natural capital: an EU biodiversity strategy to 2020, COM(2011) 244 final.

<sup>2</sup> Tucker, G.M., Quéfier, F. & Wende, W. (2020) Guidance on achieving no net loss or net gain of biodiversity and ecosystem services. Report to the European Commission, DG Environment on Contract ENV.B.2/SER/2016/0018, Institute for European Environmental Policy, Brussels.



1. **Avoidance:** *measures taken to avoid creating detrimental impacts from the outset, such as careful spatial or temporal placement of elements of infrastructure, in order to completely avoid impacts on certain components of biodiversity.*

2. **Minimisation:** *measures taken to reduce the duration, intensity and/or extent of detrimental impacts (including direct, indirect and cumulative impacts, as appropriate) that cannot be completely avoided, as far as is practically feasible.*

3. **Rehabilitation/restoration:** *measures taken to rehabilitate degraded ecosystems or restore cleared ecosystems following exposure to impacts that cannot be completely avoided and/or minimised.*

4. **Offset:** *measures taken to compensate for any residual significant, adverse impacts that cannot be avoided, minimised (and/or in some cases) rehabilitated or restored, in order to achieve at least NNL of BES. In other words, emphasis should be given to avoidance of significant adverse impacts at source as the first objective (as well as seeking opportunities to enhance BES). When this is insufficient, it should be followed by measures to reduce or minimise unavoidable impacts. It is only when all the previous appropriate measures of the mitigation hierarchy remain insufficient to avoid negative BES impacts that biodiversity offsetting should be used.*

*As defined by BBOP (2012d<sup>3</sup>), 'Biodiversity offsets are measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development after appropriate prevention and mitigation measures have been taken. The goal of biodiversity offsets is to achieve no net loss and preferably a net gain of biodiversity on the ground with respect to species composition, habitat structure and ecosystem function and people's use and cultural values associated with biodiversity'*

### **Recommendations**

In the context of the aforementioned policies and best practice guidance on EU Biodiversity Strategies, No net loss of biodiversity and mitigation by avoidance in line

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<sup>3</sup> BBOP (2012d) Standard on Biodiversity Offsets. Business and Biodiversity Offsets Programme (BBOP), Washington, DC.



with the mitigation hierarchy is required to avoid and/or reduce the potential negative impacts on biodiversity.

Disturbance and displacement from the proposed development activities (lighting, noise, human disturbance) are of concern. Potential for water quality incidents are also of concern from activities such as fuel storage area, gravel processing site operations, waste water/sewage. An assessment of the site design and the potential for adverse impacts of sensitive ecological receptors is recommended in this regard.

You are requested to send any further communications to this Department's Development Applications Unit (DAU) at [referrals@npws.gov.ie](mailto:referrals@npws.gov.ie), where used, or to the following address:

The Manager  
Development Applications Unit (DAU)  
Government Offices  
Newtown Road  
Wexford  
Y35 AP90

Is mise, le meas

A handwritten signature in black ink, appearing to read 'D. O'Connor', is written over a horizontal line.

David O'Connor  
Development Applications Unit  
Administration



<b>HSE South Emergency Management Consultation Report</b>			
<b>Report to</b>	<b>Adrian O’Sullivan PEHO South Lee (West Cork)</b>	<b>Date</b>	<b>19<sup>th</sup> Dec., 2024</b>
<b>Type of consultation:</b> EIS <input type="checkbox"/> Scoping <input type="checkbox"/> Screening <input type="checkbox"/> EIAR <input type="checkbox"/> EPA <input type="checkbox"/>			
<b>Other (please specify):</b> SID Application (Strategic Infrastructure Development Application)			
<b>Authority</b>	<b>Cork County Council HSE</b>		
<b>Reference Number</b>	<b>EHIS No. 4422</b>		
<b>EM Reference Number</b>	<b>EMENV 220</b>		
<b>Applicant</b>	<b>McCutcheon Halley, Planning Consultants, for Murray Brothers Tarmacadam Limited</b>		
<b>Proposal</b>	<b>Continued quarrying operations at Ardcahan, Dunmanway, Co. Cork.</b>		

**HSE South Emergency Management Observations:** Please be advised that the HSE South Emergency Management function does not have any specific observations to make with respect to this application. However, please note the following recommendations within the context of site operations:

1. Should an incident occur at the site and the site operator requires the assistance of the emergency services, the incident information should be provided in the `ETHANE` format (please see attached).
2. Emergency Services access to the site should be clearly identified. This should be undertaken via appropriate high visibility signage, i.e.; a green sign with a yellow border and white lettering citing the abbreviation RVP
3. The site should have a mechanism in place to account for personnel during an evacuation in order to provide the responding emergency services with an estimate of the number of people accounted and unaccounted for.
4. The site should identify any critical / vulnerable facilities within the geographical catchment area, such as hospitals, schools, nursing homes, etc, that could be directly or indirectly affected by an incident at the site.
5. Where the `off-site` impacts of an incident at the site affects a vulnerable cohort / population such as children within crèches, schools; patients / clients / residents within nursing homes, etc; the emergency services will require assistance from the site operator in determining the impact on the local community.
6. The site operator is encouraged to develop a business continuity plan that includes a plan for severe weather. For more advice on this, please see the Department of Business, Enterprise and Innovation, *Business Continuity Planning in Severe Weather*.  
<https://dbei.gov.ie/en/Publications/Publication-files/Business-Continuity-Planning-in-Severe-Weather-Check-List-for-Businesses.pdf>

All correspondence or any queries with regard to this report should be forwarded to Ms. Maryanne Horgan, Emergency Management Office, HSE South, Eye, Ear and Throat Hospital, Western Road, Cork, T12 WP62 or [maryanne.horgan@hse.ie](mailto:maryanne.horgan@hse.ie)



An tOifig Náisiúnta um Sláint Chomhshaoil  
Feidhmeannacht na Seirbhíse Sláinte, Urlár 2, Teach na Darach, Ascaill na Teile  
Páirc na Mílaoise, An Nás,  
Co. Chill Dara.

National Office for Environmental Health Services  
2nd Floor, Oak House, Lime Tree Avenue  
Millennium Park, Naas, Co. Kildare  
Eircode: W91KDC2  
[Env.CCNSU@hse.ie](mailto:Env.CCNSU@hse.ie)

### **HSE EIA Scoping**

## **Environmental Health Service Submission Report**

**Date:** 15/01/2025

**Our reference:** EHIS 4422

**Report to:** McCutcheon Halley Planning Consultants, 6 Joyce House, Barrack Square, Ballincollig, Cork, P31 YX97, Email: [mrivero@mhplanning.ie](mailto:mrivero@mhplanning.ie)

**Type of Consultation:** rEIA Scoping Application for proposed continued quarrying operations at Ardcahan Quarry, Dunmanway, Co. Cork

**Proposed development:** SID Application for continued quarrying operations at Ardcahan Quarry, Dunmanway, Co. Cork

**Details of the application were circulated to the following HSE stakeholders on 4/12/2024:**

- HSE South Emergency Management
- National Capital Estates Office – Regional AND
- Director of National Health Protection
- REO South West



## **Introduction and Proposed site location**

The existing quarry is located at Ardcahan, approximately 5km north-east of Dunmanway in County Cork. The quarry is accessed from a minor road close to its junction with Regional Road R587 at Inchicahan Cross Roads.

The regional road links Dunmanway to the south with Macroom to the north. The quarry within the landholding is worked out for a substantial part of its southern end. There are office/administration buildings, staff/visitor car parking and aggregate storage within this area and at the eastern end of this southern section there is a tarmacadam / asphalt plant and a large storage building. There are a network of internal roads throughout the holding. Lands to the south of the main access road at the southern extremity of the holding remain in mixed woodland while there are extensive areas beyond the worked out sections of the quarry that appear to remain undisturbed. There is extensive lands to the north and north-east of the southern worked out section that are covered in dense scrub. There is an existing watercourse that runs along the eastern and southern boundaries of the landholding that flows to the Bandon River a short distance to the west of the regional road.

## **Planning History**

It is understood that the quarry was previously a Council quarry established prior to 1964. This quarry was not registered pursuant to section 261 of the Planning and Development Act.

### **Section 261A**

The planning authority determined in August 2012 that development had been carried out since 1st February 1990 which was considered would have required EIA and since 26th February 1997 which would have required AA and that neither had been carried out. It was also determined that the quarry had not been registered under section 261 before the deadline of April 2005 and it was concluded that the quarry was unauthorised development.

In November 2013 an enforcement notice was issued by the planning authority seeking the cessation of quarrying. In October 2014 the Council wrote to the quarry operator informing them that the notice had been complied with. ABP Ref. PL 88.245174 (P.A. 14/.616) Permission was granted by the Board for the quarrying of stone with an extraction area of 6 hectares.

A subsequent Judicial Review (2016 No. 499 JR) quashed this decision. ABP-302158-18 An application for leave to apply for substitute consent for the quarry was refused by the Board in July 2018.



It was determined that the provisions of section 177C of the Act could not apply to the site the subject of ABP Ref. PL 88.245174 because such permission was for future quarrying development, because the area in the application did not include all of the former quarry that is unauthorised and includes areas of lands that have not been developed that the Board is not in a position to assess whether exceptional circumstances apply.

### **General Scoping Introduction**

The following documents should be taken into consideration when preparing the Environmental Impact Assessment Report:

- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment

[https://www.housing.gov.ie/sites/default/files/publications/files/guidelines\\_for\\_planning\\_authorities\\_and\\_an\\_bord\\_pleanála\\_on\\_carrying\\_out\\_eia\\_-\\_august\\_2018.pdf](https://www.housing.gov.ie/sites/default/files/publications/files/guidelines_for_planning_authorities_and_an_bord_pleanála_on_carrying_out_eia_-_august_2018.pdf)

- EU publication: Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report, EU, 2017  
[http://ec.europa.eu/environment/eia/pdf/EIA\\_guidance\\_EIA\\_report\\_final.pdf](http://ec.europa.eu/environment/eia/pdf/EIA_guidance_EIA_report_final.pdf)
- Adoption of the Directive (2014/52/EU) in April 2014 initiated a review of the National Guidance for EIA and the EIAR accompanying a planning application.
- New guidelines can be seen at:

<https://www.epa.ie/publications/monitoring--assessment/assessment/guidelines-on-the-information-to-be-contained-in-environmental-impact-assessment.php>

The introduction of the new Guidance is supported by a Webinar produced by the EPA and can be found at:

<https://www.youtube.com/embed/ejKVFUztxBY>

**Generally the Environmental Impact Assessment should examine all likely significant impacts and provide the following information for each:**

- a) Description of the receiving environment
- b) The nature and scale of the impact
- c) An assessment of the significance of the impact
- d) Proposed mitigation measures
- e) Residual impacts



Directive 2014/52/EU has an enhanced requirement to assess likely significant impacts on Population and Human Health. It is the experience of the National Environmental Health Service (NEHS) that impacts on human health are often inadequately assessed in EIAs in Ireland. It is recommended that the wider determinants of health and wellbeing are considered in a proportionate manner when considering the EIA. Guidance on wider determinants of health can be found at [www.publichealth.ie](http://www.publichealth.ie)

In addition to any likely significant negative impacts from the proposed development, any positive likely significant impacts should also be assessed.

An application for substitute consent would allow for the effects on the environment to be remediated and the existing environment improved if carried out in full. The application, accompanied by a remedial EIAR and AA, should give the opportunity to have the full environmental effects between 1990 and 2014 assessed, remediated and improved.

As this is **an existing quarry**, a review should be undertaken of compliance with any current planning conditions and any complaints received and any action taken to resolve complaints. Particularly around noise and dust emissions and use of the local road network as part of the activities of the existing quarry. Because this is an application for the operation of an existing development the predictive methodology routinely employed in EIA can be supported by actual data of operation of the existing quarry. Therefore, any assessment of likely significant impacts from the continued use should be supported by data of actual impacts during the operation phase of the current development.

This assessment should include the effectiveness of any existing mitigation measures and identify where mitigation should be continued and/or reviewed. The public consultation should include consultation on how the existing quarry might or might not be impacting on local communities.

The HSE will consider the final rEIAR accompanying the planning application and will make comments to An Bord Pleanála/Local Planning Authority on the methodology used for assessing the likely significant impacts and the evaluation criteria used in assessing the significance of the impact.

**The National Environmental Health Service (NEHS) recommends that the following matters are included and assessed in the rEIAR:**

- Public Consultation
- Population and Human Health
- Water (Hydrology and Hydrogeology)
- Land and Soils



- Air, Dust and Odour
- Climate Change and Opportunity for Health Gain
- Noise and Vibration
- Waste Management
- Ancillary Facilities
- Cumulative Impacts

### **Public Consultation**

The applicant should consider the appointment of a community liaison officer. Early and meaningful public consultation with the local community should be carried out to ensure all potentially significant impacts have been adequately addressed. All parties affected by the proposed development, including those who may benefit financially from the project, must be fully informed of what the proposal entails especially with regard to potential impacts on surrounding areas. Sensitive receptors and other stake-holders should be identified to ensure all necessary and appropriate mitigation measures are put in place to avoid any complaints about the proposed quarry development in the future. With the lifting of restrictions around public gatherings as a result of Covid 19 prevention measures there should be no barrier to holding public consultation events albeit within current government guidance at the time. Meaningful public consultation, where the local community is fully informed of the proposed development must be undertaken. Members of the public should be given sufficient opportunities to express their views on the proposed development.

The Environmental Impact Assessment Report (rEIAR) should clearly demonstrate the link between public consultations and how those consultations have influenced the decision-making process in the EIA. The rEIAR should state the period of planning permission sought, the length of time construction estimated, and if it is anticipated that the development will be decommissioned or will continue to operate (following any further planning consent) at the end of this period of planning permission (should permission be granted).

### **Decommissioning /site restoration**

The submission of a Site Restoration Plan, which includes a timeframe for undertaking restoration works, and actual works detail is included as a condition of planning permission, if granted.

To minimise the risk of future water safety issues, consideration be given to an alternative restoration plan for the quarry void involving filling the void and restoring it to agricultural use or as a public amenity.

### **Assessment of Consideration of Alternatives**



The rEIAR should consider an assessment of alternatives should be assessed as part of the rEIAR.

### **Noise & Vibration**

The potential impacts for noise and vibration from the proposed development on all noise sensitive locations must be clearly identified in the rEIAR. The rEIAR must also consider the appropriateness and effectiveness of all proposed mitigation measures to minimise noise and vibration. A baseline noise monitoring survey should be undertaken to establish the existing background noise levels. Noise from any existing industry /quarries or any potential sources in the area should not be included as part of the back ground levels.

### **Air Quality**

Due to the nature of the construction works, generation of airborne dust has the potential to have significant impacts on sensitive receptors. A **Construction Environmental Management Plan** (CEMP) should be included in the rEIAR which details dust control and mitigation measures.

Measures should include:

- Sweeping of hard road surfaces
- Provision of a water bowser on site, regular spraying of haul roads
- Wheel washing facilities at site exit
- Restrict speed on site
- Provide covers to all delivery trucks to minimise dust generation
- Inspect and clean public roads in the vicinity if necessary
- Material stockpiling provided with adequate protection from the wind
- Dust monitoring at the site boundary
- Truck inspection and maintenance plan
- Details of a road maintenance agreement between the operator and the Local Roads Authority to clarify responsibility for the upkeep and repair of access roads during the construction phase of the project .

### **Surface and Ground Water Quality**

The proposed development has the potential to have a significant impact on the quality of both surface and ground water.

All drinking water sources, both surface and ground water, must be identified.

Public and Group Water Scheme sources and supplies should be identified in addition to any private wells supplying potable water to houses in the vicinity of the



proposed development. Measures to ensure that all sources and supplies are protected should be described.

The National Environmental Health Service recommends that a walk-over survey of the site is undertaken in addition to a desktop analysis of Geological Survey of Ireland data in order to identify the location of private wells used for drinking water purposes. Any potential significant impacts to drinking water sources should be assessed. Details of bedrock, overburden, vulnerability, groundwater flows, aquifers and catchment areas should be considered when assessing potential impacts and any proposed mitigation measures. Any impacts on surface water as a result of the construction of the underground cables should be identified and addressed in the rEIAR.

### **Ancillary Facilities**

The rEIAR should include details of the location of all site office, construction compound, fuel storage depot, sanitary accommodation and canteen, wheel washing/ vehicle washing, First Aid facilities, disposal of wastewater and the provision of a potable water supply to the site canteen.

### **Cumulative Impacts**

All existing or proposed Quarries/ industry or developments/housing in the vicinity should be clearly identified in the rEIAR. The impact on sensitive receptors of the proposed development combined with any other developments in the vicinity should be considered. The rEIAR should include a detailed assessment of any likely significant cumulative impacts of the new proposed Quarry application.

A handwritten signature in black ink that reads 'Eve Smith'.

**Eve Smith**  
Oifigeach Sláinte Comhshaoil | Environmental Health Officer  
Environment/Climate Change, Network Support Unit (NSU)

\* All correspondence or any queries with regard to this report including acknowledgement of this report should be forwarded to : Eve Smith ,Environmental Health Officer, Environmental Health Service, Dungloe Community Hospital, Letterkenny Co. Donegal. F94 Y326

Murray Brothers Tarmacadam Ltd

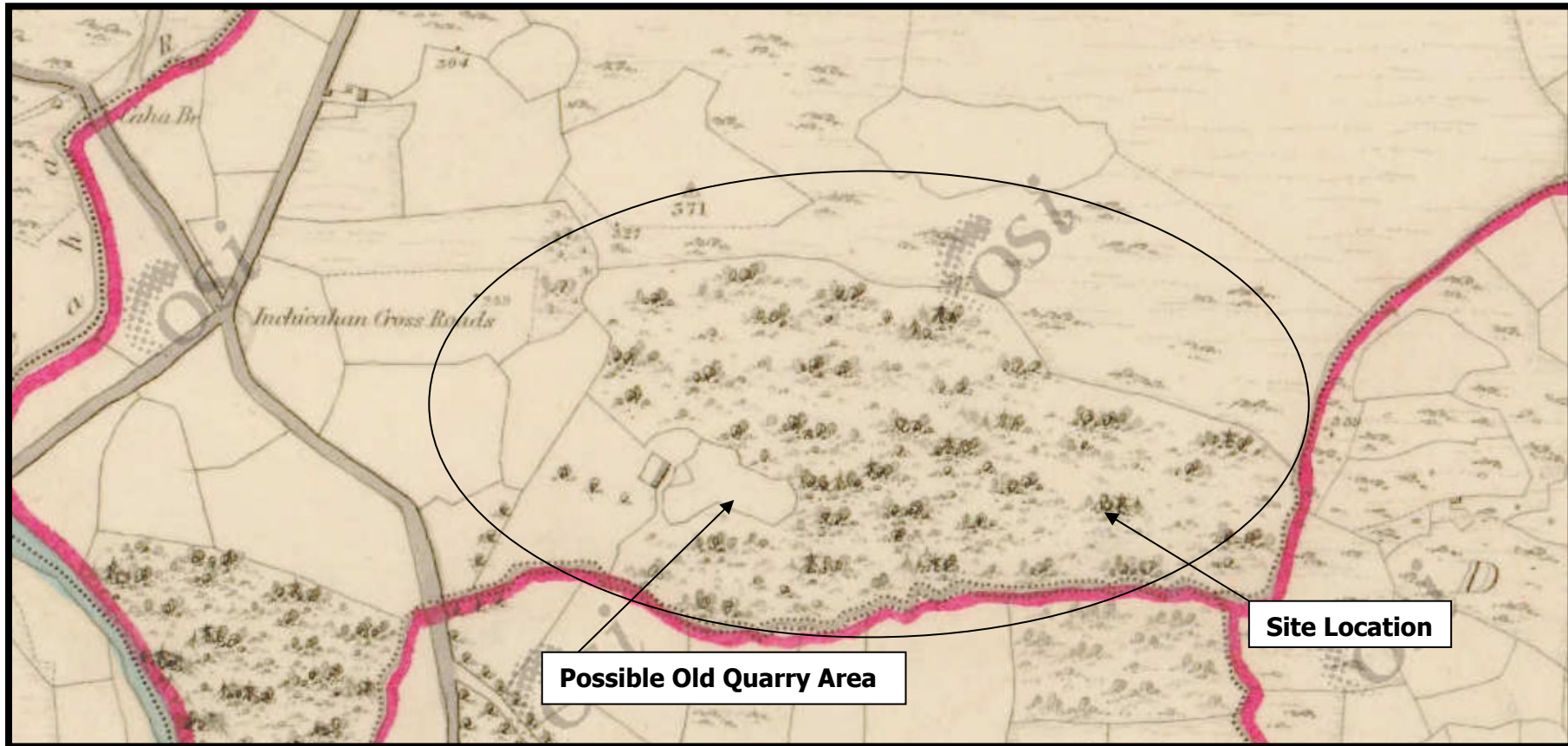
**APPENDIX 6.1**  
**TAILTE ÉIREANN HISTORIC**  
**MAPPING**

**VOLUME III**  
APPENDICES

APRIL 2026

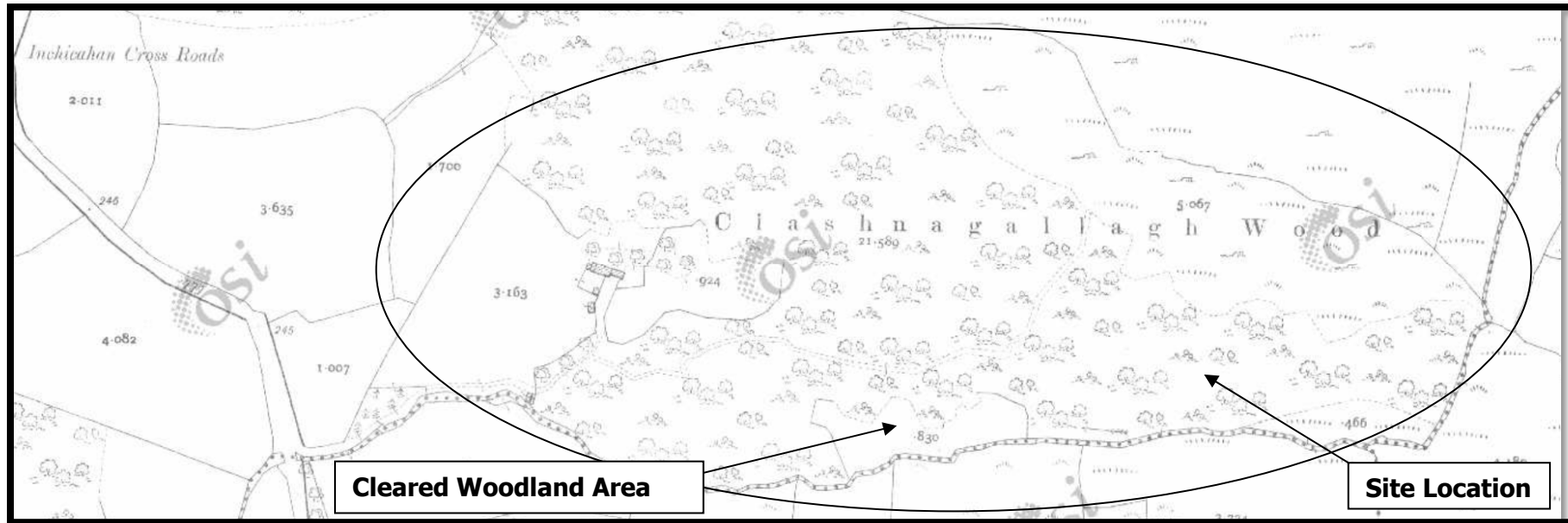
Ardcahan Quarry EIAR – Chapter 6 Land Use, Soils (Geology)  
**Appendix 6.1 – Tailte Eireann Historic Mapping**

Appendix 6.1 – Ardcahan EIAR – Land Use/Soils (Geology) Chapter 6  
Tailte Eireann (previously Ordnance Survey of Ireland) – Historic Mapping



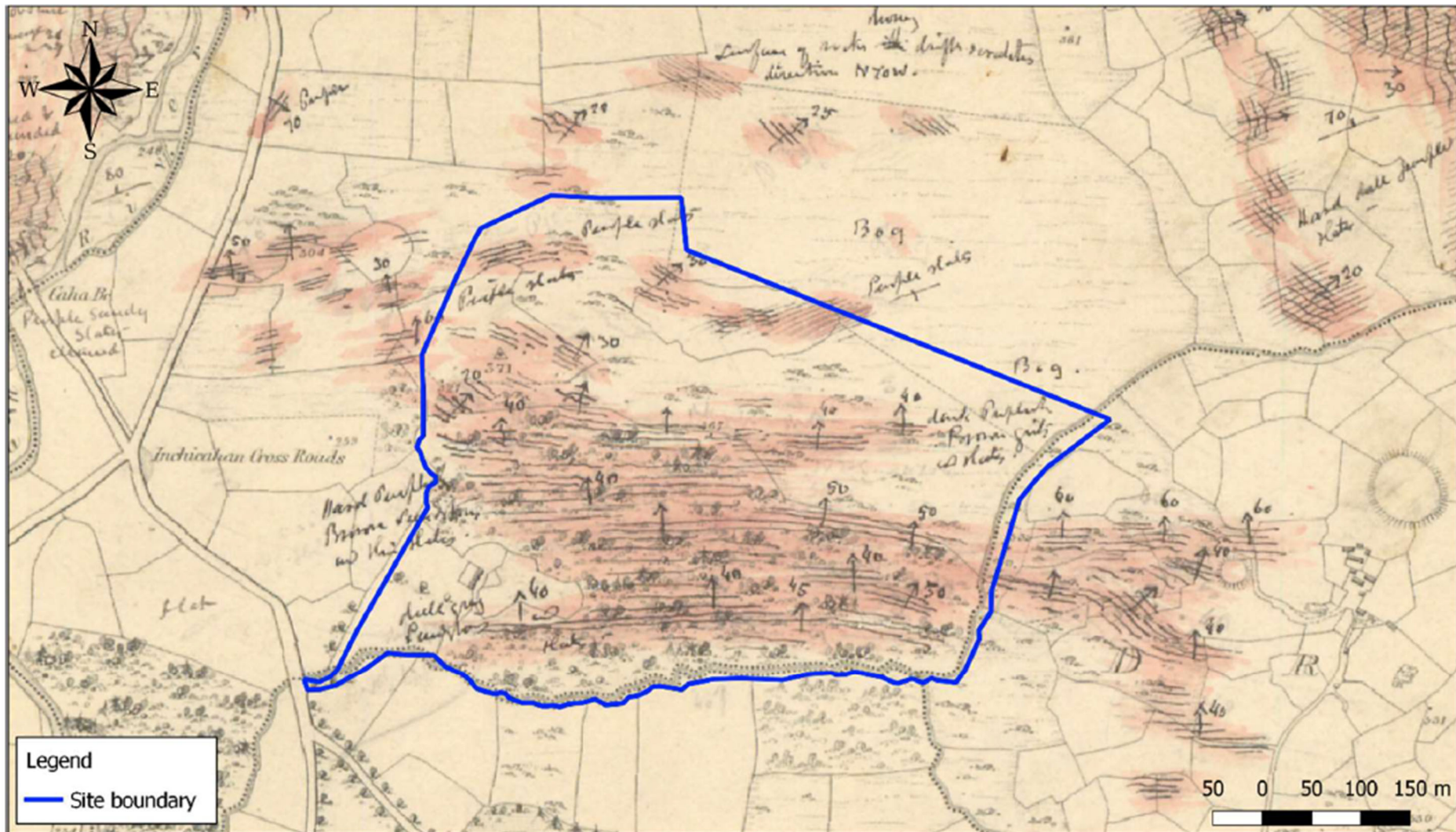
**Appendix 6.1.1 – Tailte Eireann 1840's 6" Inch Mapping – approximate site location.**

Appendix 6.1 – Ardcahan EIAR – Land Use/Soils (Geology) Chapter 6  
Tailte Eireann (previously Ordnance Survey of Ireland) – Historic Mapping



**Appendix 6.1.2 – Tailte Eireann early 1900's 25" Inch Mapping.**

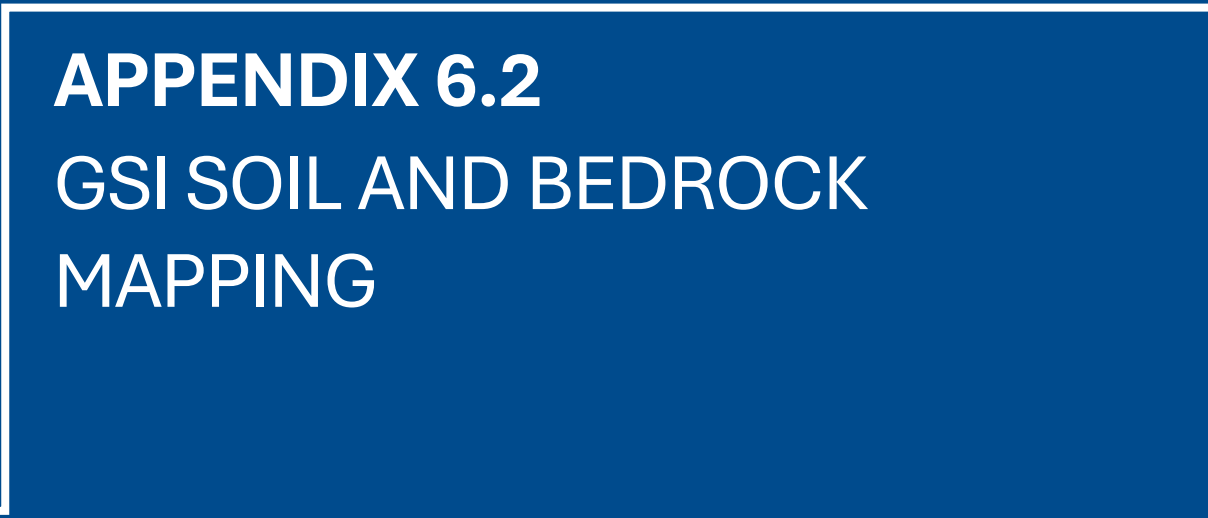
Appendix 6.1 – Ardcahan EIAR – Land Use/Soils (Geology) Chapter 6  
Tailte Eireann (previously Ordnance Survey of Ireland) – Historic Mapping



**Appendix 6.1.3 – Old 1840's GSI Geological Mapping on an old 6" Map showing extensive north dipping bedrock at surface. (Screen shot taken from APEX Geophysical survey report included in Appendix 6.4)**



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**APPENDIX 6.2**  
**GSI SOIL AND BEDROCK**  
**MAPPING**

**VOLUME III**  
APPENDICES



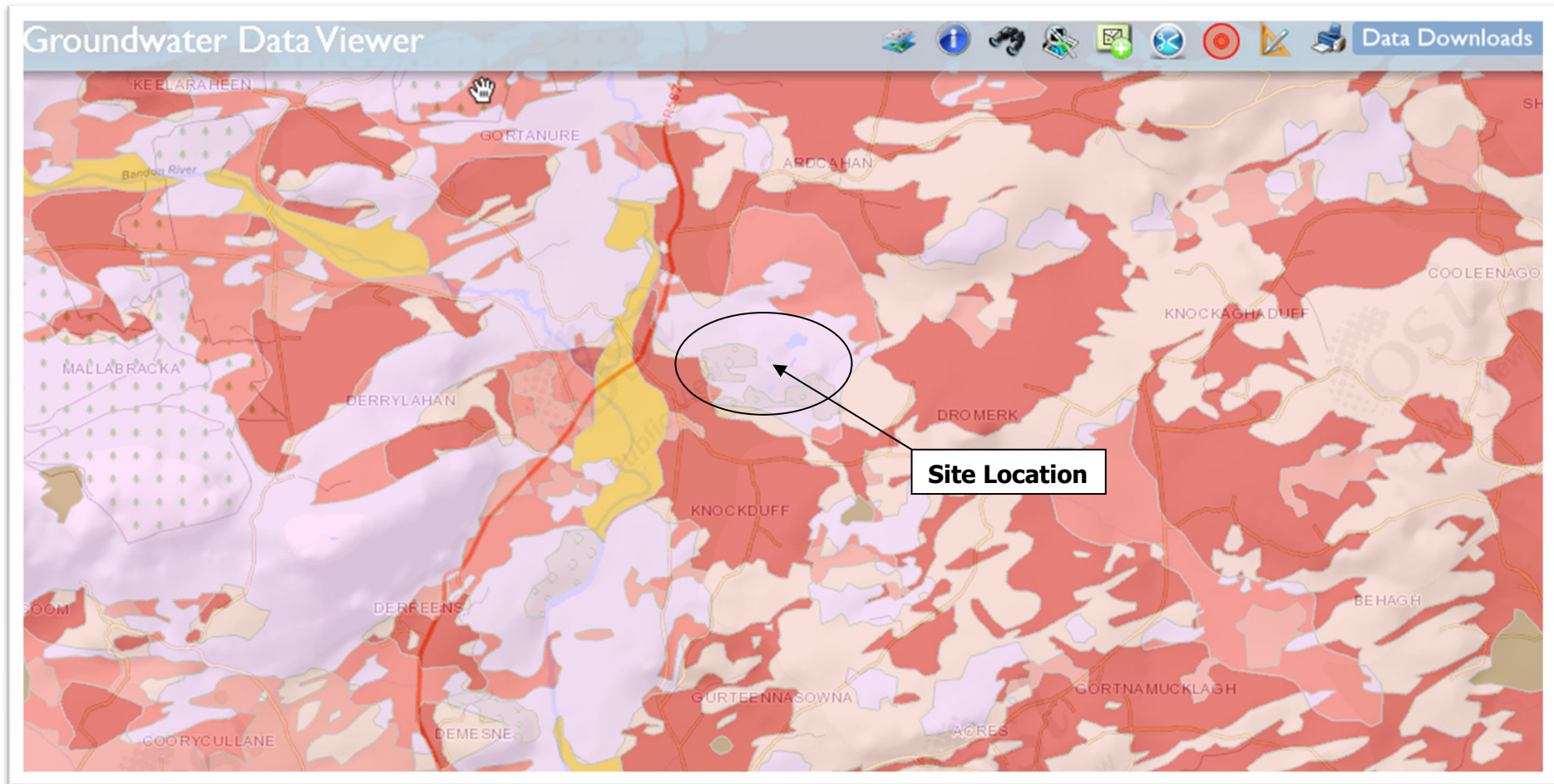
APRIL 2026





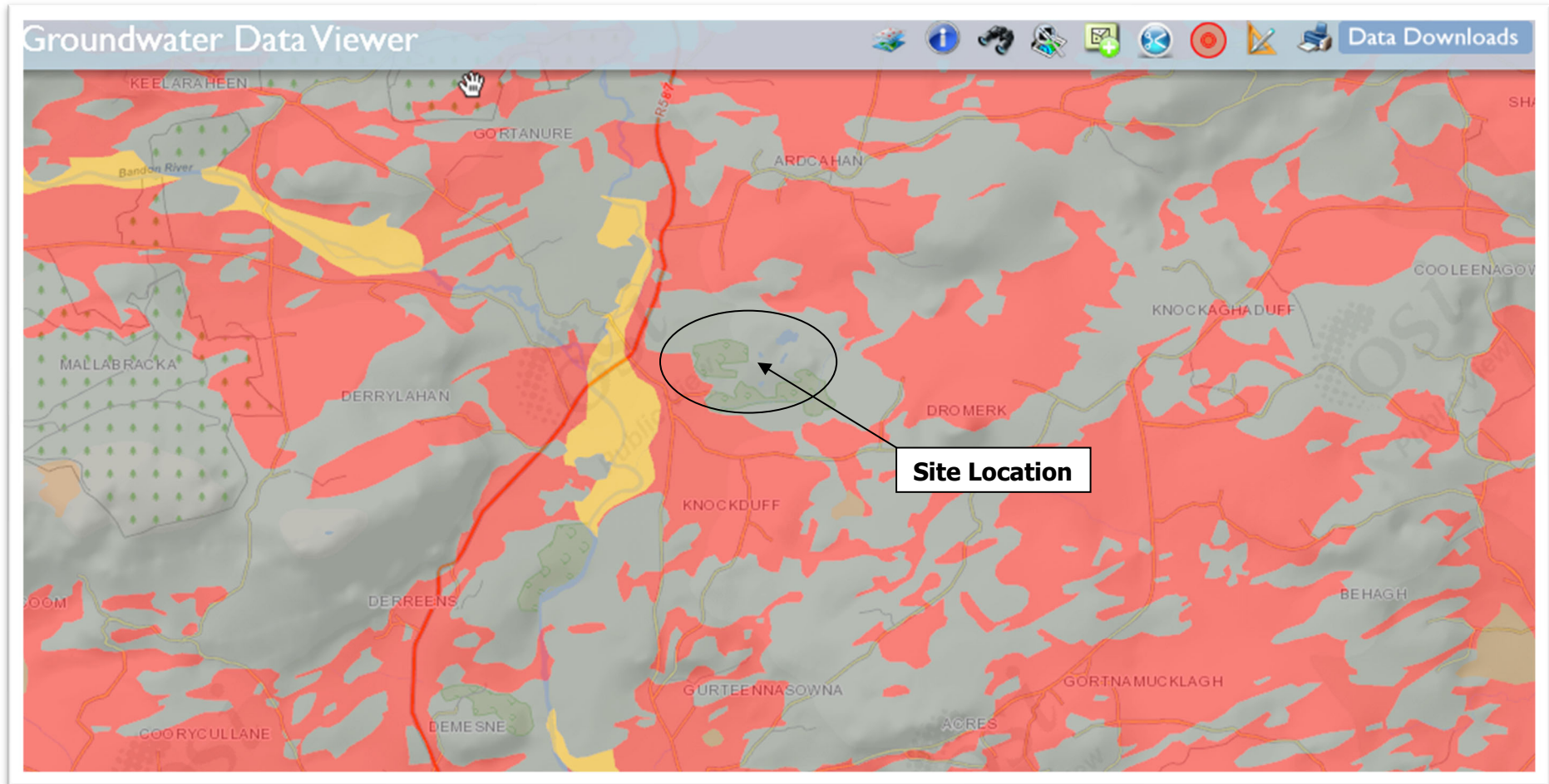
Ardcahan Quarry EIAR – Chapter 6 Land Use, Soils (Geology)  
**Appendix 6.2 – GSI Soil and Bedrock Mapping**

Appendix 6.2 – Ardcahan EIAR – Land Use/Soils (Geology) Chapter  
Geological Survey of Ireland Soils Mapping Data



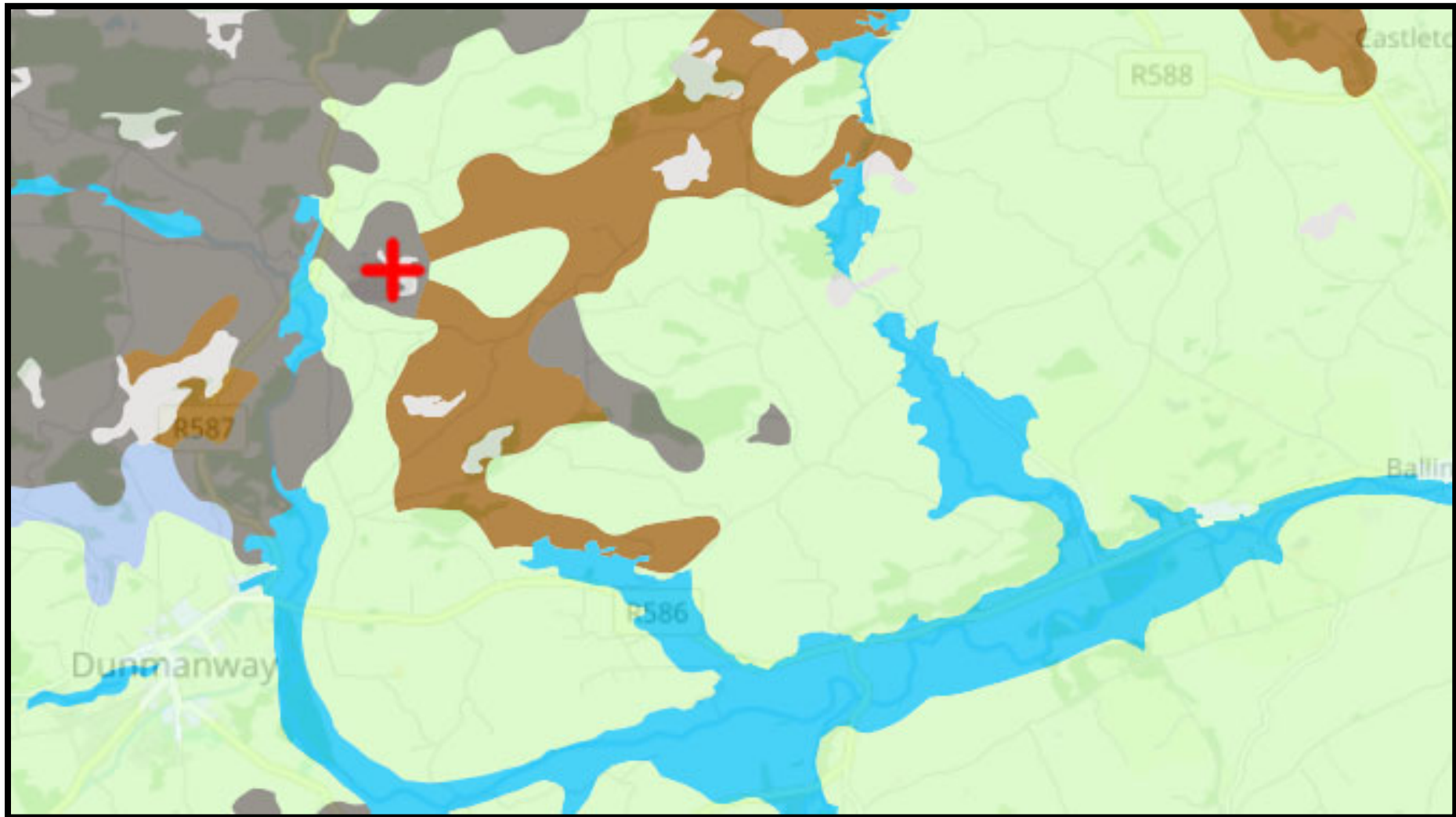
**Appendix 6.2.1: Map 1 Regional Topsoil Map showing site area with 'shallow soils of non-calcareous rocks'. ([www.gsi.ie](http://www.gsi.ie)).**

## Appendix 6.2 – Ardcahan EIAR – Land Use/Soils (Geology) Chapter Geological Survey of Ireland Soils Mapping Data



**Appendix 6.2.1 – Map 2 Regional Subsoil Map showing site as underlain by 'bedrock' - (source [www.GSI.ie](http://www.GSI.ie)).**

Appendix 6.2 – Ardcahan EIAR – Land Use/Soils (Geology) Chapter  
Geological Survey of Ireland Soils Mapping Data



**Appendix 6.2.3 – Map 3 Teagasc/Cranfield Soil Map with rock (light grey) & peaty soil (dark grey) in the site area with Carbury Soil Association (light green) to Southwest and south of site. (Site location shown by red cross). Source [www.GSI.ie](http://www.GSI.ie).**

## REPRESENTATIVE PROFILE DESCRIPTION

### SERIES: ROSS CARBERY

**Reference profile:** RPW39BR01  
**County:** Cork  
**Weather:** Overcast  
**Elevation:** 38

#### TOPOGRAPHY

**Position:** Lower slope  
**Slope degree:** 11  
**Slope Form:** Concave  
**Aspect:** SE

#### PARENT MATERIAL

**Substrate Type:** Drift  
**Substrate Subgroup:** Siliceous stones

#### TEXTURAL CRITERIA

**Textural Class:** Coarse loamy  
**Texturally contrasting:**

#### LAND USE

**Land use:** Grassland improved  
**Human technologies:** Fertilizer applications, Slurry applications, Seeded/reseeded  
**Vegetation:** Grassland, Grassland  
**Species:** Bramble/Briars

#### WATER TABLE

None

#### ROCK OUTCROPS

None

#### SURFACE STONE

None

#### IRISH CLASSIFICATION (2013)

**Soil subgroup:** 09.0.0 Typical Brown Podzolic

**National Soil Series:** Ross Carbery  
Coarse loamy compact drift with siliceous stones

### DESCRIPTION

**0 - 35 cm** **Ap**

**MATRIX COLOR:** 10YR33. **STONES (%):** Few, 2-6 mm, Angular, Siliceous stones; Few, 2-6 cm, Angular, Siliceous stones. **TEXTURE:** Sandy loam. **STRUCTURE:** Weak, Crumb, Fine. **CONSISTENCY:** Very friable. **PLASTICITY:** Non-plastic. **STICKINESS:** Non-sticky. **ROOTS:** Many, Medium. **PACKING DENSITY:** Very Low **POROSITY:** Very High. **MACROPORES:** Medium. **BOUNDARY:** Clear, Smooth.

**35 - 70 cm** **AB**

**MATRIX COLOR:** 10YR43. **STONES (%):** Common, 2-6 mm, Angular, Shale; Common, 2-6 cm, Angular, Shale. **TEXTURE:** Coarse, Sandy loam. **STRUCTURE:** Moderate, Sub-angular blocky, Fine to Medium. **CONSISTENCY:** Friable. **PLASTICITY:** Non-plastic. **STICKINESS:** Non-sticky. **ROOTS:** Common, Fine. **PACKING DENSITY:** Medium. **POROSITY:** High. **MACROPORES:** Fine. **BOUNDARY:** Abrupt, Wavy.

**70 - 100 cm** **Bs buried**

**MATRIX COLOR:** 75YR46. **STONES (%):** Common, 2-6 mm, Angular, Shale; Common, 2-6 cm, Angular, Shale. **TEXTURE:** Sandy Loam. **STRUCTURE:** Weak, Sub-angular blocky, Fine. **CONSISTENCY:** Very friable. **PLASTICITY:** Non-plastic. **STICKINESS:** Non-sticky. **ROOTS:** Few, Fine. **COATS:** Clay, Few, Faint, Discontinuous. **PACKING DENSITY:** Medium. **POROSITY:** High. **MACROPORES:** Fine. **BOUNDARY:** Clear, Wavy.

**100 - 150 cm** **2C buried**

**MATRIX COLOR:** 25Y62. **VARIEGATION:** 75YR46, Few, Fine, Distinct, Sharp. **STONES (%):** Many, 2-6 mm, Angular, Shale; Many, 2-6 cm, Angular, Shale. **TEXTURE:** Sandy Loam. **STRUCTURE:** Massive. **COMPACTITY:** Non-cemented but compacted. **CONSISTENCY:** Firm. **PLASTICITY:** Non-plastic. **STICKINESS:** Non-sticky. **ROOTS:** Very few, Fine. **PACKING DENSITY:** High. **POROSITY:** Low. **MACROPORES:** Fine.



## LABORATORY ANALYSIS

Horizon	pH	Total (%)		Organic Carbon (%)	Loss-on-ignition (%)
		Nitrogen	Carbon		
1 (Ap)	8.3	0.31	4.26	2.78	
2 (AB)	8.5	0.12	2.62	0.94	
3 (Bs buried)	8.2	0.07	1.19	0.48	
4 (2C buried)	8.5	0.01	0.24	0.16	

OXALATE EXTRACTABLE		EXCHANGEABLE COMPLEX					
Fe (g kg <sup>-1</sup> )	Al (g kg <sup>-1</sup> )	CEC (cmol kg <sup>-1</sup> )	Exchangeable Bases (cmol kg <sup>-1</sup> )				Base Saturation (%)
			Na <sup>+</sup>	K <sup>+</sup>	Mg <sup>2+</sup>	Ca <sup>2+</sup>	
2.98	0.73	20.60	0.5	8.97	1.18	19.40	Sat.
4.47	0.83	12.20	0.35	5.00	0.39	11.9	Sat.
11.35	3.01	13.1	0.51	0.02	0.23	13.20	Sat.
0.93	0.73	1.82	0.26	0.14	0.209	2.27	Sat.

PARTICLE SIZE (%)			Textural Class USDA	Bulk Density g/cm <sup>3</sup>	Standard Deviation
Sand 2000-50 μm	Silt 50-2 μm	Clay <2 μm			
64	18	18	Sandy Loam	1.19	0.11
62	23	15	Sandy Loam	0.97	0.06
54	35	11	Sandy Loam		
57	37	6	Sandy Loam		

**SERIES: ROSS CARBERY (0900RO) - REPRESENTATIVE PROFILE DESCRIPTION - PDF version available**

**Reference profile:** RPW39BR01  
**Weather:** Overcast

**LAND USE**  
**Land use:** Grassland improved  
**Human technologies:** Fertilizer applications



**TOPOGRAPHY**

**Position:** Lower slope  
**Form:** Concave  
**Aspect:** SE

**ROCK OUTCROPS** None (0 %)

**SURFACE STONE** None (0 %)

**PARENT MATERIAL**

**Substrate type:** Drift  
**Substrate subgroup:** Siliceous stones

**IRISH CLASSIFICATION (2013)**

**Soil subgroup:** 900 Typical Brown Podzolics  
**National Soil Series:** Ross Carbery  
**Definition:** Coarse loamy compact drift with siliceous stones

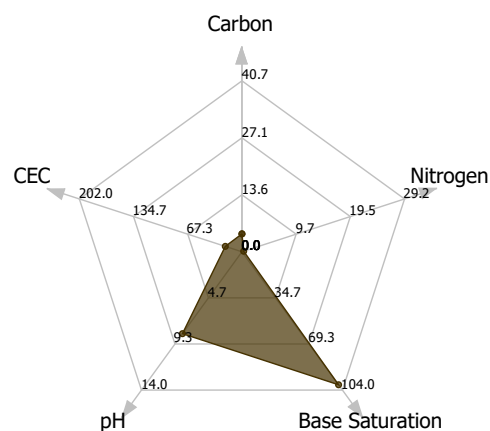
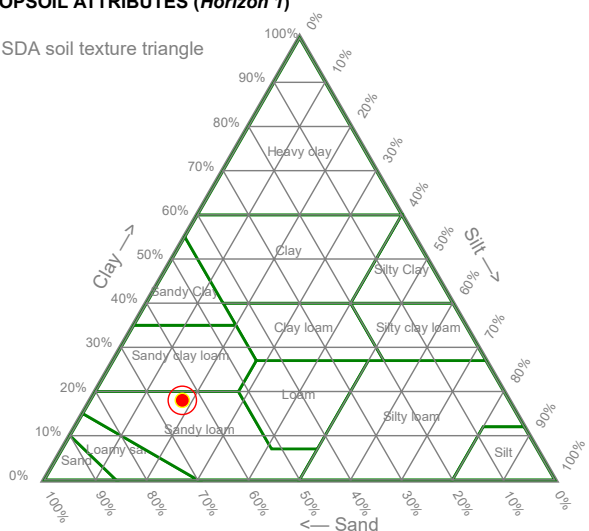
**TEXTURAL CRITERIA**

**Texture 1:** Coarse loamy  
**Texture 2:** -

[Download a PDF version of this profile description here](#)

**TOPSOIL ATTRIBUTES (Horizon 1)**

USDA soil texture triangle



**Horizon 1: 0 - 35 cm**

**Humose:** No  
**Matrix colour (moist):** 10YR33  
**Texture:** Sandy

**Stones (% total):** Few (2-5 %)  
**Stones details:** Fine gravels (2-6 mm)  
**Stickiness:** Non-sticky

**HCL reaction:** No reaction  
**Packing density:** Very Low  
**Plasticity:** Non-plastic

**TOTAL %**

**Nitrogen:** 0.31  
**Carbon:** 4.26  
**Organic carbon:** 2.78  
**Loss on ignition:** -

**PARTICLE SIZE %**

**Sand:** 64%  
**Silt:** 18%  
**Clay:** 18%

**Textural Class (USDA):** Sandy Loam  
**Bulk density:** -  
**pH:** 8.29

**EXCHANGEABLE COMPLEX**

**Exchangeable Bases (cmol kg<sup>-1</sup>)**  
**Na:** 0.51  
**K:** 0.09  
**Mg:** 1.20  
**Ca:** 19.48

**CEC (cmol kg<sup>-1</sup>):** 20.69  
**Base saturation:** 100%

**Horizon 2: 35 - 70 cm**

**Humose:** No  
**Matrix colour (moist):** 10YR43  
**Texture:** Coarse loamy

**Stones (% total):** Common (5-15 %)  
**Stones details:** Fine gravels (2-6 mm)  
**Stickiness:** Non-sticky

**HCL reaction:** No reaction  
**Packing density:** Medium  
**Plasticity:** Non-plastic

<b>TOTAL %</b>		<b>PARTICLE SIZE %</b>	
Nitrogen:	0.12	Sand:	62%
Carbon:	2.62	Silt:	23%
Organic carbon:	0.94	Clay:	15%
Loss on ignition:	-		
		<b>Textural Class (USDA):</b>	Sandy Loam
		<b>Bulk density:</b>	-
		<b>pH:</b>	8.46
<b>EXCHANGEABLE COMPLEX</b>			
<b>Exchangeable Bases (cmol kg<sup>-1</sup>)</b>		<b>CEC (cmol kg<sup>-1</sup>):</b> 12.23	
Na:	0.36	<b>Base saturation:</b> 100%	
K:	0.05		
Mg:	0.40		
Ca:	11.99		

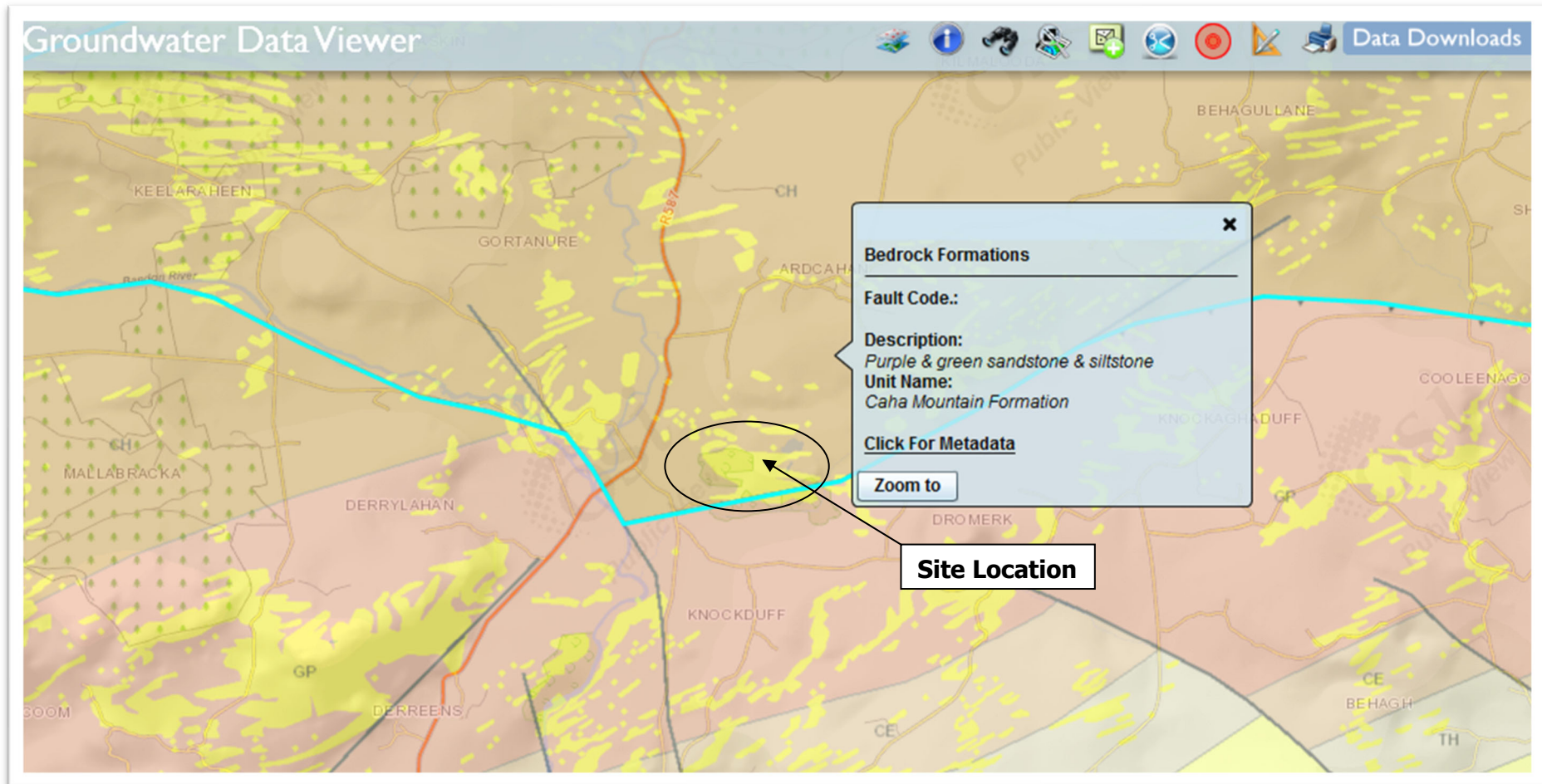
**Horizon 3: 70 - 100 cm**

<b>Humose:</b>	No	<b>Stones (% total):</b>	Common (5-15 %)	<b>HCL reaction:</b>	No reaction
<b>Matrix colour (moist):</b>	75YR46	<b>Stones details:</b>	Fine gravels (2-6 mm)	<b>Packing density:</b>	Medium
<b>Texture:</b>	Coarse loamy	<b>Stickiness:</b>	Non-sticky	<b>Plasticity:</b>	Non-plastic
<b>TOTAL %</b>		<b>PARTICLE SIZE %</b>			
Nitrogen:	0.07	Sand:	54%	<b>Textural Class (USDA):</b>	Sandy Loam
Carbon:	1.19	Silt:	35%	<b>Bulk density:</b>	-
Organic carbon:	0.48	Clay:	11%	<b>pH:</b>	8.21
Loss on ignition:	-				
<b>EXCHANGEABLE COMPLEX</b>					
<b>Exchangeable Bases (cmol kg<sup>-1</sup>)</b>			<b>CEC (cmol kg<sup>-1</sup>):</b> 13.12		
Na:	0.51	<b>Base saturation:</b> 100%			
K:	0.03				
Mg:	0.23				
Ca:	13.25				

**Horizon 4: 100 - 150 cm**

<b>Humose:</b>	No	<b>Stones (% total):</b>	Many (15-40 %)	<b>HCL reaction:</b>	No reaction
<b>Matrix colour (moist):</b>	25Y62	<b>Stones details:</b>	Fine gravels (2-6 mm)	<b>Packing density:</b>	High
<b>Texture:</b>	Fine loamy	<b>Stickiness:</b>	Non-sticky	<b>Plasticity:</b>	Non-plastic
<b>TOTAL %</b>		<b>PARTICLE SIZE %</b>			
Nitrogen:	0.01	Sand:	57%	<b>Textural Class (USDA):</b>	Sandy Loam
Carbon:	0.24	Silt:	37%	<b>Bulk density:</b>	-
Organic carbon:	0.16	Clay:	6%	<b>pH:</b>	8.45
Loss on ignition:	-				
<b>EXCHANGEABLE COMPLEX</b>					
<b>Exchangeable Bases (cmol kg<sup>-1</sup>)</b>			<b>CEC (cmol kg<sup>-1</sup>):</b> 1.82		
Na:	0.27	<b>Base saturation:</b> 100%			
K:	0.15				
Mg:	0.21				
Ca:	2.28				

Appendix 6.2 – Ardcahan EIAR – Land Use/Soils (Geology) Chapter  
Geological Survey of Ireland Geology Map



**Appendix 6.2.3: Regional Bedrock Map indicating the whole quarry area is underlain by the Caha Mountain Formation (CH) comprising Purple & Green Sandstone & Siltstone. (source [www.gsi.ie](http://www.gsi.ie)). The Gunpoint Formation (GP) occurs to the South.**

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## **APPENDIX 6.3**

# **ROCK QUALITY PSV LAB TEST REPORTS**

**VOLUME III**

APPENDICES

APRIL 2026




Ardcahan Quarry rEiAR – Chapter 6 Land Use, Soils (Geology)  
**Appendix 6.3 – Rock Quality PSV Lab Test Reports**

# Appendix 6.3 – Ardcahan EIAR – Land Use Soils/Geology Quarry Polished Stone Value Laboratory Results.

Stanger Testing Services (Ireland) Ltd  
 Edgeworthstown Business Park  
 Edgeworthstown, Co. Longford  
 Tel : 043 667 2070 Email : contact@stanger.ie

**Stanger**



Your Ref :  
 Our Ref : E13046  
 Date : 06 May 2014  
 Job No. : J0000479

**Certificate of Test for Polished Stone Value on a Sample of Aggregate to BS EN 1097 - 8 : 2009**

Client : Murray Bros Tarmacadam Ltd  
 Contract : Dunmanway Quarry  
 Supplier / Source : Murray Bros Tarmacadam Ltd Dunmanway Quarry  
 Sample Location : Quarry Production  
 Method of Sampling : BS EN 932 : 1 1997  
 Sample Description : 10mm Chips  
 Date Sampled : 12/03/2014  
 Date Received : 13/03/2014  
 Our Sample Ref. : E13046  
 Date Test Completed : 02 May 2014  
 Declared Control Stone Value : 49.0

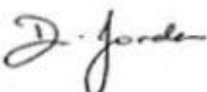
**Test Result**

Specimen No.	Run No.	Control Stone	Specimen
1	1	47.3	61.3
2	1	47.3	60.7
3	2	48.3	60.0
4	2	49.0	60.3
Mean Value :		48.0	60.6
Laboratory Determined P.S.V :			<b>62</b>

**Remarks :**

- a The test results only relate to the sample tested
- b We confirm that in preparing this report we have exercised all reasonable skill and care
- c Please be advised that all samples (if not destroyed in the testing process) will be disposed of 7 days from the date of issue of this report unless we received written instruction to retain them, in which case charges may apply.

Comparative Sample in accordance with NRA IAN 05/13 - Sample Tested by Stanger Testing Services, Glasgow

Signed :   
 for Stanger Testing Services (Ireland) Ltd

Date : 06 May 2014


Authorised signatories :

D. Jordan - Contracts Manager       D. Djekovs - Technician

## Appendix 6.3.1 – PSV Results from Ardcahan Quarry Rock Aggregate Testing.

# Appendix 6.3 – Ardcahan EIAR – Land Use Soils/Geology Quarry Polished Stone Value Laboratory Results.

**Stanger Testing Services (Ireland) Ltd**  
 Edgeworthstown Business Park  
 Edgeworthstown, Co. Longford  
 Tel : 043 667 2070 Email : contact@stanger.ie

**Stanger**  
  
 0251 Group

**Your Ref :**  
**Our Ref :** E13045  
**Date :** 13 May 2014  
**Job No. :** J0000479

**Certificate of Test for Polished Stone Value on a Sample of Aggregate to BS EN 1097 - 8 : 2009**


**Client :** Murray Bros Tarmacadam Ltd  
**Contract :** Dunmanway Quarry  
**Supplier / Source :** Murray Bros Tarmacadam Ltd Dunmanway Quarry  
**Sample Location :** Quarry Production  
**Method of Sampling :** BS EN 932 : 1 1997  
**Sample Description :** 10mm Chips  
**Date Sampled :** 12/03/2014  
**Date Received :** 13/03/2014  
**Our Sample Ref. :** E13045  
**Date Test Completed :** 13 May 2014  
**Declared Control Stone Value :** 49.0

**Test Result**

Specimen No.	Run No.	Control Stone	Specimen
1	1	47.3	61.0
2	1	48.0	60.0
3	2	47.6	60.3
4	2	48.0	59.6
Mean Value :		47.7	60.2
Laboratory Determined P.S.V :			<b>62</b>

**Remarks :**

- a The test results only relate to the sample tested
- b We confirm that in preparing this report we have exercised all reasonable skill and care
- c Please be advised that all samples (if not destroyed in the testing process) will be disposed of 7 days from the date of issue of this report unless we received written instruction to retain them, in which case charges may apply.



Signed :   
 for Stanger Testing Services (Ireland) Ltd

Date : 13 May 2014

Authorised signatories :  
 D. Jordan - Contracts Manager  
 D. Djakovs - Technician


## Appendix 6.3.2 – PSV Results from Ardcahan Quarry Rock Aggregate Testing.

# Appendix 6.3 – Ardcahan EIAR – Land Use Soils/Geology Quarry Polished Stone Value Laboratory Results.

	<p><b>TESTCONSULT LIMITED</b>          40A Hardwick Grange, Warrington, WA1 4RF          Testconsult Ireland Ltd.          Clonminam Ind. Est., Portlaoise, Co. Laois          Tel.: (057) 8664885 Fax.: (057) 8664380</p>																			
<b>LABORATORY TEST REPORT</b>																				
<b>DETERMINATION OF POLISHED STONE VALUE (PSV)</b>																				
<b>In accordance with BS EN 1097-8 : 2000</b>																				
<table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;"><b>Project:</b> Ardcahan Quarry</td> <td style="width: 25%;"><b>Job No.:</b> PL</td> <td style="width: 25%;"></td> </tr> <tr> <td><b>Client:</b> Murray Brothers Tarmacadam Ltd. Ardcahan Quarry Dunmanway Co. Cork</td> <td><b>Lab Ref No.:</b> ST 60018</td> <td></td> </tr> <tr> <td></td> <td><b>Date Received:</b> 07/03/2014</td> <td></td> </tr> <tr> <td><b>Order No:</b> N/A</td> <td><b>Date Reported:</b> 09/04/2014</td> <td></td> </tr> <tr> <td><b>Originator:</b> Fred Lavers</td> <td><b>Material:</b> 10mm Aggs</td> <td></td> </tr> <tr> <td></td> <td><b>Specification:</b> IS EN 13043. IAT Table 3</td> <td></td> </tr> </table>			<b>Project:</b> Ardcahan Quarry	<b>Job No.:</b> PL		<b>Client:</b> Murray Brothers Tarmacadam Ltd. Ardcahan Quarry Dunmanway Co. Cork	<b>Lab Ref No.:</b> ST 60018			<b>Date Received:</b> 07/03/2014		<b>Order No:</b> N/A	<b>Date Reported:</b> 09/04/2014		<b>Originator:</b> Fred Lavers	<b>Material:</b> 10mm Aggs			<b>Specification:</b> IS EN 13043. IAT Table 3	
<b>Project:</b> Ardcahan Quarry	<b>Job No.:</b> PL																			
<b>Client:</b> Murray Brothers Tarmacadam Ltd. Ardcahan Quarry Dunmanway Co. Cork	<b>Lab Ref No.:</b> ST 60018																			
	<b>Date Received:</b> 07/03/2014																			
<b>Order No:</b> N/A	<b>Date Reported:</b> 09/04/2014																			
<b>Originator:</b> Fred Lavers	<b>Material:</b> 10mm Aggs																			
	<b>Specification:</b> IS EN 13043. IAT Table 3																			
<b>Sample Details</b>																				
<b>10mm Aggs</b>																				
<b>Supplier:</b>	Murray Bros.	<b>Date of Sampling:</b> Client Info.																		
<b>Source:</b>	Ardcahan Quarry	<b>Sampled By:</b> Client																		
<b>Location:</b>	Client Info.	<b>In accordance with EN 933:</b> Yes																		
<b>Sample Type:</b>	Bulk	<b>Control Stone Batch No.:</b> 11051610																		
<b>Results</b>																				
<b>Recorded Polished Stone Value</b>																				
<b>Test Specimen:</b>	Test Run 1	a 60.7 Mean																		
		b 63.7 recorded																		
	Test Run 2	c 59.7 value (S) = 60.8																		
		d 59.0																		
<b>Control Stone:</b>	Test Run 1	a 51.3 Mean																		
		b 50.3 recorded																		
	Test Run 2	c 47.3 value (C) = 48.9																		
		d 46.7																		
<b>Corrected Polished Stone Value: S + 49.0 - C =</b>		<b>61</b>																		
Tested in accordance with the above specifications																				
<b>Approved Signature</b>																				
<b>TESTCONSULT IRELAND LIMITED</b>																				
<input type="checkbox"/> Mark Dawkins, Director; <input checked="" type="checkbox"/> Michael Robinson, Director & Lab. Manager <input type="checkbox"/> James Ward, Senior Technician																				
Page 1 of 1	MBL ST 60018 10mm aggs																			

## Appendix 6.3.3 – PSV Results from Ardcahan Quarry Rock Aggregate Testing.

# Appendix 6.3 – Ardcahan EIAR – Land Use Soils/Geology Quarry Polished Stone Value Laboratory Results.



INDEPENDENT MATERIALS TESTING | TRAINING | CONSULTING & CALIBRATION

SAFETY ROAD, TETTERBURN LANE  
CULROSSWAY  
Co Cork  
Ireland  
8D118560

TEST REPORT REF: S46087  
Page 1 of 1

### LABORATORY TEST REPORT

**TEST REQUIREMENTS:** To determine the Polished Stone Value (PSV) of aggregate sample in accordance with **BS EN 1097-8 : 2009**

**SAMPLE DETAILS:**



Certificate of sampling received:	<b>No</b>	Name of Source:	<b>Unknown</b>
Laboratory Ref. No:	<b>S46087</b>	Method of Sampling:	<b>Unknown</b>
Client Ref. No:	<b>10mm</b>	Sampled By:	<b>Client</b>
Date and Time of Sampling:	<b>Unknown</b>		
Date of Receipt at Lab:	<b>10/02/2014</b>		
Date of Start of Test:	<b>25/02/2014</b>		
Sampling Location:	<b>Unknown</b>		
Material Description:	<b>10mm</b>		

**RESULTS:**

Recorded Polished Stone Value				
Test Specimen	Test Run 1	(i)	57.7	Mean Recorded Value (S) = <b>57.8</b>
		(ii)	57.3	
	Test Run 2	(iii)	58.0	
		(iv)	58.3	
Control Stone	Test Run 1	(i)	47.7	Mean Recorded Value (C) = <b>47.3</b>
		(ii)	47.0	
	Test Run 2	(iii)	47.0	
		(iv)	47.3	


Corrected Polished Stone Value:  $S + 49^* - C =$  **60**

**Comments**  
\*New Control Stone

Certificate Prepared by:-		Approved by: - 
	Mathew Sayer Job Coordinator	Eric Goulden Technical Manager

Trefelin Bangor Gwynedd LL57 4LH T +44 (0)1248 355269 F +44 (0)1248 351563 E postmaster@celtest.com W www.celtest.com

Celtest Company Limited. Registered in Wales and England 1533370. Vat No. 352-5034-81



## Appendix 6.3.4 – PSV Results from Ardcahan Quarry Rock Aggregate Testing.

Murray Brothers Tarmacadam Ltd

**APPENDIX 6.4**  
**OLD BOREHOLE DRILLING LOGS**  
**2003**

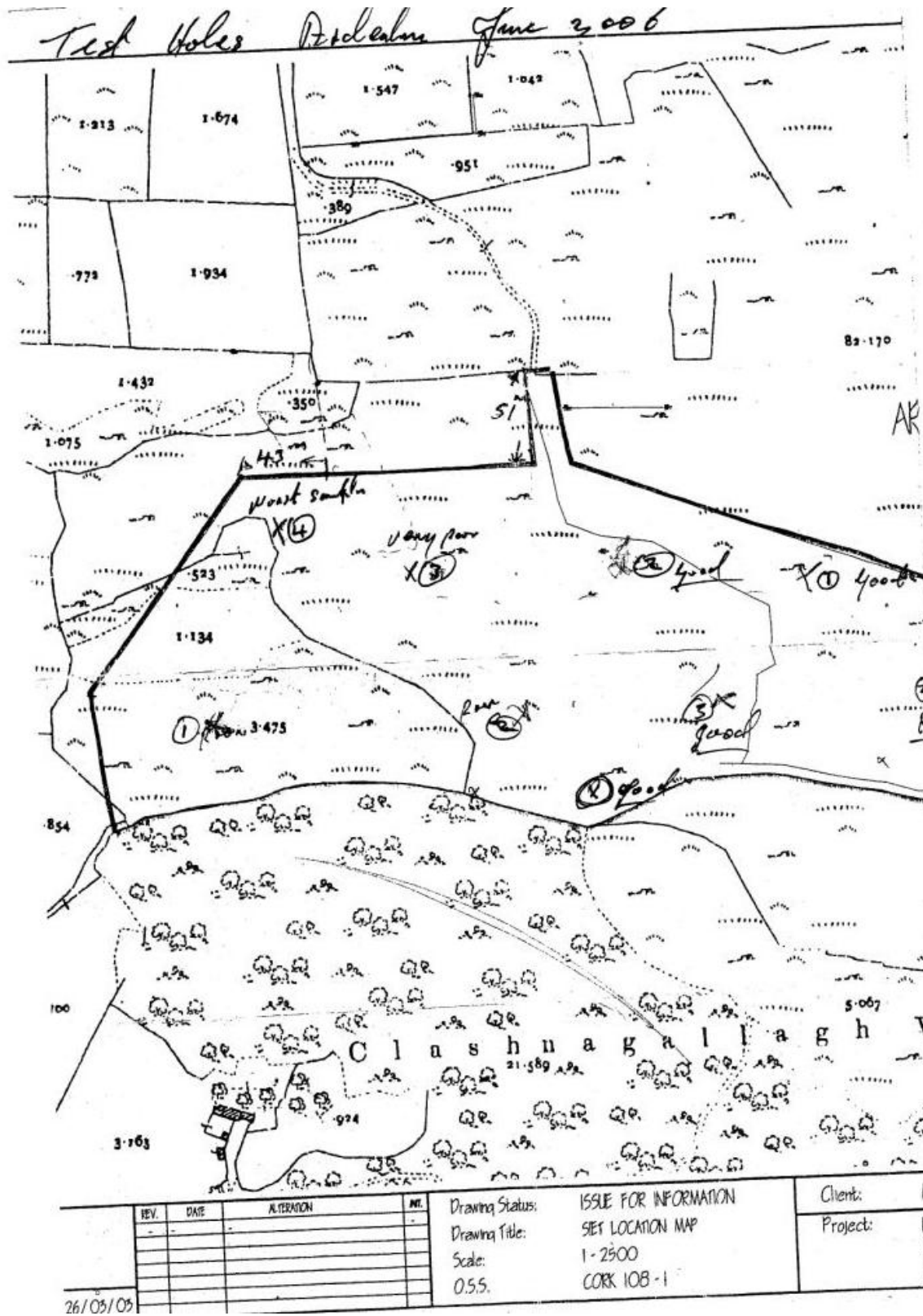
**VOLUME III**  
APPENDICES

APRIL 2026



Ardcahan Quarry EIAR – Chapter 6 Land Use, Soils (Geology)  
**Appendix 6.4 – Old Borehole Drilling Logs 2003**

Appendix 6.4 – Ardcahan EIAR – Land Use/Soils (Geology)  
 Ardcahan Quarry North Site Area Drilling Data 2003

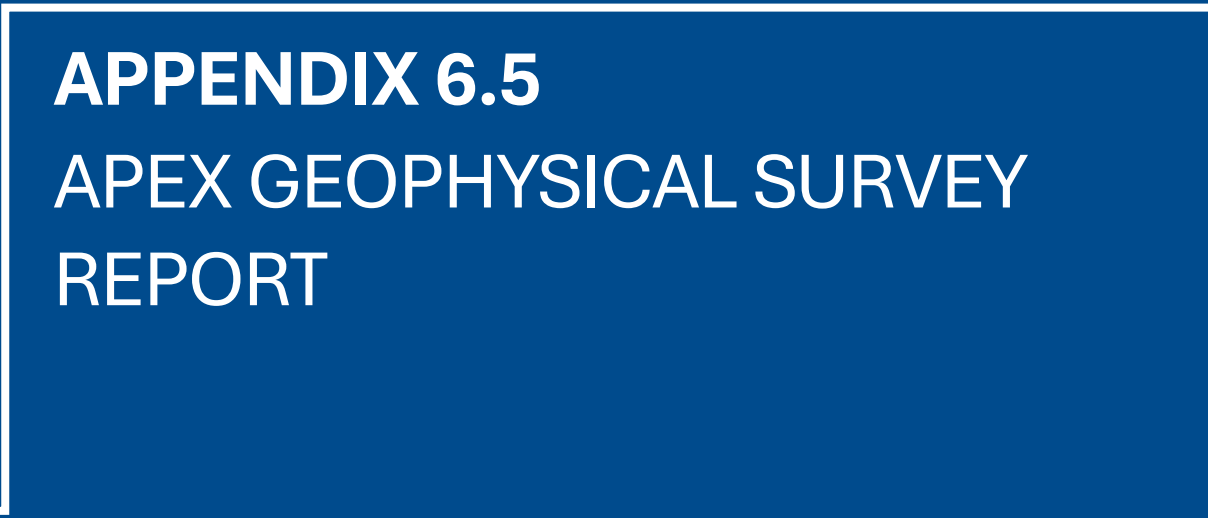


Appendix 6.4.1 – Old Driller Notes – Test Hole Drilling Locations Map 26/03/2003.





Murray Brothers Tarmacadam Ltd



**APPENDIX 6.5**  
**APEX GEOPHYSICAL SURVEY**  
**REPORT**

**VOLUME III**  
APPENDICES



APRIL 2026





Ardcahan Quarry EIAR – Chapter 6 Land Use, Soils (Geology)  
**Appendix 6.5 – Apex Geophysical Survey Report**

AGP22197\_01

REPORT  
ON THE  
GEOPHYSICAL INVESTIGATION  
AT  
ARDCAHAN QUARRY,  
DUNMANWAY,  
Co. CORK  
FOR  
MURRAY BROTHERS  
TARMACADAM LIMITED.



APEX Geophysics Limited  
Unit 6, Knockmullen Business Park  
Gorey  
Co. Wexford

17<sup>TH</sup> JANUARY 2023

T: 0402 21842  
E: [info@apexgeophysics.ie](mailto:info@apexgeophysics.ie)  
W: [www.apexgeophysics.com](http://www.apexgeophysics.com)

## **PRIVATE AND CONFIDENTIAL**

*THE FINDINGS OF THIS REPORT ARE THE RESULT OF A GEOPHYSICAL SURVEY USING NON-INVASIVE SURVEY TECHNIQUES CARRIED OUT AT THE GROUND SURFACE. INTERPRETATIONS CONTAINED IN THIS REPORT ARE DERIVED FROM A KNOWLEDGE OF THE GROUND CONDITIONS, THE GEOPHYSICAL RESPONSES OF GROUND MATERIALS AND THE EXPERIENCE OF THE AUTHOR. APEX GEOPHYSICS LTD. HAS PREPARED THIS REPORT IN LINE WITH BEST CURRENT PRACTICE AND WITH ALL REASONABLE SKILL, CARE AND DILIGENCE IN CONSIDERATION OF THE LIMITS IMPOSED BY THE SURVEY TECHNIQUES USED AND THE RESOURCES DEVOTED TO IT BY AGREEMENT WITH THE CLIENT. THE INTERPRETATIVE BASIS OF THE CONCLUSIONS CONTAINED IN THIS REPORT SHOULD BE TAKEN INTO ACCOUNT IN ANY FUTURE USE OF THIS REPORT.*

<b>PROJECT NUMBER</b>	AGP22197		
<b>AUTHOR</b>	<b>CHECKED</b>	<b>REPORT STATUS</b>	<b>DATE</b>
EURGEOL PETER O'CONNOR P.GEO., M.Sc (GEOPHYSICS), DIP. EIA MGT.	TONY LOMBARD M.Sc (GEOPHYSICS)	V.01	17 <sup>TH</sup> JANUARY 2023

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## 1. EXECUTIVE SUMMARY

APEX Geophysics Limited was requested by Murray Brothers Tarmacadam Limited to carry out a geophysical survey at Ardcahan Quarry, Dunmanway, County Cork. The objectives of the geophysical investigation were to provide information on overburden type and thickness, depth to bedrock, bedrock type and quality and volume of available resource.

Ardcahan Quarry is located approximately 3.5 km north of Dunmanway. The site consists of the working quarry, plant area, overburden and spoil stockpiles, and flooded and overgrown areas with rock outcrop. The site is c.26 ha in extent. Topography ranges from around 90 mOD to 110 mOD and the quarry floor is at c. 75 mOD.

The Geological Survey of Ireland (GSI) Geology map shows purple/green sandstone and siltstone of the Caha Mountain Formation over most of the site with green-grey sandstone and purple siltstone of the Gun Point Formation along the southern boundary. The Quaternary sediments map shows much subcropping/outcropping rock in the site area with some till derived from Devonian sandstones in the southwest. The Caha Mountain Formation is classified as a 'Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones'. The historical 6-inch sheet shows extensive rock outcrop with bedding striking generally east – west.

The geophysical survey was carried out on the 19<sup>th</sup> and the 20<sup>th</sup> December 2022 with the collection of 9 Electrical Resistivity Tomography (ERT) profiles and 3 seismic refraction profiles at accessible locations. No EM31 conductivity was recorded due to the overgrown nature of the site.

Overburden is generally very thin or absent apart from two locations where there are overburden/spoil stockpiles (R5 in the east) and where possible backfilling has occurred (R4 in the north) and where up to 10 m of soil/spoil/fill is indicated. There is some indication of slightly increased overburden thickness along profile R1 in the northwest and a feature on profile R8 in the south may be associated with local backfilling or a buried service. Elsewhere a nominal 2.5 m thick surface layer of highly weathered and fractured rock has been inferred from the seismic data.

Rock type has been divided into predominant higher resistivity slightly weathered/fractured to fresh SANDSTONE with minor SILTSTONE with lower resistivity slightly weathered/fractured SILTSTONE with minor SANDSTONE in places. However the general increase in resistivity with depth indicates that the lower values may be mainly due to weathering and fracturing of the upper rock levels rather a change in rock type. Resistivity values in or adjacent to the working pit are broadly similar to elsewhere across the site. Seismic velocity values for the bedrock indicate a generally medium bedded, moderately strong to strong material.

A potential rock resource of 2.0 m.t. of slightly weathered/fresh rock and 0.6 m.t. of moderately or slightly weathered/fractured rock over 2 x 15 m benches has been made for a c.3.5 ha area north of the working quarry. This estimate is subject to satisfactory drilling and laboratory testing results. There is also scope for further expansion to the southeast and with depth.

Investigation by rotary coring is recommended to confirm rock type and quality. Samples should be taken for testing of physical, mechanical and chemical properties. A detailed topographic survey should be carried out to give accurate elevations and extents of existing workings, and allow better volume calculations. The geophysical report should be reviewed after completion of pitting, drilling, and testing.

## 2. INTRODUCTION

APEX Geophysics Limited was requested by Murray Brothers Tarmacadam Limited to carry out a geophysical survey at Ardcahan Quarry, Dunmanway, County Cork.

### 2.1 Survey Objectives

The objectives of the geophysical investigation were to provide information on the following:

- overburden type and thickness
- bedrock type
- depth to bedrock
- quality of the bedrock.
- volume of available resource.

### 2.2 Site Background

Ardcahan Quarry is located approximately 3.5 km north of Dunmanway. The site consists of the working quarry in the centre-west, area of previous extraction and plant area in the southeast, overburden and spoil stockpiles in the east, and flooded and overgrown areas with rock outcrop in the north. Possible settlement ponds are noted in the east. The site is c.26 ha in extent (Fig. 2.1A).

The topography ranges from 90 mOD to 110 mOD rising to the north. The quarry floor is at c. 75 mOD.



Figure 2.1A. Site location with boundary in blue.



*Figure 2.1B. Northern face of quarry. Dipping beds and folded synclinal structure visible.*



*Figure 2.1C. Plant area and previously worked face looking east*



*Figure 2.1D. Scrub and rock outcrop from spoil heap looking northeast.*

### 2.2.1 Geology

The Geological Survey of Ireland (GSI) 1:100k Bedrock Geology map for the area (GSI, 2018, Fig. 2.2) shows the site as underlain by purple/green sandstone and siltstone of the Caha Mountain Formation. Rock outcrop is present across much of the site area. Green-grey sandstone and purple siltstone of the Gun Point Formation is shown in the south of the site with a faulted boundary between the two formations.

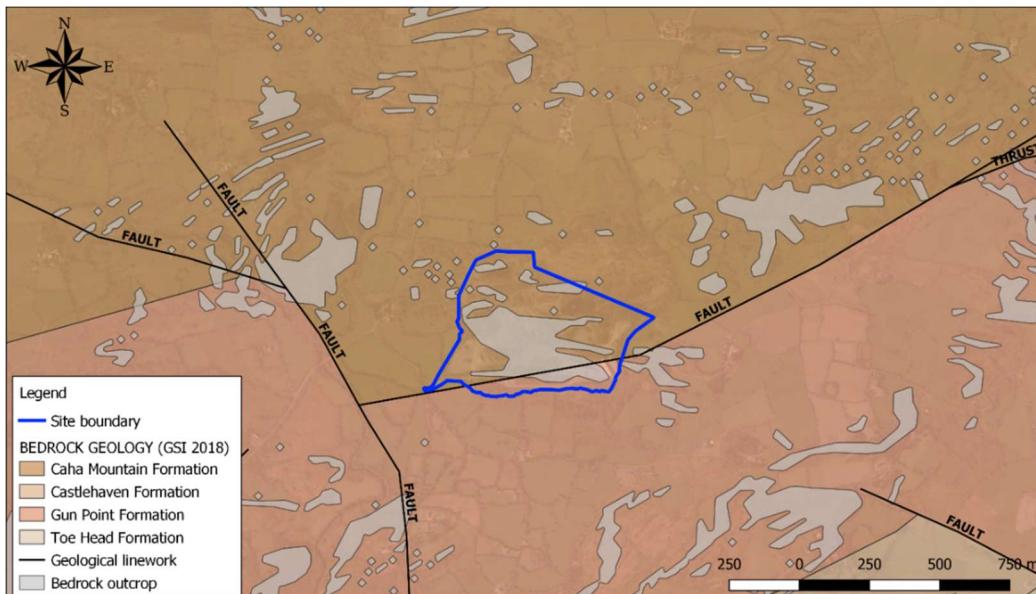


Figure 2.2A. Geological map for the survey area.

### 2.2.2 Soils

The Quaternary sediments map for the area (GSIa, 2019) shows much subcropping/outcropping rock in the site area with till derived from Devonian sandstones in the southwest (Fig. 2.3).

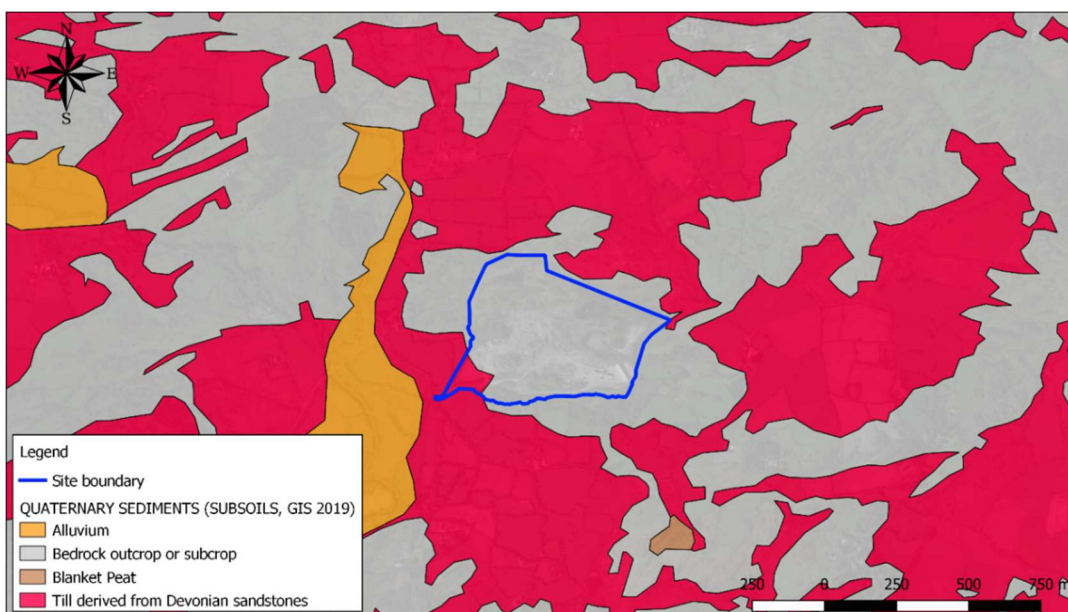


Fig. 2.3: Quaternary sediments map.

### 2.2.3 Aquifers

The rocks of Caha Mountain Formation mapped across the site are classified as a 'Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones' (GSIc, 2019), see Fig. 2.4.

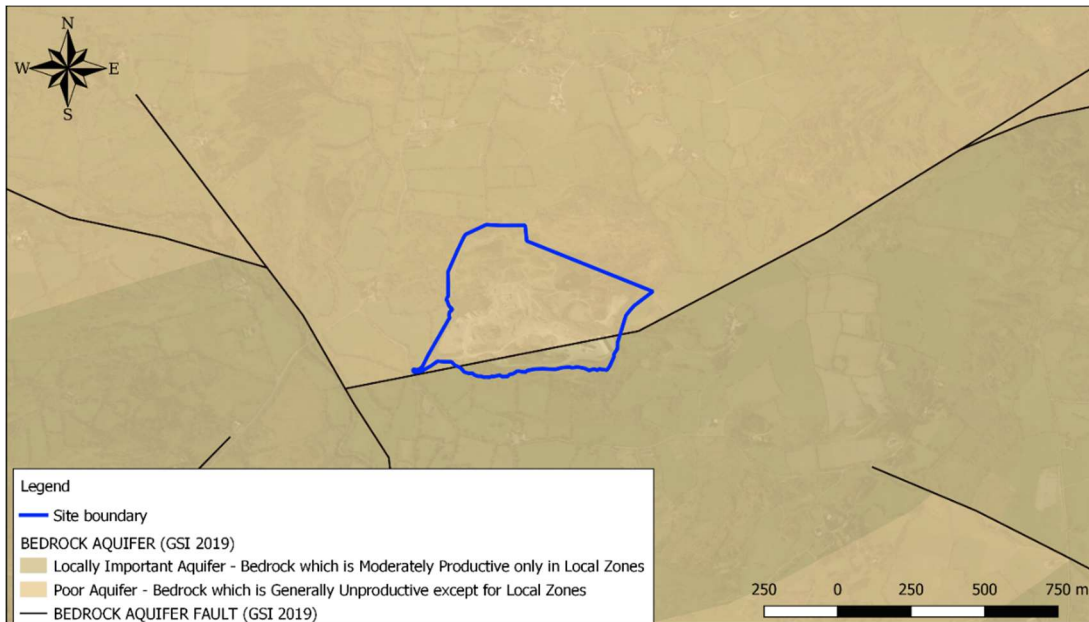


Fig 2.4: Bedrock aquifer.

### 2.2.4 Groundwater Vulnerability

The groundwater vulnerability (GSIb, 2019) is classified as generally 'extreme' to 'rock at surface or karst' across the site (Fig. 2.5).

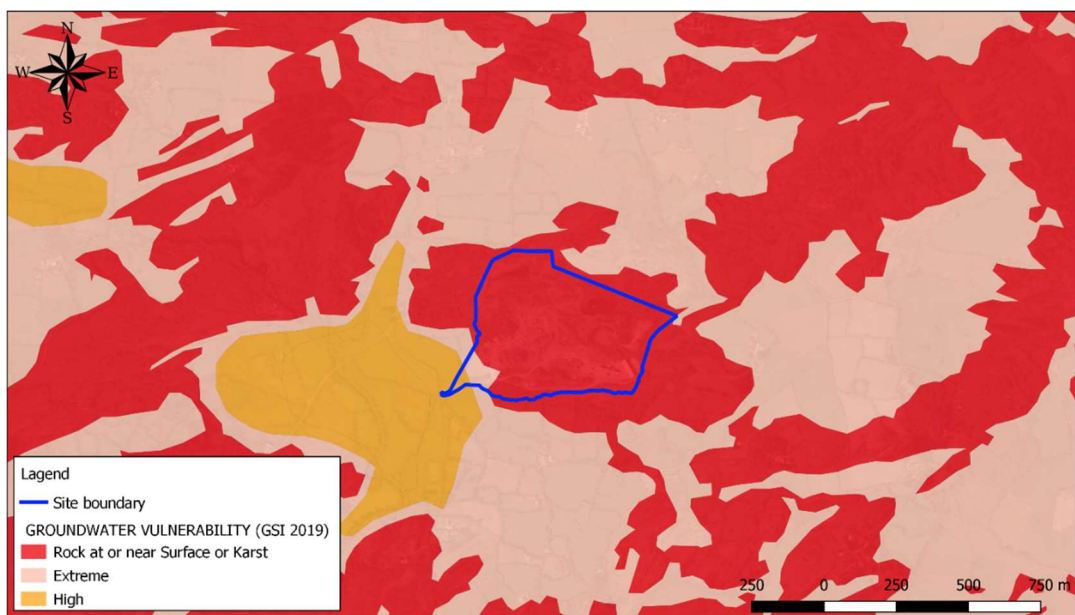


Fig 2.5. Groundwater vulnerability classification.

## 2.2.5 Historical Data

The historical 6-inch sheet for the area (Fig. 2.6) shows extensive rock outcrop striking generally east – west. The rocks are described as ‘purple/brown slates’ and ‘grits’ and are dipping towards the north and northeast at 30-50 degrees.

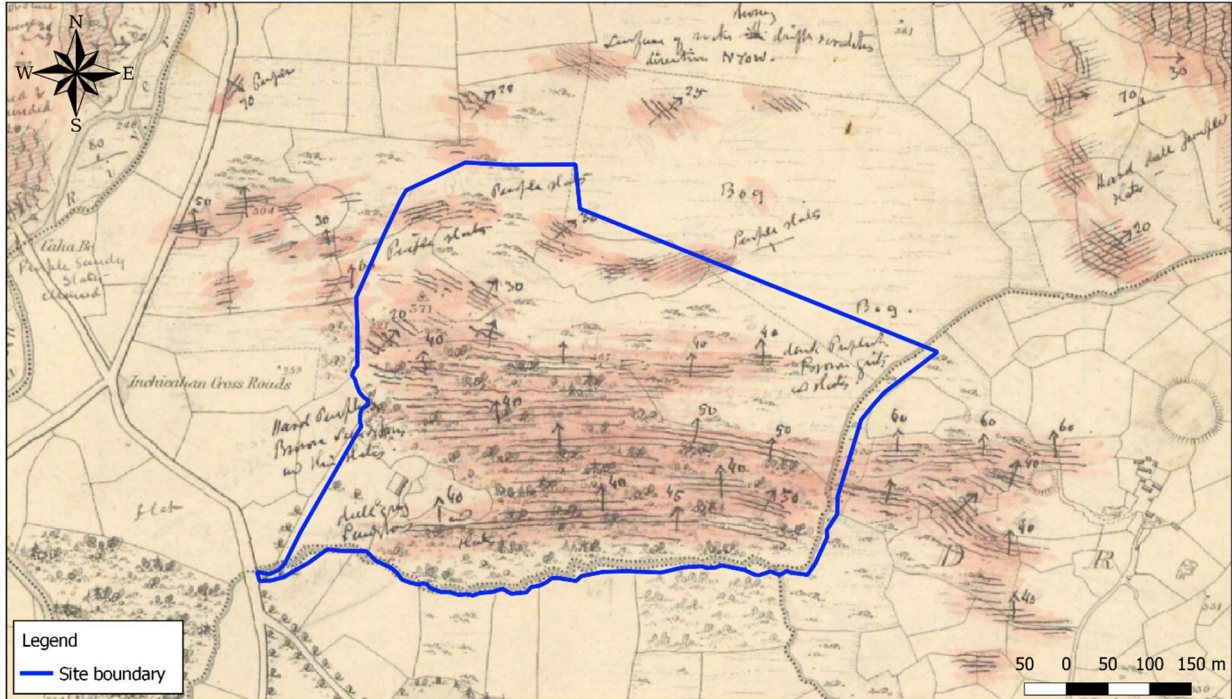


Fig 2.6: The historical 6-inch map (outcropping rock coloured blue).

## 2.3 Survey Rationale

The investigation consisted of 2D Electrical Resistivity Tomography (ERT) and Seismic Refraction profiling:

**ERT** images the resistivity of the materials in the subsurface along a profile to produce a cross-section showing the variation in resistivity with depth, depending on the length of the profile. Each cross-section will be interpreted to determine the material type along the profile at increasing depth, based on the typical resistivities returned for Irish ground materials.

**P-wave Seismic Refraction** profiling measures the velocity of refracted seismic waves through the overburden and rock material and allows an assessment of the thickness and quality of the materials present to be made. Stiffer and stronger materials usually have higher seismic velocities while soft, loose or fractured materials have lower velocities. This method allows us to profile the depth to the top of the bedrock.

As with all geophysical methods the results are based on indirect readings of the subsurface properties. The effectiveness of the proposed approach will be affected by variations in the ground properties. By combining a number of techniques it is possible to provide a higher quality interpretation and reduce any ambiguities which may otherwise exist. Further information on the detailed methodology employed in this investigation is given in **APPENDIX B: DETAILED GEOPHYSICAL METHODOLOGY**.

No geological mapping was carried out during this survey.

### 3. RESULTS

The survey was carried out on the 19<sup>th</sup> and the 20<sup>th</sup> December 2022 with the collection of 9 ERT profiles and 3 seismic refraction profiles at accessible locations. No EM31 conductivity was recorded due to the limited access in scrub covered areas. The survey locations are shown on Drawing AGP22194\_01 (Appendix A).

#### 3.1 ERT Profiling

The ERT profiles (R1 – R9) have been interpreted on the following basis and the results are shown in Drawings AGP22197\_R1-R9 (Appendix A):

Resistivity (Ohm-m)	Interpretation
350 – 3,000	FILL/GRAVEL (at surface)
50 - 350	SOIL/SPOIL/FILL/highly weathered ROCK
350 – 1,000	Possible SILTSTONE with minor SANDSTONE (or weathered/fractured SANDSTONE with minor SILTSTONE)
1,000 – 4,000	Slightly Weathered/Fractured – Fresh SANDSTONE with minor SILTSTONE

#### 3.3 Seismic Refraction Profiling

Three seismic refraction spreads were recorded across the site (S1 – S3) and the results have been incorporated into the relevant ERT profiles and are also presented in Appendix C. The seismic data showed 3 velocity layers that have been interpreted on the following basis:

P-Wave Seismic Velocity (m/s)	Interpretation	Estimated Stiffness/Rock Quality
300 - 550	SOIL/SPOIL/FILL/highly weathered ROCK	Loose/soft – medium dense/firm
800 - 1,000	SOIL/SPOIL/FILL/highly weathered ROCK	Firm/dense, poor
3,600 - 3,800	Slightly weathered/fractured – Fresh SANDSTONE with minor SILTSTONE, moderately strong to strong.	Good

### 4. DISCUSSION

#### 4.1 Overburden

Overburden is generally very thin or absent on the ERT profiles apart from two main locations where there are overburden/spoil stockpiles or where possible backfilling has occurred. These two locations are along profile R5 in the east of the site where up to 10 m of overburden/spoil is indicated and between 70 and 100 m along profile R4 in the centre of the site where up to 10 m of overburden/fill is indicated. Overburden/spoil resistivities are typical of a gravelly silty clay material type.

There is some indication of slightly increased overburden thickness in places along profile R1 in the northeast of the site. A low resistivity zone between 120 and 130 m along profile R8 may be associated with local backfilling or a buried service.

Elsewhere a nominal 2.5 m thick surface layer has been inferred based on the results of seismic profile S3 on ERT profile R2 which outlined a 2.0 – 2.5 m thick low velocity (550 m/s) layer. This layer has been interpreted as probable highly weathered and fractured rock (blasting overbreak and joint relaxation on R6 on the quarry floor).

### Bedrock

Rock type has been divided into two units based on electrical resistivity values. Values in the range 350 – 1,000 Ohm-m occur on all profiles and have been interpreted as possible SILTSTONE with minor SANDSTONE (or weathered/fractured SANDSTONE with minor SILTSTONE). The absence of this lower resistivity at depth on profile R6 (quarry floor) is an indication that it is associated with increased weathering rather than rock type.

Elsewhere values in the range 1,000 to 4,000 Ohm-m have been interpreted as predominantly slightly weathered/fracture to fresh SANDSTONE with minor SILTSTONE. The high electrical resistivity of this material (1,000 – 10,000 Ohm-m) indicates a high quartz content which may give rise to a high wear rate on crushing equipment.

Seismic velocity values for all bedrock types are in the range 3,600 – 3,800 m/s indicating a generally medium bedded, moderately strong to strong material. Resistivity values in or adjacent to the working pit are broadly similar to elsewhere across the site.

The localised decrease in resistivity between 20 and 30 m along profile R9 coincides with where the E-W trending fault is shown on the GSI geological map and may be associated with it.

## 4.2 Resource estimate

A preliminary estimate of the rock resource present north of the existing quarry (Drawing AGP22197\_02) has been made for an area of approximately 3.5 ha. Overburden and rock volumes have been calculated for 2 benches (bench height 15 m). A standoff of 50m from the site boundary has been taken and a catch bench/face slope width of 7.5 m has been used. As no detailed topographic or mapping data is available face positions from open source aerial photos and average heights from the geophysical data have been used. The results are shown in Table 4.1 with a potential resource of 2.0 m.t. of slightly weathered/fresh rock and 0.6 m.t. of moderately or slightly weathered/fractured rock. This estimate is subject to satisfactory drilling and laboratory testing results.

Bench	Average Surface (mOD)	Average Base (mOD)	Area (ha)	Overb. thickness (m)	Overb. volume (cu.m.)	Weath. Rock thickness (m)	Weath. Rock Volume (cu.m.)	Weath. Rock @ 2.5 tonnes/cu.m. (tonnes)	Rock thickness (m)	Rock Volume (cu.m.)	Rock @ 2.5 tonnes/cu.m. (tonnes)
Overburden	107	105	35,000	2.0	70,000						
Weathered	105	98	35,000			7	245,000	612,500			
1	98	90	35,000						8.0	280,000	700,000
2	90	75	35,700						15.0	535,500	1,338,750
Totals					70,000			612,500		815,500	2,038,750

Table 4.1 Potential resource estimate.

There is also scope for extension of the present quarry into the plant area to the east based on the results of profiles R8 and R9, and downward from the floor of the existing quarry based on the results of profile R6.

## 5. RECOMMENDATIONS

Further investigation by rotary coring is recommended to confirm rock type and quality. Samples should be taken for testing of physical, mechanical and chemical properties. Locations will be dependent on future development plans and permit but should include:

No.	Easting	Northing	Target	Depth (m)
PBH1	524774.0	556018.4	Rock quality	50
PBH2	524886.3	556046.6	Rock quality	50
PBH3	525024.9	556033.9	Rock quality	50

A detailed topographic survey should be carried out to give accurate elevations and extents of existing workings, and allow better volume calculations.

The geophysical report should be reviewed after completion of pitting, drilling, and testing.

## REFERENCES

Geotomo Software, 2006;  
'RES2DINV Users Manual', Malaysia.

GSI, 2018;  
Bedrock Geology 1:100,000 Shapefile. <http://www.gsi.ie/Mapping.htm>

GSIa, 2019;  
Quaternary Subsoils Shapefile. <http://www.gsi.ie/Mapping.htm>

GSIb, 2019;  
Groundwater Vulnerability Shapefile. <http://www.gsi.ie/Mapping.htm>

GSIc, 2019;  
Bedrock Aquifer Shapefile. <http://www.gsi.ie/Mapping.htm>

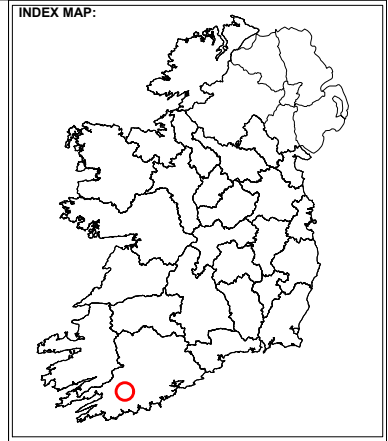
Interpex Ltd. 1995; Firstpix Users' Manual.

Interpex Ltd. 1995; Gremix Users' Manual.

## APPENDIX A: DRAWINGS

The information derived from the geophysical investigation is presented in the following drawings:

AGP22197_01	Geophysical Locations	1:4000	@ A4
AGP22197_02	Summary Interpretation Map	1:4000	@ A4
AGP22197_R1	Results & Interpretation: R1	1:1100	@ A4
AGP22197_R2	Results & Interpretation: R2 & S3	1:1000	@ A4
AGP22197_R3	Results & Interpretation: R3	1:1000	@ A4
AGP22197_R4	Results & Interpretation: R4 & S2	1:1000	@ A4
AGP22197_R5	Results & Interpretation: R5 & S1	1:1000	@ A4
AGP22197_R6	Results & Interpretation: R6	1:1000	@ A4
AGP22197_R7	Results & Interpretation: R7	1:1000	@ A4
AGP22197_R8	Results & Interpretation: R8	1:1000	@ A4
AGP22197_R9	Results & Interpretation: R9	1:1000	@ A4



LEGEND:

- Site boundary
- R1 2D resistivity profile
- S1 Seismic refraction profile

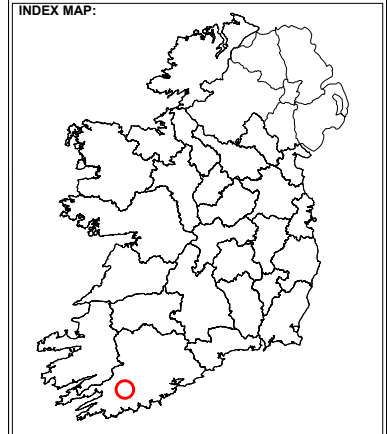
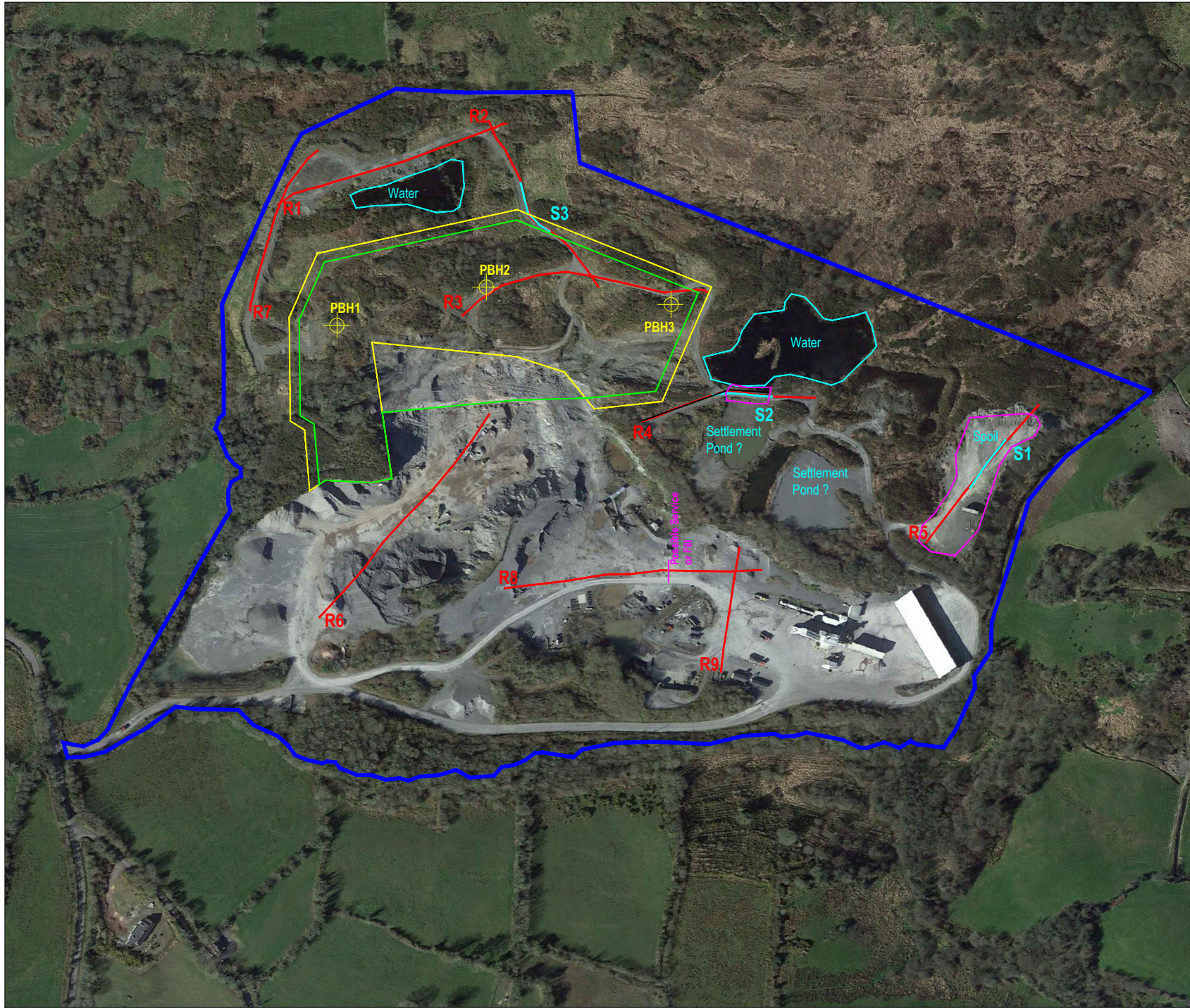
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PROJECT:	ARDCAHAN QUARRY GEOPHYSICAL SURVEY		
CLIENT:	MURRAY BROTHERS TARMACADAM LIMITED		
DRAWING NO:	AGP22197_01		
SCALE:	AS INDICATED @ A4		
DATE:	17-01-2023		
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- LEGEND:
- Site boundary
  - 2D resistivity profile
  - Seismic refraction profile
  - Thick soil/spoil/fill
  - Proposed Benches
  - Possible Service or Fill
  - Proposed Borehole

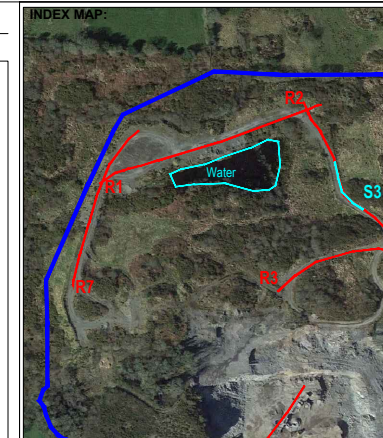
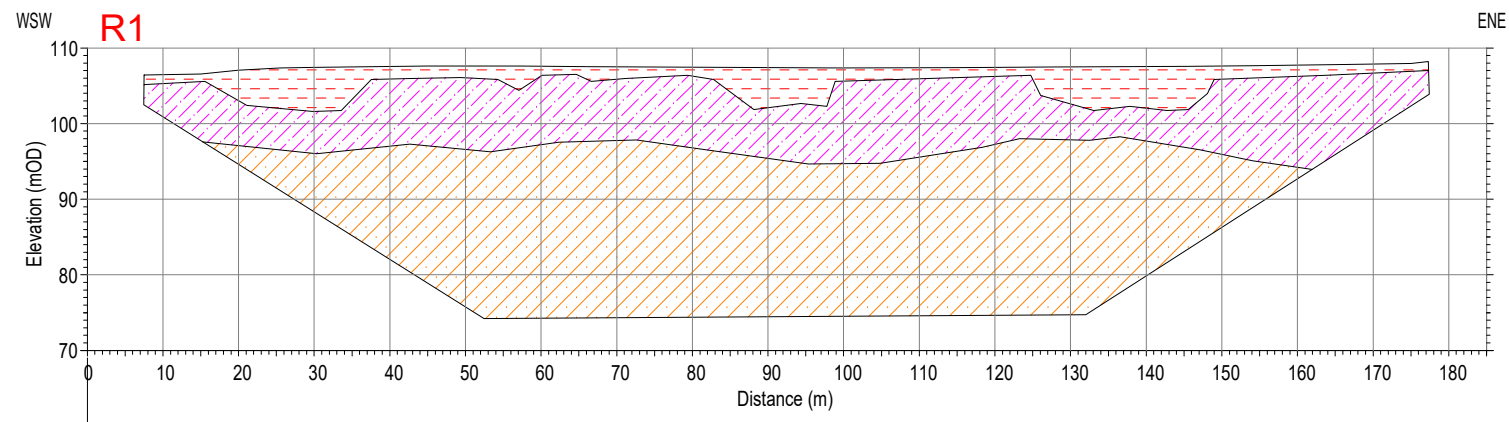
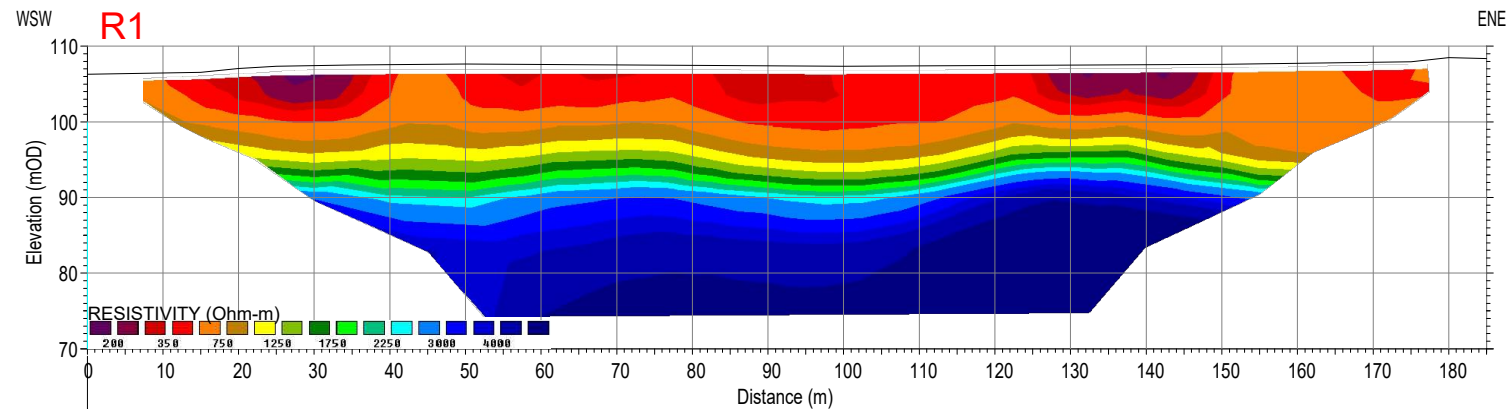
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- LEGEND:**
- Seismic refraction layer with interpreted P-wave velocity
  - FILL/GRAVEL
  - SOIL/SPOIL/FILL
  - Highly weathered/fractured ROCK (from seismic data)
  - Possible SILTSTONE with minor SANDSTONE (or weathered/fractured SANDSTONE with minor SILTSTONE)
  - Slightly weathered/fractured - fresh SANDSTONE with minor SILTSTONE
  - POSSIBLE FAULT

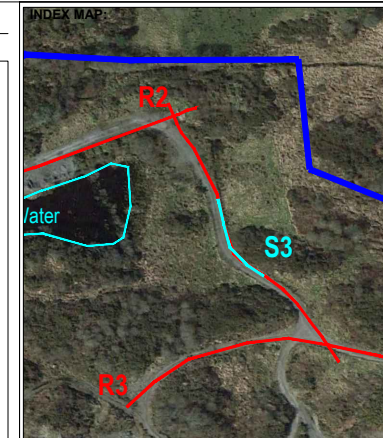
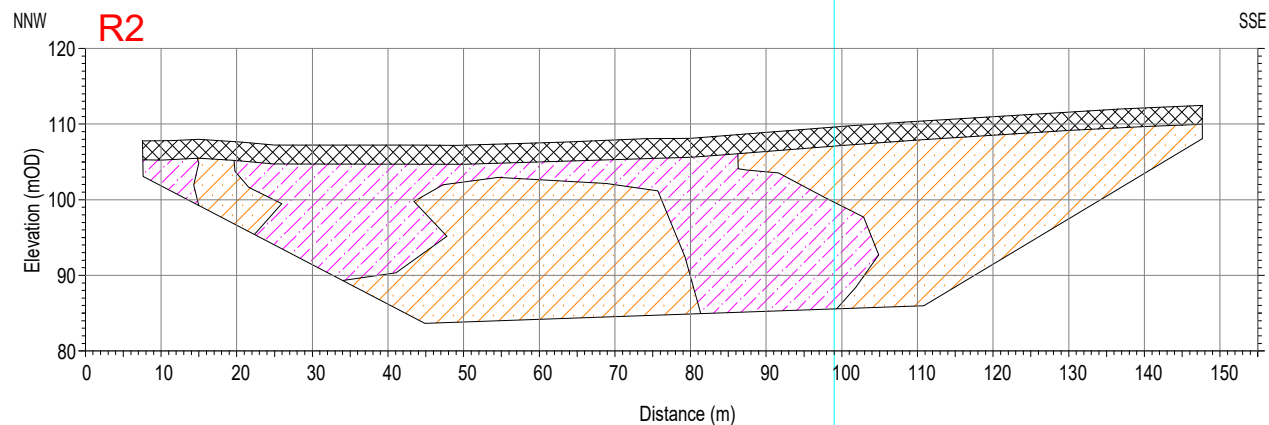
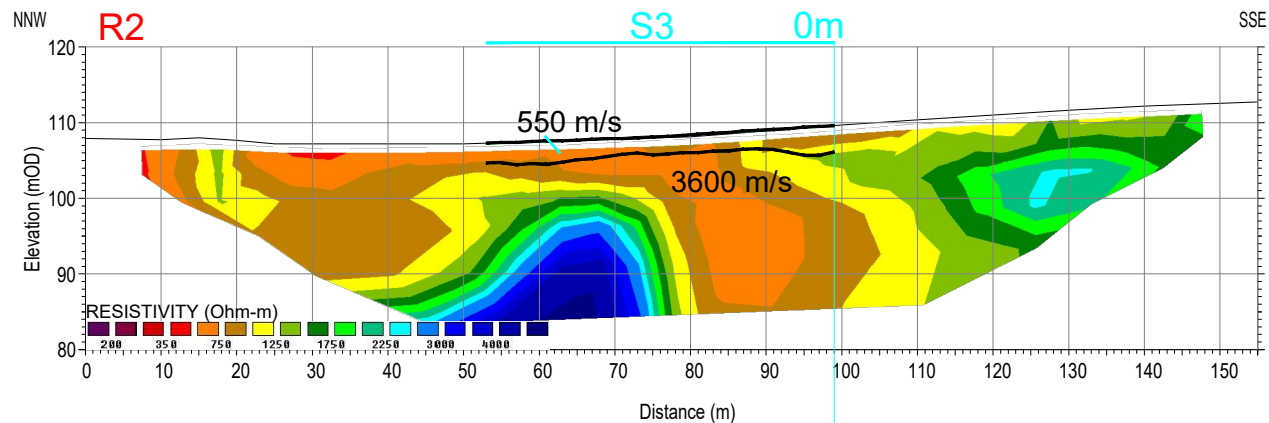
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SCALE: AS INDICATED @ A4			
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- LEGEND:**
- Seismic refraction layer with interpreted P-wave velocity
  - FILL/GRAVEL
  - SOIL/SPOIL/FILL
  - Highly weathered/fractured ROCK (from seismic data)
  - Possible SILTSTONE with minor SANDSTONE (or weathered/fractured SANDSTONE with minor SILTSTONE)
  - Slightly weathered/fractured - fresh SANDSTONE with minor SILTSTONE
  - POSSIBLE FAULT

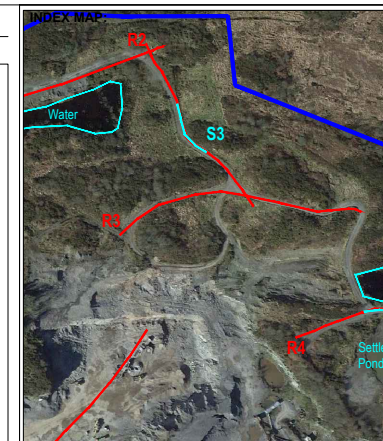
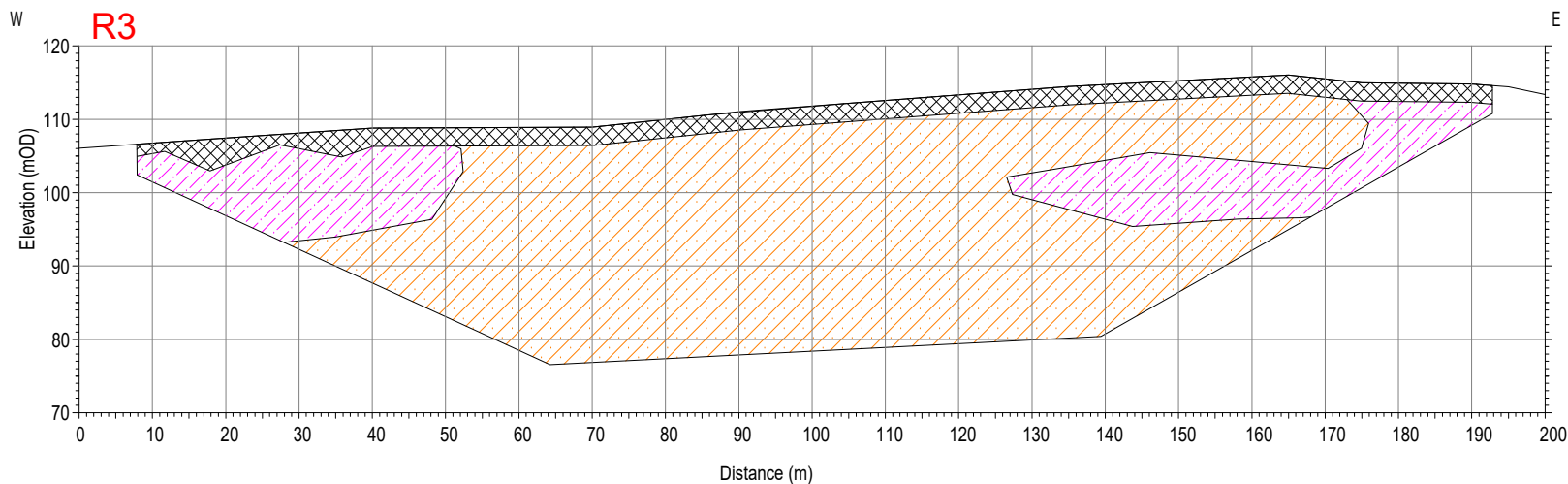
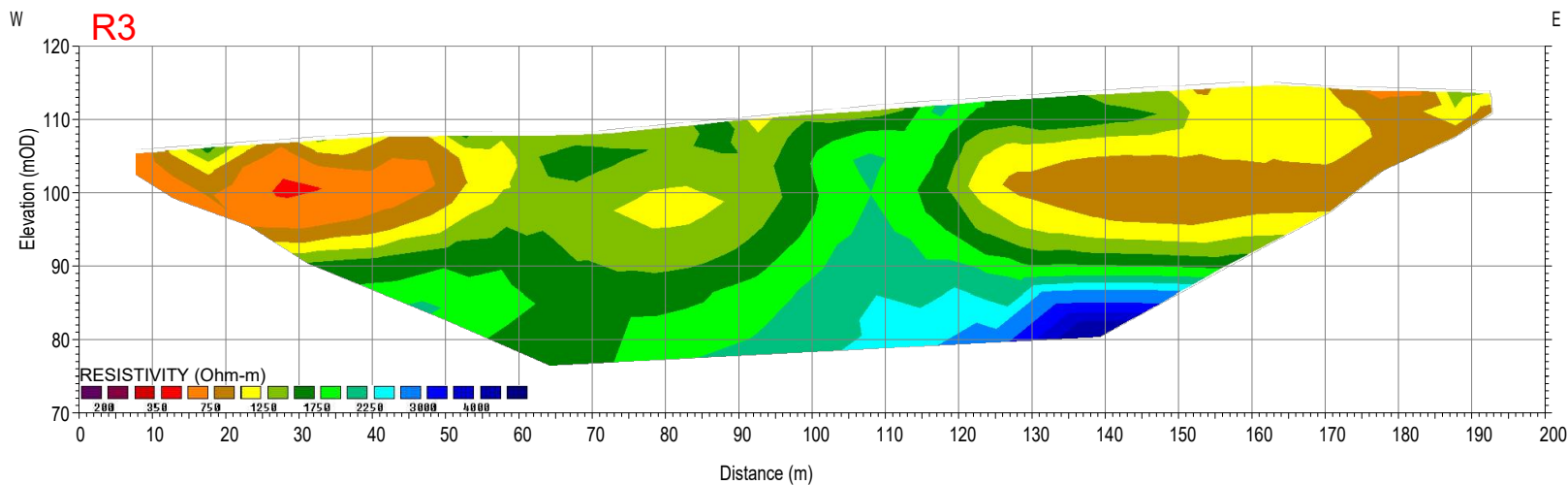
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- LEGEND:**
- Seismic refraction layer with interpreted P-wave velocity
  - FILL/GRAVEL
  - SOIL/SPOIL/FILL
  - Highly weathered/fractured ROCK (from seismic data)
  - Possible SILTSTONE with minor SANDSTONE (or weathered/fractured SANDSTONE with minor SILTSTONE)
  - Slightly weathered/fractured - fresh SANDSTONE with minor SILTSTONE
  - POSSIBLE FAULT

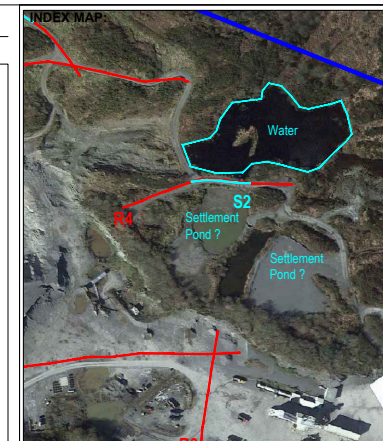
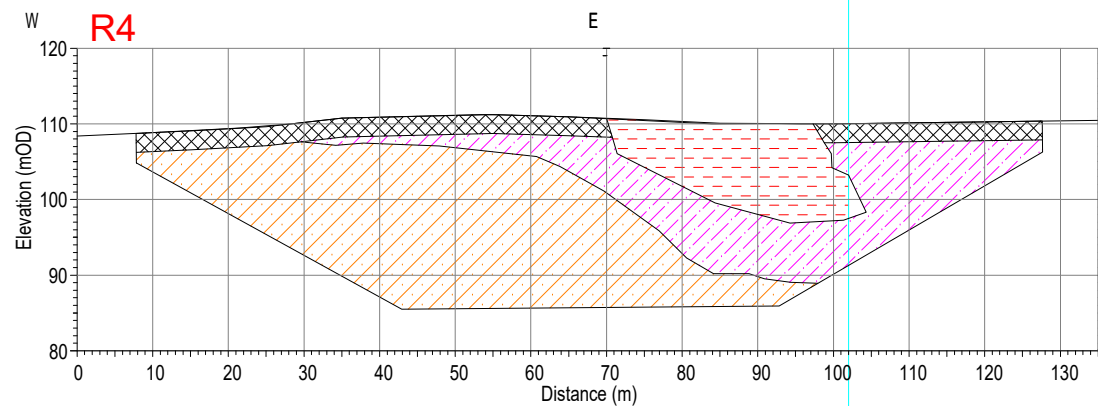
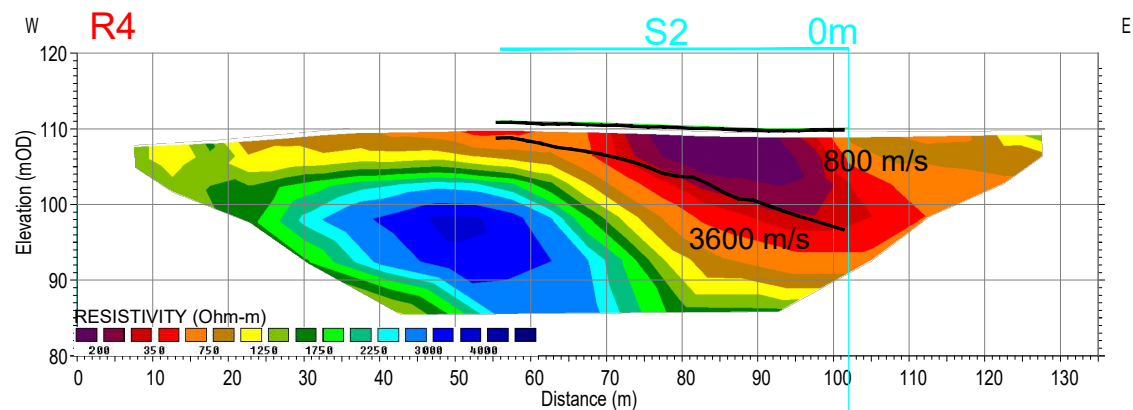
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- LEGEND:**
- Seismic refraction layer with interpreted P-wave velocity
  - FILL/GRAVEL
  - SOIL/SPOIL/FILL
  - Highly weathered/fractured ROCK (from seismic data)
  - Possible SILTSTONE with minor SANDSTONE (or weathered/fractured SANDSTONE with minor SILTSTONE)
  - Slightly weathered/fractured - fresh SANDSTONE with minor SILTSTONE
  - POSSIBLE FAULT

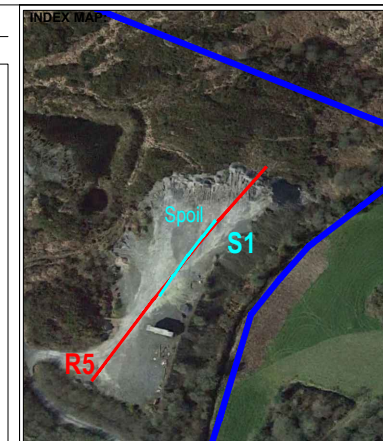
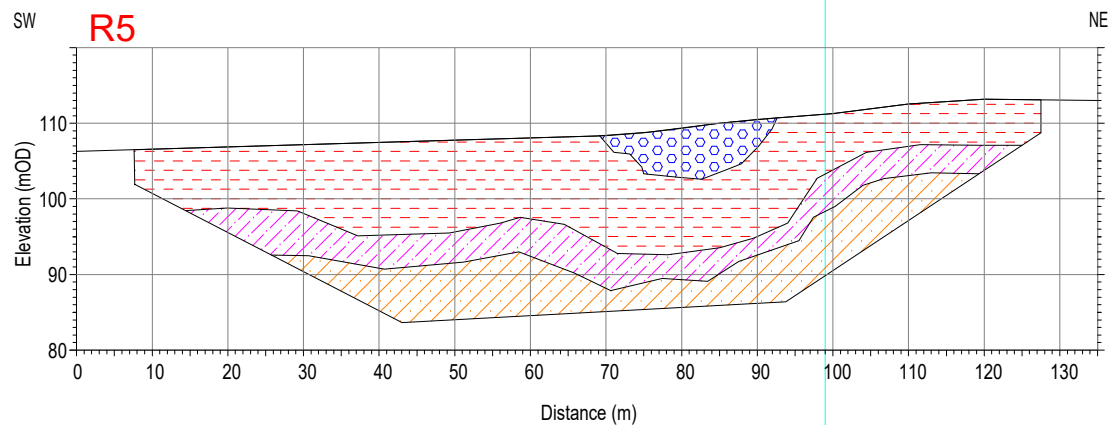
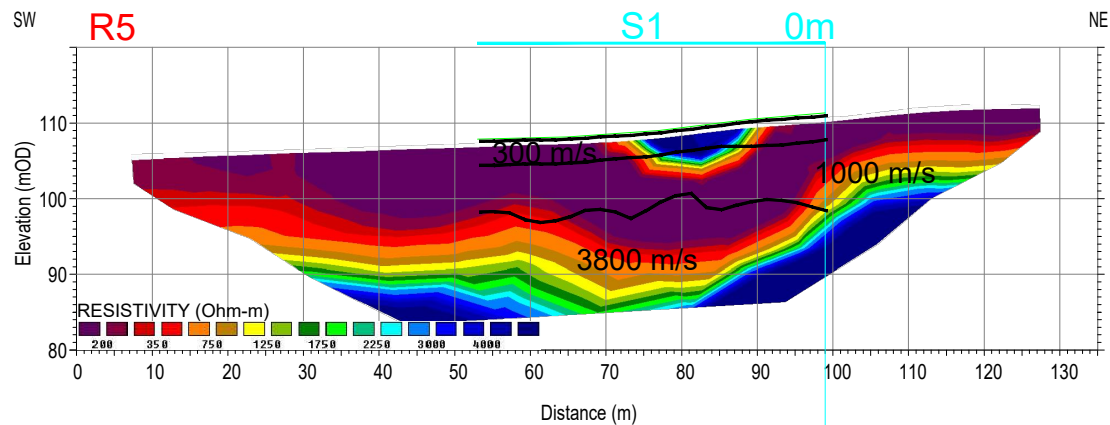
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- LEGEND:**
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  - FILL/GRAVEL
  - SOIL/SPOIL/FILL
  - Highly weathered/fractured ROCK (from seismic data)
  - Possible SILTSTONE with minor SANDSTONE (or weathered/fractured SANDSTONE with minor SILTSTONE)
  - Slightly weathered/fractured - fresh SANDSTONE with minor SILTSTONE
  - POSSIBLE FAULT

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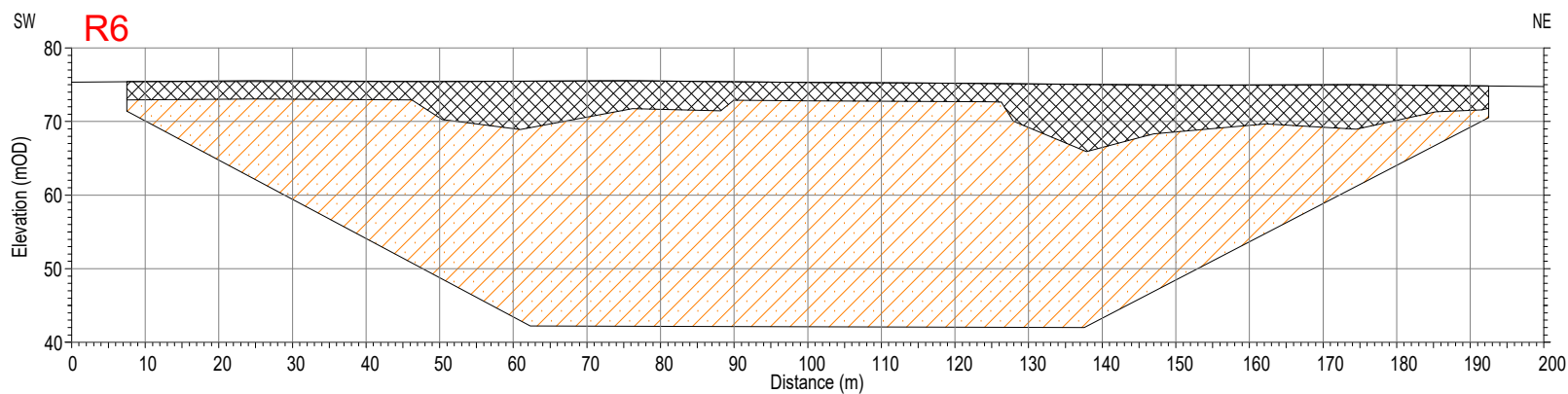
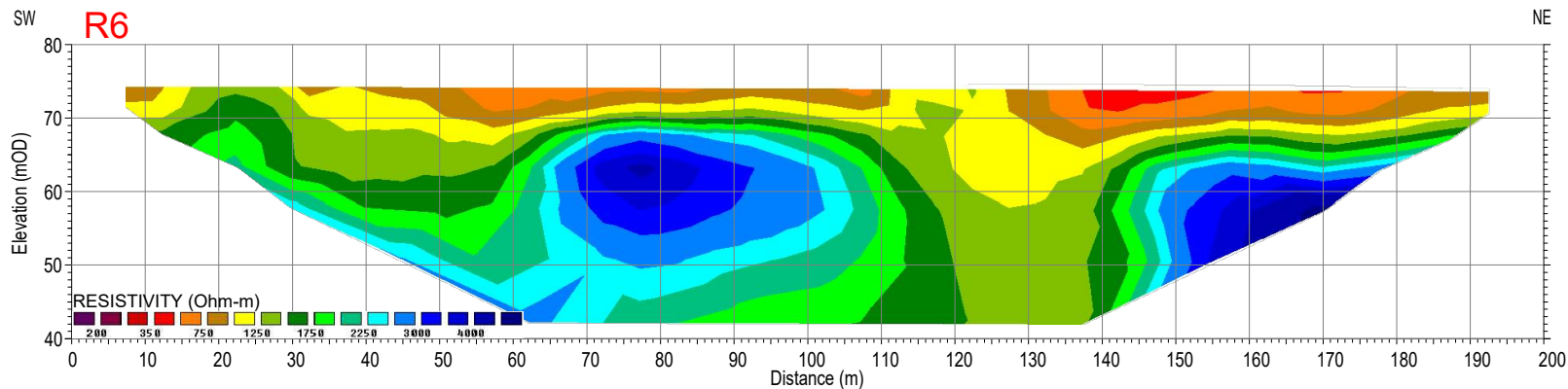
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RESULTS AND INTERPRETATION: R6

SCALE 1:1000



- LEGEND:**
- Seismic refraction layer with interpreted P-wave velocity
  - FILL/GRAVEL
  - SOIL/SPOIL/FILL
  - Highly weathered/fractured ROCK (from seismic data)
  - Possible SILTSTONE with minor SANDSTONE (or weathered/fractured SANDSTONE with minor SILTSTONE)
  - Slightly weathered/fractured - fresh SANDSTONE with minor SILTSTONE
  - POSSIBLE FAULT

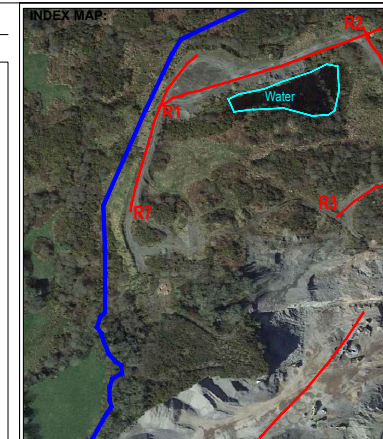
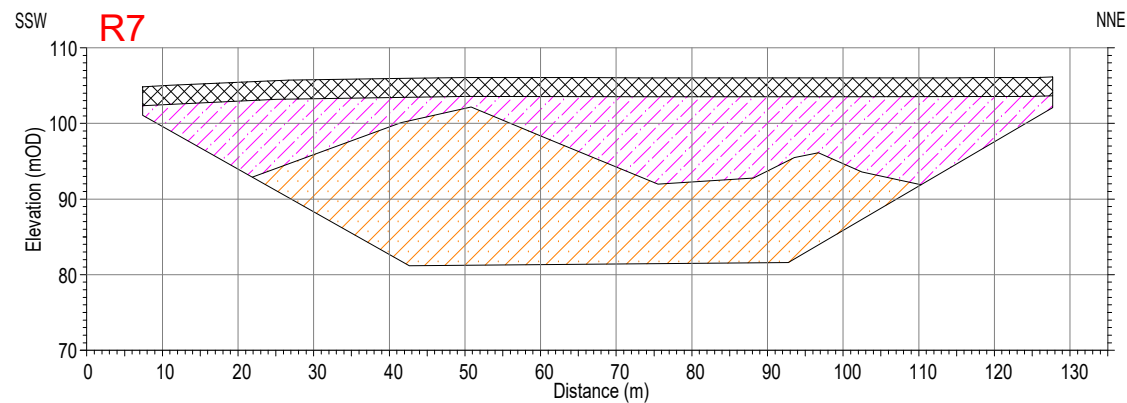
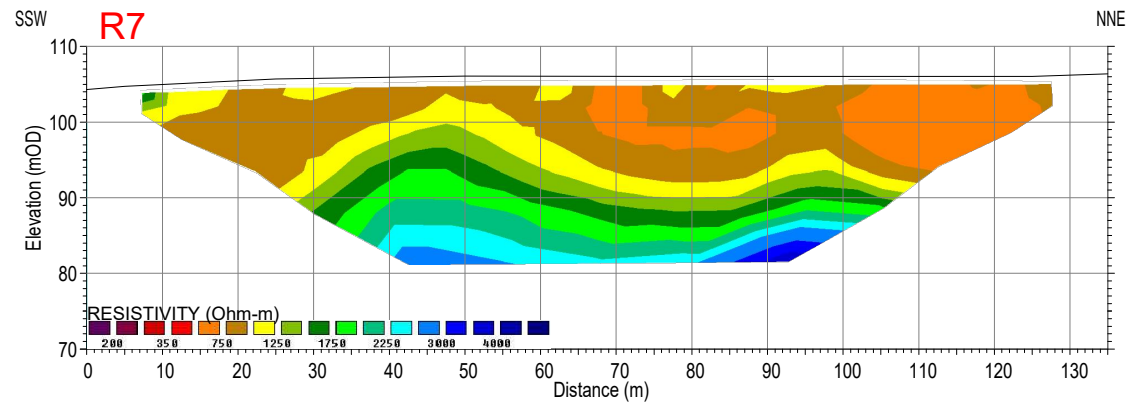
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SCALE:	AS INDICATED @ A4		
DATE:	17-01-2023		
Version:	Date:	Drawn By:	Checked:
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- LEGEND:**
- Seismic refraction layer with interpreted P-wave velocity
  - FILL/GRAVEL
  - SOIL/SPOIL/FILL
  - Highly weathered/fractured ROCK (from seismic data)
  - Possible SILTSTONE with minor SANDSTONE (or weathered/fractured SANDSTONE with minor SILTSTONE)
  - Slightly weathered/fractured - fresh SANDSTONE with minor SILTSTONE
  - POSSIBLE FAULT

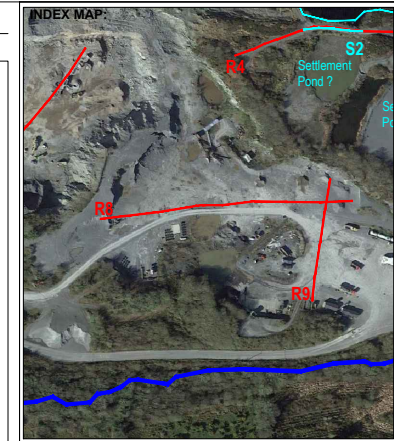
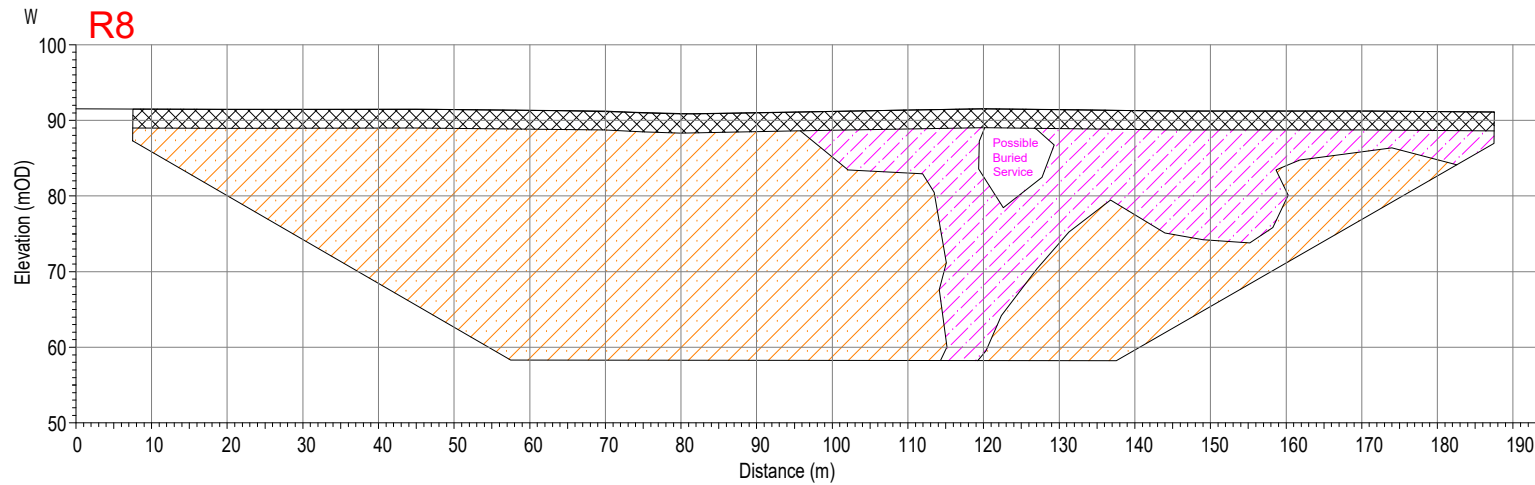
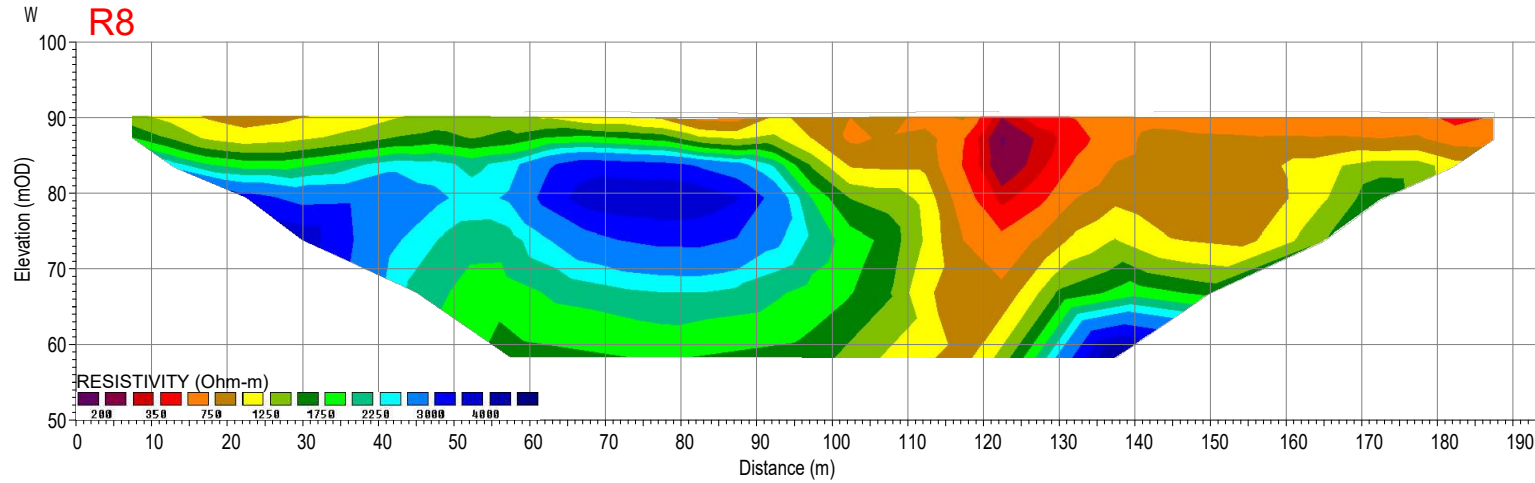
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Version:	Date:	Drawn By:	Checked:
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- LEGEND:**
- Seismic refraction layer with interpreted P-wave velocity
  - FILL/GRAVEL
  - SOIL/SPOIL/FILL
  - Highly weathered/fractured ROCK (from seismic data)
  - Possible SILTSTONE with minor SANDSTONE (or weathered/fractured SANDSTONE with minor SILTSTONE)
  - Slightly weathered/fractured - fresh SANDSTONE with minor SILTSTONE
  - POSSIBLE FAULT

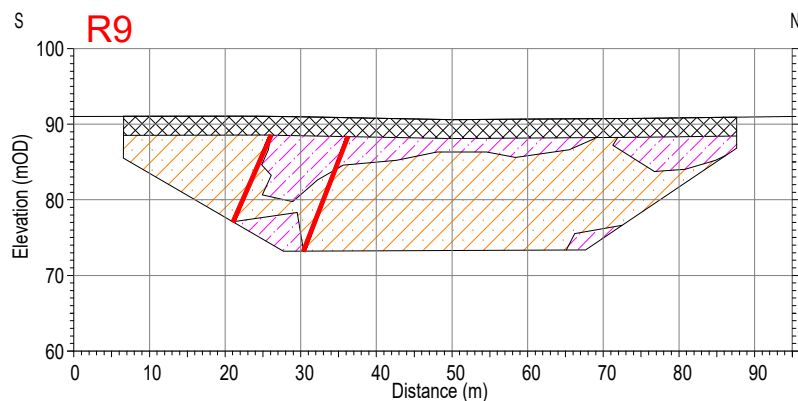
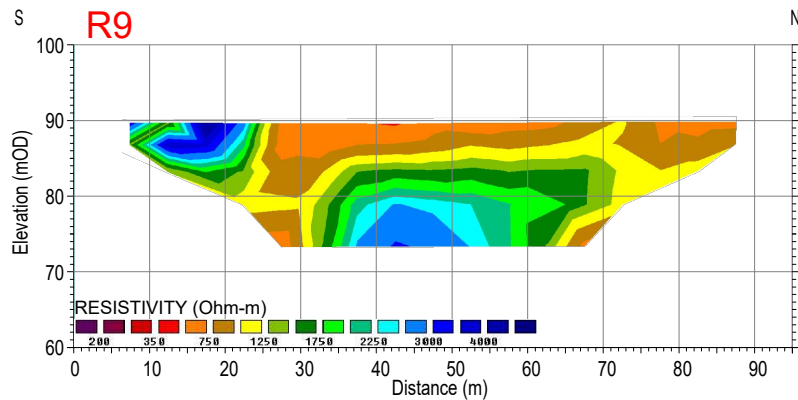
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DATE:	17-01-2023		
Version:	Date:	Drawn By:	Checked:
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- LEGEND:**
- Seismic refraction layer with interpreted P-wave velocity
  - FILL/GRAVEL
  - SOIL/SPOIL/FILL
  - Highly weathered/fractured ROCK (from seismic data)
  - Possible SILTSTONE with minor SANDSTONE (or weathered/fractured SANDSTONE with minor SILTSTONE)
  - Slightly weathered/fractured - fresh SANDSTONE with minor SILTSTONE
  - POSSIBLE FAULT

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CLIENT:	MURRAY BROTHERS TARMACADAM LIMITED		
DRAWING NO:	AGP22197_R9		
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DATE:	17-01-2023		
Version:	Date:	Drawn By:	Checked:
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## APPENDIX B: DETAILED GEOPHYSICAL METHODOLOGY

### Electrical Resistivity Tomography (ERT)

Electrical Resistivity Tomography was carried out to provide information on lateral variations in the overburden material as well as on the underlying overburden and bedrock.

#### Principles

This surveying technique makes use of the Wenner resistivity array. The 2D-resistivity profiling method records a large number of resistivity readings in order to map lateral and vertical changes in material types. This method involves the use of electrodes connected to a resistivity meter, using computer software to control the process of data collection and storage.

#### Data Collection

Profiles were recorded using a n ABEM LS4 resistivity meter, imaging software, four 20 takeout multicore cables and up to 80 stainless steel electrodes. Saline solution was used at the electrode/ground interface in order to gain a good electrical contact required for the technique to work effectively. The recorded data were processed and viewed immediately after surveying.

#### Data Processing

The field readings were stored in computer files and inverted using the RES2DINV package (Geotomo Software, 2006) with up to 5 iterations of the measured data carried out for each profile to obtain a 2D-depth model of the resistivities.

The inverted 2D resistivity models and corresponding interpreted geology are displayed on the accompanying drawings alongside the processed seismic sections. Profiles have been contoured using the same contour intervals and colour codes. Distance is indicated along the horizontal axis of the profiles.

### Seismic Refraction Profiling

#### Principles

This method measures the velocity of refracted seismic waves through the overburden and rock material and allows an assessment of the thickness and quality of the materials present to be made. Stiffer and stronger materials usually have higher seismic velocities while soft, loose or fractured materials have lower velocities.

Seismic profiling measures the p-wave velocity ( $V_p$ ) of refracted seismic waves through the overburden and rock material and allows an assessment of the thickness and quality of the materials present to be made. Stiffer and stronger materials usually have higher  $V_p$  velocities while soft, loose or fractured materials have lower  $V_p$  velocities. Readings are taken using geophones connected via multi-core cable to a seismograph.

#### Data Collection

---

A Geode high resolution 24 channel digital seismograph, 24 10HZ vertical geophones and a 10 kg hammer were used to provide first break information, with a 24 take-out cable (2m spacing). Equipment was carried was operated by a two to three person crew.

Readings are taken using geophones connected via multi-core cable to a seismograph. The depth of resolution of soil/bedrock boundaries is determined by the length of the seismic spread, typically the depth of resolution is about one third the length of the profile (e.g. 46m profile ~16m depth). Shots from seven different positions were taken (2 x off-end, 2 x end, 3 x middle) to ensure optimum coverage of all refractors.

#### **Data Processing**

First break picking in digital format was carried out using the FIRSTPIX software program to construct traveltimes plots for each spread. The recorded data was processed and interpreted using the GREMIX software program to calculate the thickness of individual velocity units. GREMIX interprets seismic refraction data as a laterally varying layered earth structure. It incorporates the slope-intercept method, parts of the Plus-Minus Method of Hagedoorn (1959), Time-Delay Method, and features the Generalized Reciprocal Method (GRM) of Palmer (1980). Up to four layers can be mapped; one deduced from direct arrivals and three deduced from refractions. Phantomings of all possible travel time pairs can be carried out by adjusting reciprocal times of off shots. Material types were assigned and estimation made of material properties, cross-referenced to other geophysical data.

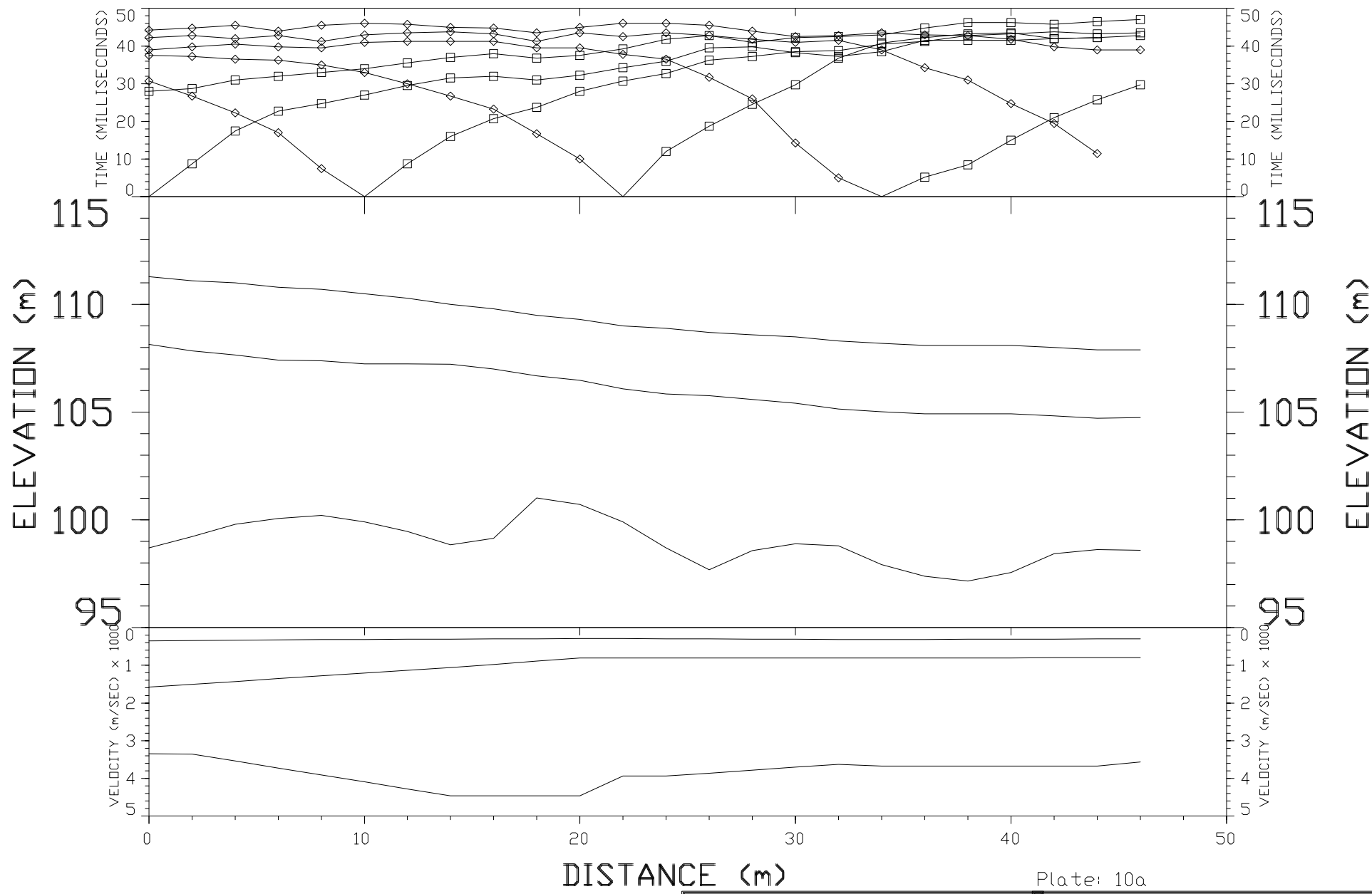
Approximate errors for Vp velocities are estimated to be +/- 10%. Errors for the calculated layer thicknesses are of the order of +/-20%. Possible errors due to the "hidden layer" and "velocity inversion" effects may also occur (Soske, 1959).

### **Spatial Relocation**

All the geophysical investigation locations were acquired using a Trimble Geo 7X high-accuracy GNSS handheld system using the settings listed below. This system allows collection of GPS data with c.20mm accuracy.

<b>Projection:</b>	Irish Transverse Mercator
<b>Datum:</b>	Ordnance
<b>Coordinate units:</b>	Metres
<b>Altitude units:</b>	Metres
<b>Survey altitude reference:</b>	MSL
<b>Geoid model:</b>	Republic of Ireland

## **APPENDIX C: SEISMIC PLATES**



for: Ardcahan Quarry		AGP22197	
by: APEX Geophysics Ltd.		Ardcahan Cork	
Data Set: S1	Date: 13/01/23		
Equipment: Geode	Spread: S1	Azimuth:	

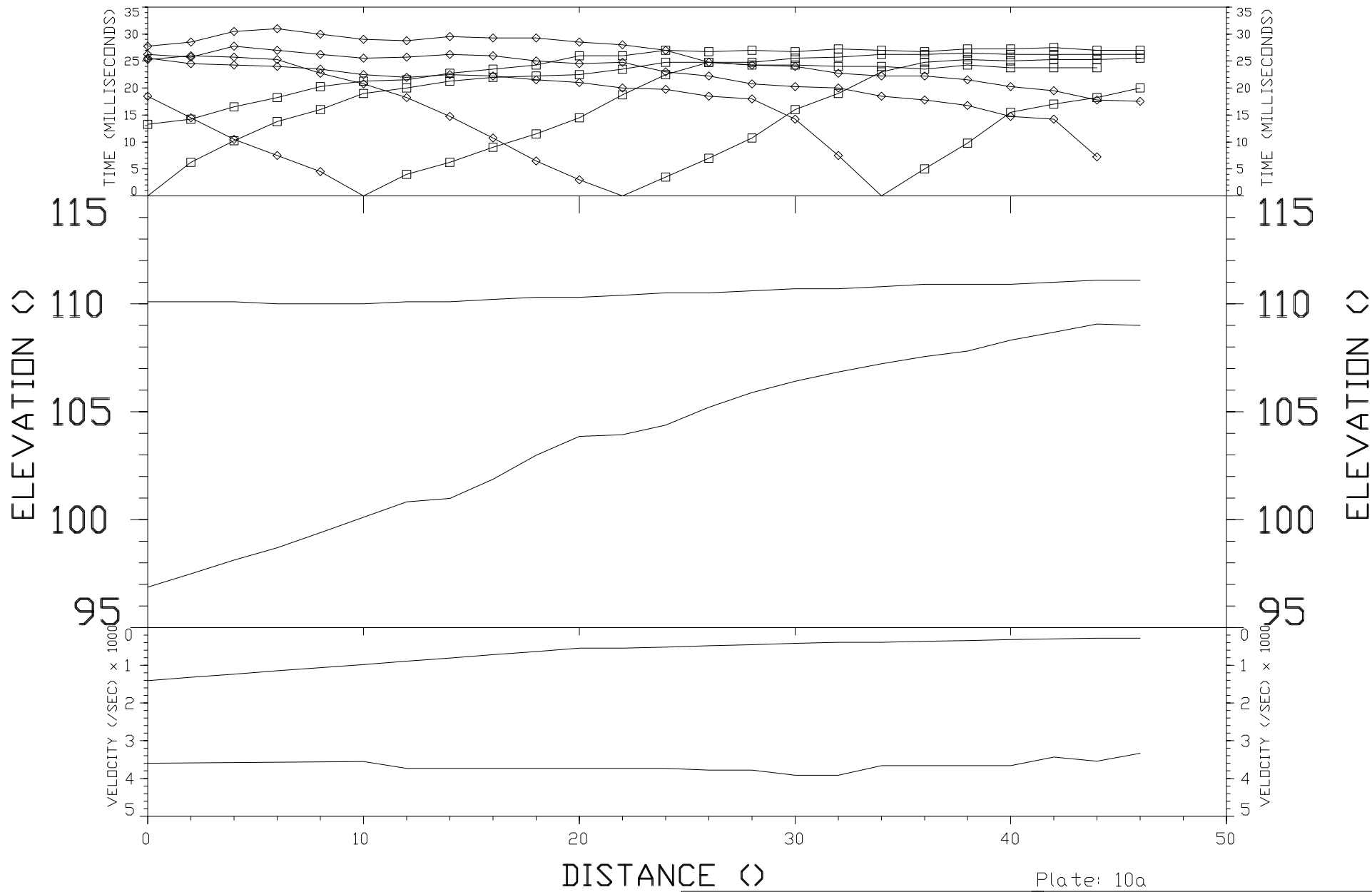


Plate: 10a

for: Ardcahan Quarry		AGP22197	
by: APEX Geophysics Ltd.		Ardcahan Cork	
Data Set: S2	Date: 13/01/23	Azimuth:	
Equipment: Geode	Spread: S2		

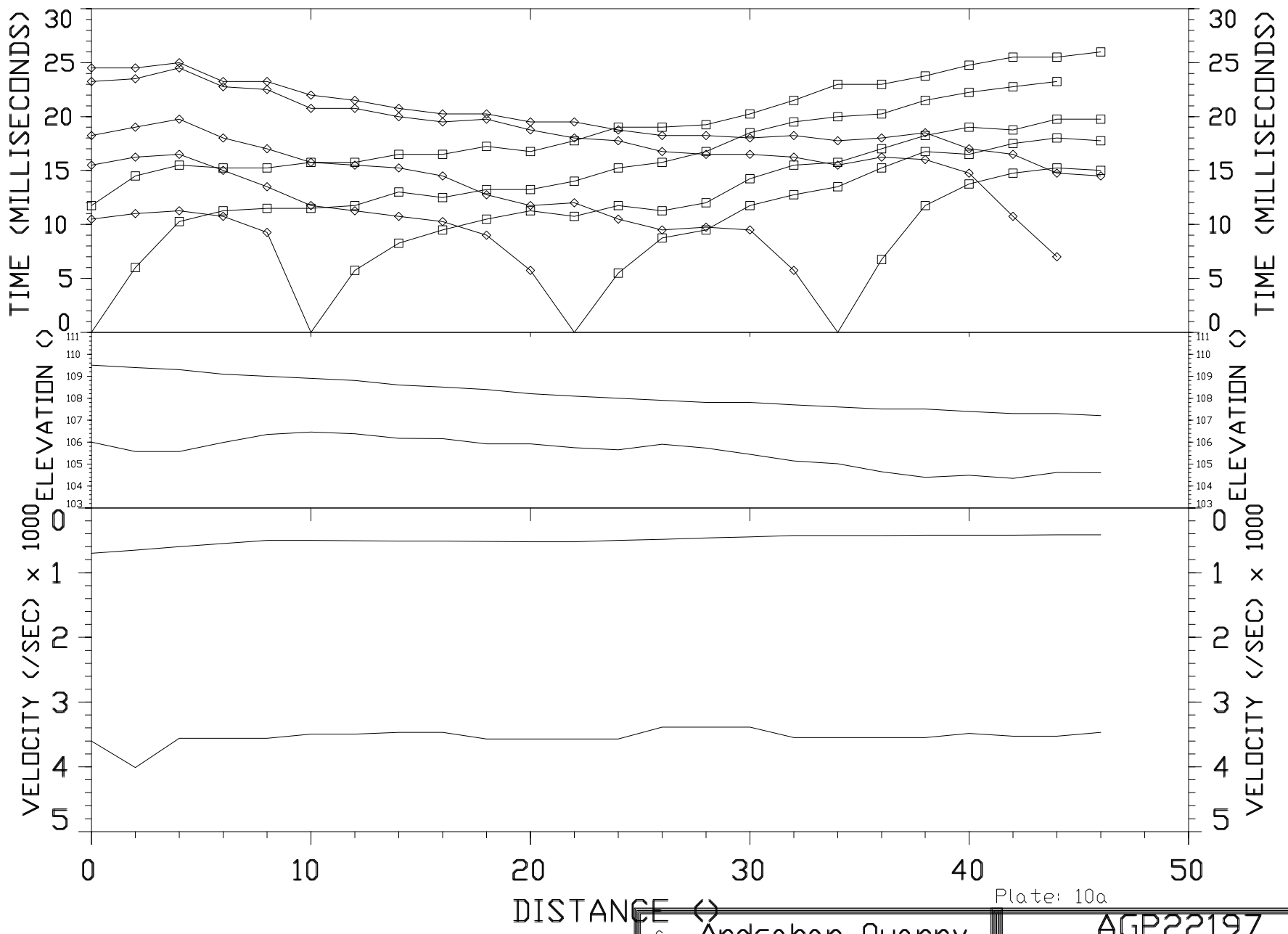


Plate: 10a

for: Ardcahan Quarry		AGP22197
by: APEX Geophysics Ltd.		Ardcahan Cork
Data Set: S3	Date: 13/01/23	Azimuth:
Equipment: Geode	Spread: S3	

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## **APPENDIX 6.6**

# **SOUTHERN PUMPS OCT 2024 BH DRILLING LOGS**

**VOLUME III**

**APPENDICES**

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Ardcahan Quarry EIAR – Chapter 6 Land Use, Soils (Geology)  
**Appendix 6.6 – Southern Pumps Oct 2024 BH Drilling Logs**

Southern Pumps Ltd Daily Timesheet

Date: MON 21-10-24 Name: Paul, Darrogh, Conar.

Cash Collected

Project No.	Hours	Materials Used - Work Carried Out	Cash Collected
	8:00	yard	
	8:15	leave yard	
	10:45	Arrived @ Job Murray Bros. Dunmurry.	
	BH101	Bedrock @ 1mb. Dilled to 18.5mb.	
	<del>102877</del>	Water Strikes @ 4mb & 11mb & 15mb.	
12380	<del>102877</del>	4mts Slotted 63mm Block.	
	102919	14.5mts Casing " " Pea gravel, Bentonite, Cover, Plinth. 100871 103141	
	BH109	Bedrock @ .6mb.	
	BH102	Dilled to 22mts No Noticable Water Strikes Rocks Consistent	
	12380	4mts of 63mm Slotted Block.	
	102919	20mts of " Casing " Pea gravel, Bentonite, Cover, Plinth. 105801 103141	
	4:30	leave Job	PJ: 36 <del>777</del>
	6:30	Home.	882

Southern Pumps Ltd Daily Timesheet

Date: Tues 22-10-24 Name: Paul & Darrogh & Conas.

Cash Collected

Project No.	Hours	Materials Used - Work Carried Out	Cash Collected
	7:30	yard	
	8:00	load truck leave yard.	
	9:50	Arrived @ J&S Murray Bros Dunmanway.	
BH107 BH103		6mts of Casing Bedrock @ 3mt Soft @ start. Drilled to 40mts Water strikes @ 4.6 & 28mt. Rock Consistent no brown Fractures	
	12380	6mt stotted Blue.	
	102919	36mts Casing Blue Pea gravel, bentonite, Cover, Plinth 100871 103141	
BH106 BH104		6mts of Casing Bedrock @ 2.7mt. Drilled to 43mts Wds strikes @ 4mt & 11mt & 29-30mt. Rock good. Few Brown Fractures.	
	12380	6mts of Screen Blue	
	102919	37mts of Casing Blue. Pea gravel, Bentonite, Cover & Plinth. 100871 103141	
	4:30	leave job	PJ: 36927
	6:30	Home.	882

Southern Pumps Ltd Daily Timesheet

Date: Wed 23-10-24 Name: Pave, Darragh, Conor.

Project No. Hours Materials Used - Work Carried Out Cash Collected

8:00 yard load truck

8:30 leave yard

11:00 Arrived @ Job Murray Bros  
Dunmanway.

BH105

~~BH103~~ Bedrock @ Sabs

100958 Sabs of Casing 1x Casing Shoe (FOC)  
Water Strike @ 5.4mb

Drilled to 43mb

12380 bmt Slotted Blue

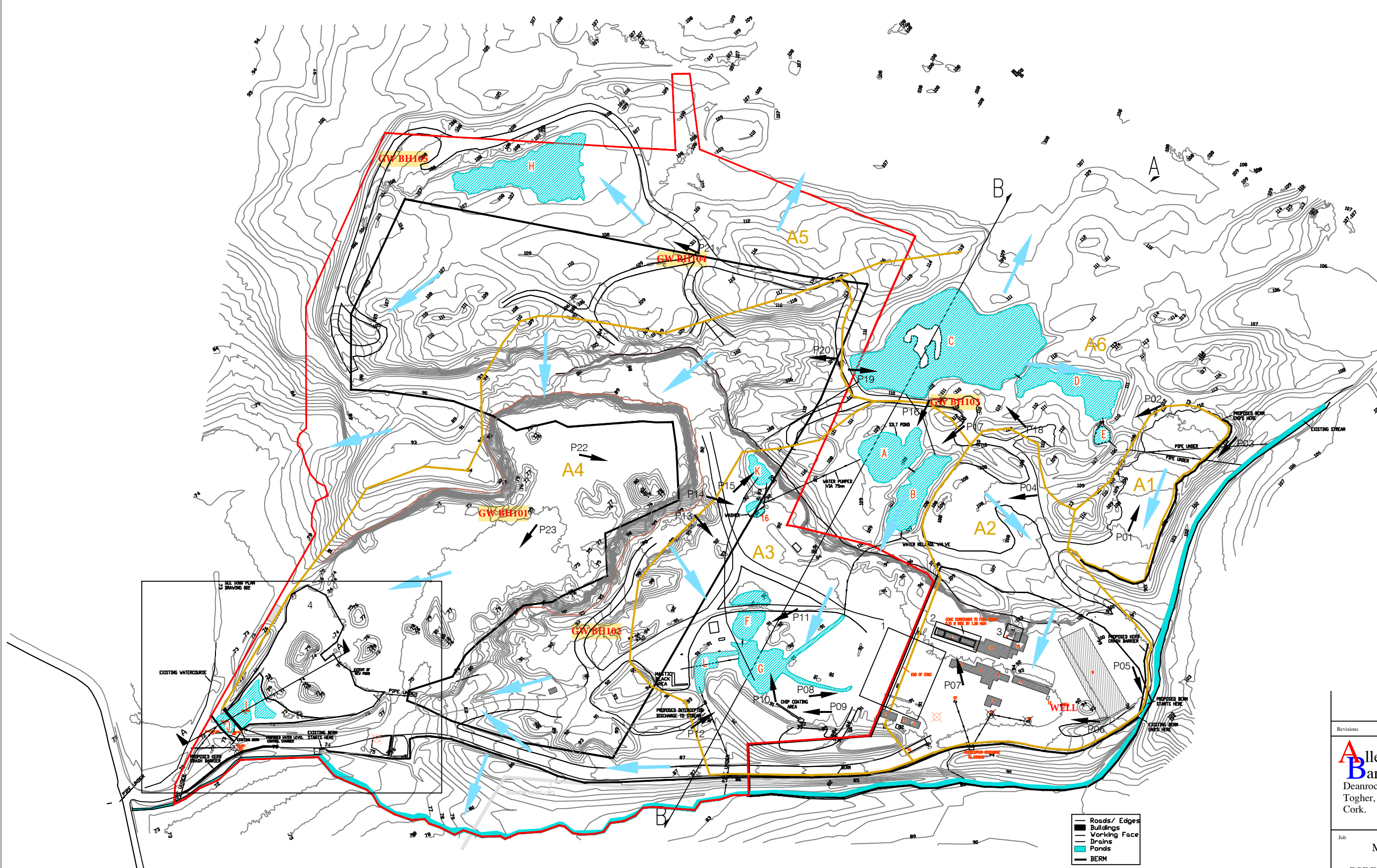
102919 3.7mb Casing "  
Pea gravel, Bentonite, Cover, Plinth.  
100571 103141

3:45 leave Job

PJ: 36 ~~227~~

6:00 Home.

882



APPENDIX 6.6 - Ardcahan Quarry EIA/Soils/Geology Chapter - Site Layout with New Monitoring BHs GWBH101 to GW BH105 Shown

Revisions	Issue	Date	By

**Allen Barber**  
 Deanrock Business Park,  
 Togher,  
 Cork.

tel 021 4319291  
 fax 021 4319291  
 e-mail rob@allenbarber.ie

Job: **MURRAY BROS. ARDCAHAN, DUNMANWAY, CO.CORK**

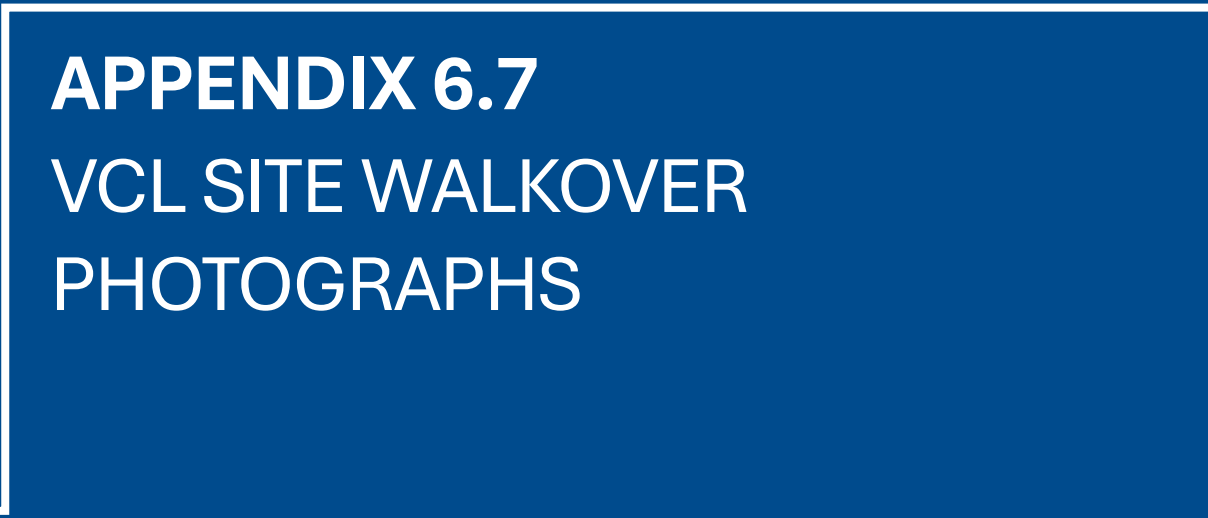
Drawing: **SITE LAYOUT**

Job No.	DRG No.	Issue
ARDCAHAN	001	F1

Scale	Date	Drawn	Checked
1:2500	MAY 15	PB	DM



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**APPENDIX 6.7**  
**VCL SITE WALKOVER**  
**PHOTOGRAPHS**

**VOLUME III**  
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Ardcahan Quarry EIAR – Chapter 6 Land Use, Soils (Geology)  
**Appendix 6.7 – VCL Site Walkover Photographs**

## Appendix 6.7 Ardcahan EIAR-Land Use/Soils (Geology) Ardcahan Quarry Site Photographs



**Photo 01: View northeast of existing quarry floor and benched high wall at end of quarrying in 2014. (Note that Phase 1 of the proposed expansion is to expand to the right (east) and Phase 3 is to the right.)**



**Photo 02: View north of existing double benched quarry high wall of 2014 quarry face. Proposed Phase 3.**



**Photo 03: View northwest from bench of Phase 3 expansion area.**

## Appendix 6.7 Ardcahan EIAR-Land Use/Soils (Geology) Ardcahan Quarry Site Photographs



**Photo 04: View east of old quarry face – Phase 1 of the proposed expansion.**



**Photo 05: View west of old quarry floor from top of Phase 1 expansion area.**



**Photo 06: View north of second (northern) bench of old quarry which is part of Phase 1 Expansion area.**

## Appendix 6.7 Ardcahan EIAR-Land Use/Soils (Geology) Ardcahan Quarry Site Photographs



**Photo 07: View north across west side of the tarmac site with old quarry face in background.**



**Photo 08: View east of BH02 installed on the upper quarry bench in the Phase 1 expansion area.**

## Appendix 6.7 Ardcahan EIAR-Land Use/Soils (Geology) Ardcahan Quarry Site Photographs



**Photo 09: View west of BH04 installed on the northern boundary of the Phase 1 area.**



**Photo 10: View east of BH05 installed in the NW corner of the site to the north of the Phase 3 area.**

## Appendix 6.7 Ardcahan EIAR-Land Use/Soils (Geology) Ardcahan Quarry Site Photographs



**Photo 11: View of Southern Pumps drilling BH03 to the north of the Phase 2 expansion area.**



**Photo 12: View SW across the vegetated old fine silt sludge area created by Tarmac Plant process.**



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**APPENDIX 6.8**  
**GSI REGIONAL SLOPE STABILITY**  
**RISK MAP**

**VOLUME III**  
APPENDICES



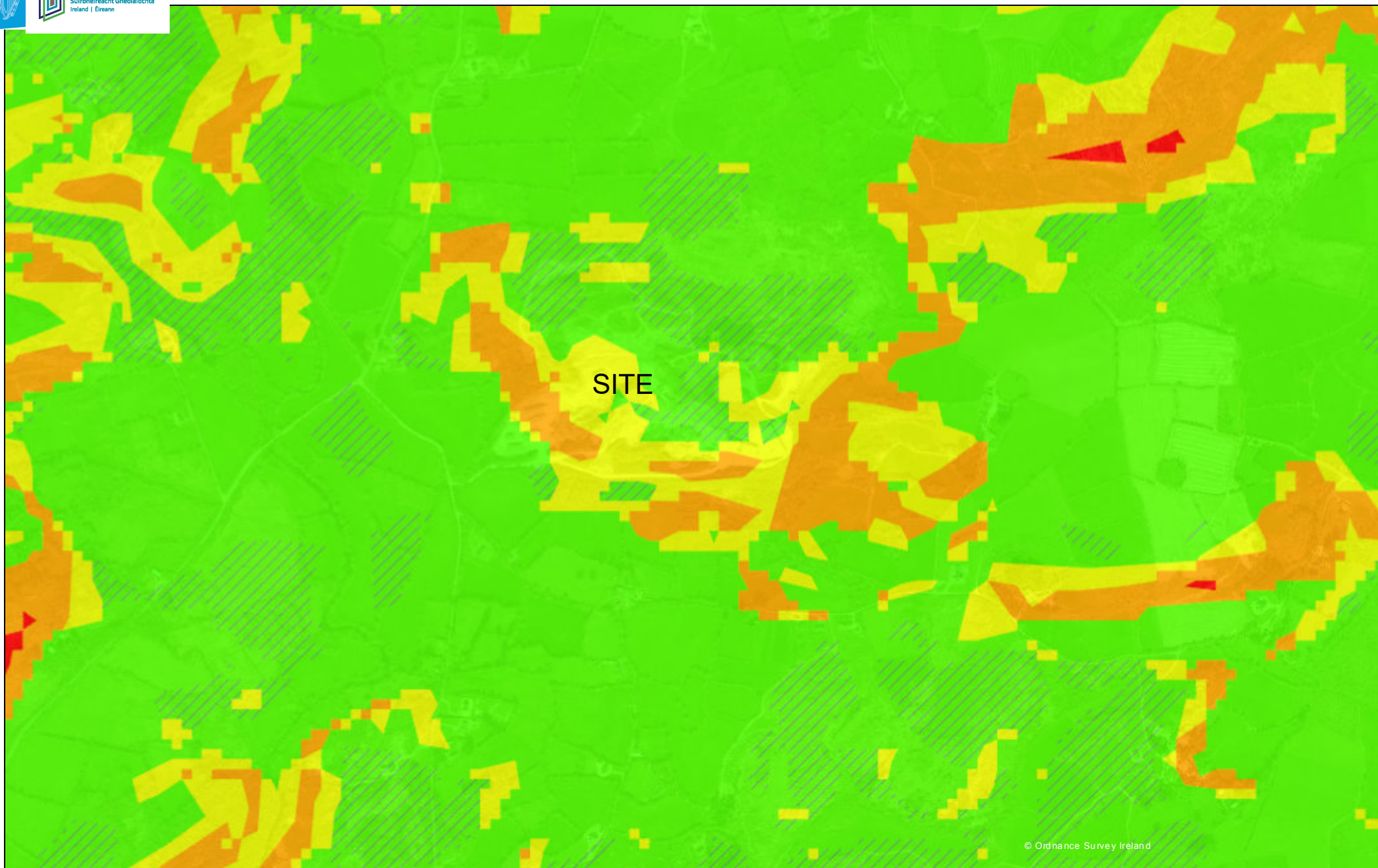
APRIL 2026



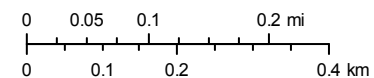


Ardcahan Quarry EIAR – Chapter 6 Land Use, Soils (Geology)  
**Appendix 6.8 – GSI Regional Slope Stability Risk Map**

# GSI Ardcahan Quarry Area Landslide Susceptibility Mapping



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## **APPENDIX 6.9**

### **IGI EIA GUIDANCE FIGS 1 & 2**

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Ardcahan Quarry EIAR – Chapter 6 Land Use, Soils (Geology)  
**Appendix 6.9 – IGI EIA Guidance Figs 1 & 2**

**Figure 1** Flow Chart



\*Matrix: See Figure 2 in Guidelines for the Preparation of the Soils, Geology and Hydrogeological Chapters of Environmental Impact Statements - Issued by the Institute of Geologists of Ireland (2013)

Figure 2 Activities /Environments Matrix

Activities

	Earthworks	Storage / transmission of leachable and/or hazardous materials	Lowering of groundwater levels by pumping or drainage	Discharges to ground	Excavation of materials above the water table	Excavation of materials below the water table	Land-spreading	Abstraction / Discharge of energy (heat) from/to the ground
Type A	Invasive site works to characterise nature <sup>1</sup> and thickness of soil and subsoil e.g. trial pits or augering.	Establish nature and quantity of leachable materials.	Establish details of borehole /spring construction or drainage system structure details (as appropriate).	Complete a Risk Assessment as per EPA (2011) Guidance on the Authorisation of Discharges to Groundwater <sup>2</sup> ; Apply Tier 1, 2 or 3 Assessment as appropriate	Site works to characterise nature <sup>1</sup> , thickness, permeability and stratification of soils and subsoils e.g. trial pits, augering.	Site works to characterise nature <sup>1</sup> , thickness, permeability and stratification of soils and subsoils e.g. trial pits, augering.	Establish the type of waste to be landspread.	Provide details of type of system (open/closed, shallow/deep). The site works required and described below will reflect the design parameters of the system being installed.
		Site works to characterise nature <sup>1</sup> , thickness, permeability and stratification of soils, subsoils and bedrock geology e.g. trial pits, boreholes.	Establish sustainable yield and proposed daily abstraction rate or drainage system invert levels (as appropriate).		Site works to fully characterise the bedrock geology and in order to to define the resource volume/weight according to The PERC Reporting Standard <sup>3</sup> e.g. trenching, drilling, geophysics.	Site works to fully characterise the bedrock geology and in order to to define the resource volume/weight according to The PERC Reporting Standard <sup>3</sup> e.g. trenching, drilling, geophysics.	Undertake a walkover survey of the site.	Site works to characterise nature <sup>1</sup> , thickness, permeability and stratification of soils, subsoils and bedrock geology.
		Works to determine groundwater level, e.g.mapping, monitoring in stand pipes, piezometers, or boreholes.	Works to determine summer level of the water table, annual actual recharge and proposed maximum drawdown.  Measurement of effects of change in water level on nearby abstractions.		Works to determine groundwater level, flow direction and gradient; e.g.monitoring in stand pipes, piezometers, or boreholes.	Works to determine groundwater level, flow direction and gradient; e.g.monitoring in stand pipes, piezometers, or boreholes.	Review Groundwater Protection Responses for Landspreading <sup>4</sup> , and apply Departmental <sup>5</sup> and Regulatory <sup>6</sup> guidelines and best practice.  Assign a response category.	Design parameters for the system will be required to be collected, however these are out of the remit of this document - although any information gathered for design purposes should be used in the EIS.

Type B	<i>In addition to all the above;</i> Works to determine groundwater level, flow direction and gradient; e.g. monitoring in stand pipes, piezometers, or boreholes.	<i>In addition to all the above;</i> Works to determine groundwater flow direction and gradient; e.g. monitoring in stand pipes, piezometers, or boreholes.	<i>In addition to all the above;</i> Works to determine aquifer properties, seasonal variations in water levels, extent of cone of depression or drawdown of surrounding water levels (as appropriate) and alterations in groundwater flow pattern.	<i>As above;</i>	<i>As above;</i>	<i>As above;</i>	<i>In addition to all the above;</i> Site works to characterise subsoil/soil characteristics e.g. trial pits or augering.	<i>In addition to all the above;</i> Characterise baseline temperature of soil / groundwater and groundwater hydrochemistry and quality.
	Works to determine groundwater - surface water interactions.	Works to determine groundwater - surface water interactions.	Works to determine groundwater - surface water interactions and measure effects of drawdown in water levels on hydraulically connected surface waters and springs.					Works to determine groundwater level e.g.monitoring in stand pipes, piezometers, or boreholes.  If it is proposed to discharge to surface water, then characterisation surface water quality, baseline temperature and flow rates.

Type C	<i>In addition to all the above;</i> Identify location and abstraction rate of nearby groundwater abstractions.	<i>In addition to all the above;</i> Measure or determine rate of groundwater flow/travel time.	<i>In addition to all the above;</i> Installation of sufficient monitoring wells to provide groundwater flow direction, gradient, flow pattern and rate of flow/travel time.  Identify nearby geothermal systems, and discharges to groundwater	<i>As above;</i>	<i>As above;</i>	<i>As above;</i>	<i>In addition to all the above;</i> Confirm subsoil permeability in laboratory. Delineate inner and outer source protection areas and source protection zones.  Establish water quality of groundwater abstraction. Undertake risk assessment if appropriate.	<i>In addition to all the above;</i> Works to determine thermal and hydraulic conductivity of soil, subsoil and bedrock.  Identify location and abstraction rate of nearby groundwater abstractions.
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Type D	<i>In addition to all the above;</i> Regional study of karst in an area, including identified karst features (both mapped and identified during site walkovers).	<i>In addition to all the above;</i> Full detailed hydrogeological assessment required in this situation.	<i>In addition to all the above;</i> Geotechnical assessment of risk of landslide or subsidence.	<i>In addition to all the above;</i> Geotechnical assessment of risk of landslide or subsidence.	<i>In addition to all the above;</i> Full detailed hydrogeological assessment required in this situation.	<i>In addition to all the above;</i> Geotechnical assessment of risk of landslide or subsidence.	<i>As for Type C above</i>	<i>In addition to all the above;</i> Geotechnical assessment of risk of landslide or subsidence.
	Map bedrock topography.  Geotechnical assessment of risk of landslide or subsidence.	Geotechnical assessment of risk of landslide or subsidence.			Geotechnical assessment of risk of landslide or subsidence.			

Type E	Full detailed hydrogeological assessment required in this situation.	Full detailed hydrogeological assessment required in this situation.	Full detailed hydrogeological assessment required in this situation.	Complete a Risk Assessment as per EPA (2011); Apply Tier 1, 2 or 3 Assessment as appropriate.	Full detailed hydrogeological assessment required in this situation.	Full detailed hydrogeological assessment required in this situation.	<i>As for Type C above</i>	Full thermogeological and/or hydrogeological assessment required in this situation.
--------	--	--	--	---	--	--	----------------------------	---

<p>Type A Type B Type C Type D Type E</p>	<p>Passive geological / hydrogeological environments Natural dynamic hydrogeological environments Man-made dynamic hydrogeological environments Sensitive geological / hydrogeological environments Groundwater dependent eco systems</p>	<p>Where works are required to characterise, establish, measure, determine or otherwise provide information, the level of activity and detail required will be informed by a combination of a) the potential impact of the proposed development, b) the scale of the proposed development and c) the professional judgement of the project geoscientist. In addition, the works are likely to be iterative, with new works required in response to information acquired during any phase of works.</p> <p>1 Characterisation of soil and sub-soils to be carried out in accordance with a recognised standard or nomenclature system e.g. BS5930:1990 for subsoils or EPA Code of practice for Environmental Risk Assessment for Unregulated Waste Disposal sites where relevant 2 EPA, 2011. Guidance on the Authorisation of Discharges to Groundwater - Version 1 December 2011. www.epa.ie 3 The PERC Reporting Standard 4 Groundwater Protection Schemes (DoELG/EPA/GSI, 1999) 5 Control of Farm Pollution (DAFF, 1992) and the Code of Good Agricultural Practice to Protect Waters from Pollution by Nitrates (DoE and DAFF, 1996) 6 Landspreading of Organic Waste - Guidance on Groundwater Vulnerability Assessment of Land ( EPA 2004)</p>
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## **APPENDIX 7.1**

# **EPA CATCHMENT & WATER QUALITY MAPPING**

**VOLUME III**

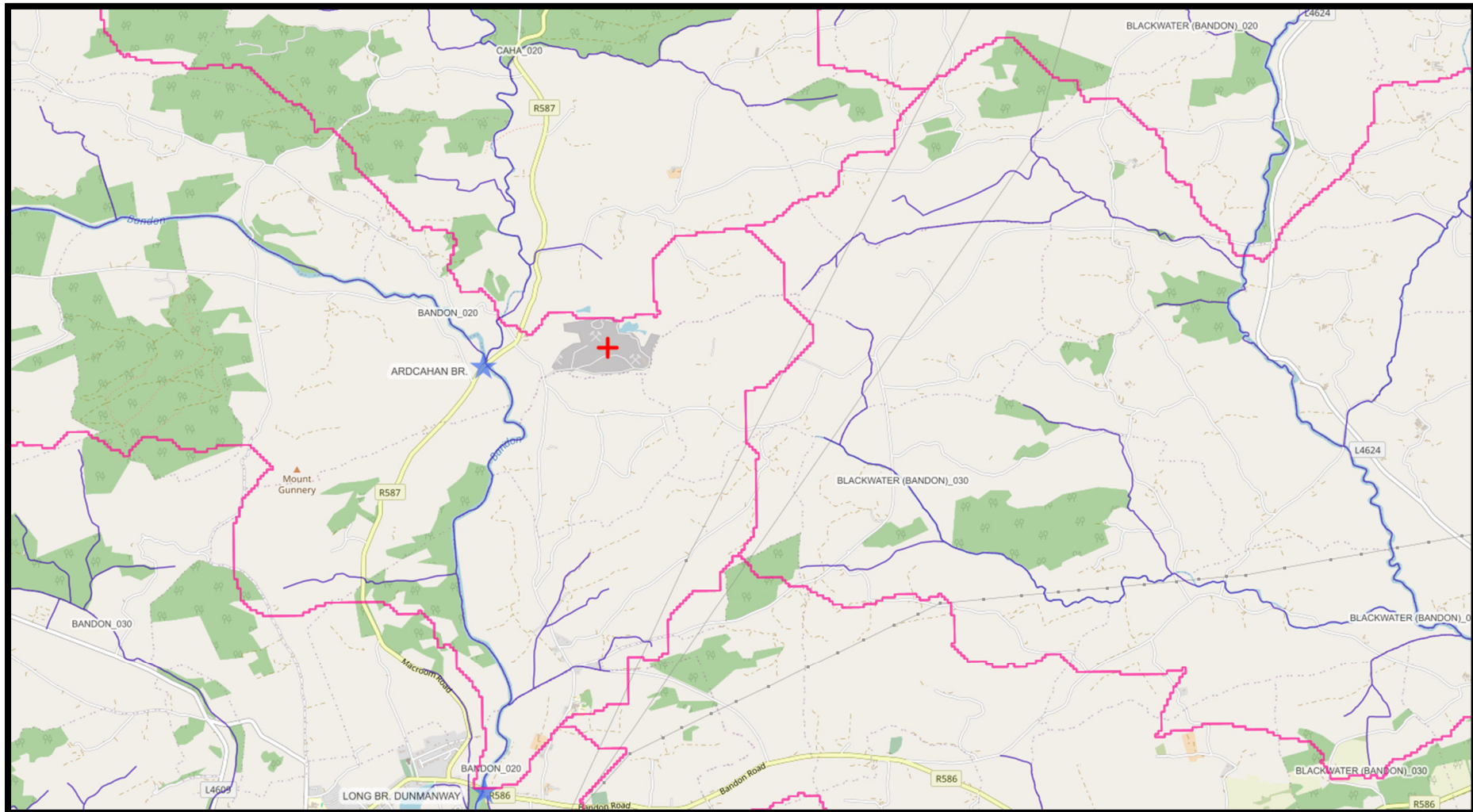
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Ardcahan Quarry EIAR – Chapter 7 Water Attributes  
**Appendix 7.1 – EPA Catchment & Water Quality Mapping**

# Appendix 7.1: Ardcahan Quarry EIAR – Water Chapter EPA Hydrology Catchment, Water Quality and Risk Mapping



**Appendix 7.1.1 – EPA Hydrology Mapping showing site location (red +), in the WFD Bandon\_020 River Sub Basin Catchment. The northern fringe of the site is along the boundary of the WFD Caha\_020 River Sub Basin Catchment.**

## Appendix 7.1: Ardcahan Quarry EIAR – Water Chapter EPA Hydrology Catchment, Water Quality and Risk Mapping



**Appendix 7.1.2 – EPA Hydrology Mapping showing site location (red +), in the Bandon\_020 River Sub Basin Catchment. (The north-western edge of the site is located along the boundary (yellow line) of the Caha\_020 River Sub Basin Catchment.) The un-named stream that flows along the eastern and southern boundary of the quarry area is not mapped by the EPA. (Note that the course of the un-named stream is shown as a dotted line as it represents the local townland boundary.)**

## Appendix 7.1: Ardcahan Quarry EIAR – Water Chapter EPA Hydrology Catchment, Water Quality and Risk Mapping



**Appendix 7.1.3 – EPA Hydrology Mapping showing the Bandon\_020 and Caha\_020 Rivers both with Moderate Quality Status. (EPA River Quality Status Mapping 2019 to 2024 from <https://gis.epa.ie/EPAMaps/Water>.)**

## Appendix 7.1: Ardcahan Quarry EIA – Water Chapter EPA Hydrology Catchment, Water Quality and Risk Mapping



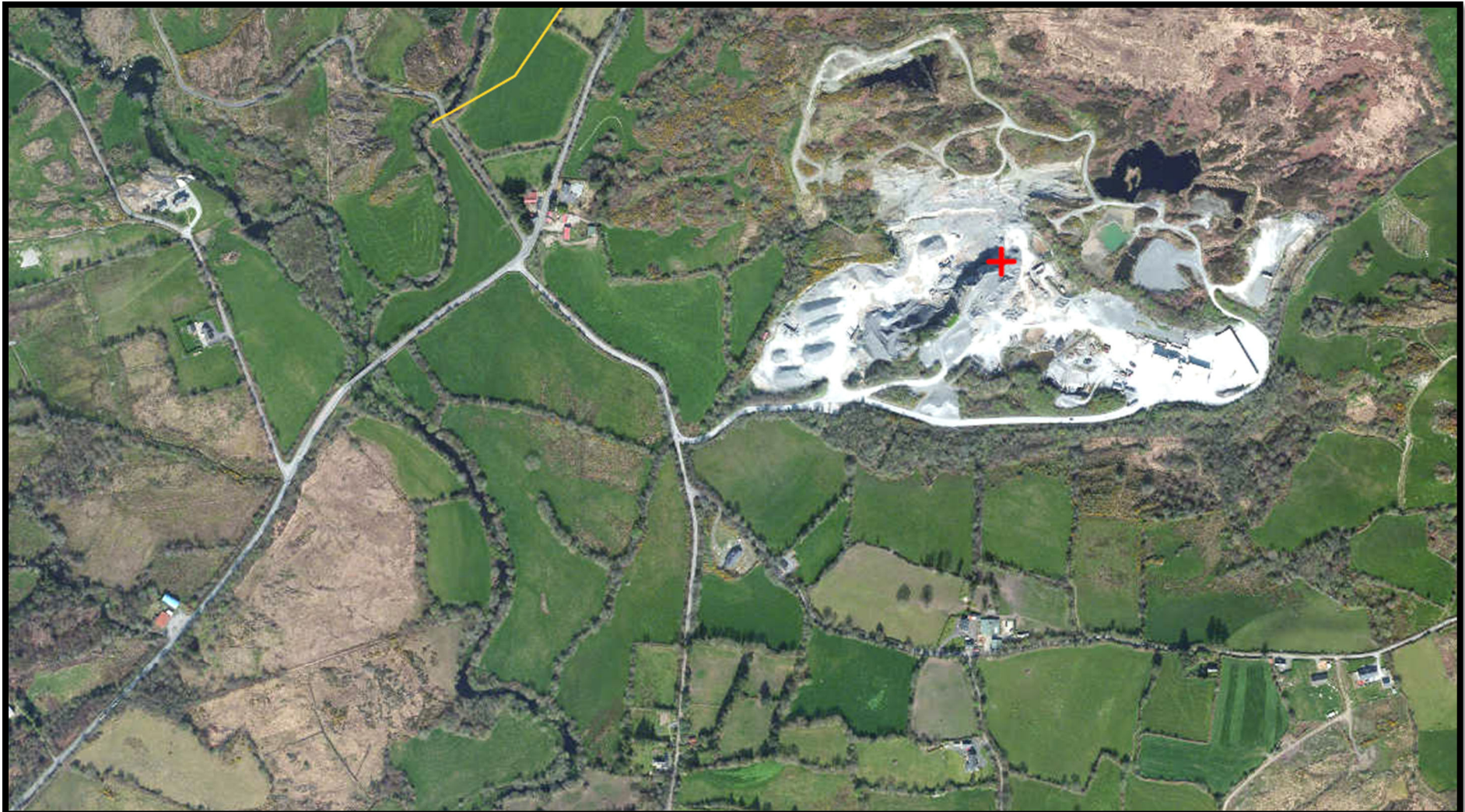
**Appendix 7.1.4 – EPA Hydrology Mapping showing the Bandon\_020 and Caha\_020 rivers both having High Risk Status. (EPA River Future Risk Quality Status Mapping 2019 to 2024 from <https://gis.epa.ie/EPAMaps/Water>.)**

## Appendix 7.1: Ardcahan Quarry EIAR – Water Chapter EPA Hydrology Catchment, Water Quality and Risk Mapping



**Appendix 7.1.5 – EPA Hydrology Mapping showing the Bandon\_020 & Caha\_020 rivers both under Agricultural Risk Pressures. (EPA River Future Risk Quality Status Mapping 2019 to 2024 from <https://gis.epa.ie/EPAMaps/Water>.)**

## Appendix 7.1: Ardcahan Quarry EIAR – Water Chapter EPA Hydrology Catchment, Water Quality and Risk Mapping



**Appendix 7.1.5 – EPA Hydrology Map showing the Caha\_020 river under Extractive Industry & Anthropogenic Risk Pressures. (EPA River Future Risk Quality Status Mapping 2019 to 2024 from <https://gis.epa.ie/EPAMaps/Water>.)**

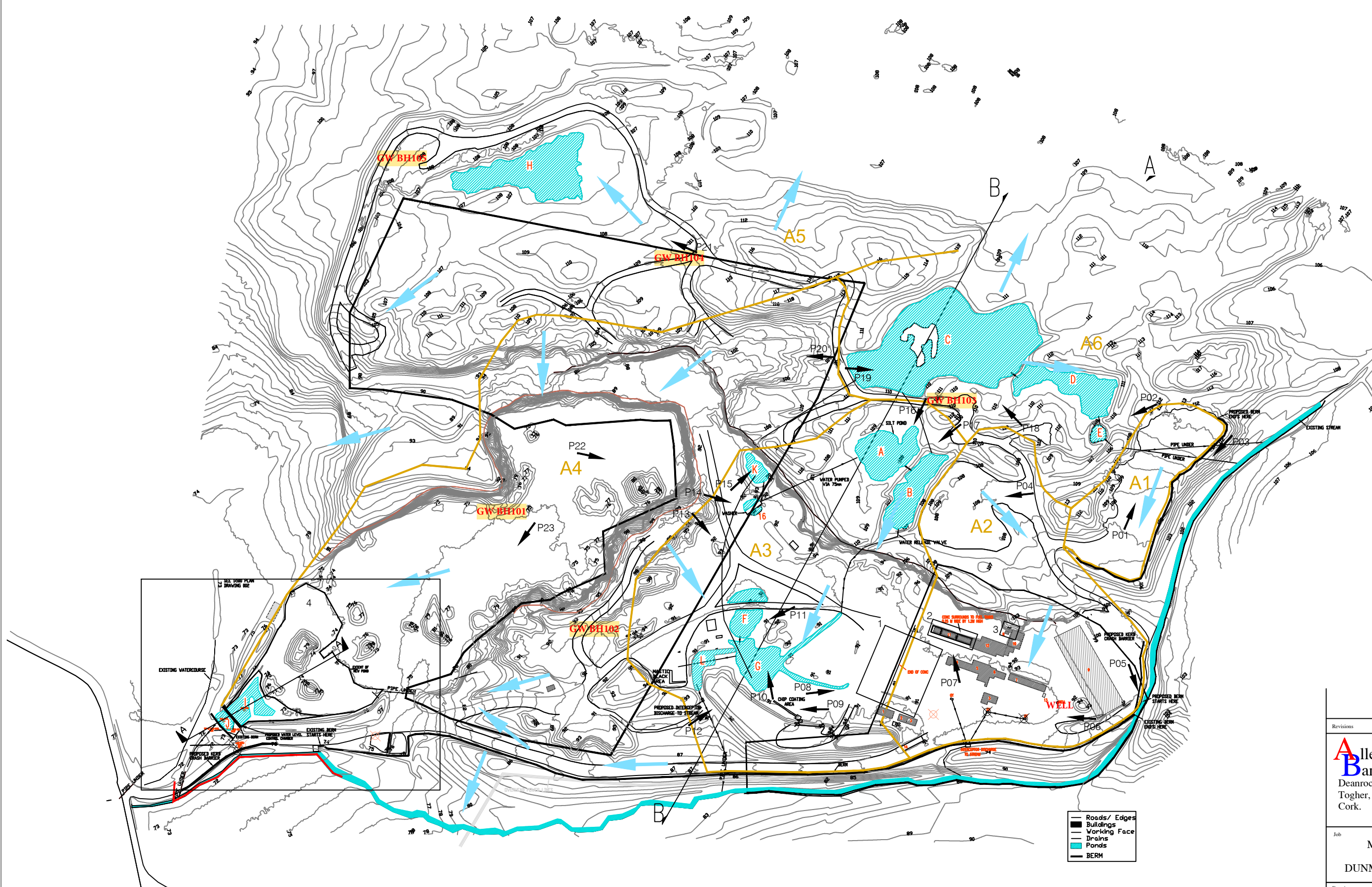
## **APPENDIX 7.2**

**ARDCAHAN QUARRY SUB-  
CATCHMENT MAP (WITH  
LOCATION OF 2024 BOREHOLES  
BH01 TO BH05 SHOWN)**

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Ardcahan Quarry EIAR – Chapter 7 Water Attributes  
**Appendix 7.2 – Ardcahan Quarry Sub-Catchment Map  
(with location of 2024 Boreholes BH01 to BH05 shown)**



Revisions	Issue	Date	By

**Allen Barber**  
 Deanrock Business Park,  
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tel 021 4319291  
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Job  
**MURRAY BROS.**  
**ARDCAHAN,**  
**DUNMANWAY, CO.CORK**

Drawing  
**SITE LAYOUT**

Job No.	DRG No.	Issue
ARDCAHAN	001	F1

Scale	Date	Drawn	Checked
1:2500	MAY 15	PB	DM



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**APPENDIX 7.3**  
VCL SITE PHOTOS OF  
HYDROLOGY FEATURES

**VOLUME III**  
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APRIL 2026



Ardcahan Quarry EIAR – Chapter 7 Water Attributes  
**Appendix 7.3 – VCL Site Photos of Hydrology Features**

## Appendix 7.3 Ardcahan Quarry EIAR – Water Chapter VCL Photos of Sites Main Hydrology Features



**Photo 7.3.01: View of old settlement & water retention Pond A in central site area – Catchment Area A3. This pond and the adjacent Pond B are now dry and overgrown.**



**Photo 7.3.02: View East across the Main Pond (Pond C) in the NW part of the site – Catchment Area A6. (Water from this pond was used for plant process use if required.)**

**This Pond overflows east to ponds D & E and discharges to the boundary stream at discharge Loc 01.**

## Appendix 7.3 Ardcahan Quarry EIAR – Water Chapter VCL Photos of Sites Main Hydrology Features



**Photo 7.3.03: View West of the Pond H located in the NW corner of the site. Catchment Area A5.**



**Photo 7.3.04: View South of Pond H located in the NW corner of the site. Catchment Area A5.  
There is no known discharge point from this pond.**

# Appendix 7.3 Ardcahan Quarry EIAR – Water Chapter VCL Photos of Sites Main Hydrology Features



**Photo 7.3.05: View NW of track going to the upper north side of site. Catchment Area A2. Yard & road drainage goes to the stream here, at a point just above the sites discharge Location 02.**



**Photo 7.3.06: Road at back of aggregate warehouse next to stream. Just below discharge Location 02.**



**Photo 7.3.07: Boundary stream at Up-Stream sample point . Overgrown in July 2023.**

## Appendix 7.3 Ardcahan Quarry EIAR – Water Chapter VCL Photos of Sites Main Hydrology Features



**Photo 7.3.08: View of local boundary stream at the Up-Stream SW sampling point. January 2025.  
This section of the watercourse is just below the quarry discharge Location 02.**



**Photo 7.3.9: View downstream of the sites Up-Stream SW sampling point, from January 2025.**

# Appendix 7.3 Ardcahan Quarry EIAR – Water Chapter VCL Photos of Sites Main Hydrology Features



Photo 7.3.10: Manholes of old interceptor on south edge of Tarmac Plant – SW discharge Location 03.

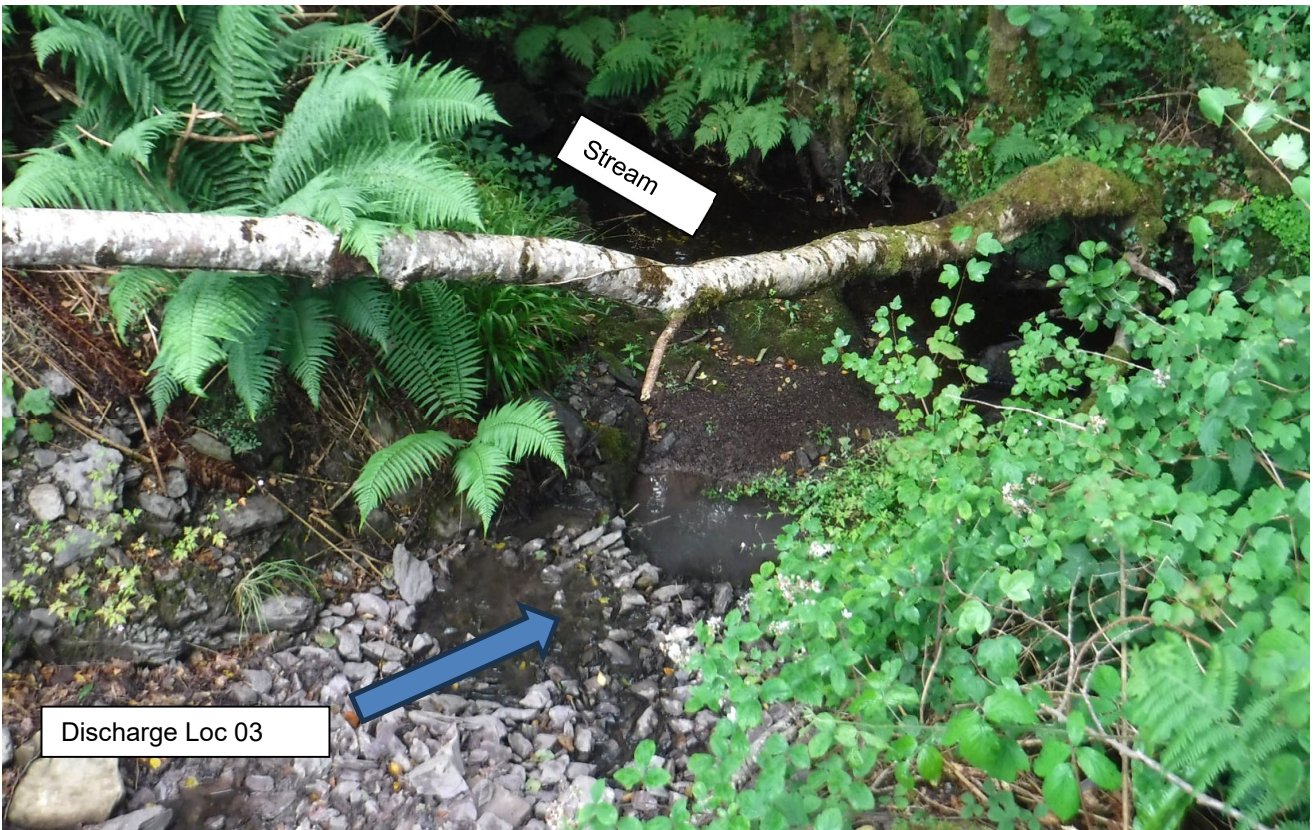


Photo 7.3.11: View of SW discharge location 03 for Tarmac Plant stormwater runoff to stream.

## Appendix 7.3 Ardcahan Quarry EIAR – Water Chapter VCL Photos of Sites Main Hydrology Features



**Photo 7.3.12: Old photo of view SE over lower part of Catchment Area A3 with Ponds F & G visible. Pond L is in overgrown area behind the white van and overflows south to the boundary stream.**



**Photo 7.3.13: View NW of Pond G which is connected to Ponds F and L in the Tarmac Plant area.**



**Photo 7.3.14: View South of Pond F. Wash water from the Tarmac Plant is recycled to Ponds F & G.**

## Appendix 7.3 Ardcahan Quarry EIAR – Water Chapter VCL Photos of Sites Main Hydrology Features



**Photo 7.3.15: View of the Pond L overflow with the Tarmac Plant interceptor on discharge Location 04.**



**Photo 7.3.16: View of Boundary Stream south of the sites access road down from where the Location 04 discharge enters it.**

## Appendix 7.3 Ardcahan Quarry EIA – Water Chapter VCL Photos of Sites Main Hydrology Features



**Photo 7.3.17: View NE of the old quarry face across the old quarry floor. Proposed quarry expansion area. The Cahu Formation of sandstones and Siltstones is classified as a Poor Aquifer.**



**Photo 7.3.18: View SW across the old quarry floor. SW drains off site in the bottom corner of this area. This is part of the sites Catchment Area A4.**

## Appendix 7.3 Ardcahan Quarry EIAR – Water Chapter VCL Photos of Sites Main Hydrology Features



**Photo 7.3.19: Pond I in the SW corner of the site where runoff accumulates before discharging to Pond J.**



**Photo 7.3.20: Final Pond J in SW corner of site where stormwater accumulates before discharging offsite.**

## Appendix 7.3 Ardcahan Quarry EIAR – Water Chapter VCL Photos of Sites Main Hydrology Features



**Photo 7.3.21: The sites final outflow drainage ditch going to a pipe under the road and to the stream. This is the Quarry Site Discharge Location 05.**



**Photo 7.3.22: View of separate drainage ditch near the site access that takes road runoff and pipes it under the road to the local stream. This drain is not connected to the quarry area.**

## Appendix 7.3 Ardcahan Quarry EIAR – Water Chapter VCL Photos of Sites Main Hydrology Features



**Photo 7.3.23: View West of main access road into the quarry. Note the camber of the road is away from the stream and there is an earthen berm along the road edge almost as far as the access gate.**



**Photo 7.3.24: View of boundary stream (on left) flowing beside the road and main access gate to the site.**



**Photo 7.3.25: View of the boundary stream adjacent to the quarry gate.  
(If the downstream location by the bridge is impacted by agricultural activity this location is sampled.)**

## Appendix 7.3 Ardcahan Quarry EIA – Water Chapter VCL Photos of Sites Main Hydrology Features



**Photo 7.13.26: View of local stream down gradient of the Quarry main gate. Cattle allowed access the stream for drinking water creates very dirty, muddy and silty water conditions.**



**Photo 7.3.27: Down stream sampling point by road bridge – impacted by local agricultural activity.**

## Appendix 7.3 Ardcahan Quarry EIAR – Water Chapter VCL Photos of Sites Main Hydrology Features



**Photo 7.3.28: View of stream flowing under bridge over public road adjacent to access road to quarry. (This is just downstream from where the attenuated quarry stormwater enters the watercourse).**

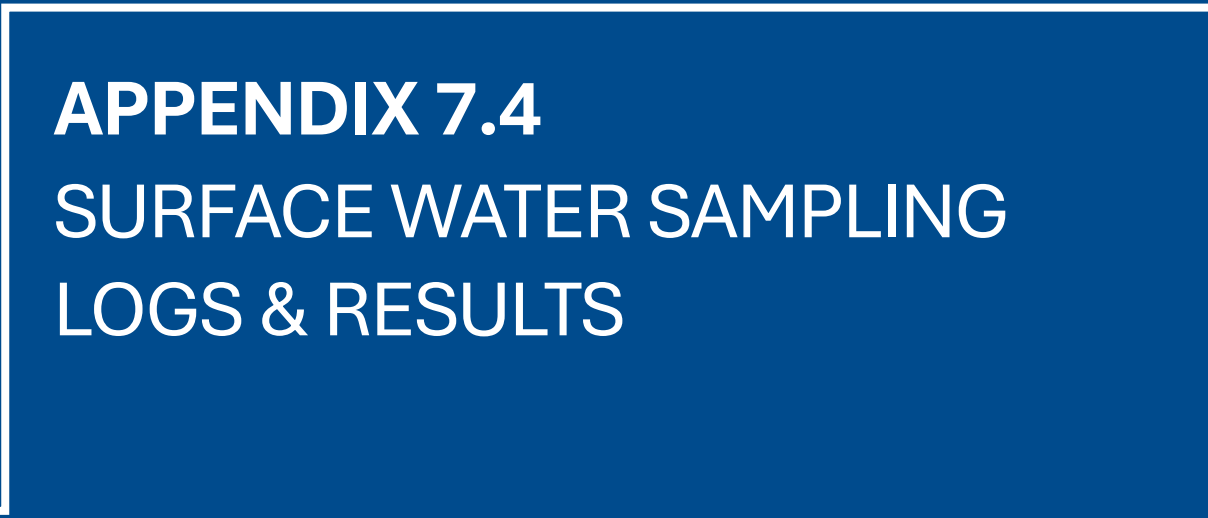


**Photo 7.3.29: View SW of boundary stream flowing below the public road. This is part of the Bandon SAC.**





Murray Brothers Tarmacadam Ltd



**APPENDIX 7.4**  
**SURFACE WATER SAMPLING**  
**LOGS & RESULTS**

**VOLUME III**  
APPENDICES



APRIL 2026





Ardcahan Quarry EIAR – Chapter 7 Water Attributes

**Appendix 7.4 – Surface Water Sampling Logs & Results**



## Surface Water Sampling Log

### Location I.D.: Ardcahan SW-Up Stream

#### Project Details

<b>Client:</b>	Murray Bros	<b>Project No.:</b>	CONS0212
<b>Location:</b>	Ardcahan Quarry	<b>Scientist:</b>	Darragh Musgrave
		<b>Date:</b>	21st May 2020

#### Sample Location Details

<b>Sample Location:</b>	Up Stream - Loc 02	<b>Water Flow:</b>	Low
<b>Sample Acquired:</b>	By Hand	<b>Stream Depth (m):</b>	~10cm
<b>Measurement Point:</b>	River Bank	<b>Containers Used:</b>	Lab supplied plastic, glass containers & vials

#### Field Measurements

<b>Observed Colour:</b>	Clear	<b>Odour:</b>	None
<b>Temperature (° C):</b>	12.2	<b>Conductivity (µS/cm):</b>	201
<b>pH:</b>	7.39		

#### Analysis Required

Ammonium  
Nitrate, Nitrite  
BOD, COD  
Banded TPH's

Chloride, Sulphate, Sulphide  
Total Hardness, Alkalinity,  
Total Dissolved Solids,  
Suspended Solids,

#### Comments

Dry sunny day - warm conditons.  
Stream bed has algae and weed - growth from nutrient enrichment.  
Location is at back of aggregate storage shed area near Discharge Loc 02.  
Samples delivered to laboratory on same day of sampling.  
Preservative H2SO4 used for ammonia.

Email <darragh.musgrave@viridus.ie>

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## Surface Water Sampling Log

### Location I.D.: Ardcahan SW-Down Stream

#### Project Details

<b>Client:</b>	Murray Bros	<b>Project No.:</b>	CONS0212
<b>Location:</b>	Ardcahan Quarry	<b>Scientist:</b>	Darragh Musgrave
		<b>Date:</b>	21st May 2020

#### Sample Location Details

<b>Sample Location:</b>	Down Stream	<b>Water Flow:</b>	Low
<b>Sample Acquired:</b>	By Hand	<b>Stream Depth (m):</b>	~10cm to 20cm
<b>Measurement Point:</b>	River Bank	<b>Containers Used:</b>	Lab supplied plastic, glass containers & vials

#### Field Measurements

<b>Observed Colour:</b>	Clear	<b>Odour:</b>	None
<b>Temperature (° C):</b>	12.0	<b>Conductivity (µS/cm):</b>	203
<b>pH:</b>	7.26		

#### Analysis Required

Ammonium  
Nitrate, Nitrite  
BOD, COD  
Banded TPH's

Chloride, Sulphate, Sulphide  
Total Hardness, Alkalinity,  
Total Dissolved Solids,  
Suspended Solids,

#### Comments

Dry sunny day - warm conditons.  
Slow flow of stream.

Samples delivered to laboratory on same day of sampling.  
Preservative H2SO4 used for ammonia.

Email <darragh.musgrave@viridus.ie>

Viridus Consulting Ltd.



## Surface Water Sampling Log

### Location I.D.: Ardcahan SW-Up Stream

#### Project Details

<b>Client:</b>	Murray Bros	<b>Project No.:</b>	CONS0212
<b>Location:</b>	Ardcahan Quarry	<b>Scientist:</b>	Darragh Musgrave
		<b>Date:</b>	4th July 2023

#### Sample Location Details

<b>Sample Location:</b>	Up Stream	<b>Water Flow:</b>	Low (weedy conditons)
<b>Sample Acquired:</b>	By Hand	<b>Stream Depth (m):</b>	~10cm
<b>Measurement Point:</b>	River Bank	<b>Containers Used:</b>	Lab supplied plastic, glass containers & vials

#### Field Measurements

<b>Observed Colour:</b>	Clear	<b>Odour:</b>	None
<b>Temperature (° C):</b>	13.5	<b>Conductivity (µS/cm):</b>	170
<b>pH:</b>	7.44		

#### Analysis Required

Ammonium Nitrate, Nitrite BOD, COD Banded TPH's	Chloride, Sulphate, Sulphide Total Hardness, Alkilineity, Total Dissolved Solids, Suspended Soilds,
--	--

#### Comments

Dry sunny day - warm conditons. Stream bed has algae and weed - growth from nutrient enrichment. Very small fish and some dragon flies noticed. Samples delivered to laboratory on same day of sampling. Preservative H2SO4 used for ammonia. Location is at back of aggregate storage shed area near Discharge Loc 02.
--

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## Surface Water Sampling Log

### Location I.D.: Ardcahan SW-Down Stream

#### Project Details

<b>Client:</b>	Murray Bros	<b>Project No.:</b>	CONS0212
<b>Location:</b>	Ardcahan Quarry	<b>Scientist:</b>	Darragh Musgrave
		<b>Date:</b>	4th July 2023

#### Sample Location Details

<b>Sample Location:</b>	Down Stream	<b>Water Flow:</b>	Very Low
<b>Sample Acquired:</b>	By Hand	<b>Stream Depth (m):</b>	~5 to 10cm
<b>Measurement Point:</b>	Stream Bank	<b>Containers Used:</b>	Lab supplied plastic, glass containers & vials

#### Field Measurements

<b>Observed Colour:</b>	Clear	<b>Odour:</b>	None
<b>Temperature (° C):</b>	13.5	<b>Conductivity (µS/cm):</b>	186
<b>pH:</b>	7.52		

#### Analysis Required

Ammonium Nitrate, Nitrite BOD, COD Banded TPH's	Chloride, Sulphate, Sulphide Total Hardness, Alkalinity, Total Dissolved Solids, Suspended Solids,
--	---

#### Comments

Dry sunny day - warm conditons. Slow flow of stream.  Samples delivered to laboratory on same day of sampling. Preservative H2SO4 used for ammonia.
---

Email <darragh.musgrave@viridus.ie>

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## Surface Water Sampling Log

### Location I.D.: Ardcahan SW-Up Stream

#### Project Details

<b>Client:</b>	Murray Bros	<b>Project No.:</b>	CONS0212
<b>Location:</b>	Ardcahan Quarry	<b>Scientist:</b>	Darragh Musgrave
		<b>Date:</b>	21st January 2025

#### Sample Location Details

<b>Sample Location:</b>	Up Stream	<b>Water Flow:</b>	Low
<b>Sample Acquired:</b>	By Hand	<b>Stream Depth (m):</b>	~10cm
<b>Measurement Point:</b>	River Bank	<b>Containers Used:</b>	Lab supplied plastic, glass containers & vials

#### Field Measurements

<b>Observed Colour:</b>	Clear	<b>Odour:</b>	None
<b>Temperature (° C):</b>	8.4	<b>Conductivity (µS/cm):</b>	165
<b>pH:</b>	6.99		

#### Analysis Required

Ammonium  
Nitrate, Nitrite  
BOD, COD  
Banded TPH's

Chloride, Sulphate, Sulphide  
Total Hardness, Alkalinity,  
Total Dissolved Solids,  
Suspended Solids,

#### Comments

Dry cool sunny day - occasional showers.  
Stream has mid to low flow after relatively dry January.  
Location is at back of aggregate storage shed area near Discharge Loc 02.  
Samples delivered to laboratory on same day of sampling.  
Preservative H2SO4 used for ammonia.

Email <darragh.musgrave@viridus.ie>

Viridus Consulting Ltd.



## Surface Water Sampling Log

### Location I.D.: Ardcahan SW-Down Stream

#### Project Details

<b>Client:</b>	Murray Bros	<b>Project No.:</b>	CONS0212
<b>Location:</b>	Ardcahan Quarry	<b>Scientist:</b>	Darragh Musgrave
		<b>Date:</b>	21st January 2025

#### Sample Location Details

<b>Sample Location:</b>	Down Stream	<b>Water Flow:</b>	Low to medium
<b>Sample Acquired:</b>	By Hand	<b>Stream Depth (m):</b>	~5 to 10cm
<b>Measurement Point:</b>	Stream Bank	<b>Containers Used:</b>	Lab supplied plastic, glass containers & vials

#### Field Measurements

<b>Observed Colour:</b>	Clear	<b>Odour:</b>	None
<b>Temperature (° C):</b>	8.8	<b>Conductivity (µS/cm):</b>	157
<b>pH:</b>	7.29		

#### Analysis Required

Ammonium  
Nitrate, Nitrite  
BOD, COD  
Banded TPH's

Chloride, Sulphate, Sulphide  
Total Hardness, Alkalinity,  
Total Dissolved Solids,  
Suspended Solids,

#### Comments

Dry cool sunny day - occasional showers.  
Low to medium flow.  
Sample taken from the boundary stream by sites access gate.  
Samples delivered to laboratory on same day of sampling.  
Preservative H2SO4 used for ammonia.

Email <darragh.musgrave@viridus.ie>

Viridus Consulting Ltd.

**Ardcahan Quarry Expansion EIAR Water Chapter 7 - Appendix 7.4**  
**Surface Water Up-Stream and Down-Stream Analytical Results - Physico-chemical Indicator Hydrocarbon Parameters.**

Sampling Reference Date	Limit of Detection	Units	SW-US	SW-DS	SW-US	SW-DS	SW-US	SW-DS	SW-US	SW-DS	EQS*	SWR"
			1/7/14	21/5/20	4/7/23	21/1/25						
<b>Field Measurements</b>												
pH	-	pH Units	7.50	8.14	7.39	7.26	7.44	7.52	6.99	7.29	5.5 - 9.0	6.0 - 9.0
Temperature	-	°C	14.4	13.5	12.2	12.0	13.5	13.5	8.4	8.8	25	rise not >1.5
Electrical Conductivity	-	µS/cm	185	200	201	203	170	186	165	157	1000	-
<b>Lab Analysis</b>												
pH	-	pH units	7.5	7.9	7.7	7.6	6.90	6.20	N/A	N/A	-	6.5 - 9.5
Electrical Conductivity at 25°C	25	µS/cm	190	197	167	172	160	190	N/A	N/A	1000	-
Total Suspended Solids	5	mg/l	<5	<5	<5	<5	<5	<5	5	<5	<25 (50 Max)	-
Nitrate (as NO3)	4.4	mg/l	8.23	6.68	7.4	6.4	5.34	<4.4	10.30	8.76	50	-
Nitrite (as NO2)	Various	mg/l	<0.043	<0.043	<0.016	<0.016	<0.033	<0.033	<0.033	<0.033	0.2	-
Ammonia (as N)	Various	mg/l	N/A	N/A	0.019	0.05	0.05	<0.05	0.018	0.019	-	<0.04 mean
Ammonium (as NH4)	0.006	mg/l	N/A	N/A	0.024	0.064	0.05	0.020	0.023	0.024	-	0.065^
Ortho phosphate (as P)	Various	mg/l	0.02	<0.005	0.024	0.026	<0.05	<0.05	0.031	0.025	-	<0.025 (mean)
PRO/TPH (C6-C10)	0.01	mg/l	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	-
Min Oil/TPH (C10-C20)	0.01	mg/l	<0.01	<0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01	0.01	-
DRO/TPH (C20-C40)	0.01	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	-
Total TPH (C6-C40)	0.01	mg/l	<0.01	<0.01	<b>0.014</b>	<b>0.016</b>	<0.01	<0.01	<0.01	<0.01	0.01	-
<b>Anions &amp; Cations</b>												
Manganese	1.0	ug/l	17.6	20.2	12	81	N/A	N/A	N/A	N/A	-	-
Calcium	1.0	mg/l	21.3	24.3	21.3	21.6	N/A	N/A	N/A	N/A	-	-
Potassium	0.2	mg/l	3.7	3.8	3.3	2.1	N/A	N/A	N/A	N/A	-	-
Magnesium	0.3	mg/l	2.7	3.3	3.1	3.2	N/A	N/A	N/A	N/A	-	-
Sodium	0.5	mg/l	8.9	9.6	10.2	10.1	N/A	N/A	N/A	N/A	-	-
Chloride	2.6	mg/l	16.6	17.0	18.0	19.0	17.1	17.5	16.3	16.1	250	-
Sulphate	1.0	mg/l	6.5	6.00	13.00	10.00	9.23	37.0	8.67	8.73	200	-
Sulphide	0.03	mg/l	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.183	0.521	-	-
Total Dissolved Solids	15	mg/l	181	246	101	134	99	158	103	89	-	-
Alkalinity (Total) mg/l CaCO3	10	mg/l	50	61	66	73	N/A	N/A	N/A	N/A	-	-
<b>Microbiological Analysis</b>												
BOD Settled	1	mg/l	<1	<1	<1	<1.0	<1.0	<1.0	<1.0	<1.0	<5	<1.3 (mean)
COD	8	mg/l	10	13	9	8	12	12	<8	8	40	-
<b>Legend</b>												
*Surface Water EQS - Environmental Quality Standards for Surface Water - EPA 2001.												
"Surface Water Regulations - SI 272 of 2009 - 'RiverWater Body' values used.												
^ Mean value for A-A EQS inland Surface Waters as per SI 272 of 2009.												
- = no environmental surface water guidance value												
N/A = Not Analysed for that round of sampling												
<b>Results are in bold where they exceed the EQS</b>												
Results are underlined where they exceed the SWR												



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<b>Contact Name</b>	Darragh Musgrave	<b>Report Number</b>	<b>180439 - 1</b>
<b>Address</b>	Viridus Consulting Ltd. Gaia House, Cloughphilip,	<b>Sample Number</b>	180439/001
<b>Tel No</b>	021 438 4733	<b>Date of Receipt</b>	21/05/2020
<b>Customer PO</b>	PO180	<b>Date Started</b>	21/05/2020
<b>Project No.</b>	QN010206	<b>Received or Collected</b>	Hand
<b>Customer Ref</b>	AQUS	<b>Date of Report</b>	12/06/2020
		<b>Sample Type</b>	Surface Waters
		<b>Condition on receipt</b>	Satisfactory

**CERTIFICATE OF ANALYSIS**

TEST	ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
<b>BOD</b>									
BOD			EW001	1.0		<1.0	mg/L	INAB	
<b>COD-Chemical Oxygen Demand</b>									
COD			EW184	8		9	mg/L	INAB	
<b>Gallery Plus-Suite A</b>									
Ammonia as N			EW175	0.005		0.019	mg/l N	INAB	
Ammonium as NH4 (calc)			EW175	0.006		0.024	mg/l NH4	INAB	
Nitrate as N			EW175	0.15		1.7	mg/l N	INAB	
Nitrate as NO3 (Calc)			EW175	0.66		7.4	mg/l NO3	INAB	
Nitrite as N			EW175	0.005		<0.005	mg/l N	INAB	
Nitrite as NO2 (Calc)			EW175	0.016		<0.016	mg/l NO2	INAB	
Phosphate (Ortho/MRP) as P			EW175	0.005		0.024	mg/l P	INAB	
Chloride mg/L			EW175	1.0		18	mg/L	INAB	
Sulphate mg/L			EW175	1.0		13	mg/L	INAB	
<b>GCFID-(LVI) EPH C8 to C40 (Mineral Oil C8-C40)</b>									
EPH >C10 - C20 (Diesel Range)			EO063	0.01		0.01	mg/L		
EPH >C20 - C40 (Motor Oil Range)			EO063	0.01		<0.01	mg/L		
EPH >C8 - C10 (Petrol Range)			EO063	0.01		<0.01	mg/L		
EPH-C8 to C40			EO063	0.01		0.01	mg/L	INAB	
EPH-C8 to C40 (Calc ug/l)			EO063	10		14	µg/L		
<b>Metals-Trace</b>									
Total Hardness (Calc)			EW188	3.0		66.2	mg/L CaCO3	INAB	
Manganese			EW188	1.0		12	ug/L	INAB	
Calcium			EW188	0.1		21.3	mg/L		
Potassium			EW188	0.2		3.3	mg/L	INAB	
Magnesium			EW188	0.3		3.1	mg/L	INAB	
Sodium			EW188	0.5		10.2	mg/L	INAB	
<b>Sulfide</b>									
Sulfide			EW024	0.03		<0.03	mg/L		
<b>Suspended Solids</b>									
Suspended Solids			EW013	5		<5	mg/L	INAB	
<b>Titralab</b>									
pH			EW153	0.0		7.7	pH Units	INAB	
Conductivity @20 DegC			EW153	25		167	uscm-1@20	INAB	

*EMMA DAVIS*

Signed :

12/06/2020

**Emma Davis-Technical Manager**

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- 2.SPEC= Allowable limit or parametric value
- 3.OOS=Result which is outside specification highlighted as OOS-A
- 4.LOQ=Limit of Quantification or lowest value that can be reported
- 5.ACCRED=Indicates matrix accreditation for the test,a blank field indicates not accredited
- 6."\*" Indicates sub-contract test
- 7.Where the date of sampling has not been provided,sample stability times cannot be assessed. It is therefore possible that the results provided may be compromised



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<b>Contact Name</b>	Darragh Musgrave	<b>Report Number</b>	<b>180439 - 1</b>
<b>Address</b>	Viridus Consulting Ltd. Gaia House, Cloughphilip,	<b>Sample Number</b>	180439/001
<b>Tel No</b>	021 438 4733	<b>Date of Receipt</b>	21/05/2020
<b>Customer PO</b>	PO180	<b>Date Started</b>	21/05/2020
<b>Project No.</b>	QN010206	<b>Received or Collected</b>	Hand
<b>Customer Ref</b>	AQUS	<b>Date of Report</b>	12/06/2020
		<b>Sample Type</b>	Surface Waters
		<b>Condition on receipt</b>	Satisfactory

**CERTIFICATE OF ANALYSIS**

TEST	ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
<b>Titralab</b>									
	Alkalinity Total (R2 pH4.5)		EW153	10		66	mg/L CaCO3	INAB	
<b>Total Dissolved Solids (TDS)</b>									
	Total Dissolved Solids (TDS)		EW046	15		101	mg/L	INAB	

*EMMA DAVIS*

Signed : \_\_\_\_\_

**Emma Davis-Technical Manager**

12/06/2020

**NOTES**

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- 2.SPEC= Allowable limit or parametric value
- 3.OOS=Result which is outside specification highlighted as OOS-A
- 4.LOQ=Limit of Quantification or lowest value that can be reported
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- 6.\*\*\* Indicates sub-contract test
- 7.Where the date of sampling has not been provided,sample stability times cannot be assessed. It is therefore possible that the results provided may be compromised



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<b>Contact Name</b>	Darragh Musgrave	<b>Report Number</b>	<b>180439 - 1</b>
<b>Address</b>	Viridus Consulting Ltd. Gaia House, Cloughphilip,	<b>Sample Number</b>	180439/002
<b>Tel No</b>	021 438 4733	<b>Date of Receipt</b>	21/05/2020
<b>Customer PO</b>	PO180	<b>Date Started</b>	21/05/2020
<b>Project No.</b>	QN010206	<b>Received or Collected</b>	Hand
<b>Customer Ref</b>	AQDS	<b>Date of Report</b>	12/06/2020
		<b>Sample Type</b>	Surface Waters
		<b>Condition on receipt</b>	Satisfactory

**CERTIFICATE OF ANALYSIS**

TEST	ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
<b>BOD</b>									
BOD			EW001	1.0		<1.0	mg/L	INAB	
<b>COD-Chemical Oxygen Demand</b>									
COD			EW184	8		8	mg/L	INAB	
<b>Gallery Plus-Suite A</b>									
Ammonia as N			EW175	0.005		0.050	mg/l N	INAB	
Ammonium as NH4 (calc)			EW175	0.006		0.064	mg/l NH4	INAB	
Nitrate as N			EW175	0.15		1.4	mg/l N	INAB	
Nitrate as NO3 (Calc)			EW175	0.66		6.4	mg/l NO3	INAB	
Nitrite as N			EW175	0.005		<0.005	mg/l N	INAB	
Nitrite as NO2 (Calc)			EW175	0.016		<0.016	mg/l NO2	INAB	
Phosphate (Ortho/MRP) as P			EW175	0.005		0.026	mg/l P	INAB	
Chloride mg/L			EW175	1.0		19	mg/L	INAB	
Sulphate mg/L			EW175	1.0		10	mg/L	INAB	
<b>GCFID-(LVI) EPH C8 to C40 (Mineral Oil C8-C40)</b>									
EPH-C8 to C40			EO063	0.01		0.02	mg/L	INAB	
EPH-C8 to C40 (Calc ug/l)			EO063	10		16	µg/L		
EPH >C10 - C20 (Diesel Range)			EO063	0.01		<0.01	mg/L		
EPH >C20 - C40 (Motor Oil Range)			EO063	0.01		0.01	mg/L		
EPH >C8 - C10 (Petrol Range)			EO063	0.01		<0.01	mg/L		
<b>Metals-Trace</b>									
Total Hardness (Calc)			EW188	3.0		66.9	mg/L CaCO3	INAB	
Manganese			EW188	1.0		81	ug/L	INAB	
Calcium			EW188	0.1		21.6	mg/L		
Potassium			EW188	0.2		2.1	mg/L	INAB	
Magnesium			EW188	0.3		3.2	mg/L	INAB	
Sodium			EW188	0.5		10.1	mg/L	INAB	
<b>Sulfide</b>									
Sulfide			EW024	0.03		<0.03	mg/L		
<b>Suspended Solids</b>									
Suspended Solids			EW013	5		<5	mg/L	INAB	
<b>Titralab</b>									
pH			EW153	0.0		7.6	pH Units	INAB	
Conductivity @20 DegC			EW153	25		172	uscM-1@20	INAB	
Alkalinity Total (R2 pH4.5)			EW153	10		73	mg/L CaCO3	INAB	

*EMMA DAVIS*

Signed :

\_\_\_\_\_

12/06/2020

**Emma Davis-Technical Manager**

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- 6."\*" Indicates sub-contract test
- 7.Where the date of sampling has not been provided,sample stability times cannot be assessed. It is therefore possible that the results provided may be compromised



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<b>Contact Name</b>	Darragh Musgrave	<b>Report Number</b>	<b>180439 - 1</b>
<b>Address</b>	Viridus Consulting Ltd. Gaia House, Cloughphilip,	<b>Sample Number</b>	180439/002
<b>Tel No</b>	021 438 4733	<b>Date of Receipt</b>	21/05/2020
<b>Customer PO</b>	PO180	<b>Date Started</b>	21/05/2020
<b>Project No.</b>	QN010206	<b>Received or Collected</b>	Hand
<b>Customer Ref</b>	AQDS	<b>Date of Report</b>	12/06/2020
		<b>Sample Type</b>	Surface Waters
		<b>Condition on receipt</b>	Satisfactory

**CERTIFICATE OF ANALYSIS**

TEST	ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
<b>Total Dissolved Solids (TDS)</b>									
	Total Dissolved Solids (TDS)		EW046	15		134	mg/L	INAB	

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**Emma Davis-Technical Manager**

12/06/2020

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**Page Number:** Page 1 of 6

**PO reference:**

Sample number	966-2023-00030364	Received on	05/07/2023
Your sample reference	ARD US	Analysis started on	05/07/2023
Sample Matrix	Surface water		
Sample Condition on Arrival	Satisfactory	Sample Date	04/07/2023
Time Sampled	16:00		

Test Code Analyte	SUB <sup>5</sup> Analysis Started	Method	LOQ <sup>3</sup>	SPEC <sup>2</sup>	Result	Units	ACCRED <sup>4</sup>
<b>Suspended Solids [M3002]</b>							
Suspended Solids	10/07/23 09:29	EW013	5		<5	mg/l	C6
<b>Biochemical Oxygen Demand (BOD) [M3003]</b>							
Biochemical oxygen demand (BOD) 5d	06/07/23 09:10	EW001	1		<1	mg/l	C6
<b>Chemical Oxygen Demand (COD) [M3004]</b>							
Chemical oxygen demand (COD)	06/07/23 10:14	EW094	8		12	mg/l	C6
<b>Total Dissolved Solids (TDS) [M3006]</b>							
Total dissolved solids @ 180°C	10/07/23 09:50	EW046	15		99	mg/l	C6
<b>Sulfide [M3009]</b>							
Sulphide	12/07/23 12:34	EW024	0.03		<0.03	mg/l	C6
<b>Nitrate as NO<sub>3</sub> (Calc) - Gallery [M300L]</b>							
Nitrate as NO <sub>3</sub> (Calc) - Gallery	06/07/23 08:52	EW175	4.4		5.339	mg/l	C6
<b>Sulphate mg/L - Gallery [M300N]</b>							
Sulphate mg/L - Gallery	06/07/23 08:52	EW175	1		9.23	mg/l	C6
<b>Phosphate (Ortho/MRP) as P - Gallery [M300P]</b>							

Signed: \_\_\_\_\_



Niamh Ward - Senior Laboratory Analyst

17/07/2023

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- 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
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**PO reference:**

Phosphate (Ortho/MRP) as P - Gallery	06/07/23 08:52	EW175	0.05	<0.05	mg/l	C6
<b>Chloride mg/L - Gallery [M300S]</b>						
Chloride mg/L - Gallery	06/07/23 08:52	EW175	5	17.1	mg/l	C6
<b>Nitrite as NO2 (Calc) - Gallery [M300Y]</b>						
Nitrite as NO2 (Calc) - Gallery	06/07/23 08:52	EW175	0.033	<0.033	mg/l	C6
<b>Ammonia as N - Gallery [M300Z]</b>						
Ammonia as N - Gallery	06/07/23 08:52	EW175	0.05	<0.05	mg/l	C6
<b>Nitrite (as N) - Gallery [M3016]</b>						
Nitrite (as N) - Gallery	06/07/23 08:52	EW175	0.01	<0.01	mg/l	C6
<b>Nitrate (as N) - Gallery [M301A]</b>						
Nitrate (as N) - Gallery	06/07/23 08:52	EW175	1	1.206	mg/l	C6
<b>pH (Robotic Method) [M3051]</b>						
pH	10/07/23 15:22 <sup>7A</sup>	EW152R	4	6.9		
<b>Conductivity at 20°C (Robotic Method) [M3052]</b>						
Conductivity at 20°C	10/07/23 15:22	EW152R	91	160	µS/cm	
<b>Ammonium as NH4 (Gallery) [M3280]</b>						
Ammonium as NH4 (calc)	06/07/23 08:52	EW175		0.05	mg/l	
<b>TPH 3 Band (C6-10-21-40) in water [M502B]</b>						
TPH >C10-C21	* 05/07/23 13:48		0.1	<0.1	µg/l	
TPH >C21-C40	* 05/07/23 13:48		0.1	<0.1	µg/l	
TPH >C6-C10	* 05/07/23 13:48		0.1	<0.1	µg/l	
TPH Total >C6-C40	* 05/07/23 13:48		10	<10	µg/l	

Signed: \_\_\_\_\_



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#### <sup>4</sup> Accreditation Information

C6: ISO/IEC 17025:2017 INAB 138-T



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**Page Number:** Page 4 of 6

**PO reference:**

Sample number	966-2023-00030365	Received on	05/07/2023
Your sample reference	ARD DS	Analysis started on	05/07/2023
Sample Matrix	Surface water		
Sample Condition on Arrival	Satisfactory	Sample Date	04/07/2023
Time Sampled	16:30		

Test Code Analyte	SUB <sup>5</sup> Analysis Started	Method	LOQ <sup>3</sup>	SPEC <sup>2</sup>	Result	Units	ACCRED <sup>4</sup>
<b>Suspended Solids [M3002]</b>							
Suspended Solids	10/07/23 09:29	EW013	5		<5	mg/l	C6
<b>Biochemical Oxygen Demand (BOD) [M3003]</b>							
Biochemical oxygen demand (BOD) 5d	06/07/23 09:10	EW001	1		<1	mg/l	C6
<b>Chemical Oxygen Demand (COD) [M3004]</b>							
Chemical oxygen demand (COD)	06/07/23 10:14	EW094	8		12	mg/l	C6
<b>Total Dissolved Solids (TDS) [M3006]</b>							
Total dissolved solids @ 180°C	10/07/23 09:50	EW046	15		158	mg/l	C6
<b>Sulfide [M3009]</b>							
Sulphide	12/07/23 12:51	EW024	0.03		<0.03	mg/l	C6
<b>Nitrate as NO<sub>3</sub> (Calc) - Gallery [M300L]</b>							
Nitrate as NO <sub>3</sub> (Calc) - Gallery	06/07/23 08:52	EW175	4.4		<4.4	mg/l	C6
<b>Sulphate mg/L - Gallery [M300N]</b>							
Sulphate mg/L - Gallery	06/07/23 08:52	EW175	1		37.0	mg/l	C6
<b>Phosphate (Ortho/MRP) as P - Gallery [M300P]</b>							

Signed: \_\_\_\_\_



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**PO reference:**

Phosphate (Ortho/MRP) as P - Gallery	06/07/23 08:52	EW175	0.05	<0.05	mg/l	C6
<b>Chloride mg/L - Gallery [M300S]</b>						
Chloride mg/L - Gallery	06/07/23 08:52	EW175	5	17.5	mg/l	C6
<b>Nitrite as NO2 (Calc) - Gallery [M300Y]</b>						
Nitrite as NO2 (Calc) - Gallery	06/07/23 08:52	EW175	0.033	<0.033	mg/l	C6
<b>Ammonia as N - Gallery [M300Z]</b>						
Ammonia as N - Gallery	06/07/23 08:52	EW175	0.05	<0.05	mg/l	C6
<b>Nitrite (as N) - Gallery [M3016]</b>						
Nitrite (as N) - Gallery	06/07/23 08:52	EW175	0.01	<0.01	mg/l	C6
<b>Nitrate (as N) - Gallery [M301A]</b>						
Nitrate (as N) - Gallery	06/07/23 08:52	EW175	1	<1	mg/l	C6
<b>pH (Robotic Method) [M3051]</b>						
pH	10/07/23 15:22 <sup>7A</sup>	EW152R	4	6.2		
<b>Conductivity at 20°C (Robotic Method) [M3052]</b>						
Conductivity at 20°C	10/07/23 15:22	EW152R	91	190	µS/cm	
<b>Ammonium as NH4 (Gallery) [M3280]</b>						
Ammonium as NH4 (calc)	06/07/23 08:52	EW175		0.02	mg/l	
<b>TPH 3 Band (C6-10-21-40) in water [M502B]</b>						
TPH >C10-C21	* 05/07/23 13:48		0.1	<0.1	µg/l	
TPH >C21-C40	* 05/07/23 13:48		0.1	<0.1	µg/l	
TPH >C6-C10	* 05/07/23 13:48		0.1	<0.1	µg/l	
TPH Total >C6-C40	* 05/07/23 13:48		10	<10	µg/l	

Signed: \_\_\_\_\_



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#### <sup>4</sup> Accreditation Information

C6: ISO/IEC 17025:2017 INAB 138-T



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**Page Number:** Page 1 of 2

**PO reference:**

## Certificate of Analysis

Sample number	966-2025-00002411	Received on	21/01/2025
Your sample reference	AQUS	Analysis started on	22/01/2025
Sample Matrix	Surface water		
Sample Condition on Arrival	Satisfactory	Sample Date	21/01/2025
Time Sampled	11:00		

Test Code Analyte	SUB <sup>5</sup> Analysis Started	Method	LOQ <sup>3</sup>	SPEC <sup>2</sup>	Result	Units	ACCRED <sup>4</sup>
<b>Ammonia as N - Gallery [M300Z]</b>							
Ammonia as N - Gallery	22/01/25 11:19	EW175	0.01		0.0180	mg/l	C6
<b>Ammonium as NH4 (Gallery) [M3280]</b>							
Ammonium as NH4 (calc)	22/01/25 11:19	EW175			0.0230	mg/l	
<b>Biochemical Oxygen Demand (BOD) Robotic Method [M304E]</b>							
Biochemical oxygen demand (BOD) 5d by Robotic Method	22/01/25 10:36	Ew001R	1		<1	mg/l	C6
<b>Chemical Oxygen Demand (COD) [M3004]</b>							
Chemical oxygen demand (COD)	23/01/25 09:41	EW094	8		<8	mg/l	C6
<b>Chloride mg/L - Gallery [M300S]</b>							
Chloride mg/L - Gallery	22/01/25 11:19	EW175	5		16.3	mg/l	C6
<b>Nitrate (as N) - Gallery [M301A]</b>							
Nitrate (as N) - Gallery	22/01/25 11:19	EW175	1		2.32	mg/l	C6
<b>Nitrate as NO3 (Calc) - Gallery [M300L]</b>							
Nitrate as NO3 (Calc) - Gallery	22/01/25 11:19	EW175	4.4		10.3	mg/l	C6
<b>Nitrite (as N) - Gallery [M3016]</b>							
Nitrite (as N) - Gallery	22/01/25 11:19	EW175	0.01		<0.01	mg/l	C6
<b>Nitrite as NO2 (Calc) - Gallery [M300Y]</b>							
Nitrite as NO2 (Calc) - Gallery	22/01/25 11:19	EW175	0.033		<0.033	mg/l	C6
<b>Phosphate (Ortho/MRP) as P - Gallery [M300P]</b>							
Phosphate (Ortho/MRP) as P - Gallery	22/01/25 11:19	EW175	0.01		0.0310	mg/l	C6
<b>Sulphate mg/L - Gallery [M300N]</b>							
Sulphate mg/L - Gallery	22/01/25 11:19	EW175	1		8.67	mg/l	C6
<b>Sulphide [M3009]</b>							
Sulphide	28/01/25 10:20	EW024	0.03		0.183	mg/l	
<b>Suspended Solids [M3002]</b>							
Suspended Solids	23/01/25 12:34	EW013	5		5.00	mg/l	C6
<b>Total Dissolved Solids (TDS) [M3006]</b>							
Total dissolved solids @ 180°C	23/01/25 10:10	EW046	15		103	mg/l	C6
<b>TPH 3 Band (C6-10-21-40) in water [M502B]</b>							
TPH >C10-C21	* 22/01/25 14:42		0.1		<0.1	µg/l	
TPH >C21-C40	* 22/01/25 14:42		0.1		<0.1	µg/l	

Signed: \_\_\_\_\_



Aoife De Barra - Organics & Instrumentation Team Lead

06/02/2025

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**Certificate Code:** AR-25-M3-003626-01

**Page Number:** Page 2 of 2

**PO reference:**

## Certificate of Analysis

Sample number	966-2025-00002411	Received on	21/01/2025
Your sample reference	AQUS	Analysis started on	22/01/2025
Sample Matrix	Surface water		
Sample Condition on Arrival	Satisfactory	Sample Date	21/01/2025
Time Sampled	11:00		

Test Code Analyte	SUB <sup>5</sup>	Analysis Started	Method	LOQ <sup>3</sup>	SPEC <sup>2</sup>	Result	Units	ACCRED <sup>4</sup>
TPH >C6-C10	*	22/01/25 14:42		0.1		<0.1	µg/l	
TPH Total >C6-C40	*	22/01/25 14:42		10		<10	µg/l	YA
Validation	*	22/01/25 14:42				0		
Validation	*	22/01/25 14:42				0		

#### <sup>4</sup> Accreditation Information

C6: ISO/IEC 17025:2017 INAB 138-T  
YA: Accredited (External Subcontractor)

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- \* indicates the test was sub-contracted, "D" indicates the analysis was performed in Dublin and "C" indicates the analysis performed in Cork.
- The sampling date was not communicated; this may impact the validity of the results unless provided.
- 7A. This test was conducted outside of recommended best practice holding time; this may impact the accreditation status/validity of the result. The result will still be technically sound in terms of the method and associated quality controls
- 7B. No time of sampling was supplied, a default time of 00:00:00 will be assumed for holding time calculations unless provided. This may impact the validity of the results.
- 7C. Your sample arrived into the laboratory already outside of the recommended holding time, and outside the holding time window for which we have validated the test(s) identified. As such the test conducted doesn't meet the criteria to provide an accredited result. The result will still be technically sound and conducted using an accredited method.
- 7D. The sample was received close to or outside of the recommended best practice holding time; this may impact the accreditation status of the result.
- 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.
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Aoife De Barra - Organics & Instrumentation Team Lead

06/02/2025



Murray Brothers Tarmacadam Ltd

## **APPENDIX 7.5**

# **GSI BEDROCK, AQUIFER & EPA GW MAPS**

**VOLUME III**

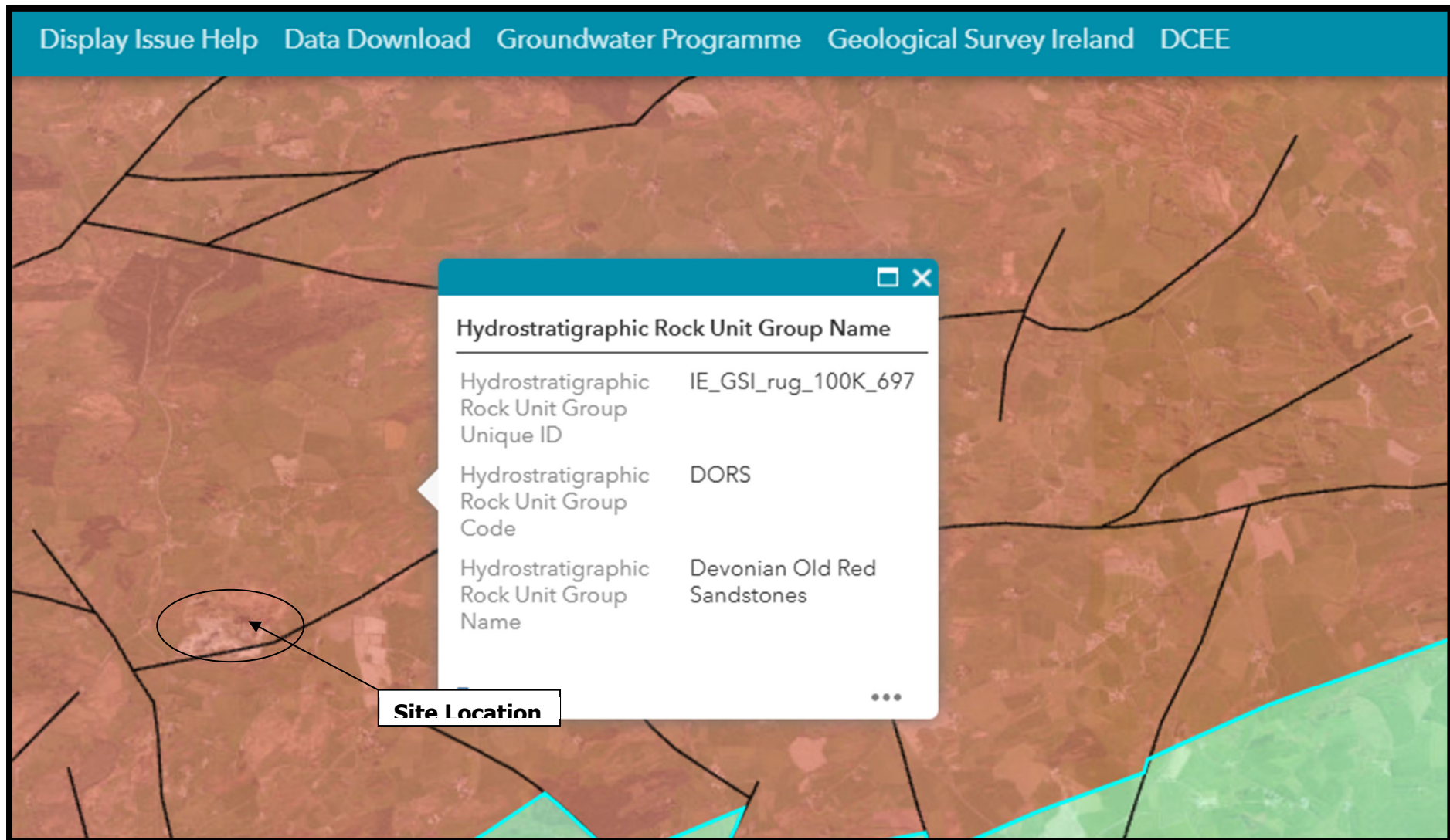
APPENDICES

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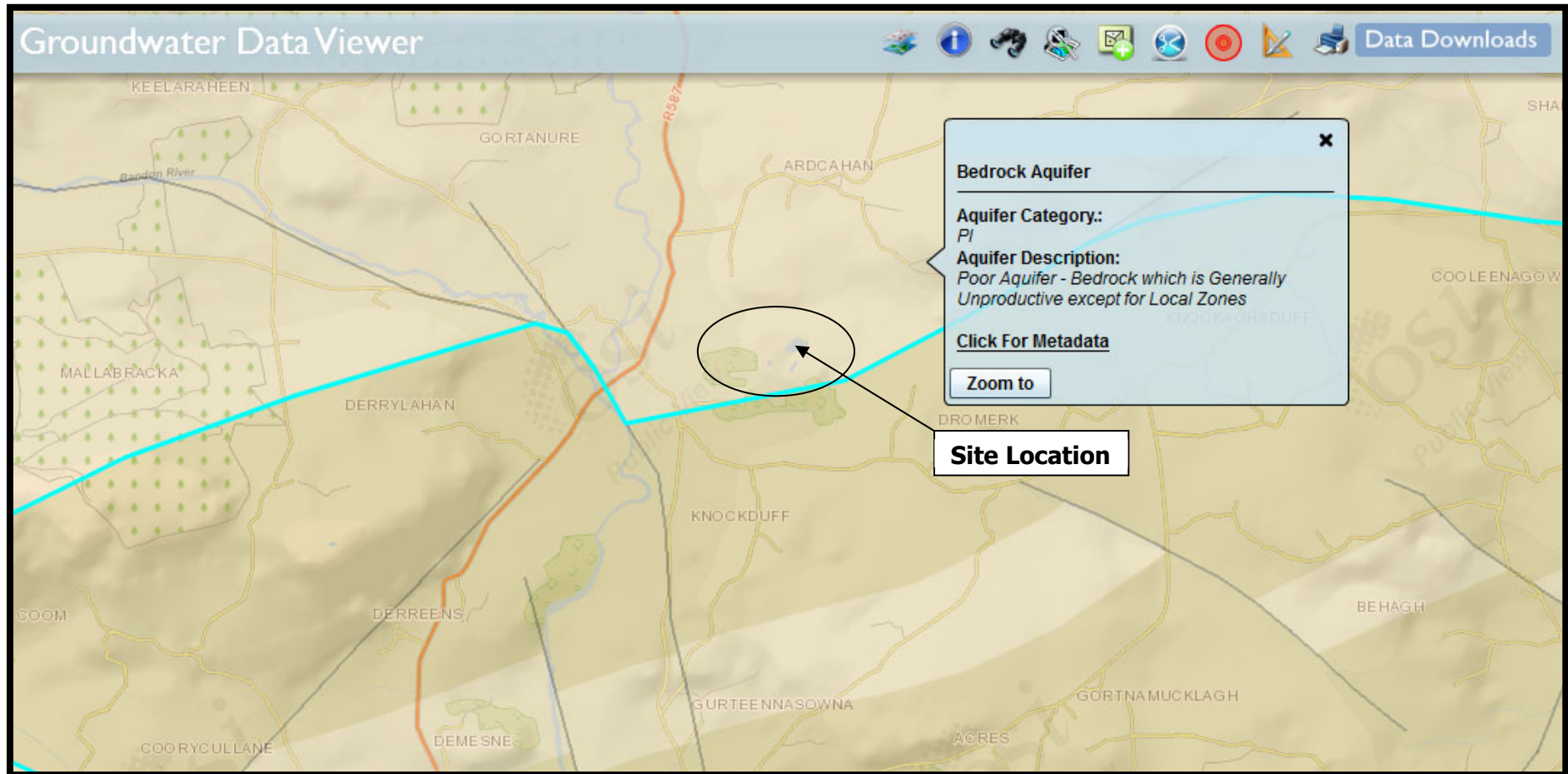
Ardcahan Quarry EIAR – Chapter 7 Water Attributes  
**Appendix 7.5 – GSI Bedrock, Aquifer & EPA GW Maps**

# Appendix 7.5 – Ardcahan Quarry EIAR – Water Chapter Geological Survey of Ireland & EPA - Hydrogeological Mapping Data



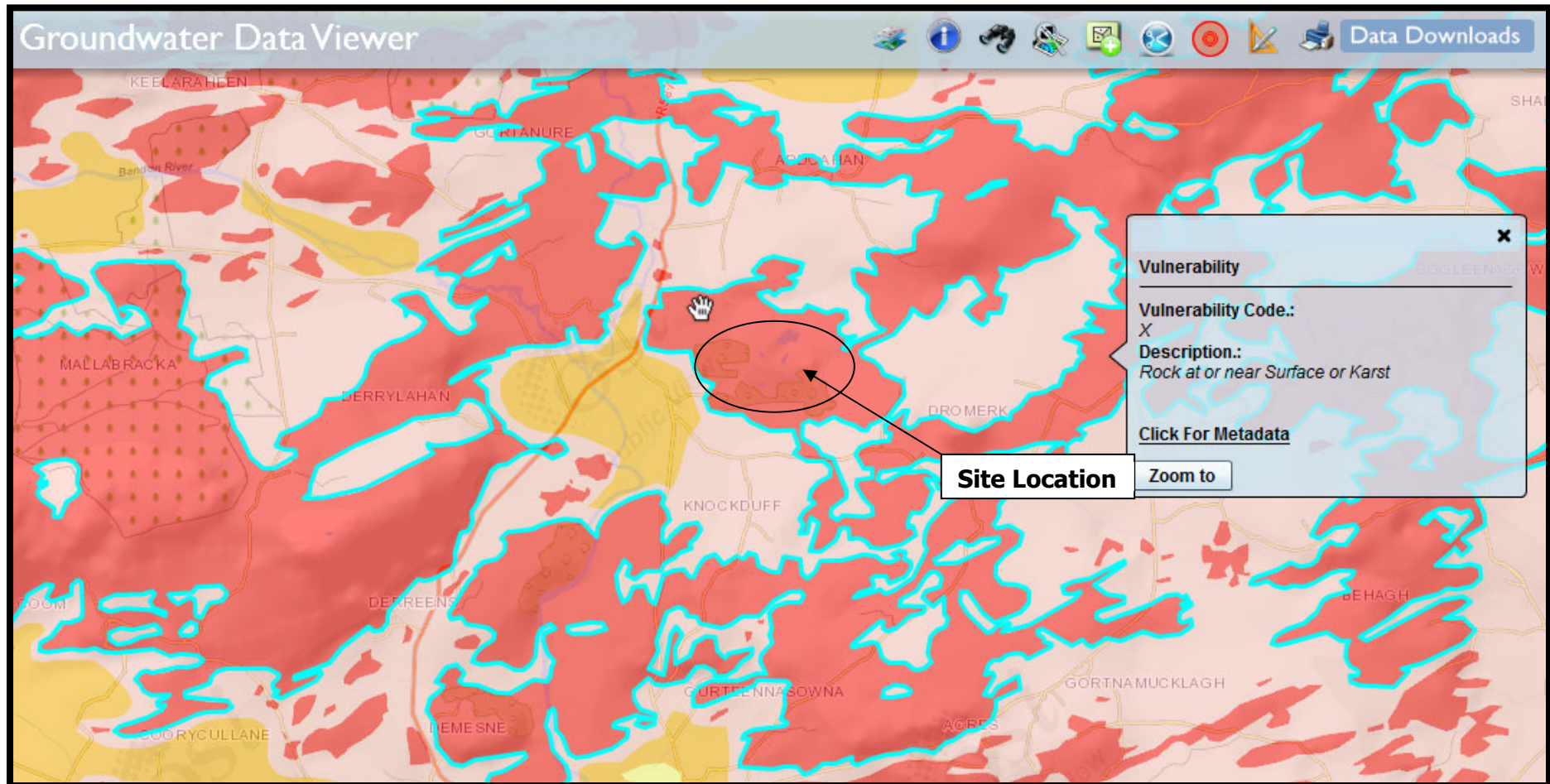
**Appendix 7.5.1: GSI Rock Unit Group (RUG) Map showing the Ardcahan Quarry site in the ORS Group, (GSI online mapping).**

# Appendix 7.5 – Ardcahan Quarry EIAR – Water Chapter Geological Survey of Ireland & EPA - Hydrogeological Mapping Data



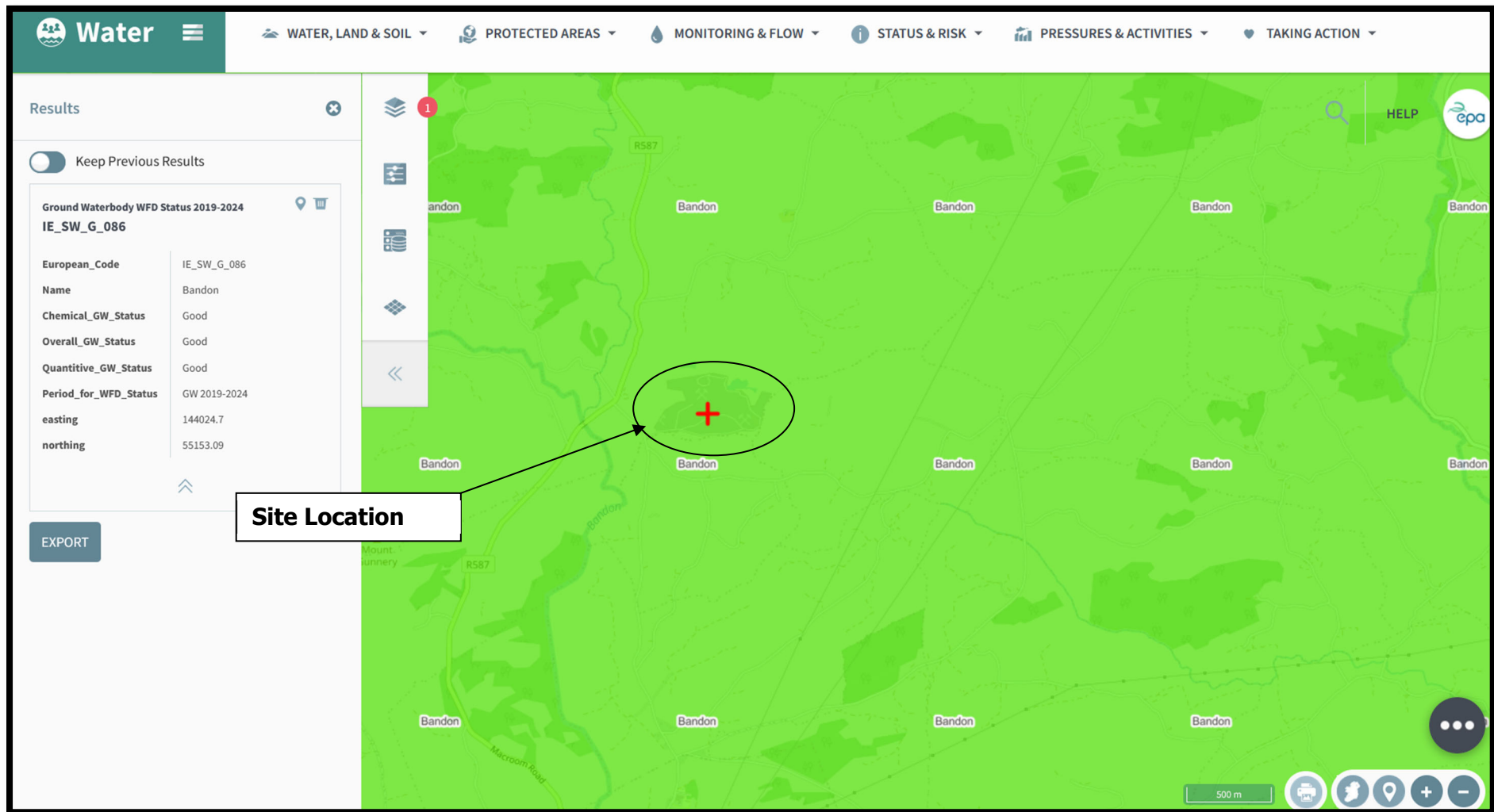
**Appendix 7.5.2: Regional Aquifer Map indicating that the Ardcahan Quarry site is on a 'Poor Aquifer', (GSI online mapping).**

# Appendix 7.5 – Ardcahan Quarry EIA – Water Chapter Geological Survey of Ireland & EPA - Hydrogeological Mapping Data



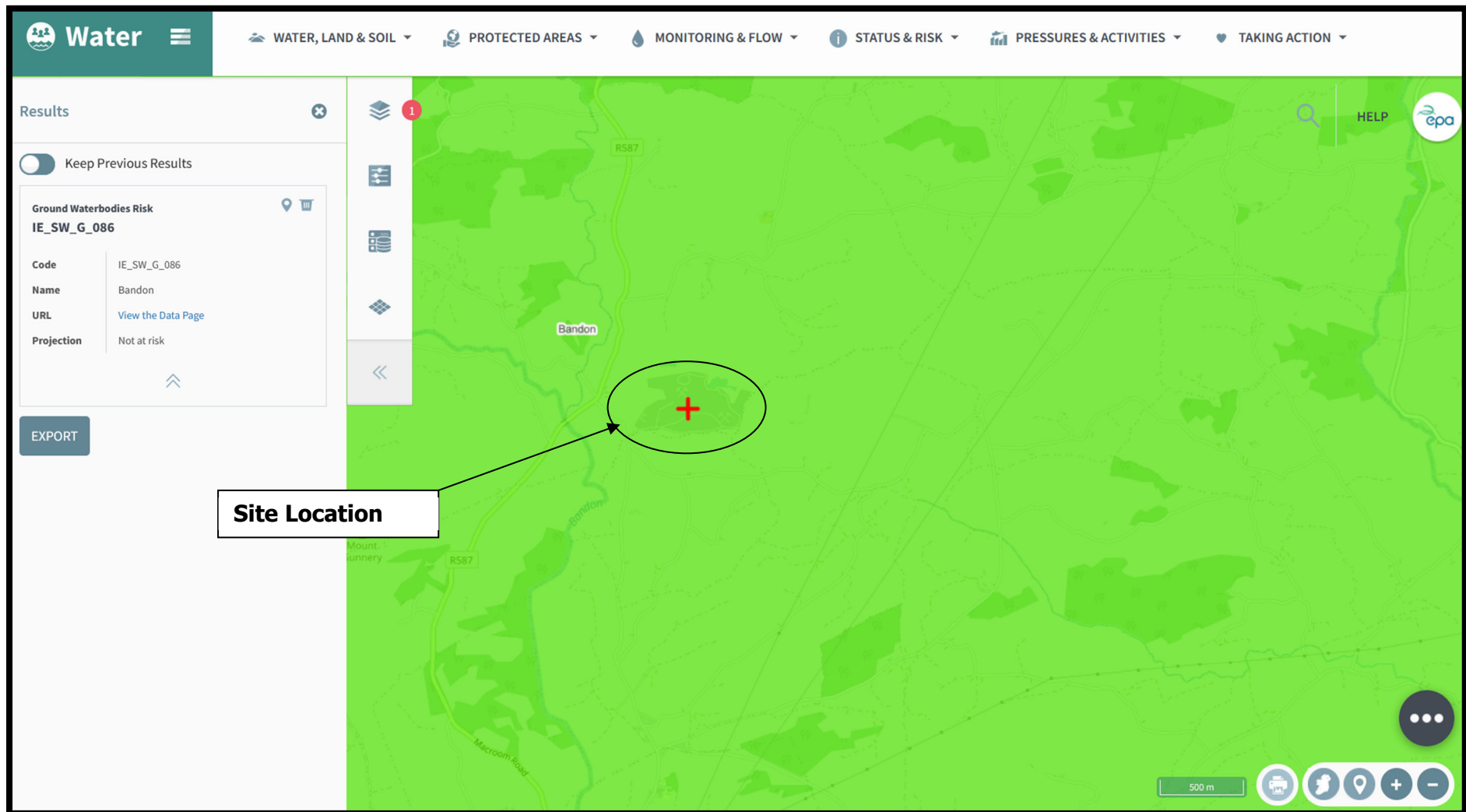
**Appendix 7.5.3: Regional Vulnerability Map showing site area as 'Extremely Vulnerable', (sourced GSI online mapping).**

# Appendix 7.5 – Ardcahan Quarry EIAR – Water Chapter Geological Survey of Ireland & EPA - Hydrogeological Mapping Data



**Appendix 7.5.4 – Site with EPA Ground Waterbody WFD Status 2019-2014 as Good, (EPA online <https://gis.epa.ie/EPAMaps>).**

# Appendix 7.5 – Ardcahan Quarry EIAR – Water Chapter Geological Survey of Ireland & EPA - Hydrogeological Mapping Data



Appendix 7.5.5 – Site area with EPA Ground Waterbody WFD Risk as 'Not at Risk', (EPA online <https://gis.epa.ie/EPAMaps>).



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**APPENDIX 7.6**  
**GROUNDWATER BH DRILLING &**  
**HEADWORKS**

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Ardcahan Quarry EIAR – Chapter 7 Water Attributes  
**Appendix 7.6 – Groundwater BH Drilling & Headworks**

## Appendix 7.6: Ardcahan Quarry EIAR - Water Chapter Site Photographs of Drilling & Sampling New Boreholes



Photo 01: Drilling rig on Location BH03 in the NE area of the site by Pond C. (Tuesday 22<sup>nd</sup> Oct 2024).



Photo 02: View East of Ponds C & D in the NE area of the site. (Note rig tower in background on right.)

## Appendix 7.6: Ardcahan Quarry EIAR - Water Chapter Site Photographs of Drilling & Sampling New Boreholes



Photo 03: View West of the BH03 Headworks by the existing quarry track. (Tuesday 19<sup>th</sup> Aug 2025).



Photo 04: BH03 Headworks during sampling using electric wasp pump. (Tuesday 21<sup>st</sup> Jan 2025).

Appendix 7.6: Ardcahan Quarry EIA - Water Chapter  
Site Photographs of Drilling & Sampling New Boreholes



**Photo 05: View of water being pumped from BH03 during sampling. (Tuesday 21<sup>st</sup> Jan 2025.)**



**Photo 06: View NE towards the old quarry working face. BH01 is just on the left (west) of this view.**

## Appendix 7.6: Ardcahan Quarry EIA - Water Chapter Site Photographs of Drilling & Sampling New Boreholes



**Photo 07: View of BH01 located on the west side of the old quarry area.**



**Photo 08: View NE of BH01 being sampled using electric wasp pump, 21<sup>st</sup> January 2025.**

Appendix 7.6: Ardcahan Quarry EIA - Water Chapter  
Site Photographs of Drilling & Sampling New Boreholes



**Photo 09: Groundwater from BH01 being pumped for sampling, 21<sup>st</sup> January 2025.**



**Photo 10: View East of BH02 on middle bench in old quarry area. (GW level survey 19<sup>th</sup> August 2025).**

## Appendix 7.6: Ardcahan Quarry EIAR - Water Chapter Site Photographs of Drilling & Sampling New Boreholes



Photo 11: View East of BH02 Headworks during sampling, (21<sup>st</sup> January 2025).



Photo 12: View of silty brown water being pumped during sampling of BH02, (21<sup>st</sup> Jan 2025).

## Appendix 7.6: Ardcahan Quarry EIAR - Water Chapter Site Photographs of Drilling & Sampling New Boreholes



Photo 13: View west of BH04 located by the access track in the northern area of the site, (19<sup>th</sup> Aug 2025).



Photo 14: View of BH04 Headworks being pumped for sampling, (21<sup>st</sup> January 2025).



Photo 15: View of water being pumped for sampling of BH04, (21<sup>st</sup> January 2025).

## Appendix 7.6: Ardcahan Quarry EIAR - Water Chapter Site Photographs of Drilling & Sampling New Boreholes



**Photo 16: View East of BH05 headworks, in the NW corner of the site, at the end of the internal track. (This BH was not sampled as part of the initial GW sampling works as the track was too wet to drive on.)**



**Photo 17: View west of BH05 during GW level monitoring, 19<sup>th</sup> August 2025.**

## Appendix 7.6: Ardcahan Quarry EIAR - Water Chapter Site Photographs of Drilling & Sampling New Boreholes



**Photo 18: View east of active Tarmac aggregate yard. Sites water supply well is shown by arrow.**



**Photo 19: View of Tarmac sites water supply Well headworks.**

Appendix 7.6: Ardcahan Quarry EIAR - Water Chapter  
Site Photographs of Drilling & Sampling New Boreholes

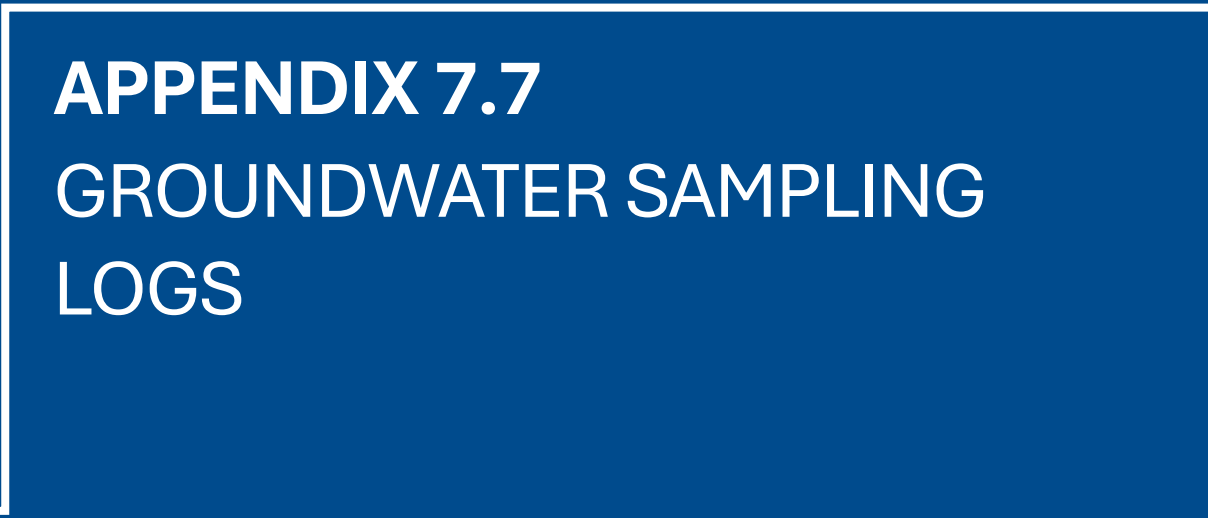


Photo 20: View of water sample being acquired from Tarmac Well outside tap, (4<sup>th</sup> July 2023).





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**APPENDIX 7.7**  
**GROUNDWATER SAMPLING**  
**LOGS**

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Ardcahan Quarry EIAR – Chapter 7 Water Attributes  
**Appendix 7.7 – Groundwater Sampling Logs**

**Appendix 7.7: Ardcahan Quarry Groundwater Analysis: Field, Chemical, Metal and Hydrocarbon Parameters.**

GROUNDWATER											
PARAMETER	UNITS	Old Well	Old Well	Old Well	BH101	BH102	BH103	BH104	Drinking Water Regs S.I. No. 122 of 2014	Groundwater Regs S.I. No. 9 of 2010	EPA IGV's 2003
Sampling Date		01/07/14	04/07/23	21/01/25	21/01/25	21/01/25	21/01/25	21/01/25			
Sample point		Site Tap	Site Tap	Site Tap	New BH	New BH	New BH	New BH			
<b>FIELD MEASUREMENTS</b>											
Conductivity	µS/cm	185	333	203	291	331	289	134	2,500	800 - 1875	1,000
pH	pH units	6.93	6.78	6.56	7.17	7.01	<b>6.48</b>	<b>5.95</b>	6.5 - 9.5	-	6.5 - 9.5
Temperature	°C	14.50	18.83	9.30	10.63	13.17	11.20	11.63	-	-	25°C
<b>BACTERIAL TESTING</b>											
Coliform E	cfu/ml	-	<b>1</b>	0	-	-	-	-	0	-	0
E Coli Escherichia	cfu/ml	-	<1	0	-	-	-	-	0	-	0
Clostridium E	cfu/ml	-	<1	0	-	-	-	-	0	-	0
<b>CHEMICAL PARAMETERS</b>											
Conductivity	µS/cm	330	327	-	291	356	305	140	2,500	800 - 1875	1,000
pH	pH units	7.10	7.00	-	7.30	7.20	<b>6.40</b>	<b>6.10</b>	6.5 - 9.5	-	6.5 - 9.5
Ammonium as NH4	mg/l NH4	0.021	0.04	-	0.017	0.025	<u>0.167</u>	0.021	0.30	0.175	0.15
Ammonia as N	mg/l N	0.016	<0.05	-	0.013	0.02	0.13	0.017	-	0.065 - 0.175	-
Nitrate as NO3	mg/l NO3	5.14	<4.4	-	9.44	10.40	<4.4	<4.4	50	37.5	25
Nitrite as NO2	mg/l NO2	<0.033	<0.033	-	<0.033	<0.033	<0.033	<0.033	0.50	0.375	0.1
Phosphate-Ortho	ug/l PO4	<0.009	<0.05	-	0.02	0.017	<0.05	0.027	-	35	30
Chloride	mg/l Cl	16.90	18.30	-	15.30	16.60	15.10	15.30	250	24 - 187.5	30
Sulphate	mg/l SO4	13.00	11.80	-	9.23	7.62	11.80	4.87	250	187.5	200
Sulphide	mg/l	<0.03	<0.03	-	<0.03	0.039	<0.03	<0.03	-	-	-
Hardness	mg/l	152.50	153.86	-	147	167	138	47	200	-	200
Calcium	mg/l	54.00	53.90	-	50.10	58.20	48.70	15.50	200	-	200
Magnesium	mg/l	4.30	4.70	-	5.21	5.35	3.94	2.02	50	-	50
Potassium	mg/l	3.00	2.60	-	1.03	3.10	2.60	0.28	12	-	5
Sodium	mg/l	11.70	12.80	-	9.42	11.80	12.80	10.70	200	150	150
Manganese	mg/l	0.0018	<0.003	-	0.0183	0.0119	<b>4.170</b>	<b>0.939</b>	0.05	-	0.05
Total Alkalinity	mg/L CaCO3	132	160	-	132	170	155	47.2	-	-	-
Total Dissolved Solids	mg/l	265	155	-	169	236	153	121	-	-	1000
Total Suspended Solids	mg/l	<5	<5	-	137	211	<5	7	-	-	-
<b>Microbiological</b>											
Biological O2 Demand	mg/l	<1	<1	-	<1	1.2	1.9	<1	-	-	-
Chemical O2 Demand	mg/l	<8	<8	-	<8	22	13	<8	-	-	-
Total Organic Carbon	mg/l	-	-	-	2.19	1.79	4.60	1.09	-	-	-
<b>Hydrocarbons</b>											
TPH >C6 - C10 (PRO)	mg/l	<0.010	<0.001	-	<0.001	<0.001	<0.001	<0.001	-	-	0.01
TPH >C10 - C20 (DRG)	mg/l	<b>&lt;0.029</b>	<0.001	-	<0.001	<0.001	<0.001	<0.001	-	-	0.01
TPH >C20 - C40 (MO)	mg/l	<b>&lt;0.017</b>	<0.001	-	<0.001	<0.001	<0.001	<0.001	-	-	0.01
TPH >C6 - C40 (TPH)	mg/l	<b>&lt;0.046</b>	<0.001	-	<0.001	<0.001	<0.001	<0.001	-	-	0.01
<b>Metals - Dissolved</b>											
Iron	mg/l	-	-	-	<0.005	<0.005	<b>0.326</b>	<0.005	0.2	-	0.2
Aluminium	mg/l	-	-	-	0.00525	<0.005	0.0193	0.00652	0.2	-	0.2
Arsenic	mg/l	-	-	-	0.00023	0.00097	0.00195	0.000213	0.01	0.0075	0.01
Boron	mg/l	-	-	-	<0.21	<0.21	<0.21	<0.21	1.00	0.75	1.00
Cadmium	mg/l	-	-	-	<0.0001	<0.0001	<0.0001	0.000442	0.005	0.00375	0.005
Chromium	mg/l	-	-	-	<0.001	<0.001	<0.001	<0.001	0.05	0.0375	0.03
Copper	mg/l	-	-	-	<0.003	<0.003	<0.003	<0.003	2.0	1.5	0.03
Lead	mg/l	-	-	-	<0.00051	<0.00051	<0.00051	<0.00051	0.01	0.01875	0.01
Nickel	mg/l	-	-	-	<0.0005	<0.0005	<0.0005	<0.0005	0.02	0.015	0.02
Mercury	mg/l	-	-	-	<0.00003	<0.00003	<0.00003	<0.00003	0.001	0.00075	0.001
Antimony	mg/l	-	-	-	0.00011	0.00030	<0.00004	<0.0001	0.005	-	-

**Notes:**  
 VCL Sampled GW for EIS in July 2014 and for EIAR in January 2025. (New Monitoring BHs installed Oct 2024).  
 Drinking Water Standards SI No.122 of 2014.  
 Groundwater Regulations SI No. 9 of 2010 - 'Overall Threshold Value Range' values.  
 IGV = EPA Groundwater Interim Guideline Values 2003.  
 "-" = no value or not analysed.  
 TPH = Total Petroleum Hydrocarbons  
 cfu - colony forming units  
**Results are bold where they exceed relevant Drinking Water Standard.**  
 Results are shaded where they exceed the the Groundwater Regulations.  
 Results are underlined where they exceed the relevant EPA IGV

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 Job Ref: CONS0211  
 Date: Jan 2026





## Groundwater Borehole Sampling Log

### Borehole I.D.: Old Well (Tarmac Yard Area)

#### Project Details

<b>Client:</b>	Murray Bros	<b>Project No.:</b>	CONS0136
<b>Location:</b>	Ardcahan Quarry	<b>Scientist:</b>	Darragh Musgrave
		<b>Date:</b>	4th July 2023

#### Monitoring Borehole Details

<b>Water Level (m):</b>	1.33	<b>Well Depth (m):</b>	>30
<b>Head (m):</b>	>28.67	<b>Well Diameter (mm):</b>	150
<b>Volume in Well (L):</b>	>250	<b>Volume Purged (L):</b>	Well in use for site admin
<b>Decon. Procedure:</b>	New sample bottles/Gloves etc..	<b>Bailer Type:</b>	From Site Tap
<b>Measurement Point:</b>	Ground at BH edge	<b>Containers Used:</b>	Lab supplied plastic, glass containers & vials

#### Field Measurements

<b>Observed Colour:</b>	Clear	<b>Odour:</b>	None
<b>Temperature (° C):</b>	18.83	<b>Conductivity (µS/cm):</b>	333
<b>pH:</b>	6.78	<b>Sample Depth @ (m):</b>	>25m BTC (pump depth)

#### Analysis Required

Bacteria/Ecoli	Chloride, Sulphate, Sulphide
Ammonium	Total Hardness, Alkalinity,
Nitrate, Nitrite	Calcium, Potassium, Magnesium, Sodium
BOD, COD	Suspended Soilds,
TPH's	Total Dissolved Solids,
Heavy Metals	

#### Comments

Weather - Breezy day, dry, showers, warm.  Sample taken from external tap from site production well in Tarmac yard area.
---

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## Groundwater Borehole Sampling Log

### Borehole I.D.: Old Well (Tarmac Yard Area)

#### Project Details

<b>Client:</b>	Murray Bros	<b>Project No.:</b>	CONS0212
<b>Location:</b>	Ardcahan Quarry	<b>Scientist:</b>	Darragh Musgrave
		<b>Date:</b>	21st January 2025

#### Monitoring Borehole Details

<b>Water Level (m):</b>	1.20	<b>Well Depth (m):</b>	>30
<b>Head (m):</b>	>28.67	<b>Well Diameter (mm):</b>	150
<b>Volume in Well (L):</b>	>250	<b>Volume Purged (L):</b>	Well in use for site offices
<b>Decon. Procedure:</b>	New sample bottles/Gloves etc..	<b>Bailer Type:</b>	From Site Tap
<b>Measurement Point:</b>	Ground at BH edge	<b>Containers Used:</b>	Lab supplied plastic, glass containers & vials

#### Field Measurements

<b>Observed Colour:</b>	Clear	<b>Odour:</b>	None
<b>Temperature (° C):</b>	9.3	<b>Conductivity (µS/cm):</b>	203
<b>pH:</b>	6.56	<b>Sample Depth @ (m):</b>	>25m BTC (pump depth)

#### Analysis Required

Bacteria Test only

#### Comments

Weather - Dry, sunny, cool to mild day - calm conditions.

Sample taken from external tap from site production well in Tarmac yard area.



## Groundwater Borehole Sampling Log

### Borehole I.D.: BH101

#### Project Details

<b>Client:</b>	Murray Bros	<b>Project No.:</b>	CONS0212
<b>Location:</b>	Ardcahan Quarry	<b>Scientist:</b>	Darragh Musgrave
		<b>Date:</b>	21st January 2025

#### Monitoring Borehole Details

<b>Water Level (mBGL):</b>	1.13	<b>Well Depth (m):</b>	19.00
<b>Head (m):</b>	17.38	<b>Well Diameter (mm):</b>	50
<b>Volume in Well (L):</b>	34.76	<b>Volume Purged (L):</b>	>260
<b>Decon. Procedure:</b>	New sample bottles/Gloves etc..	<b>Bailer Type:</b>	Electric Wasp Pump
<b>Measurement Point:</b>	Top Casing (0.57m)	<b>Containers Used:</b>	Lab supplied plastic, glass containers & vials

#### Field Measurements

<b>Observed Colour:</b>	Clear becoming slightly silty	<b>Odour:</b>	None
<b>Temperature (° C):</b>	10.63	<b>Conductivity (µS/cm):</b>	291
<b>pH:</b>	7.17	<b>Sample Depth @ (m):</b>	9m BTC

#### Analysis Required

Ammonium Nitrate, Nitrite BOD, COD TPH's Heavy Metals	Chloride, Sulphate, Sulphide Total Hardness, Alkalinity, Calcium, Potassium, Magnesium, Sodium Suspended Solids, Total Dissolved Solids,
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#### Comments

Weather - Dry, sunny, cool to mild day - calm conditions.  <b>BH is located on western side of the old quarry floor in the SW part of site.</b>  Sample taken using electric wasp pump to remove greater than three times the borehole volume. Pumped 20L every 3 mins from 11.37 to 12.17 = ~260L.
--

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## Groundwater Borehole Sampling Log

### Borehole I.D.: BH102

#### Project Details

<b>Client:</b>	Murray Bros	<b>Project No.:</b>	CONS0212
<b>Location:</b>	Ardcahan Quarry	<b>Scientist:</b>	Darragh Musgrave
		<b>Date:</b>	21st January 2025

#### Monitoring Borehole Details

<b>Water Level (mBGL):</b>	7.85	<b>Well Depth (m):</b>	23.32
<b>Head (m):</b>	14.85	<b>Well Diameter (mm):</b>	50
<b>Volume in Well (L):</b>	29.40	<b>Volume Purged (L):</b>	~100
<b>Decon. Procedure:</b>	New sample bottles/Gloves etc..	<b>Bailer Type:</b>	Electric Wasp Pump
<b>Measurement Point:</b>	Top Casing (0.62m)	<b>Containers Used:</b>	Lab supplied plastic, glass containers & vials

#### Field Measurements

<b>Observed Colour:</b>	Slightly silty brown	<b>Odour:</b>	None
<b>Temperature (° C):</b>	13.17	<b>Conductivity (µS/cm):</b>	331
<b>pH:</b>	7.01	<b>Sample Depth @ (m):</b>	13m BTC

#### Analysis Required

Ammonium Nitrate, Nitrite BOD, COD TPH's Heavy Metals	Chloride, Sulphate, Sulphide Total Hardness, Alkalinity, Calcium, Potassium, Magnesium, Sodium Suspended Solids, Total Dissolved Solids,
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#### Comments

Weather - Dry, sunny, cool to mild day - calm conditions.  <b>BH is located on first bench of the old quarry - near the Mastic Laydown Area.</b>  Sample taken using electric wasp pump to remove greater than three times the borehole volume. Pumped 10L every 3 mins from 13.05 to 13.35 = ~100L.
---

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## Groundwater Borehole Sampling Log

### Borehole I.D.: BH103

#### Project Details

<b>Client:</b>	Murray Bros	<b>Project No.:</b>	CONS0212
<b>Location:</b>	Ardcahan Quarry	<b>Scientist:</b>	Darragh Musgrave
		<b>Date:</b>	21st January 2025

#### Monitoring Borehole Details

<b>Water Level (mBGL):</b>	2.21	<b>Well Depth (m):</b>	40.70
<b>Head (m):</b>	37.59	<b>Well Diameter (mm):</b>	50
<b>Volume in Well (L):</b>	75.18	<b>Volume Purged (L):</b>	~225
<b>Decon. Procedure:</b>	New sample bottles/Gloves etc..	<b>Bailer Type:</b>	Electric Wasp Pump
<b>Measurement Point:</b>	Top Casing (0.90m)	<b>Containers Used:</b>	Lab supplied plastic, glass containers & vials

#### Field Measurements

<b>Observed Colour:</b>	Clear	<b>Odour:</b>	Occasional slight rotten egg smell from water.
<b>Temperature (° C):</b>	11.2	<b>Conductivity (µS/cm):</b>	289
<b>pH:</b>	6.48	<b>Sample Depth @ (m):</b>	13m BTC

#### Analysis Required

Ammonium Nitrate, Nitrite BOD, COD TPH's Heavy Metals	Chloride, Sulphate, Sulphide Total Hardness, Alkalinity, Calcium, Potassium, Magnesium, Sodium Suspended Solids, Total Dissolved Solids,
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#### Comments

Weather - Dry, sunny, cool to mild day - calm conditions.  <b>BH is located on track in NE portion of the site area - by Pond C.</b>  Sample taken using electric wasp pump to remove greater than three times the borehole volume. Pumped 10L every 2 mins from 15.03 to 15.48 = ~225L.
---

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## Groundwater Borehole Sampling Log

### Borehole I.D.: BH104

#### Project Details

<b>Client:</b>	Murray Bros	<b>Project No.:</b>	CONS0212
<b>Location:</b>	Ardcahan Quarry	<b>Scientist:</b>	Darragh Musgrave
		<b>Date:</b>	21st January 2025

#### Monitoring Borehole Details

<b>Water Level (mBGL):</b>	3.20	<b>Well Depth (m):</b>	43.70
<b>Head (m):</b>	39.57	<b>Well Diameter (mm):</b>	50
<b>Volume in Well (L):</b>	79.14	<b>Volume Purged (L):</b>	~330
<b>Decon. Procedure:</b>	New sample bottles/Gloves etc..	<b>Bailer Type:</b>	Electric Wasp Pump
<b>Measurement Point:</b>	Top Casing (0.93m)	<b>Containers Used:</b>	Lab supplied plastic, glass containers & vials

#### Field Measurements

<b>Observed Colour:</b>	Clear	<b>Odour:</b>	Occasional slight rotten egg smell from water.
<b>Temperature (° C):</b>	11.63	<b>Conductivity (µS/cm):</b>	134
<b>pH:</b>	5.95	<b>Sample Depth @ (m):</b>	13m BTC

#### Analysis Required

Ammonium Nitrate, Nitrite BOD, COD TPH's Heavy Metals	Chloride, Sulphate, Sulphide Total Hardness, Alkalinity, Calcium, Potassium, Magnesium, Sodium Suspended Solids, Total Dissolved Solids,
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#### Comments

Weather - Dry, sunny, cool to mild day - calm conditions.  <b>BH is located on track in central northern boundary area of the site.</b>  Sample taken using electric wasp pump to remove greater than three times the borehole volume. Pumped 10L every 2 mins from 14.25 to 15.17 = ~330L.
--

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## Groundwater Borehole Sampling Log

### Borehole I.D.: BH105

#### Project Details

<b>Client:</b>	Murray Bros	<b>Project No.:</b>	CONS0212
<b>Location:</b>	Ardcahan Quarry	<b>Scientist:</b>	Darragh Musgrave
		<b>Date:</b>	21st January 2025

#### Monitoring Borehole Details

<b>Water Level (mBGL):</b>	2.54	<b>Well Depth (m):</b>	43.35
<b>Head (m):</b>	40.81	<b>Well Diameter (mm):</b>	50
<b>Volume in Well (L):</b>	81.62	<b>Volume Purged (L):</b>	NONE
<b>Decon. Procedure:</b>	Not Sampled	<b>Bailer Type:</b>	Not Bailed
<b>Measurement Point:</b>	Top Casing (0.52m)	<b>Containers Used:</b>	Not sampled

#### Field Measurements

<b>Observed Colour:</b>	-	<b>Odour:</b>	-
<b>Temperature (° C):</b>	-	<b>Conductivity (µS/cm):</b>	-
<b>pH:</b>	-	<b>Sample Depth @ (m):</b>	-

#### Analysis Required

NOT SAMPLED THIS ROUND

#### Comments

Weather - Dry, sunny, cool to mild day - calm conditions.

BH is located at the end of the site track in NW boundary area of the site.

Borehole was not sampled as access was not possible due to the wet and muddy road conditons.



Murray Brothers Tarmacadam Ltd

**APPENDIX 7.8**  
**GROUNDWATER SAMPLING**  
**RESULTS**

**VOLUME III**  
APPENDICES

APRIL 2026



Ardcahan Quarry EIAR – Chapter 7 Water Attributes  
**Appendix 7.8 – Groundwater Sampling Results**

**Client:** Viridus Consulting Ltd.  
Inch House (East),  
Inch, Whitegate,  
Inch, Whitegate,  
Co. Cork. P25 H004  
Cork  
IRELAND

**Certificate Code:** AR-23-M3-024968-01

**Page Number:** Page 1 of 4

**PO reference:**

## Certificate of Analysis

Sample number	966-2023-00030363	Received on	05/07/2023
Your sample reference	ARD BH01	Analysis started on	05/07/2023
Sample Matrix	Ground water		
Sample Condition on Arrival	Satisfactory	Sample Date	04/07/2023
Time Sampled	15:30		

Test Code Analyte	SUB <sup>5</sup>	Analysis Started	Method	LOQ <sup>3</sup>	SPEC <sup>2</sup>	Result	Units	ACCRED <sup>4</sup>
<b>Alkalinity (Dublin) [BB00B]</b>								
Alkalinity	*	06/07/23 13:47		30		159.6	mg/l CaCO <sub>3</sub>	
<b>Suspended Solids [M3002]</b>								
Suspended Solids		07/07/23 10:05	EW013	5		<5	mg/l	C6
<b>Biochemical Oxygen Demand (BOD) [M3003]</b>								
Biochemical oxygen demand (BOD) 5d		06/07/23 09:10	EW001	1		<1	mg/l	C6
<b>Chemical Oxygen Demand (COD) [M3004]</b>								
Chemical oxygen demand (COD)		06/07/23 10:14	EW094	8		<8	mg/l	C6
<b>Total Dissolved Solids (TDS) [M3006]</b>								
Total dissolved solids @ 180°C		11/07/23 10:01	EW046	15		155	mg/l	C6
<b>Sulfide [M3009]</b>								
Sulphide		12/07/23 12:33	EW024	0.03		<0.03	mg/l	
<b>Nitrate as NO<sub>3</sub> (Calc) - Gallery [M300L]</b>								
Nitrate as NO <sub>3</sub> (Calc) - Gallery		06/07/23 08:52	EW175	4.4		<4.4	mg/l	C6

Signed: \_\_\_\_\_



Niamh Ward - Senior Laboratory Analyst

17/07/2023

### NOTES

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- SPEC = Allowable limit or parametric value.
- LOQ = Limit of Quantification or lowest value that can be reported
- ACCRED = Indicates accreditation for the test, a blank field indicates not accredited
- \*\*\* indicates the test was sub-contracted
- 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.
- 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
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**Sulphate mg/L - Gallery [M300N]**

Sulphate mg/L - Gallery	06/07/23 08:52	EW175	1	11.8	mg/l	C6
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**Phosphate (Ortho/MRP) as P - Gallery [M300P]**

Phosphate (Ortho/MRP) as P - Gallery	06/07/23 08:52	EW175	0.05	<0.05	mg/l	C6
--------------------------------------	----------------	-------	------	-------	------	----

**Chloride mg/L - Gallery [M300S]**

Chloride mg/L - Gallery	06/07/23 08:52	EW175	5	18.3	mg/l	C6
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**Nitrite as NO2 (Calc) - Gallery [M300Y]**

Nitrite as NO2 (Calc) - Gallery	06/07/23 08:52	EW175	0.033	<0.033	mg/l	C6
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**Ammonia as N - Gallery [M300Z]**

Ammonia as N - Gallery	06/07/23 08:52	EW175	0.05	<0.05	mg/l	C6
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**Nitrite (as N) - Gallery [M3016]**

Nitrite (as N) - Gallery	06/07/23 08:52	EW175	0.01	<0.01	mg/l	C6
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**Nitrate (as N) - Gallery [M301A]**

Nitrate (as N) - Gallery	06/07/23 08:52	EW175	1	<1	mg/l	C6
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**Calcium - Dissolved [M3165]**

Calcium (Ca)	07/07/23 09:51	EW188	1.08	54.878	mg/l	C6
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**Calcium-Total [M3205]**

Calcium-Total	07/07/23 10:14	EW187		53.9	mg/l	
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**Iron-Total [M3209]**

Iron-Total	07/07/23 10:14	EW187		<15	µg/l	
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**Magnesium-Total [M3211]**

Magnesium-Total	07/07/23 10:14	EW187		4.7	mg/l	
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**Manganese-Total [M3212]**

Manganese-Total	07/07/23 10:14	EW187	3	<3	µg/l	
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**PO reference:**

**Potassium-Total [M3217]**

Potassium-Total 07/07/23 10:14 EW187 2.6 mg/l

**Sodium-Total [M3221]**

Sodium-Total 07/07/23 10:14 EW187 12.8 mg/l

**Total Hardness (Calc Total Metals) [M3229]**

Total Hardness (Calc Total Metals) 11/07/23 11:13 EW187 153.86 mg/l CaCO3

**Ammonium as NH4 (Gallery) [M3280]**

Ammonium as NH4 (calc) 06/07/23 08:52 EW175 0.04 mg/l

**pH [M3282]**

pH 06/07/23 11:45 <sup>7D</sup> EW158 7.0

**Conductivity [M3283]**

Conductivity 06/07/23 11:45 EW153 100 327 µS/cm C6

**TPH 3 Band (C6-10-21-40) in water [M502B]**

TPH >C10-C21 \* 05/07/23 13:48 0.1 <0.1 µg/l

TPH >C21-C40 \* 05/07/23 13:48 0.1 <0.1 µg/l

TPH >C6-C10 \* 05/07/23 13:48 0.1 <0.1 µg/l

TPH Total >C6-C40 \* 05/07/23 13:48 10 <10 µg/l

**Coliforms E (Water) [IE Env] <1 >2 420 /100 ml (0) Colilert-18-Q MDW**

Coliforms \* 05/07/23 13:32 1 1 MPN/100 ml

**Escherichia Coli E (Water) [IE Env] <1 >2 420 /100 ml (0) Colilert-18-Q**

Escherichia coli \* 05/07/23 13:32 1 <1 MPN/100 ml

**Clostridium perfringens E (Water) [IE Env] <1 >100 /100 ml (0) TSC A**

Clostridium perfringens \* 05/07/23 13:32 1 <1 cfu/100 ml

Signed: \_\_\_\_\_



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17/07/2023

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#### <sup>4</sup> Accreditation Information

C6: ISO/IEC 17025:2017 INAB 138-T



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Niamh Ward - Senior Laboratory Analyst

17/07/2023

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**Page Number:** Page 1 of 3

**PO reference:**

## Certificate of Analysis

Sample number	966-2025-00002414	Received on	21/01/2025
Your sample reference	AQ BH101	Analysis started on	21/01/2025
Sample Matrix	Ground water		
Sample Condition on Arrival	Satisfactory	Sample Date	21/01/2025
Time Sampled	12:15		

Test Code Analyte	SUB <sup>5</sup> Analysis Started	Method	LOQ <sup>3</sup>	SPEC <sup>2</sup>	Result	Units	ACCRED <sup>4</sup>
<b>Alkalinity as CaCO<sub>3</sub> [M30D3]</b>							
Alkalinity as CAC03	22/01/25 11:13	EW175	30		132	mg/l	
<b>Aluminium - Dissolved [M3157]</b>							
Aluminium	04/02/25 11:51	EW188	5		5.25	µg/l	C6
<b>Ammonia as N - Gallery [M300Z]</b>							
Ammonia as N - Gallery	22/01/25 11:13	EW175	0.01		0.0130	mg/l	C6
<b>Ammonium as NH<sub>4</sub> (Gallery) [M3280]</b>							
Ammonium as NH <sub>4</sub> (calc)	22/01/25 11:13	EW175			0.0170	mg/l	
<b>Antimony - Dissolved [M3158]</b>							
antimony	04/02/25 11:51	EW188	0.1		0.106	µg/l	C6
<b>Arsenic - Dissolved [M3159]</b>							
Arsenic	04/02/25 11:51	EW188			0.225	µg/l	C6
<b>Biochemical Oxygen Demand (BOD) Robotic Method [M304E]</b>							
Biochemical oxygen demand (BOD) 5d by Robotic Method	22/01/25 10:36	Ew001R	1		<1	mg/l	C6
<b>Boron - Dissolved [M3163]</b>							
Boron (B)	04/02/25 11:51	EW188	0.21		<0.21	mg/l	C6
<b>Cadmium - Dissolved [M3164]</b>							
Cadmium (Cd)	04/02/25 11:51	EW188			<0.1	µg/l	C6
<b>Calcium - Dissolved [M3165]</b>							
Calcium (Ca)	04/02/25 11:51	EW188	1.08		50.1	mg/l	C6
<b>Chemical Oxygen Demand (COD) [M3004]</b>							
Chemical oxygen demand (COD)	23/01/25 09:41	EW094	8		<8	mg/l	C6
<b>Chloride mg/L - Gallery [M300S]</b>							
Chloride mg/L - Gallery	22/01/25 11:13	EW175	5		15.3	mg/l	C6
<b>Chromium - Dissolved [M3166]</b>							
Chromium (Cr)	04/02/25 11:51	EW188			<1	µg/l	C6
<b>Conductivity at 20°C (Robotic Method) [M3052]</b>							
Conductivity at 20°C	21/01/25 19:37	EW152R	5		291	µS/cm	C6
<b>Copper - Dissolved [M3168]</b>							
Copper (Cu)	04/02/25 11:51	EW188	0.003		<0.003	mg/l	C6
<b>Iron - Dissolved [M3172]</b>							
Iron (Fe)	04/02/25 11:51	EW188	5		<5	µg/l	C6

Signed: \_\_\_\_\_



06/02/2025

Aoife De Barra - Organics & Instrumentation Team Lead

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## Certificate of Analysis

Sample number	966-2025-00002414	Received on	21/01/2025
Your sample reference	AQ BH101	Analysis started on	21/01/2025
Sample Matrix	Ground water		
Sample Condition on Arrival	Satisfactory	Sample Date	21/01/2025
Time Sampled	12:15		

Test Code Analyte	SUB <sup>5</sup> Analysis Started	Method	LOQ <sup>3</sup>	SPEC <sup>2</sup>	Result	Units	ACCRED <sup>4</sup>
<b>Lead - Dissolved [M3173]</b>							
Lead (Pb)	04/02/25 11:51	EW188	0.51		<0.51	µg/l	C6
<b>Magnesium - Dissolved [M3174]</b>							
Magnesium (Mg)	04/02/25 11:51	EW188	1.11		5.21	mg/l	C6
<b>Manganese - Dissolved [M3175]</b>							
Manganese (Mn)	04/02/25 11:51	EW188			18.3	µg/l	C6
<b>Mercury - Dissolved [M3176]</b>							
Mercury	04/02/25 11:51	EW188	0.03		<0.03	µg/l	C6
<b>Nickel - Dissolved [M3178]</b>							
Nickel (Ni)	04/02/25 11:51	EW188			<0.5	µg/l	C6
<b>Nitrate (as N) - Gallery [M301A]</b>							
Nitrate (as N) - Gallery	22/01/25 11:13	EW175	1		2.13	mg/l	C6
<b>Nitrate as NO3 (Calc) - Gallery [M300L]</b>							
Nitrate as NO3 (Calc) - Gallery	22/01/25 11:13	EW175	4.4		9.44	mg/l	C6
<b>Nitrite (as N) - Gallery [M3016]</b>							
Nitrite (as N) - Gallery	22/01/25 11:13	EW175	0.01		<0.01	mg/l	C6
<b>Nitrite as NO2 (Calc) - Gallery [M300Y]</b>							
Nitrite as NO2 (Calc) - Gallery	22/01/25 11:13	EW175	0.033		<0.033	mg/l	C6
<b>pH (Robotic Method) [M3051]</b>							
pH	21/01/25 19:37	EW152R	4		7.3		C6
<b>Phosphate (Ortho/MRP) as P - Gallery [M300P]</b>							
Phosphate (Ortho/MRP) as P - Gallery	22/01/25 11:13	EW175	0.01		0.0200	mg/l	C6
<b>Potassium - Dissolved [M3180]</b>							
Potassium (K)	04/02/25 11:51	EW188	0.15		1.03	mg/l	C6
<b>Sodium - Dissolved [M3184]</b>							
Sodium (Na)	04/02/25 11:51	EW188	1.5		9.42	mg/l	C6
<b>Sulphate mg/L - Gallery [M300N]</b>							
Sulphate mg/L - Gallery	22/01/25 11:13	EW175	1		9.23	mg/l	C6
<b>Sulphide [M3009]</b>							
Sulphide	03/02/25 13:46	EW024	0.03		<0.03	mg/l	
<b>Suspended Solids [M3002]</b>							
Suspended Solids	23/01/25 12:34	EW013	5		137	mg/l	C6

Signed: \_\_\_\_\_



Aoife De Barra - Organics & Instrumentation Team Lead

06/02/2025

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## Certificate of Analysis

Sample number	966-2025-00002414	Received on	21/01/2025
Your sample reference	AQ BH101	Analysis started on	21/01/2025
Sample Matrix	Ground water		
Sample Condition on Arrival	Satisfactory	Sample Date	21/01/2025
Time Sampled	12:15		

Test Code Analyte	SUB <sup>5</sup> Analysis Started	Method	LOQ <sup>3</sup>	SPEC <sup>2</sup>	Result	Units	ACCRED <sup>4</sup>
<b>Total Dissolved Solids (TDS) [M3006]</b>							
Total dissolved solids @ 180°C	23/01/25 10:10	EW046	15		169	mg/l	C6
<b>Total Hardness - Dissolved [M3191]</b>							
Total hardness	05/02/25 14:37	EW188			147	mg/l CaCO3	C6
<b>Total Organic Carbon (TOC) [M3022]</b>							
TOC (total organic carbon)	23/01/25 15:45	EW123	1		2.19	mg/l	C6
<b>TPH 3 Band (C6-10-21-40) in water [M502B]</b>							
TPH >C10-C21	* 22/01/25 14:42		0.1		<0.1	µg/l	
TPH >C21-C40	* 22/01/25 14:42		0.1		<0.1	µg/l	
TPH >C6-C10	* 22/01/25 14:42		0.1		<0.1	µg/l	
TPH Total >C6-C40	* 22/01/25 14:42		10		<10	µg/l	YA
Validation	* 22/01/25 14:42				0		
Validation	* 22/01/25 14:42				0		

#### <sup>4</sup> Accreditation Information

C6: ISO/IEC 17025:2017 INAB 138-T  
YA: Accredited (External Subcontractor)

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- The sampling date was not communicated; this may impact the validity of the results unless provided.
- 7A. This test was conducted outside of recommended best practice holding time; this may impact the accreditation status/validity of the result. The result will still be technically sound in terms of the method and associated quality controls
- 7B. No time of sampling was supplied, a default time of 00:00:00 will be assumed for holding time calculations unless provided. This may impact the validity of the results.
- 7C. Your sample arrived into the laboratory already outside of the recommended holding time, and outside the holding time window for which we have validated the test(s) identified. As such the test conducted doesn't meet the criteria to provide an accredited result. The result will still be technically sound and conducted using an accredited method.
- 7D. The sample was received close to or outside of the recommended best practice holding time; this may impact the accreditation status of the result.
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Signed: \_\_\_\_\_



Aoife De Barra - Organics & Instrumentation Team Lead

06/02/2025

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IRELAND

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## Certificate of Analysis

Sample number	966-2025-00002415	Received on	21/01/2025
Your sample reference	AQ BH102	Analysis started on	21/01/2025
Sample Matrix	Ground water		
Sample Condition on Arrival	Satisfactory	Sample Date	21/01/2025
Time Sampled	13:30		

Test Code Analyte	SUB <sup>5</sup> Analysis Started	Method	LOQ <sup>3</sup>	SPEC <sup>2</sup>	Result	Units	ACCRED <sup>4</sup>
<b>Alkalinity as CaCO<sub>3</sub> [M30D3]</b>							
Alkalinity as CaCO <sub>3</sub>	22/01/25 11:19	EW175	30		170	mg/l	
<b>Aluminium - Dissolved [M3157]</b>							
Aluminium	04/02/25 11:51	EW188	5		<5	µg/l	C6
<b>Ammonia as N - Gallery [M300Z]</b>							
Ammonia as N - Gallery	22/01/25 11:19	EW175	0.01		0.0200	mg/l	C6
<b>Ammonium as NH<sub>4</sub> (Gallery) [M3280]</b>							
Ammonium as NH <sub>4</sub> (calc)	22/01/25 11:19	EW175			0.0250	mg/l	
<b>Antimony - Dissolved [M3158]</b>							
antimony	04/02/25 11:51	EW188	0.1		0.295	µg/l	C6
<b>Arsenic - Dissolved [M3159]</b>							
Arsenic	04/02/25 11:51	EW188			0.967	µg/l	C6
<b>Biochemical Oxygen Demand (BOD) Robotic Method [M304E]</b>							
Biochemical oxygen demand (BOD) 5d by Robotic Method	22/01/25 10:36	Ew001R	1		1.20	mg/l	C6
<b>Boron - Dissolved [M3163]</b>							
Boron (B)	04/02/25 11:51	EW188	0.21		<0.21	mg/l	C6
<b>Cadmium - Dissolved [M3164]</b>							
Cadmium (Cd)	04/02/25 11:51	EW188			<0.1	µg/l	C6
<b>Calcium - Dissolved [M3165]</b>							
Calcium (Ca)	04/02/25 11:51	EW188	1.08		58.2	mg/l	C6
<b>Chemical Oxygen Demand (COD) [M3004]</b>							
Chemical oxygen demand (COD)	22/01/25 10:31	EW094	8		22.0	mg/l	C6
<b>Chloride mg/L - Gallery [M300S]</b>							
Chloride mg/L - Gallery	22/01/25 11:19	EW175	5		16.6	mg/l	C6
<b>Chromium - Dissolved [M3166]</b>							
Chromium (Cr)	04/02/25 11:51	EW188			<1	µg/l	C6
<b>Conductivity at 20°C (Robotic Method) [M3052]</b>							
Conductivity at 20°C	21/01/25 19:37	EW152R	5		356	µS/cm	C6
<b>Copper - Dissolved [M3168]</b>							
Copper (Cu)	04/02/25 11:51	EW188	0.003		<0.003	mg/l	C6
<b>Iron - Dissolved [M3172]</b>							
Iron (Fe)	04/02/25 11:51	EW188	5		<5	µg/l	C6

Signed: \_\_\_\_\_



06/02/2025

Aoife De Barra - Organics & Instrumentation Team Lead

**Client:** Viridus Consulting Ltd.  
Inch House (East),  
Inch, Whitegate,  
Inch, Whitegate,  
Co. Cork. P25 H004  
Cork  
IRELAND

**Certificate Code:** AR-25-M3-003671-01

**Page Number:** Page 2 of 3

**PO reference:**

## Certificate of Analysis

Sample number	966-2025-00002415	Received on	21/01/2025
Your sample reference	AQ BH102	Analysis started on	21/01/2025
Sample Matrix	Ground water		
Sample Condition on Arrival	Satisfactory	Sample Date	21/01/2025
Time Sampled	13:30		

Test Code Analyte	SUB <sup>5</sup> Analysis Started	Method	LOQ <sup>3</sup>	SPEC <sup>2</sup>	Result	Units	ACCRED <sup>4</sup>
<b>Lead - Dissolved [M3173]</b>							
Lead (Pb)	04/02/25 11:51	EW188	0.51		<0.51	µg/l	C6
<b>Magnesium - Dissolved [M3174]</b>							
Magnesium (Mg)	04/02/25 11:51	EW188	1.11		5.35	mg/l	C6
<b>Manganese - Dissolved [M3175]</b>							
Manganese (Mn)	04/02/25 11:51	EW188			11.9	µg/l	C6
<b>Mercury - Dissolved [M3176]</b>							
Mercury	04/02/25 11:51	EW188	0.03		<0.03	µg/l	C6
<b>Nickel - Dissolved [M3178]</b>							
Nickel (Ni)	04/02/25 11:51	EW188			<0.5	µg/l	C6
<b>Nitrate (as N) - Gallery [M301A]</b>							
Nitrate (as N) - Gallery	22/01/25 11:19	EW175	1		2.35	mg/l	C6
<b>Nitrate as NO3 (Calc) - Gallery [M300L]</b>							
Nitrate as NO3 (Calc) - Gallery	22/01/25 11:19	EW175	4.4		10.4	mg/l	C6
<b>Nitrite (as N) - Gallery [M3016]</b>							
Nitrite (as N) - Gallery	22/01/25 11:19	EW175	0.01		<0.01	mg/l	C6
<b>Nitrite as NO2 (Calc) - Gallery [M300Y]</b>							
Nitrite as NO2 (Calc) - Gallery	22/01/25 11:19	EW175	0.033		<0.033	mg/l	C6
<b>pH (Robotic Method) [M3051]</b>							
pH	21/01/25 19:37	EW152R	4		7.2		C6
<b>Phosphate (Ortho/MRP) as P - Gallery [M300P]</b>							
Phosphate (Ortho/MRP) as P - Gallery	22/01/25 11:19	EW175	0.01		0.0170	mg/l	C6
<b>Potassium - Dissolved [M3180]</b>							
Potassium (K)	04/02/25 11:51	EW188	0.15		3.10	mg/l	C6
<b>Sodium - Dissolved [M3184]</b>							
Sodium (Na)	04/02/25 11:51	EW188	1.5		11.8	mg/l	C6
<b>Sulphate mg/L - Gallery [M300N]</b>							
Sulphate mg/L - Gallery	22/01/25 11:19	EW175	1		7.62	mg/l	C6
<b>Sulphide [M3009]</b>							
Sulphide	03/02/25 13:46	EW024	0.03		0.0390	mg/l	
<b>Suspended Solids [M3002]</b>							
Suspended Solids	23/01/25 12:36	EW013	5		211	mg/l	C6

Signed: \_\_\_\_\_



Aoife De Barra - Organics & Instrumentation Team Lead

06/02/2025

**Client:** Viridus Consulting Ltd.  
Inch House (East),  
Inch, Whitegate,  
Inch, Whitegate,  
Co. Cork. P25 H004  
Cork  
IRELAND

**Certificate Code:** AR-25-M3-003671-01

**Page Number:** Page 3 of 3

**PO reference:**

## Certificate of Analysis

Sample number	966-2025-00002415	Received on	21/01/2025
Your sample reference	AQ BH102	Analysis started on	21/01/2025
Sample Matrix	Ground water		
Sample Condition on Arrival	Satisfactory	Sample Date	21/01/2025
Time Sampled	13:30		

Test Code	SUB <sup>5</sup>	Analysis Started	Method	LOQ <sup>3</sup>	SPEC <sup>2</sup>	Result	Units	ACCRED <sup>4</sup>
<b>Total Dissolved Solids (TDS) [M3006]</b>								
Total dissolved solids @ 180°C		23/01/25 10:09	EW046	15		236	mg/l	C6
<b>Total Hardness - Dissolved [M3191]</b>								
Total hardness		05/02/25 14:37	EW188			167	mg/l CaCO3	C6
<b>Total Organic Carbon (TOC) [M3022]</b>								
TOC (total organic carbon)		23/01/25 15:45	EW123	1		1.79	mg/l	C6
<b>TPH 3 Band (C6-10-21-40) in water [M502B]</b>								
TPH >C10-C21	*	22/01/25 14:42		0.1		<0.1	µg/l	
TPH >C21-C40	*	22/01/25 14:42		0.1		<0.1	µg/l	
TPH >C6-C10	*	22/01/25 14:42		0.1		<0.1	µg/l	
TPH Total >C6-C40	*	22/01/25 14:42		10		<10	µg/l	YA
Validation	*	22/01/25 14:42				0		
Validation	*	22/01/25 14:42				0		

#### <sup>4</sup> Accreditation Information

C6: ISO/IEC 17025:2017 INAB 138-T  
YA: Accredited (External Subcontractor)

#### NOTES

- This Report shall not be reproduced, except in full, without the permission of the Laboratory and only relates to the items tested.
- SPEC = Allowable limit or parametric value.
- LOQ = Limit of Quantification or lowest value that can be reported.
- ACCRED = Indicates accreditation for the test, a blank field indicates not accredited.
- \* indicates the test was sub-contracted, "D" indicates the analysis was performed in Dublin and "C" indicates the analysis performed in Cork.
- The sampling date was not communicated; this may impact the validity of the results unless provided.
- 7A. This test was conducted outside of recommended best practice holding time; this may impact the accreditation status/validity of the result. The result will still be technically sound in terms of the method and associated quality controls
- 7B. No time of sampling was supplied, a default time of 00:00:00 will be assumed for holding time calculations unless provided. This may impact the validity of the results.
- 7C. Your sample arrived into the laboratory already outside of the recommended holding time, and outside the holding time window for which we have validated the test(s) identified. As such the test conducted doesn't meet the criteria to provide an accredited result. The result will still be technically sound and conducted using an accredited method.
- 7D. The sample was received close to or outside of the recommended best practice holding time; this may impact the accreditation status of the result.
- 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.
- Report is issued as per our standard T&C of sale.

Signed: \_\_\_\_\_



Aoife De Barra - Organics & Instrumentation Team Lead

06/02/2025

**Client:** Viridus Consulting Ltd.  
Inch House (East),  
Inch, Whitegate,  
Inch, Whitegate,  
Co. Cork. P25 H004  
Cork  
IRELAND

**Certificate Code:** AR-25-M3-003673-01

**Page Number:** Page 1 of 3

**PO reference:**

## Certificate of Analysis

Sample number	966-2025-00002417	Received on	21/01/2025
Your sample reference	AQ BH103	Analysis started on	21/01/2025
Sample Matrix	Ground water		
Sample Condition on Arrival	Satisfactory	Sample Date	21/01/2025
Time Sampled	15:45		

Test Code Analyte	SUB <sup>5</sup> Analysis Started	Method	LOQ <sup>3</sup>	SPEC <sup>2</sup>	Result	Units	ACCRED <sup>4</sup>
<b>Alkalinity as CaCO<sub>3</sub> [M30D3]</b>							
Alkalinity as CaCO <sub>3</sub>	22/01/25 11:13	EW175	30		155	mg/l	
<b>Aluminium - Dissolved [M3157]</b>							
Aluminium	04/02/25 11:51	EW188	5		19.3	µg/l	C6
<b>Ammonia as N - Gallery [M300Z]</b>							
Ammonia as N - Gallery	22/01/25 11:13	EW175	0.01		0.130	mg/l	C6
<b>Ammonium as NH<sub>4</sub> (Gallery) [M3280]</b>							
Ammonium as NH <sub>4</sub> (calc)	22/01/25 11:13	EW175			0.167	mg/l	
<b>Antimony - Dissolved [M3158]</b>							
antimony	04/02/25 11:51	EW188	0.1		<0.1	µg/l	C6
<b>Arsenic - Dissolved [M3159]</b>							
Arsenic	04/02/25 11:51	EW188			1.95	µg/l	C6
<b>Biochemical Oxygen Demand (BOD) Robotic Method [M304E]</b>							
Biochemical oxygen demand (BOD) 5d by Robotic Method	22/01/25 10:36	Ew001R	1		1.90	mg/l	C6
<b>Boron - Dissolved [M3163]</b>							
Boron (B)	04/02/25 11:51	EW188	0.21		<0.21	mg/l	C6
<b>Cadmium - Dissolved [M3164]</b>							
Cadmium (Cd)	04/02/25 11:51	EW188			<0.1	µg/l	C6
<b>Calcium - Dissolved [M3165]</b>							
Calcium (Ca)	04/02/25 11:51	EW188	1.08		48.7	mg/l	C6
<b>Chemical Oxygen Demand (COD) [M3004]</b>							
Chemical oxygen demand (COD)	23/01/25 09:41	EW094	8		13.0	mg/l	C6
<b>Chloride mg/L - Gallery [M300S]</b>							
Chloride mg/L - Gallery	22/01/25 11:13	EW175	5		15.1	mg/l	C6
<b>Chromium - Dissolved [M3166]</b>							
Chromium (Cr)	04/02/25 11:51	EW188			<1	µg/l	C6
<b>Conductivity at 20°C (Robotic Method) [M3052]</b>							
Conductivity at 20°C	21/01/25 19:37	EW152R	5		305	µS/cm	C6
<b>Copper - Dissolved [M3168]</b>							
Copper (Cu)	04/02/25 11:51	EW188	0.003		<0.003	mg/l	C6
<b>Iron - Dissolved [M3172]</b>							
Iron (Fe)	04/02/25 11:51	EW188	5		326	µg/l	C6

Signed: \_\_\_\_\_



06/02/2025

Aoife De Barra - Organics & Instrumentation Team Lead

**Client:** Viridus Consulting Ltd.  
Inch House (East),  
Inch, Whitegate,  
Inch, Whitegate,  
Co. Cork. P25 H004  
Cork  
IRELAND

**Certificate Code:** AR-25-M3-003673-01

**Page Number:** Page 2 of 3

**PO reference:**

## Certificate of Analysis

Sample number	966-2025-00002417	Received on	21/01/2025
Your sample reference	AQ BH103	Analysis started on	21/01/2025
Sample Matrix	Ground water		
Sample Condition on Arrival	Satisfactory	Sample Date	21/01/2025
Time Sampled	15:45		

Test Code Analyte	SUB <sup>5</sup> Analysis Started	Method	LOQ <sup>3</sup>	SPEC <sup>2</sup>	Result	Units	ACCRED <sup>4</sup>
<b>Lead - Dissolved [M3173]</b>							
Lead (Pb)	04/02/25 11:51	EW188	0.51		<0.51	µg/l	C6
<b>Magnesium - Dissolved [M3174]</b>							
Magnesium (Mg)	04/02/25 11:51	EW188	1.11		3.94	mg/l	C6
<b>Manganese - Dissolved [M3175]</b>							
Manganese (Mn)	06/02/25 16:43	EW188			4170	µg/l	
<b>Mercury - Dissolved [M3176]</b>							
Mercury	04/02/25 11:51	EW188	0.03		<0.03	µg/l	C6
<b>Nickel - Dissolved [M3178]</b>							
Nickel (Ni)	04/02/25 11:51	EW188			<0.5	µg/l	C6
<b>Nitrate (as N) - Gallery [M301A]</b>							
Nitrate (as N) - Gallery	22/01/25 11:13	EW175	1		<1	mg/l	C6
<b>Nitrate as NO3 (Calc) - Gallery [M300L]</b>							
Nitrate as NO3 (Calc) - Gallery	22/01/25 11:13	EW175	4.4		<4.4	mg/l	C6
<b>Nitrite (as N) - Gallery [M3016]</b>							
Nitrite (as N) - Gallery	22/01/25 11:13	EW175	0.01		<0.01	mg/l	C6
<b>Nitrite as NO2 (Calc) - Gallery [M300Y]</b>							
Nitrite as NO2 (Calc) - Gallery	22/01/25 11:13	EW175	0.033		<0.033	mg/l	C6
<b>pH (Robotic Method) [M3051]</b>							
pH	21/01/25 19:37	EW152R	4		6.4		C6
<b>Phosphate (Ortho/MRP) as P - Gallery [M300P]</b>							
Phosphate (Ortho/MRP) as P - Gallery	22/01/25 11:13	EW175	0.01		0.0490	mg/l	C6
<b>Potassium - Dissolved [M3180]</b>							
Potassium (K)	04/02/25 11:51	EW188	0.15		0.464	mg/l	C6
<b>Sodium - Dissolved [M3184]</b>							
Sodium (Na)	04/02/25 11:51	EW188	1.5		10.8	mg/l	C6
<b>Sulphate mg/L - Gallery [M300N]</b>							
Sulphate mg/L - Gallery	22/01/25 11:13	EW175	1		<1	mg/l	C6
<b>Sulphide [M3009]</b>							
Sulphide	03/02/25 13:46	EW024	0.03		<0.03	mg/l	
<b>Suspended Solids [M3002]</b>							
Suspended Solids	23/01/25 12:36	EW013	5		<5	mg/l	C6

Signed: \_\_\_\_\_



Aoife De Barra - Organics & Instrumentation Team Lead

06/02/2025

**Client:** Viridus Consulting Ltd.  
Inch House (East),  
Inch, Whitegate,  
Inch, Whitegate,  
Co. Cork. P25 H004  
Cork  
IRELAND

**Certificate Code:** AR-25-M3-003673-01

**Page Number:** Page 3 of 3

**PO reference:**

## Certificate of Analysis

Sample number	966-2025-00002417	Received on	21/01/2025
Your sample reference	AQ BH103	Analysis started on	21/01/2025
Sample Matrix	Ground water		
Sample Condition on Arrival	Satisfactory	Sample Date	21/01/2025
Time Sampled	15:45		

Test Code	SUB <sup>5</sup>	Analysis Started	Method	LOQ <sup>3</sup>	SPEC <sup>2</sup>	Result	Units	ACCRED <sup>4</sup>
<b>Total Dissolved Solids (TDS) [M3006]</b>								
Total dissolved solids @ 180°C		23/01/25 10:10	EW046	15		153	mg/l	C6
<b>Total Hardness - Dissolved [M3191]</b>								
Total hardness		05/02/25 14:37	EW188			138	mg/l CaCO3	C6
<b>Total Organic Carbon (TOC) [M3022]</b>								
TOC (total organic carbon)		23/01/25 15:45	EW123	1		4.60	mg/l	C6
<b>TPH 3 Band (C6-10-21-40) in water [M502B]</b>								
TPH >C10-C21	*	22/01/25 14:42		0.1		<0.1	µg/l	
TPH >C21-C40	*	22/01/25 14:42		0.1		<0.1	µg/l	
TPH >C6-C10	*	22/01/25 14:42		0.1		<0.1	µg/l	
TPH Total >C6-C40	*	22/01/25 14:42		10		<10	µg/l	YA
Validation	*	22/01/25 14:42				0		
Validation	*	22/01/25 14:42				0		

#### <sup>4</sup> Accreditation Information

C6: ISO/IEC 17025:2017 INAB 138-T  
YA: Accredited (External Subcontractor)

#### NOTES

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- SPEC = Allowable limit or parametric value.
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- ACCRED = Indicates accreditation for the test, a blank field indicates not accredited.
- \* indicates the test was sub-contracted, "D" indicates the analysis was performed in Dublin and "C" indicates the analysis performed in Cork.
- The sampling date was not communicated; this may impact the validity of the results unless provided.
- 7A. This test was conducted outside of recommended best practice holding time; this may impact the accreditation status/validity of the result. The result will still be technically sound in terms of the method and associated quality controls
- 7B. No time of sampling was supplied, a default time of 00:00:00 will be assumed for holding time calculations unless provided. This may impact the validity of the results.
- 7C. Your sample arrived into the laboratory already outside of the recommended holding time, and outside the holding time window for which we have validated the test(s) identified. As such the test conducted doesn't meet the criteria to provide an accredited result. The result will still be technically sound and conducted using an accredited method.
- 7D. The sample was received close to or outside of the recommended best practice holding time; this may impact the accreditation status of the result.
- 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.
- Report is issued as per our standard T&C of sale.

Signed: \_\_\_\_\_



Aoife De Barra - Organics & Instrumentation Team Lead

06/02/2025

**Client:** Viridus Consulting Ltd.  
Inch House (East),  
Inch, Whitegate,  
Inch, Whitegate,  
Co. Cork. P25 H004  
Cork  
IRELAND

**Certificate Code:** AR-25-M3-003672-01

**Page Number:** Page 1 of 3

**PO reference:**

## Certificate of Analysis

Sample number	966-2025-00002416	Received on	21/01/2025
Your sample reference	AQ BH104	Analysis started on	21/01/2025
Sample Matrix	Ground water		
Sample Condition on Arrival	Satisfactory	Sample Date	21/01/2025
Time Sampled	15:15		

Test Code Analyte	SUB <sup>5</sup> Analysis Started	Method	LOQ <sup>3</sup>	SPEC <sup>2</sup>	Result	Units	ACCRED <sup>4</sup>
<b>Alkalinity as CaCO<sub>3</sub> [M30D3]</b>							
Alkalinity as CaCO <sub>3</sub>	22/01/25 11:19	EW175	30		47.2	mg/l	
<b>Aluminium - Dissolved [M3157]</b>							
Aluminium	04/02/25 11:51	EW188	5		6.52	µg/l	C6
<b>Ammonia as N - Gallery [M300Z]</b>							
Ammonia as N - Gallery	22/01/25 11:19	EW175	0.01		0.0170	mg/l	C6
<b>Ammonium as NH<sub>4</sub> (Gallery) [M3280]</b>							
Ammonium as NH <sub>4</sub> (calc)	22/01/25 11:19	EW175			0.0210	mg/l	
<b>Antimony - Dissolved [M3158]</b>							
antimony	04/02/25 11:51	EW188	0.1		<0.1	µg/l	C6
<b>Arsenic - Dissolved [M3159]</b>							
Arsenic	04/02/25 11:51	EW188			0.213	µg/l	C6
<b>Biochemical Oxygen Demand (BOD) Robotic Method [M304E]</b>							
Biochemical oxygen demand (BOD) 5d by Robotic Method	22/01/25 10:36	Ew001R	1		<1	mg/l	C6
<b>Boron - Dissolved [M3163]</b>							
Boron (B)	04/02/25 11:51	EW188	0.21		<0.21	mg/l	C6
<b>Cadmium - Dissolved [M3164]</b>							
Cadmium (Cd)	04/02/25 11:51	EW188			0.442	µg/l	C6
<b>Calcium - Dissolved [M3165]</b>							
Calcium (Ca)	04/02/25 11:51	EW188	1.08		15.5	mg/l	C6
<b>Chemical Oxygen Demand (COD) [M3004]</b>							
Chemical oxygen demand (COD)	23/01/25 09:41	EW094	8		<8	mg/l	C6
<b>Chloride mg/L - Gallery [M300S]</b>							
Chloride mg/L - Gallery	22/01/25 11:19	EW175	5		15.3	mg/l	C6
<b>Chromium - Dissolved [M3166]</b>							
Chromium (Cr)	04/02/25 11:51	EW188			<1	µg/l	C6
<b>Conductivity at 20°C (Robotic Method) [M3052]</b>							
Conductivity at 20°C	21/01/25 19:37	EW152R	5		140	µS/cm	C6
<b>Copper - Dissolved [M3168]</b>							
Copper (Cu)	04/02/25 11:51	EW188	0.003		<0.003	mg/l	C6
<b>Iron - Dissolved [M3172]</b>							
Iron (Fe)	04/02/25 11:51	EW188	5		<5	µg/l	C6

Signed: \_\_\_\_\_



06/02/2025

Aoife De Barra - Organics & Instrumentation Team Lead

**Client:** Viridus Consulting Ltd.  
Inch House (East),  
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**Certificate Code:** AR-25-M3-003672-01

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**PO reference:**

## Certificate of Analysis

Sample number	966-2025-00002416	Received on	21/01/2025
Your sample reference	AQ BH104	Analysis started on	21/01/2025
Sample Matrix	Ground water		
Sample Condition on Arrival	Satisfactory	Sample Date	21/01/2025
Time Sampled	15:15		

Test Code Analyte	SUB <sup>5</sup> Analysis Started	Method	LOQ <sup>3</sup>	SPEC <sup>2</sup>	Result	Units	ACCRED <sup>4</sup>
<b>Lead - Dissolved [M3173]</b>							
Lead (Pb)	04/02/25 11:51	EW188	0.51		<0.51	µg/l	C6
<b>Magnesium - Dissolved [M3174]</b>							
Magnesium (Mg)	04/02/25 11:51	EW188	1.11		2.02	mg/l	C6
<b>Manganese - Dissolved [M3175]</b>							
Manganese (Mn)	04/02/25 11:51	EW188			939	µg/l	C6
<b>Mercury - Dissolved [M3176]</b>							
Mercury	04/02/25 11:51	EW188	0.03		<0.03	µg/l	C6
<b>Nickel - Dissolved [M3178]</b>							
Nickel (Ni)	04/02/25 11:51	EW188			<0.5	µg/l	C6
<b>Nitrate (as N) - Gallery [M301A]</b>							
Nitrate (as N) - Gallery	22/01/25 11:19	EW175	1		<1	mg/l	C6
<b>Nitrate as NO3 (Calc) - Gallery [M300L]</b>							
Nitrate as NO3 (Calc) - Gallery	22/01/25 11:19	EW175	4.4		<4.4	mg/l	C6
<b>Nitrite (as N) - Gallery [M3016]</b>							
Nitrite (as N) - Gallery	22/01/25 11:19	EW175	0.01		<0.01	mg/l	C6
<b>Nitrite as NO2 (Calc) - Gallery [M300Y]</b>							
Nitrite as NO2 (Calc) - Gallery	22/01/25 11:19	EW175	0.033		<0.033	mg/l	C6
<b>pH (Robotic Method) [M3051]</b>							
pH	21/01/25 19:37	EW152R	4		6.1		C6
<b>Phosphate (Ortho/MRP) as P - Gallery [M300P]</b>							
Phosphate (Ortho/MRP) as P - Gallery	22/01/25 11:19	EW175	0.01		0.0270	mg/l	C6
<b>Potassium - Dissolved [M3180]</b>							
Potassium (K)	04/02/25 11:51	EW188	0.15		0.283	mg/l	C6
<b>Sodium - Dissolved [M3184]</b>							
Sodium (Na)	04/02/25 11:51	EW188	1.5		10.7	mg/l	C6
<b>Sulphate mg/L - Gallery [M300N]</b>							
Sulphate mg/L - Gallery	22/01/25 11:19	EW175	1		4.87	mg/l	C6
<b>Sulphide [M3009]</b>							
Sulphide	03/02/25 13:46	EW024	0.03		<0.03	mg/l	C6
<b>Suspended Solids [M3002]</b>							
Suspended Solids	23/01/25 12:35	EW013	5		7.00	mg/l	C6

Signed: \_\_\_\_\_



Aoife De Barra - Organics & Instrumentation Team Lead

06/02/2025

**Client:** Viridus Consulting Ltd.  
Inch House (East),  
Inch, Whitegate,  
Inch, Whitegate,  
Co. Cork. P25 H004  
Cork  
IRELAND

**Certificate Code:** AR-25-M3-003672-01

**Page Number:** Page 3 of 3

**PO reference:**

## Certificate of Analysis

Sample number	966-2025-00002416	Received on	21/01/2025
Your sample reference	AQ BH104	Analysis started on	21/01/2025
Sample Matrix	Ground water		
Sample Condition on Arrival	Satisfactory	Sample Date	21/01/2025
Time Sampled	15:15		

Test Code	SUB <sup>5</sup>	Analysis Started	Method	LOQ <sup>3</sup>	SPEC <sup>2</sup>	Result	Units	ACCRED <sup>4</sup>
<b>Total Dissolved Solids (TDS) [M3006]</b>								
Total dissolved solids @ 180°C		23/01/25 10:10	EW046	15		121	mg/l	C6
<b>Total Hardness - Dissolved [M3191]</b>								
Total hardness		05/02/25 14:37	EW188			47.0	mg/l CaCO3	C6
<b>Total Organic Carbon (TOC) [M3022]</b>								
TOC (total organic carbon)		23/01/25 15:45	EW123	1		1.09	mg/l	C6
<b>TPH 3 Band (C6-10-21-40) in water [M502B]</b>								
TPH >C10-C21	*	22/01/25 14:42		0.1		<0.1	µg/l	
TPH >C21-C40	*	22/01/25 14:42		0.1		<0.1	µg/l	
TPH >C6-C10	*	22/01/25 14:42		0.1		<0.1	µg/l	
TPH Total >C6-C40	*	22/01/25 14:42		10		<10	µg/l	YA
Validation	*	22/01/25 14:42				0		
Validation	*	22/01/25 14:42				0		

#### <sup>4</sup> Accreditation Information

C6: ISO/IEC 17025:2017 INAB 138-T  
YA: Accredited (External Subcontractor)

#### NOTES

- This Report shall not be reproduced, except in full, without the permission of the Laboratory and only relates to the items tested.
- SPEC = Allowable limit or parametric value.
- LOQ = Limit of Quantification or lowest value that can be reported.
- ACCRED = Indicates accreditation for the test, a blank field indicates not accredited.
- \* indicates the test was sub-contracted, "D" indicates the analysis was performed in Dublin and "C" indicates the analysis performed in Cork.
- The sampling date was not communicated; this may impact the validity of the results unless provided.
- 7A. This test was conducted outside of recommended best practice holding time; this may impact the accreditation status/validity of the result. The result will still be technically sound in terms of the method and associated quality controls
- 7B. No time of sampling was supplied, a default time of 00:00:00 will be assumed for holding time calculations unless provided. This may impact the validity of the results.
- 7C. Your sample arrived into the laboratory already outside of the recommended holding time, and outside the holding time window for which we have validated the test(s) identified. As such the test conducted doesn't meet the criteria to provide an accredited result. The result will still be technically sound and conducted using an accredited method.
- 7D. The sample was received close to or outside of the recommended best practice holding time; this may impact the accreditation status of the result.
- 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.
- Report is issued as per our standard T&C of sale.

Signed:



Aoife De Barra - Organics & Instrumentation Team Lead

06/02/2025

**Client:** Viridus Consulting Ltd.  
Inch House (East),  
Inch, Whitegate,  
Inch, Whitegate,  
Co. Cork. P25 H004  
Cork  
IRELAND

**Certificate Code:** AR-25-M3-003629-01

**Page Number:** Page 1 of 1

**PO reference:**

## Certificate of Analysis

Sample number	966-2025-00002418	Received on	21/01/2025
Your sample reference	AQPW	Analysis started on	21/01/2025
Sample Matrix	Ground water		
Sample Condition on Arrival	Satisfactory	Sample Date	21/01/2025
Time Sampled	16:15		

Test Code Analyte	SUB <sup>5</sup>	Analysis Started	Method	LOQ <sup>3</sup>	SPEC <sup>2</sup>	Result	Units	ACCRED <sup>4</sup>
<b>Clostridium perfringens [XD00G]</b>								
Clostridium perfringens	*	21/01/25 18:03				0	cfu/100 ml	YA
<b>Coliforms [XD002]</b>								
Coliforms	*	21/01/25 18:03				0	cfu/100 ml	YA
<b>Escherichia coli, confirmed [XD005]</b>								
Escherichia coli, confirmed	*	21/01/25 18:03				0	cfu/100 ml	YA

#### <sup>4</sup> Accreditation Information

YA: Accredited (External Subcontractor)

#### NOTES

- This Report shall not be reproduced, except in full, without the permission of the Laboratory and only relates to the items tested.
- SPEC = Allowable limit or parametric value.
- LOQ = Limit of Quantification or lowest value that can be reported.
- ACCRED = Indicates accreditation for the test, a blank field indicates not accredited.
- \* indicates the test was sub-contracted, "D" indicates the analysis was performed in Dublin and "C" indicates the analysis performed in Cork.
- The sampling date was not communicated; this may impact the validity of the results unless provided.
- This test was conducted outside of recommended best practice holding time; this may impact the accreditation status/validity of the result. The result will still be technically sound in terms of the method and associated quality controls
- No time of sampling was supplied, a default time of 00:00:00 will be assumed for holding time calculations unless provided. This may impact the validity of the results.
- Your sample arrived into the laboratory already outside of the recommended holding time, and outside the holding time window for which we have validated the test(s) identified. As such the test conducted doesn't meet the criteria to provide an accredited result. The result will still be technically sound and conducted using an accredited method.
- The sample was received close to or outside of the recommended best practice holding time; this may impact the accreditation status of the result.
- 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.
- Report is issued as per our standard T&C of sale.

Signed: \_\_\_\_\_



Aoife De Barra - Organics & Instrumentation Team Lead

06/02/2025



Murray Brothers Tarmacadam Ltd

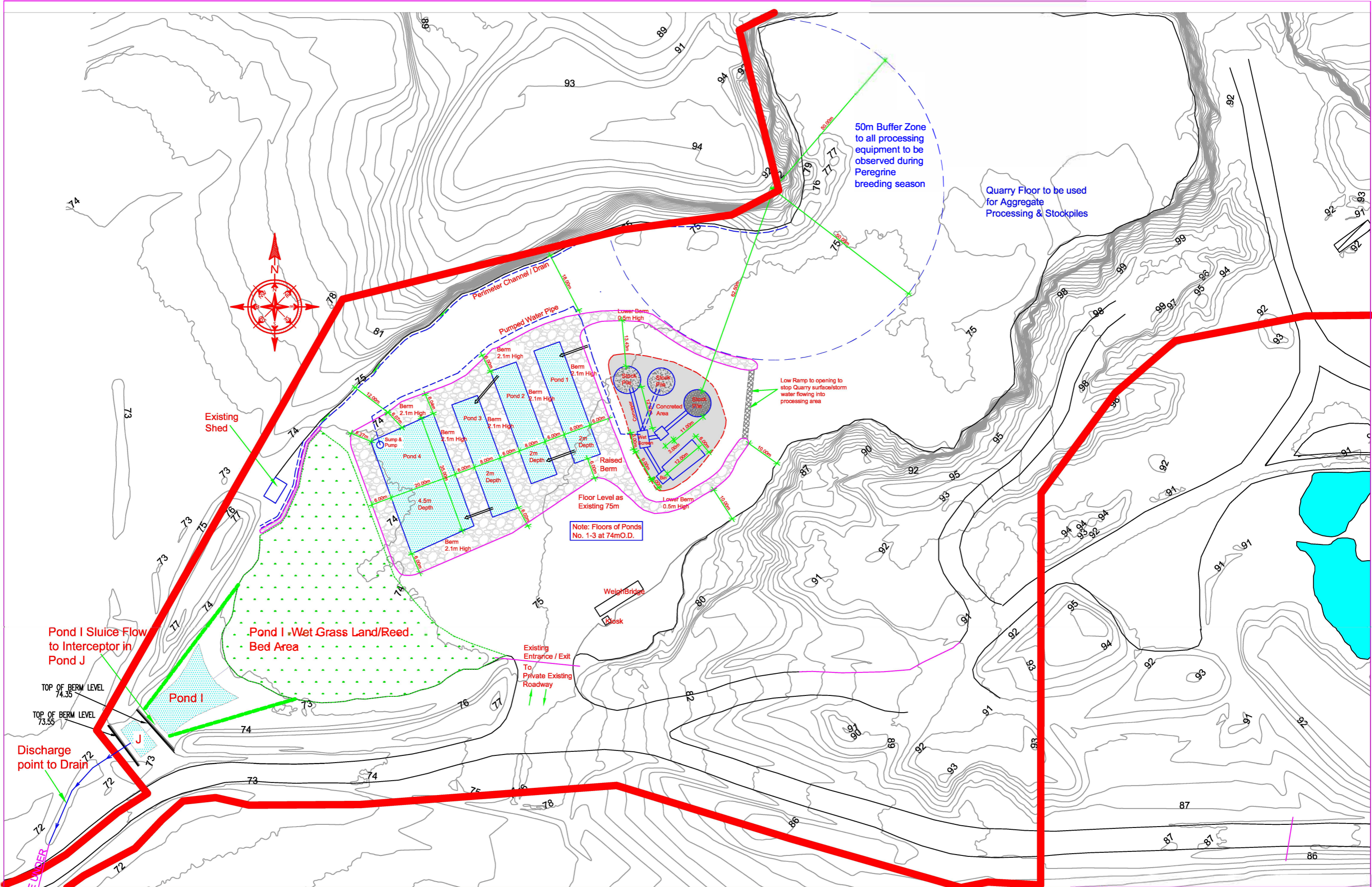
**APPENDIX 7.9**  
**AGGREGATE WASH PLANT**  
**LAYOUT PLAN**

**VOLUME III**  
APPENDICES

APRIL 2026



Ardcahan Quarry EIAR – Chapter 7 Water Attributes  
**Appendix 7.9 – Aggregate Wash Plant Layout Plan**



Drawn By: J. Murphy  
 Size: A3  
 Date: 10/2025  
 Dwg No: K145a

REV.	DATE	ALTERATION	INT.
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-

Drawing Status: ISSUE FOR PLANNING  
 Drawing Title: Site - Chip Washing Facility  
 Scale: 1:1000

Client: Murray Brothers Tarmacadam Ltd  
 Project: Ardcahan, Dunmanway, Co. Cork

PAIRC NA SLAT  
 WOODFIELD  
 CLONAKILTY  
 CO. CORK  
 PHONE: (023) 8834149  
 E.MAIL:jamesohearch@gmail.com

**JAMES O'HEA**

LAND SURVEYING · MAPS ·  
 PLANNING · ARCHITECTURE ·  
 CONSTRUCTION CONSULTANTS





Murray Brothers Tarmacadam Ltd



**APPENDIX 7.10**  
SITE DISCHARGE CALCULATION  
DATA

**VOLUME III**  
APPENDICES



APRIL 2026





Ardcahan Quarry EIAR – Chapter 7 Water Attributes  
**Appendix 7.10 – Site Discharge Calculation Data**

## EIAR APPENDIX 7.10 - Ardcahan Quarry full development area runoff calculations.

					RATIONAL FORMULA USED	
<b>C</b>	Coefficient of run-off (dimensionless)	0.75	0.75		From Nomogram (Appendix 10.1)	
<b>i</b>	Rainfall intensity (mm/hr)	see below			From Met Eireann (Appendix 10.2)	
<b>Quarry Area</b>	Future active quarry area (ha)	8.3	8.3		Active Quarry Area Catchment	
<b>Quarry Area</b>	Final catchment area (ha)	8.3	8.3		Conservative Total Area (assuming no vegetation)	
	Pre & Post Development	Assumes exposed rock for both scenarios				

**Peak Flow  $Q=2.78CiA$  l/s**

### Final Quarry Area of 8.3 ha

Duration (hours)	Return Period (year)	6hrs T year rainfall (mm)	Intensity (mm/hr)	Pre-Development		Operational Phase		Attenuated Volume (m3)
				Runoff (l/s)	Run-off Volume (m3)	Runoff (l/s)	Run-off Volume (m3)	
6	1	31.1	5.2	90	1938	90	1938	1938
6	30	59.1	9.9	170	3682	170	3682	3682
6	100	72.3	12.1	209	4504	209	4504	4504

### With Total Catchment Area 8.3 Ha

Duration (hours)	Return Period (year)	6hrs T year rainfall (mm)	Intensity (i)	Green Field		Post development		Attenuated Volume (m3)
				Runoff (l/s)	Run-off Volume (m3)	Runoff (l/s)	Run-off Volume (m3)	
6	1	31.1	5.2	90	1938	90	1938	1938
6	30	59.1	9.9	170	3682	170	3682	3682
6	100	72.3	12.1	209	4504	209	4504	4504

### Design dimension of attenuation pond

Return Period (year)	Attenuated Volume (m3)	Length (m)	Width (m)	Depth (m)
1	1938	44.02	44.02	1
30	3682	60.68	60.68	1
100	4504	67.11	67.11	1

APPENDIX 7.10.1 - Ardcahan Quarry EIAR 2026.  
Infiltration Coefficient Nomogram Graph.

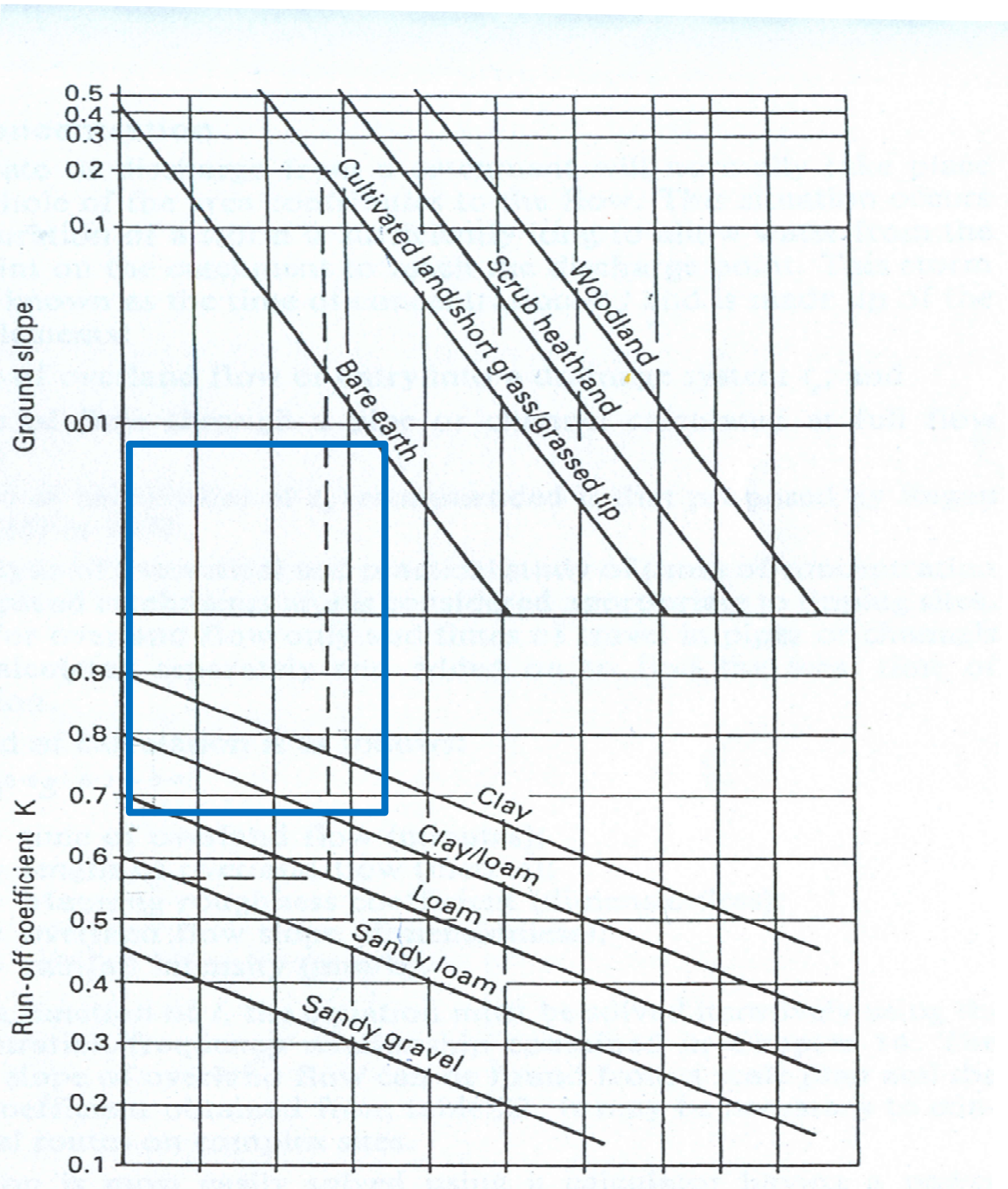


Figure 3 Nomogram to determine the run-off coefficient

Met Eireann  
Return Period Rainfall Depths for sliding Durations  
Irish Grid: Easting: 124723, Northing: 55805,

DURATION	Interval		Years													
	6months,	1year,	2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	150,	200,	250,	500,
5 mins	3.3,	4.1,	4.5,	5.1,	5.4,	5.7,	6.5,	7.3,	7.8,	8.5,	9.1,	9.6,	10.3,	10.8,	11.2,	N/A,
10 mins	4.7,	5.7,	6.3,	7.0,	7.5,	7.9,	9.0,	10.2,	10.9,	11.9,	12.7,	13.4,	14.3,	15.0,	15.5,	N/A,
15 mins	5.5,	6.8,	7.4,	8.3,	8.9,	9.3,	10.6,	12.0,	12.9,	14.0,	15.0,	15.7,	16.8,	17.6,	18.3,	N/A,
30 mins	7.6,	9.4,	10.3,	11.6,	12.4,	12.9,	14.8,	16.7,	17.9,	19.5,	20.9,	21.9,	23.4,	24.6,	25.5,	N/A,
1 hours	10.7,	13.2,	14.4,	16.1,	17.2,	18.1,	20.6,	23.3,	25.0,	27.2,	29.2,	30.6,	32.7,	34.3,	35.6,	N/A,
2 hours	14.9,	18.4,	20.1,	22.5,	24.0,	25.2,	28.8,	32.5,	34.9,	38.0,	40.7,	42.7,	45.6,	47.8,	49.6,	N/A,
3 hours	18.0,	22.3,	24.4,	27.3,	29.2,	30.6,	35.0,	39.5,	42.4,	46.2,	49.4,	51.8,	55.4,	58.1,	60.3,	N/A,
4 hours	20.7,	25.6,	28.0,	31.4,	33.5,	35.1,	40.1,	45.4,	48.6,	53.0,	56.7,	59.5,	63.6,	66.7,	69.2,	N/A,
6 hours	25.2,	31.1,	34.0,	38.1,	40.7,	42.7,	48.8,	55.1,	59.1,	64.4,	68.9,	72.3,	77.3,	81.0,	84.1,	N/A,
9 hours	30.6,	37.8,	41.3,	46.3,	49.5,	51.9,	59.2,	67.0,	71.8,	78.2,	83.7,	87.8,	93.9,	98.5,	102.1,	N/A,
12 hours	35.1,	43.4,	47.4,	53.1,	56.8,	59.5,	68.0,	76.9,	82.4,	89.8,	96.1,	100.8,	107.8,	113.0,	117.3,	N/A,
18 hours	42.6,	52.7,	57.6,	64.5,	69.0,	72.3,	82.6,	93.4,	100.1,	109.1,	116.7,	122.5,	130.9,	137.3,	142.5,	N/A,
24 hours	49.0,	60.5,	66.1,	74.1,	79.2,	83.0,	94.9,	107.2,	114.9,	125.3,	134.0,	140.6,	150.3,	157.7,	163.6,	183.3,
2 days	63.5,	76.9,	83.4,	92.4,	98.2,	102.5,	115.6,	129.2,	137.5,	148.7,	158.1,	165.1,	175.4,	183.1,	189.3,	209.9,
3 days	75.9,	90.9,	98.1,	108.0,	114.3,	119.0,	133.2,	147.9,	156.9,	168.8,	178.8,	186.2,	197.1,	205.3,	211.8,	233.4,
4 days	87.2,	103.5,	111.3,	122.1,	128.9,	133.9,	149.2,	164.8,	174.3,	186.9,	197.5,	205.3,	216.7,	225.2,	232.1,	254.6,
6 days	107.9,	126.5,	135.4,	147.6,	155.2,	160.8,	177.8,	195.1,	205.6,	219.4,	231.0,	239.5,	251.9,	261.1,	268.5,	292.7,
8 days	126.9,	147.7,	157.4,	170.8,	179.2,	185.3,	203.9,	222.6,	234.0,	248.9,	261.2,	270.3,	283.7,	293.5,	301.3,	327.0,
10 days	144.9,	167.6,	178.2,	192.6,	201.7,	208.3,	228.2,	248.3,	260.4,	276.2,	289.4,	299.0,	313.1,	323.5,	331.8,	358.8,
12 days	162.3,	186.6,	198.0,	213.5,	223.1,	230.2,	251.4,	272.6,	285.4,	302.2,	316.0,	326.2,	341.0,	351.8,	360.5,	388.8,
16 days	195.5,	223.0,	235.8,	253.1,	263.8,	271.7,	295.1,	318.6,	332.6,	350.9,	366.0,	377.1,	393.2,	405.0,	414.4,	444.9,
20 days	227.5,	257.8,	271.8,	290.8,	302.5,	311.0,	336.6,	361.9,	377.1,	396.8,	413.0,	424.9,	442.1,	454.7,	464.8,	497.2,
25 days	266.2,	299.8,	315.3,	336.1,	348.9,	358.3,	386.1,	413.6,	430.1,	451.4,	468.9,	481.6,	500.1,	513.7,	524.4,	559.1,

NOTES:

N/A Data not available

These values are derived from a Depth Duration Frequency (DDF) Model

For details refer to:


'Fitzgerald D. L. (2007), Estimates of Point Rainfall Frequencies, Technical Note No. 61, Met Eireann, Dublin',

Available for download at [www.met.ie/climate/dataproducts/Estimation-of-Point-Rainfall-Frequencies\\_TN61.pdf](http://www.met.ie/climate/dataproducts/Estimation-of-Point-Rainfall-Frequencies_TN61.pdf)





Murray Brothers Tarmacadam Ltd



**APPENDIX 7.11**  
**MAIN ATTENUATION POND &  
DISCHARGE DESIGN**

**VOLUME III**  
APPENDICES



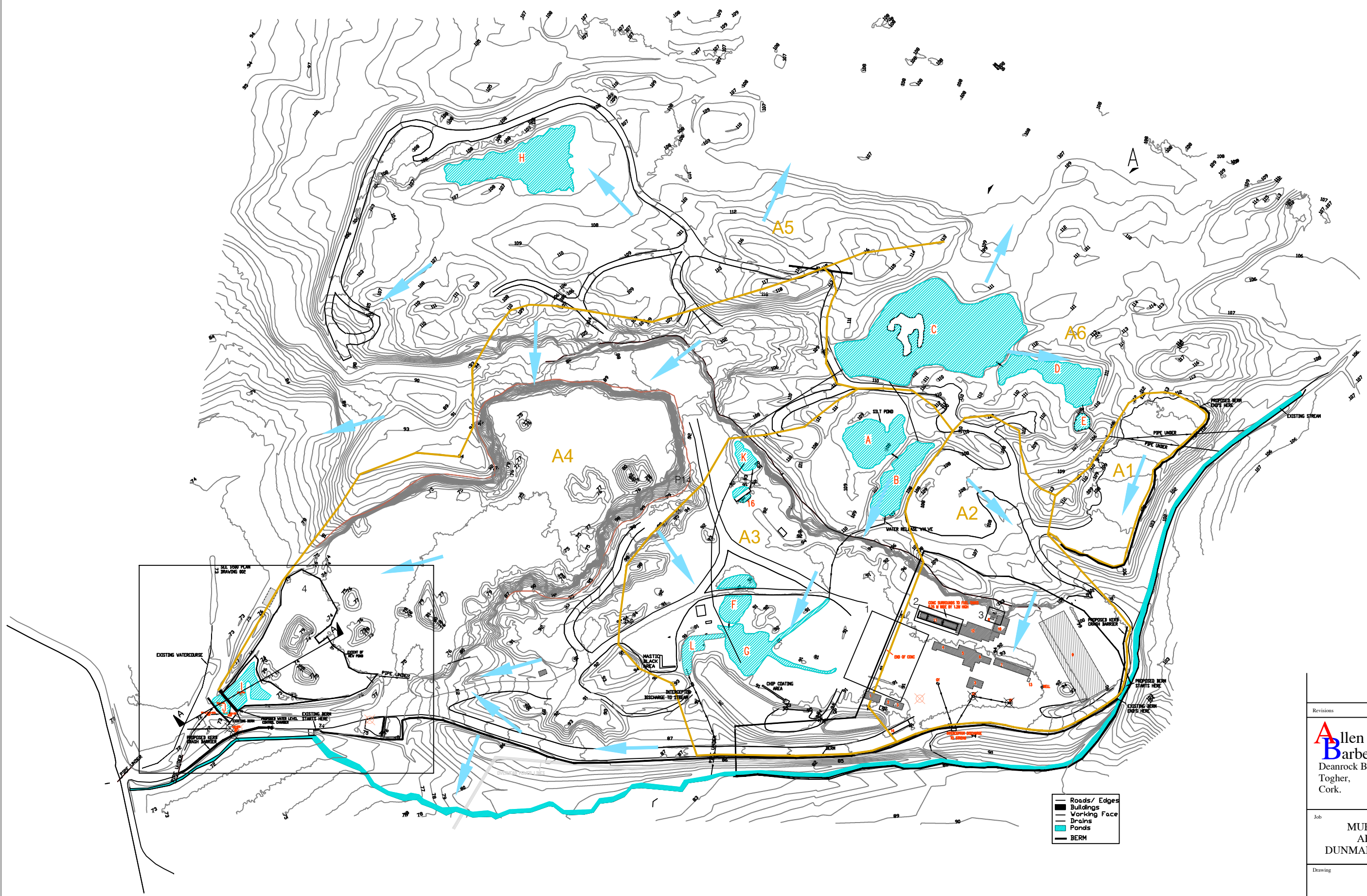
APRIL 2026





Ardcahan Quarry EIAR – Chapter 7 Water Attributes

**Appendix 7.11 – Main Attenuation Pond & Discharge Design**



- Roads/ Edges
- Buildings
- - - Working Face
- Drains
- Ponds
- BERM

Revisions	Issue	Date	By

**Allen Barber**  
 Deanrock Business Park,  
 Togher,  
 Cork.

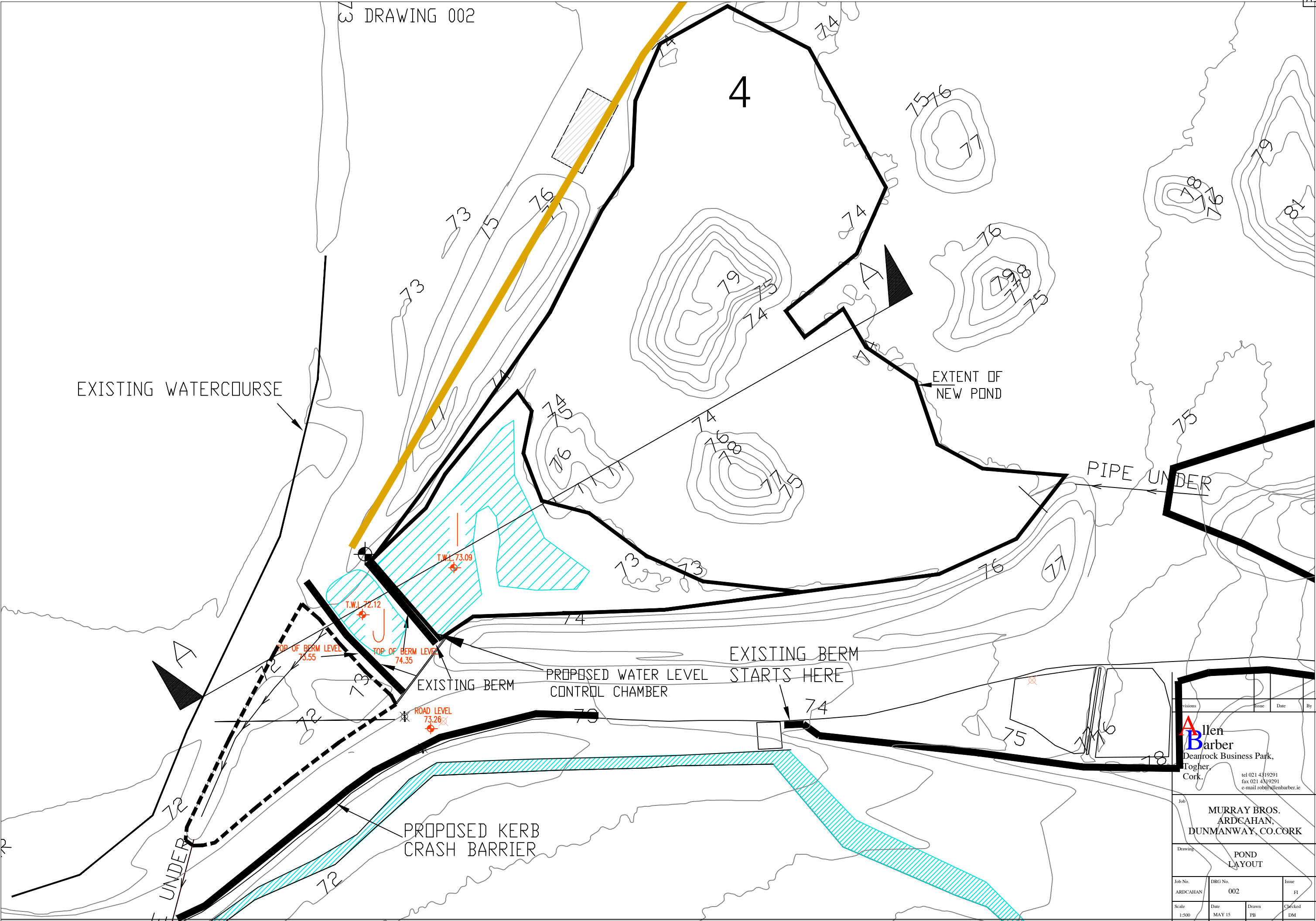
tel 021 4319291  
 fax 021 4319291  
 e-mail rob@allenbarber.ie

Job  
**MURRAY BROS.**  
**ARDCAHAN,**  
**DUNMANWAY, CO.CORK**

Drawing  
**SITE LAYOUT**

Job No.	DRG No.	Issue
ARDCAHAN	001	F1

Scale	Date	Drawn	Checked
1:2500	MAY 15	PB	DM



EXISTING WATERCOURSE

EXTENT OF NEW POND

PIPE UNDER

TOP OF BERM LEVEL 73.55

TOP OF BERM LEVEL 74.35

EXISTING BERM

PROPOSED WATER LEVEL CONTROL CHAMBER

EXISTING BERM STARTS HERE

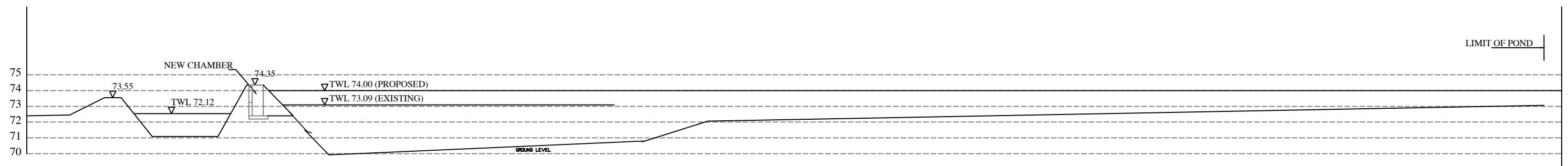
PROPOSED KERB CRASH BARRIER

**Allen Barber**  
 Dearrock Business Park,  
 Togher,  
 Cork.  
 tel 021 4319291  
 fax 021 4319291  
 e-mail rob@allenbarber.ie

Job  
**MURRAY BROS.**  
**ARDCAHAN,**  
**DUNMANWAY, CO.CORK**

Drawing  
**POND LAYOUT**

Job No. ARDCAHAN	DRG No. 002	Issue FI
Scale 1:500	Date MAY 15	Drawn PB
	Checked DM	



TYPICAL CROSS SECTION A-A

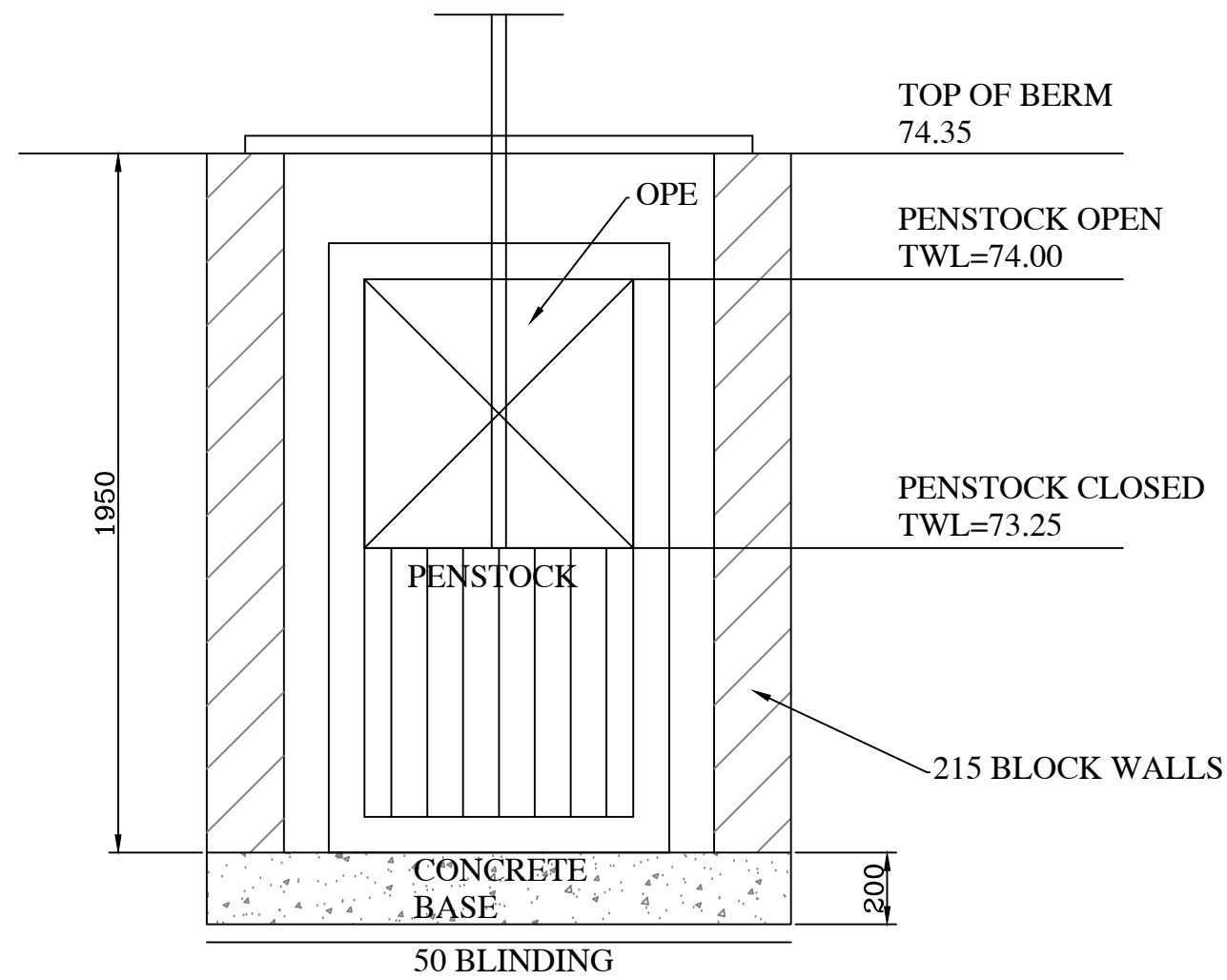
Revisions	Issue	Date	By

**Allen Barber**  
 Deanrock Business Park,  
 Togher,  
 Cork. tel 021 4319291  
 fax 021 4319291  
 e-mail rob@allenbarber.ie

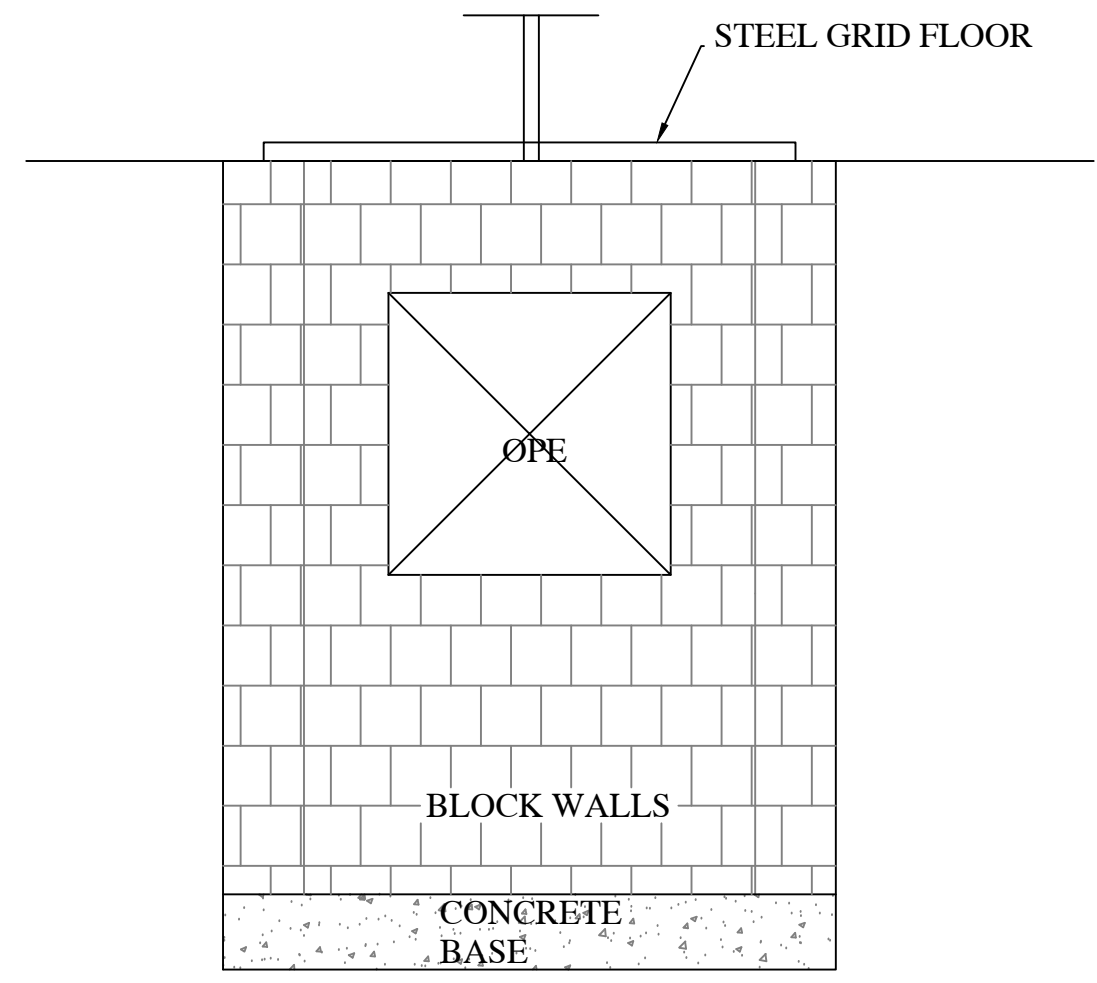
Job  
**MURRAY BROS.  
 ARDCAHAN,  
 DUNMANWAY, CO.CORK**

Drawing  
**POND  
 CROSS SECTION**

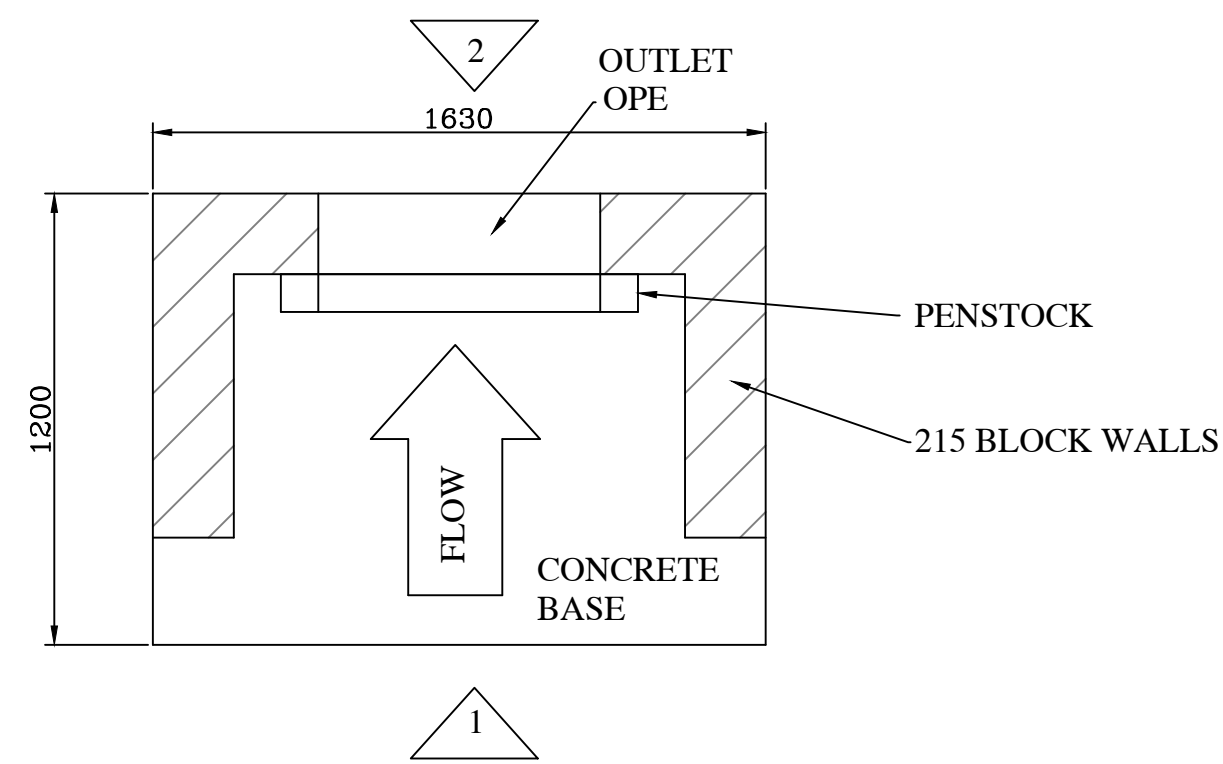
Job No. ARDCAHAN	DRG No. 003	Issue FI
Scale 1:250	Date MAY 15	Drawn PB
	Checked DM	



**ELEVATION 1**



**ELEVATION 2**



**PLAN**

FOR PLANNING	P	05/05/15	PB
Revisions	Issue	Date	By
<p>Deanrock Business Park, Togher, Cork.</p> <p>tel 021 4319291 fax 021 4319291 e-mail rob@allenbarber.ie</p>			
Job MURRAY BROS. ARDCAHAN DUNMANWAY, CO.CORK			
Drawing OUTLET CHAMBER DETAILS			
Job No. ARDCAHAN	DRG No. 004	Issue P	
Scale AS	Date MAY 15	Drawn PB	Checked DM



PENSTOCKS  
DAMPERS



**WEIR PENSTOCK 3 SIDE SEALED - CCV -**  
**"General information"**

Industrial area "Asteasu", sector A pavillon 4, 20159, ASTEASU (GIPUZKOA) SPAIN Tel: (+34) 943 69 61 31 Fax:(+34) 943 69 62 39

Bidapro -CCV- is a 3 side sealed penstock projected to be wall-mounted. The design allows to control the level of fluid in a chamber.

Mainly used for the following applications:

- Waste water treatment plants
- Drain manifolds
- Hydroelectric power plants
- Storm tanks
- Desalination installations
- Irrigation installations

Standard product dimensions range from 200x200 to 2000x2000 and standard model is supplied with the following characteristics:

- Closed frame
- Rising stem
- Wall mounting



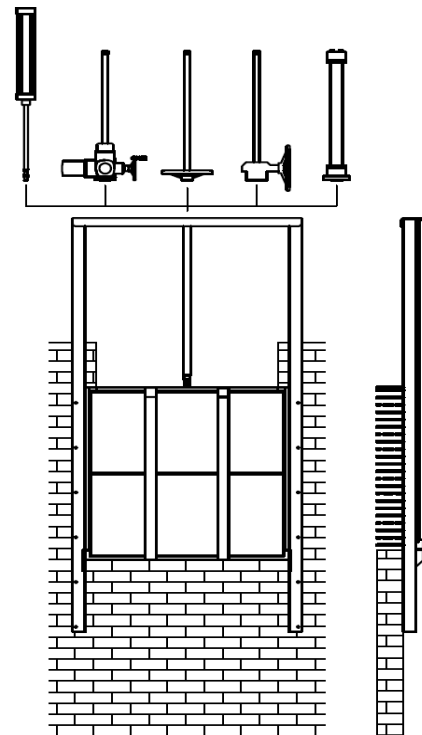
Special PIVOTING model upon request

Leakage rate according to ANSI / AWWA C 513-05

High density polyethylene sliders to minimize friction coefficient

- Materials:
- Frame: carbon steel / AISI 304 / AISI 316
  - Plate: carbon steel / AISI 304 / AISI 316
  - Sliders: high density polyethylene
  - Spindle: AISI 303 / AISI 304 / AISI 316
  - Nut: bronze
  - Seat: EPDM / Nitrile

Other materials upon request



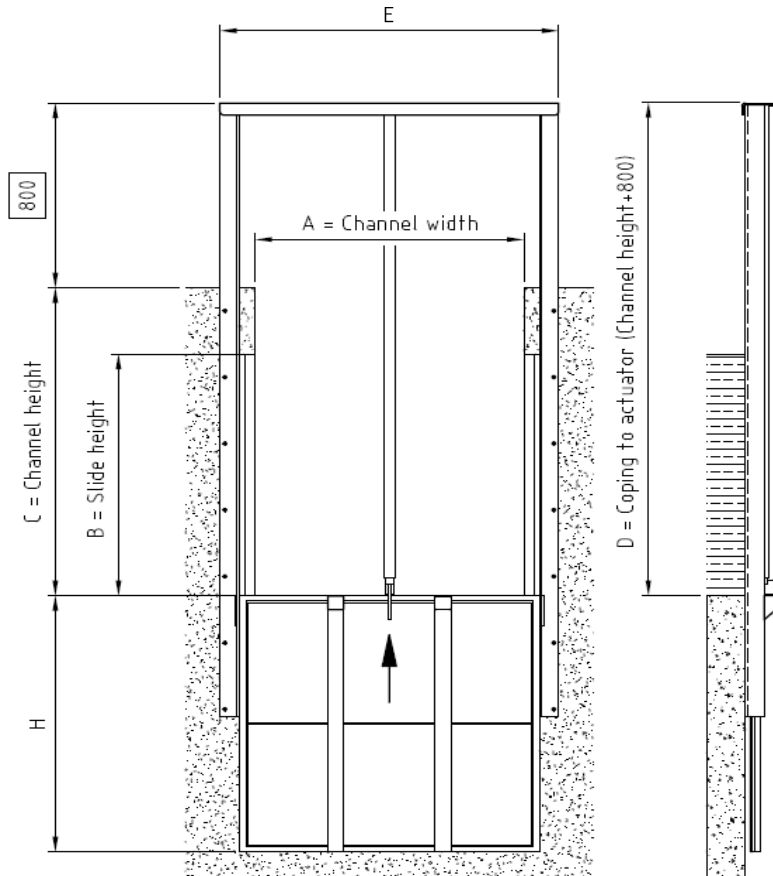


PENSTOCKS  
DAMPERS



**WEIR PENSTOCK 3 SIDE SEALED - CCV -**  
Rising stem - Non rising stem

Industrial area "Asteasu", sector A pavillon 4, 20159, ASTEASU (GIPUZKOA) SPAIN Tel: (+34) 943 69 61 31 Fax:(+34) 943 69 62 39



**DIMENSIONS FROM 200X200 TO 1200X1200**

AXB	E	H
200X200	420	260
300X300	520	360
400X400	620	460
500X500	720	560
600X600	820	660
700X700	920	760
800X800	1020	860
900X900	1120	960
1000X1000	1260	1060
1100X1100	1360	1160
1200X1200	1460	1220
1300x1300	1525	1350
1400x1400	1625	1450
1500x1500	1725	1550
1600x1600	1825	1650
1700x1700	1925	1750
1800X1800	2025	1850
1900X1900	2125	1950
2000X2000	2225	2050

*Bidapro reserves the rights to change dimensions at any time without prior notice*

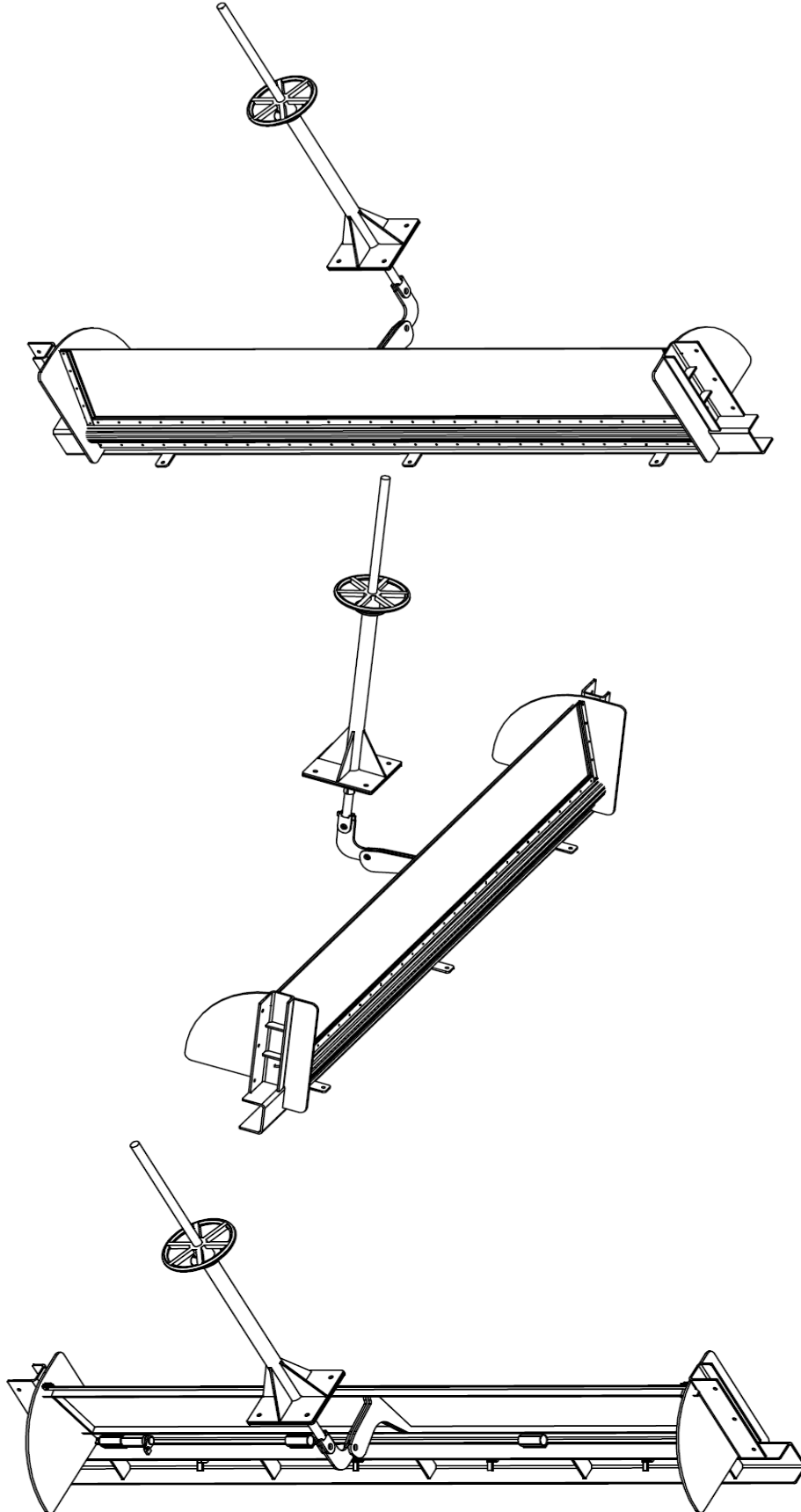


PENSTOCKS  
DAMPERS



WEIR PENSTOCK 3 SIDE SEALED - CCV -  
"Pivoting model"

Industrial area "Asteasu", sector A pavillon 4, 20159, ASTEASU (GIPUZKOA) SPAIN Tel: (+34) 943 69 61 31 Fax:(+34) 943 69 62 39





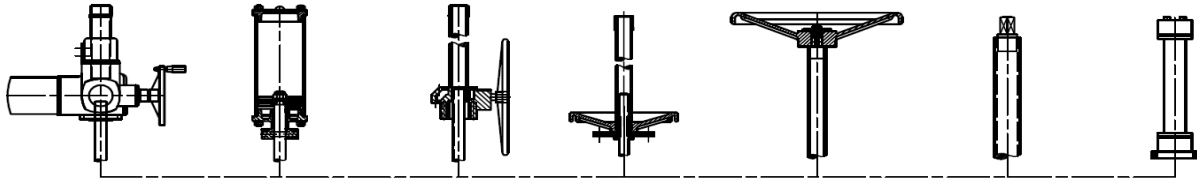
PENSTOCKS  
DAMPERS



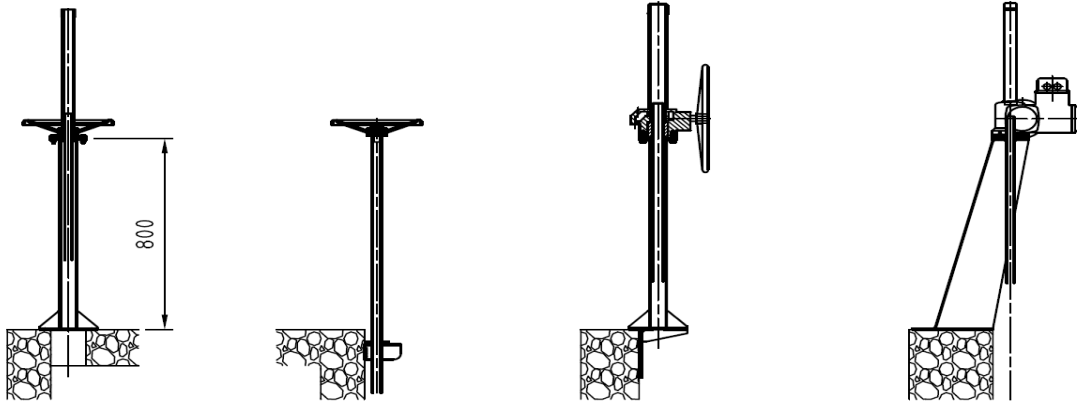
**WEIR PENSTOCK 3 SIDE SEALED - CCV -  
"Actuators and placements"**

Industrial area "Asteasu", sector A pavillon 4, 20159, ASTEASU (GIPUZKOA) SPAIN Tel: (+34) 943 69 61 31 Fax: (+34) 943 69 62 39

Electric Motor    Pneumatic    Gear Box    Handwheel    Non rising handwheel    Square nut    Hydraulic



Straight column    Guiding support    Angular column    Inclined column



Square nut support    Wall angular support    Angular support    On the frame





PENSTOCKS  
DAMPERS



## WEIR PENSTOCK 3 SIDE SEALED - CCV - "Installation and Maintenance"

Industrial area "Asteasu", sector A pavillon 4, 20159, ASTEASU (GIPUZKOA) SPAIN Tel: (+34) 943 69 61 31 Fax:(+34) 943 69 62 39

### Installation

- Make sure of the flatness of the wall according to norm: DIN 18202;
- Place the penstock on the wall in open position, perfectly aligned with the hole in the wall;
- Using the orifices of the frame, drill the holes for expanding bolts;
- Now remove the penstock in order to apply the sealant model Sikaflex (or similar) to avoid leakages;
- Then place again the penstock on the wall and tighten bolts, being careful near by the seat and making sure not to deform the frame;
- If the frame begin to deform due to unnoticed wall irregularities, stop tightening bolts. Remove the penstock, fill gaps with an appropriate grout, wait for the grout to become dry and then start again tightening;
- Clean and grease the penstock for a open - close test.
- Bidapro is not responsible for a penstock not installed correctly.

### Maintenance

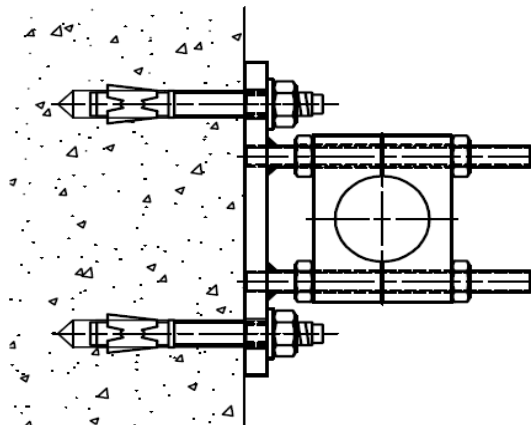
- Check the EPDM seat and change it in case of deterioration;
- Check the high density polyethylene sliders are in good condition and change them in case of deterioration. Keep the screwed part of the stem (spindle) and the actuator clean.

### Routine operations

- Opening and closing:
  - to open: turn the handwheel anticlockwise;
  - to close: turn the handwheel clockwise. Do not apply unnecessary force while closing the penstock.

### Guiding supports installation

- Use guiding support' holes as a guidance to drill the wall keeping in mind that you have to place one guiding support for each 2 meters of extension for CMC "rising stem" and one for each 3 meters of extension for CMC "non rising" models.
- Then tighten the bolts.





PENSTOCKS  
DAMPERS



**WEIR PENSTOCK 3 SIDE SEALED - CCV -**  
**"Quotation data"**

Industrial area "Asteasu", sector A pavillon 4, 20159, ASTEASU (GIPUZKOA) SPAIN Tel: (+34) 943 69 61 31 Fax:(+34) 943 69 62 39

**Quantity**

- .....

**Channel dimensions**

- Width ..... mm
- Length ..... mm

**Slide height**

- "C"..... mm

**Coping to actuator**

- "D"..... mm

**Water height**

- ..... mm

**Fluid direction**

- Unidirectional
- Bidirectional

**Installation**

- Embedded
- On wall
- On side

**Stem**

- Rising stem
- Non rising stem

**Material**

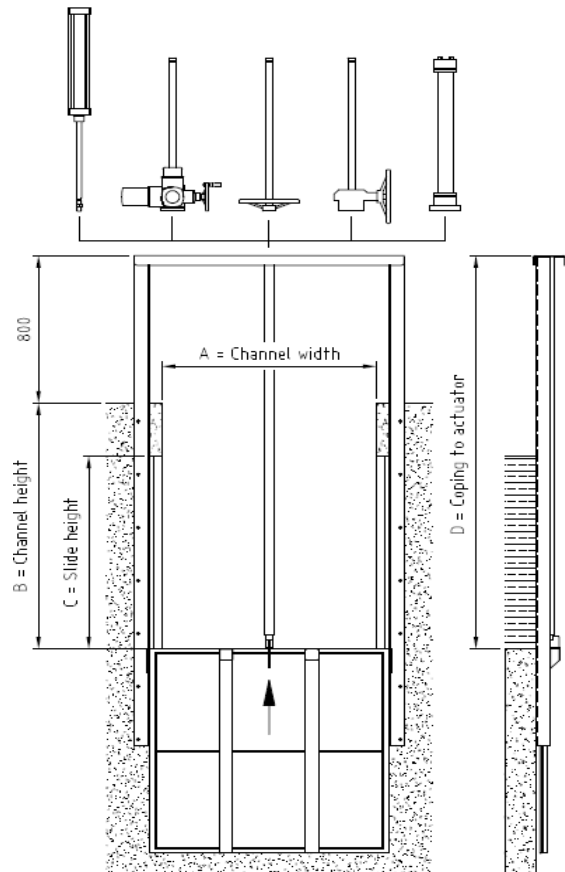
- AISI 304
- AISI 316
- Carbon steel
- Others

**Actuator**

- Handwheel
- Gearbox
- Electric motor
- Hydraulic
- Pneumatic
- T key
- Others

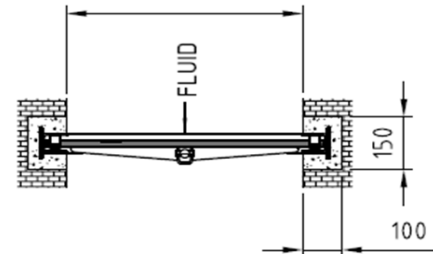
**Actuator support**

- Straight column
- On the frame



**INSTALLATION**

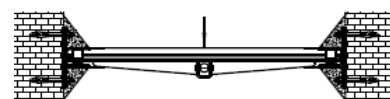
A: Channel width



Embedded



On wall

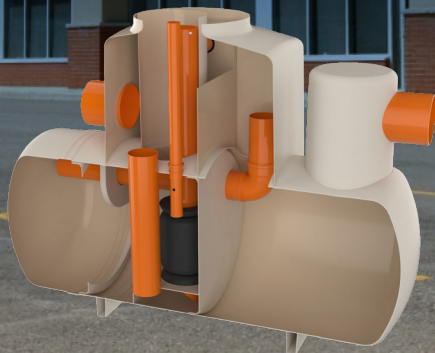


On side

Water Management Solutions

**Klargester**

# AquaTreat Bypass GRP Surface Water Treatment Separators



## Mitigation Indices

TSS	0.8
Metals	0.6
Hydrocarbons	0.9*
*Test results to BS EN858	

## Why choose an AquaTreat separator?

- Larger sludge storage capacities (compared to vortex separators)
- Our separator achieves low to medium risk indices, but can achieve high risk indices if installed in a train
- Lesser risk of downstream pollution in SuDS drainage solution due to high capacity sludge storage
- Vent points with necks
- Easier servicing with maintenance from ground level
- SmartServ Pro remote monitoring solution (available as optional extra)

Application Risk (SuDS Manual Indice)	Tested at PIA Aachen				BS EN 858	
	Total Suspended Solids (TSS)		Metals		Hydrocarbons	
	Mitigation Indice	AquaTreat % Removal	Mitigation Indice	AquaTreat % Removal	Mitigation Indice	AquaTreat % Removal
Low Risk	0.8 (80%)	0.8697 (86.97%)	0.6 (60%)	0.6523 (65.23%)	0.9 (90%)	0.9997 (99.97%)

**KNECT PRO**  
POWERED BY  
**SMART MONITORING**

With Klargester, your AquaTreat Bypass Separator is monitored, serviced and cared for by the experts who know it best, giving you total peace of mind.

As part of our Planet Passionate programme, Kingspan are dedicated to delivering innovative surface water management technologies, developed on the back of 70 years' experience.

\*Terms and conditions apply. View online at <https://service.kwe.kingspan.com/warranty-registration-ie>



# Klargester AquaTreat

## Bypass GRP Surface Water Treatment Separators

### Technical Specifications

26.2 Pollution hazard indices for different land use classifications

Land Use	Pollution Hazard Level	Total suspended solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie <300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads and trunk roads/ motorways(1)	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways(1)	High	0.8 (2)	0.8 (2)	0.9 (2)

Model	Treated Flow Rate [l/s]	Connectable Surface Area [m <sup>2</sup> ]	NSB Flow Rate EN858-1	EN858-1 Connectable surface [m <sup>2</sup> ]	Dimensions		Based on BS EN 858	
					Length [mm]	Diameter [mm]	Silt Storage Capacity [L]	Oil Storage Capacity [L]
SWB002	7	933	10	5,556	2072	1220	1000	150
SWB003	10	1,333	15	8,333	2950	1220	1500	225
SWB004	13	1,733	20	11,111	3896	1220	2000	300
SWB005	17	2,267	25	13,889	3576	1420	2500	375
SWB006	20	2,667	30	16,667	4266	1420	3000	450
SWB007	27	3,600	40	22,222	3230	1920	4000	600
SWB008	33	4,400	50	27,778	3960	1920	5000	750
SWB009	50	6,667	75	41,667	5841	1920	7500	1125
SWB010	67	8,933	100	55,556	7661	1920	10000	1500
SWB011	83	11,067	125	69,444	9548	1920	12500	1875

For more information on any of our products:

T: +44 (0) 28 3026 6799

E: [klargestinfo@kingspan.com](mailto:klargestinfo@kingspan.com)

W: [klargest.ie](http://klargest.ie)



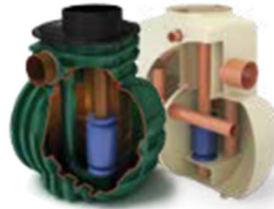
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Water Management Solutions

# Klargester Bypass Separators

NSB RANGE



Concentration Less Than  
**5**  
MG/L

Bypass separators are used when it is considered an acceptable risk to not provide full treatment for very high flows, such as where the risk of a large spillage and heavy rainfall occurring at the same time is small. Typical applications include surface carparks, roadways and lightly contaminated commercial areas.

### Product Benefits

- Light and easy to install.
- Inclusive of silt storage volume.
- Fitted inlet/outlet connectors.
- Vent points within necks.
- Oil alarm system available (required by EN 858-1 and PPG3).
- Extension access shafts for deep inverts.
- Maintenance from ground level.
- GRP or polyethylene construction (subject to model).

### Performance & Compliance

- › Fully compliant and tested to EN 858-1.
- › Bypass separators are tested by British standards institute (BSI).
- › Certified flow and process performance assessing effluent qualities to the requirements of EN 858-1.
- › The unit is designed to treat the 'first flush' - 10% of peak flow. The calculated drainage areas served by each separator are indicated according to the formula given by PPG3 NSB = 0.0018A(m<sup>2</sup>).
- › Class I separators are designed to achieve a concentration of less than 5mg per litre.

### Technical Specifications

Model Reference	Flow (l/s)	Peak Flow Rate (l/s)	Drainage Area(m <sup>2</sup> ) Based on UK rainwater flow	Storage Capacity (Ltrs)		Length (mm)	Diameter (mm)	Access Shaft Diameter (mm)	Base Inlet Invert (mm)	Base to Outer Invert (mm)	Standard Fall Across (mm)	Min Inlet Invert (mm)	Standard Pipework Diameter (mm)**
				Silt	Oil								
<b>Polyethylene Chamber Construction</b>													
NSBP003	3	30	1670	300	45	1700	1350	600	1420	1320	100	500	160
NSBP004	4.5	45	2500	450	60	1700	1350	600	1420	1320	100	500	160
NSBP006	6	60	3335	600	90	1700	1350	600	1420	1320	100	500	160
<b>GRP Chamber Construction</b>													
NSBE010	10	100	5560	1000	150	2069	1220	750	1450	1350	100	700	315
NSBE015	15	150	8335	1500	225	2947	1220	750	1450	1350	100	700	315
NSBE020	20	200	11111	2000	300	3895	1220	750	1450	1350	100	700	375
NSBE025	25	250	13890	2500	375	3575	1420	750	1680	1580	100	700	375
NSBE030	30	300	16670	3000	450	4265	1420	750	1680	1580	100	700	450
NSBE040	40	400	22222	4000	600	3230	1920	600	2185	2035	150	1000	500
NSBE050	50	500	27778	5000	750	3960	1920	600	2185	2035	150	1000	600
NSBE075	75	750	41667	7500	1125	5841	1920	600	2235	2035	200	950	675
NSBE100	100	1000	55556	10000	1500	7661	1920	600	2235	2035	200	950	750
NSBE125	125	1250	69444	12500	1875	9548	1920	600	2235	2035	200	950	750

\* Some units have more than one access shaft - diameter of largest shown | \*\* Larger pipework available on request.



Water Quality Monitoring

# Water Quality Station

## ADVANCED WATER QUALITY DATA

The Obscape **Multiparameter Water Quality Station** combines real-time data logging, telemetry, and solar power, seamlessly integrating with industry-leading water quality instruments for high-accuracy environmental monitoring. Designed for 24/7 deployment, it features a wet-mateable connector for secure sensor interfacing and hassle-free installation. With preinstalled sensor-specific software, deployment is simple, and access to real-time data is seamless. Monitor key parameters such as turbidity, salinity, pH, temperature, pressure and oxygen content, ensuring reliable insights from project inception to post-monitoring phases. Select your preferred multiparameter sensor, from the list of supported sensors, to meet specific field measurement requirements.

### PURCHASE INCLUDES

- Free access to the **Obscape Data Portal**
- Mounting brackets
- SD card - can also be run in offline mode

#### Optional:

- 1) **Satcom upgrade** for continuous connectivity beyond cellular range
- 2) **Cellular global SIM** - Includes €100 of data credit



### KEY FEATURES

- 01 **Comprehensive Data:** Accurate water quality data in real-time
- 02 **Reliable Connectivity:** Data transfer via cellular networks ensures seamless access
- 03 **Compact & Robust Design:** Durable, weatherproof housing built for tough conditions
- 04 **Easy Deployment:** Software is pre-loaded - simply turn on device, install and start logging
- 05 **Sensor Integration Capability:** Able to integrate with a wide range of water quality sensors
- 06 **Integrated Data Portal:** User-friendly portal for efficient data management and analysis



# WATER QUALITY STATION TECHNICAL SPECIFICATIONS

SPECS	
HOUSING SIZE	195 mm height x 87 mm width x 87 mm depth
HOUSING WEIGHT	2 kg
PRIMARY POWER SOURCE	Solar-powered, 3 Watt
CONNECTIVITY	Cellular (4G with 2G fallback) and Optional upgrade to Satellite (Iridium)
REAL-TIME DATA INTERVAL	5 minutes - 24 hours (User selectable)
BATTERY TYPE	1 x 18650 Lithium-ion battery, nominal voltage 3.7V
OUTPUT POWER	12V
PROTOCOLS	RS485, Rs232, SDI-12, analog

PARAMETERS	
SAMPLE INTERVAL	5 - 60 minutes (User selectable)
TELEMETRY DATA QUEUE	In the event of temporary connection outages, a data queue ensures data is sent
DIAGNOSTIC PARAMETERS	Sensor inclination, battery voltage, signal strength, internal temperature

SENSOR	
SENSOR ALTERNATIVES	In-Situ Aqua TROLL, YSI EXCO3, NKE WiMo, Aqualabo CTZN, ANB Sensors, Observator Analite NEP5000
MAXIMUM SENSOR DEPTH	Up to 250 m

DATA OUTPUT	
PARAMETERS*	Data output is dependant on selected sensor type and required parameters

DATA STORAGE	
 CLOUD STORAGE	Free access to the <b>Obscape Data Portal</b> for real-time and historical data, sensor configuration, alerts
 ON-BOARD SD CARD	Data stored to the on-board SD card as a backup - or for cases where data connection is absent

\*Sensor options: Rugged Dissolved Oxygen, Optical Dissolved Oxygen, Actual and specific conductivity, pH/ORP, Salinity, Turbidity, Temperature, pressure, Chlorophyll a, Phycoerythrin (BGA-PE), Phycocyanin (BGA-PC), Rhodamine WT, Fluorescein WT Ammonium (ISE), Total dissolved solids (TDS), Chloride (ISE), Nitrate (ISE), Ion Selective Electrodes, Fluorometer, Crude Oil, Fluorescent Dissolved Oxygen

## OPTIONAL SATCOM UPGRADE



SATCOM SPECS	
ANTENNA SIZE	Height 74.2mm / Diameter 66.5mm
NETWORK	Iridium
DATA LOAD	1 satellite credit per message
MONTHLY COST	Line rental and SATCOM credits

Satellite subscription services and credits available on request

## DATA ACCESS

### SEAMLESSLY CONNECT FIELD DATA & OFFICE OPERATIONS

- 01 Real-time data:** Water quality data
- 02 Download:** CSV file, graphs, PDF report
- 03 Forwarding:** JSON API or HTTP post
- 04 Notifications:** Online/offline, battery level, parameter threshold exceedance

## CONTACT US

E-mail: [info@obscape.com](mailto:info@obscape.com)  
 Website: [www.obscape.com](http://www.obscape.com)

Integration Partners



[WWW.OBSCAPE.COM](http://WWW.OBSCAPE.COM)

Kluyverweg 1, 2629HS Delft, The Netherlands | [info@obscape.com](mailto:info@obscape.com)



Suitable for monitoring water quality – food processing – waste treatment – dredging operations

## Datasheet

# Analite NEP-5000 Turbidity Sensor

## Multiple Output Auto-Ranging

The Analite NEP-5000 ISO7027 90°series of digital turbidity probes are designed for monitoring and process applications where ultimate sensor flexibility is a consideration. This probe offers a multitude of physical sensor variations, with the further benefit of a PC interface that allows the user to easily calibrate, modify range modes, and adjust sensor output modes and data characterisation.

The Analite NEP-5000 is a completely customisable turbidity probe that can be ordered to the end user's particular needs. It has all the benefits of a custom solution at a very competitive price.

Available outputs, included, are analog voltage or current loop (4 to 20 mA), RS422/RS485, SDI-12, RS232, USB and digital TTL.

The standard NEP-5000 can be ordered in several custom variations:

- Wiping and non-wiping
- Several outer case material options
- Glanded cable or marine connector / cable
- 90° or 180° backscatter for high NTU applications
- With temperature and/or pressure

The Analite PC configurator allows:

- Fast accurate calibration
- Compensation tools
- Adjustable Slew Rates
- Three range settings (low, medium, and high)
- Range hopping between three ranges
- Wiper behaviour settings
- Selection of many digital and analog outputs

### Field, process & lab application

The Analite NEP-5000 wiping probes are specifically designed for applications where bio-fouling build up occurs obscuring the optics. Such environments include, long monitoring deployment or places in warm bio-active waters.

The Analite integral wiper assembly and optional copper case is designed for operations where severe bio-fouling or sedimentation build up is likely, including:

- Monitoring of streams, rivers and water storage
- Intermediate and final effluent treatment monitoring
- Hydrological run off studies
- Ground and bore water analysis
- Drinking water filtration efficiency
- Industrial process monitoring
- Sludge and dredge monitoring

### NEP-5000 range set concept

The Analite NEP-5000 series turbidity probes offers a multiple range concept. in settings and selection. Calibrations can be made for three different levels of usage (Low, Medium and High)\*.

These 3 levels of usage are offered as versions to simplify range selection and order placement. The versions are as follows:

- V1 NTU ranges: 10, 400, 1000
- V2 NTU ranges: 10, 400, 5000
- V3 NTU ranges: 100, 1000, 5000
- V4 NTU ranges: user specified

Calibration costing rules do apply. One calibration for the 3 ranges is included in the purchase price. Additional range calibrations are an extra cost. Different ranges are available for the 90° sensor, but they must be specified at time of order and they may attract further costs.

The three range calibrations allow for three types of usage modes and linearity from low range to high range in the auto-ranging mode\*\*. This is applicable to event-based sediment studies where NTU readings are prone to peaks above a set range.

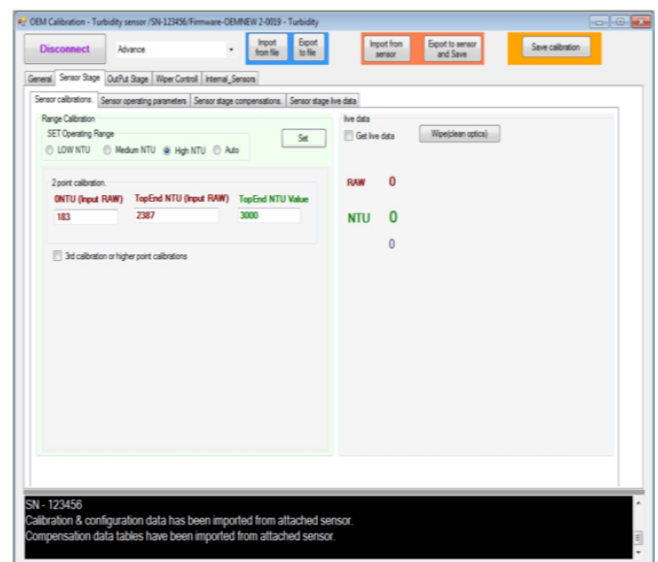
90-degree versions provide extremely accurate and stable results at very low NTU values. This sensor can be used in conditions that require high resolution readings at near zero NTU.

Whatever the requirement, the NEP-5000 series probe is the most flexible choice. It can be ordered and configured to a multitude of applications.

Add parameters, modify ranges and refine calibrations. This can all be done on the PC interface and saved to configuration files. These configuration files can be saved and read back into the sensor to restore the settings.

\* Please refer to Observator NEP-5000 ordering guide document for correct ordering codes.

\*\* One factory calibrated range in the list price.



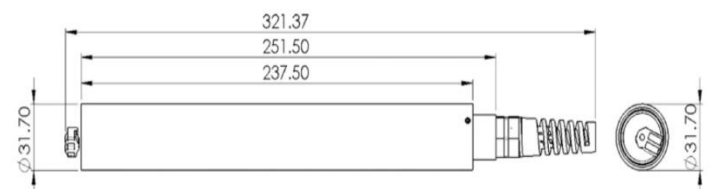
### Turbidity specifications

Technique	Standard: 90° modulated infra-red (ISO7027) Optional: 180° backscatter	
Ranges	3 preset range groups: <ul style="list-style-type: none"> <li>• Low (example 0-10NTU)</li> <li>• Medium (example 0-400NTU)</li> <li>• High (example 0-1,000NTU)</li> </ul> Recommended range versions: <ul style="list-style-type: none"> <li>• V1 NTU ranges: 10, 400, 1000</li> <li>• V2 NTU ranges: 10, 400, 5000</li> <li>• V3 NTU ranges: 100, 1000, 5000</li> <li>• V4 NTU ranges: user specified</li> </ul> Custom ranges available Range hopping capable	
Resolution	Range	Resolution
	Up to 100NTU	±0.01NTU
	Up to 400NTU	±0.1NTU
	Up to 1,000NTU	±1.0NTU
	Up to 5,000NTU	±2.0NTU
Accuracy	±1% at 25°C, up to 5,000NTU	
Linearity	Better than 1% for 0 to 3,000NTU Better than 2% for 0 to 5,000NTU	
Temperature coefficient	Better than ±0.05%/°C	
Outputs	Digital 3.6V TTL (streaming or polled) RS422/RS485 (streaming or polled) SDI-12 RS232 USB Analog 4-20mA. Analog -2.5V to +2.5V (or variations)	
Zero drift	Less than ±0.2NTU	
Calibration	Factory calibrated using non-toxic AEPA polymer solutions	
Power	8-30V DC, 15mA on 40mA reading and 60mA wiping	

Settling time	<1 second after application of power to 99%
Wiping	Wiping configuration through the PC configuration tool. Wipe directions or alternate settings and timeouts will prolong probe life. During a wipe, the output remains within ±1% full scale of the turbidity value just prior to the wipe.
Wipe time	8 seconds nominal

### Mechanics

Weight	NEP-5000 Delrin models 300 grams (probe only*) NEP-5000 metal models 770 grams (probe only*) *100 grams connector plus 70 grams per meter of cable
Construction	<ul style="list-style-type: none"> <li>• Delrin composite casing is standard</li> <li>• 316 stainless steel</li> <li>• Titanium</li> <li>• Anti-biofoul CW352H 70/30% copper/nickel</li> </ul>
Cable	6 core + shield, 6mm nominal dia. PUR sheath Conductor resistance 45 Ohms/km. Weight – 70 grams per meter
Cable length	Standard Glanded cable length to be specified at time of order. Per meter price applies.
Depth rating	200m (660ft) non-wiping 100m (300ft) wiping
Operating temp.	-10°C to 40°C
Storage temp.	-20°C to 50°C



### The NEP-5000 code explained

When ordering a NEP-5000 sensor, you are kindly asked to specify the full code as explained below. This to make sure you order the correct sensor. The full code also directs you to the right items from the pricelist, as shown in the table below. This is an example of the ordering code which is explained below, with reference to the items in the price list:

WY-	90-	D-	R42-	NO-	GC-	V1-	TN-	PN
1	2	3	4	5	6	7	8	9

#	Values	Meaning	Price list	Comments
1	WY	Wiper Yes	- (Standard)	Indicates if there is a wiper or not.
	WN	Wiper No	NEP-NOWIPER (Negative value)	
2	90	90-degree optics (ISO7027)	- (Standard)	
	180	180-degree optics (back-scatter)	NEP-180	
3	D	Delrin housing	- (Standard)	Lowest cost
	C	Copper alloy housing	NEP-CUC	Anti-fouling
	S	Stainless steel housing	NEP-SSC	Strong, rugged
	T	Titanium housing	NEP-TTC	Anti-corrosion
4	R42	RS422/485	- (Standard)	
	S12	SDI-12	NEP-SDI12	
	R23	RS-232	NEP-RS232	Max 10 meter
	USB	USB	NEP-USB	Max 5 meter
5	NO	No current or voltage output	- (Standard)	
	CUR	Current output 4-20 mA. Only for NTU (not for pressure or temperature)	NEP-CUR	Max 100 meter, no auto NTU range selection
	VOL	Voltage output over 5V range. 0 to 5 V or - 2.5 to +2.5V. Only for NTU (not for pressure or temperature)	NEP-VOL	Max 10 meter, no auto NTU range selection
6	GC	Glanded cable	- (Standard)	
	SM	Subcon connector, male	CON34MCBH6MSS	Recommended
	SF	Subcon connector, female	CON34MCBH6FSS	
7	V1	NTU ranges: 10, 400, 1,000	NEP5000-V1	Note that the factory calibration of one range is included in the price.
	V2	NTU ranges: 10, 400, 5,000	NEP5000-V2	
	V3	NTU ranges: 100, 1000, 5,000	NEP5000-V3	
	V4	NTU ranges: user specified	NEP5000-V4	
8	TN	Temperature No	- (Standard)	Water temperature sensor in optic block yes/no
	TY	Temperature Yes	NEP-TEMP	
9	PN	Pressure No	- (Standard)	Pressure sensor in the housing yes/no
	PY	Pressure Yes	NEP-PRES	

For example, to order WY-90-D-R42-NO-GC-V1-TN-PN, you would only need to order NEP-5000-V1, because the rest is standard. However, if you want the same sensor to come in a copper housing and with a male Subconn connector, the order code would be: WY-90-C-R42-NO-SM-V1-TN-PN, and you would have to order: NEP-5000-V1; NEP-CUC; CON34MCBH6MSS.

### Notes

- The maximum allowable cable lengths for SDI-12 and RS422/485 are expected to be over 1,000 meters.
- The voltage and current output options only refer to the turbidity and not to other (optional) parameters like pressure and temperature. You lose the option of automatic range switching.
- If you chose a sensor with a connector, you obviously require a cable with a mating connector. Thus, when ordering the cable, please also order the mating connector.
- Without the temperature option (TY), you can still get a temperature reading from the sensor, but this is the internal and uncalibrated temperature.
- The pressure sensor is unvented, hence requires external barometric compensation.

### Accessories

The standard Analite NEP-5000 series of probes, with its Delrin composite housing, may be submerged to a depth of 100 meters. A metal housing is available for applications where a greater depth rating is required. Maximum depth rating is 200 meters (non-wiping with metal case).

NEP-CFG	PC interface and communication module and PC configuration and calibration software.
NEP-WIPER-KIT	Wiper replacement kit comprising of 4 silicon wipers and a hex fastening key.
NEP-SHRD-D	Delrin protective shroud
NEP-SHRD-C	Copper protective shroud
NEP-SHRD-S	Stainless protective shroud
NEP-SHRD-T	Titanium protective shroud
NEP-CBL	Probe cable in meters
NEP-CBL-CON	Subconn connector and cable assembly
Options	180° optics Outer case in copper, stainless steel or titanium marine connectors.



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**APPENDIX 8.1**  
**AIR QUALITY EMISSION FACTORS**

**VOLUME III**  
APPENDICES



APRIL 2026



## APPENDIX 8.1 - EMISSION FACTORS

Emission Factors Used In Dust Emission Calculations (USEPA, 1986 & subsequent updates):

### ***Road Haulage (Unpaved)***

$$E = [281.9 * k * (s/12)^a * (W/3)^b * ((365-P)/365)] \text{ g/veh km}$$

Where:

s = surface silt content (8.3%)

k = 4.9 (Total Dust), 1.8 (PM<sub>10</sub>), 0.15 (PM<sub>2.5</sub>)

W = mean vehicle weight (32 tonnes)

a = 0.9 (PM<sub>10</sub>/PM<sub>2.5</sub>), 0.7 (Total Dust)

b = 0.45

P = 218 wet days

### ***Road Haulage (Paved)***

$$E = [k * (sL)^{0.91} * (W)^{1.02}] * (1 - (P/4N)) \text{ g/veh km}$$

Where:

sL = surface silt loading (0.6 g/m<sup>2</sup>)

k = 24 (Total Dust), 4.6 (PM<sub>10</sub>), 0.66 (PM<sub>2.5</sub>)

W = mean vehicle weight (32 tonnes)

P = 218 wet days

N = 365 days

### ***Material Loading***

$$E = k * (0.0016) * (U/2.2)^{1.3} / (M/2)^{1.4} * ((365-P)/365) \text{ kg/Mg}$$

Where:

k = 0.74 (Total Dust), 0.35 (PM<sub>10</sub>), 0.053 (PM<sub>2.5</sub>)

M = moisture content (2.0%)

U = mean wind speed (5.0 m/s)

P = 218 wet days

### ***Wind Erosion of Stockpiles***

The formulae for calculating wind erosion can be found in section 13.2.5 of AP42 titled "Industrial Wind Erosion". Information on monthly peak wind speeds and the number of gales per month is required in order to calculate the emission rates.

### ***Screening***

$$E = ((T * K) / (H * 3600 * A)) * ((365 - P) / 365) \text{ g/s/m}^2$$

Where:

T = Annual Tonnage of Material (225,000 T)

K = 12.5 (Total Dust), 4.3 (PM<sub>10</sub>) , 0.28 (PM<sub>2.5</sub>)

H = Annual Hours of Operation (3216 hours)

A = Area of Activity

P = 218 Wet Days

### **Crushing**

$$E = ((T*K)/(H*3600*A))*((365-P)/365) \text{ g/s/m}^2$$

Where:

T = Annual Tonnage of Material (225,000 T)

K = 2.7 (Total Dust), 1.2 (PM<sub>10</sub>) , 0.22 (PM<sub>2.5</sub>)

H = Annual Hours of Operation (3216 hours)

A = Area of Activity

P = 218 Wet Days

### **Conveyor**

$$E = ((T*K)/(H*3600*A))*((365-P)/365) \text{ g/s/m}^2$$

Where:

T = Annual Tonnage of Material (225,000 T)

K = 1.5 (Total Dust), 0.55 (PM<sub>10</sub>) , 0.14 (PM<sub>2.5</sub>)

H = Annual Hours of Operation (3216 hours)

A = Area of Activity

P = 218 Wet Days

### **Blasting**

$$E = (((AB)^{1.5}) * K) * B / (H * 3600 * A)$$

Where:

AB = Area of Blast (1329m<sup>2</sup> approximately)

K = 0.22 (Total Dust), 0.114 (PM<sub>10</sub>), 0.0066 (PM<sub>2.5</sub>)

H = Annual Hours of Operation (3216 hours)

A = Area of Excavation

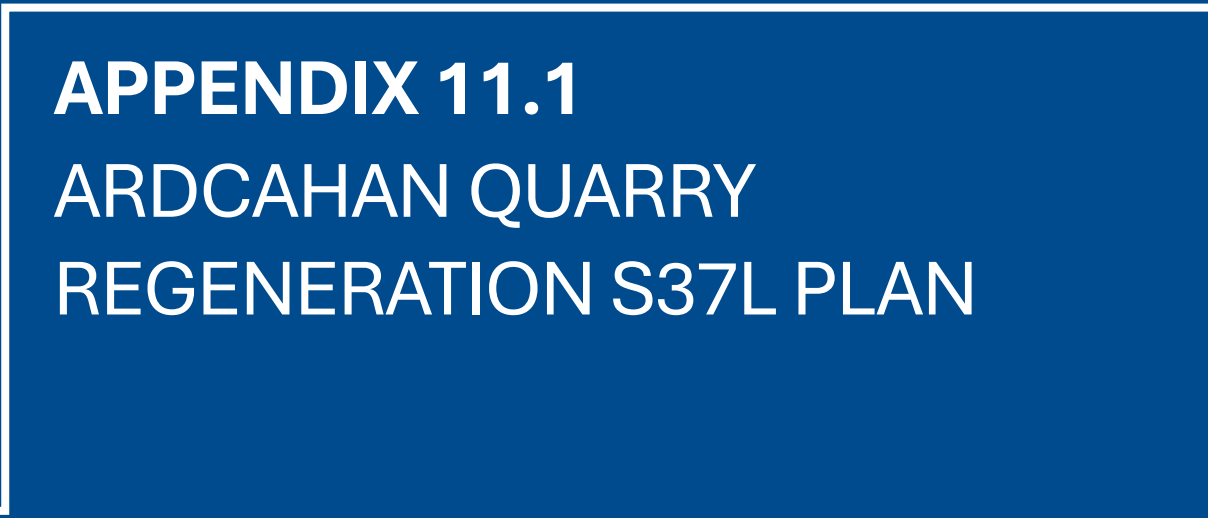
B = No. of Blasts per annum (2 no.)

<b>Operation</b>	<b>Total Dust Emission Rate</b>	<b>PM<sub>10</sub> Emission Rate</b>	<b>PM<sub>2.5</sub> Emission Rate</b>
Conveyor Transfer (g/s/m <sup>2</sup> )	3.14E-05	1.15E-05	2.93E-06
Screening (g/s/m <sup>2</sup> )	2.62E-04	9.00E-05	5.86E-06
Crushing (g/s/m <sup>2</sup> )	5.65E-05	2.51E-05	4.60E-06
Blasting (g/s/m <sup>2</sup> )	3.86E-08	1.99E-08	1.26E-09
Material Loading (g/s/m <sup>2</sup> )	1.30E-04	6.13E-05	9.28E-06

<b>Operation</b>	<b>Total Dust Emission Rate</b>	<b>PM<sub>10</sub> Emission Rate</b>	<b>PM<sub>2.5</sub> Emission Rate</b>
Aggregate Storage (g/s/m <sup>2</sup> )	2.89E-06	1.37E-06	2.07E-07
Paved Roads (g/s) per source every 5 m	4.13E-04	1.38E-05	3.33E-06
Unpaved Roads (g/s) per source every 5 m	1.25E-04	4.26E-05	3.55E-06
Topsoil removal	2.27E-04	1.07E-04	1.62E-05
Bulldozing & compacting	2.01E-04	3.79E-05	5.29E-06



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**APPENDIX 11.1**  
**ARDCAHAN QUARRY**  
**REGENERATION S37L PLAN**

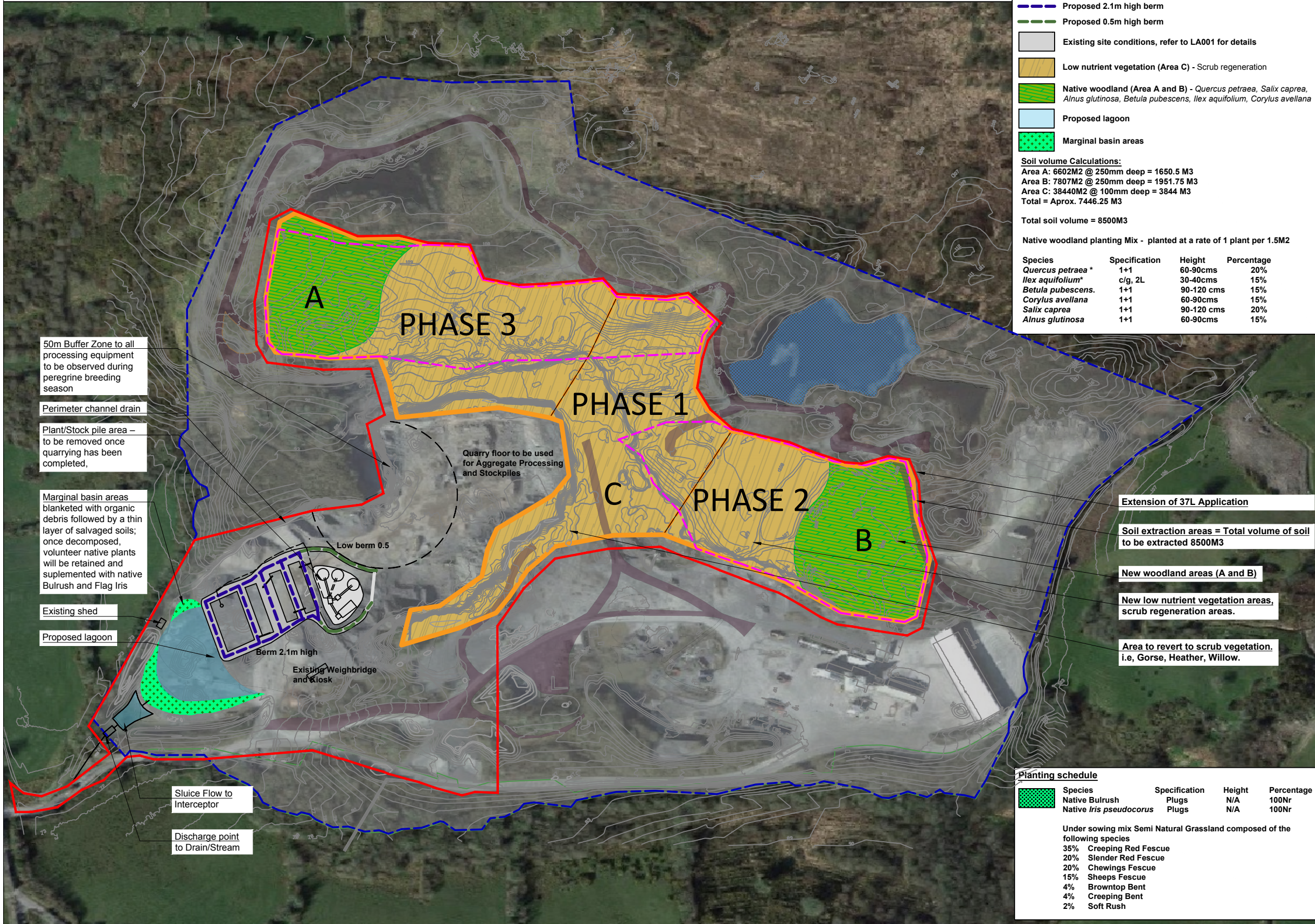
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# ARDCAHAN QUARRY REGENERATION 37L PLAN



**Landscape Key**

- Extension of 37L Application
- Overall site ownership
- Soil extraction areas (35202M<sup>2</sup>) = Total volume of soil to be extracted 8500M<sup>3</sup>
- 3 proposed intervention phases
- Proposed 2.1m high berm
- Proposed 0.5m high berm
- Existing site conditions, refer to LA001 for details
- Low nutrient vegetation (Area C) - Scrub regeneration
- Native woodland (Area A and B) - *Quercus petraea*, *Salix caprea*, *Alnus glutinosa*, *Betula pubescens*, *Ilex aquifolium*, *Corylus avellana*
- Proposed lagoon
- Marginal basin areas

**Soil volume Calculations:**  
 Area A: 6602M<sup>2</sup> @ 250mm deep = 1650.5 M<sup>3</sup>  
 Area B: 7807M<sup>2</sup> @ 250mm deep = 1951.75 M<sup>3</sup>  
 Area C: 38440M<sup>2</sup> @ 100mm deep = 3844 M<sup>3</sup>  
 Total = Approx. 7446.25 M<sup>3</sup>

Total soil volume = 8500M<sup>3</sup>

Native woodland planting Mix - planted at a rate of 1 plant per 1.5M<sup>2</sup>

Species	Specification	Height	Percentage
<i>Quercus petraea</i> *	1+1	60-90cms	20%
<i>Ilex aquifolium</i> *	c/g, 2L	30-40cms	15%
<i>Betula pubescens</i> .	1+1	90-120 cms	15%
<i>Corylus avellana</i>	1+1	60-90cms	15%
<i>Salix caprea</i>	1+1	90-120 cms	20%
<i>Alnus glutinosa</i>	1+1	60-90cms	15%

**THIS IS NOT FOR CONSTRUCTION**

This drawing is the copyright of the Landscape Architect unless otherwise stated. All dimensions are in millimeters. Where dimensions are not given, drawings must not be scaled and the matter must be referred to the Landscape Architect. If the drawing includes conflicting details/dimensions the matter must be referred to the Landscape Architect. All dimensions must be checked on site. The Landscape Architect must be informed, by the contractor, of any discrepancies before work proceeds.

**Cathal O'Meara**  
 Landscape Architects  
**087 9202549**  
 2 Mc Sweeney St,  
 Fermoy, Co. Cork



Chartered member of the Irish Landscape Institute

Client: Murray Bros. Tarmacadam Ltd.

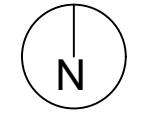
Project: Ardcahan Quarry Restoration 37L Plan  
 Drawing: Landscape Layout

Date: 27/03/2026

Drawn By: Luis Medeiros  
 Checked By: Cathal O'Meara

Issue: Planning

Dwg No: 2009\_LA002 15



Scale 1:2500, @ A3

50m Buffer Zone to all processing equipment to be observed during peregrine breeding season

Perimeter channel drain

Plant/Stock pile area – to be removed once quarrying has been completed,

Marginal basin areas blanketed with organic debris followed by a thin layer of salvaged soils; once decomposed, volunteer native plants will be retained and supplemented with native Bulrush and Flag Iris

Existing shed

Proposed lagoon

Berm 2.1m high

Existing Weighbridge and Kiosk

Quarry floor to be used for Aggregate Processing and Stockpiles

Low berm 0.5

Sluice Flow to Interceptor

Discharge point to Drain/Stream

Extension of 37L Application

Soil extraction areas = Total volume of soil to be extracted 8500M<sup>3</sup>

New woodland areas (A and B)

New low nutrient vegetation areas, scrub regeneration areas.

Area to revert to scrub vegetation. i.e. Gorse, Heather, Willow.

**Planting schedule**

Species	Specification	Height	Percentage
Native Bulrush	Plugs	N/A	100Nr
Native <i>Iris pseudocorus</i>	Plugs	N/A	100Nr

Under sowing mix Semi Natural Grassland composed of the following species

35%	Creeping Red Fescue
20%	Slender Red Fescue
20%	Chewings Fescue
15%	Sheeps Fescue
4%	Browntop Bent
4%	Creeping Bent
2%	Soft Rush



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**APPENDIX 14.2**  
**BANDON RIVER SURVEY**

**VOLUME III**  
APPENDICES



APRIL 2026



**Sweeney Consultancy**

Rahan, Mallow, Co. Cork.

Tel. 022 26780, 086 2263383

E-mail [sweeneyconsultancy@gmail.com](mailto:sweeneyconsultancy@gmail.com)

**Freshwater Pearl Mussel (*Margaritifera margaritifera*)**  
**Survey of the River Bandon**  
**at Ardcahan, Dunmanway, Co. Cork.**

*September 2024*

*Due to the sensitive nature of data concerning the locations of freshwater pearl mussels, distribution of this report should be restricted and not released to the public.*

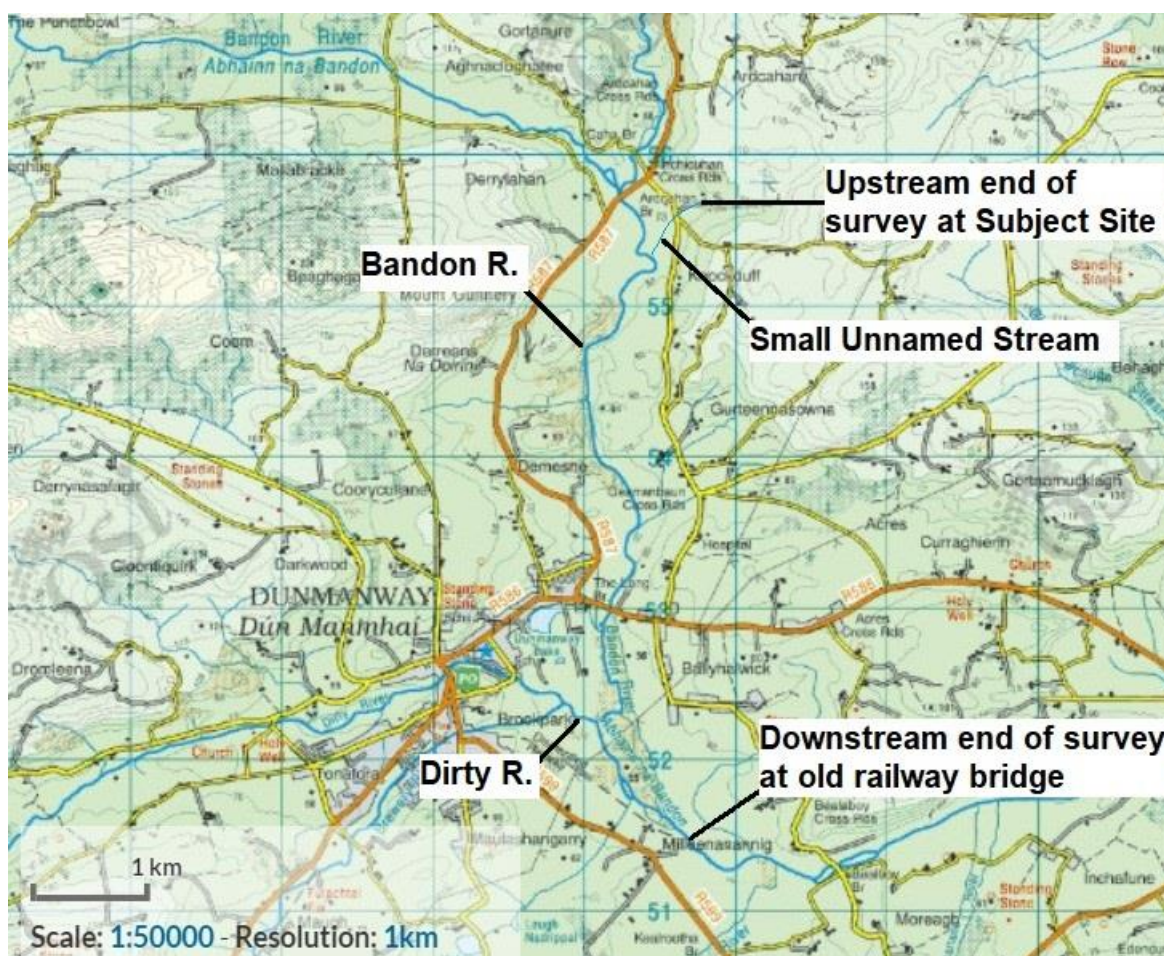
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## 1. INTRODUCTION

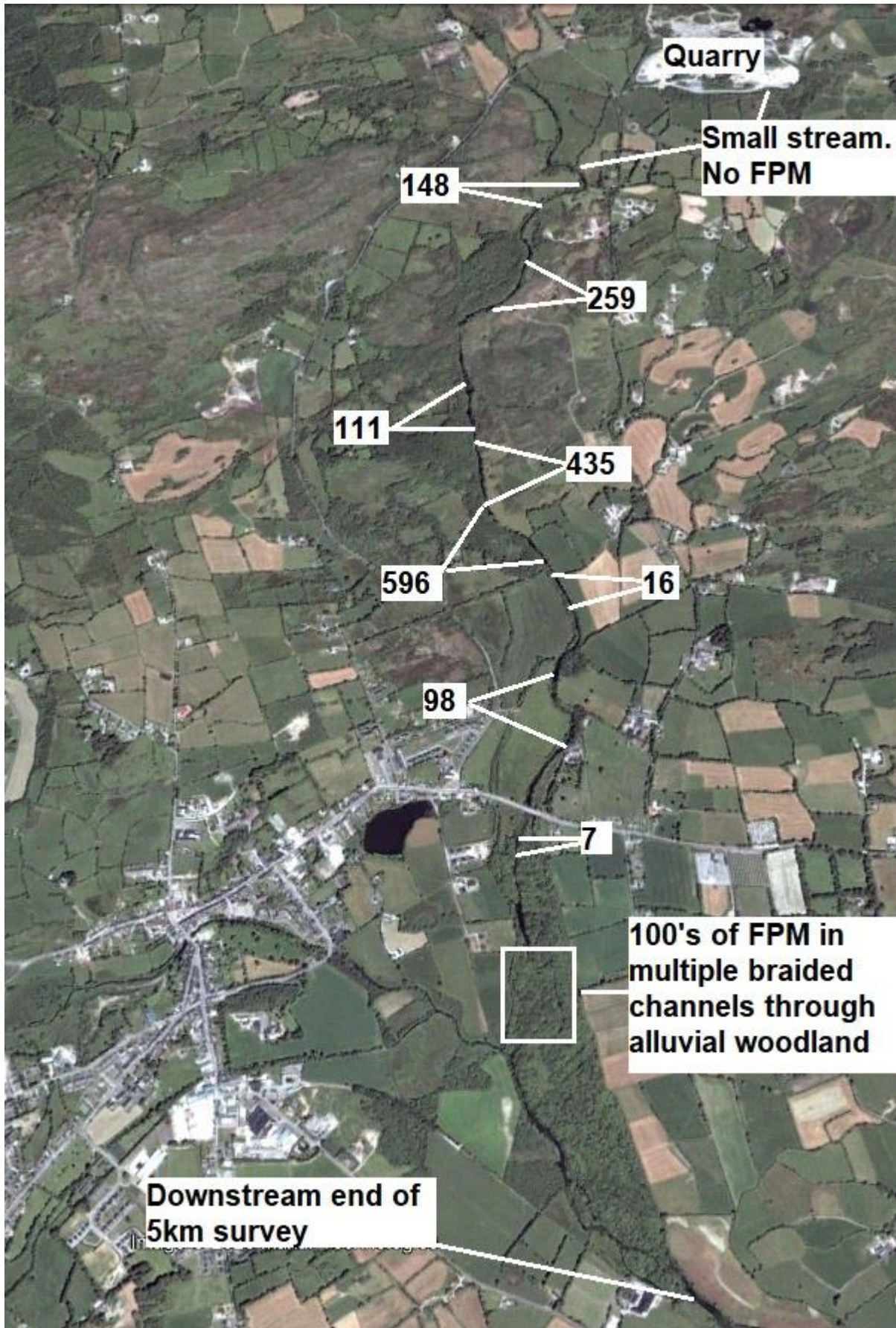
In June 2023, Sweeney Consultancy was commissioned by Malone O'Regan Environmental to undertake an aquatic ecological assessment, including a survey of Freshwater Pearl Mussels (*Margaritifera margaritifera*) downstream of a quarry at Ardcahan, Dunmanway, Co. Cork. As the aquatic zone of potentially highest impact is from the location of a proposed development to 5km downstream (Escauriaza *et. al.*, 2017), the section of watercourse assessed was from an unnamed small stream adjacent to the quarry site to the old railway bridge downstream of Dunmanway (Figure 1).

**Figure 1. June 2023 Survey Location Map**



The distance from the confluence of the stream from the quarry with the River Bandon (ITM 524406 555396) to the first Freshwater Pearl Mussel (FPM) downstream was c. 80m. From this point, at ITM 524438 655304 to ITM 524423 655268, 148 FPM were counted. (Figure 2). As the proposed development at the quarry site was delayed, Sweeney Consultancy was commissioned to re-survey this part of the River Bandon FPM population nearest the quarry.

Figure 2. Freshwater Pearl Mussel Locations and Numbers June 2023



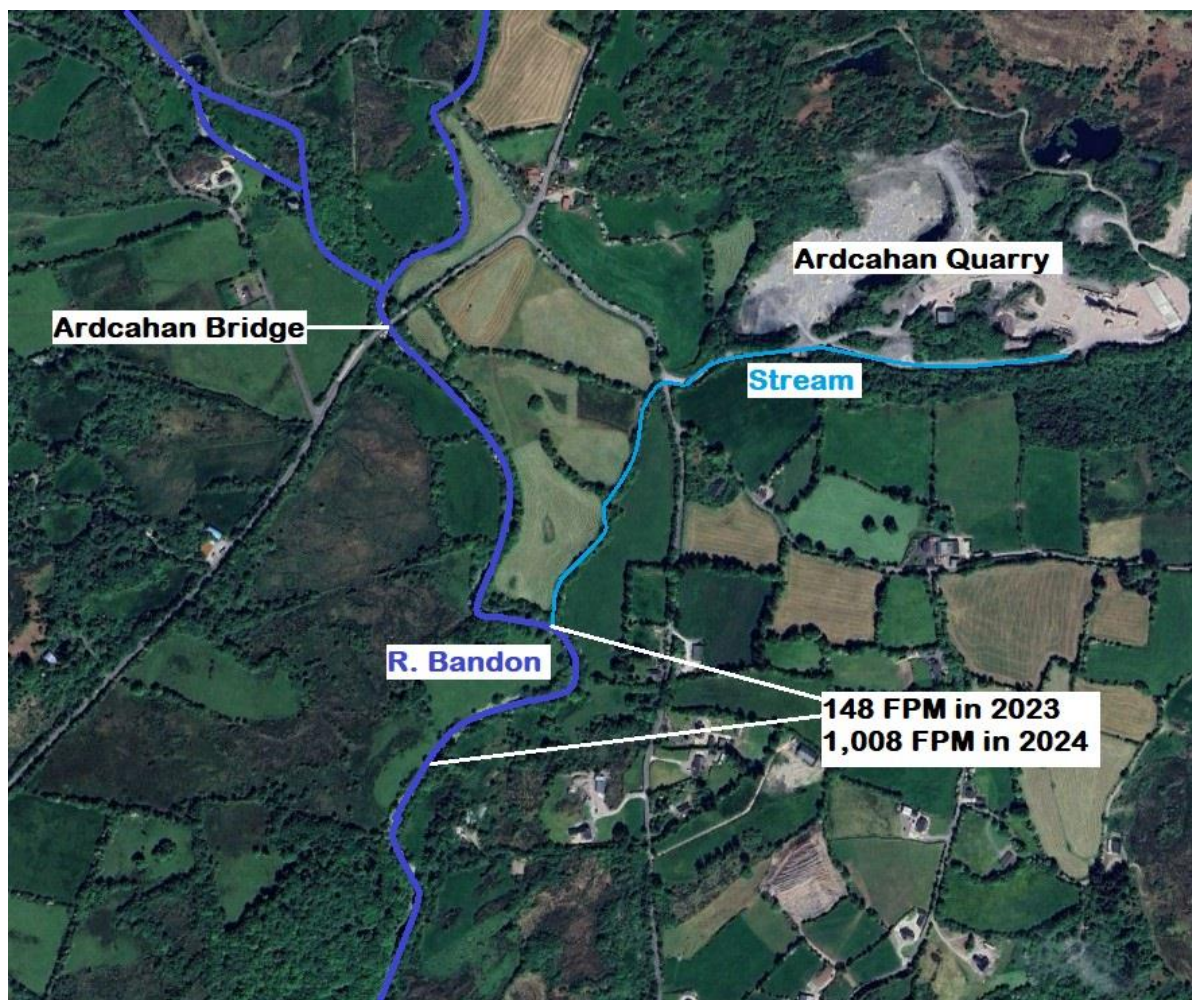
## 2. METHODOLOGY

A field survey was carried out on September 10<sup>th</sup>, 2024 by Pascal Sweeney (Licence No. C09/2024), and Henry Tennyson (Licence No. C196/2024). The survey methodology used was in accordance with the guidelines given in Irish Wildlife Manual No. 12, NPWS (Anon., 2004). Grid references were recorded using a hand-held Garmin GPS 72H.

## 3. RESULTS

1,008 live FPM were found in the section of the River Bandon surveyed (Figure 3). This included some very close to the confluence of the small stream from the quarry.

**Figure 3. Freshwater Pearl Mussels close to Ardcahan Quarry**



Information on the locations of freshwater pearl mussels gathered in this survey will be given to National Parks and Wildlife Service, as required by the Licence Conditions.

#### **4. FURTHER INVESTIGATIONS & DISCUSSION**

As an increased count of FPM from 148 in 2023 to 1,008 in 2024 in a relatively short section of river, is very far outside the normal margin of error for a survey of this kind, some further investigations were undertaken. In 2022, Sweeney Consultancy had been commissioned by Triturus Ltd to survey FPM bedded under Ardcahan Bridge, with a view to an application to re-locate them, in order to facilitate bridge repair and flood relief works. Fourteen FPM were recorded under the bridge and high numbers were observed within a short distance downstream. No licensed re-location of FPM followed.

On 10/09/2024, Pascal Sweeney and Henry Tennyson checked for FPM under and immediately downstream of Ardcahan Bridge. None were observed. It would appear that this absence of mussels at Ardcahan Bridge could be linked to the substantial increase found downstream of the stream from the quarry.

## REFERENCES

Anon (2004). *Margaritifera margaritifera*. Stage 1 and Stage 2 survey guidelines. *Irish Wildlife Manuals*, No. 12. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

Escauriaza, C., Paola, C. and Voller, V.R. (2017). Computational models of flow, sediment transport and morphodynamics in rivers. In Tsutsumi, D., and Laronne, J.B. (eds.) *Gravel bed rivers. Processes and disasters*. Wiley Blackwell.

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**APPENDIX 14.3**  
**BAT REPORT**

**VOLUME III**  
APPENDICES

APRIL 2026

# Bat Report

**Ardcahan Quarry, Dunmanway, Co.  
Cork**

**Murray Brothers Tarmacadam Ltd**



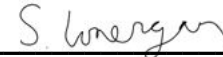


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**Title: Bat Report, Ardcahan Quarry, Dunmanway, Co. Cork, Murray Brothers Tarmacadam Ltd**

**Job Number: E2049**

**Prepared By: Stephanie Lonergan**

**Signed:** 

**Checked By: Annie Coady**

**Signed:** 

**Approved By: Dyfrig Hubble**

**Signed:** 

**Revision Record**

Issue No.	Date	Description	Remark	Prepared	Checked	Approved
01	18/02/26	Bat Report	Final	SL	HT	DH

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**Bat Report**  
**Ardcahan Quarry, Dunmanway, Co. Cork**  
**Murray Brothers Tarmacadam Ltd**

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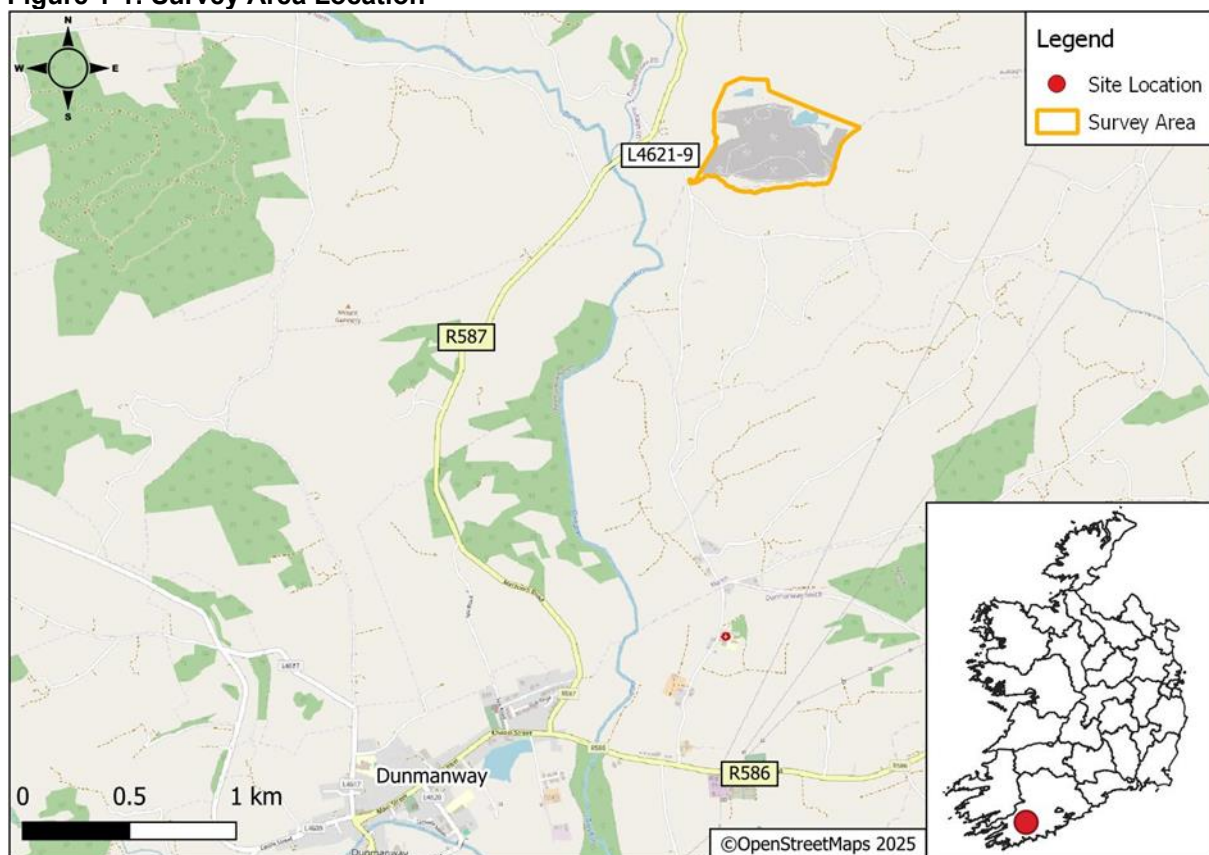
# 1 INTRODUCTION

This Bat Report has been prepared by Malone O'Regan Environmental ('MOR Environmental') on behalf of Murray Brothers Tarmacadam Ltd ('the Applicant'), to present the findings of bat surveys undertaken within Ardcahan Quarry, Dunmanway, Co. Cork ('the Survey Area') (ITM OS Reference W 25061 55898). The Survey Area consists of the existing operational Ardcahan Quarry and site infrastructure. The habitats within the Survey Area comprised active quarry, scrub, immature woodland, agricultural and amenity grassland, heathland, built areas and hedgerow / treelines.

Bat surveys were undertaken within the Survey Area from 2023 – 2025. This Bat Report presents the findings of the desk-based and field-based surveys undertaken within the Survey Area during this time.

The location of the Survey Area is shown in Figure 1-1.

**Figure 1-1: Survey Area Location**



## 1.1 Relevant Legislation

All Irish bat species are protected by law under the Wildlife Act 2000 (as amended) and its subsequent amendments. They are afforded full protection under this act, which makes it a criminal offence for anyone without a licence to:

- Kill, injure or handle a bat;
- Possess a bat (whether alive or dead);
- Disturb a roosting bat; and,
- Damage, destroy or obstruct access to any place used by bats for shelter, whether they are present or not.

In addition to domestic legislation, bats are also protected under the EU Habitats Directive (92/43/EEC). All Irish bats are listed in Annex IV of the Habitats Directive, and the lesser horseshoe bat is further listed under Annex II, which make it an offence to:

- Deliberately capture, injure or kill any bat; or,
- Deliberately disturb a bat, in particular any disturbance which is likely;
  - (a) To impair their ability:
    - (i) To survive, to breed or reproduce, or to rear or nurture their young; or,
    - (ii) To hibernate or migrate.
  - (b) To affect significantly the local distribution or abundance of the bat species; or,
- Damage or destroy a breeding site or resting place of a bat.

Therefore, the destruction, alteration or evacuation of a known bat roost is a notifiable action under current legislation, and a derogation license must be obtained from the National Parks and Wildlife Service ('NPWS') before works can commence.

Furthermore, it should also be noted that any works interfering with bats and especially their roosts, including, for instance, the installation of lighting in the vicinity of the latter, may only be carried out under a license to derogate from Regulation 23 of the Habitats Regulations 1997 (which transposed the EU Habitats Directive into Irish law) issued by NPWS.

## 1.2 Statement of Authority

The bat inspection survey and subsequent report were undertaken and prepared under the guidance of the following MOR Environmental personnel: Ms Stephanie Lonergan, Mr Henry Tennyson and Mr. Dyfrig Hubble.

Stephanie Lonergan, Environmental Consultant, has a B.A. (Mod) (Hons) in Environmental Science. Stephanie is a qualifying member of the Chartered Institute of Ecology and Environmental Management ('CIEEM') with a particular interest in bat ecology and conservation. Stephanie has completed courses on bat ecology, identification, handling, biometrics and mitigation with CIEEM and Bat Conservation Ireland. Stephanie has undertaken training run by Wildlife Acoustics for analysis of bat calls in Kaleidoscope Pro Software and regularly uses this programme within her role at MOR Environmental. Stephanie also holds a certificate of Bat Acoustic Analysis from Batability. Stephanie has experience undertaking bat surveys and tree / building assessments and regularly attends events held by local bat groups.

This report was reviewed and approved by Mr. Dyfrig Hubble, Associate Director – Ecologist. Dyfrig has a B.Sc. (Hons) in Tropical Environmental Science and an M.Sc. in Environmental Forestry. Dyfrig is a full member CIEEM. Dyfrig has over 18 years' experience working in the ecological consultancy sector, including habitat appraisals and specialist species-specific surveys. Dyfrig has extensive experience in undertaking a variety of bat surveys, including dawn / dusk surveys, transects, static monitoring, harp trapping, Lesser Horseshoe roost counts. Dyfrig has also worked on numerous projects that have required supervision of building demolition and tree removal works under licence. These projects have included work both in the UK and Ireland.

## 1.3 Species Background

Bats in Ireland feed exclusively on insects, and in the summer months (May – September) they generally emerge from their roosts around sunset to feed. Bats are known to use a number of different foraging sites on the same night and move between them to locate areas

of high insect concentrations. They are also known to exhibit site loyalty and will return to the same foraging sites night after night [1].

There are eleven recorded bat species in Ireland, nine of which are considered resident and two which are considered vagrants (Please see Table 1-1 below).

**Table 1-1: Status of Irish Bat Species [2]**

Bat Species	Latin Name	Irish status	European Status
<b>Resident Bat Species</b>			
Brown Long-eared Bat	<i>Plecotus auritus</i>	Least Concern	Least Concern
Common Pipistrelle	<i>Pipistrellus pipistrellus</i>	Least Concern	Least Concern
Daubenton's Bat	<i>Myotis daubentonii</i>	Least Concern	Least Concern
Leisler's Bat	<i>Nyctalus leisleri</i>	Least Concern	Least Concern
Lesser Horseshoe Bat	<i>Rhinolophus hipposideros</i>	Least Concern	Near Threatened
Nathusius' Pipistrelle	<i>Pipistrellus nathusii</i>	Least Concern	Least Concern
Natterer's Bat	<i>Myotis nattereri</i>	Least Concern	Least Concern
Soprano Pipistrelle	<i>Pipistrellus pygmaeus</i>	Least Concern	Least Concern
Whiskered Bat	<i>Myotis mystacinus</i>	Least Concern	Least Concern
<b>Vagrants</b>			
Brandt's Bat	<i>Myotis brandtii</i>	Data Deficient	Least Concern
Greater Horseshoe Bat	<i>Rhinolophus ferrumequinum</i>	Data Deficient	Near Threatened

## 1.4 Types of Bat Roosts

Bats were originally cave and tree-dwelling animals, but many now use buildings to roost within. Buildings are highly important as roosting sites for all Irish bat species, as they use buildings for all roost types. Most significant in terms of roosts in buildings are maternity roosts, but cellars and attics can serve as hibernation sites for bats. Roosts within buildings can far exceed the numbers encountered in trees, bridges, caves or cliffs and roosts of over 1,000 bats have been recorded in buildings [3].

Bats are social animals, and most species congregate in large colonies during the late spring / summer. These colonies consist mostly of females, with some juvenile males from the previous year. Male bats normally roost individually or in small groups, meeting up with the females in the late autumn, when it is time to mate. In summer, bats seek warm, dry buildings in which they can give birth and suckle their young. In winter, they seek out places with a constant low temperature and high humidity where they can become torpid and hibernate during adverse weather conditions. However, bats do not hibernate continuously during winter and will awake and hunt during mild nights when there are insects available, and it is energetically advantageous to forage [4].

One purpose of daytime tree or building inspections is to determine the potential of bat roosts within the survey area. Due to the transient nature of bats and their seasonal life cycle, there are a number of different types of bat roosts. Where possible, one of the objectives of the surveys is to be able to identify the types of roosts present, if any.

Table 1-2 below shows an excerpt of the definitions of the types of bat roosts taken from the Bat Conservation Trust's '*Bat Surveys for Professional Ecologists - Good Practice Guidelines* (4<sup>th</sup> ed.) [4]. It should be noted that there is no equivalent Irish guidance and that this guidance is applicable to the bat roost types found in Ireland. Additionally, all bat species found within Ireland are also present in the UK, so Irish bat species have been fully assessed as part of this Bat Conservation Trust guidance.

**Table 1-2: Bat roost types. (definitions written by the Natural England Earned Recognition Project). [4]**

Roost Type	Natural England Definition
Day Roost	A place where individual bats or small groups, rest or shelter in the day during the summer.
Night Roost	A place where bats rest or shelter in the night but are not found in the day. May be used by a single individual on occasion, or it could be used regularly by the whole colony..
Feeding Roost	A place where individual bats, or few individuals, rest or feed for short periods during the night but are not present by day.
Transitional Roost	A place used by a few individuals or occasionally small groups for generally short periods of time on waking from hibernation or in the period prior to hibernation.
Maternity Site	A place where female bats give birth and raise their young to independence. In some species males may also be present in the maternity roost.
Hibernation Site	A place where bats may be found individually or together during winter. They have a constant cool temperature and high humidity.
Satellite Roost	An alternative roost found in close proximity to the main nursery colony used by a few individuals to small groups of breeding females throughout the breeding season.

## 1.5 Purpose of Survey Work

The implication of these legislative policies is that the projects and Developments need to take account of the potential effects on bats. Survey work is necessary to establish whether the species are currently present in areas where suitable habitat exists and in areas where bats have previously been recorded.

The survey work also enables appropriate mitigation measures to be incorporated into the remediation works of the project and ensures that there are no adverse effects on the conservation status of the species, and also informs the assessment for potential effects that may have occurred.

## 2 METHODOLOGY

The methodologies used to establish the presence / potential presence of bats are summarised below.

### 2.1 Desk-Based Studies

A desk-based study was undertaken to identify records of bats within the Survey Area. The following sources of information were reviewed:

- Aerial mapping was reviewed to identify any habitats and features likely to be used by bats. Maps and images of the Survey Area and general landscape were examined for suitable foraging or commuting habitats, including woodlands and forestry, hedgerows, treelines, and watercourses;
- The National Parks and Wildlife Service ('NPWS') website was consulted to obtain the most up-to-date details on conservation objectives for the European sites relevant to this assessment [5];
- The National Biodiversity Data Centre ('NBDC') website was consulted with regard to bat species distributions and the bat habitat suitability index [6]; and,
- The National Bat Database of Ireland dataset on the NBDC website was consulted to investigate the nearest known roosts within the vicinity of the Survey Area [7].

### 2.2 Field-Based Studies

The survey design was informed by previous experience and the following publications:

- *Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes* [3];
- *A Conservation Plan for Irish Vesper Bats* Irish Wildlife Manual No. 20 [8];
- *UK Bat Mitigation Guidelines: A guide to impact assessment, mitigation and compensation for developments affecting bats* [9];
- *Bat Mitigation Guidelines for Ireland – V2*. Irish Wildlife Manuals, No. 134 [10] a publication by the NPWS; and,
- *Bat Surveys for Professional Ecologists - Good Practice Guidelines* (4<sup>th</sup> ed.). London: The Bat Conservation Trust [4].

#### 2.2.1 Daytime Bat Walkover and Identification of Bat Habitats

The Survey Area was assessed during the daytime bat walkover survey on 9<sup>th</sup> January 2023 and during an updated assessment on 17<sup>th</sup> September 2024 in relation to potential bat roosting, foraging habitat and potential commuting routes. Bat habitats and commuting routes identified were considered in relation to the wider landscape to determine connectivity for local bat populations, and through the examination of aerial mapping.

During the updated walkover on 17<sup>th</sup> September 2024, assessment criteria for evaluating the potential suitability of the Survey Area for bats were carried out in line with the most up-to-date guidance - 'Bat Surveys for professional Ecologists: Good Practice Guidelines' [4].

**Table 2-1: Guidelines for assessing the potential suitability of proposed development sites for bats, based on the presence of habitat features within the landscape, to be applied using professional judgement [4]**

Potential Suitability	Description of Roosting habitats in structures	Description of Potential flightpaths and foraging habitats
None	No habitat features on site likely to be used by any roosting bats at any time of the year	No habitat features on site likely to be used by any commuting or foraging bats at any time of

Potential Suitability	Description of Roosting habitats in structures	Description of Potential flightpaths and foraging habitats
	(i.e. a complete absence of crevice/suitable shelter at all ground/underground levels).	the year (i.e. no habitats that provide continuous lines of shade/protection for flight-lines or generate/shelter insect populations available to foraging bats).
Negligible <sup>1</sup>	No obvious habitat features on site likely to be used by roosting bats; however, a small element of uncertainty remains as bats can use small and apparently unsuitable features on occasion.	No obvious habitat features on site likely to be used as flightpaths or by foraging bats; however, a small element of uncertainty remains in order to account for non-standard bat behaviour.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically at any time of the year. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions <sup>2</sup> and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e., unlikely to be suitable for maternity and not a classic cool/stable hibernation site, but could be used by individual hibernating bats <sup>3</sup> ).	Habitat that could be used by small numbers of bats as flightpaths, such as a gappy hedgerow or unvegetated stream, but isolated, i.e., not very well connected to the surrounding landscape by another habitat.  Suitable, but isolated habitat that could be used by small numbers of foraging bats, such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate	A structure with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only, such as maternity and hibernation – the categorisation described in this table is made irrespective of species conservation status, which is established after presence is confirmed).	Continuous, high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by bats for flightpaths, such as river valleys, streams, hedgerows, lines of trees and woodland edge.  High-quality habitat that is well connected to the wider landscape, which is likely to be used regularly by foraging bats, such as broadleaved woodland, tree-lined watercourses and grazed parkland.  The Site is close to and connected to known roosts.
High	A structure with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat. These structures have the potential to support high conservation status roost, e.g. maternity or classic cool/stable hibernation site.	Continuous, high-quality habitat that is well connected to the wider landscape, which is likely to be used regularly by commuting bats, such as river valleys, streams, hedgerows, lines of trees and woodland edge.  High-quality habitat that is well connected to the wider landscape, which is likely to be used regularly by foraging bats, such as broadleaved woodland, tree-lined watercourses and grazed parkland.  The Site is close to and connected to known roosts.

<sup>1</sup> Negligible is defined as 'so small or unimportant as to be not worth considering, insignificant'. This category may be used where there are places that a bat could roost or forage (due to one attribute) but it is unlikely that they actually would (due to another attribute).

<sup>2</sup> For example, in terms of temperature, humidity, height above ground level, light levels or levels of disturbance.

<sup>3</sup> Evidence from the Netherlands shows mass swarming events of common pipistrelle bats in the autumn followed by mass hibernation in a diverse range of building types in urban environments ([13] and [14]). Common pipistrelle swarming has been observed in the UK ([15] and [16]) and winter hibernation of numbers of this species has been detected at Seaton Delaval Hall in Northumberland ([17]). This phenomenon requires some research in the UK, but ecologists should be aware of the potential for larger numbers of this species to be present during the autumn and winter in prominent buildings in the landscape, urban or otherwise.

## 2.2.2 Ground Level Tree Assessment

As part of the walkover, all trees within the Survey Area were assessed for the presence of features that could be utilised by roosting bats, using close-focusing binoculars and a powerful focused-beam light source. The following criteria were used:

- Presence of natural cavities, splits, cracks, loose bark and rot holes in the trunk or boughs of the tree;
- Presence of dense and woody ivy (*Hedera helix*) growth that could be used by bats for roosting;
- Evidence of bat droppings, which may also be seen as a black streak beneath holes, cracks, branches, etc;
- Presence of smooth edges with dark marks and urine stains at potential entrances to roosts;
- Adjoining habitat which are likely to be important to bats, including the river corridor, and hedge / treelines within the survey area that offer a variety of potential foraging, roosting and commuting opportunities for bats; and,
- Adjoining potential roosts / known roosts identified, as this raises the likelihood of a tree being of benefit, as bats may move roosts if a roost becomes too hot / cold.

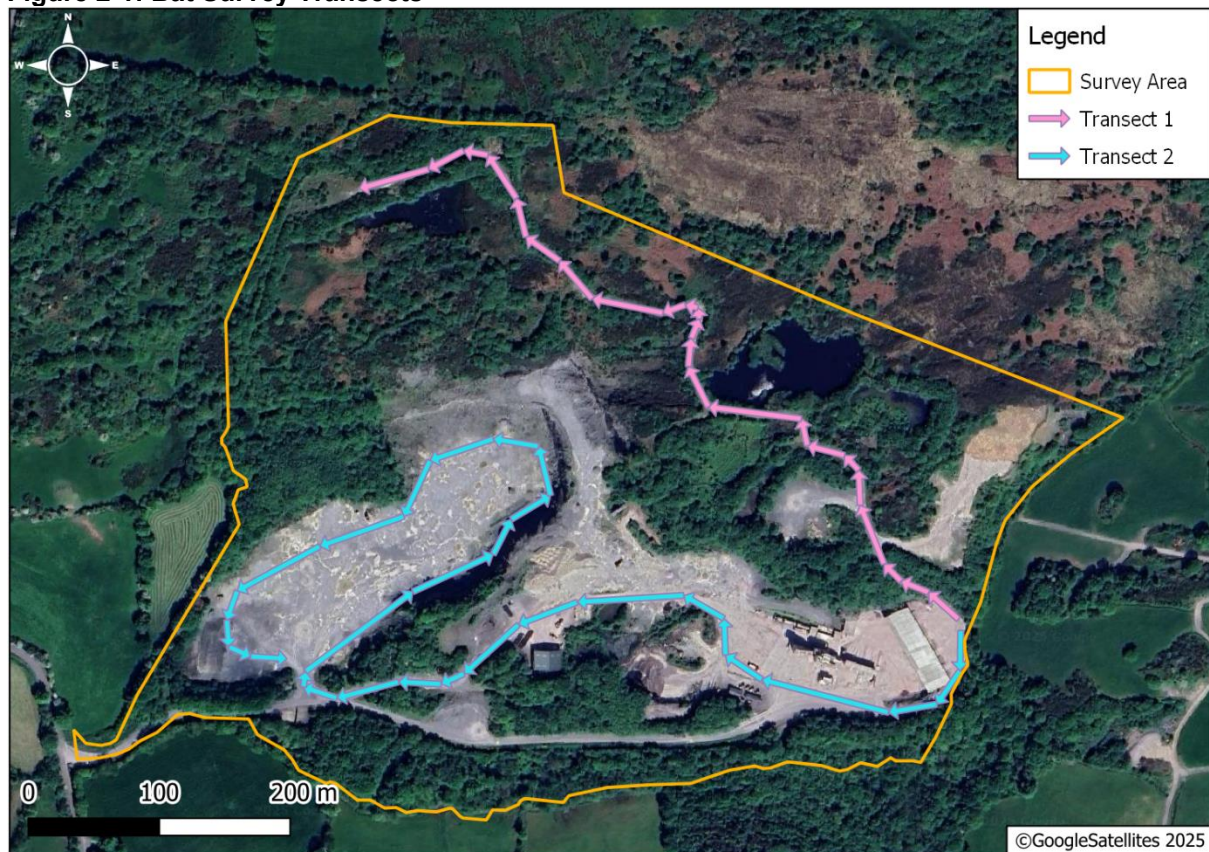
## 2.2.3 Dusk Nighttime Bat Walkover ('NBW') Surveys

Three dusk emergence and NBW surveys took place at the Survey Area, the first on 24<sup>th</sup> July 2023, the second on 17<sup>th</sup> September 2024 and the third on 3<sup>rd</sup> June 2025. The surveys commenced 15 minutes before sunset and ended 2 hours after sunset, therefore encompassing the typical emergence times of Irish bat species.

The NBW surveys involved walking predetermined transects (T – T1 and T2) for two hours and 15 minutes, and were designed to incorporate all treelines, linear features and other areas of the Survey Area that the daytime bat walkover survey identified as providing suitable habitats for foraging and commuting bats. The transects aimed to capture bat activity levels within the Survey Area and to determine what areas within the Survey Area, if any, were important habitats for bats. The surveyors used an Echo Meter Touch2 Pro to listen for bat calls. These bat calls were recorded using this Echo Meter Touch2 Pro and stored on the EchoMeter App. A combination of visual observation and listening to ultrasonic bat calls was used, and surveyors continuously recorded any signs of bat activity using the Echo Meter Touch2 Pro and noted any visual observations.

Two MOR Environmental Ecologists surveyed separate locations of the Survey Area; see Figure 2-1 below for full details of the locations of the transects walked during the surveys.

Figure 2-1: Bat Survey Transects



#### 2.2.4 SM4s

Two passive bat detectors, Wildlife Acoustics Song Meter 4-BAT ('SM4s'), were placed within the Survey Area for one period of static monitoring. Figure 2-2 below shows the locations where the SM4s were placed within the Survey Area.

The SM4s were equipped with ultrasonic microphones and were left in specific locations for a specified period of time (13 nights – from 21<sup>st</sup> May 2025 to 3<sup>rd</sup> June 2025). The SM4s were used as a bat activity data logger, as there was no surveyor present. Bats which passed near enough to the SM4 unit were recorded, and their calls were stored for analysis post monitoring period. This resulted in a far greater sampling effort over a shorter period of time.

The SM4s and the ultrasonic microphones were positioned in open spaces and locked in secure boxes so there would be no interference during the monitoring period. The SM4 bat loggers used real-time recording as a technique to record bat echolocation calls, and using specific software, the bat calls were identified. It was these sonograms of the bat calls (2-D sound graphs) that were digitally stored in the SD cards within the SM4s that were then downloaded for analysis.

These results were depicted in a table detailing the number of bat passes per species / per hour / night. Each bat pass did not correlate to an individual bat but was representative of the bat activity levels within the area. For example, some species of bats, such as *Pipistrellus* species, will continuously fly around a habitat, and therefore it is likely that a series of bat passes within a similar timeframe could be the same pipistrelle bat. However, other bat species, such as Leisler's bats, tend to travel through an area quickly and therefore an individual bat pass is more indicative of the actual number of individual bats.

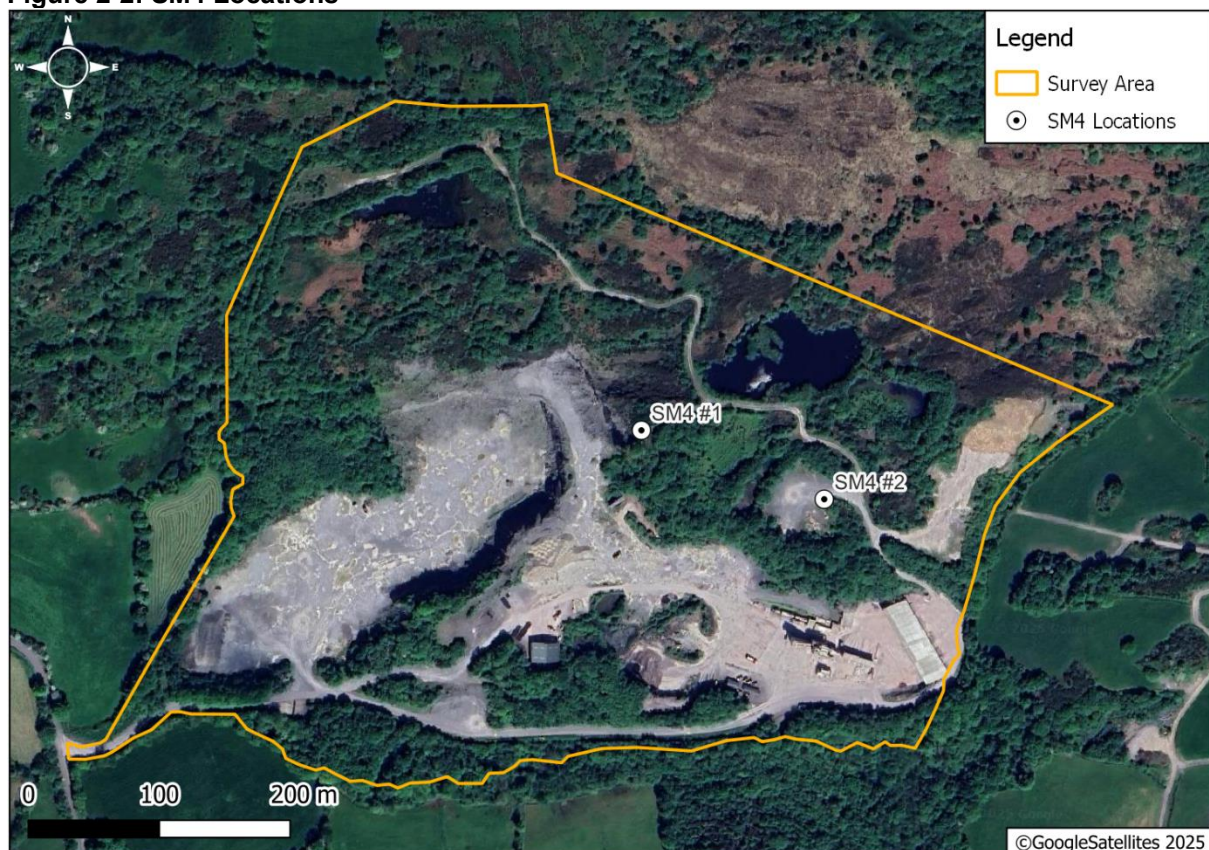
The total number of bat passes recorded per night and divided by the number of hours of recording, provides a figure for this analysis. The bat activity levels were determined as follows:

- None – 0 passes;
- Low = 1 - <10 passes per hour;
- Moderate = >10 - <50 passes per hour; and,
- High = >50 passes per hour.

All sound file data downloaded from the SM4s was analysed using Kaleidoscope Pro Software. The 'auto-ID' function was used to batch assign the top auto-ID species for each sound file. This approach allowed identification of bats to genus level for *Myotis* species, and to species level for other bats found in Ireland. Separation of *Myotis* species is complicated by the high degree of overlap between call characteristics. This software can also automatically sort sound files that contain only noise ('non-bat') from sound files that contain bat passes.

Following the batch analysis, all non-Leisler's bat calls and all non-pipistrellus (excluding Nathusius' pipistrelle) and no ID calls were manually checked by a capable bat acoustic analyst. Auto-ID calls from common pipistrelle, soprano pipistrelle and Leisler's bat were not manually checked, as it is accepted that due to the lack of complexity within these species' calls, the auto-ID function is sufficient.

**Figure 2-2: SM4 Locations**



### 2.2.5 Data Analysis

The bat recordings taken during the surveys were analysed using the software KaleidoscopePro to aid the identification of bat species present. A combination of the visual

observations taken during the survey and the number of bat passes<sup>4</sup> identified on the recordings was used to determine bat activity levels within the area.

All non-noise recordings taken on the bat surveys were manually checked by a capable bat acoustic analyst.

### 2.3 Validation of Survey Data

Bat surveys are a snapshot of the bat activity within an area at the time of surveying. It is therefore important that bat surveys comprise a number of surveys designed to provide as much information as possible on the species and levels of bats using an area. Therefore, a combination of surveys was used to determine the potential importance of the Survey Area for bats.

Best practice guidance dictates that bat surveys should be undertaken when there is no rain or wind and the temperature is above 10°C. Please see Table 2-2 below for the weather conditions on-site during the NBW surveys undertaken from 2023 – 2025, and Table 2-3 below for the weather conditions on the Site during the SM4 monitoring period in 2025.

**Table 2-2: Bat Survey Metadata**

Date	Survey Type	Sunset	Survey Times (Start-End)	Weather	Temperature (°C) Start - End
24/07/2023	NBW	21:38	21:23 – 23:38	Dry, light breeze	13°C -10°C
17/09/2024	NBW	19:45	19:30 – 21:45	Dry, light breeze	16°C -13°C
03/06/2025	NBW	21:46	22:03 – 23:46	Dry, light breeze	11°C – 8°C

**Table 2-3: Weather Conditions during SM4 Monitoring**

Date	Nighttime Rain	Nighttime Wind (km/h, high - low)	Nighttime Temperature (°C high – low)	Bat Surveying Conditions
21/05/2025	None	20-17	17-13	Optimal
22/05/2025	None	24-17	17-10	Optimal
23/05/2025	None	24-15	15-11	Optimal
24/05/2025	Showers from 21:00 – 22:00	24-11	15-13	Moderate
25/05/2025	Showers at 01:00 & from 21:00-21:30	37-17	12-10	Suboptimal
26/05/2025	Showers at 03:00	32-9	13-8	Suboptimal

<sup>4</sup> It is important to acknowledge that bat calls provide a measure of bat activity rather than the number of individuals in a population. In practice, bat activity (as, for example, represented by 100 recordings) could be from 100 bats passing the detector or one bat passing 100 times [4].

Date	Nighttime Rain	Nighttime Wind (km/h, high - low)	Nighttime Temperature (°C high - low)	Bat Surveying Conditions
27/05/2025	Light rain from 03:30 – 06:00	20-7	14-11	Moderate
28/05/2025	Light rain from 21:00 – 23:30	28-7	14-8	Suboptimal
29/05/2025	Light rain all night	35-19	14	Suboptimal
30/05/2025	Light rain from 00:00 – 03:30	17-7	14	Moderate
31/05/2025	Light rain from 02:30 – 03:00	20-7	14-10	Optimal
1/06/2025	Light rain from 05:30 – 06:00	28-15	13-10	Moderate
2/06/2025	Light to moderate rain from 21:00 – 23:30	41-7	12-7	Suboptimal
3/06/2025	Light rain from 00:00 – 01:00	32-15	12-9	Moderate

## 2.4 Evaluation of the Importance of the Survey Area for Bat Species

The value of the importance of the Survey Area for bat species was evaluated using the ecological evaluation guidance given in the Transport Infrastructure Ireland ('TII'), formerly known as National Roads Authority ('NRA'), guidance on assessment of ecological impacts of National Road Schemes [11]. This guidance provides ratings for resources based primarily on geographic context and allows for resources at the following levels:

- International Importance;
- National Importance;
- County Importance (or vice-county in the case of plant or insect species);
- Local Importance (Higher Value); and,
- Local Importance (Lower Value).

### 3 RESULTS

#### 3.1 Desk-Based Results

Prior to conducting the field surveys, a desk-based review of information sources was completed.

Three of the nine resident bat species found in Ireland have been recorded within a 2km radius of the Survey Area at the time of writing this report [6]: Daubenton’s bat, common pipistrelle and brown long-eared bat. The NBDC records were checked on 8<sup>th</sup> January 2025. The following NBDC 2km grids have been reviewed: W25G, W25H, W25I, W25L, W25M, W25N, W25R, W25S, W25T. Only records over the past 10 years were included in this report. The parameter of 10 years was chosen on the basis of habitat adaption and modification; it is considered that any records over 10 years old are not representative of the current distribution of bat species populations.

The National Bat Database of Ireland showed that the nearest known roost is located in a 1km grid square, ca. 633m to the west of the Survey Area [7]. This was recorded as a brown long-eared bat roost in a building in 2019 in Dunmanway, Co. Cork.

The National Lesser Horseshoe Bat Database showed that the nearest known lesser horseshoe bat roost is located in a 1km grid square, ca. 6.6km to the west of the Survey Area. This was most recently recorded in 2013 [12].

Table 3-1 provides details of the habitat suitability index for the Survey Area [6]. The habitat suitability index identifies the geographical areas that are suitable for individual species. The index ranges from 0 to 100, with 100 being the most favourable to bats. The index presented is for all species combined, in addition to the individual species indices within the Survey Area.

From the indices, it can be established that the Survey Area has an overall high habitat suitability index range of 28-36. The habitat suitability for Irish bats within the area ranges from very low to very high. Excluding Nathusius’ pipistrelle and the lesser horseshoe bat, which have a ‘very low’ and ‘low’ habitat suitability for the Survey Area, respectively, all of the other listed species are likely to occur within the area.

**Table 3-1: Habitat Suitability Index**

Bat Species	Latin Name	Suitability Index Range	Suitability Index Level
All Bat Species	-	28-36	High
Brown Long-eared Bat	<i>Plecotus auritus</i>	50-79	Very High
Whiskered Bat	<i>Myotis mystacinus</i>	32-44	High
Common Pipistrelle	<i>Pipistrellus pipistrellus</i>	31-38	Moderate
Soprano Pipistrelle	<i>Pipistrellus pygmaeus</i>	31-38	Moderate
Leisler’s bat	<i>Nyctalus leisleri</i>	30-37	Moderate
Natterer’s Bat	<i>Myotis nattereri</i>	27-36	Moderate
Daubenton’s Bat	<i>Myotis daubentonii</i>	22-29	Moderate
Lesser Horseshoe Bat	<i>Rhinolophus hipposideros</i>	5-13	Low
Nathusius’ Pipistrelle	<i>Pipistrellus nathusii</i>	0-5	Very Low

## 3.2 Field-Based Results

### 3.2.1 Daytime Bat Walkover Survey

It was concluded that the Survey Area provides *Low* foraging and flight path habitat suitability for bats. The Survey Area consists of a former quarry, but areas of immature woodland, scrub, ponds and wet grassland were also present.

### 3.2.2 Ground Level Tree Assessment

No trees within the Survey Area were considered suitable for roosting bats.

### 3.2.3 Dusk NBW Survey Results

Between moderate and high levels of bat activity were recorded during the bat surveys undertaken on site in 2023, 2024 and 2025. The surveyors recorded the majority of bat activity in the north of the Survey Area, and bats were observed foraging and commuting over the vegetation and waterbodies on site. No bats were roosting onsite.

The following bats were recorded as a result of the dusk surveys onsite:

- Common pipistrelle, soprano pipistrelle, Leisler's bat, brown long-eared bat, and *Myotis species* were recorded foraging and commuting within the Survey Area. The most frequently encountered species of these were soprano pipistrelle, followed by common pipistrelle; and,
- Leisler's bat and soprano pipistrelle were recorded shortly after sunset during the dusk surveys, indicating that bat roosts are likely to be present within the vicinity of the Survey Area.

#### 3.2.3.1 Dusk NBW 24/07/2023

Sunset was at 21:38.

##### T1

The first bat recorded was a Leisler's bat at 21:38, but the surveyor did not observe it. Shortly afterwards, at 21:40, two Leisler's bats were observed foraging in the northeast of the Survey Area until 21:43. The next bat observed by the surveyor was a soprano pipistrelle at 22:03, commuting over the path in the north of the Survey Area towards the south of the Survey Area. From 22:18, a combination of common pipistrelle and soprano pipistrelle were recorded foraging in the scrub and immature woodland to the west of the road in the north of the Survey Area. At 22:30, common pipistrelle and soprano pipistrelle were also observed foraging over the grassland adjacent to the road in the north of the Survey Area. Common pipistrelle and soprano pipistrelle were also observed foraging and commuting over the road towards the east of the Survey Area. The last bat observed was a soprano pipistrelle at 23:35. It should be noted that bat calls were recorded but not observed while the surveyor was walking along all areas of T1. It can therefore be assumed that bats are using the habitats within the vicinity of T1 in the Survey Area for foraging and commuting.

Overall, there was high bat activity recorded at T1 with ca. 106 bat passes recorded per hour. Soprano pipistrelle had ca. 64 passes per hour, common pipistrelle had ca. 32 passes per hour, Leisler's bat had ca. eight passes per hour, brown long-eared bat had ca. one pass per hour and *Myotis species* had ca. one pass per hour.

##### T2

The first sighting and recording at T2 was a soprano pipistrelle commuting north to south over the road in the north of the Survey Area. Shortly afterwards, at 21:57, a soprano pipistrelle was seen commuting east to west over the lake in the northeast of the Survey Area. A soprano pipistrelle was also observed foraging over the grassland adjacent to the lake, and commuting

north to south over the same area. Multiple soprano pipistrelle were observed commuting and foraging over the area to the south of the lake onsite. The first common pipistrelle recorded and observed was at 22:10, seen commuting east to west over the road in the south of the Survey Area. At 22:15, four individual soprano pipistrelle were observed foraging over the grassland to the south of the Survey Area. The first non-pipistrelle species recorded and observed was a Leisler's bat at 22:26, seen commuting south to north over trees to the south of the lake. A brown long-eared bat and a *Myotis* species were recorded when the surveyor was walking the transect towards the southwest of the road, but were not observed by the surveyor. Common pipistrelle and soprano pipistrelle were recorded constantly along all areas of T2 until the last bat was recorded, a soprano pipistrelle, at 23:34.

Overall, there was high bat activity recorded at T2 with ca. 91 bat passes recorded per hour. Soprano pipistrelle had ca. 69 passes per hour, common pipistrelle had ca. 15 passes per hour, Leisler's bat had ca. five passes per hour, brown long-eared bat had ca. one pass per hour and *Myotis* species had ca. one pass per hour.

### 3.2.3.2 Dusk NBW 17/09/2024

Sunset was at 19.45.

#### T1

The first bat recorded and observed at T1 was a soprano pipistrelle at 20:14, seen commuting over the road in the northeast of the Survey Area. Soprano pipistrelle and common pipistrelle were observed foraging and commuting along all areas of the road in the northwest of the Survey Area. The first non-pipistrelle species recorded was a brown long-eared bat at 20:45, not observed but recorded when the surveyor was walking by the northeast of the road. A *Myotis* species was recorded at 21:23 when the surveyor was walking adjacent to the road in the northeast of the Survey Area, but was not observed. Common pipistrelle and soprano pipistrelle were recorded consistently across all areas of T1 until the last bat was recorded, a soprano pipistrelle, at 21:44.

Overall, there was moderate bat activity recorded at T1 with ca. 32 bat passes recorded per hour. Common pipistrelle had ca. 15 passes per hour, soprano pipistrelle had ca. 14 passes per hour, Leisler's bat had ca. one pass per hour, brown long-eared bat had ca. one pass per hour, and *Myotis* species had ca. one pass per hour.

#### T2

The first bat recorded at T2 was a soprano pipistrelle at 19:55, but the surveyor did not observe it. Bat calls from common pipistrelle, soprano pipistrelle and brown long-eared bat were recorded infrequently for the first ca. hour of the survey, but no bats were observed by the surveyor. The first bat observed at T2 was a Leisler's bat at 21:01, observed commuting west over the vegetation in the south of the Survey Area multiple times. A Leisler's bat was also recorded at 21:10 when the surveyor was walking the transect in the southeast of the Survey Area. Common pipistrelle and Leisler's bat were observed commuting back and forth over the vegetation in the south of the Survey Area at 21:20. Common pipistrelle and soprano pipistrelle were recorded infrequently for the remainder of the survey at T2 but not observed by the surveyor. The last bat recorded was a common pipistrelle at 21:42.

Overall, there was moderate bat activity recorded at T2 with ca. 22 bat passes recorded per hour. Common pipistrelle had ca. nine passes per hour, soprano pipistrelle had ca. six passes per hour, Leisler's bat had ca. six passes per hour and brown long-eared bat had ca. one pass per hour.

### 3.2.3.3 Dusk NBW 03/06/2025

Sunset was at 21:46.

#### T1

The first bat recorded at T1 was a soprano pipistrelle at 22:15. This bat was not observed, but was recorded when the surveyor was walking along the south of the existing access track. The first bat observed at T1 was a soprano pipistrelle at 22:18, seen commuting southeast over the access track. Shortly afterwards, at 22:30, a soprano pipistrelle was seen commuting southeast over the access track and foraging over a pond onsite. At least one bat was seen constantly commuting and foraging southeast over the access track at T1 from 22:20 – 22:36 (see activity in Figure 3-1 below). The bat calls recorded during this time period included calls from common pipistrelle and soprano pipistrelle, so it is likely that the bats observed were a combination of these species. The next bat recorded was a Leisler's bat at 22:44, not observed but recorded when the surveyor was walking the transect south of the pond onsite. Soprano pipistrelle and common pipistrelle were constantly observed from 22:44 to 23:00 commuting over the access path by the surveyor at T1. One pass from a *Myotis* species was recorded at 22:50, and the surveyor observed this bat foraging over the yard in the southeast of the Survey Area. Activity significantly reduced from 23:00 until the end of the survey at 23:46. There were three passes from one common pipistrelle at 23:01 and two passes from a Leisler's bat 23:30, which was the last bat recorded during the survey.

Overall, there was moderate bat activity recorded at T1 with ca. 23 bat passes recorded per hour. Soprano pipistrelle had ca. 13 passes per hour, common pipistrelle had ca. eight passes per hour, Leisler's bat had ca. one pass per hour and *Myotis* species had ca. one pass per hour.

#### T2

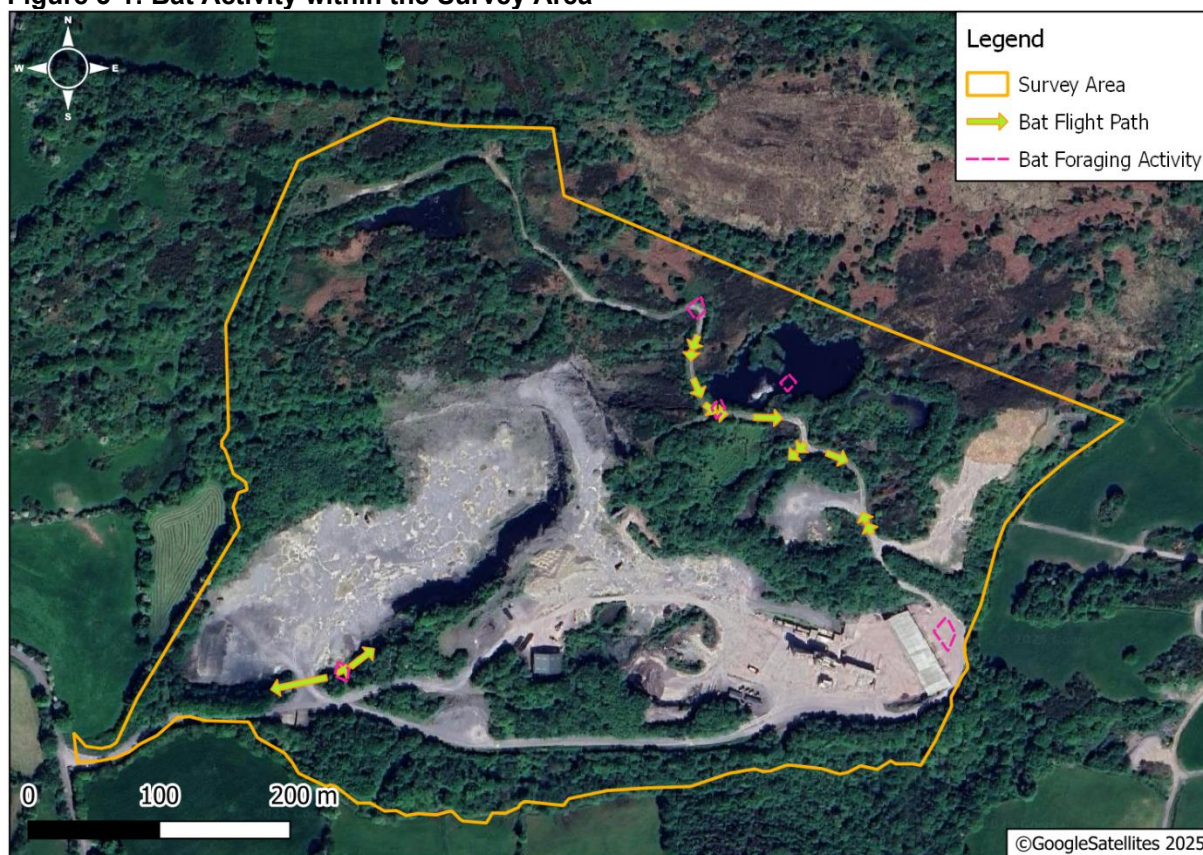
The first bat recorded at T2 was two common pipistrelle at 22:33, seen commuting west over a treeline in the quarry. The next bat observed at T2 was a common pipistrelle at 22:48, seen foraging and commuting to the east of the quarry. A call from a brown long-eared bat was recorded at 22:49 when the surveyor was walking in the southwest of the quarry, but not observed by the surveyor. No other bats were observed by the surveyor at T2, but bat calls from Leisler's bat, common pipistrelle, soprano pipistrelle and *Myotis* species were recorded infrequently when the surveyor was mostly walking the transect in the southwest of the Survey Area. The last bat recorded was a Leisler's bat at 23:30.

Overall, there was low bat activity at T2, with ca. 12 bat passes recorded per hour. Common pipistrelle had ca. four passes per hour, Leisler's bat had ca. three passes per hour, soprano pipistrelle had ca. three passes per hour, brown long-eared bat had ca. one pass per hour and *Myotis* species had ca. one pass per hour.

It should be noted that the surveyor at T2 noted extensive light spillage around the tarmac plant in the southeast of the Survey Area. The surveyor also observed a peregrine falcon flying around the quarry at 22:43. The light spillage and presence of peregrine falcon in the south of the quarry would reduce this area of the Survey Area for bats, as bats are averse to artificial lighting and peregrine falcon are known to prey on bat species.

Figure 3-1 below shows the activity observed during the bat survey on site in 2025.

Figure 3-1: Bat Activity within the Survey Area



### 3.2.4 SM4s

Tables 3-2 and 3-3 below summarise the results from the SM4 deployment from 21<sup>st</sup> May 2025 – 3<sup>rd</sup> June 2025.

Common pipistrelle, Leisler's bat, soprano pipistrelle, *Myotis* species, brown long-eared bat and lesser horseshoe bat were the species recorded across the SM4 deployments onsite. Assuming that the *Myotis* bat calls were recorded from all three *Myotis* species found in Ireland (Daubenton's bat, Natterer's bat and whiskered bat), this means that eight of the nine resident Irish bat species found in Ireland were recorded onsite. Nathusius' pipistrelle was the only resident Irish bat species not recorded on-site.

Overall, SM4 #2 in the east of the Survey Area had higher levels of bat activity than SM4 #1 in the west of the Survey Area. However, SM4 #1 had higher species diversity recorded.

Leisler's bat was the most frequently recorded species at SM4 #2, followed by common pipistrelle and soprano pipistrelle. *Myotis* species were recorded on five out of 14 nights of monitoring, and brown long-eared bat was recorded on three out of 14 nights of monitoring. Lesser horseshoe bat was not recorded at SM4 #2. These results indicate that Leisler's bat, common pipistrelle and soprano pipistrelle are using the woodland in the east of the Survey Area frequently throughout the night for foraging and commuting.

Common pipistrelle was the most frequently recorded species at SM4 #1, followed by soprano pipistrelle, Leisler's bat and *Myotis* species. Brown long-eared bat was recorded on three out of 14 nights of monitoring, and lesser horseshoe bat was recorded on one night of deployment (31<sup>st</sup> May 2025). The lower levels of lighting in the west of the Survey Area, where SM4 #1 was installed, make this area within the Survey Area more suitable for light-averse species, including *Myotis* species, brown long-eared bat and lesser horseshoe bat. However, as lesser horseshoe bat was only recorded on one night of 14 nights of monitoring and only a single

pass was recorded, it is unlikely that the Survey Area is a site of importance for lesser horseshoe bat.

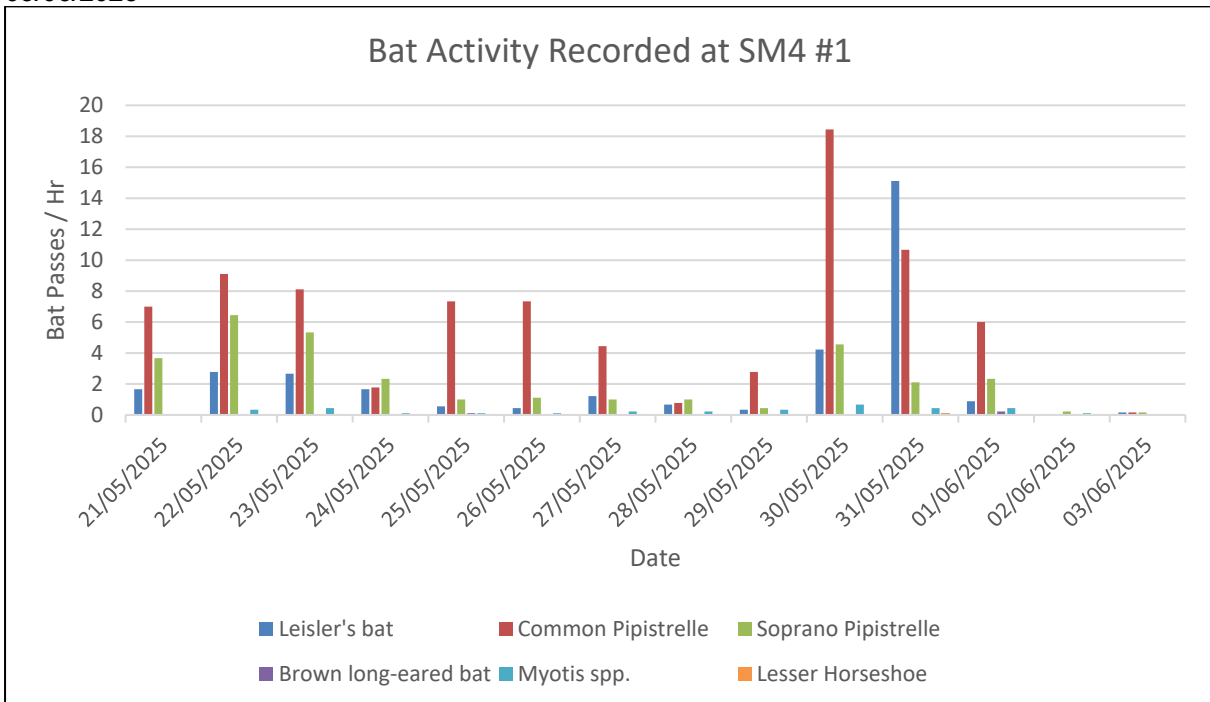
**Table 3-2: SM4 Results from Spring Monitoring – 30<sup>th</sup> May 2025 – 12<sup>th</sup> June 2025**

Static Monitor Location	Survey Period	Night	Common Pipistrelle	Soprano Pipistrelle	Leisler's bat	Brown Long Eared Bat	Myotis spp.	Lesser Horseshoe Bat
SM4 #1 (West)	21/05/2025 – 03/06/2025	1	Low	Low	Low	None	None	None
		2	Low	Low	Low	None	Low	None
		3	Low	Low	Low	None	Low	None
		4	Low	Low	Low	None	Low	None
		5	Low	Low	Low	Low	Low	None
		6	Low	Low	Low	None	Low	None
		7	Low	Low	Low	None	Low	None
		8	Low	Low	Low	None	Low	None
		9	Low	Low	Low	None	Low	None
		10	Moderate	Low	Low	None	Low	None
		11	Moderate	Low	Low	None	Low	Low
		12	Low	Low	Low	Low	Low	None
		13	None	Low	None	None	Low	None
		14	Low	Low	Low	None	None	None
SM4 #2 (East)	21/05/2025 – 03/06/2025	1	Moderate	Low	Low	Low	None	None
		2	Low	Low	Low	Low	Low	None
		3	Low	Low	Low	Low	None	None
		4	Low	Low	Moderate	None	None	None
		5	Low	Low	Low	None	None	None
		6	Low	Low	Low	None	None	None

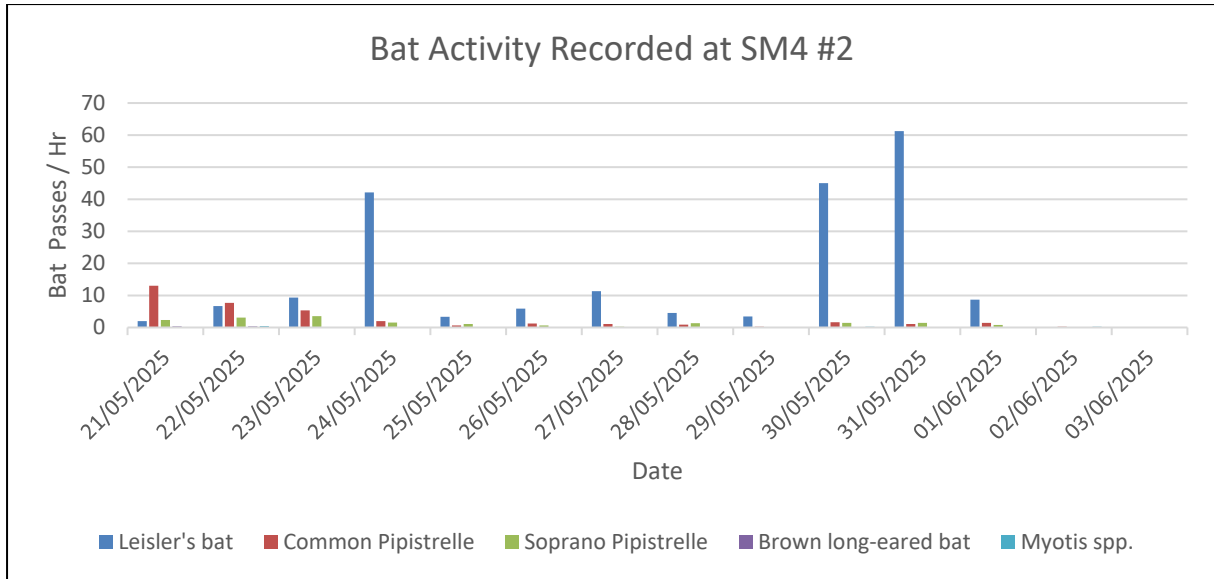
Static Monitor Location	Survey Period	Night	Common Pipistrelle	Soprano Pipistrelle	Leisler's bat	Brown Long Eared Bat	Myotis spp.	Lesser Horseshoe Bat
		7	Low	Low	Moderate	None	None	None
		8	Low	Low	Low	None	None	None
		9	Low	None	Low	None	None	None
		10	Low	Low	Moderate	None	Low	None
		11	Low	Low	High	None	Low	None
		12	Low	Low	Low	None	Low	None
		13	Low	None	Low	None	Low	None
		14	None	None	None	None	None	None
		14	Low	Low	Low	None	None	None

Figure 3-2 and Figure 3-3 below show bar charts illustrating the results from the SM4 monitoring undertaken within the Survey Area in 2025.

**Figure 3-2: Bar Chart illustrating Results from SM4 #1 Static Monitoring from 21/05/2025 - 03/06/2025**



**Figure 3-3: Bar Chart illustrating Results from SM4 #2 Static Monitoring from 21/05/2025 - 03/06/2025**



## 4 CONCLUSIONS

Bat surveys were undertaken within the Survey Area from 2023 – 2025 and included yearly nighttime bat walkover surveys and SM4 monitoring in 2025.

The bat survey results can be summarised as follows:

- Common pipistrelle, soprano pipistrelle, Leisler's bat, brown long-eared bat, and *Myotis* species were recorded commuting / foraging within or above the Survey Area during the NBW surveys. In addition to these species, one lesser horseshoe bat was recorded during the SM4 monitoring in 2025. The most frequently encountered species across all surveys were soprano pipistrelle, common pipistrelle and Leisler's bat. These species are widespread and the most commonly encountered species within Ireland;
- Leisler's bat and soprano pipistrelle were recorded soon after dusk during the first survey, indicating that a bat roost for this species is likely to be present within the local area. The survey recorded the majority of the bat commuting and foraging activity over the woodland, scrub and other vegetation in the north of the Survey Area; and,
- No bats were identified to be roosting on the Site.

## 5 REFERENCES

- [1] C. Kelleher and F. Marnell, "Bat Mitigation Guidelines for Ireland. Irish Wildlife Manuals, No. 25.," Department of Environment, Heritage and Local Government, Dublin, 2006.
- [2] F. Marnell, D. Looney and C. Lawton, "Ireland Red List No. 12 - Terrestrial Mammals," National Parks and Wildlife Service, Department of the Culture, Heritage and the Gaeltacht, Dublin, Ireland, 2019.
- [3] National Roads Authority, "Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes," 2006.
- [4] J. Collins, "Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th edn)," The Bat Conservation Trust, London, 2023.
- [5] National Parks and Wildlife Service, "National Parks and Wildlife Service," 2025. [Online]. Available: <https://www.npws.ie>.
- [6] NBDC, "National Biodiversity Live Maps," 2025. [Online]. Available: <http://maps.biodiversityireland.ie/>.
- [7] NBDC, "National Bat Database of Ireland," 2025. [Online]. Available: <https://maps.biodiversityireland.ie/Map/Terrestrial/Dataset/128>. [Accessed 2025].
- [8] McAney, K. et al., "A conservation plan for Irish vesper bats, Irish Wildlife Manual No.20," National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland, 2006.
- [9] P. Reason and S. Wray, "UK Bat Mitigation Guidelines: a guide to impact assessment, mitigation and compensation for developments affecting bats," Chartered Institute of Ecology and Environmental Management , Ampfield, 2023.
- [10] F. Marnell, C. Kelleher and E. Mullen, "Bat Mitigation Guidelines for Ireland - V2. Irish Wildlife Manuals, No. 134.," Department of Housing, Local Government and Heritage, Ireland, 2022.
- [11] NRA, "Guidelines for Assessment of Ecological Impacts of National Roads Schemes," 2009.
- [12] National Biodiversity Data Centre, "National Lesser Horseshoe Bat Database," 2025. [Online]. [Accessed 21 February 2025].
- [13] E. Korsten, E. Jansen, M. Boonman, M. Schillemans and H. Limpens, "Swarm and Switch: on the trail of the hibernating common pipistrelle," Bat News Issue 110, Bat Conservation Trust, 2016.
- [14] E. Jansen, E. Korsten, M. Schillemans, M. Boonman and H. Limpens, "A method for actively surveying mass hibernation sites of the common pipistrelle (Pipistrellus pipistrellus) in the urban environment.," Lutra, 2022.

- [15] C. Bell, "The annual occurrence of mass mortality at a Common Pipistrelle swarming site.," *European Journal of Wildlife Research*, 2022.
- [16] N. Tomlinson, "Eight years of swarming studies in Purbeck - what does it tell us?," *British Island Bats*, Volume 1, 2020.
- [17] Bat Conservation Trust, "Home to roost - largest hibernation of pipistrelle bats recorded at Seaton Delavel Hall," 2018. [Online]. Available: <https://www.bats.org.uk/news/2018/08/home-to-roost-largest-hibernation-of-pipistrelle-bats-recorded-at-seaton-delaval-hall>.



Murray Brothers Tarmacadam Ltd



**APPENDIX 14.4**  
**BIRD REPORT**

**VOLUME III**  
APPENDICES



APRIL 2026



# Bird Survey Results Report

## Ardcahan Quarry

On behalf of Murray Brothers  
Tarmacadam Ltd.



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**Job Number: E2049**

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**Checked By: Amelia Keane**

**Signed:** *Amelia Keane*

**Approved By: Dyfrig Hubble**

**Signed:** *[Signature]*

**Revision Record**

Issue No.	Date	Description	Remark	Prepared	Checked	Approved
01	18/02/2026	Bird Report	Final	SK	AK	DH

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**Bird Survey Results Report**  
**Ardcahan Quarry, Dunmanway, Co. Cork**  
**On behalf of Murray Brothers Tarmacadam Ltd.**  
**6 Joyce House, Barrack Square, Ballincollig, Co. Cork**

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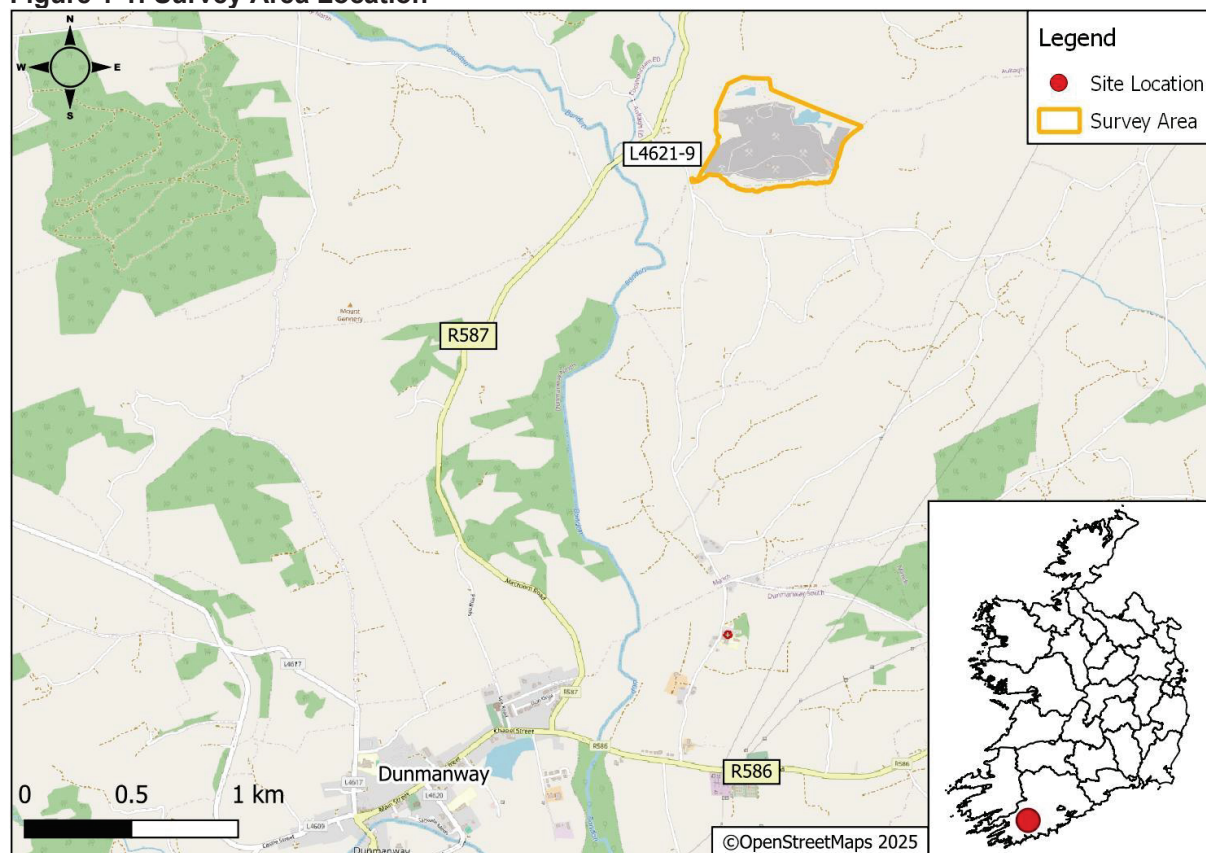
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## 1 INTRODUCTION

This report has been prepared by Malone O'Regan Environmental ('MOR Environmental') on behalf of our client Murray Brothers Tarmacadam Ltd ('the Applicant'), to present the findings of wintering bird surveys, breeding bird surveys and peregrine falcon surveys undertaken within Ardcahan Quarry and associated lands at Dunmanway, Co. Cork (ITM OS Reference W 25061 55898) ('the Survey Area').

The Survey Area is located on a site that is circa ('ca.') 25 hectares ('ha') in size and is located within the townland of Ardcahan, Co. Cork, ca. 3.5km northeast of Dunmanway, Co. Cork and is shown in Figure 1-1 ('the Survey Area').

Figure 1-1: Survey Area Location

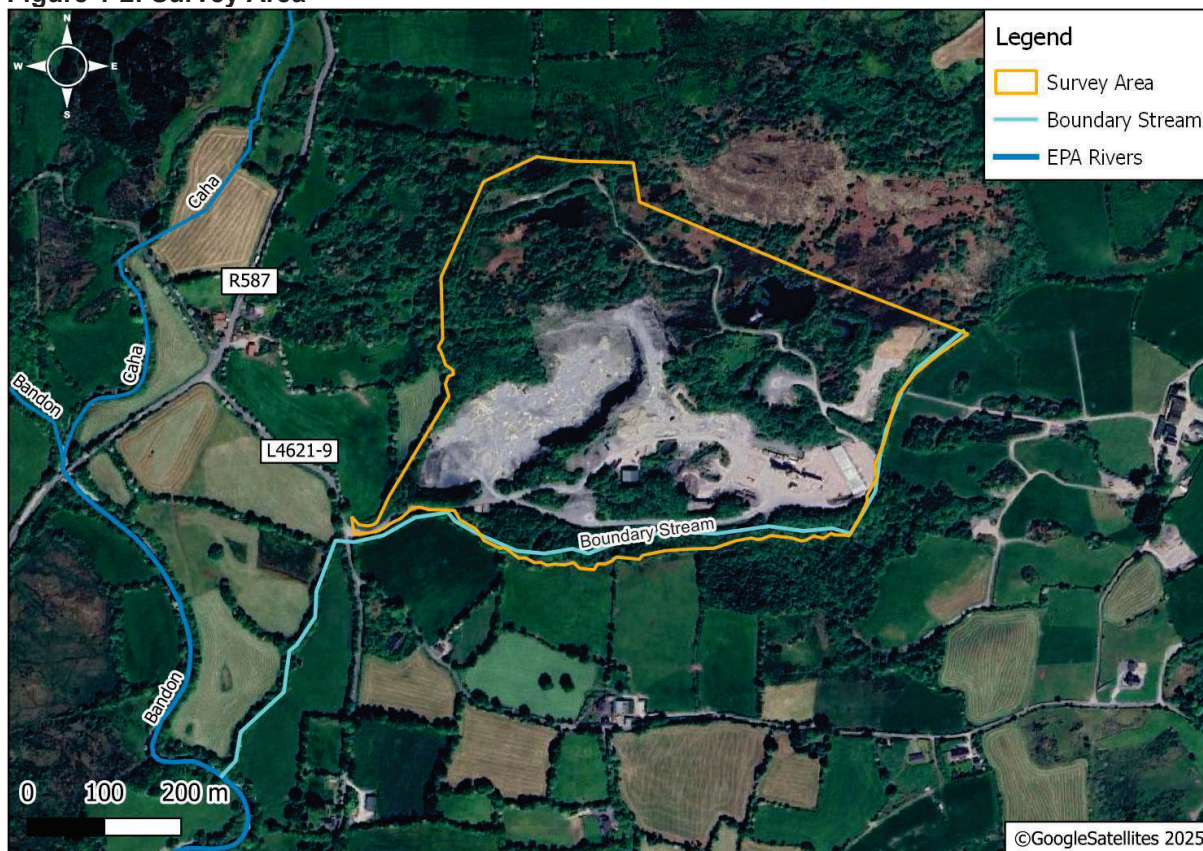


The Survey Area is located in a rural setting characterised by undulating topography, irregularly shaped fields and clusters of mixed woodland. The lands with the Survey Area are sloped with lower ground levels in the southwest (ca. 72 to 75 MOD1), rising to the north (118 MOD).

The former extraction area (1990 - 2014) is situated in the southwest of the overall landholding. The northern part of the landholding has not been quarried, but portions of it were used for storing crushed product, as a settling pond and for backfilling. In the southeast of the landholding is a tarmacadam production plant and buildings used for administration, welfare and storage purposes. The Survey Area also contains a network of internal roads which extend across the wider landholding.

The land immediately around the quarry consists of scrub, woodland and agricultural grassland. Land uses in the surrounding area primarily comprise livestock farming and rural housing.

Figure 1-2: Survey Area



## 1.1 Relevant Legislation

All wild birds are protected by law under the Wildlife Act 1976 and subsequent amendments. All species are afforded full protection under this Act, which makes it a criminal offence for anyone without a licence to:

- Kill or injure a wild bird;
- Disturb, damage or remove a wild bird nest or eggs; and,
- Disturb any wild bird while at the nest.

In addition to domestic legislation, birds are also protected under the EU Birds Directive (2009/147/EC). The Birds Directive provides for a network of sites to protect birds at their breeding, feeding, roosting and wintering areas.

For the purposes of this report, a species was considered to be of 'conservation concern' should it be included in one or more of the following:

- Annex 1 of the EU Birds Directive;
- Part 1 of the Fourth Schedule of the Wildlife Act, 1976 (as amended);
- Birds of Conservation Concern in Ireland ('BoCCI') red list; and,
- BoCCI amber list.

## 1.2 Objectives

The bird surveys aimed to assess the following:

### Wintering / Breeding Bird Suitability Assessment

- To ascertain the potential of the Survey Area to provide suitable habitat for breeding birds, to support important assemblages of wintering birds or to support rare or notable species.

### Wintering Bird Surveys

- To identify, if any, overwintering bird species utilise the Survey Area; and,
- To determine the potential of overwintering bird species, especially wetland bird species, to utilise the Survey Area as an inland feeding / roosting Site.

### Breeding Bird Surveys

- To identify and assess the number of active breeding bird territories within the Survey Area;
- To map active nests, where present, within the Survey Area;
- To evaluate the overall bird community within the Survey Area by recording all behavioural activity of birds; and,
- Utilise the information in order to identify and assess any areas of the Survey Area that may require special consideration during the breeding bird season.

### Breeding Peregrine Falcon (*Falco peregrinus*)

- To identify and assess the number of active peregrine falcon territories within the Survey Area;
- To map active nests, where present, within the Survey Area; and,
- To utilise the information in order to identify and assess any areas of the Survey Area that may require special consideration during the breeding bird season.

## 1.3 Statement of Authority

This report was checked by Ms. Amelia Keane, Senior MOR Environmental Consultant - Ecology. Amelia is a full member of the Chartered Institute of Ecology and Environmental Management ('CIEEM') and has over 6 years' experience working in the ecological consultancy with a specialisation in ornithology. As part of her role, Amelia regularly conducts ornithological surveys in line with Best Practice Guidelines and prepares specialist ornithological assessments and reports.

This report was approved by Mr. Dyfrig Hubble, Associate Director - Ecologist. Dyfrig is a full member of CIEEM. Dyfrig has over 18 years' experience working in the ecological consultancy sector, including habitat surveys and appraisals and specialist protected species surveys in support of Appropriate Assessments and Ecological Impact Assessments.

## 2 METHODOLOGY

The methodologies used to establish the presence or potential presence of breeding birds and potentially suitable habitat are summarised below.

### 2.1 Desk Study

A desk-based review of information sources was completed, which included the following sources of information:

- Review of aerial maps of the Survey Area and the surrounding area;
- The National Parks and Wildlife Service ('NPWS') website was consulted to obtain the most up-to-date details on conservation objectives for the European Designated sites relevant to this assessment [1];
- Bird Watch Ireland – The Irish Wetland Bird Survey ('I-WeBS') data was reviewed with regard to wintering waterbird population within the vicinity of the Survey Area [2]; and,
- The National Biodiversity Data Centre ('NBDC') website was consulted with regard to species distributions within 2km of the Survey Area [3].

#### 2.1.1 Irish Wetland Bird Survey ('I-WeBS')

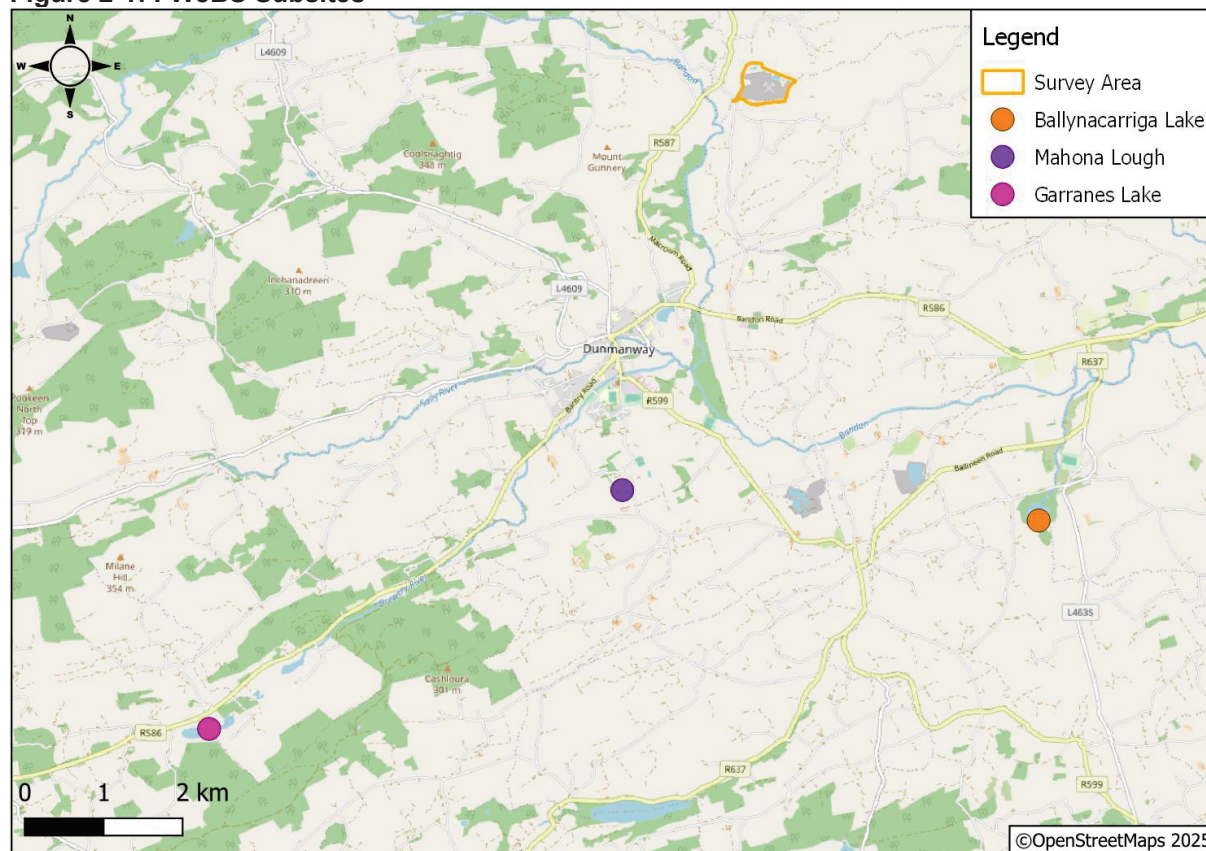
As mentioned above, I-WeBS data was reviewed in order to understand the potential assemblages of wintering bird populations that tend to occur within the vicinity of the Survey Area.

As part of this review, a data request was submitted to the I-WeBS on 13<sup>th</sup> February 2025, which is coordinated by BirdWatch Ireland and under contract to the NPWS. The data request was made for all available data from the nearest subsites in the vicinity of the Survey Area, which resulted in data from eight subsites to the Survey Area as listed in Table 2-1 below. See Figure 2-1 for the location of the subsites in relation to the Survey Area.

**Table 2-1: I-WeBS subsites**

Site Name	Site Code	Distance from the Survey Area (km)	Direction from the Survey Area
Ballynacarriga Lake	0L013	ca. 6.1km	SE
Mahona Lough	0L014	ca. 5.1km	SW
Garranes Lake	0L023	ca. 10.3km	SW

Figure 2-1: I-WeBS Subsites



## 2.2 Field Studies

### 2.2.1 Habitat Assessment

An initial habitat survey was undertaken on 9<sup>th</sup> January 2023, by two suitably qualified MOR Environmental Ecologists, with updated surveys completed on:

- 17<sup>th</sup> September 2024; and
- 21<sup>st</sup> May 2025.

These surveys aimed to assess the extent and quality of habitats present within the Survey Area and to identify any potential ecological receptors. All the surveys were undertaken using Fossitt's 'Guide to Habitats in Ireland' [4] and were conducted in line with the Heritage Council's 'Best Practice Guidance for Habitat Survey and Mapping' [5].

### 2.2.2 Bird Suitability Assessment

During the initial habitat survey on 9<sup>th</sup> September 2023, the Survey Area was assessed for its potential to provide nesting habitat for breeding birds, to support important assemblages of wintering birds or to support rare or notable species.

The habitats within the Survey Area were fully assessed for their potential to provide suitable nesting, winter roosting habitat or foraging habitat. Areas of wetland habitat, scrub habitat and woodland were noted.

Following the initial assessment of the Survey Area and a desk-based review, it was deemed necessary to undertake specialist wintering and breeding bird surveys on the Site.

### 2.2.3 Winter Bird Survey

Vantage point ('VP') bird surveys were undertaken at the Survey Area by a suitably qualified and experienced MOR Environmental ecologist on 16<sup>th</sup> February 2023 and 21<sup>st</sup> March 2023.

The surveys were undertaken at pre-determined VP locations; see Figure 2-3. Given the fact that the Survey Area contains two large separate waterbodies, two VP locations were identified that provide suitable views of each waterbody and were located in a safe position away from ongoing activities associated with the tarmacadam plant within the Survey Area.

All species observed utilising the Survey Area were recorded, and their locations were marked on the maps. The surveys were undertaken using methodology adapted from the I-WeBS Core Counts methodology [6]. This methodology employs the well-established technique of counting the numbers of waterbirds at wetland sites using the so-called 'look-see' method, whereby the observer surveys the whole of a predefined area.

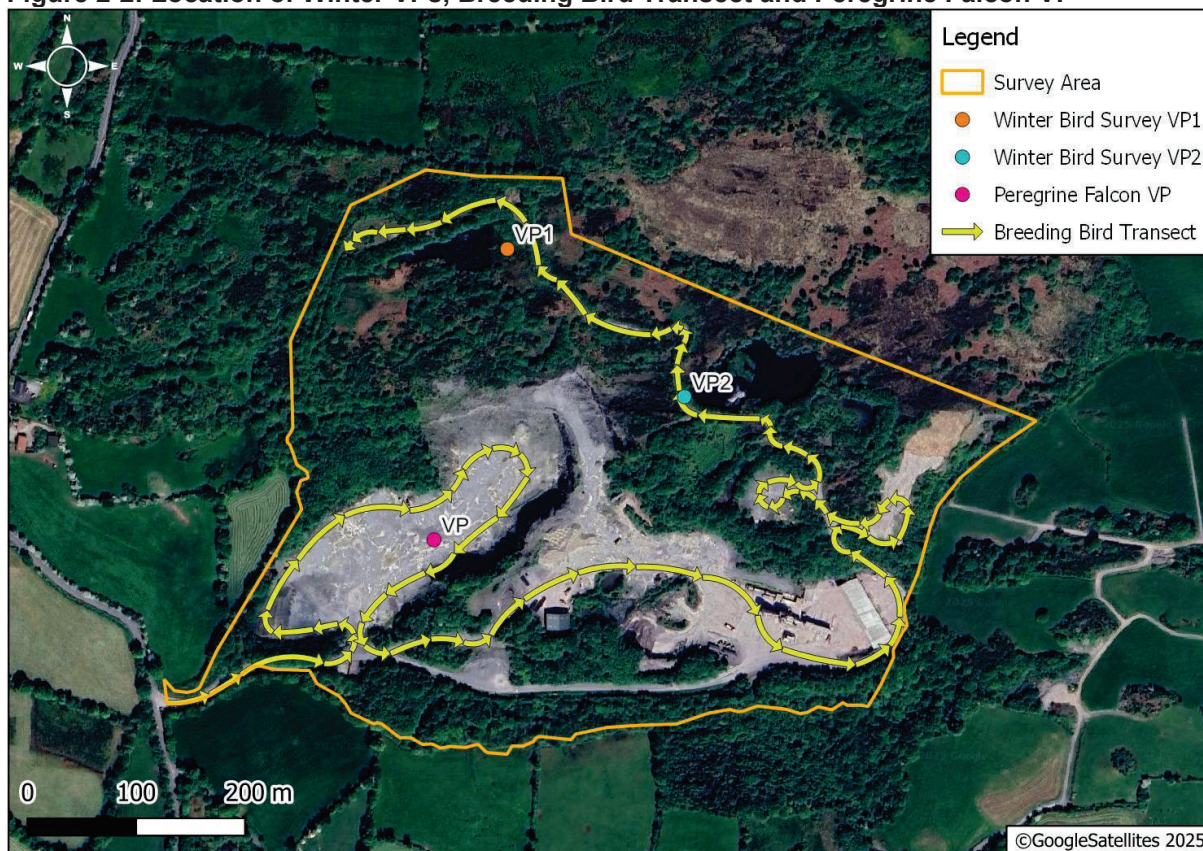
During the surveys, all birds were recorded using a standard British Trust for Ornithology ('BTO') code through sight and sound and used optical equipment, such as a telescope and binoculars, to minimise disturbance to wintering birds. The behaviours and activities of the birds were recorded to identify whether the birds were roosting or feeding within the Survey Area.

The date, time, tide (in Cork Harbour) and weather conditions of each survey are described in Table 2-2.

**Table 2-2: Wintering Bird Survey Metadata**

Visit No.	Date	Time		Tide Times	Temp (°C) Start - End	Wind (Beaufort Scale)	Rain	Cloud Cover
		VP1	VP2					
1	16/02/2023	08:30 – 11:30	11:30 – 14:30	13:21 (high)	9 - 10°C	3	Showers	25- 100%
2	21/03/2023	08:00 – 11:00	11:05- 14:05	11:48 (low)	9 - 10°C	4	Heavy Rain Showers	100%

**Figure 2-2: Location of Winter VPs, Breeding Bird Transect and Peregrine Falcon VP**



### 2.2.4 Breeding Bird Survey

Breeding bird transect surveys were undertaken within the Survey Area on the following dates:

- 17<sup>th</sup> May 2023;
- 7<sup>th</sup> June 2023;
- 12<sup>th</sup> July 2023;
- 10<sup>th</sup> April 2025; and,
- 23<sup>rd</sup> April 2025.

These surveys were conducted by a suitably qualified and experienced MOR Environmental Ecologist, and in line with the methodology described in:

- British Trust for Ornithology ('BTO') - *A Field Guide to Monitoring Nests* [7]; and,
- Common Bird Census in *Bird Monitoring Methods* [8].

The Common Bird Census ('CBC') methodology was used to establish whether any breeding bird species were utilising the Survey Area. The transect route is shown in Figure 2-2 above.

All birds were recorded through sight and sound. Optical equipment was used, including binoculars, in order to minimise disturbance to potentially breeding birds. During the surveys, the behavioural activity of the recorded birds was noted using the BTO breeding status codes [9]. Birds that displayed non-territorial behaviours were recorded as well (i.e., birds that were foraging and not calling, birds that were loafing).

Birds were classified as non-breeding, possibly breeding and confirmed breeding based on the behaviours exhibited. The criteria for each classification are described below:

- Non-breeding – Birds that were flying over the Survey Area, birds that were foraging and not calling, birds that were loafing;
- Possibly Breeding – Birds observed in suitable nesting habitat and displaying either territorial and / or courtship behaviours, including singing / calling, nest building behaviours or observed visiting a possible nest; and,
- Confirmed Breeding – Birds observed either on nest or carrying faecal sac or food, sighting of a nest with eggs / chicks, used nests, eggshells or recently fledged young.

The metadata for the breeding bird surveys are described in Table 2-3. The transects used are shown in Figure 2-2.

**Table 2-3: Breeding Bird Survey Metadata**

Visit	Date	Survey Times (Start-End)	Temperature (°C) (Start – End)	Wind (Beaufort Wind Scale)	Rain	Cloud Cover
1	17/05/2023	07:15 – 08:45	7 - 10°C	1	None	0-10%
2	07/06/2023	07:15 – 08:45	11 – 14°C	2	None	80-100%
3	12/07/2023	07:30 – 08:55	13 – 14°C	2	None	40-50%
4	10/04/2025	07:15 – 08:50	5 – 8°C	2	None	0%
5	23/04/2025	06:40 – 08:20	6 – 10°C	3	None	80%

## 2.2.5 Peregrine Falcon Survey

Following the identification of suitable peregrine falcon habitat within the Survey Area, targeted surveys were undertaken by suitably qualified and experienced MOR Environmental Ecologists on the following dates:

- 17<sup>th</sup> May 2023;
- 7<sup>th</sup> June 2023;
- 14<sup>th</sup> April 2025; and,
- 23<sup>rd</sup> April 2025.

These surveys were undertaken to confirm the presence / absence of peregrine falcon within the vicinity of the Survey Area.

The surveys were undertaken at a pre-determined VP to the southwest of the Survey Area, which provided appropriate views of the suitable nesting habitat for peregrine falcon; see Figure 2-3 above.

The VP surveys were conducted over a 3-hour period. The surveyors recorded peregrine falcons through sightings and, where possible, sound. Optical equipment, including binoculars and telescopes, was used to minimise disturbance to any birds potentially present on the Site.

The peregrine falcon surveys were conducted utilising methodology adapted from:

- Raptors: A Field Guide for Surveys and Monitoring [10]; and,
- BTO – A Field Guide to Monitoring Nests [7].

Survey dates, times and weather conditions are described in Table 2-4.

**Table 2-4: Peregrine Falcon Survey Metadata**

Date	Survey Times (Start-End)	Temperature (°C) (Start – End)	Wind (Beaufort Wind Scale)	Rain	Cloud Cover (0-100%)	Visibility
17/05/2023	10:00-13:10	13-16°C	4	None	10%	Good
06/06/2023	10:00-13:00	14-18°C	3	None	75-100%	Good
14/04/2025	10:00-13:00	10-17°C	2	None	0%	Good
23/04/2025	10:00-13:00	12-15°C	0	None	50-70%	Good

## 2.3 Survey Constraints

Sections of the Survey Area were inaccessible due to steep topography, water or dense vegetated gorse cover. Additionally, noise levels within a section of the Survey Area, particularly around operational buildings and machinery, limited the ability to detect potential birds, as background noise made it difficult to detect. However, it is not considered that these areas are likely to support flora or fauna that present a constraint to this survey or this assessment.

The bird survey VPs were selected on the basis that it facilitated the best view of the waterbodies within and adjacent to the Survey Area. Refer to Figures 2-2 and Figure 2-3 above.

These areas were considered relatively small in comparison to the total size of the ponds. As birds are highly mobile and move throughout the ponds during the surveys, these obstructed areas were not considered to be a significant limitation.

No other limitations were encountered during the bird surveys.

## 2.4 Avian Receptor Evaluation

The value of the avian receptors at the Survey Area was evaluated using the ecological evaluation guidance given in the National Roads Authority ('NRA') guidance on assessment of ecological impacts of National Road Schemes [11]. This guidance provides ratings for resources based primarily on geographic context and allows for resources at International, National, County and Local (higher and lower value) levels. Key ecological receptors for assessment are those deemed to be above the 'Local Importance (lower value)' evaluation (see Table 2-5 below).

**Table 2-5: NRA Guidance for Evaluation Criteria relevant to Avian Fauna**

Resource Evaluation	Criteria
International Importance	<p>'European Site' including Special Area of Conservation ('SAC'), Site of Community Importance ('SCI'), Special Protection Area ('SPA'), proposed Special Area of Conservation, or Proposed Special Protection Area ('pSPA').</p> <p>Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971). World Heritage Site (Convention for the Protection of World Cultural &amp; Natural Heritage, 1972).</p> <p>Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979).</p> <p>Resident or regularly occurring populations (assessed to be important at the national level) of the following:</p> <ul style="list-style-type: none"> <li>Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive.</li> </ul>

Resource Evaluation	Criteria
National Importance	<p>Site designated or proposed as a Natural Heritage Area ('NHA'), Statutory Nature Reserve, Refuge for Fauna and Flora protected under the Wildlife Acts, or National Park,</p> <p>Resident or regularly occurring populations (assessed to be important at the national level) of the following:</p> <ul style="list-style-type: none"> <li>• Species protected under the Wildlife Acts; and / or</li> <li>• Species listed on the relevant Red Data list.</li> </ul>
County Importance	<p>County important populations of species, or viable areas of semi-natural habitats or natural heritage features identified in the National or Local Biodiversity Action Plan ('BAP') (if this has been prepared).</p> <p>Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.</p> <p>Resident or regularly occurring populations (assessed to be important at the County level) of the following:</p> <ul style="list-style-type: none"> <li>• Species of bird, listed in Annex I and / or referred to in Article 4(2) of the Birds Directive.</li> <li>• Species protected under the Wildlife Acts; and / or,</li> <li>• Species listed on the relevant Red Data list.</li> </ul>
Local Importance (High Value)	<p>Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP (if this has been prepared).</p> <p>Resident or regularly occurring populations (assessed to be important at the Local level) of the following:</p> <ul style="list-style-type: none"> <li>• Species of bird, listed in Annex I and / or referred to in Article 4(2) of the Birds Directive.</li> <li>• Species protected under the Wildlife Acts; and / or,</li> <li>• Species listed on the relevant Red Data list.</li> </ul>
Local Importance (Low Value)	<p>Species that remain common and widespread.</p> <p>Green Listed species.</p>

### 3 RESULTS

#### 3.1 Desk Study

##### 3.1.1 NBDC Data

Table 3-1 provides a summary of records held by the NBDC for legally protected or otherwise notable bird species that occurred within 2km of the Survey Area over the last ten years [3]. The NBDC records were checked on 17<sup>th</sup> February 2025.

The parameter of ten years was chosen to allow for habitat adaption and modification; it is considered that any records over ten years old are not representative of the current distribution of species populations.

**Table 3-1: Bird Species within 2km of the Survey Area (Grid: W25G, W25H, W25I, W25L, W25M, W25N, W25R, W25S, W25T)**

Common Name	Scientific Name	Date of last record	Designation
<b>Bird Species</b>			
Blackcap	<i>Sylvia atricapilla</i>	10/06/2014	Wildlife Acts 1976 / 2000 Birds of Conservation Concern Green List
Common Buzzard	<i>Buteo buteo</i>	30/06/2016	Wildlife Acts 1976 / 2000 Birds of Conservation Concern Green List
Common Kingfisher	<i>Alcedo atthis</i>	15/06/2017	Wildlife Acts 1976 / 2000 Birds of Conservation Concern Amber List
Common Swift	<i>Apus apus</i>	14/07/2021	Wildlife Acts 1976 / 2000 Birds of Conservation Concern Red List

##### 3.1.2 Irish Wetland Bird Survey ('I-WeBS')

I-WeBS data was requested for nearby sites within the vicinity of the Survey Area. This data request was for all available data from the nearest I-WeBS sites. This included the following sites and years of data:

- Ballynacarriga Lake (Site code: 0L013) – Data from 1994/1995 to 2019/2020, but there was no available data for 2012/2013;
- Mahona Lough (Site code: 0L014) – Data provided only for 2018/2019; and,
- Garranes Lake (Site code: 0L023) – Data provided only for 2012/2013.

It is important to note that although the data sets for these sites and subsites were not continuous and contained information gaps for years, the records still provide an understanding of the potential assemblage of bird populations that may utilise the areas within the vicinity of the Survey Area.

A total of 29 species were recorded in all of the data. However, during the most recent counts available, the 2019/2020 season, a total of 26 species were recorded.

Following a review of the available data, no species were recorded in numbers of international importance. However, three species were recorded in the Ballynacarriga Lake site in numbers that were considered to be of national importance:

- Coot were recorded at numbers of international importance in the 2019/20;
- Gadwall were recorded at numbers of international importance in the 2019/20; and,
- Little grebe were recorded at numbers of international importance in the 2019/20.

It should be noted that these subsites are not located within the immediate vicinity of the Survey Area.

## **3.2 Field Studies**

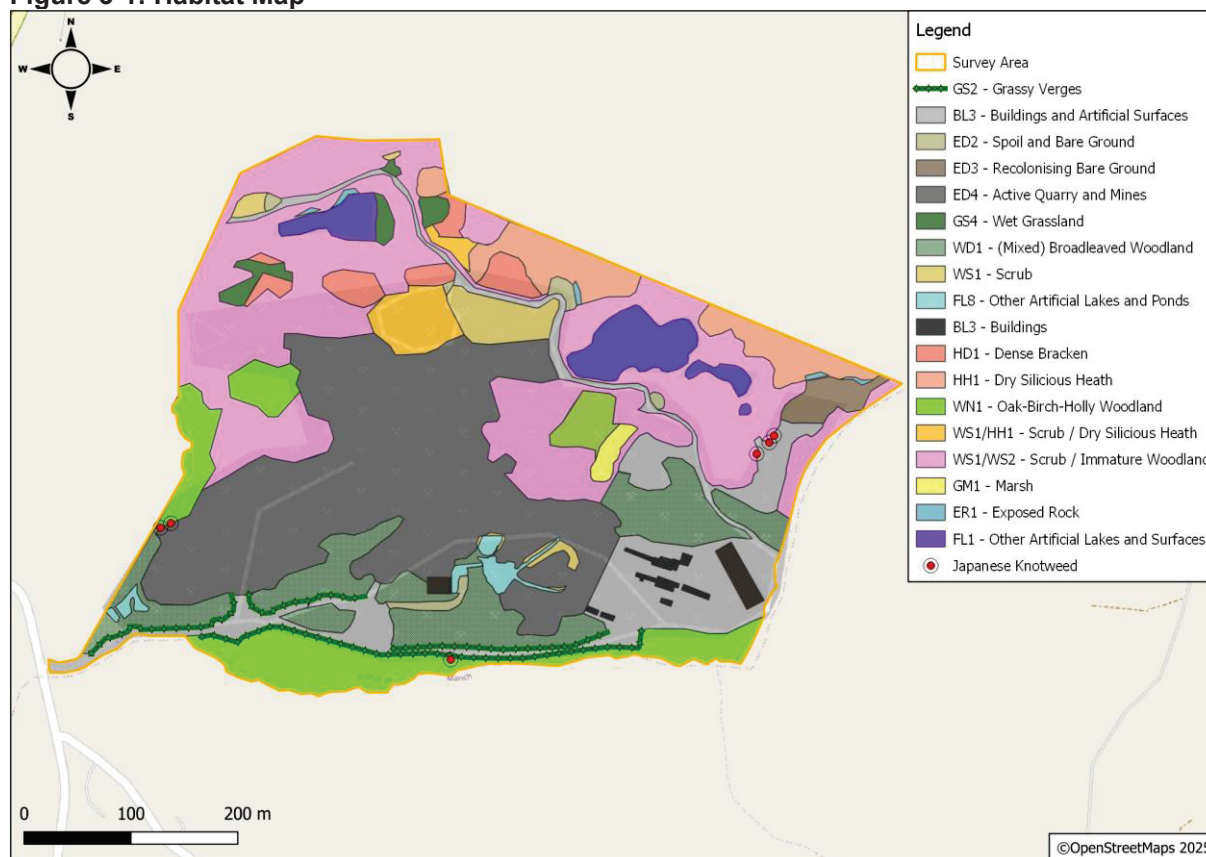
### **3.2.1 Habitat Assessment**

The habitat assessments identified the following habitats on-site:

- Active Quarry and Mines (ED4);
- Artificial Surfaces (BL3);
- Bare Ground (ED2);
- Dense Bracken (HD1);
- Dry Silicious Heath (HH1);
- Dystrophic Lake (FL1);
- Exposed Rock (ER1);
- Grassy Verges (GS2);
- Marsh (GM1);
- Mixed Broadleaved Woodland (WD1);
- Oak-Birch-Holly Woodland (WN1);
- Other Artificial Lakes and Ponds (FL8);
- Recolonising Bare Ground (ED3);
- Scrub (WS1);
- Scrub / Immature Woodland (WS1 / WS2); and,
- Wet Grassland (GS4).

The distribution of habitats is illustrated in Figure 3-1.

**Figure 3-1: Habitat Map**



### 3.2.2 Bird Habitat Assessment

The surveys undertaken at the Survey Area identified two lakes that had the potential to support wintering and breeding waterbirds. As a result, both wintering and breeding bird surveys were conducted to assess these areas.

The woodlands, scrub, wet grassland and heath within the Survey Area had the potential to support breeding birds. Therefore, breeding bird surveys were undertaken.

The cliff edges of the quarry were identified with the potential to support peregrine falcon. Therefore, peregrine falcon surveys were undertaken.

### 3.2.3 Wintering Bird Surveys

Table 3-2 contains a summary of the birds recorded within the Survey Area and flying over the Survey Area, and their status according to the BoCCI, which is the third assessment of the status of all regularly occurring birds on the island of Ireland [13].

During the wintering bird VP surveys, a total of ten species were recorded:

- Four Green-listed BoCCI non-Annex I species – buzzard, grey heron, jay and moorhen;
- Six Amber-listed BoCCI, non-Annex I species were recorded – coot, herring gull, mallard, tufted duck, teal and little grebe; and,
- No Red-listed BoCCI species were recorded.

Details on the species that were recorded, their abundance and their behaviours are provided in Table 3-2 below.

**Table 3-2: Birds Recorded within the Survey Area during the Wintering Bird Surveys**

BoCCI Conservation Status (EU Birds Directive Annex Species)	Species	Latin Name	Number Recorded		Notes
			Visit 1	Visit 2	
<b>Green Listed</b>	Buzzard	<i>Buteo buteo</i>	2	0	Visit 1: Two individuals were observed calling and soaring east of VP1. Visit 2: No buzzards were observed during this survey.
	Grey Heron	<i>Turdus merula</i>	1	1	Visit 1: One individual was observed flying low over the pond from VP1. Visit 2: One individual was identified flying south over VP2.
	Eurasian Jay	<i>Garrulus glandarius</i>	1	0	Visit 1: One individual was identified calling from within the scrub at VP1. Visit 2: No Eurasian jays were observed during this survey.
	Little Grebe	<i>Tachybaptus ruficollis</i>	8	5	Visit 1: One individual was observed diving under the water within the pond at VP2. One individual dove twice into the pond and resurfaced at VP2. One individual dove into reeds within the pond at VP2. One individual dove beside the reeds within the pond at VP2. One individual was observed travelling across the pond at VP2. Two individuals were observed travelling across the pond at VP2. One individual was observed pruning and diving in the centre of the pond at VP2 Visit 2: Two individuals were observed emerging from vegetation within the pond at VP2. One individual was observed swimming and diving within the pond at VP1. Two individuals were observed swimming and diving along the bank of the pond at VP1.
	Moorhen	<i>Gallinula chloropus</i>	1	5	Visit 1: One individual was travelling across the pond at VP2 Visit 2: Two individuals were recorded swimming in front of VP1. One individual was calling from within the woodland at VP1. One individual was observed calling and travelling across the pond at VP1. One individual was observed travelling across the pond at VP1.

<b>Amber Listed</b>					<p>Visit 1: One individual was flushed before the survey at VP2.</p> <p>Visit 2: One individual was observed flying east over the Survey Area at VP1. Two individuals (female and male) were flushed and flew west at VP2. Five individuals were observed on the water within the pond during the survey at VP2. Four individuals were flushed and flew west, circled and then flew south at VP2. Two individuals flew south over the Survey Area at VP2. Two individuals were observed calling and flying over the Survey Area at VP2. Two individuals landed along the bank of the pond at VP2. One female individual was flushed and flew south at VP2. One male individual flew from the west and landed on the pond at VP2. One male individual flew from the east and landed along the bank of the pond at VP2.</p>
Mallard	<i>Anas platyrhynchos</i>	1	18		<p>Visit 1: Two individuals (possibly a breeding pair) were observed travelling across the pond at VP2.</p> <p>Visit 2: No teal were observed during this survey.</p>
Teal	<i>Anas crecca</i>	2	0		<p>Visit 1: No coot were observed during these surveys.</p> <p>Visit 2: One individual was observed swimming and diving within the pond at VP1. One individual was observed swimming within the pond at VP1. One individual was observed swimming to the north of the pond by VP1. One individual was observed feeding and swimming into rushes within the pond at VP1. One individual was observed swimming to the west of the pond and diving at VP1. One individual was observed swimming and diving to the west of the pond at VP1.</p>
Coot	<i>Fulica atra</i>	0	6		<p>Visit 1: No herring gull were observed during these surveys.</p> <p>Visit 2: One individual was observed flying east over the Survey Area at VP1.</p>
Herring gull	<i>Larus argentatus</i>	0	1		

\*Annex I species

### 3.2.4 Breeding Bird Surveys

Table 3-3 and Table 3-4 contain a summary of the birds recorded within the Survey Area during the breeding bird surveys and their status according to the Birds of Conservation Concern in Ireland ('BoCCI'), which is the third assessment of the status of all regularly occurring birds on the island of Ireland [13].

Details on the species that were recorded, their abundance and their behaviours are provided in Table 3-3 and Table 3-4 below.

During the 2023 breeding bird surveys, a total of 26 species were recorded:

- 20 Green-Listed BoCCI non-Annex I species – blackbird, blackcap, blue tit, bullfinch, chaffinch, chiffchaff, dunnock, goldfinch, great tit, jackdaw, little grebe, moorhen, pied wagtail, redpoll, robin, sedge warbler, song thrush, treecreeper and wren; and,
- Six Amber-Listed BoCCI, non-Annex I species were recorded – goldcrest, house sparrow, swallow, willow warbler, mallard and sand martin.

Of the species recorded, three were classified as '*Confirmed Breeding*' - jackdaw, wren, and sand martin (see Table 3-3 below). In addition, 17 other species were classified as '*Possibly Breeding*' and six species were classified as '*Non-breeding*'.

During the 2025 breeding bird surveys, a total of 28 species were recorded:

- 21 Green-Listed BoCCI non-Annex I species – blackbird, blackcap, blue tit, chaffinch, chiffchaff, coal tit, dunnock, great tit, hooded crow, jackdaw, jay, little grebe, mistle thrush, peregrine falcon, pheasant, redpoll, robin, rook, song thrush, woodpigeon and wren; and,
- Six Amber-Listed BoCCI, non-Annex I species were recorded – goldcrest, mallard, sand martin, swallow, willow warbler, grey wagtail and starling.

No Red-listed species were recorded.

Of the species recorded, four were classified as '*Confirmed Breeding*' - blackbird, jackdaw, rook, and sand martin (see Table 3-4 below). In addition, 20 other species were classified as '*Possibly Breeding*', and four species were classified as '*Non-breeding*'.

**Table 3-3: Birds Recorded within the Survey Area during the 2023 Breeding Bird Surveys**

BoCCI Conservation Status (EU Birds Directive Annex Species)	Species	Latin Name	Number Recorded			Notes	Breeding Status
			Visit 1	Visit 2	Visit 3		
Green Listed	Blackbird	<i>Turdus merula</i>	5	4	0	<p>Visit 1: One individual was identified calling from within the heath along the northeastern boundary of the Survey Area. One individual was identified calling from within the immature woodland to the north of the Survey Area. One individual was identified calling from within the heath to the north of the Survey Area. Two individuals were calling and flushed from the immature woodland northwest of the Survey Area.</p> <p>Visit 2: One individual was identified flying from the pond towards the buildings south of the Survey Area. One individual was observed calling beside the building southeast of the Survey Area. One individual was identified calling from the oak-birch-holly woodland west of the Survey Area. One individual was identified calling from the immature woodland south of the Survey Area.</p> <p>Visit 3: No blackbirds were recorded during this survey.</p>	Possibly Breeding
	Blue Tit	<i>Cyanistes caeruleus</i>	2	2	8	<p>Visit 1: One individual was observed flying over a building to the south of the Survey Area. One individual was observed calling from the oak-birch-holly woodland south of the Survey Area.</p> <p>Visit 2: One individual was observed calling from the oak-birch-holly woodland to the south of the Survey Area. One individual was observed calling from the immature woodland to the west of the Survey Area along the boundary.</p> <p>Visit 3: Five individuals were observed calling and perching within the broadleaved woodland south of the quarry area. Two individuals were observed calling from within the immature woodland east of the Survey Area. One individual was observed calling from the immature woodland east of the pond within the Survey area.</p>	Possibly Breeding
	Blackcap	<i>Sylvia atricapilla</i>	8	6	7	<p>Visit 1: Four individuals were observed calling from the broadleaved woodland south of the quarry area. Two individuals were observed calling and perching from within the oak-birch-holly woodland along the western boundary of the Survey Area. One individual was observed calling from</p>	Possibly Breeding

BoCCI Conservation Status (EU Birds Directive Annex Species)	Species	Latin Name	Number Recorded			Notes	Breeding Status
			Visit 1	Visit 2	Visit 3		
						<p>within the oak-birch-holly woodland along the southern boundary of the Survey Area. One individual was observed calling from within the broadleaved woodland along the southeastern boundary of the Survey Area behind the building.</p> <p>Visit 2: Two individuals were observed calling/perching and showing territorial behaviour from within the broadleaved woodland to the south of the quarry area. Two individuals were observed calling from within the oak-birch-holly woodland along the southern boundary of the Survey Area. One individual was observed calling from within the heath along the northern boundary of the Survey Area. One individual was observed calling from within the scrub along the northwestern boundary.</p> <p>Visit 3: Three individuals were observed calling from within the immature woodland to the east of the quarry area. Two individuals were observed calling from within the immature woodland to the north of the quarry area. Two individuals were observed calling from within the immature woodland along the northwestern boundary of the Survey Area.</p>	
	Bullfinch	<i>Pyrrhula pyrrhula</i>	1	0	0	<p>Visit 1: One individual was observed flying over a building along the southwestern boundary of the Survey Area.</p> <p>Visit 2: No bullfinch were observed during this survey.</p> <p>Visit 3: No bullfinch were observed during this survey.</p>	Non-Breeding
	Chaffinch	<i>Fringilla coelebs</i>	6	4	2	<p>Visit 1: Two individuals were observed calling and perching from within the broadleaved woodland along the southwestern Survey Area boundary. One individual was observed flying over a building south of the quarry area. Two individuals were observed calling and perching within the broadleaved woodland south of the quarry area. One individual was observed calling within the immature woodland north of the Survey Area.</p> <p>Visit 2: One individual was observed calling within the scrub in the quarry area. Two individuals were observed calling from the immature woodland along the southeastern boundary. One individual was observed calling from within the immature woodland southeast of the Survey Area.</p>	Possibly Breeding

BoCCI Conservation Status (EU Birds Directive Annex Species)	Species	Latin Name	Number Recorded			Notes	Breeding Status
			Visit 1	Visit 2	Visit 3		
						Visit 3: Two individuals were observed perched within the immature woodland east of the Survey Area.	
	Chiffchaff	<i>Phylloscopus collybita</i>	14	11	5	<p>Visit 1: Three individuals were observed calling from the scrub within the quarry area. One individual was observed calling within the broadleaved woodland south of the quarry area. Two individuals were observed calling within the immature woodland along the southern boundary. One individual was observed calling from the scrub within the quarry area. Two individuals were observed calling within the immature woodland along the northwestern boundary. Four individuals were observed calling within the immature woodland to the northwest corner of the Survey Area.</p> <p>Visit 2: One individual was observed calling within the quarry area. Two individuals were observed calling within the broadleaved woodland in the southwestern corner of the Survey Area. Two individuals were observed calling within the immature woodland in the southeastern corner of the Survey Area. One individual was observed calling within the immature woodland northeast of the Survey Area. One individual was observed calling within the scrub north of the quarry area. One individual was observed calling by the pond northwest of the Survey Area. Four individuals were observed calling within the immature woodland along the northwestern boundary of the Survey Area.</p> <p>Visit 3: One individual was observed calling within the broadleaved woodland south of the quarry area. One individual was observed calling territorially within the oak-birch-holly woodland along the southern boundary of the Survey Area. One individual was observed calling within the oak-birch-holly woodland along the southern boundary of the Survey Area. Two individuals were observed calling territorially within the immature woodland along the northwestern corner of the Survey Area.</p>	Possibly Breeding

BoCCI Conservation Status (EU Birds Directive Annex Species)	Species	Latin Name	Number Recorded			Notes	Breeding Status
			Visit 1	Visit 2	Visit 3		
	Dunnock	<i>Prunella modularis</i>	1	3	0	<p>Visit 1: One individual was observed calling within the scrub within the quarry area.</p> <p>Visit 2: Two individuals were observed calling within the scrub southwest of the Survey Area. One individual was observed calling within the broadleaved woodland along the southwestern boundary of the Survey Area.</p> <p>Visit 3: No dunnocks were observed during this survey.</p>	Possibly Breeding
	Goldfinch	<i>Carduelis carduelis</i>	2	0	0	<p>Visit 1: Two individuals were observed calling and perching within the immature woodland beside a building southeast of the Survey Area.</p> <p>Visit 2: No goldfinch were observed during this survey.</p> <p>Visit 3: No goldfinch were observed during this survey.</p>	Possibly Breeding
	Great Tit	<i>Parus major</i>	3	5	2	<p>Visit 1: Two individuals were observed calling and perching within the oak-birch-holly woodland along the southeastern corner of the Survey Area boundary. One individual was observed calling and perching within the immature woodland along the northern boundary of the Survey Area.</p> <p>Visit 2: Two individuals were observed calling within the scrub in the quarry area. Three possible chicks were observed calling within the immature woodland along the southeastern corner of the Survey Area boundary.</p> <p>Visit 3: Two individuals were observed calling and perching within the immature woodland to the east of the Survey Area.</p>	Possibly Breeding
	Jackdaw	<i>Coloeus monedula</i>	1	2	6	<p>Visit 1: One individual was observed calling and perching within a dead tree within the quarry area.</p> <p>Visit 2: Two individuals were observed calling and flying above a building within the quarry area.</p> <p>Visit 3: Six individuals were observed calling and perching within a nest along the quarry face to the south of the Survey Area.</p>	Confirmed Breeding

BoCCI Conservation Status (EU Birds Directive Annex Species)	Species	Latin Name	Number Recorded			Notes	Breeding Status
			Visit 1	Visit 2	Visit 3		
	Little Grebe	<i>Tachybaptus ruficollis</i>	1	0	0	Visit 1: One individual was observed calling within the reedbed in the pond to the north of the Survey Area. Visit 2: No little grebe were observed during this survey. Visit 3: No little grebe were observed during this survey.	Possibly Breeding
	Moorhen	<i>Gallinula chloropus</i>	1	0	0	Visit 1: One individual was observed perching on the water within the pond to the northwest of the Survey Area. Visit 2: No moorhen were observed during this survey. Visit 3: No moorhen were observed during this survey.	Non-Breeding
	Pied Wagtail	<i>Motacilla alba yairrellii</i>	0	0	1	Visit 1: No pied wagtail were observed during this survey. Visit 2: No pied wagtail were observed during this survey. Visit 3: One individual was observed perching on a building roof within the quarry area to the south of the Survey Area.	Non-Breeding
	Redpoll (Lesser)	<i>Acanthis cabaret</i>	1	0	0	Visit 1: One individual was observed calling and flying west in the northwestern corner of the Survey Area. Visit 2: No lesser redpoll were observed during this survey. Visit 3: No lesser redpoll were observed during this survey.	Possibly Breeding
	Robin	<i>Erithacus rubecula</i>	7	1	4	Visit 1: Two individuals were observed calling within the scrub within the quarry area. One individual was observed calling and perching within the broadleaved woodland along the southwestern corner of the Survey Area boundary. One individual was observed calling within the immature woodland along the southern boundary of the Survey Area. One individual was observed calling within the immature woodland northeast of the Survey Area. One individual was observed perching within the immature woodland to the northwest along the Survey Area boundary. One individual was	Possibly Breeding

BoCCI Conservation Status (EU Birds Directive Annex Species)	Species	Latin Name	Number Recorded			Notes	Breeding Status
			Visit 1	Visit 2	Visit 3		
						observed calling within the immature woodland to the northwest along the Survey Area boundary. Visit 2: One individual was observed calling within the scrub in the quarry area. Visit 3: One individual was observed within the immature woodland along the southern Survey Area boundary. Two individuals were observed calling territorially within the immature woodland along the northern Survey Area boundary. One individual was observed perching and calling territorially within the immature woodland along the northwestern corner of the Survey Area boundary.	
	Rook	<i>Corvus frugilegus</i>	6	0	0	Visit 1: Six individuals were calling and perching in vegetation along the rock face within the quarry area to the south of the Survey Area. Visit 2: No rook were observed during this survey. Visit 3: No rook were observed during this survey.	Possibly Breeding
	Sedge Warbler	<i>Acrocephalus schoenobaenus</i>	2	0	0	Visit 1: Two individuals were observed calling aggressively / territorially and perching within the immature woodland to the north of the Survey Area. Visit 2: No sedge warbler were observed during this survey. Visit 3: No sedge warbler were observed during this survey.	Possibly Breeding
	Song Thrush	<i>Turdus philomelos</i>	1	0	2	Visit 1: One individual was observed calling from within scrub along the quarry edge. One individual was observed calling by the pond to the northwest of the Survey Area. Visit 2: No song thrush were observed during this survey. Visit 3: Two individuals were observed calling territorially within the immature woodland along the northwestern corner of the Survey Area boundary.	Possibly Breeding
	Treecreeper	<i>Certhia familiaris</i>	0	0	2	Visit 1: No treecreeper were observed during this survey.	Possibly Breeding

BoCCI Conservation Status (EU Birds Directive Annex Species)	Species	Latin Name	Number Recorded			Notes	Breeding Status
			Visit 1	Visit 2	Visit 3		
						<p>Visit 2: No tree creeper were observed during this survey.</p> <p>Visit 3: Two individuals were observed calling within the broadleaved woodland along the southwestern boundary of the Survey Area.</p>	
	Wren	<i>Troglodytes troglodytes</i>	24	25	10	<p>Visit 1: One individual was observed calling within the broadleaved woodland southwest of the Survey Area. One individual was observed calling within the broadleaved woodland along the southwestern boundary of the Survey Area. Three individuals were observed calling within the immature woodland in the northwestern corner of the Survey Area. Five individuals were observed calling within the oak-birch-holly woodland along the southern Survey Area boundary. Five individuals were observed calling within the immature woodland along the southeastern Survey Area boundary. One individual was observed calling within the immature woodland northeast of the Survey Area. Four individuals were observed calling within the immature woodland north of the Survey Area. Four individuals were observed calling within the immature woodland northwest of the Survey Area.</p> <p>Visit 2: One individual was observed calling within the scrub in the quarry area. Four individuals were observed calling within the broadleaved woodland southwest of the Survey Area. Two individuals were observed calling within the oak-birch-holly woodland along the southern boundary of the Survey area. Three individuals were observed calling within the immature woodland along the southeastern Survey Area boundary. One individual was observed calling by a building along the southeastern Survey Area boundary. Two individuals were observed calling within the scrub northeast of the Survey Area. One individual was observed calling along the northern boundary of the Survey Area. One individual was observed calling by the pond along the northern Survey Area boundary. Three individuals were observed calling within the scrub along the northern boundary of the Survey Area. Two individuals were observed calling within the heath along the northern Survey Area boundary. One individual was observed calling within the scrub northwest of the Survey Area. One individual was observed calling by the pond northwest of the Survey Area. Six individuals (including two chicks) were observed calling from within the immature woodland in the northwestern corner of the Survey Area.</p>	Confirmed Breeding

BoCCI Conservation Status (EU Birds Directive Annex Species)	Species	Latin Name	Number Recorded			Notes	Breeding Status
			Visit 1	Visit 2	Visit 3		
						Visit 3: Two individuals were observed calling territorially within the oak-birch-holly woodland south of the Survey Area. Three individuals were observed calling and perching within the woodland in the southwestern corner of the Survey Area. One individual was observed calling within the oak-birch-holly woodland along the southern Survey Area boundary. Two individuals were observed calling within the immature woodland along the northern boundary of the Survey Area. One individual was observed calling within heath along the northern Survey Area boundary. One individual was observed calling within the immature woodland along the northwestern boundary of the Site.	
Amber Listed	Goldcrest	<i>Regulus regulus</i>	1	1	2	Visit 1: One individual was observed calling within the oak-birch-holly woodland along the southern boundary of the Survey Area. Visit 2: One individual was observed calling within the oak-birch-holly woodland along the southeast corner of the Survey Area boundary. Visit 3: Two individuals were observed calling within the oak-birch-holly woodland along the western boundary of the Site.	Possibly Breeding
	House Sparrow	<i>Passer domesticus</i>	2	0	0	Visit 1: Two individuals were observed perching within the immature woodland along the northwestern corner of the Survey Area boundary. Visit 2: No house sparrow were observed during this survey. Visit 3: No house sparrow were observed during this survey.	Non-Breeding
	Mallard	<i>Anas platyrhynchos</i>	1	0	0	Visit 1: One female individual was observed flying south over the quarry area. Visit 2: No mallard were observed during this survey. Visit 3: No mallard were observed during this survey.	Non-Breeding
	Sand Martin	<i>Riparia riparia</i>	0	19	6	Visit 1: No sand martins were observed during this survey. Visit 2: One individual was observed flying south over the pond and the building. 10-15 individuals were observed calling and nesting within the sand and gravel pit south of the Survey Area. More than 20 holes were noted	Confirmed Breeding

BoCCI Conservation Status (EU Birds Directive Annex Species)	Species	Latin Name	Number Recorded			Notes	Breeding Status
			Visit 1	Visit 2	Visit 3		
						<p>within the sand and gravel pit. Three individuals were observed calling and foraging by the pond northeast of the Survey Area.</p> <p>Visit 3: Two individuals were observed flying southeast towards a nest along the access track along the southern boundary of the Site. Two individuals were observed flying within the oak-birch-holly woodland along the southern Survey Area boundary. Two individuals were observed calling within the immature woodland along the northwestern corner of the Survey Area boundary.</p>	
	Swallow	<i>Hirundo rustica</i>	10	10	0	<p>Visit 1: Eight individuals were observed flying overhead southwest of the Survey Area. Two individuals were observed flying west within the southwestern corner of the Survey Area.</p> <p>Visit 2: Four individuals were observed foraging within the quarry area southeast of the Survey Area. Six individuals were observed foraging by the pond southeast of the Survey Area.</p> <p>Visit 3: No swallows were observed during this survey.</p>	Non - Breeding
	Willow Warbler	<i>Phylloscopus trochilus</i>	16	13	4	<p>Visit 1: One individual was observed calling within the scrub within the quarry area south of the Survey Area. One individual was observed calling within the broadleaved woodland within the quarry area to the southwest of the Survey Area. One individual was observed calling within the oak-birch-holly woodland along the southeastern corner of the Survey Area. Three individuals were observed calling within the immature woodland northeast of the Survey Area. Three individuals were observed calling within the immature woodland north of the Survey Area. One individual was observed calling within the immature woodland along the northern Survey Area boundary. Six individuals were observed calling within heath along the northern boundary of the survey area.</p> <p>Visit 2: Two individuals were observed calling from within the scrub within the quarry area to the southeast of the Survey Area. Two individuals were observed calling within the scrub to the northeast of the Survey Area. Two individuals were observed calling within the heath northwest of the Survey Area. Two individuals were observed calling by the pond by the northwestern</p>	Possibly Breeding

BoCCI Conservation Status (EU Birds Directive Annex Species)	Species	Latin Name	Number Recorded			Notes	Breeding Status
			Visit 1	Visit 2	Visit 3		
						<p>corner of the Survey Area. Five individuals were observed calling within the immature woodland along the northwestern boundary of the Survey Area.</p> <p>Visit 3: Two individuals were observed calling within the broadleaved woodland in the quarry area to the south of the Survey Area. Two individuals were observed calling within the immature woodland along the northwestern boundary of the Survey area</p>	

**Table 3-4: Birds Recorded within the Survey Area during the 2025 Breeding Bird Surveys**

BoCCI Conservation Status (EU Birds Directive Annex Species)	Species	Latin Name	Number Recorded		Notes	Breeding Status
			Visit 1	Visit 2		
Green Listed	Blackbird	<i>Turdus merula</i>	5	4	<p>Visit 1: One individual was observed foraging on the ground within the quarry along the western boundary of the Site. Another was observed calling within the scrub along the access track south of the Survey Area. One male was observed perching within the immature woodland along the northeastern Survey Area boundary. Two individuals were observed carrying nesting material and calling within the immature woodland along the northern Survey Area boundary.</p> <p>Visit 2: Two individuals were identified nesting and calling within the woodland to the west of the Survey Area. One male was flushed from the willow to the south of the Survey Area, and one individual was identified flying within the heath to the north of the Survey Area.</p>	Confirmed Breeding
	Blue Tit	<i>Cyanistes caeruleus</i>	5	2	<p>Visit 1: Two individuals were observed calling within the immature woodland along the eastern boundary of the Site. Two individuals were perching within the scrub to the south of the Survey Area. One individual was observed perching within the oak-birch-holly woodland south of the quarry area.</p> <p>Visit 2: One individual was observed perching and calling within the broadleaved woodland to the southwest of the Survey Area. One individual was observed calling and perching within the scrub along the quarry edge to the north of the Survey Area.</p>	Possibly Breeding
	Blackcap	<i>Sylvia atricapilla</i>	1	2	<p>Visit 1: One individual was observed calling within the immature woodland to the north of the Survey Area along the access track.</p> <p>Visit 2: Two individuals were observed calling from within the oak-birch-holly woodland to the southeast of the Survey Area.</p>	Possibly Breeding
	Chaffinch	<i>Fringilla coelebs</i>	0	1	<p>Visit 1: No chaffinches were observed during this survey.</p> <p>Visit 2: One individual was observed calling within the oak-birch-holly woodland along the southern Survey Area boundary.</p>	Possibly Breeding

BoCCI Conservation Status (EU Birds Directive Annex Species)	Species	Latin Name	Number Recorded		Notes	Breeding Status
			Visit 1	Visit 2		
	Chiffchaff	<i>Phylloscopus collybita</i>	13	18	<p>Visit 1: Two individuals were observed singing within the willow within the southwestern corner of the Survey Area. One individual was observed signing within the oak-birch-holly woodland along the southern Survey Area boundary. One individual was observed calling along a cliff east of the Survey Area. Three individuals were observed calling within the immature woodland east of the Survey Area along the access track. One individual was observed calling within the immature woodland northeast of the Survey Area. Five individuals were observed calling within the immature woodland to the north of the Survey Area along the access track.</p> <p>Visit 2: Three individuals were observed calling within the broadleaved woodland southwest of the Survey Area. Five individuals were observed calling within the immature woodland along the edge of the quarry area to the northeast of the Survey Area. Two individuals were observed calling from within the oak-birch-holly woodland along the access track on the southern boundary of the Survey Area.</p>	Possibly Breeding
	Coal Tit	<i>Parus ater</i>	3	1	<p>Visit 1: Three individuals were observed perching and calling within oak-birch-holly woodland south of the Survey Area.</p> <p>Visit 2: One individual was observed perching and calling within the immature woodland northeast of the quarry area.</p>	Possibly Breeding
	Dunnock	<i>Prunella modularis</i>	1	1	<p>Visit 1: One individual was observed calling within immature woodland along the eastern boundary of the Site.</p> <p>Visit 2: One individual was observed calling within the oak-birch-holly woodland along the southern boundary of the Site.</p>	Possibly Breeding
	Great Tit	<i>Parus major</i>	2	3	<p>Visit 1: One individual was observed calling and perching within the oak-birch-holly woodland to the southeastern corner of the Survey Area. One individual was observed calling and perching within the immature woodland along the eastern boundary of the Site.</p>	Possibly Breeding

BoCCI Conservation Status (EU Birds Directive Annex Species)	Species	Latin Name	Number Recorded		Notes	Breeding Status
			Visit 1	Visit 2		
					Visit 2: Two individuals were observed calling from within the woodland along the southwestern boundary of the Survey Area. One individual was observed calling within the scrub along the access track northeast of the Survey Area.	
	Hooded Crow	<i>Corvus cornix</i>	1	0	Visit 1: One individual was observed perching and foraging within the immature woodland north of the Survey Area. Visit 2: No hooded crows were observed during this survey.	Non - Breeding
	Jackdaw	<i>Coloeus monedula</i>	25	29	Visit 1: Ten individuals were observed perching on the northern quarry cliff face and carrying nesting material. 12 individuals were observed perching on the quarry cliff face within the centre of the quarry carrying nesting material. Three individuals were observed perching along the northern quarry cliff face Visit 2: One individual was observed flying east over broadleaved woodland within the southwestern area of the Survey Area. Four individuals were observed foraging within the oak-birch-holly woodland along the southern boundary of the Survey Area. Seven individuals were observed calling and perching within oak-birch-holly woodland south of the Survey Area. 15 individuals were observed alarm calling, perching and foraging within the quarry north of the Survey Area. One individual was observed carrying nesting material within scrub along the access track north of the Survey Area.	Confirmed Breeding
	Jay	<i>Garrulus glandarius</i>	0	1	Visit 1: No jays were observed during this survey. Visit 2: One individual was observed calling within the oak-birch-holly woodland along the southern Survey Area boundary.	Possibly Breeding
	Little Grebe	<i>Tachybaptus ruficollis</i>	2	2	Visit 1: Two individuals were observed on the pond north of the Survey Area. Visit 2: One individual was observed wading and calling within a pond north of the Survey Area. One individual was observed wading and perching within a pond northwest of the Survey Area.	Possibly Breeding

BoCCI Conservation Status (EU Birds Directive Annex Species)	Species	Latin Name	Number Recorded		Notes	Breeding Status
			Visit 1	Visit 2		
	Mistle Thrush	<i>Turdus viscivorus</i>	0	1	<p>Visit 1: No mistle thrush were observed during this survey.</p> <p>Visit 2: One individual was observed calling within the oak-birch-holly woodland along the western Survey Area boundary.</p>	Possibly Breeding
	Peregrine Falcon	<i>Falco peregrinus</i>	1	1	<p>Visit 1: One individual was flushed from within the immature woodland and flew north</p> <p>Visit 2: One individual was observed agitated, calling and foraging on the quarry floor east of the Survey Area.</p>	Possibly Breeding
	Pheasant	<i>Phasianus colchicus</i>	1	0	<p>Visit 1: One individual was observed calling within the immature woodland along the northern Survey Area boundary.</p> <p>Visit 2: No pheasants were recorded during this survey.</p>	Possibly Breeding
	Redpoll (Lesser)	<i>Acanthis cabaret</i>	3	5	<p>Visit 1: Three individuals were observed singing and were then flushed onto the access track north of the Survey Area.</p> <p>Visit 2: Three individuals were observed perching and calling within the oak-birch-holly woodland along the southeastern Survey Area boundary. Two individuals were observed calling within the scrub along the northeastern Survey Area boundary.</p>	Possibly Breeding
	Robin	<i>Erithacus rubecula</i>	1	5	<p>Visit 1: Two individuals were observed alarm calling within the scrub in the quarry area.</p> <p>Visit 2: One individual was observed calling within the scrub in the quarry area. One individual was observed calling within the oak-birch-holly woodland along the western boundary of the Survey Area. One individual was observed calling within the scrub in the quarry area. One individual was observed calling within the immature woodland along the access track to the east of the Survey Area. One individual was observed calling and perching within the immature woodland along the access track north of the Survey Area.</p>	Possibly Breeding

BoCCI Conservation Status (EU Birds Directive Annex Species)	Species	Latin Name	Number Recorded		Notes	Breeding Status
			Visit 1	Visit 2		
	Rook	<i>Corvus frugilegus</i>	1	2	Visit 1: One individual was observed flying west over the quarry carrying nesting material. Visit 2: No rooks were recorded during Visit 2.	Confirmed Breeding
	Song Thrush	<i>Turdus philomelos</i>	1	4	Visit 1: One individual was observed calling within the immature woodland along the eastern Survey Area boundary. Visit 2: One individual was observed calling within the oak-birch-holly woodland along the western Survey Area boundary. Three individuals were observed calling within the scrub along the access track along the northern Survey Area boundary.	Possibly Breeding
	Wood Pigeon	<i>Columba palumbus</i>	3	3	Visit 1: Two individuals were observed perching within the oak-birch-holly woodland along the access track south of the Survey Area. One individual was observed calling within the immature woodland along the northern Survey Area boundary. Visit 2: Two individuals were observed calling within the oak-birch-holly woodland along the western boundary of the Survey Area. One individual was observed calling along the access track within the eastern corner of the Survey Area.	Possibly Breeding
	Wren	<i>Troglodytes troglodytes</i>	7	11	Visit 1: Two individuals were observed calling within the broadleaved woodland within the southwestern corner of the Survey Area. Two individuals were observed alarm calling within the scrub in the quarry area. One individual was observed calling within the scrub in the northeastern corner of the Survey Area. Two individuals were observed perching and calling within the immature woodland along the northern Survey Area boundary. Visit 2: Three individuals were observed calling from within the broadleaved woodland along the southwestern boundary of the Survey Area. Four individuals were observed calling from within the scrub in the quarry area to the south of the Survey Area. Three individuals were observed calling from within the scrub along the access track to the north west of the Survey Area. One individual was	Possibly Breeding

BoCCI Conservation Status (EU Birds Directive Annex Species)	Species	Latin Name	Number Recorded		Notes	Breeding Status
			Visit 1	Visit 2		
					observed calling from within the scrub along the access track on the southern boundary of the Survey Area.	
Amber Listed	Goldcrest	<i>Regulus regulus</i>	2	1	Visit 1: One individual was observed singing within the oak-birch-holly woodland along the southwestern Survey Area boundary. One individual was observed calling within the immature woodland to the east of the Survey Area. Visit 2: One individual was observed calling within the oak-birch-holly woodland along the southeastern boundary of the Site.	Possibly Breeding
	Mallard	<i>Anas platyrhynchos</i>	0	2	Visit 1: No mallards were observed during this survey. Visit 2: One male was observed flying north within the quarry area. Another male was observed foraging within the pond north of the Survey Area.	Non-Breeding
	Sand Martin	<i>Riparia riparia</i>	3	6	Visit 1: Three individuals were observed foraging within the quarry to the southeast of the Survey Area. Visit 2: Six individuals were observed foraging within the woodland along the southern boundary of the Site. A total of 47 sand martin holes were observed within the stockpiled materials along the southern Survey Area boundary.	Confirmed Breeding
	Swallow	<i>Hirundo rustica</i>	1	2	Visit 1: One individual was observed perching along the access track north of the Survey Area. Visit 2: Two individuals were observed foraging within the quarry area.	Non-Breeding
	Willow Warbler	<i>Phylloscopus trochilus</i>	42	24	Visit 1: Four individuals were observed calling within the scrub in the quarry area. Two individuals were observed perching and foraging on bare ground northeast of the Survey Area. 17 individuals were observed perching, foraging and calling within willow, scrub and wet grassland areas to the northeast of the Survey Area. Five individuals were observed calling and perching within immature woodland along the northern Survey Area boundary. 14 individuals were observed calling	Possibly Breeding

BoCCI Conservation Status (EU Birds Directive Annex Species)	Species	Latin Name	Number Recorded		Notes	Breeding Status
			Visit 1	Visit 2		
					perching and foraging within the immature woodland northeast of the Survey Area. Visit 2: One individual was observed perching on the ground along the western boundary of the Site. One individual was observed foraging along the access track north of the quarry area. Five individuals were observed calling within the immature woodland along the access track north of the Survey Area. Six individuals were observed calling within the immature woodland north of the Survey Area. Six individuals were observed perching and calling within the scrub north of the Survey Area along the access track. Five individuals were observed perching and calling within the immature woodland along the northern boundary of the Survey Area.	
	Grey Wagtail	<i>Motacilla cinerea</i>	0	2	Visit 1: No grey wagtails were observed during this survey. Visit 2: Two individuals were observed perching within the oak-birch-holly woodland along the southeastern boundary of the Site.	Non-Breeding
	Starling	<i>Sturnus vulgaris</i>	2	0	Visit 1: One individual was observed perching and mimicking a peregrine falcon within the oak-birch-holly woodland south of the Survey Area. One individual was observed calling to the east of the Survey Area, along the access track. Visit 2: No starling were observed during this survey.	Possibly Breeding

### 3.2.5 Peregrine Falcon Surveys

As previously outlined, the quarry features steep-sided cliff faces, which provide suitable nesting habitats for peregrine falcons. Therefore, peregrine falcon surveys were undertaken to identify any peregrine falcon activity within the quarry during the breeding season and to determine if this species was breeding within the Survey Area. These surveys were targeted at the quarry faces within the Survey Area and also recorded activity within the Study Area.

#### 17<sup>th</sup> May 2023 Survey

High levels of peregrine activity were observed during this survey. One adult male peregrine falcon was observed perched within the centre of the quarry near the vantage point at 10:00. The bird remained there until 10:12 before flying east over the quarry. At 10:03, a female peregrine falcon was observed alarm calling northwest of the quarry. Shortly after, at 10:07, a female flew south along the quarry face to a potential nest. At 10:18, a female flew west from the potential nest. At 10:24, an adult male flew to the potential nest and was observed calling.

At 10:30, a female landed in the potential nest with food and then flew south along the quarry face. At 10:39, a male flew east and out of the Survey Area. At 10:54, an adult female flew in from the east and landed on the potential nest. At 11:45, an adult female was perched and calling from the potential nest. At 11:47, an adult female was alarm calling from the potential nest, and alarm called again at 11:47 and 11:50. At 12:28, an adult peregrine falcon was observed flying and hovering west from the potential nest along the quarry face. At 12:31, an adult was observed calling from the potential nest. At 12:37, an adult was observed calling from the potential nest. At 12:43, an adult flew into the potential nest from the east with food and gave it to the adult that was occupying the potential nest.

#### 7<sup>th</sup> June 2023 Survey

High levels of peregrine activity was observed during the survey on 6<sup>th</sup> June 2023. At 10:00, two peregrine falcon chicks (four to five weeks old) were observed on a nest along the northwestern quarry face. At 10:01, one adult peregrine falcon was observed calling and flying from the west of the Survey Area before landing out of the Survey Area. At 10:11, one adult peregrine falcon landed to the north of the quarry and was calling. Large amounts of whitewash were present at this location. At 10:33, two peregrine falcon chicks move 5 metres from the nest to the west.

At 10:46, one adult female peregrine falcon caught a jackdaw and brought it to the nest and proceeded to feed the chicks. At 11:02, one adult male peregrine falcon landed on the nest and was feeding on the jackdaw and feeding the chicks. The adult female flew off and landed northeast of the nest and was feeding on the other half of the jackdaw. At 11:09, an adult female peregrine falcon flew from northeast of the nest, where she was feeding and calling loudly within the tarmacadam plant. The male flew west out of the Survey Area.

At 11:11, one adult peregrine falcon was observed chasing a bird and heading north along the edge of the quarry. At 11:25 and 11:35, one adult was heard calling northwest of the vantage point. At 11:49, one adult was heard calling north of the vantage point. At 11:51, one adult was heard calling west of the vantage point. At 11:57, one adult was calling very faintly west of the vantage point. At 12:05, one peregrine falcon was heard calling north of the vantage point. At 12:11, one peregrine falcon was heard calling west of the vantage point. And again at 12:21. This continued at 12:25 and 12:42, although the call was faint. At 12:47, a louder call was heard.

#### 14<sup>th</sup> April 2025 Survey

High levels of peregrine and raptor activity were observed during the survey on 14<sup>th</sup> April 2025. Two ravens were first observed at 10:22 flying in and perching along the northwestern cliff face, where they were also heard calling from a tree. At 10:30, two more ravens were recorded

calling. At 10:37, two ravens were again present, and shortly afterwards, at 10:56, one raven landed and perched before both circled overhead and flew north. One bird landed again at the original location.

At 11:05, a single adult peregrine falcon appeared from behind a rock and gave an alarm call. At 11:15, a peregrine was observed calling and then landed from the north. At 11:17, a kestrel flew into a scree slope. At 11:48, a kestrel was mobbed by jackdaws near a perch close to a nest site, then flew north and out of sight. At 12:06, a kestrel was again seen landing on a cliff to the north of the Survey Area, where it was mobbed by jackdaws.

At 13:00, a kestrel was seen on the nest, where it had been since 12:06, occasionally entering and exiting. At the same time, a peregrine was observed incubating on a nest with signs suggesting the possible presence of chicks. A large nest was also noted to the south of the kestrel nest.

### 23<sup>rd</sup> April 2025 Survey

High levels of peregrine activity were observed during the survey on 24<sup>th</sup> April 2025. The first observation was at 10:10, when a female peregrine flew into a quarry ledge and called. No nest was visible. At 10:15, the female peregrine took off and flew west. At 11:07, a peregrine was seen perched and calling from a tree to the north of the Survey Area. At 11:26, the same peregrine was observed flying west.

At 11:51, a kestrel flew from the south past a nest and into the heathland. At 12:07, one peregrine flew in from the south and landed in the same tree as was previously noted to the north of the Survey Area. At 12:18, a second peregrine flew in from the north and landed along the quarry cliff face to the northeast of the Survey Area. At 12:24, two peregrines flew from the tree to the north of the Survey Area, to the quarry cliff face. One peregrine attempted to land on the cliff edge twice before the peregrine flew north. At 12:29, one male peregrine landed at the top of the cliff face to the northeast of the Survey Area. One female was recorded perched within a tree to the north of the Survey Area from 12:07 until the end of the survey. This peregrine was alarm calling from 12:31 onwards.

## 4 SURVEY AREA ASSESSMENT

During the winter and breeding bird surveys undertaken at the Survey Area, a total of 35 bird species were recorded. This number also includes birds observed flying over the Survey Area during the surveys.

### 4.1 Winter Bird Assessment

As mentioned in Section 3.2.1, the Survey Area comprises a combination of an inactive quarry, areas of woodland and immature woodland, scrub, dry heath, recolonising bare ground, two dystrophic lakes, and artificial ponds. The quarry waterbodies were considered to provide suitable habitat for wintering wetland bird species.

However, it should be noted that the Survey Area has an active tarmacadam plant within it and is currently exposed to anthropogenic disturbances.

During the winter bird surveys, a total of ten bird species were recorded. No species were recorded during the surveys in numbers that would be considered of national or international importance.

Following a review of I-WeBS data, only three species were recorded at numbers of national importance, coot, gadwall and little grebe. Of these species, coot and little grebe were recorded on the Survey Area; however, they were recorded in very low numbers. Therefore, it is considered that the Survey Area is of very low significance for birds associated with the Ballynacarriga Lake I-WeBS subsite.

Overall, there was limited bird activity noted on the waterbodies during the surveys. Mallard were the most abundant species recorded during the surveys and were seen on the lakes exhibiting a range of behaviours, including flushing, flying, and landing on the lakes. Therefore, it can be considered that, given the presence of Amber-listed bird species, the Survey Area is of Local Importance (High Value). However, given the fact that the species within the Survey Area were only recorded in low numbers, the Survey Area is not considered to be of significant importance for any specific wintering bird species.

### 4.2 Breeding Bird Assessment

During the 2023 breeding bird surveys, a total of 27 bird species were identified within the Survey Area during the breeding season.

Of the species recorded within the Study Area in 2023 and 2025, five were classified as 'Confirmed Breeding', blackbird, jackdaw, rook, sand martin and wren (see Table 3-3 and 3-4). In addition, 22 other species were classified as 'Possibly Breeding', and eight species were classified as 'Non-breeding'.

Of the species that were confirmed to be breeding on-site, it was noted that the primary habitats utilised were:

- The quarry cliff faces – jackdaw were noted nesting in this habitat and sand martin were noted entering nest holes;
- Immature woodland in the northern section of the Survey Area – blackbird and wren were both recorded as confirmed breeding in this habitat.

In addition, a number of species were recorded as possibly breeding within the scrub and vegetation within the Survey Area.

### **4.3 Peregrine Falcon**

The quarry walls provide a suitable nesting habitat for peregrine falcon. Peregrine falcon were recorded during the surveys in the north of the quarry. Furthermore, the presence of chicks and a nest during the 2023 surveys within the Survey Area confirms breeding.

It is therefore considered that the Survey Area is a site of Local Importance (High Value), given the presence of a peregrine falcon nest in the cliffs and suitable foraging habitat.

## **5 CONCLUSIONS**

A bird suitability assessment was undertaken at the Survey Area in September 2023, and following this, wintering bird surveys were undertaken in the 2023/2024 winter season and breeding peregrine falcon surveys and breeding bird surveys were undertaken in the 2023 and 2025 breeding seasons.

All surveys have been completed in accordance with recent recommended best practice guidance and by suitably qualified and experienced ecologists, and therefore, the survey effort is deemed appropriate for the Survey Area.

Based on the surveys undertaken, it can be concluded that the Survey Area is considered to be a site of Local Importance (High Value), given the presence of a peregrine falcon nest in the cliffs and Amber-listed species within the Survey during both the wintering and breeding seasons.

## 6 REFERENCES

- [1] NPWS, “National Parks and Wildlife Service,” 2025. [Online]. Available: <https://www.npws.ie>.
- [2] BirdWatch Ireland, “Irish Wetland Bird Survey,” 2024. [Online]. Available: <https://birdwatchireland.ie/our-work/surveys-research/research-surveys/irish-wetland-bird-survey/>.
- [3] NBDC, “National Biodiversity Live Maps,” 2025. [Online]. Available: <http://maps.biodiversityireland.ie/>.
- [4] J. Fossitt, “A Guide to Habitats in Ireland,” 2000.
- [5] G. Smith, P. O'Donoghue and K. & D. E. O'Hara, “Best Practice and Guidance for Habitat Surveying and Mapping,” Heritage Council, 2011.
- [6] B. Ireland, “I-Webs Counter Manual,” [Online]. Available: <https://birdwatchireland.ie/publications/i-webs-counter-manual/>.
- [7] J. Ferguson-Lee, R. Castell and D. Leech, A Field Guide to Monitoring Nests, Norfolk, United Kingdom: British Trust for Ornithology, 2011.
- [8] G. Gilbert, D. Gibbons and J. Evans, Bird Monitoring Methods, Exeter, United Kingdom: Pelagic Publishing, 1998.
- [9] BTO, “Breeding Status Codes,” [Online]. Available: <https://www.bto.org/sites/default/files/u36/downloads/breedingcodes.pdf>. [Accessed 2024].
- [10] J. C. W. R. E. a. T. Hardey, Raptors: A Field Guide for Surveys and Monitoring, The Stationery Office, 2013.
- [11] National Roads Authority (NRA), “Guidelines for Assessment of Ecological Impacts of National Road Schemes,” NRA, 2009.
- [12] The Council of the European Communities, “Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora,” 1992.
- [13] G. Gilbert, A. Stanbury and L. Lewis, “Birds of Conservation Concern in Ireland 2020-2026,” *Irish Birds*, vol. 9, pp. 523-544, 2021.



Murray Brothers Tarmacadam Ltd



**APPENDIX 14.5**  
**JAPANESE KNOTWEED**  
**MANAGEMENT PLAN**

**VOLUME III**  
APPENDICES



APRIL 2026



# Japanese Knotweed Management Plan

**Ardcahan Quarry**

**On behalf of  
Murray Brothers Tarmacadam Ltd.**





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**Job Number: E2049**

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**Approved By: Dyfrig Hubble**

**Signed:** 

**Revision Record**

Issue No.	Date	Description	Remark	Prepared	Checked	Approved
01	18/02/2026	JK Mgt. Plan	Final	AC	DH	DH

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**Japanese Knotweed Management Plan  
Ardcahan Quarry  
Murray Brothers Tarmacadam Ltd.**

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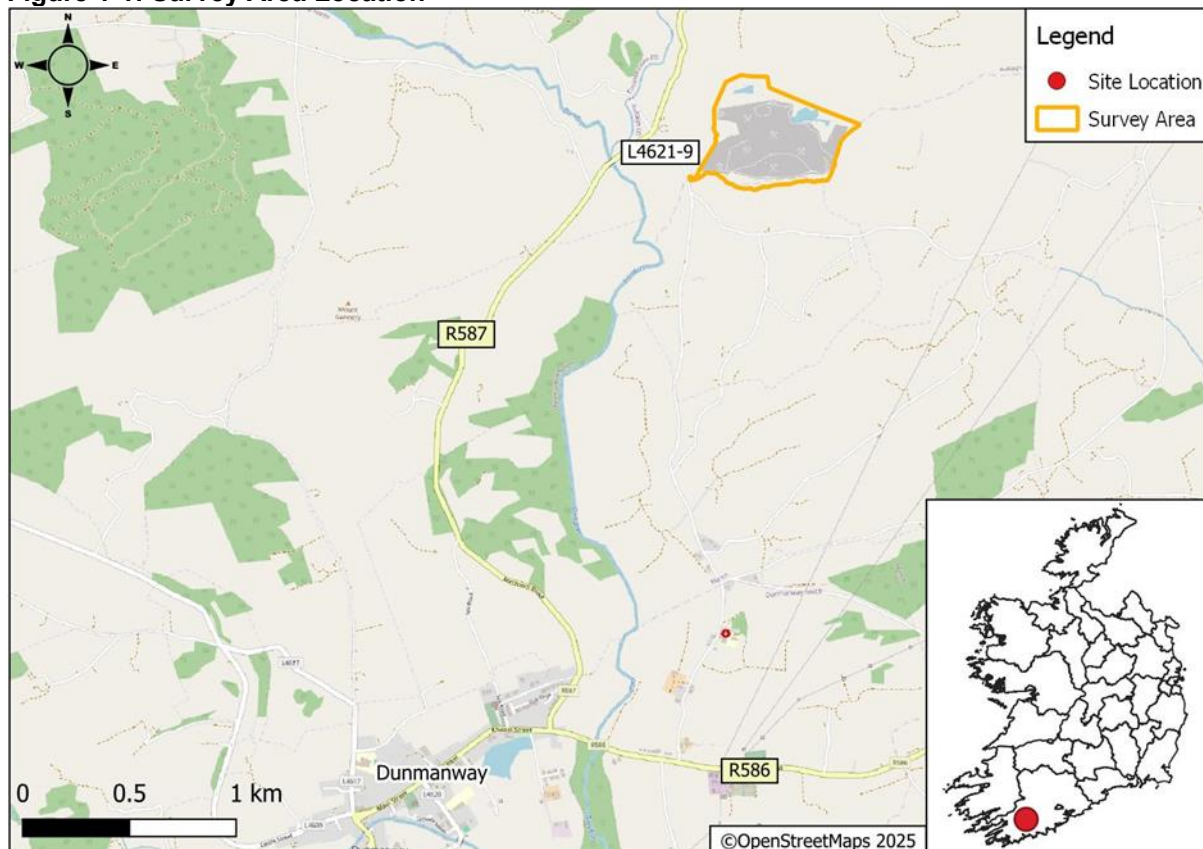
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# 1 INTRODUCTION

## 1.1 Background

Malone O'Regan Environmental ('MOR Environmental') was commissioned by McCutcheon Halley Chartered Planning Consultants on behalf of Murray Brothers Tarmacadam Ltd. ('the Applicant') to undertake an assessment of Japanese knotweed (*Reynoutria japonica*) ('JK'), and prepare a JK Management Plan at Ardcahan Quarry and associated lands at Dunmanway, Co. Cork (ITM OS Reference W 25061 55898) ('the Survey Area'). The location of the Survey Area is shown in Figure 1-1.

**Figure 1-1: Survey Area Location**



## 1.2 Statement of Authority

This report was approved by Mr. Dyfrig Hubble, Associate Director - Ecologist. Dyfrig is a full member of the Chartered Institute of Ecology and Environmental Management ('CIEEM'). Dyfrig has over 18 years' experience working in the ecological consultancy sector and has extensive experience in undertaking invasive species surveys, preparing invasive species management plans, supervising the implementation of these plans and monitoring works.

## 1.3 Aims of the JK Management Plan

The principal aim of this JK Management Plan is to remediate the JK located within the Survey Area in order to safeguard existing operations and any future developments at the Survey Area and to ensure that there will be no unintentional spread of JK during any operations or future works.

The key objectives of this JK Management Plan are to:

- Identify and map all locations on site where JK is present;

- Identify the best method for managing and controlling JK on the Survey Area with regard to the existing operations;
- Provide an outline of measures which should be implemented as a matter of priority to prevent any potential spread of JK on the Survey Area; and,
- Prevent any and all unintentional spread of JK.

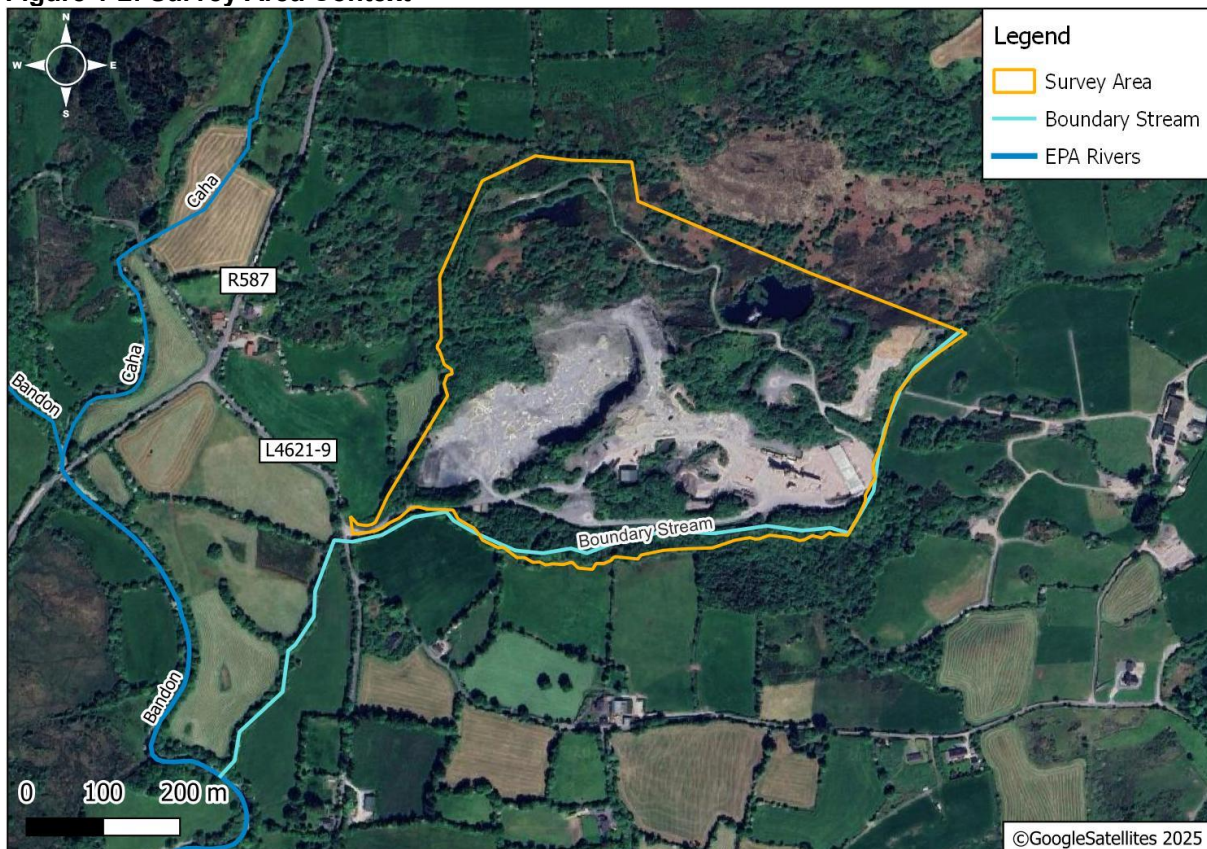
#### 1.4 Survey Area Description

Ardcahan Quarry is in the townland of Ardcahan, approximately ('ca.') 3.5km northeast of Dunmanway in West Cork. The Survey Area is situated off the L4621-9 local road ('Hospital Road'), ca. 300m east of its junction with the R587 regional road, which links Dunmanway and Macroom (see Figure 1-2).

The Survey Area is located in a rural setting characterised by undulating topography, irregularly shaped fields and clusters of mixed woodland. The land immediately around the quarry consists of scrub, woodland and agricultural grassland. Land uses in the surrounding area primarily comprise livestock farming and rural housing.

The Survey Area is shown in Figure 1-2.

Figure 1-2: Survey Area Context



## 2 BACKGROUND INFORMATION

JK is an injurious, invasive herbaceous perennial. Since it was introduced as an ornamental plant in the 19<sup>th</sup> Century from Japan, it has spread across much of Ireland, particularly along watercourses, transport routes and waste grounds where its movement is unrestricted.

JK is considered to be a serious issue on the basis that it can:

- Damage buildings, hard surfaces and infrastructure by growing through concrete, tarmac and other hard surfaces;
- Outcompete and negatively impact on native plants and thus animals by forming dense thickets;
- Cause damage to flood defence infrastructure along watercourses and increase flood risk through reduced capacity of channels to carry flood water;
- Negatively impact the ability of projects to gain planning permission. Proper planning process requires measures to remove and eradicate the species from a development site;
- Cost of remediation can be both expensive and negatively impact on construction works; and,
- Decrease land value.

In Ireland, JK has not yet been recorded as producing viable seeds; all JK plants recorded in Ireland are female, which only reproduce through vegetative propagation. There are records of a hybrid JK plant, which is male; however, as of yet, no records of viable seed have been reported.

JK spreads through vegetative propagation from the crown, stem and rhizome (underground root); even small amounts of cut stem, crown or rhizome are capable of producing a new plant.

The rhizomes of JK are considered to be the main cause of the spread of JK. The rhizomes are particularly resistant to dehydration and freezing, and as little as 0.7gm of rhizome can regenerate into a new plant. Therefore, when a rhizome is disturbed or cut, it will produce a new shoot, and it is known that digging or other disturbances, such as earthworks, can significantly increase stem density. Also, JK plants can regrow from soil contaminated with JK rhizomes.

Similarly, the crown and stems of JK are also capable of regenerating. Small fragments of cut crown or stem are capable of regenerating and becoming a new plant. However, once stems are thoroughly dried, they are unable to regenerate.

Therefore, controlling the spread of JK is dependent on preventing the spread of all of these parts of the plant.

### 2.1 Legal Context

JK is a legally controlled species within Ireland due to the harm that it can cause to the natural environment and to built structures. It is controlled under the following legislation:

- European Union, Regulation on the prevention and management of introduction and spread of invasive alien species, 2014 [1143/2014];
- The Wildlife (Amendment) Act, 2023;
- European Communities (Birds and Natural Habitats) Regulations, 2011 to 2015
- Section 34 of the Planning and Development Acts, 2000, as amended; and,
- The European Union (Invasive Alien Species) Regulations 2024 (S.I. No. 374/2024).

Under this legislation, it is an offence to:

- Plant, disperse, allow dispersal or cause the spread of JK;
- Keep the plant in possession for the purpose of sale, breeding, reproduction, propagation, distribution, introduction or release;
- Keep anything from which the plant can be reproduced or propagated from without a granted licence; or,
- Keep any vector material, in this case soil or spoil taken from JK, for the purposes of breeding, distribution, introduction or release.

## 2.2 4<sup>th</sup> National Biodiversity Action Plan 2023 -2030

The National Biodiversity Plan sets out objectives, targets and actions with regard to controlling, managing and, where possible, eradicating invasive alien species in Ireland and notes that *'Efforts to tackle Invasive Alien Species will be elevated'*.

### Objective Two:

- *'Meet Urgent Conservation and Restoration Needs '*

Outcome 2H:

- *'Invasive alien species (IAS) are controlled and managed on an all-island basis to reduce the harmful impact they have on biodiversity and measures are undertaken to tackle the introduction and spread of new IAS to the environment.'*

To achieve the above, 4 targets which incorporate 10 actions are set out, as follows:

- *By 2030, IAS are controlled, managed, and where possible, eradicated;*
- *By 2030, IAS are controlled, managed, and where possible, eradicated within Protected Areas and effectively controlled in urban, peri-urban areas, the wider countryside and marine and coastal areas;*
- *By end of 2023, a systematic baseline survey of priority invasive species and key hot-spot sites has been undertaken with subsequent periodic monitoring; and,*
- *By 2025, Ireland has adopted an all-island approach to invasive species.*

Objective Four of the Plan:

- *'Enhance the Evidence Base for Action on Biodiversity'*.

Action 4C8 under Outcome 4A states:

- *'The NBDC will, with relevant state partners, devise and undertake a systematic baseline survey for priority invasive species and hot-spot introduction sites with subsequent monitoring. This will be state-led and supported by Citizen Science engagement programmes'*.

### 3 SITE ASSESSMENT

An assessment of the Survey Area was undertaken on 9<sup>th</sup> January 2023 by two MOR Environmental Ecologists and encompassed the entire Survey Area. Updated surveys were undertaken on:

- 17<sup>th</sup> September 2024; and,
- 21<sup>st</sup> May 2025.

Large stands of JK were recorded in the northeast section of the Survey Area, adjacent to the recolonising bare ground. Stands of JK were recorded in the southwest of the Site, adjacent to the quarry. A stand of JK was recorded adjacent to the road in the south of the Survey Area. See Figure 3-1 for the locations of JK.

**Figure 3-1: JK Locations**



**Plate 3-1: JK in the northeast of the Survey Area**



**Plate 3-2: JK in the southwest of the Site**



### **3.1 Assessment Constraints**

Some areas of the Site were inaccessible due to dense vegetation. However, these areas were assessed using binoculars from a distance. MOR Environmental Ecologists could not identify any stands of JK within these sections.

## 4 JAPANESE KNOTWEED MANAGEMENT PLAN

The JK Management Plan detailed below aims to ensure the remediation of the JK in the Survey Area and to ensure that there will not be unintentional spreading of JK to new locations. It is recommended that JK be remediated utilising herbicide treatment.

### 4.1 Description of the JK Management Plan

The herbicide treatment of JK within the Survey Area shall be overseen by the project Ecologist Clerk of Works ('ECoW'). The JK Management Plan, appendices and any subsequent revision shall be kept for future monitoring and remediation works. This JK Management Plan should be read in conjunction with:

- *The Knotweed Code of Practice: Managing Japanese Knotweed on Development Sites* [1];
- *The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Road* [2];
- *Best Practice Management Guidelines: Japanese Knotweed Fallopia japonica* [3]; and,
- *Best Practice for Control of Japanese Knotweed Fallopia japonica* [4].

### 4.2 Setting Priorities

#### High Priority:

- JK signage should be erected;
- Remediation of JK and prevent unintentional spread of JK; and,
- No works should take place in any of the JK areas until the Ecologist has signed off that the JK remediation works have been completed.

### 4.3 Specific Remediation Actions

#### 4.3.1 Site Preparation

Prior to any remediation works being undertaken, the following preparation actions will be required to limit the potential for any further spread of JK:

- Infected areas should be cordoned off (with an adequate 7m buffer zone), and signage should be erected to prevent access. These works should be supervised by the project ECoW;
- No vegetation management works or earthworks should take place within areas identified as having JK present or within the buffer zones;
- No new material or soil should be stored adjacent to the JK area; and,
- No plant or machinery should be tracked through areas containing JK or within the 7m buffer zone.

#### 4.3.2 Herbicide Treatment

It is recommended that herbicide treatment be undertaken within the Survey Area and cover all areas of identified JK before the end of the growing season, which is typically from the end of September to the start of October. Herbicide treatments are known to be very effective and cause significant dieback of JK. Herbicide treatments generally take between 3-5 years, with spot treatment required each year until no regrowth is observed.

The initial JK treatment should be undertaken as soon as practically possible and before the end of the growing season. This will allow the JK to draw as much herbicide as possible into

the below-ground rhizomes. Following completion of the initial spray, this will then need to be followed up by a programme of regular spray treatments, comprising of three treatments per year during the growing season for a period of three to five years.

#### **4.4 Site Biosecurity Measures**

In order to mitigate against the unintentional spread of invasive species, the following biosecurity measures should be implemented.

- All vehicles, machinery and any other equipment entering / leaving the Survey Area should be washed and clean before entering and leaving the Site to prevent the spread of invasive plant material;
- Before machinery or equipment is unloaded within the Survey Area, equipment will be visually inspected to ensure that all adherent material and debris has been removed; and,
- Any vehicles and machinery that are not clean will not be permitted entry to the Survey Area.

##### **4.4.1.1 Monitoring**

The treatment works should be supervised by the project ECoW. As part of these works, the project ECoW will also monitor the effectiveness of the treatment.

On-going monitoring should be undertaken by the project ECoW in conjunction with chemical treatment to provide effective control of this species, as knotweed rhizomes that have not been completely killed off may send up new shoots as many as three years later.

Continued monitoring with the Survey Area is required in order to limit any potential spread of species to ensure desired results are being achieved and also to adapt remediation plans to improve success and treat any re-growth.

## 5 FURTHER REMEDIATION OPTIONS

In order to accommodate future developments / activities within the landholding (see Table 5-1), there are a number of remediation options that can be implemented in order to reduce the length time required for remediation works. The table below provides an outline of potential options that are available.

Also, it should be noted that to facilitate the development of small sections of the Survey Area, combinations of the remediation options may be implemented.

**Table 5-1: Further Remediation Options**

Narrative	Advantages	Disadvantages
<p><b>A) Removal to Landfill</b>  Excavation and removal of contaminated soil offsite to a suitably licenced facility.</p>	<ul style="list-style-type: none"> <li>• Complete Removal of Soil from Survey Area;</li> <li>• Very quick to implement; and,</li> <li>• Allows for immediate development.</li> </ul>	<ul style="list-style-type: none"> <li>• Expensive option; and,</li> <li>• Availability of suitably licenced facilities would need to be considered.</li> </ul>
<p><b>B) Onsite Treatment</b>  This option involves excavating the JK and stockpiling the contaminated soil within a contained bund to allow for intensive herbicide treatment.</p>	<ul style="list-style-type: none"> <li>• Far cheaper option than off-site disposal.</li> </ul>	<ul style="list-style-type: none"> <li>• A suitable-sized area needs to be sterilised for the duration of the treatment process;</li> <li>• Bunded area would need to be fully contained;</li> <li>• Need for ongoing herbicide treatment; and,</li> <li>• Monitoring will be required.</li> </ul>
<p><b>C) Onsite Burial</b>  Contaminated soil and JK would be buried onsite and fully encapsulated in a lined cell. Clean soil would then be placed on top of the cell.</p>	<ul style="list-style-type: none"> <li>• Far cheaper option than off-site disposal; and,</li> <li>• No need for any ongoing herbicide treatment.</li> </ul>	<ul style="list-style-type: none"> <li>• JK would need to be placed within a full encapsulated cell;</li> <li>• Dependant on suitable ground conditions;</li> <li>• The optimum requirement would be for 2m of cover materials;</li> <li>• May be a need to provide backfill materials;</li> <li>• Low-level risk would remain if the liner integrity were ever compromised; and,</li> <li>• Monitoring will be required.</li> </ul>

## **6 CONCLUSION**

Following the invasive species assessment carried out at the Site, a number of JK stands were identified within the Survey Area. It is recommended that preparation measures, the herbicide treatment and the biosecurity measures be implemented as soon as possible in order to halt the spread of JK within the Survey Area and potentially to locations off-site.

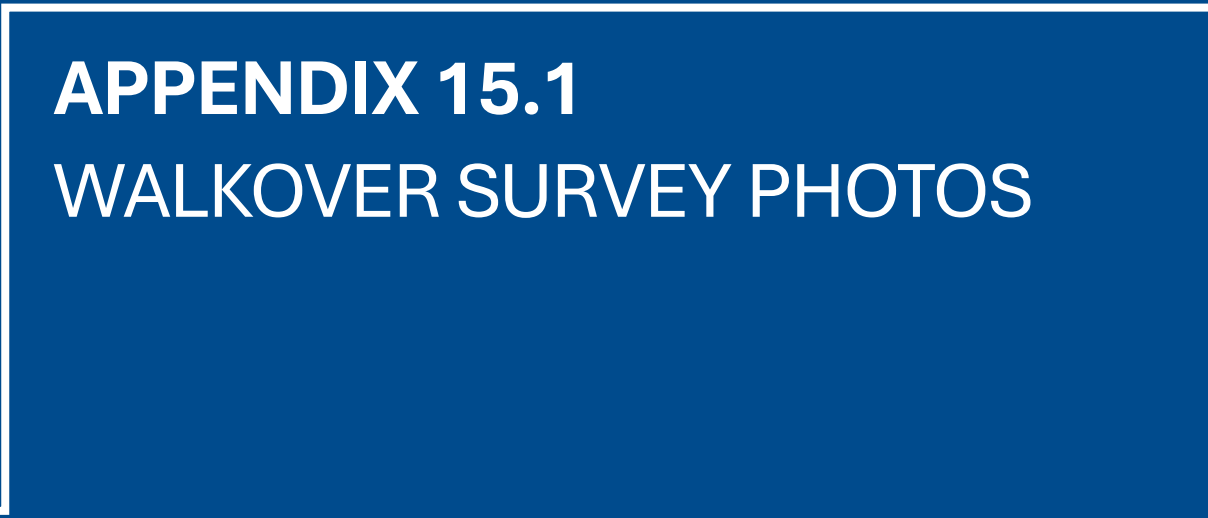
Ongoing monitoring will be carried out by the project ECoW to track treatment effectiveness and manage any potential regrowth.

## 7 REFERENCES

- [1] Environment Agency, "The Knotweed Code of Practice: Managing Japanese Knotweed on Development Sites," 2016.
- [2] National Roads Authority, "The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads," 2010.
- [3] Invasive Species Ireland, "Best Practice Management Guidelines: Japanese Knotweed *Fallopia japonica*," 2008.
- [4] Inland Fisheries Ireland, "Best Practice for Control of Japanese Knotweed *Fallopia japonica*," n.d..
- [5] EC, "S.I. No. 374/2024 - European Union (Invasive Alien Species) Regulations 2024," European Union, 26 07 2024. [Online]. Available: <https://www.irishstatutebook.ie/eli/2024/si/374/made/en/print>.



Murray Brothers Tarmacadam Ltd



**APPENDIX 15.1**  
**WALKOVER SURVEY PHOTOS**

**VOLUME III**  
APPENDICES



APRIL 2026





**Figure 1:** Grotto on the western side of Mount Gunnery, looking east



**Figure 2:** Holy Well on the western side of Mount Gunnery, looking east



**Figure 3:** Former extraction area active between 1990 and 2014, looking southwest



**Figure 4:** Top of the former extraction area, looking northeast



**Figure 5:** Area of hardstanding at the eastern extent of the proposed development site, looking northwest



**Figure 6:** Former settlement pond in the eastern part of the proposed development site, now largely dried, looking west



**Figure 7:** Former settlement pond area with regenerating vegetation, looking southwest



**Figure 8:** Northwest area of the proposed development site showing an overgrown pathway through dense vegetation, looking southwest



**Figure 9:** Densely overgrown ground at the northwest of the proposed development site, looking west



**Figure 10:** Area of hardstanding at the northwest of the proposed development site, looking northeast