An Bord Pleanála

STAGE 1 SCREENING FOR APPROPRIATE ASSESSMENT

Bison Quarries Ltd (Section 37L Application)

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Bison Quarries Ltd (Section 37L Application)

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1 INTRODUCTION

1.1 BACKGROUND

WSP Consulting Ireland Ltd (WSP) has been commissioned by Bison Quarries Ltd (BQL) to carry out an Appropriate Assessment Screening assessment and, if deemed necessary, produce a Natura Impact Statement (NIS) to accompany a 37L Application for the Proposed Project under Section 37L of the Planning and development Act, 2000, as amended.

The Proposed Project is the restoration of a disused quarry by import of clean, uncontaminated greenfield or equivalent green field soil and stone as by-product from development sites in the greater Dublin and Kildare region. The lands on which the Proposed Project occur (the 'Project Site' or 'Site') are located in the townland of Coolsickin or Quinsborough, Co. Kildare (see location illustrated in Figure 1-1). The proposed works are described in Section 2 and are hereafter collectively referred to as the 'Proposed Project'.

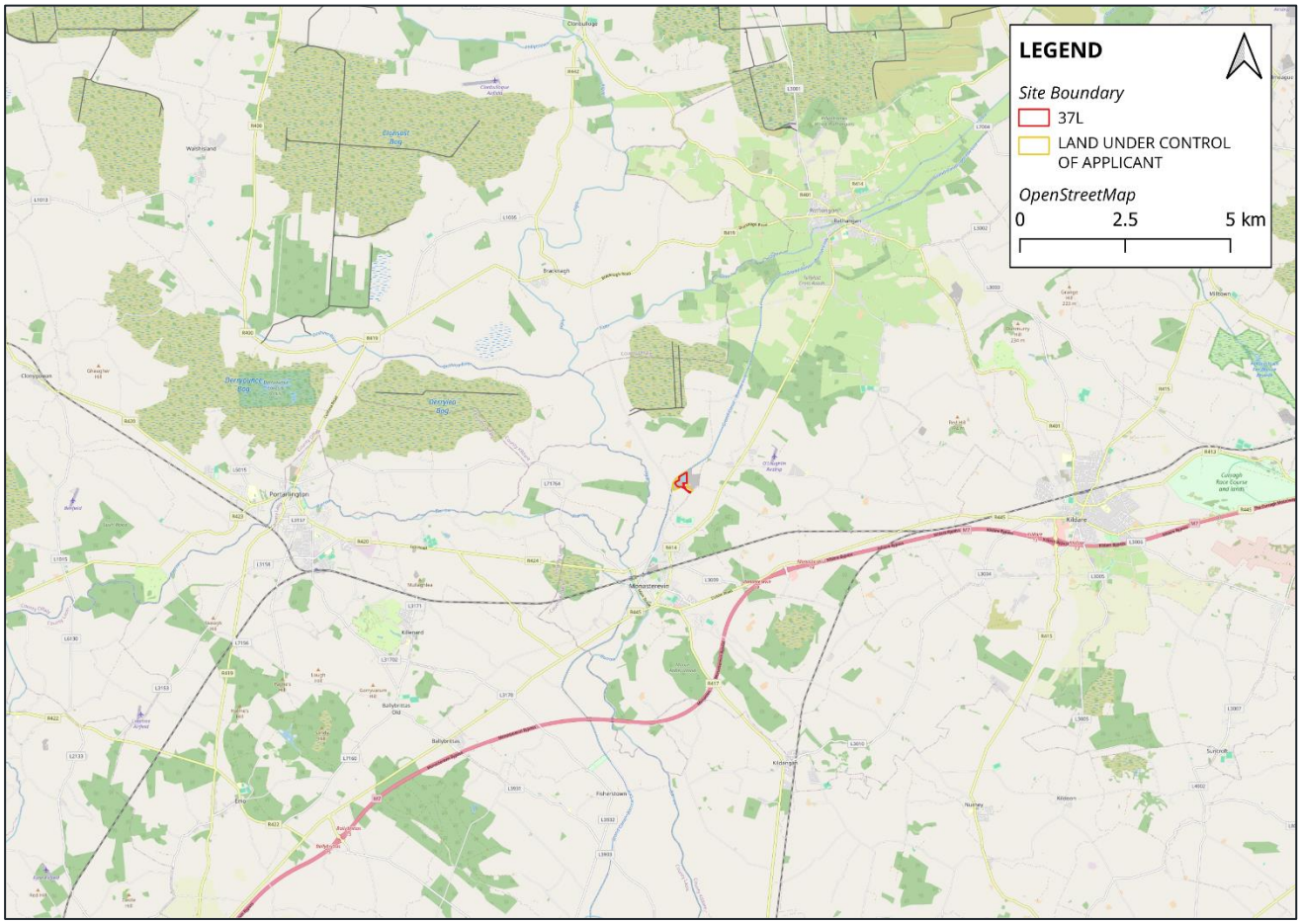

Figure 1-1 – Project Site Location

1.2 THE HABITATS DIRECTIVE

Having regard to the requirements of European Council Directive 92/43/EEC of 21 May 1992 (as amended) on the conservation of natural habitats and of wild flora and fauna (the 'Habitats Directive' (EC, 2019), the competent authority is required to undertake a Screening for Appropriate Assessment (AA), to determine whether the Proposed Project may have likely significant effects (LSEs) upon European sites, i.e. those that may be present within the Proposed Project's Ecological Zone of Influence (EZoI)[1], either alone, or in combination with other plans or projects.

European sites consist of Special Areas of Conservation (SACs) designated for habitats and species of community importance, and Special Protection Areas (SPAs) designated for birds and bird habitats. The process of completing the designation of SACs and SPAs is ongoing in Ireland. Until such time as this process is completed, candidate SACs (cSACs) and proposed SPAs (pSPAs) have the same protection as SACs and SPAs. For projects requiring planning permission, AA Screening (and AA if required) is transposed into Irish law through Part XAB of the Planning and Development Act 2000 (as amended) ('The Planning Acts'), and the Planning and Development Regulations 2001 (as amended).

1.3 LEGISLATIVE CONTEXT

Section 177U (1) of The Planning Acts places a duty upon 'Competent Authorities' to determine LSEs of proposed Project's upon European sites prior to granting consent. The Competent Authority's AA Screening determination will be informed by this report.

Should AA Screening identify LSEs (or should it not be possible to exclude such effects based on objective evidence and in view of best scientific knowledge) it will be necessary for the Competent Authority to carry out an AA to determine if the Proposed Project may have adverse effect on the integrity of a European Site, either alone or in combination with other plans or projects. In line with Section 177V of the Planning Acts, AA determination would be informed by a Natura Impact Statement (NIS), which would determine whether those LSEs are likely to have an adverse effect on the integrity of any European Site, in light of their Conservation Objectives.

1.4 REPORT PURPOSE

The objectives of this report include:

- Introduce the Proposed Project and provide ecological context within the existing landscape;
- Identify the potential environmental impacts associated with the Proposed Project;
- Identify European sites which lie within the EZoI[1] of the Proposed Project;
- Identify whether any of the impacts associated with the Proposed Project, both alone and in combination with other plans or projects, are likely to result in significant effects on any of the European sites identified, and hence indicate whether further assessment of those impacts is required or not (i.e., through an AA);
- Produce a NIS for those European sites upon which LSEs are predicted or for which LSEs could not be excluded based on objective information, both for the Proposed Project alone and in

[1] The CIEEM EcIA Guidelines define the EZoI as the area over which important ecological features may be subject to significant effects resulting from the Development; this may extend beyond the footprint of the Development. The EZoI may vary for each ecological feature due to the varying mobility range of the feature being assessed. For example, the EZoI for otter (which are mobile) will be greater than the EZoI for habitats (which are sedentary).

combination with other plans or projects and determine whether they are likely to have an adverse effect on the integrity of any European site(s). Mitigation is to be proposed as necessary. The purpose of the NIS is to inform the decision-making process of the Competent Authority in carrying out AA.

1.5 METHODOLOGY

1.5.1 DESKTOP STUDY

1.5.1.1 Identification of Relevant European Sites

The OPR (2021) recommend that the scope of an AA Screening should consider the following:

- Any European sites within or adjacent to the plan or project area;
- Any European sites within the likely Ecological Zone of Impact (EZoI) of the plan or project. 15 km is often the 'default' zone of influence, as recommended by DoEHLG (2010) but for projects could be much less than that, in some cases less than 100 m, but this must be evaluated on a case-by-case basis with reference to the nature, size and location of the project, and the sensitivities of the ecological receptors, and the potential for in combination effects; and
- European sites that are more than 15 km from the plan or project area depending on the likely impacts of the plan or project, and the sensitivities of the ecological receptors, bearing in mind the precautionary principle (EC, 2000). For example:
    - In the case of sites with water dependent habitats or species, and a plan or project that could affect water quality or quantity, for example, it may be necessary to consider the full extent of the upstream and/or downstream catchment.
    - In the case that the plan or project area is indirectly connected to a European Site. For example, when there is no direct hydrological connection between the project area and a European site, but there is a watercourse that is upstream of a European site and is adjacent to the project area. Certain effects, such a dust emission, may result in deposition into the watercourse. This creates indirect connectivity between the project area and the European site.

For this AA Screening, European sites with the potential to be affected by the Proposed Project were identified based on their proximity, as well as their potential to be connected, either directly (e.g., via watercourses) or indirectly (e.g., via dust deposition to watercourses upstream of a European site).

Results of this exercise are presented in Section 4.1.

1.5.1.2 Gathering Habitats and Species Data

Based on the assessment of connectivity, and in preparation for Project Site surveys, data was collected on the distribution of qualifying interest (QI[2]) habitats and species of the relevant European sites. Sources included:

- 2019 Article 17 Spatial Data (NPWS, 2019);

[2] The specific named bird species for which a SPA is selected is called the 'Special Conservation Interests' (SCIs). However, in practice, the common terminology of Qualifying Interests (QI) applies also to SCI (and is used in this document for simplicity) as per OPR, 2021.

- National Biodiversity Data Centre (NBDC, 2025);
- Margaritifera Sensitive Area Mapping (DoHLGH, 2017);
- The Status and Distribution of Lamprey in the River Barrow SAC (King, 2006); and
- Fish Stock Assessment of the River Barrow Catchment (IFI, 2015).

Online records from the NBDC pertained to a 5 km radius around the Project Site. Records more than 10 years old (i.e., from 2015 or earlier) were disregarded.

1.5.2 PROJECT SITE SURVEYS

The survey strategy in an AA context was informed by the connectivity between the Project Site and European sites (see Section 4). Given that the Project Site does not spatially overlap with any European sites, surveys to identify the presence of QI habitats were not necessary.

A habitat and species walkover survey was undertaken on the 9th of May 2024. The results of these surveys were primarily relevant to the EcIA process and only results relevant to Appropriate Assessment are discussed in this report.

The habitats walkover survey focused on identifying broad habitat types to Level 3 of Fossitt (2000) present within the Survey Area, with additional guidance from Smith *et al.* (2011).

The Project Site was searched for evidence indicating the presence of Otter (*Lutra lutra*), considering the proximity of the Project Site to the Barrow Line branch of the Grand Canal (see Section 2.3). Survey effort focused on identifying the location of resting sites – holts or couches along the canal (up to 150m either side of the Project Site), and the entirety of the area within the Project Site. The survey also included a search for common signs of otters (spraints, prints, anal jelly, prey remains) and considered standard methodology described in Monitoring the Otter (Chanin, 2003).

Surveys for other aquatic QI species (i.e. fish, molluscs or crustaceans) were not undertaken, on the basis that there is no surface connectivity with any waterbodies outside the Project Site boundary (see Section 2.3), and thereby no opportunity for these species to enter the Project Site.

This AA Screening report and NIS has been informed by the following guidance:

- Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government (DoEHLG). Dublin. (2009)
- Assessment of Plans and Projects Significantly affecting Natura 2000 Sites: Methodological Guidance on the provisions of Article 6(3) and 6(4) of the Habitats Directive 92/43/EEC (European Commission, 2002) Communication from the Commission on the Precautionary Principle
- CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.2, Winchester
- European Commission (2002) Assessment of plans and projects significantly affecting European sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC.
- European Commission & D.G. Environment (2013) Interpretation Manual of European Union Habitats EUR28.Nature ENV B.
- Fossitt, J. (2000) A Guide to Habitats in Ireland. Heritage Council.
- European Commission (2019) Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC
- National Roads Authority (NRA) (2009) Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes.
- NPWS (2019). The Status of EU Protected Habitats and Species in Ireland. Volume 3: Species Assessments. Unpublished NPWS Report. Edited by Deirdre Lynn and Fionnuala O'Neill.
- Office of the Planning Regulator (OPR) (2021) Practice Note PN01: AA Screening for Development Management.
- Smith, G. F. et al. (2011) Best Practice and Guidance for Habitat Surveying and Mapping. Heritage Council.
- Scottish Natural Heritage (SNH) (2016). Assessing connectivity with Special Protection Areas (SPAs). Version 3 - June 2016.

1.6 CONTRIBUTORS TO THIS REPORT

This report has been produced by Alex Hayden (Consultant Ecologist at WSP). It has been reviewed by Steven Tooher ACIEEM (Principal Ecologist) and Luis Iemma MCIEEM CEcol (Associate Director). Alex, Steven and Luis have 2.5, 10-, and 15-years' professional ecology experience respectively.

2 PROPOSED PROJECT

2.1 OVERVIEW

The Proposed Project comprises the restoration of a former sand, gravel and rock quarry that was operational in the north of the Project Site from 2000 to 2006. The Proposed Project seeks to restore the land via infilling with uncontaminated clean soil and stone, which will be registered or notified as required to the EPA as a by-product under Regulation 27 of the European Communities (Waste Directive) Regulations (Government of Ireland, S.I. 126/2011)).

The Project Site boundary is shown on the drawing set which accompanies the planning application.

The temporal scope of the assessment covers the 10-year construction phase. The construction phase comprises:

- enabling works carried out to install the site facilities (welfare facilities, hard standing areas, weighbridge, etc), and upgraded/realigned private access road and site entrance; and
- acceptance of clean soil and stone to the Project Site and its placement to restore the disused quarry in the north of the Project Site.

The restoration, following the construction phase infilling works, largely comprises aftercare and maintenance activities. The restoration phase has been scoped out of this assessment due to the nature of the works to be carried out in that project phase and the short-term nature of the phase having limited potential to impact land, geology and soils.

Clean soil and stone (non-waste) by-product will be delivered to the Project Site in tipper lorries, whereupon it will be deposited to the void, then spread and compacted by tracked excavator or similar plant machinery. No dewatering of the void will be carried out. Granular material will be placed to the leading edge and pushed directly into void space via the existing bench on the northwest on the void. This will generally continue in a south and southeast direction at a level above the water level. Infilling may be undertaken from various locations depending on site operational conditions. Soil will be placed on top of the granular type material and levelled in a northwest to southeast direction.

The applicant proposes to import approximately (ca.) 720,000 tonnes of clean soil and stone (non-waste) by-product to infill the quarry void space and contour surrounding lands to ground levels that tie in with the existing topographical levels of surrounding lands.

The total daily trips associated with the quarry operation for the importation of approximately 100,000 tonnes per annum accounts for 46 movements daily, 36 of which relate to HGV's (approximately 80%). These numbers have been broken down as follows:

- 36 daily truck movements enter and exit the Project Site importing material, 18 inbound and 18 outbound;
- 6 staff trips daily, 3 inbound and 3 outbound; and
- 4 miscellaneous trips daily, 2 inbound and 2 outbound.

The Project Site will accept less than 100,000 tonnes of clean soil and stone (non-waste) by-product soil and stone per annum. Based on a maximum 20 tonnes per load this indicates that the Project Site will have an operation life of ca. 8 years (on the basis that site will operate 5.5 days per week and 50 weeks per year). However, short-term import rates will be influenced by supply and demand

and therefor permission is sought for a 10 years year construction phase and a 3 year restoration phase, following the construction phase, for aftercare and maintenance of the restored lands. As such, a permission for a total 13 years is being sought for the Proposed Project.

A full drawing pack has been prepared to support the 37L Application for the Proposed Project, and this is available within the wider 37L Application.

2.2 BY-PRODUCTS UNDER REGULATION 27

The concept of a by-product was established by the European Waste Framework Directive (Directive 2008/98/EC). This concept has been transposed into Irish law through Regulation 27 of the European Communities (Waste Directive) Regulations 2011, as amended.

Under the Waste Action Plan for a Circular Economy (DCCAE, 2020), the fundamental goal is to achieve a circular economy that avoids unnecessary waste generation and allows for the use of materials as a resource, wherever possible.

Only a 'production residue' can be considered a potential by-product. The initial assessment of whether a production residue is a by-product or a waste is referred to as the 'by-product test'.

The by-product test is made up of four conditions, which represent the requirements of Regulation 27. All four of the following conditions must be met in order to determine that a production residue is a by-product:

- Further use of the material is certain;
- The material can be used directly without any further processing other than normal industrial practice;
- The material is produced as an integral part of the production process; and
- Further use is lawful, in that the substance or object fulfils all relevant product, environmental and health protection requirements for the specific use and will not lead to overall adverse environmental or human health impacts.

In the context of the Proposed Project, the infill material will conform to the National By-Product Criteria (EPA, 2024) for Greenfield Soil and Stone (EPA, 2024). Importantly in the context of assessing ecological or environmental impacts, the quality of the soil and stone by-product must conform to the conditions set out in Table 2-1.

Table 2-1 - Quality criteria for greenfield soil and stone by-product

Criteria	Details	Self-Monitoring Requirements
3(a)	▪ The batch of greenfield soil and stone by-product shall be free of: • Invasive alien plant species; • Anthropogenic material or substances including but not limited to: – Man-made substances or objects such as concrete, bricks, metal, plastic, bituminous materials,	The producer, or designated qualified staff, shall assess the greenfield soil and stone and ensure this criterion is satisfied.

Criteria	Details	Self-Monitoring Requirements
	– Organic compounds such as Benzene, Toluene, Ethyl-benzene, Xylene (BTEX), mineral oil, Total Petroleum Hydrocarbons (TPHs), Polycyclic Aromatic Hydrocarbons (PAHs), Polychlorinated Biphenyls (PCBs); – Volatile Organic Compounds (VOCs); – Pesticides; – Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS); – any other substance or material as may be prescribed by the Agency	
3(b)	Where a batch of greenfield soil and stone includes topsoil, this portion of the batch shall be segregated and managed separately and shall only be used in a final surface layer.	The producer or designated qualified staff shall ensure the topsoil portion of the batch is appropriately labelled and segregated. The end user, or designated qualified staff, shall complete the inspections required to ensure criterion 3(a) has been satisfied.

2.3 PROJECT SITE DESCRIPTION

The majority of the Project Site has been disturbed by extraction activities, which have now ceased. Extraction was focused on the east, which has resulted in the formation of large void, which has filled with water and formed a quarry waterbody (ca. 2.3 ha in area). Stockpiles of overburden to the southwest and west of the void have undergone varying degrees of recolonisation, leading to the creation of patchy mosaics of bare ground, grassland and scrub. The deposition of overburden has led to a hummocky topography throughout much of the Project Site.

The topsoil onsite contains high proportions of sand and gravel (refer to Chapter 5 of the EIAR). Groundwater vulnerability, per Geological Survey Ireland (GSI, 2025) is classified as ‘extreme’, which is an indication of the free-draining nature of the Project Site.

2.3.1 SURFACE WATERCOURSES

There are no surface watercourses within the Project Site boundary. The northwest boundary of the Project Site is parallel to the Grand Canal (Barrow Line branch). The canal and its embankment is separated from the Project Site by a dense treeline/hedgerow, an asphalt footpath and a strip of grassland. The Grand Canal Barrow Line continues south until it crosses over the River Barrow via an aqueduct in Monasterevin, approximately 6.5 km downstream. This section of the River Barrow is part of the River Barrow and River Nore SAC (002162) (see Figure 2-1). The Grand Canal Barrow Line converges with the River Barrow in Athy ca. 25 km downstream. The River Barrow continues to flow south, discharging into Waterford Harbour which lies approximately 140.6 km downstream of the Project Site.

There is no surface water connectivity between the Project Site and any external watercourses.

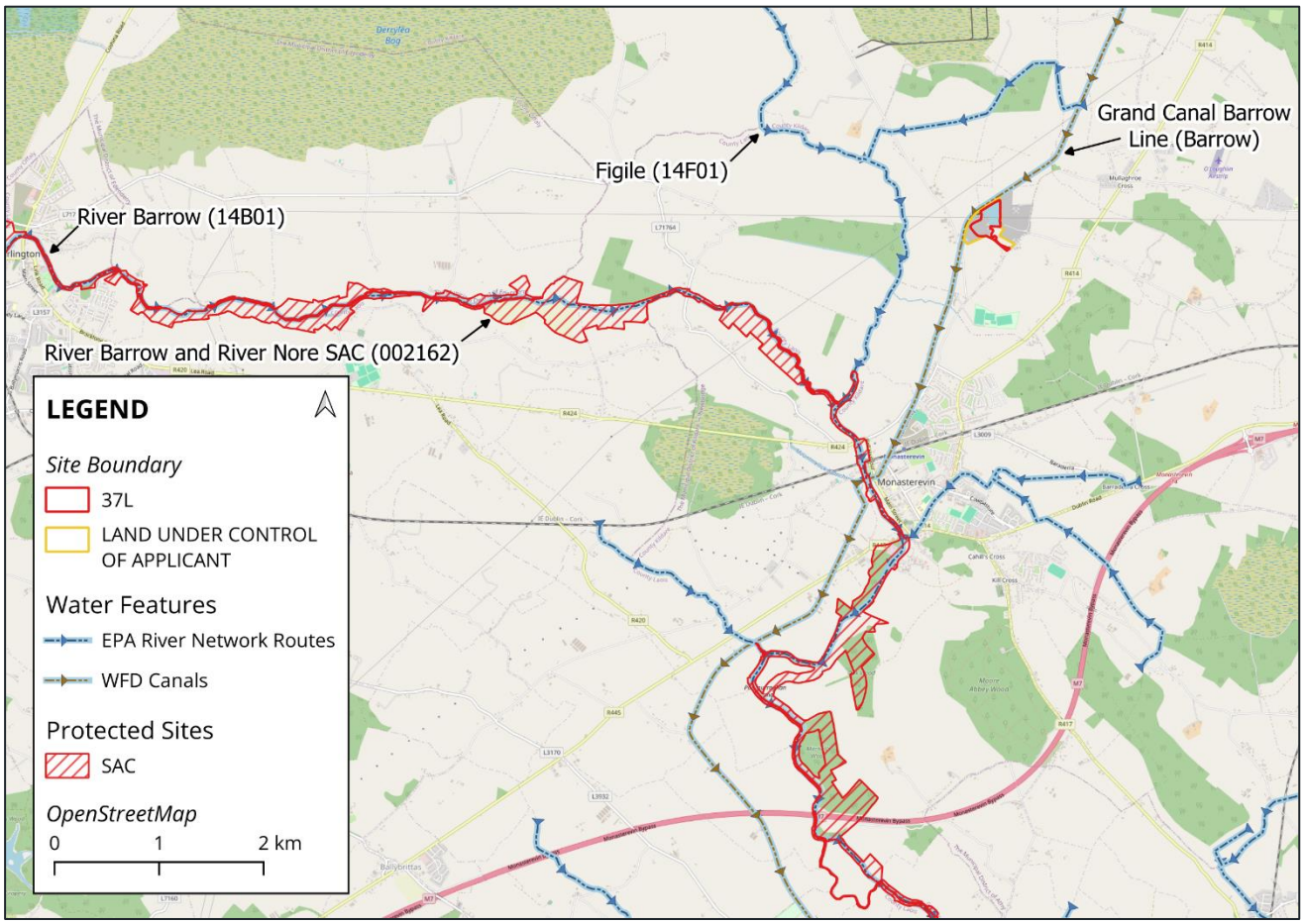

Figure 2-1 - Hydrological Connectivity

2.3.2 GROUNDWATER

The Project Site is underlain by the River Barrow karstic (diffuse) aquifer, which in turn overlies the limestone (and subordinate shale) bedrock aquifer of the Allenwood Formation. The quarry void extends below the groundwater table, such that the quarry waterbody that is currently present is mostly composed of groundwater.

The Project Site is situated above the Bagenalstown Upper groundwater body (EU Code: IE_SE_G_153). The natural flow (as suggested by the topography of the Project Site) of the groundwater below the Project Site is in the west direction. However, the groundwater contours show that there is a flow to the south-east of the Project Site. It is likely that abstraction for the Monasterevin public water supply influences the groundwater flow.

The Grand Canal Barrow Line and the River Figile lie to the west of the Project Site. Hydraulic connectivity between the Project Site and these waterbodies is highly unlikely due to the flow direction observed using the groundwater contours. Additional reasons to support a lack of hydraulic connectivity from the Project Site and these waterbodies are:

- The Grand Canal is situated approximately 3.65 m above the groundwater body and is a closed system and is clay-lined (Murray, 2020), preventing hydraulic connectivity between the canal and the Project Site.
- The River Figile is more likely to be fed by the sand and gravel aquifer (Aquifer Sand and Gravel Unique ID: IE_GSI_sgAq_40K_52) than the moderately productive (LI) bedrock aquifer (see EIAR Chapter 6, Appendix A).

3 APPROPRIATE ASSESSMENT CONTEXT

3.1 STAGES OF APPROPRIATE ASSESSMENT

AA is a multi-stage process as described below. This report covers Stage 1 of the AA, which involves screening for LSEs on European sites. Stage 2 (Appropriate Assessment) involves the assessment of those LSEs to determine if they will adversely affect the integrity of any European sites. Appropriate Assessment is carried out by the Competent Authority and is informed by the information contained in a Natura Impact Statement (NIS). A brief description of the legislative context is also provided in this section.

Guidance on Article 6 of the Habitats Directive (European Commission, EC 2018 and EC 2021) sets out the step wise approach which should be followed to enable Competent Authorities to discharge their duties under the Habitats Directive and provides further clarity on the interpretation of Articles 6 (3) and 6 (4). The process used is usually summarised in four distinct stages of assessment.

- Stage 1 (AA Screening) - The purpose of the screening stage is to determine, on the basis of a preliminary assessment and objective criteria, whether a plan or project, alone and in-combination with other plans or projects, could have significant effects on a European site in view of the site's conservation objectives. There is no necessity to establish such an effect; it is merely necessary for the Competent Authority to determine that there may be such an effect. The need to apply the precautionary principle in making any key decisions in relation to the tests of AA has been confirmed by the case law of the Court of Justice of the European Union (CJEU). Plans or projects that have no appreciable effect on a European site may be excluded. The threshold at this first stage is a very low one and operates as a trigger to determine whether a Stage Two AA must be undertaken by the Competent Authority on the implications of the Proposed Project for the conservation objectives of a European site. Therefore, where significant effects are likely, uncertain or unknown at screening stage, a second stage AA will be required.
- Stage 2 (NIS to inform AA) - A Stage Two AA is a focused and detailed examination, analysis and evaluation carried out by the Competent Authority of the implications of the plan or project, alone and in-combination with other plans and projects, on the integrity of a European sites in view of that site's conservation objectives. Case law has established that such an AA, to be lawfully conducted, in summary:
    - must identify, in the light of the best scientific knowledge in the field, all aspects of the Proposed Project which can, by itself or in-combination with other plans or projects, affect the conservation objectives of the European site;
    - must contain complete, precise and definitive findings and conclusions and may not have lacunae or gaps; and
    - may only include a determination that the Proposed Project will not adversely affect the integrity of any relevant European site where the Competent Authority decides (on the basis of complete, precise and definitive findings and conclusions) that no reasonable scientific doubt remains as to the absence of the identified potential effects. If adverse impacts can be satisfactorily avoided or successfully mitigated at this stage, so that no reasonable doubt remains as to the absence of the identified potential effects, then the process is complete. If the assessment is negative, i.e. adverse effects on the integrity of a site cannot be excluded, then the process must proceed to stage three and, if necessary, stage four.

- Stage 3 - This stage of the potential process arises where adverse effects on the integrity of a European site cannot be excluded and examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the European site.
- Stage 4 - Assessment where no alternative solutions exist and where adverse effects remain: an assessment of whether the development is necessary for imperative reasons of overriding public interest and, if so, of the compensatory measures needed to maintain the overall coherence of the network of European sites.

3.2 LEGISLATIVE CONTEXT

3.2.1 EUROPEAN UNION HABITATS DIRECTIVE

Article 6(3) of the Habitats Directive sets out the need for AA of plans or projects which adversely affect the integrity of a European site (SPAs, SACs and candidate SACs (cSACs)) based on their proximity, or connectivity to the Proposed Project:

- Any plan or project not directly connected with or necessary to the management of a European site, but which is likely to have a significant effect upon such a site, either individually or in combination with other plans or projects, shall undergo an AA to determine its implications for the site. The competent authorities can only agree to the plan or project after having ascertained that it will not adversely affect the integrity of the site concerned (Article 6.3).

3.2.2 PLANNING AND DEVELOPMENT ACT

The Habitats Directive was transposed into Irish law in a planning context, through Part XAB of the Planning and Development Acts 2000 (as amended). This sets out the circumstances under which an AA is required, the stages of that assessment which must be undertaken, as summarised above, and the responsibilities of the Competent Authority in considering whether to approve consent for proposed plans or projects.

Section 177U(1) of the Act states that:

> *A screening for appropriate assessment of a draft Land use plan or application for consent for Proposed Project shall be carried out by the competent authority to assess, in view of best scientific knowledge, if that Land use plan or Proposed Project, individually or in combination with another plan or project is likely to have a significant effect on the European site.*

Section 177(4) of the Act states that:

> *The competent authority shall determine that an appropriate assessment of a draft Land use plan or a Development, as the case may be, is required if it cannot be excluded, on the basis of objective information, that the draft Land use plan or Development, individually or in combination with other plans or projects, will have a significant effect on a European site.*

Where likely significant effects upon a European site are predicted, or cannot be ruled out, it is the responsibility of the Competent Authority to undertake an AA under Article 6(3) of the Habitats Directive, informed through an NIS, to determine whether the proposed plan in combination with any other plan or project would adversely affect the integrity of a European site in light of its Conservation Objectives.

Where an AA concludes there will be adverse effects on the integrity of a European site, the Competent Authority may only agree to the plan or project if:

- It is evidenced that there are no alternative solutions (Stage 3); and
- There are imperative reasons of overriding public interest for the advancement of the project (Stage 4), and appropriate compensation measures have been identified.

In October 2024, the Planning and Development Act 2024, was signed into law. This new legislation is to be implemented according to the Planning and Development Act 2024 Implementation Plan published in March 2025. A phased commencement approach will be employed with the existing the Act of 2000 remaining in place until the relevant provision in Act of 2024 are effective. The plan provides a high-level overview of the commencement of the various sections of the Act of 2024. Sections have been categorised in blocks (Block A1, A2, B, C and D). Part 6, which provides for environmental assessment (including AA) will commence in Block B and Block C. Block B is expected to commence in mid-2025.

Section 177(4) of the Act states that:

> *The competent authority shall determine that an appropriate assessment of a draft Land use plan or a Proposed Project, as the case may be, is required if it cannot be excluded, on the basis of objective information, that the draft Land use plan or Proposed Project, individually or in combination with other plans or projects, will have a significant effect on a European site.*

Where likely significant effects upon a European site are predicted, or cannot be ruled out, it is the responsibility of the Competent Authority to undertake an AA under Article 6(3) of the Habitats Directive, informed through an NIS, to determine whether the proposed plan in combination with any other plan or project would adversely affect the integrity of a European site in light of its Conservation Objectives.

Where an AA concludes there will be adverse effects on the integrity of a European site, the Competent Authority may only agree to the plan or project if:

- It is evidenced that there are no alternative solutions (Stage 3); and,
- There are imperative reasons of overriding public interest for the advancement of the project (Stage 4), and appropriate compensation measures have been identified.

In October 2024, the Planning and Development Act 2024, was signed into law. This new legislation is to be implemented according to the Planning and Development Act 2024 Implementation Plan published in March 2025. A phased commencement approach will be employed with the existing the Act of 2000 remaining in place until the relevant provision in Act of 2024 are effective. The plan provides a high-level overview of the commencement of the various sections of the Act of 2024. Sections have been categorised in blocks (Block A1, A2, B, C and D). Part 6, which provides for environmental assessment (including AA) will commence in Block B and Block C. Block B is expected to commence in mid-2025.

3.2.3 A NOTE ON MITIGATION

It should be noted that this report has taken account of the 2017 European Court of Justice (CJEU) ruling (C-323/17 - People Over Wind and Peter Sweetman v Coillte):

> *Article 6(3) of the Habitats Directive must be interpreted as meaning that, in order to determine whether it is necessary to carry out, subsequently, an AA of the implications, for a site concerned, of a plan or project, it is not appropriate, at the screening stage, to take account of the measures intended to avoid or reduce the harmful effects of the plan or project on that site.*

4 APPROPRIATE ASSESSMENT SCREENING (STAGE 1)

4.1 IDENTIFICATION OF RELEVANT EUROPEAN SITES

Table 4-1 provides details of the Qualifying Interests (QIs) of each of the European sites identified within the EZoI of the Proposed Project, the approximate distance and direction of each European site, and if there is potential connectivity[3]. The locations of these European sites in relation to the Project Site are shown in Figure 4-1.

[3] Information on designated sites was obtained from freely downloadable datasets from National Park and Wildlife Service (NPWS). Available at: https://www.npws.ie/faq/site-designation

Table 4-1 - European Sites within the EZoI

Site Name and Code	Qualifying Interests [Habitats/Birds Directive Code]	Distance to Proposed Project	Impact Pathways	Connectivity (Y/N)
002162 River Barrow and River Nore SAC	**Habitats:** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Reefs [1170] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] European dry heaths [4030] Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430] Petrifying springs with tufa formation (*Cratoneurion*) [7220] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0]	1.6 km NE (direct) 25.6 km (via canal)	The Project Site lies approximately 1.6 km north-east of the SAC. As discussed in Section 2.3, there are no surface watercourses within the Project Site boundary. There is therefore **no direct hydrological connectivity** between the Project Site and this SAC. The Project Site and parts of the SAC lie within the Bagenalstown Upper groundwater body (EU Code: IE_SE_G_153) and there is a direct pathway to the groundwater table onsite in the form of an open groundwater quarry waterbody. However, as discussed in Section 2.3.1, the flow of the groundwater is in the south-east direction (away from the SAC and surface watercourses that feed into the SAC) due to abstraction for the Monasterevin public water supply. In addition, the section of River Barrow to the west of the Project Site is most likely fed by the sand and gravel aquifer and not from the underlying moderately productive (LI) bedrock aquifer. Therefore, the **groundwater impact pathway can be ruled out**. Air quality impacts of the Proposed Project were conducted in Chapter 7 of the EIAR (see Appendix A). The guidance used for the assessment states that effects of dust do not exceed a buffer of 400 m. Due to the distance	**Y**

Site Name and Code	Qualifying Interests [Habitats/Birds Directive Code]	Distance to Proposed Project	Impact Pathways	Connectivity (Y/N)
	Species: Desmoulin's Whorl Snail (*Vertigo moulinsiana*) [1016] Freshwater Pearl Mussel (*Margaritifera margaritifera*) [1029] White-clawed Crayfish (*Austropotamobius pallipes*) [1092] Sea Lamprey (*Petromyzon marinus*) [1095] Brook Lamprey (*Lampetra planeri*) [1096] River Lamprey (*Lampetra fluviatilis*) [1099] Twaite Shad (*Alosa fallax fallax*) [1103] Salmon (*Salmo salar*) [1106] Otter (*Lutra lutra*) [1355] Killarney Fern (*Trichomanes speciosum*) [1421]		involved, there is **no direct connectivity for dust emissions** to the River Barrow and River Nore SAC. Although the fluvial distance between the SAC and the Project Site is 25.6 km, further analysis is required to determine the likelihood of significant effects on qualifying interests given the potential functional connectivity. As such, the **indirect dust emissions pathway is viable**.	
000396 Pollardstown Fen SAC	**Habitats:** Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* [7210] Petrifying springs with tufa formation (*Cratoneurion*) [7220]	12.9 km W (direct) 26.6 km (canal)	The Project Site lies approximately 12.9 km west of the SAC. There is no direct hydrological connection between the Project Site and the SAC. The Project Site lies approximately 26.6 km downstream of the SAC via the Cloncumber Stream (EPA Name: Cloncumber (Stream);	N

Site Name and Code	Qualifying Interests [Habitats/Birds Directive Code]	Distance to Proposed Project	Impact Pathways	Connectivity (Y/N)
	Alkaline fens [7230] **Species:** Geyer's Whorl Snail (*Vertigo geyeri*) [1013] Narrow-mouthed Whorl Snail (*Vertigo angustior*) [1014] Desmoulin's Whorl Snail (*Vertigo moulinsiana*) [1016]		EPA Code: 14C17) and the Grand Canal Barrow Line, which runs along the north-west boundary of the Project Site. The lack of hydrological connectivity means that there is also no functional connectivity. Fen habitats (7210 and 7230) and are groundwater-dependent terrestrial ecosystems (GWDTEs). Similarly petrifying springs are groundwater-dependent aquatic habitat. The SAC is located within the Curragh Gravels West (EU Code: IE_SE_G_133) and GWDTE-Pollardstown Fen (SAC000396) (EU Code: IE_SE_G_106) groundwater bodies. The Project Site is located within the Bagenalstown Upper groundwater body. Given the Project Site and SAC are not within the same groundwater bodies, there is no groundwater connectivity. Due to the distance involved, there is no connectivity for dust emissions.	
002141 Mountmellick SAC	**Species:** Desmoulin's Whorl Snail (*Vertigo moulinsiana*) [1016]	14.6 km E (direct)	The Project Site lies approximately 14.6 km east of the SAC. There is no direct hydrological connection between the Project Site and the SAC. Desmoulin's whorl snails favour calcareous wetlands with tall herbaceous vegetation, often associated with lake, river, drainage ditches, reedbeds and swamps (Long & Brophy, 2019).	N

Site Name and Code	Qualifying Interests [Habitats/Birds Directive Code]	Distance to Proposed Project	Impact Pathways	Connectivity (Y/N)
			The lack of hydrological connectivity means that there is also no functional connectivity. The Project lies within the Bagenalstown Upper groundwater body while the SAC lies within the Portlaoise groundwater bodies. Thus, there is no groundwater connectivity between the Project Site and SAC. Due to the distance involved, there is no connectivity for dust emissions.	
002331 Mouds Bog SAC	**Habitats:** Active raised bogs* [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the *Rhynchosporion* [7150]	14.9 km SW (direct)	The Project Site lies approximately 14.9 km south-west of the SAC. There is no direct hydrological connection between the Project Site and the SAC. Peatland ecohydrology is dependent on groundwater levels, particularly where peat develops over more permeable materials including karstified limestone and gravel (Regan et al., 2019). The SAC lies over a sand and gravel aquifer and thus is reliant on the groundwater levels. The SAC is located within the Curragh Gravels West (EU Code: IE_SE_G_133) and Curragh Gravels East (EU Code: IE_EA_G_017) groundwater bodies. The Project Site is located within the Bagenalstown Upper groundwater body. Given the Project Site and SAC are not within the same groundwater bodies, there is **no groundwater connectivity**.	N

Site Name and Code	Qualifying Interests [Habitats/Birds Directive Code]	Distance to Proposed Project	Impact Pathways	Connectivity (Y/N)
			Due to the distance between the Project Site and SAC being over 10 km, there is **no connectivity for dust emissions**.	
000925 The Long Derries, Edenderry SAC	**Habitats:** Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (*important orchid sites) [6210]	16.2 km S (direct)	The Project Site lies approximately 16.2 km south of the SAC. There is **no hydrological connection** between the Project Site and the SAC. This SAC is designated for habitats only; there is therefore **no functional connectivity** with the Project Site. Due to the distance involved, there is **no connectivity for dust emissions**.	N

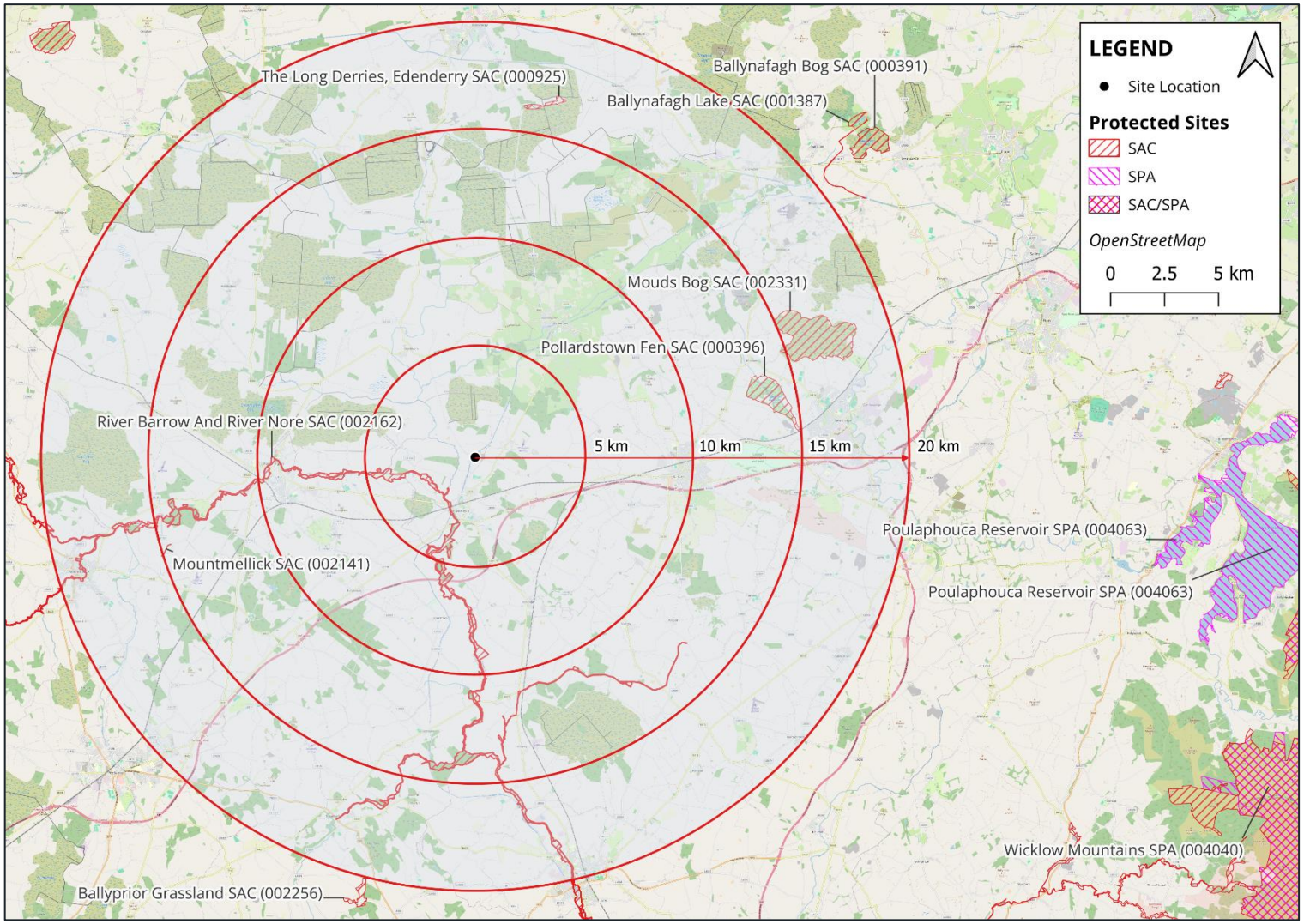

Figure 4-1 - European sites within 20 km of the Project Site

Based on the information presented in the above table, it has been concluded that the Project Site has indirect connectivity with one European site:

- River Barrow and River Nore SAC

The Project Site is not hydrologically or otherwise connected to any other European sites.

4.2 QI DISTRIBUTION & CONNECTIVITY

This section further describes the known, or inferred, distribution of the QI of the River Barrow and River Nore SAC and the potential for connectivity between the SAC and the Project. Assessing these factors will inform the assessment of the likelihood of significant effect (Section 6).

Indirect connectivity via dust emissions to the SAC was identified as impact pathways in Section 4.1. In order to evaluate connectivity via this pathway, it is important to consider the management of the Grand Canal. The canal has been managed by WI since 2000. There are no records of the management of the canal adjacent to the Project Site publicly available. However, management practices within the Barrow catchment for the purpose of navigation are likely extended to the Grand Canal Barrow line. These practices include bank repairs and removing features that obstruct the flow of water such as debris, fallen timber/trees, emergent vegetation, and accumulated silt (King, 2006). In addition, there are five canal locks (3 single locks and 1 double lock) between the area of canal adjacent to the Project Site and where the canal joins the SAC. These factors pose a significant barrier for sediment flowing downstream to the SAC containing sensitive habitats and species (see Table 4-2).

Table 4-2 – QI Distribution & Connectivity – River Barrow and River Nore SAC

Qualifying Interest	Distribution and Justification for Connectivity	Connectivity (Y/N)
Habitats:		
Estuaries [1130]	Present in tidal reaches of the Rivers Barrow, Nore and Suir – extending upstream near to Inistiogue, Co Kilkenny (R. Nore) and St. Mullins, Co. Carlow (R. Barrow). St. Mullins is approximately 109 km downstream from canal adjacent to the Project Site. Groundwater connectivity and direct hydrological connectivity between the Project Site and SAC have been ruled out (see **Table 4-1**). Therefore, the only impact pathway applicable to estuary habitat is via indirect dust emission. However, the length and nature of this potential pathway and the assimilative capacity of the watercourses between the Project Site and this habitat rule out the potential for connectivity between the estuary habitat and the Project Site As such, there is **no connectivity** between the Project Site and the estuary habitat within the SAC.	N
Mudflats and sandflats not covered by seawater at low tide [1140]	Coastal habitat. Present at the mouth of the River Suir in Waterford Harbour. Waterford Harbour is approximately 130 km downstream of the canal adjacent to the Project Site. The latest Article 17 data (NPWS, 2019) shows the downstream distribution and range of this habitat as 109 km via the canal adjacent to the Project Site.	N

Qualifying Interest	Distribution and Justification for Connectivity	Connectivity (Y/N)
	As discussed for estuaries, the downstream distance of 100 km and the assimilative capacity of the watercourses between the Project Site and this habitat rule out the potential for connectivity between the mudflats and sandflats habitat and the Project Site. As such, there is **no connectivity** between the Project Site and the mudflats and sandflats habitat within the SAC.	
Reefs [1170]	Current mapping of *Sabellaria alveolata* reefs shows this habitat along the Co. Wexford coast at the mouth of the River Suir in Waterford Harbour. According to the most recent Article 17 data, the distribution and range for this habitat is 123.3 km downstream of the canal adjacent the Project Site. Similarly to estuaries and the mudflat and sandflat habitats, the downstream distance of over 120 km and the assimilative capacity of the watercourses between the Project Site and this habitat rule out the potential for connectivity between the reefs in the SAC and the Project Site during the assessment period. As such, there is **no connectivity** between the Project Site and reefs within the SAC.	N
Salicornia and other annuals colonising mud and sand [1310]	Coastal habitat. Present at the mouth of the River Suir in Waterford Harbour. Waterford Harbour is approximately 133 km downstream of the canal adjacent to the Project Site. The latest Article 17 data, shows the downstream distribution and range of this habitat within the SAC is 121.9 km via the canal adjacent to the Project Site. The downstream distance of at least 121 km and the assimilative capacity of the watercourses between the Project Site and this habitat rule out the potential for connectivity between the *Salicornia* and other annuals colonising mud and sand habitat within the SAC and the Project Site. As such, there is **no connectivity** between the Project Site and *Salicornia* and other annuals colonising mud and sand within the SAC.	N
Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410]	These coastal habitats are present at the mouth of the River Suir in Waterford Harbour. The distribution and range of these habitats as defined by the most recent Article 17 data was 108.9 km downstream of the canal. The downstream distance of over 108 km and the assimilative capacity of the watercourses between the Project Site and these habitats rule out the potential for connectivity between the Atlantic or Mediterranean salt meadows within the SAC and the Project Site. As such, there is **no connectivity** between the Project Site and Atlantic or Mediterranean salt meadows within the SAC.	N

Qualifying Interest	Distribution and Justification for Connectivity	Connectivity (Y/N)
Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]	The latest Article 17 range and distribution of this habitat covers the entire country. However, this was based on the presence of rivers with no regard for specific vegetation. It is assumed this habitat is present within the EZoI. Nonetheless, in order for there to be connectivity via indirect dust emission between the habitat area within the SAC and the Project Site, dust will have to settle on the canal adjacent to the Project Site and flow into the SAC. Given the minimum downstream distance between the canal adjacent to the Project Site and the SAC is 25.6 km and the assimilative capacity of the canal, connectivity via indirect dust emission can be ruled out. Therefore, there is **no connectivity** between the Project Site and watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation within the SAC.	N
European dry heaths [4030]	European dry heaths within the SAC are currently unmapped. The most recent Article 17 data shows a country wide range and distribution that covers the majority of the country with the exception of Louth, Meath, Kildare (north, south-east, and south), Westmeath, Laois, Longford, Offaly, North Roscommon, East Galway, Central Monaghan, South Leitrim, South Cavan, North Dublin, East Wexford, North-west Carlow, North Kilkenny, North and East Tipperary, and Central Limerick either in full or partial. Given terrestrial nature of the habitat, the fact that there was no overlap between the Project Site and SAC boundaries, the distance between the SAC and Project Site being 1.6 km, there is **no connectivity** between areas of European dry heath within the SAC and the Project Site.	N
Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]	According to the Conservation Objectives for this SAC, the distribution of hydrophilous tall herb fringe communities is largely unknown, but the nearest mapped area of habitat in the SAC is in Carlow town, 42.8 km downstream via the canal adjacent to the Project Site. The latest Article 17 data shows the distribution and range for this habitat is 25.6 km downstream of the canal adjacent to the Project Site. Considering the lack of a direct hydrological connection between the Project Site and the SAC, the length of indirect connection via dust emissions being over 25.0 km, and the assimilative capacity of the canal, there is **no connectivity** between the Project Site and hydrophilous tall herb fringe communities of the SAC.	N
Petrifying springs with tufa formation (*Cratoneurion*) [7220]	The most notable distribution of tufa springs within the SAC are in the Nore catchment, south of Thomastown, Co. Kilkenny. There are no mapped occurrences of this habitat anywhere else within the SAC. Article 17 shows that the Project Site lies within the distribution and range for this habitat. As such the closest potential area for a spring within the SAC lies 1.6 km south-west of the Project Site or 25.6 km downstream of the canal area adjacent to the Project Site.	N

Qualifying Interest	Distribution and Justification for Connectivity	Connectivity (Y/N)
	Given groundwater connectivity between the Project Site and the SAC has been ruled out (see **Table 4-1**), the length of the downstream distance via the canal and assimilative capacity of the canal and River Barrow, there is **no connectivity via indirect dust emission** between the distribution of petrifying springs with tufa formation and the Project Site.	
Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0]	Based on the most recent Article 17 data, the distribution and range of this habitat within the SAC lies approximately 54.2 km south of the Project Site. In the Conservation Objectives document, the mapping for old sessile oak woods within the SAC was based on Perrin et al. (2008). It is found within the SAC along the River Delour, River Nore, and River Barrow (NPWS, 2011). The closest mapped area of this habitat within the SAC was 69.6 km south of the Project Site in Drummond Wood, Co. Carlow. However, this does not account for the habitat found along the Delour which is at least 35.4 km south-west of the Project Site. Given the terrestrial nature of the habitat, and the fact that there is no overlap between the Project Site and SAC boundaries, and the distance between the SAC and Project Site being 1.6 km, there is **no connectivity** between the Project Site and old sessile oak woods of the River Barrow and River Nore SAC.	N
Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0]	The distribution and range of alluvial forest, as per the latest Article 17 data, covers a large portion of the country. However, it is recognised in the Article 17 report that this habitat occurs in areas of heavy soil that are subject to periodic flooding but are otherwise well draining and aerated. The mapping for alluvial forest within the SAC for the purpose of setting Conservation Objectives was based on Perrin *et al.* (2008). Given the data in this report is of higher resolution than the Article 17 data, it is more suitable for assessing connectivity between alluvial forest within the SAC and the Project Site. As such, the closest area of alluvial habitat is 16.2 km south of the Project Site. The downstream distance to the closest mapped areas of habitat is 40 km via the canal adjacent to the Project Site. Considering the lack of a direct hydrological connection between the Project Site and the SAC, the length of indirect connection via dust emissions being approximately 40 km, and the assimilative capacity of the canal and River Barrow, there is **no connectivity** between alluvial forest habitat within the SAC and the Project Site.	N
Flora:		
Killarney Fern (*Trichomanes speciosum*) [1421]	According to the latest Article 17 data, the distribution and range for Killarney Fern is 63.2 km south of the Project Site. Given the terrestrial nature of this species, the fact that there is no overlap between SAC and the Project Site, and the distance between the Project Site and above distribution and range, there is **no connectivity** to the Project Site for Killarney Fern.	N
Species:		

Qualifying Interest	Distribution and Justification for Connectivity	Connectivity (Y/N)
White-clawed Crayfish [1092]	The canal adjacent the Project Site falls within the distribution and range of white-clawed crayfish according to the most recent Article 17 data. Although there are no records of white-clawed crayfish within the Grand Canal Barrow Line, records on the River Barrow (N622109, River Biologists' Database (EPA), 25/07/2017; N626100, General Biodiversity Records from Ireland, 2018) indicate that the species are present in the local area. There are downstream records (S710435, General Biodiversity Records from Ireland, 2020), but they lie approximately 86.9 km downstream at Graiguenamanagh, Co. Kilkenny. White-clawed crayfish are largely nocturnal and have a 10-year lifespan. Holdich (2003) describes in detail the characteristics of suitable refuge for this species. It is generally provided by substrate that has a balanced mix of cobbles, rubble, larger structures such as boulders, slates, or logs, and submerged vegetation at the base of the watercourse banks. This is particularly important for juveniles as they are prone to predation. Overwintering habitat can be in deeper waters and/or mud banks where white-clawed crayfish can burrow. This species is known to use canals as long as there is available refuge (O'Connor, Hayes, O'Keeffe, & Lynn, 2009). Maintenance of the canal likely reduces the available refuge through dredging and removal of plants, dead wood, and trees obstructing navigation. Additionally, white-clawed crayfish are likely to use habitats where the substrate is covered in mud or silt for foraging only (O'Connor, Hayes, O'Keeffe, & Lynn, 2009). The closest area of potential habitat for white-clawed crayfish within the River Barrow and River Nore SAC to the Project Site is 25.6 km downstream via the canal or 1.6 km south-west of the Project Site. Indirect connectivity via dust emissions is considered unlikely given the fluvial distance between the area of canal adjacent to the Project Site and where the canal enters the SAC and the significant barriers present. As such, there is **no connectivity** for white-clawed crayfish.	N
Sea Lamprey [1095]	The latest Article 17 data shows the distribution and range of sea lamprey at approximately 91.9 km downstream of the Project Site via the canal. Sea lamprey migrate to sea as juveniles and return to freshwater for breeding purposes. The Conservation Objectives for the SAC highlight that artificial barriers cause the distribution of lamprey to be restricted to the lower stretches of the SAC. According to King (2006), this species is typically restricted to tidal reaches (St. Mullins being the northernmost tidal area in the River Barrow), although they have been recorded up to 43 km upstream of St. Mullins at the River Fushoge. This is approximately 65.9 km downstream of the canal adjacent to the Project Site. Considering the distribution and range of this species and downstream distance from the canal adjacent to the Project Site to	N

Qualifying Interest	Distribution and Justification for Connectivity	Connectivity (Y/N)
	suitable habitat for this species within the SAC, there is **no connectivity** between SAC sea lamprey populations and the canal adjacent to the Project Site.	
River Lamprey [1099]	The distribution and range of river and brook lamprey are difficult to distinguish due to difficulties in identifying between species in the larval stage (NPWS, 2019). As a precaution, it is assumed that the range and distribution published for both species can be combined and applied to both species. As such, the Project Site and the adjacent canal lies within the distribution and range for both lamprey species. However, the closest habitat area within the SAC lies approximately 25.6 km downstream of the canal adjacent to the Project Site. Lamprey have a preference for habitat that provides a clear migration route, refuge provided by rocks, and clean spawning gravels that allow oxygenated water to flow (Maitland, 2003). The capacity of the Barrow catchment to support lamprey species at all stages of their lifecycle is considered limited due to the lack of suitable habitat. It is also considered likely that ammocoete populations were adversely impacted by the aforementioned maintenance practices by removing individuals and degrading habitat (King, 2006). The closest area of potential habitat for lamprey within the River Barrow and River Nore SAC to the Project Site is 25.6 km downstream via the canal or 1.6 km south-west of the Project Site. Indirect connectivity via dust emissions is considered unlikely given the fluvial distance between the area of canal adjacent to the Project Site and where the canal enters the SAC and the significant barriers present. As such, there is **no connectivity** for lamprey.	N
Brook Lamprey [1096]		
Twaite Shad [1103]	This species is confined to the tidal reaches of the Rivers Nore and Barrow (King, 2006; Gallagher, O'Gorman, Rooney, Brett, & O'Leary, 2023; IFI, 2015). The latest Article 17 data shows a distribution and range with a downstream distance of 91.9 km via the River Figile and 73.4 km via the canal adjacent to the Project Site. Twaite shad feed in coastal waters and spawn in the lower reaches of rivers and tributaries. For the River Barrow, the tidal limit is St. Mullins (King & Roache, 2008), which is over 100 km downstream of the canal adjacent to the Project Site. Twaite shad do not pass the weirs at the upper limits of the tide (Bracken & Kennedy, 1967). This has been confirmed by eDNA testing on behalf of the EPA (Kelly-Quinn, et al., 2015). Therefore, there is **no connectivity** for twaite shad due to the downstream distance of the distribution and range of the species and their habitat.	N
Salmon [1106]	The most recent Article 17 data shows salmon distribution and range throughout the River Barrow and River Nore SAC. Freshwater habitats are used by salmon in their reproductive and nursery phases only. Salmon requires a variety of habitat conditions in close proximity to accommodate individuals in both	N

Qualifying Interest	Distribution and Justification for Connectivity	Connectivity (Y/N)
	adult and juvenile phases. Shallow, fast-flowing water with moderately coarse substrate with cover is required for fry and parr. These must be close to holding pools with cover for adult salmon preparing to migrate or spawn. The transitional areas between pool and riffle is an example of ideal spawning habitat. In addition to ideal spawning habitat, access must be clear for adults or have the appropriate flow and pool area adjacent to a barrier in order for adults to negotiate the barrier (Hendry & Cragg-Hine, 2003). The canal does not offer the same variety of habitat as the pool and riffle found in a natural watercourse. The canal has a clay and silty substrate and is relatively uniform in depth in comparison to a natural watercourse to allow for ease of navigation. Maintenance of the canal would have removed vegetation that could have been used for cover by salmon. The homing instinct is also important to consider. Although straying is possible, salmon tend to return to their natal river. Given the artificial nature of the canal, natural watercourses long pre-date it. In combination with the fact that it discharges to the River Liffey in Dublin City Centre and not a natural waterbody, it's unlikely to be used for spawning or as a route to spawning habitat. The closest area of potential habitat for salmon within the River Barrow and River Nore SAC to the Project Site is 25.6 km downstream via the canal or 1.6 km south-west of the Project Site. Indirect connectivity via dust emissions is considered unlikely given the fluvial distance between the area of canal adjacent to the Project Site and where the canal enters the SAC as well as direct distance from the Project Site to potential salmon habitat within the SAC, and the significant barriers for sediment present. As such, there is **no connectivity** for salmon.	
Freshwater Pearl Mussel (FPM) [1029]	Article 17 data published in 2019 combines the distribution and range of FPM and NFPM after genetic research proved that the Nore population is placed within *Margaritifera margaritifera* taxon. The range and distribution lie approximately 53.3 km south of the Project Site. The downstream distances is 65.6.0 km via the canal adjacent to the Project Site. Although canalised rivers can provide suitable habitat for FPM/NFPM, they are more often recorded in rivers that have not been canalised (Moorkens E. A., 2000). FPM/NFPM has a preference for nutrient-poor, acidic to neutral waters over granite or sandstone with gravel substrate. These habitat requirements are not fulfilled in the canal adjacent to the Project Site.	N

Qualifying Interest	Distribution and Justification for Connectivity	Connectivity (Y/N)
Nore Freshwater Pearl Mussel (NFPM) [1990]	FPM are not a mobile species and rely on host fish as glochidia. Shortly after release from the maternal FPM/NFPM, the glochidia attaches to the gills of a host fish, usually Atlantic salmon, brown trout, or sea trout. They live and grow in the hyper-oxygenated environment (encystment) until they drop off into clean sandy or gravelly substrates the following spring (Skinner, Young, & Hastie, 2003). Considering the distribution and range of the species, the significant barriers for sediment travelling downstream and the fluvial length between the known distribution of FPM/NFPM within the SAC and the Project Site, there is **no connectivity** considered between FPM/NFPM within the SAC and the Project Site.	
Semi-aquatic Species:		
Otter [1355]	The range and distribution of otter in 2019 is countrywide. The closest area of potential habitat for otters within the River Barrow and River Nore SAC to the Project Site is 25.6 km downstream via the canal or 1.6 km south-west of the Project Site. Indirect connectivity via dust emissions is considered unlikely given the fluvial distance between the area of canal adjacent to the Project Site and where the canal enters the SAC as well as direct distance from the Project Site to potential otter habitat within the SAC, and the significant barriers for sediment present. As such, there is **no connectivity** for otters.	N
Desmoulin's Whorl Snail [1016]	According to the Conservation Objectives for this SAC, Demoulin's whorl snail is found only at New Wood in Co. Carlow and adjacent to the Old Glass River and M8 in Co. Laois. The New Wood distribution pocket lies 45.6 km south-west of the Project Site with downstream distances of 77.5 km via the canal area adjacent to the Project Site. There are no records within the SAC from the NBDC from the last 10 years. The Old Glass River distribution pocket lies approximately 62.9 km south with no direct hydrological connectivity to the canal adjacent to the Project Site. As such, **connectivity can be ruled out**.	N

5 SURVEY RESULTS

5.1 HABITAT SURVEY RESULTS

Habitats recorded on Project Site are listed below and their locations shown in Figure 5-1. These include:

- FL4 – Mesotrophic lakes;
- FL8 – Artificial pond;
- GS1 – Neutral grassland;
- GS4 – Wet grassland;
- WS1 – Scrub.
- WL1 – Hedgerows;
- ER2 – Exposed calcareous rock;
- ER4 – Calcareous scree and loose rock;
- ED2 – Spoil or bare ground;
- ED3 – Recolonising bare ground; and
- BC1 – Arable crops.

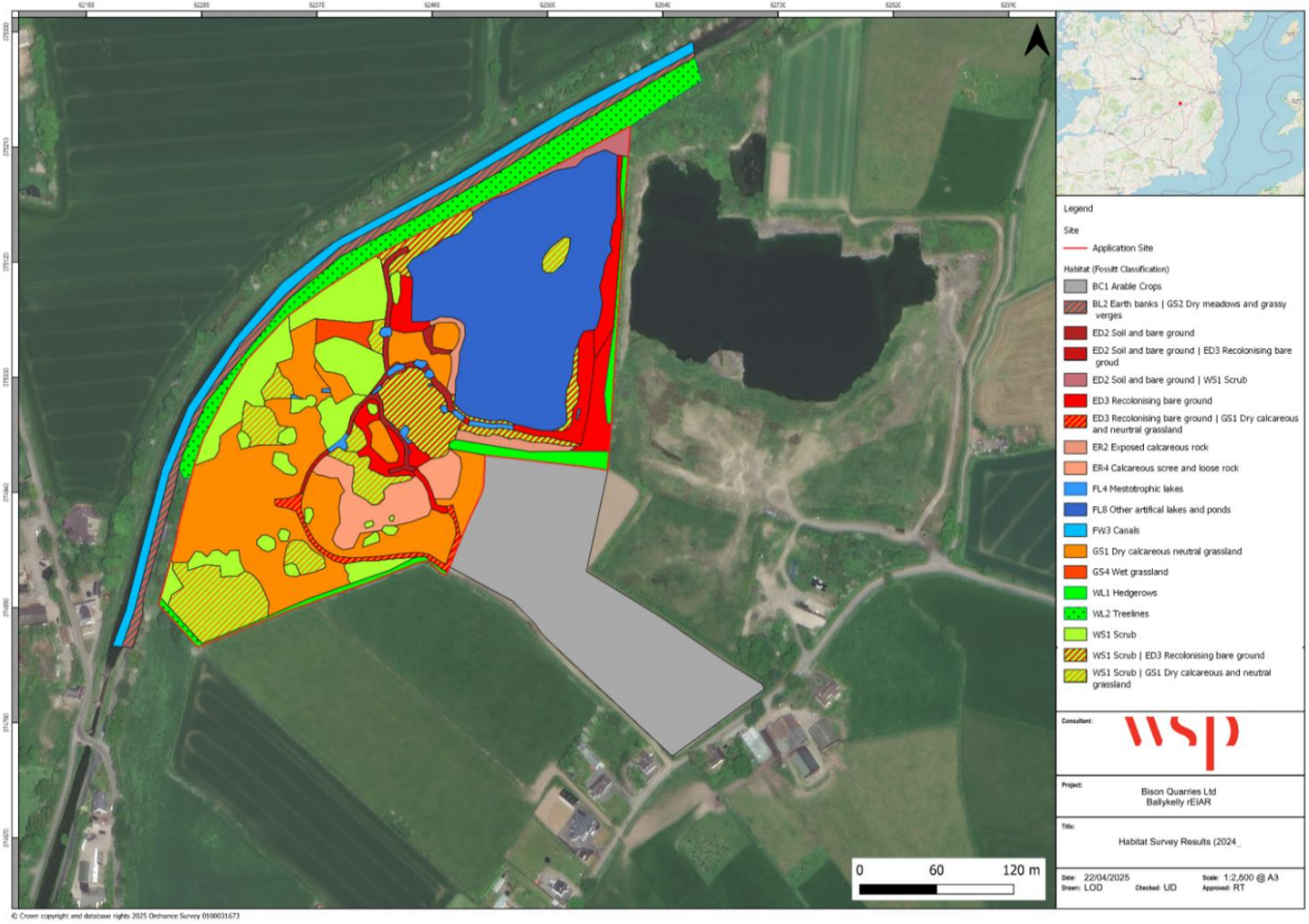

Figure 5-1 - Habitats Recorded at Project Site

5.2 MAMMAL SURVEY RESULTS

No evidence of otter activity (such as spraints, footprints, feeding remains, or holts) was recorded during the mammal survey of the Project Site and the 150 m buffer zone, which included the canal corridor.

Although the collected waters in the quarry void and the canal offer potential foraging and commuting habitats, no signs of otter presence were identified during the survey effort.

6 ASSESSMENT OF LIKELIHOOD OF SIGNIFICANT EFFECTS

This section identifies whether the impacts associated with the Proposed Project are likely to give rise to significant effects upon any of the European sites identified in the previous section. Details of the Proposed Project used to inform the assessment of LSEs are provided in Section 2. As noted in Section 3, mitigation included in this document was only considered once the project passed the Screening Stage. Any measures intended to avoid or reduce adverse effects of the Proposed Project on European sites (i.e. “mitigation measures”) or best practice measures were not considered during the Screening Stage.

For each of the European sites identified in Table 4-1 as having connectivity with the Proposed Project, a screening exercise has been undertaken. In the assessment, each site has been considered in relation to potential impacts and potential effects from the Proposed Project. A screening conclusion is then presented for each European site, identifying if there are any LSEs from the Proposed Project (Table 6-1).

ARTICLE 6(3) STATEMENT – MANAGEMENT OF EUROPEAN SITES

Considering the nature of the activities concerned, and location of the Project Site, it is determined that it is not directly connected with or necessary to the management of a European site and is therefore not exempt from the requirements of the AA process.

6.1 EFFECTS IN ISOLATION

Table 6-1 – AA Screening – Likelihood of Significant Effects (LSEs)

Project Activity	Potential Impact	Screening Assessment	LSEs
Habitat Degradation			
▪ Handling of material (loading, unloading, and movement of infill materials). ▪ Haulage. ▪ Site preparation and grading (levelling/spreading of materials or bare soil). ▪ Wind erosion from exposed surfaces and/or stockpiles.	Dust emissions leading to potential habitat degradation in the forms of: ▪ Changes in water turbidity. ▪ Changes in substrate composition. ▪ Changes in water quality. ▪ Changes in prey availability.	The conservation objectives for the River Barrow and River Nore SAC require favourable conditions to be restored for white-clawed crayfish, river and brook lamprey, salmon, and otter. Habitat degradation due to changes in water turbidity, substrate composition, and water quality within the SAC can be ruled out due to: ▪ The 25.6 km fluvial distance, slow flow, and assimilative capacity of the Grand Canal Barrow Line between the Project Site and the SAC. ▪ The low likelihood of deposited sediment traveling beyond the five weirs downstream of the canal adjacent to the Project Site before it converges with the SAC. As a result, no changes in prey availability are expected. As such, all potential impacts have been ruled out.	No LSE alone. Potential for non-significant effects to act in-combination.

6.1.1 CONCLUSION – EFFECTS IN ISOLATION

When considered in isolation, the Proposed Project was found to not have the potential to result in significant effects on River Barrow and River Nore SAC as outlined in Table 6-1. All other European sites are screened out from further consideration.

6.2 EFFECTS IN COMBINATION

As well as considering the potential for LSEs from the Project Site in isolation, the AA process must also consider those effects in combination with those associated with other plans or projects. Whilst a project in isolation may not result in significant effects to European sites, non-significant effects from one project could act in combination with non-significant effects of another project, resulting in significant effects overall.

In this context, an important distinction to make is whether a project in isolation may result in effects that are not significant, or whether they will not result in any effects at all (see ***De minimis* Effects** below). Potential impacts which have been assessed to have no effect are excluded from further in-combination assessment. Potential impacts which will result in an insignificant effect are carried forward to in-combination assessment (See Table 5-2).

***De minimis* Effects**

The term *de minimis* is referenced in the opinion of the Advocate General in relation to CJEU case C-258/11 (Sweetman v. An Bord Pleanála) as follows:

"*The requirement that the effect in question be 'significant' exists in order to lay down a de minimis threshold. Plans or projects that have no appreciable effect on the site are thereby excluded. If all plans or projects capable of having any effect whatsoever on the site were to be caught by Article 6(3), activities on or near the site would risk being impossible by reason of legislative overkill.*"

De minimis, as defined by the Mirriam Webster dictionary[4], means "lacking significance or importance - so minor as to be disregarded.

6.2.1 PARAMETERS

The in-combination assessment considered planning applications for projects of a similar size to the Proposed Project for which permission was granted within the last five years (2020-2025 inclusive)[5]. Refused applications, applications for retention and incomplete or withdrawn applications were not included for consideration. Retention applications refer to unauthorised works that are already complete and therefore will not interact with the Proposed Project.

[4] "De minimis." Merriam-Webster.com Dictionary, Merriam-Webster, https://www.merriam-webster.com/dictionary/de%20minimis, Accessed 26 March 2024.

[5] Planning permission generally has a lifespan of 5 years in Ireland (Government of Ireland, Planning and Development Act 2000, Section 40.3 (b))

The following sources were used in the search:

- Planning Enquiry System – Kildare County Council (KCC, 2025).
- EIA Portal (DoHLGH, 2025).
- The Kildare County Development Plan 2023-2029 (KCC, 2023).

The search area included a 250 m buffer from the Grand Canal Barrow Line, specifically the section that lies between approximately 500 m upstream and 500 m downstream of the Project Site.

6.2.2 CONCLUSION – EFFECTS IN COMBINATION

No projects of a similar size to the Proposed Project were identified within the search area and assessed for effects that could act in combination with those from the Proposed Project.

7 CONCLUSION OF SCREENING ASSESSMENT

This Appropriate Assessment Screening exercise was completed in compliance with the relevant European Commission and national guidelines on Appropriate Assessment. Article 42 (7) of the European Communities (Birds and Natural Habitats) Regulations 2011 states that: *"The public authority shall determine that an Appropriate Assessment of a plan or project is not required […] if it can be excluded on the basis of objective scientific information following screening under this Regulation, that the plan or project, individually or in combination with other plans or projects, will have a significant effect on a European site."*

The potential impacts from the Proposed Project have been considered in the context of the European sites potentially affected. It has been concluded that the risks posed by indirect dust emission will not result in significant effects to the qualifying interests of River Barrow and River Nore SAC as a result of the Proposed Project alone. The potential for significant in-combination effects with other plans or projects has been ruled out.

As the potential for significant effects on a European site by virtue of the Proposed Project can be ruled out, it is therefore determined that Appropriate Assessment is not required.

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Appendix A

EIAR CHAPTERS

6 Water

6.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) addresses the magnitude of potential impacts to, and the significance of effects on, surface water and/or the groundwater receptors from the Proposed Project. It considers groundwater levels, flow regime, groundwater and surface water quality and surface water flow.

The Proposed Project is the restoration of disused quarry lands using clean soil and stone. The Application Site (also referred to as 'Site') includes a disused quarry void and associated historical working areas. It also includes a private access road that connects the disused quarry to the public road network, and agricultural lands to the east that road where it is proposed to locate the temporary facilities required to manage the importation of clean soil and stone required for the Proposed Project.

All lands within the Application Site and EIA Boundary are within the ownership of the Applicant, Bison Quarries Ltd (BQL).

This EIAR is submitted in support of an application under Section 37L of the Planning and Development Act 2000, as amended.

The following assessment was prepared by Kit Pannell (BSc, MSc). Kit is a hydrogeologist with over 11 years' experience, with focus on regulatory reporting within the mining industry.

The assessment was reviewed by Richard Thompson (BSc Geo, PGeo, EurGeol). Richard is Associate Director and a chartered geologist with over 17 years of experience, has specialist expertise in hydrogeology.

6.1.1 Technical Scope

The technical scope of this assessment is to consider the potential impacts and effects of the Proposed Project on the water environment that can be reasonably foreseen as consequences of the normal construction phase and restoration phase of the Proposed Project. The assessment considers the potential sources of change resulting from Proposed Project activities detailed in the project description (Chapter 2) on hydrological (surface water) receptors and hydrogeological (groundwater) receptors.

The assessment also considers the potential effects on people (including health) as a result of predicted changes to water quality, and the potential secondary effects of changes in land quality on water quality. As such, it draws on the assessment presented in Chapter 5 (Land, Geology and Soils). Secondary effects on ecology or biodiversity as a result of changes in water quality are considered in Chapter 4 (Ecology and Biodiversity).

6.1.2 Geographical and Temporal Scope

The geographical study area for the assessment covers the Proposed Project area and a buffer zone that extends to 1 km from the EIA Boundary (see Figure 6-1). This study area allows for the identification of nearby off-site water features that may be affected by changes associated with the Proposed Development.

The temporal scope of the assessment covers the 10-year construction phase. This comprises enabling works required to install the temporary site facilities and entrance/internal private access road upgrades required for the Proposed Project.

A restoration phase largely comprising aftercare and maintenance activities, broadly following the construction phase infilling works, has been scoped out of this assessment, due to the nature of the works to be carried out in the project phase and the short-term nature of the phase having limited potential to impact sensitive water receptors.

Figure 6-1 - Application Site (indicated by the 37L Planning Application Boundary in the figure key) and EIA Boundary overlain on Google Satellite Imagery

6.1.3 Project Description Summary

The Proposed Project consists of the restoration of lands through the import of approximately 720,000 tonnes clean soil and stone as by-product (non-waste) from

development sites to infill a disused historical quarry and raise ground levels to tie in with ground levels of surrounding land.

Restoration of the lands will be to agricultural grassland, an artificial waterbody, and a hedgerow habitat with the lands returned to their pre-extraction agricultural use.

The proposed duration of infilling is 10 years depending on market conditions for the anticipated acceptance of clean soil and stone, and a further 3 years for the completion of final restoration activities.

The Application Site is located in the townland of Coolsickin or Quinsborough, Co Kildare. The Application Site is accessed by a privately-owned access road connecting to a local road (L7049).

The following temporary facilities will be installed and maintained during the life of the Proposed Project:

- office and fully serviced welfare facilities;
- weighbridge and associated portacabin;
- closed-system wheel wash;
- 6 no. parking bays;
- 2 no. waste inspection bays and 1 no. bunded waste quarantine area;
- hardstanding area (vehicle movement and storage);
- surface water drainage infrastructure from hard standing and discharge to ground, including 2 no. interceptors and 2 no. soakaways;
- Security features, including security gates and fencing; and,
- Power supply. It is intended that approval will be sought for a connection to the ESB Network for the office and fully serviced welfare facilities. Diesel generators will be used to power mobile lighting, if required.

The Proposed Project site entrance and private access road will be upgraded and realigned. These will be retained following to completion of the Proposed Project.

A full project description in provided in Chapter 2 of this EIAR.

6.2 Policy and Legislation Context

This section addresses the legislation and guidance that has been considered when preparing this chapter, and key policy context relevant to the water environment that has guided the focus of the assessment. The overarching EIAR legislation under which this assessment is required is addressed separately in Chapter 1 (Introduction, Scope and Methodology).

6.2.1 Legislation

This assessment has been made with cognisance to relevant legislation, including but not limited to:

- The Local Government (Water Pollution) Act 1977 (as amended) and associated Statutory Instrument Regulations made under that Act outline the general prohibition of entry of polluting matter to water, the requirement to licence both trade and sewage effluent discharges, licencing of water abstractions, controlling discharges to aquifers, and notification of accidental damages.
- The European Union (EU) Water Framework Directive (WFD) (2000/60/EC) is the European legislation that establishes a framework for the protection of groundwater and surface water, including the establishment of river basin districts, the requirement to prevent further deterioration by preventing or limiting inputs of pollutants into groundwater, reducing pollution, and promoting sustainable water use. The Groundwater Daughter Directive (GWDD) (2006/118/EC) sits beneath the WFD and relates to water protection and management. It establishes measures to prevent and control groundwater pollution, including criteria for assessing good chemical status and identifying trends.
- The WFD and GWDD have been transposed into Irish law by means of many Regulations. These Regulations cover governance, the shape of the WFD characterisation, monitoring, and status assessment programmes in terms of assigning responsibilities for the monitoring of different water categories, determining the quality elements and undertaking the characterisation and classification assessments. They include, but are not limited to, the following:
    - European Communities (Water Policy) Regulations 2003 and its subsequent amendments;
    - European Communities Environmental Objectives (Surface Waters) Regulations, 2009 and its subsequent amendments;
    - European Communities Environmental Objectives (Groundwater) Regulations, 2010 and its subsequent amendments; and
    - European Communities (Technical Specifications for the Chemical Analysis and Monitoring of Water Status) Regulations 2011.

Many of these regulations contain threshold values or environmental quality standards which, when exceeded, can reflect a degradation in water quality. A degradation in water quality can be reflective of negative effects caused by a project or development, but it should be noted that a poor water quality can be naturally occurring due to the environmental setting or from upgradient sources.

The EU Directive on the Assessment and Management of Flood Risks (2007/60/EC) is transposed into Irish law by the European Communities (Assessment and Management of Flood Risks) Regulations 2010 and its subsequent amendment. The aim of the legislation is to reduce the adverse consequences of flooding on human health and the environment,

and it outlines the requirements for flood risk assessments to be completed as part of the planning process.

6.2.2 Relevant Policies and Plans

The Kildare County Development Plan (CDP) 2023–2029 is the strategy document for County Kildare which covers the temporal scope of this assessment period. The key policies and objectives of this plan are listed in Section 2.9.4 of the Project Description (Chapter 2).

6.2.3 Relevant Guidance

Guidance relating to the EIA process that has been used to guide the assessment of potential impacts to the water environment and the identification of relevant mitigation includes:

- Relevant European Commission guidance – Guidance on the Preparation of the Environmental Impact Assessment Report (2017).
- EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, Environmental Protection Agency (May 2022).
- Institute of Geologists of Ireland (IGI) Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements (April 2013).
- CIRIA C532: Control of water pollution from construction sites. Guidance for consultants and contractors (2001).
- CIRIA Environmental good practice on site guide (First Edition 1999).
- The EPA guidelines on Environmental Management in the Extractive Industry (Non-Scheduled Minerals) (2006), for a more environmentally sustainable quarry & pit industrial sector, greater protection for the environment and human health.
- The CIRIA guidance Publication C532 Control of water pollution from construction sites: guidance for consultants and contractors (2001), which provides advice on environmental good practice for the control of water pollution arising from construction activities.

6.3 Assessment Methodology and Significance Criteria

This section presents the method used to assess the impacts and effects of the Proposed Project on the water environment and to secondary human health receptors from changes to the water environment. It establishes the stages of the assessment, and the qualitative criteria used to assess impact magnitude and determine the level of effect significance.

6.3.1 Qualitative Assessment Method

The assessment of potential effects has been undertaken using the qualitative assessment method outlined below. The assessment is supported by the available baseline condition information and recent monitoring and survey data collected. The assessment follows a staged approach with a summary of the stages involved below:

1) Confirm baseline conditions – determine baseline and develop conceptual site model by consideration of available records and data sets, site reports and published information.
2) Confirm the key receptors and their value/importance.
3) Qualitatively characterise the magnitude of impacts on the receptors – describe what potential changes could occur to each receptor as a result of the Proposed Project, identify source-pathway receptor linkages, and assign the magnitudes of impact. This stage considers embedded design mitigation, good practice in construction environment management and pollution prevention.
4) Determine the initial effect significance of each potential impact on each sensitive receptor.
5) Consider the need for additional mitigation, if it is considered necessary to reduce the initial magnitude of the impact and associated effect significance further.
6) Assess the residual impact magnitude and residual effect significance after all mitigation is applied.
7) Identify any monitoring that may be required to measure the success of the remedial measures.

Stages 1 and 2 have been completed using published literature, guidance, and available information specific to the Proposed Project, which is presented in Chapter 2 of this EIAR. For the identification of receptor value/importance that completes Stage 2 and the description of impact magnitude (Stage 3), a common framework of assessment criteria and terminology has been used based on the EPA's draft Guidelines on the Information to be Contained in EIARs (EPA, 2022), along with modifications based on the additional guidance outlined in Section 6.2.3, such as those by the NRA and IGI. The descriptions for sensitivity of receptors are provided in Table 6-1 and the descriptions for magnitude of impact are provided in Table 6-2.

The potential for an impact to occur at a receptor has been determined using the understanding of the baseline environment and its properties and consideration of whether there is a feasible linkage between a source of impact and each receptor (i.e. a conceptual site model).

Table 6-1 – Environmental Value (Sensitivity) and Descriptions

Value (sensitivity) of Receptor / Resource	Typical Description
High	High importance and rarity, national scale, and limited potential for substitution. For example: ▪ Global/European/National designation.

Value (sensitivity) of Receptor / Resource	Typical Description
	■ Human health. ■ WFD river designation of 'High' and in hydraulic connectivity with the Site. ■ Regionally important aquifer with multiple wellfields. ■ Inner source protection area for a regional resource. ■ Regionally important potable water source supplying >2500 homes (surface water or aquifer). ■ Floodplain protecting more than 50 residential or commercial properties or nationally important infrastructure (e.g. motorways/national roads) from flooding.
Medium	Medium or high importance and rarity, regional scale, limited potential for substitution. For example: ■ Regionally important sites. ■ Regionally important aquifer. ■ WFD river designation of 'Good' or 'Moderate'" and in hydraulic connectivity with the Site. ■ Outer source protection area for a regional resource. ■ Locally important potable water source supplying >1000 homes (surface water or aquifer). ■ Floodplain protecting between 6 and 50 residential or commercial properties or regionally important infrastructure (e.g. regional roads) from flooding.
Low	Low or medium importance and rarity, local scale. For example: ■ Locally important aquifer. ■ WFD river designation of 'Poor' or 'Bad' and in hydraulic connectivity with the Site. ■ Outer source protection area for a local resource. ■ Local potable water source supplying >50 homes (surface water or aquifer). ■ Floodplain protecting between 2 and 5 residential or commercial properties or locally important infrastructure (e.g. local roads) from flooding.
Negligible	Very low importance and rarity, local scale. For example: ■ Environmental equilibrium is stable and is resilient to impacts that are greater than natural fluctuations, without detriment to its present character. ■ Poorly productive aquifer. ■ Any WFD river quality designation not in hydraulic connectivity with the Site.

Value (sensitivity) of Receptor / Resource	Typical Description
	■ Local potable water source supplying <50 homes (surface water or aquifer). ■ Floodplain protecting up to 1 residential or commercial properties from flooding.

Table 6-2 – Magnitude of Impact and Typical Descriptions

Magnitude of impact (change)		Typical description
High	Adverse	■ Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements. ■ Significant harm to human health - death, disease, serious injury, genetic mutation, birth defects or the impairment of reproductive functions. ■ Significant harm to buildings/infrastructure/plant - Structural failure, substantial damage or substantial interference with any right of occupation. ■ Significant pollution of the water environment, as defined by: ■ A breach of, or failure to meet any statutory quality standard for the water environment at an appropriate pollution assessment point. ■ A breach of, or a failure to meet, any operational standard adopted by EPA for the protection of the water environment. ■ Pollution results in an increase in treatment required for an existing drinking water supply. ■ Pollution results in an increased level of treatment required of water abstracted for industrial purposes. ■ Pollution results in deterioration in the status of a water body, failure to meet good status objectives defined by the Water Framework Directive, or failure of a protected drinking water area to meet its objectives as defined by the Water Framework Directive. ■ There is a significant and sustained upwards trend in concentration of pollutants in groundwater being affected by the land in question. ■ There is a material and adverse impact on the economic, social and/or amenity use associated with a particular water environment.
	Beneficial	■ Large scale or major improvement of resource quality; extensive restoration; major improvement of attribute quality.

Magnitude of impact (change)		Typical description
Medium	Adverse	▪ Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements.
	Beneficial	▪ Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality.
Low	Adverse	▪ Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.
	Beneficial	▪ Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring.
Negligible	Adverse	▪ Very minor loss or alteration to one or more characteristics, features or elements.
	Beneficial	▪ Very minor benefit to or positive addition of one or more characteristics, features or elements.

The assessment of magnitude of impact considers whether the change that causes the impact is positive or negative, and whether the impact is direct or indirect, short, medium or long-term, temporary or permanent, and if it is reversible.

For the purposes of this assessment, a direct impact is one that occurs as a direct result of the Proposed Project and was likely to occur at or near the Proposed Project itself. Indirect impacts (or secondary/tertiary impacts) are those where a direct impact on one receptor has another knock-on impact on one or more other related receptor(s) (e.g. the Proposed Project results in a change in groundwater quality, which then has an indirect impact on surface water quality and/or users of the water, such as human health or ecology). Indirect impacts can occur within the study area or away from the Proposed Project.

For the purposes of this assessment, the following definitions of duration have been used:

- Temporary – impact likely to last less than 2 year without intervention.
- Short term – impact likely to last 2 to 10 years without intervention.
- Medium term – impact likely to last 10 to 15 years without intervention.
- Long term – impact likely to last 15 to 60 years without intervention.
- Permanent – impact likely to last over 60 years without intervention.

An irreversible impact is defined as a change to the baseline that would not reverse itself naturally. Such impacts will usually be long-term and irreversible, such as the changes to

the groundwater flow regimes caused by changes to the properties of the subsurface. A reversible impact is defined as a change to the baseline conditions that would reverse naturally once the source of the impact is exhausted or has stopped. For example, impacts to groundwater quality from contamination may only last if the source of the impacts is present. If it is removed, groundwater quality may naturally improve or could be remediated.

6.3.2 Significance Criteria

The approach followed to derive effects significance from receptor value and magnitude of impacts (Stage 4) is shown in Table 6-3. A description of the significance categories used is provided in Table 6-4.

Table 6-3 – Significance Matrix

	Magnitude of Impact (Degree of Change)				
Environmental Value (Sensitivity)		**Negligible**	**Low**	**Medium**	**High**
	High	Slight	Slight or moderate	Moderate or large	Profound
	Medium	Imperceptible or slight	Slight or moderate	Moderate	Large or profound
	Low	Imperceptible	Slight	Slight	Slight or moderate
	Negligible	Imperceptible	Imperceptible or slight	Imperceptible or slight	Slight

Table 6-4 – Significance Categories and Typical Descriptions

Significance Category	**Typical Description**
Profound	An effect which obliterates sensitive characteristics.
Large	An effect which, by its character, magnitude, duration or intensity alters a significant proportion of a sensitive aspect of the environment.
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.

Significance Category	Typical Description
Imperceptible	An effect capable of measurement but without significant consequences.

Residual adverse effects of ‘large’ or ‘profound’ significance are considered to be ‘significant’ for the purposes of this assessment.

If required following the assessment of the level of effect significance, mitigation measures may be presented that will be used to avoid, prevent, or reduce the magnitude of the impact (Stage 5). The significance of the effect considering the mitigation is then assessed (Stage 6) to give the residual effect significance. Any monitoring that will be required to measure the success of the mitigation is included in section 6.10 (Stage 7).

The effects of the activities at the Site are also considered cumulatively, with those that could foreseeably have resulted from other known developments that have occurred in the assessment study area (see Chapter 15 Interactions).

6.4 Baseline Conditions

6.4.1 Site Topography

The Site is located approximately 6.6 km west of Red Hill, which reaches 194 m elevation. The land therefore rises to the east and drops to the northwest, towards the Figile River and its tributary. The regional shaded topography is shown in Figure 6-2 with respect to the rivers.

The topography within the site's vicinity (excluding the quarried areas) drops from ca. 80 mAOD in the east (near the Site access) to ca. 69 mAOD in the west (near the Grand Canal—Barrow Line).

The present-day topography includes the quarry void, which has been allowed to fill with water post-cessation of mining in 2006. The quarry void is understood to be ca. 15 m deep (below natural ground surface).

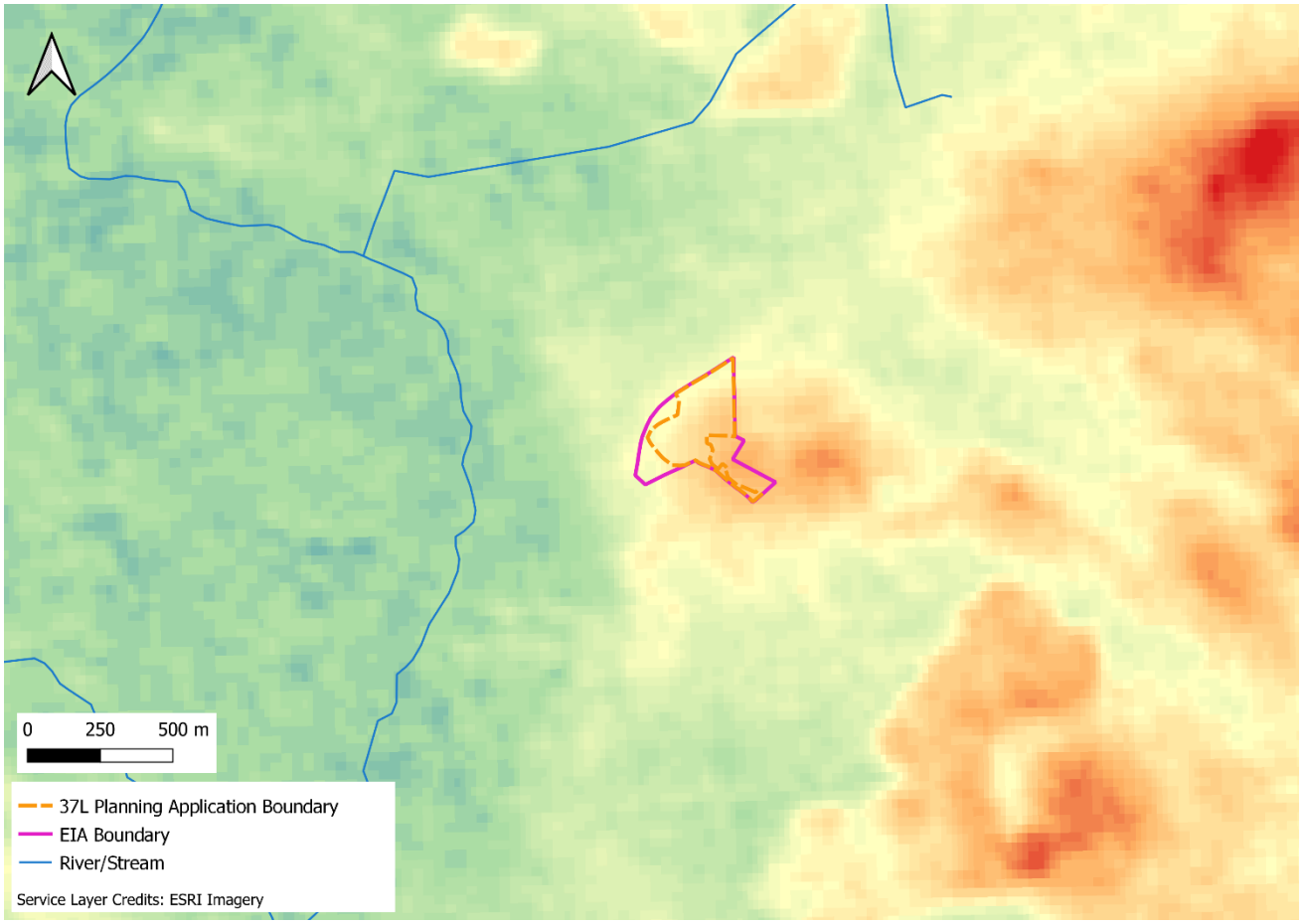


Figure 6-2 - Regional Topography and River Network (shaded from low (blue) to high (red) topography)

6.4.2 Land Use, Soils and Geology

The baseline information with respect to land use, soils and geology is presented Chapter 2 (Project Description) and Chapter 5 (Land, Geology and Soils).

The GSI Quaternary Sediments (1:50,000 scale) indicates that the subsoils underlying the Site are composed of gravels derived from limestones and till derived from limestones.

The GSI Bedrock Geology (1:50,000 scale) indicates that the Site is underlain by the Carboniferous Allenwood Formation, which consists of pale grey, generally massive shelf limestones and their dolomitised equivalents.

The Site is mainly bound by agricultural lands. The agricultural land use, both historically and currently, is not known to have included specific contaminative activities. Depending on the use and its volume for fertilisers and pesticides, some changes in land quality and related diffuse pollution into the existing water environment might be expected.

6.4.3 Rainfall and Climate Data

Figure 6-3 below presents rainfall data recorded at the ATHY (Chanterlands) meteorological station (number 6414), which is located ca. 20 km south of the Site, for the period July 1993

to February 2025 (Met Eireann, 2025). From the long-term averages, the wettest months of the year are shown to be between October and January, with the driest months between March and June.

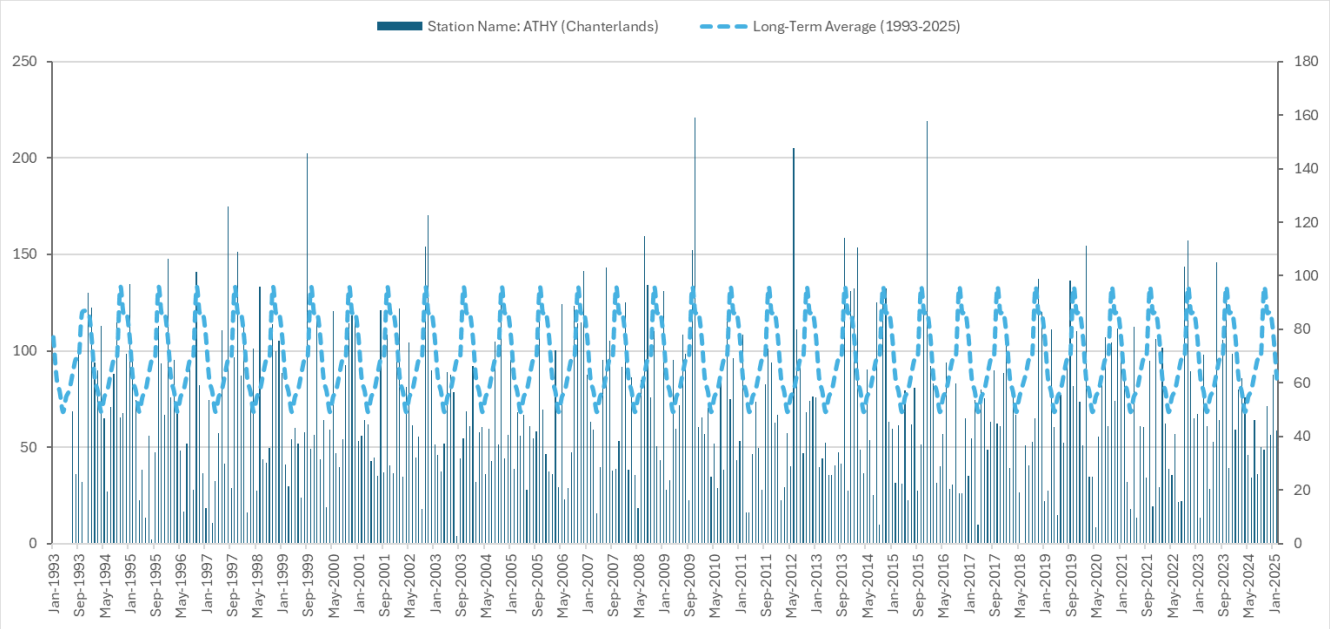


Figure 6-3 - Monthly Rainfall Graph 1993 – 2025 recorded at ATHY (Chanterlands)

6.4.4 Surface Water – Hydrology

The Site is located in the WFD Bagenalstown Upper Groundwater body (which is generally described as regionally important). The WFD designations has the Site situated within the WFD Barrow Catchment and WFD SubCatchment of Barrow_SC_040. The WFD designations has the site situated within the WFD River Sub-Basin Figile_080. There is a river sub basin divide to the southeast of the Site as depicted in Figure 6-4, with the River Sub-Basin Barrow_090 to the southeast of this divide.

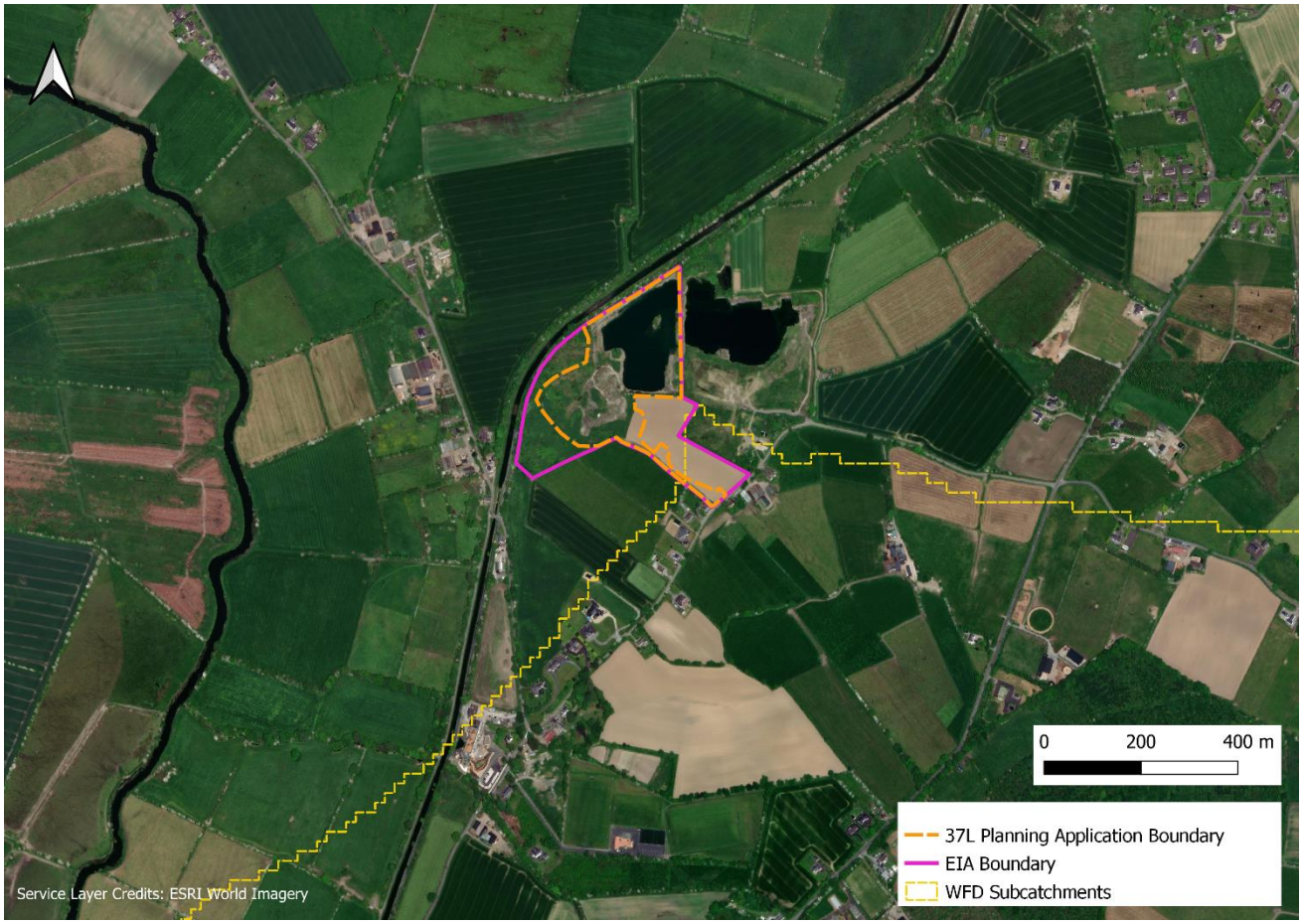


Figure 6-4 - WFD River Sub Basin Divide Across the Site (EPA, 2025)

The surface water network and Special Area of Conservation (SAC) located to the west of the Site is shown in Figure 6-5.

The closest surface water feature to the Site is the Grand Canal[1], which runs adjacent to the northwest boundary and is designated as a pNHA (see Chapter 4 Ecology and Biodiversity). The Grand Canal is constructed above ground level, with the top of the embankment at approximately 5 m above original ground level. The Grand Canal Barrow Line is likely to be lined by a low permeability layer and have negligible influence on the groundwater level. Surface water from the canal may leak into the ground and percolate into the groundwater table through defects in the liner, but is generally considered to be hydraulically disconnected from the underlying groundwater body.

Further west of the Site (ca. 0.5 km) is the River Figile, which flows from north to south. Directly north of the Site (ca. 0.8 km) is a tributary (Ummeras Beg) of the River Figile. Although not displayed by the WFD, there is also a small stream (Old Grange) ca. 0.6 km to

[1] This section of Grand Canal and associated pathway are part of the Barrow Line of the Grand Canal, and the Barrow Way National Waymarked Trail.

the south of the Site which is culverted beneath the Grand Canal, which is labelled in Figure 6-5.

Further southwest of the Site (ca. 1.6 km) is the River Barrow and River Nore SAC (Site Code: 2162), which starts at the confluence of the River Figile and River Barrow.

It is likely that any surface water flows within the vicinity of the Site will have flowed towards the northwest, towards the Grand Canal, under baseline conditions, based on the catchment divide in Figure 6-7 and the topography shown in Figure 6-2.

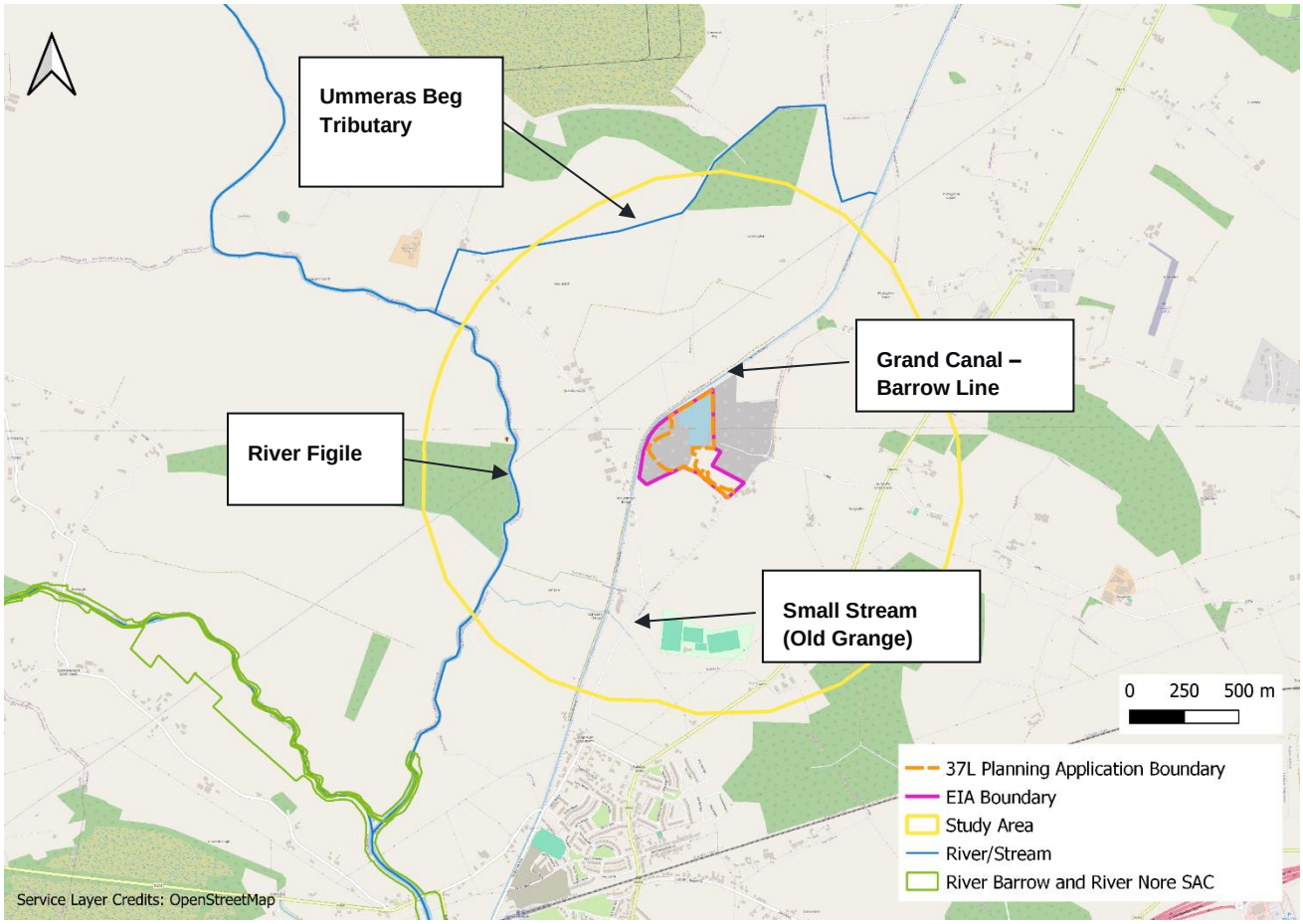


Figure 6-5 - River Network and SACs in the Vicinity of the Site (EPA, 2025)

It is likely that any surface water flows within the vicinity of the Site will flow towards the northwest, towards the River Figile. This is based on the river catchment divide in Figure 6-5 and the topography shown in Figure 6-2. Any run-off from the Site would likely be absorbed by a dense hedgerow / treeline and a strip of grassland which separates the Site from the Grand Canal, or infiltrate to ground through the superficial sands and gravels, prior to reaching the Canal in any significant quantity. The Grand Canal was constructed above ground level, with the top of the embankment at approximately 5 m above original ground level.

The baseline WFD Status and River Quality (Q) Values of surface water features in the vicinity of the Site, as assigned by the EPA, are shown in Figure 6-6 and summarised in Table 6-5. The WFD Status for rivers falls between 'Poor' to 'Good' and the Q Value for stations are 'Q 3-4 – Moderate' for locations upstream and downstream of the Site.

Figure 6-6 - WFD Status and River Q Value in Surface Water Features Close to Site (EPA, 2025)

Table 6-5 - Summary of WFD Status (2016-2021) and River Q Value in Surface Water Features Close to Site (EPA, 2025)

River Name	WFD Status (2016-2021)	Station Name	River Q Value
Figile	Good	FIGILE - 1 km u/s Barrow R confl	3-4 - Moderate (2006)
Barrow	Poor	Pass Br	3-4 - Moderate (2023)

River Name	WFD Status (2016-2021)	Station Name	River Q Value
Barrow	Poor	Ford S of Trascan	3-4 - Moderate (2023)
Slate	Moderate	River Br	3-4 - Moderate (2023)

Site Surface Water Quality

Samples were collected and analysed from the monitoring point labelled SW01 within the quarry waterbody[2] (Figure 6-7), from March to August 2024.

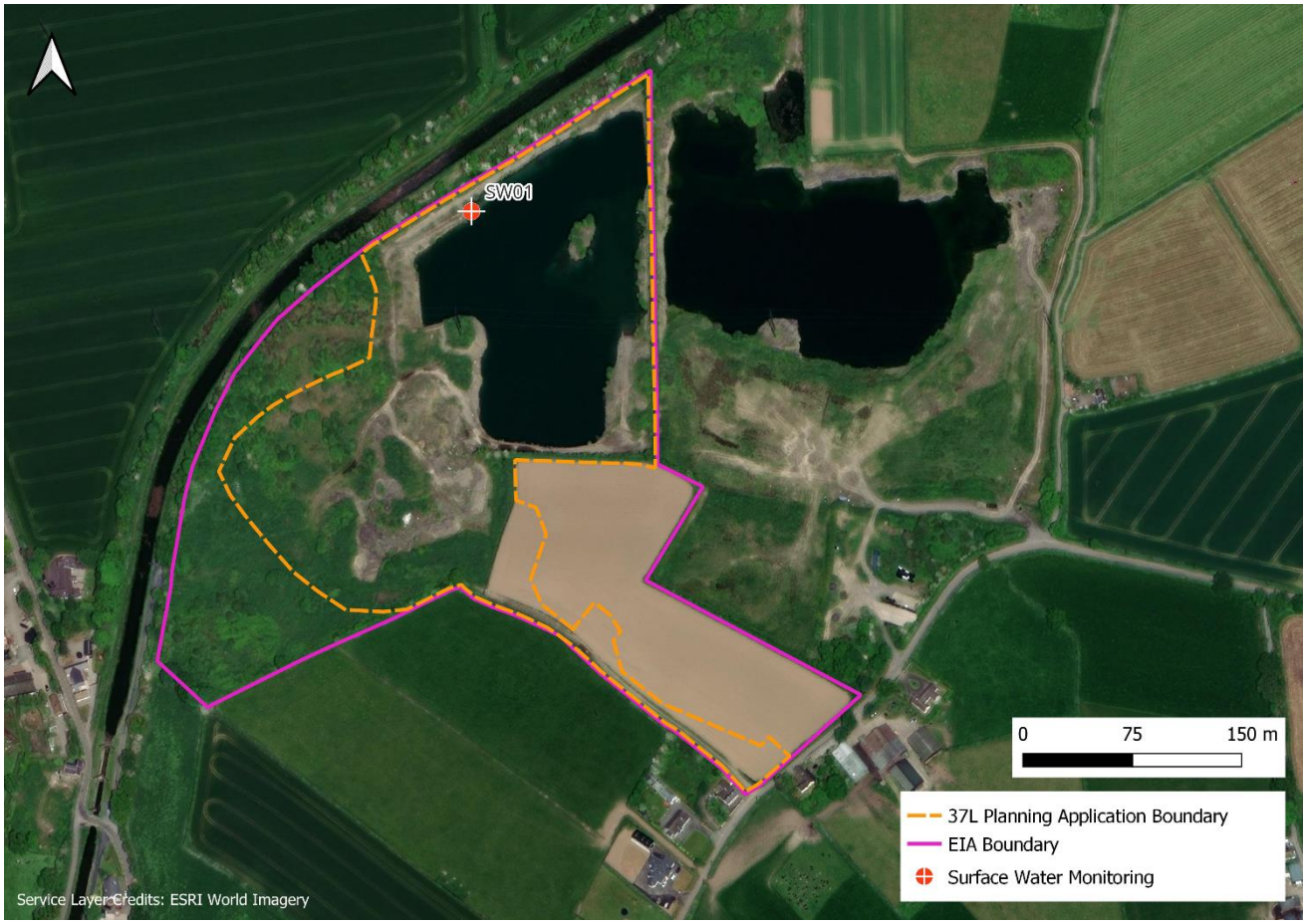


Figure 6-7 - Surface Water Quality Monitoring

[2] The waterbody term will be used here within throughout the chapter to reference the collected waters within the quarry void.

Full laboratory results are presented in Appendix 6B (Table 6B-1 to Table 6B-6) and graphed for some key analytes in Appendix 6C. The laboratory certificates for the results are included in Appendix 6D.

The laboratory results for the waterbody (SW01) were screened against GTV (2016) and AA-EQS (2019) thresholds. There are no exceedances in the guideline thresholds for SW01, indicating that the surface water is of good quality and is not connected to any ongoing source of pollution. There are some fluctuations in Nitrate concentrations over the duration of sampling, rising to 22.8 mg/L. These fluctuations are no larger than those seen in groundwater concentrations as presented in the tables in Appendix 6B and discussed in Section 6.4.5.

6.4.5 Groundwater – Hydrogeology

Based on a review of borehole logs (Appendix 6A) and published information, it is understood that one main hydrogeological unit underlies the Site; the permeable limestone of the Allenwood Formation – Regionally important Aquifer – Karstified (diffuse) - RKd. The GSI aquifer designation (GSI, 2025) for bedrock aquifers underlying the Site and the sand and gravel aquifer to the southwest of the Site, is shown in Figure 6-8 below. The Site is also located in the Bagenalstown Upper groundwater body (waterbody code IE_SE_G_153) comprised of the following four catchments: 07 Boyne, 14 Barrow, 15 Nore, 25A Lower Shannon. The 2016 - 2021 WFD groundwater status of the Bagenalstown Upper groundwater body (waterbody code IE_SE_G_153) is ‘Good’.

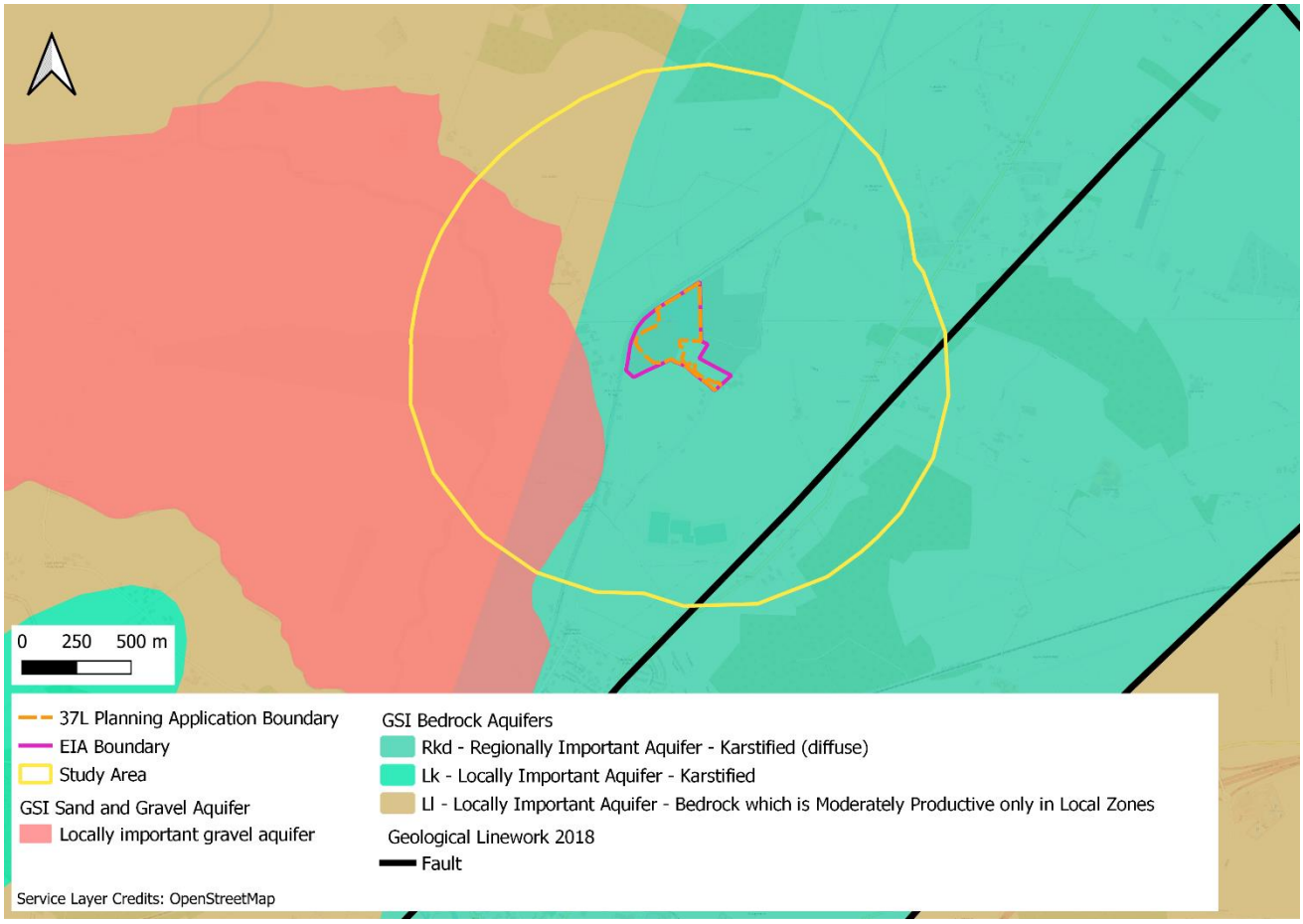


Figure 6-8 - Aquifer Designation Map (GSI, 2025)

6.4.5.1 Sand and Gravel Aquifer

Sand and gravel are reported in the borehole logs across the Site. However, this is not mapped as part of the Monasterevin gravel aquifer west of the site shown in Figure 6-8. It is possible that a higher fines/clay content in the sand and gravel beneath the Site result in lower permeabilities of the unit. Due to the heterogeneity of the aquifer material, perched groundwater bodies are likely to exist where lenses of sand, clay and gravels units are present.

6.4.5.2 Bedrock Aquifer

Bedrock underlying the Site (Allenwood Formation) is classified as a 'Rkd' regionally important aquifer – karstified (diffuse), which is described as "significant source of groundwater" where flow is more diffuse, storage is higher and there are many high yielding wells.

6.4.5.3 Groundwater Vulnerability

Groundwater Vulnerability (DELG/EPA/GSI, 1999) defines how easily groundwater may be contaminated by human activities. According to the GSI Spatial Resources online mapping tool (GSI, 2025) the majority of the Site is classified as 'Extreme' (Figure 6-9). This

‘Extreme’ classification is appropriate given the ‘regionally important aquifer’ classification and the elevated ground to the southeast of the Site, where bedrock is closer to the surface.

The lower topographies in the northwest of the Site are characterised as having ‘High’ vulnerability, associated with a thickening sequence of superficial deposits, which offer increased protection, towards the River Figile.

The groundwater vulnerability classification is based on baseline conditions and has not taken into account the current presence of bedrock currently at the surface within the quarry void. Groundwater vulnerability may be higher in areas of exposed bedrock due to direct recharge into the aquifer.

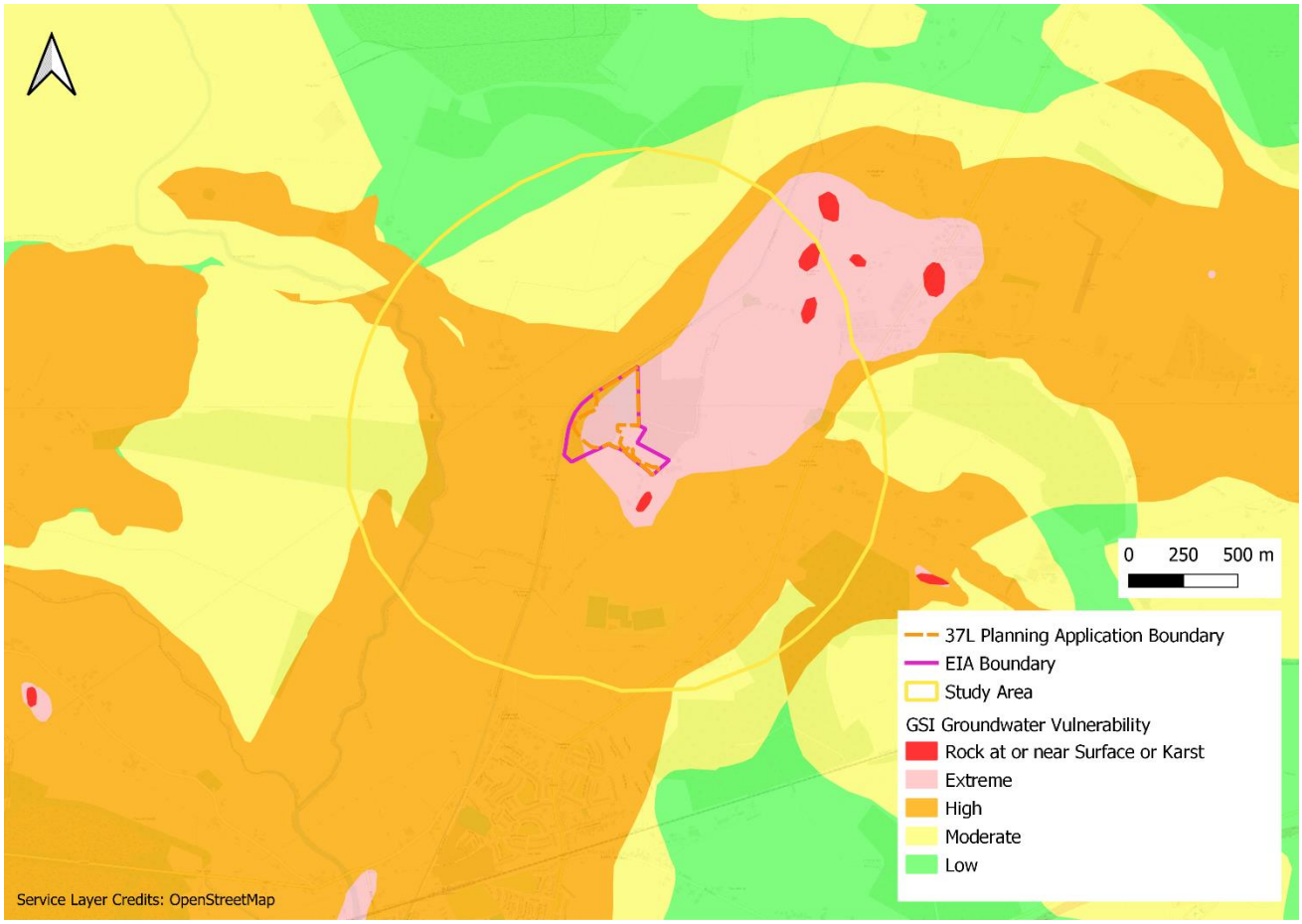


Figure 6-9 - Groundwater Vulnerability Map (GSI, 2025)

6.4.5.4 Groundwater Recharge

The groundwater recharge map for the Site is presented in Figure 6-10. The highest GSI recharge range of 351-400 mm/a applies to the area of mapped gravels derived from limestones beneath the Site. GSI mapping (2025) indicates an effective rainfall of approximately 429 mm/a across the Site. There is, therefore, the potential that the superficial deposits of sands and gravels can accept all the effective rainfall, with there being very little rainfall run-off. The ability for the bedrock limestone to accept the local

rainfall may be lower due to it consisting of an interconnected network of fractures, which may not always persist to the top of the unit.

The groundwater recharge classification is based on baseline conditions and has not taken into account the presence of bedrock at the surface within the quarry void, from historical extraction.

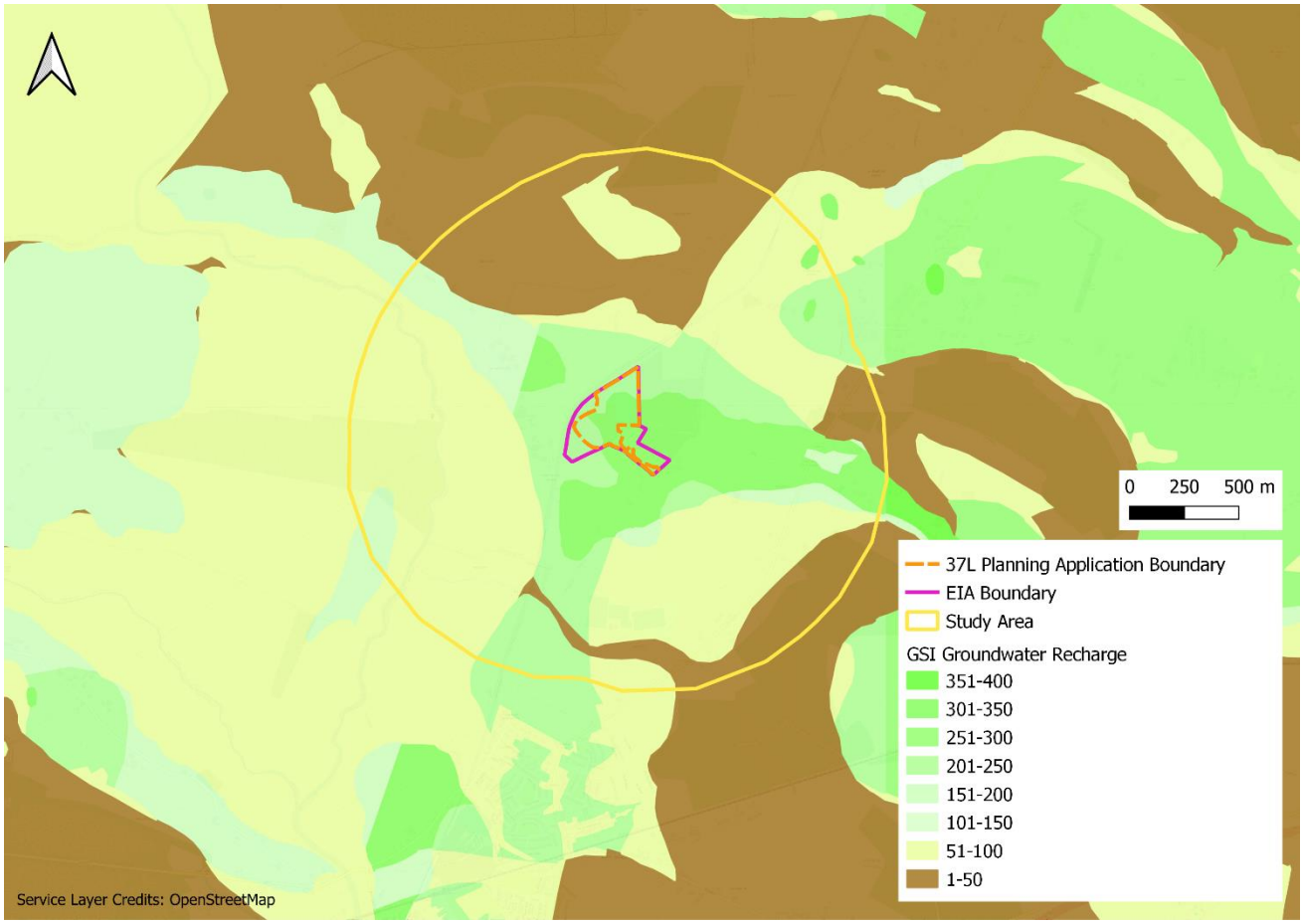


Figure 6-10 - Groundwater Recharge Map (GSI, 2023)

6.4.5.5 Karst Features

A review of GSI karst database indicates no recorded karst features within 500 m of the site.

6.4.5.6 Wells and Springs

A review of GSI Wells and Springs database indicates 10 no. records are located within 1 km of the Site and is detailed in Table 6-6 below and in Figure 6-11.

Table 6-6 – Wells and Springs within 1km of the Site

Well Unique ID	Source Type and Date of Drilling	Source Name and Owner	Depth of hole (m)	Depth to Bedrock (m)	Source Yield (m^3/day)	Distance and Direction from Site

12497	Borehole / 1966	Irish Malt Exports	54.9	8.5	196.39	On-Site*
12496	Borehole / 1966	Irish Malt Exports	32.6	9.8	272.76	On-Site*
12498	Borehole / 1966	Irish Malt Exports	54.9	8.2	120.01	On-Site*
12500	Borehole / 1962	W/KLD 1133 / N/A	7	-	27.28	160 m S
12756	Borehole / 1899	Monasterevin Ballykelly PWS	30.5	12	680	700 m SE
12860	Borehole / 2000	WW1 / Kildare County Council	91.4	9.1	1,891	730 m SE
12703	Borehole / 2001	MW5 / Kildare County Council	30	6.1	10.9	790 m SE
12501	Borehole / 1965	W/KLD 1135 / N/A	9.1	-	27.28	900 m SE
12754	Borehole / 1899	ABSTRACTION PT. NO. 9 / Kildare County Council (Decommissioned)	30.5	12	N/A	900 m SE
12707	Borehole / 2000	WW6 / Kildare County Council	98.4	13.5	Not listed	965 m SE
* Location accuracy is listed to be within 2km.						

The 3 no. wells on the Site listed with the source name of Irish Malt Exports are not expected to be located on the Site as per the site walkovers and are considered to be off-site.

A review of the planning application portal indicated that 2 no. wells were located at Ballykelly Mills in a Kildare County Council planning application document dated 08 April 2019 for a redevelopment of an existing whiskey distillery located approximately500m south/southwest of the Site.

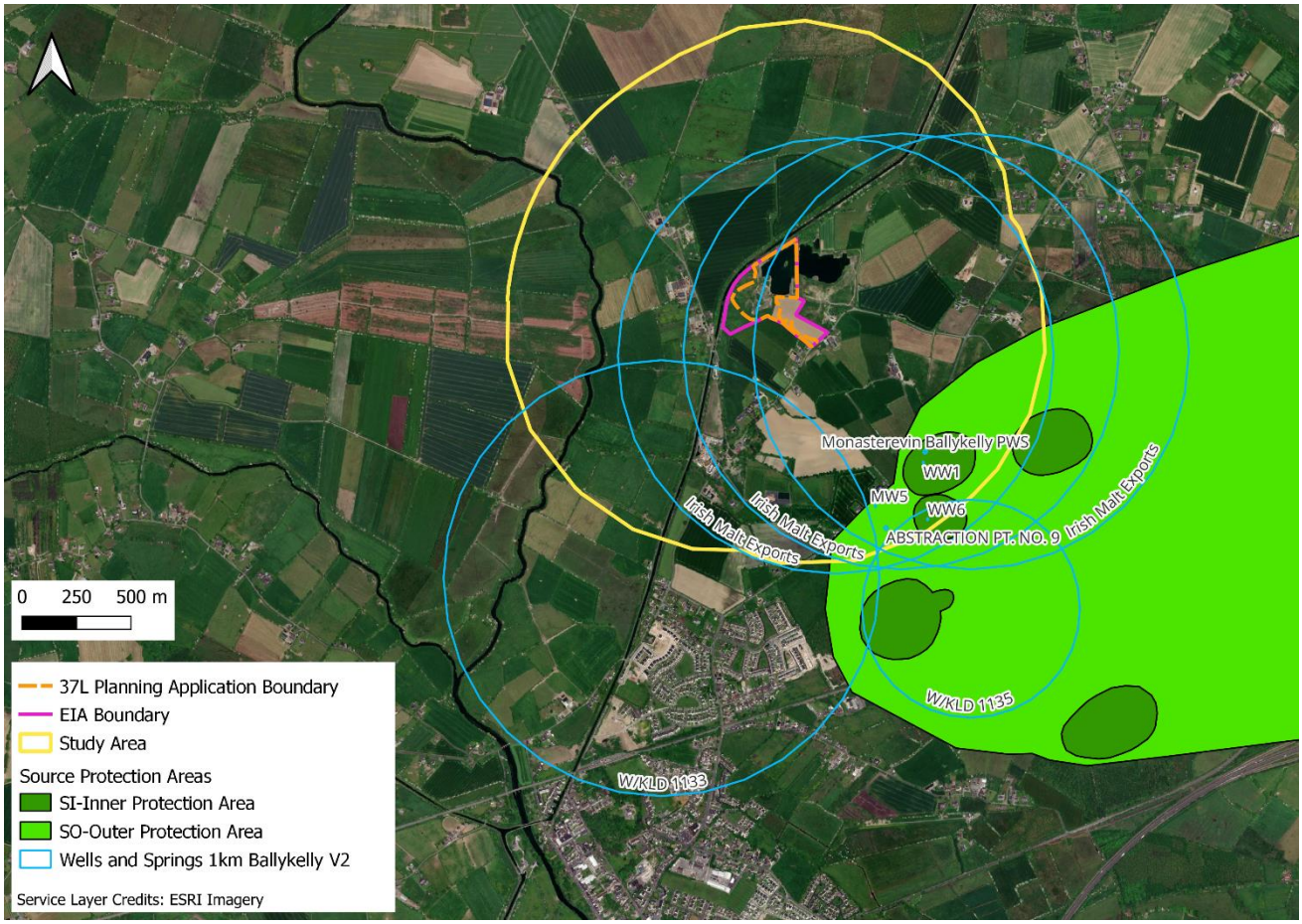


Figure 6-11 – Wells and Springs within 1km of the site

6.4.5.7 Groundwater Level and Quality Investigations

There are four monitoring wells available for water level and quality measurements. The locations of the existing monitoring wells are presented in Figure 6-12, with details on construction and lithology are provided in Table 6-7, where available. The borehole logs are provided in Appendix 6A.

The depth of the water strikes for available monitoring wells (BH2 and BH4) show that the main aquifer beneath the Site is within the limestone bedrock, rather than the superficial sand and gravels. This supports the aquifer designation in Figure 6-8, where the main sand and gravels aquifer is absent beneath the Site footprint.

Figure 6-12 - Monitoring Well Locations (including Surface Water Monitoring)

Table 6-7 – Monitoring Well Construction and Lithology

Monitoring Well ID	Installed Depth (m)	Measured Well Depth Range (m)	Ground Level (mAOD)	First Water Strike Depth (m)	Screened Interval (m) and screened lithology
BH1	19.5	18.21 to 18.31	68.75	Not recorded	16.5 to 19.5 (Dark Grey Limestone)
BH2	15.4	15.47 to 15.49	68.68	13 (55.68 mAOD) (in Dark Grey Limestone)	12.4 to 15.4 (Dark Grey Limestone)
BH3	12	11.62 to 11.96	72.08	Not recorded	11.5 to 12 (Light Grey Limestone)

Monitoring Well ID	Installed Depth (m)	Measured Well Depth Range (m)	Ground Level (mAOD)	First Water Strike Depth (m)	Screened Interval (m) and screened lithology
BH4	17	16.8 to 17.05	70.24	11.4 (58.84 mAOD) (in Light Grey Limestone)	14 to 17 (Light Grey Limestone)

Groundwater Elevations

Manual groundwater elevations in Metres Above Ordnance Datum (mAOD) are displayed in Figure 6-13 alongside monthly rainfall totals, for the monitoring wells shown in Figure 6-12.

The water levels appear to be seasonal, with groundwater highs in March and April 2024 and a decline in water levels during drier summer months between May and August 2024. The greatest water level fluctuations (1.48 m and 1.31 m) are seen in BH3 and BH4 and show a similar trend. The smallest fluctuations are seen in BH2 of 0.61 m. Although the fluctuations differ, the monitoring wells all show a similar trend, indicating that they are installed into the same aquifer. The highest groundwater elevation of 64.35 mAOD (4.57 mbgl) was recorded in BH2 in March 2023, following install of the monitoring well.

It is possible that abstractions in the region are currently influencing the water levels in the monitoring bores. The Site is not located within and SI – Inner Protection Zone or SO – Outer Protection Zone. BH4 is the closest monitoring well to an inner Source Protection Area (SPA) of the Monasterevin Public Water Supply (PWS), located ca. 890 m to the southeast. It is, therefore, possible that the larger fluctuations in BH3 and BH4 are due to them being closer to the abstractions. Further discussion on nearby abstractions is provided in Section 6.4.5.8.

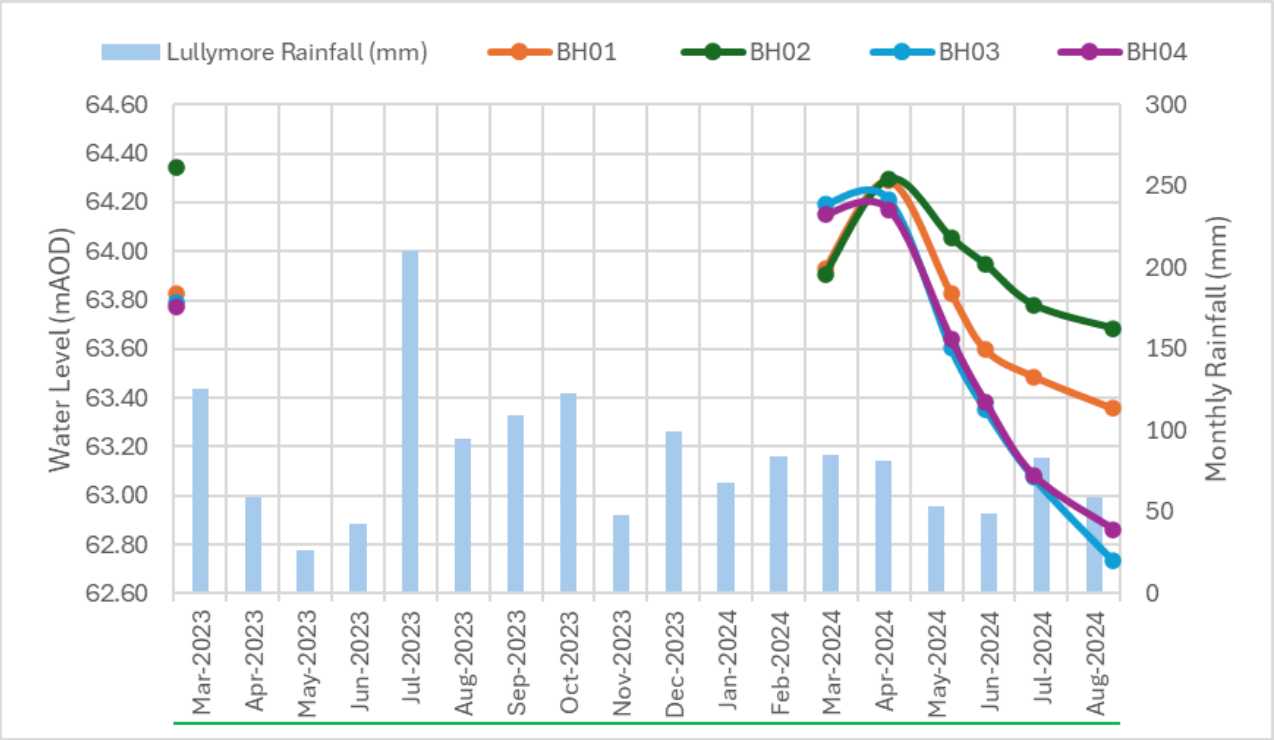


Figure 6-13 - Groundwater Level and Monthly Rainfall Monitoring Data

The groundwater contours are presented in Figure 6-14. The groundwater contours show that there is a flow to the southeast, which supports the potential impact of the Monasterevin PWS abstractions to the groundwater levels beneath the Site. The groundwater elevation falls from 63.8 mAOD to the northwest, between BH2 and the Grand Canal, to 63 mAOD, to the southeast of the Site, just beyond BH3 and BH4. This change of 0.8 m suggests a slight gradient across the Site.

The groundwater contours indicate a flow direction (to the southeast), that is at odds to the topography (to the northwest) and location of the River Figile (to the west). As discussed previously, it is possible that the water levels beneath the Site are responding to abstractions to the southeast Figure 6-11, although impact is slight. The highest yield is stated at 1,891 m^3/d from WW1, which is 730m southeast of Site. It is likely that the observed gradient beneath the Site is from abstractions at this Site.

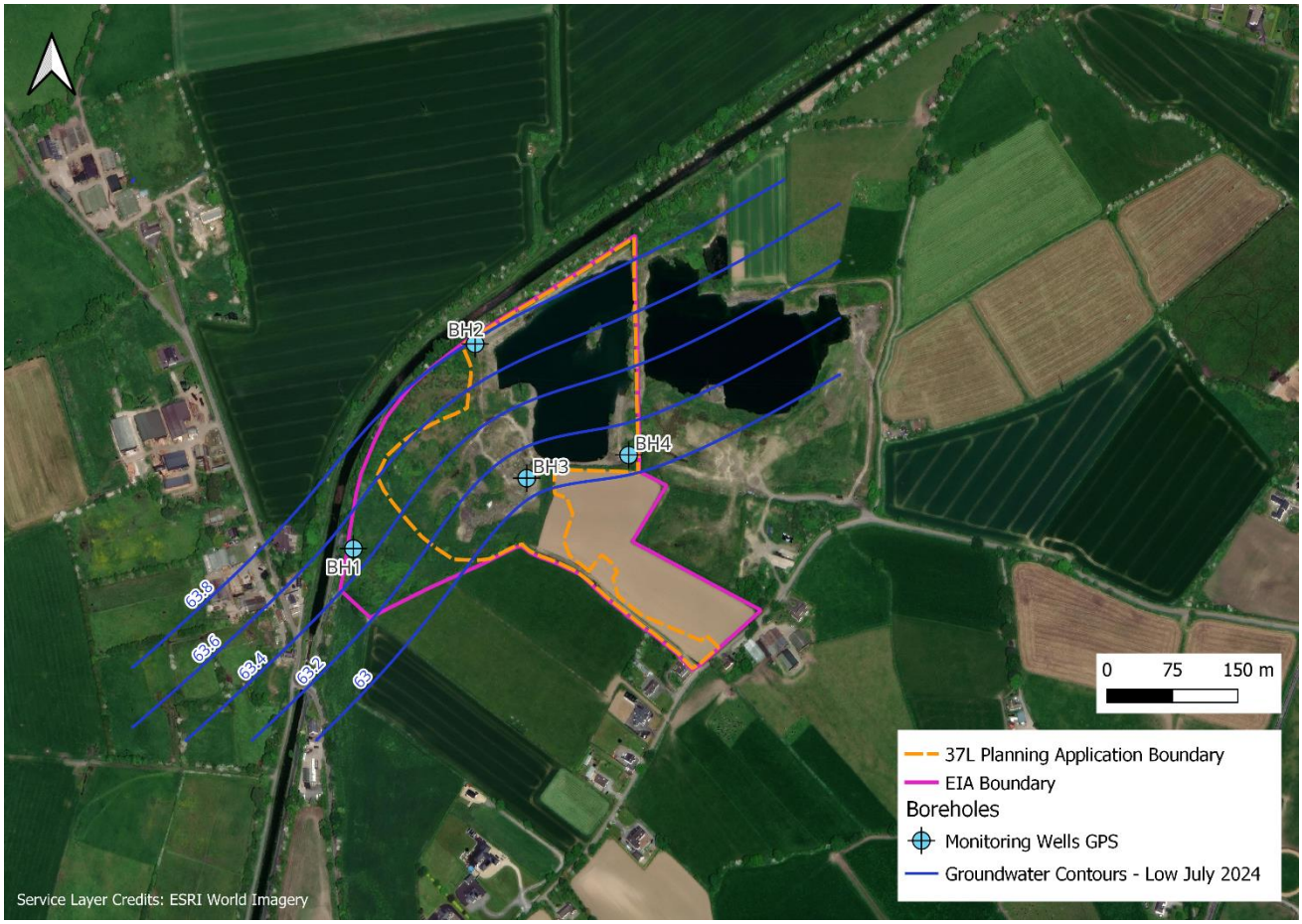


Figure 6-14 - Groundwater Contours August 2024 (Low) with aerial

Groundwater Flooding

There are no areas of groundwater flooding probability shown on the Geological Surveys of Ireland's Groundwater flooding probability maps (GSI, 2022). Water levels within the monitoring wells consistently show water levels >5 m below ground surface. With the understanding that the quarry waterbody is well connected to the groundwater, there is no indication of flooding from the waterbody itself.

Groundwater Quality

The four groundwater monitoring wells (Figure 6-12) have been used to monitor groundwater quality across the Site over a period of six months, from March to August 2024.

A summary of laboratory results with reference to GTV and AA-EQS threshold values is presented in Table 6-8. Full laboratory results are presented in Appendix 6B from Table 6B-1 to Table 6B-6, with comparison to relevant threshold values. A number of key analytes are shown graphically in Appendix 6C to represent any trends over the six months of monitoring. The laboratory certificates for the results are included in Appendix 6D.

The AA-EQS threshold for Total Dissolved Chromium III (4.7 µg/l) was exceeded on one occasion in BH1 and BH2 and on three occasions in BH3. Note that the limit of detection (LOD) for Total Dissolved Chromium III is 6 µg/l, therefore, the values of 7 µg/l are marginally above the LOD. The value of 7 µg/l for BH1 in May 2024 is a duplicate an initial measurement of <6 µg/l (Appendix 6B – Table 6B-3). Similarly, the value of 41 µg/l for BH3 in July 2024 had a subsequent duplicate reading measurement of <6 µg/l (Appendix 6B – Table 6B-5). Total Dissolved Chromium III is a less toxic form of Chromium than Total Dissolved Chromium VI and naturally occurs in rocks and soil and can leach into groundwater.

Both the GTV and AA-EQS thresholds for Nitrate as NO_3 (37.5 mg/l and 50 mg/l, respectively) were exceeded in BH1 in May 2024 (79.6 mg/l) and June 2024 (58.2 mg/l). The GTV threshold was then also exceeded in BH1 in April 2024 (44.7 mg/l). BH1 is the only monitoring well to have Nitrate exceed the thresholds. BH1 is located close to the agricultural farmland to the south of the Site. This indicates that the elevated nitrate in the groundwater may be caused by off-Site activities, such as effluent and fertiliser application to agricultural land.

Table 6-8 – Summary of Recent (2024) Groundwater Screening Exceedances

Analyte	Units	GTV	AA-EQS	BH1			BH2	BH3	
Date				Apr-24	May-24	Jun-24	Aug-24	Jul-24	Aug-24
Total Dissolved Chromium III	µg/l	-	4.7	-	7*	-	7	41*	7
Nitrate as NO_3	mg/l	37.5	50	44.7	79.6	58.2	-	-	-

*Indicates that the value has been measured twice, and the corresponding duplicate is below the AA-EQS

6.4.5.8 Designated Sites

On a regional scale, GSI mapping (2025) indicates that there are no groundwater SPAs within the Site boundary. There is, however, an outer (SO) and inner (SI) source protection area is located within the 1 km study area, as shown in Figure 6-15. This SPA relates to the Monasterevin PWS.

There is information which indicates the Monasterevin PWS initially consisted of at least two abstraction points (Ballykelly Bore and Spring) targeting the Allenwood Formation aquifer, as referenced in a report from 2002 (Kildare County Council, 2002). However, the pumping information, abstraction volumes, groundwater flow direction, zone of influence and locations of the abstractions are unknown.

In 2001, there was a plan to upgrade the water supply with a combined output estimated at 4 Megalitres/day (K. T. Cullen & Co, 2001) from 4 wells. A review of the EPA abstractions

database (December 2024) indicates Monasterevin wellfield's abstractions were registered in 2020, and they targeted the Bagenalstown Upper aquifer, rather than the Allenwood Formation aquifer, and have a maximum daily abstraction licence of 3.3 Ml/d from 10 wells. The location of these wells and whether they stopped abstracting from the older wells (Ballykelly Bore and Spring) is unknown. Kildare County Council wells WW1 and WW6 fall within the two inner protection areas closest to Site (Figure 6-11). It is therefore possible that the inner protection area relates to these wells.

It is likely that groundwater will have initially flowed to the west, following the fall in topography towards the River Figile, then with the onset of significant abstraction(s), the hydraulic gradient has switched towards the south-east.

The River Barrow and River Nore SAC is also represented in Figure 6-15 and is approximately 1.6 km from the Site boundary. It is possible that a hydraulic connection exists between the groundwater beneath the Site (within the bedrock aquifer) and the River Figile west of the Site. This section of the River Figile is, however, within the mapped sand and gravels aquifer (see Figure 6-8). It is therefore, likely that the River Figile receives more groundwater contribution from the sand and gravels aquifer than from the underlying, moderately productive (Ll) bedrock aquifer mapped in Figure 6-8.

Any significant connection between the Site groundwater and the SAC downstream of River Figile is, therefore, unlikely. With the potential onset of abstraction(s), it is further less likely that a significant hydraulic connection exists between the Site and the SAC, as there has been the inferred reversal of the groundwater flow.

The Old Grange is culverted beneath the Grand Canal at N 63088 12311 and therefore, is no potential hydrological connection between the Grand Canal and the River Barrow and River Nore SAC. A wider review of the area found the closest connection between the Grand Canal and this SAC is 25 km downstream at SF 65573 55024 in Athy, Co. Kildare.

Figure 6-15 - Source Protection Areas (SPA) near Site and River Barrow and River Nore SAC (GSI, 2023)

6.5 Selection of Sensitive Receptors

Taking account of the above and the receptor classification method described in Section 6.3, the receptors carried forward in this assessment and their assigned importance are presented in Table 6-9. The Grand Canal – pNHA is not considered here as there is no hydraulic connectivity from the Site, as elevated and up hydraulic gradient.

Table 6-9 – Water Sensitive Receptors

Receptor	Importance and Reasoning	Sensitivity
Surface Water – Quality and availability	The River Figile is ca. 0.5 km west of the Site, with tributaries located north and south (Old Grange) of the Site. It is unlikely, however, that there is a connection between the rainfall run-off from Site.	Low

Receptor	Importance and Reasoning	Sensitivity
Groundwater - Quality and availability	Water quality analysis does not indicate any groundwater pollution. The bedrock aquifer is highly productive. The Proposed Project would reduce the potential for a contaminant pathway with the reduction of a direct surface water to groundwater linkage with the additional of infilled material.	Low
Abstractions within 1km of Site	There are 10 no. abstractions listed in Table 6-6 within 1km of the Site. These wells abstract up to 3,225 m^3/d from 9no. locations. One well has been decommissioned, 2n o. wells have a total well depth of less than 10 m, and 7 no. wells are deeper than 30 m and all encountered bedrock.	High
River Barrow and River Nore SAC	The River Barrow and River Nore SAC is classified as a European designated site. The SAC is ca. 2 km downstream of the Site within the River Figile. A ny hydraulic connectivity between the Site and the SAC would be through groundwater. This is negligible given the change in groundwater flow direction in response to PWS (or above) abstractions. The contribution of groundwater to the River Figile is also likely to be minimal, with further dilution before the downstream SAC. It is unlikely that there is groundwater connectivity beneath the Site and the Old Grange stream, considering the likely groundwater flow directions based on topography and catchment divides.	Negligible
Flooding – changes in presence and impacts of water flows on infrastructure immediately adjacent and downstream of the Site.	Possibility of water level rising above surface with filling of material. The groundwater table is ~5m below ground level and linked to the water level in the waterbody. The high productivity of the bedrock aquifer means that it will respond quickly to changes in volume in the waterbody and disperse quickly.	Low
Human Health	Workers during operation or public coming into contact with contaminated water. Unlikely to be any highly toxic substances used in on-Site operations.	High

6.6 Do Nothing Scenario

Should the Proposed Project not proceed, it is considered that the future baseline conditions in relation to the hydrological and hydrogeological environment (quality and availability of both surface water and groundwater receptors) would not change. A detailed list is provided below:

- The site has limited hydraulic connectivity to surface water bodies and connectivity to rainfall run-off, including the adjacent Grand Canal.
- There is no known groundwater pollution in the karstic bedrock aquifer (Rkd) under the Site.
- Groundwater quality is unlikely to change and will continue to exhibit exceedances in Total Dissolved Chromium III and Nitrate as NO_3 and will continue to exceed the GTV and AA EQS.
- The bedrock aquifer is considered to be highly productive, and local abstractions do not significantly impact the groundwater body, as evidenced by the groundwater table being within 5 m of the surface beneath the Site. The pit void being open potentially increases the recharge from rainfall to the bedrock aquifer.
- Baseflow from groundwater to the River Figile is considered to be negligible and may be ephemeral during periods of increased rainfall (i.e. winter months November to February).
- The 2016 - 2021 WFD groundwater status of the Bagenalstown Upper groundwater body (waterbody code IE_SE_G_153) is ‘Good’ and unlikely to change following the current baseline and trend observed in during monitoring and sampling.

6.7 Characteristics of the Proposed Project

A detailed description of the Proposed Project is described in Chapter 2 (Project Description). Key elements that could present sources of impact to the water environment include the importation of materials, fuel/oil storage and use, use of a wheel wash, surface drainage systems, and the use and maintenance of welfare facilities.

6.7.1 Embedded Mitigation

To avoid the potential impacts to the water environment during activities at the Site, embedded design and commonly undertaken industry best practice mitigation measures are in place, which include:

- No deep excavation is required. Only shallow topsoil stripping and land raise. No dewatering of excavations will be required.
- Imported material will be certified as ‘clean’ and visual inspections will be undertaken as it is delivered to Site to ensure that there is no contaminant material. Stockpiles of material will be evaluated and monitored and kept stable to minimise erosion.

- Any materials that are deemed to be unacceptable for recovery at the facility on the basis of a visual inspection will be rejected and will be directed away from the Site, to an appropriate disposal facility.
- The fill material selected has similar hydraulic parameters consistent with the in-situ site geology and hydrogeology to minimise potential impact.
- Refuelling takes place on hardstanding in a designated area of the Site and any site plants are well maintained to prevent uncontained releases of hydrocarbons to the ground.
- Dust Suppression – water will be sourced from the waterbody on-Site, to dampen tracks and reduce dust particles and related issues.
- All plant and machinery utilised at the site is and will continue to be regularly serviced and maintained.
- Plant and vehicle parking is located away from sensitive receptors (quarry void/waterbody) and placed in a designated area to minimise risk of potential spillages and leakages.
- There are no significant quantities of hydrocarbons stored onsite, and all plant is re-fuelled from a visiting fuel-truck or off-Site.
- Implementation and use of a wheelwash. The wheelwash is a contained recycling system and will be maintained appropriately to avoid discharges of wash water. The final design of the wheel wash will be agreed with local authority.
- Runoff – runoff from across the Site and paved roads will be diverted via an interceptor to a soakaway.
- Drinking water will be supplied as bottled water. Welfare facilities will be serviced as required and will not require mains supply.

6.8 Potential Effects

The main potential impacts and associated effects that are considered and assessed relate to:

- Surface water (quarry pit) contamination from sediment loading during construction into the adjacent waterbody. Potentially heightened during the infilling stage of the quarry pit due to the risk of overspill.
- Importing of material during construction that could be unsuitable and could lead to leaching of contamination to the land and then into groundwater and surface water downgradient of the Proposed Project.
- Events during works phase that might impact land quality (e.g. leaks and spills from machinery or parked plant/vehicles) that could have a feasible pathway to groundwater and surface watercourses that are downgradient of the Proposed Project. Drainage at the Proposed Project may create preferential pathways.
- Direct recharge from the quarry pit into the groundwater body may be reduced when the fill material is introduced.

6.9 Evaluation of Potential Effects

Using the methodology set out in Section 6.3 and the potential effects detailed above, an evaluation and assessment of the potential effects on the identified sensitive receptors is presented in Table 6-10. This evaluation of potential effects takes embedded mitigation into consideration. The magnitudes associated with the potential future impacts at the Site are assigned either **Negligible** or **Low** following review of the baseline conditions and the assessment criteria.

Combined with the sensitivities of the identified receptors, the potential adverse effects caused by the Site are no greater than Slight and therefore **Not Significant.**

Table 6-10 - Evaluation of Initial Impacts, Effect Significance and Embedded Mitigation Measures

Receptor	Sensitivity	Source of Impact/Assessment of Magnitude/*Embedded Mitigation Measures*	Impact Magnitude (taking embedded mitigation into consideration)	Level of Effect Post Mitigation Measures
Surface Water – Quality	Low	Import of potentially contaminated construction materials leading to change in groundwater quality that may support surface water. *All material will be inspected and quarantined prior to use in infilling of void*	Negligible (adverse)	Imperceptible
		Leaks and spills from plant/vehicles that may have pathway through groundwater to surface water. *An interceptor will be installed prior to reaching soakaway. Limited connectivity between groundwater and surface water in area.*	Negligible (adverse)	Imperceptible
		Sediment loading of adjacent waterbody with filling of quarry void. *The water level will be allowed to stabilise with addition of material. Water level is already 5m below ground level so reduced risk of spillage.*	Low	Slight
Groundwater - Quality	Low	Import of potentially contaminated construction materials leading to change in groundwater quality. *All material will be*	Negligible (adverse)	Imperceptible

Receptor	Sensitivity	Source of Impact/Assessment of Magnitude/*Embedded Mitigation Measures*	Impact Magnitude (taking embedded mitigation into consideration)	Level of Effect Post Mitigation Measures
		inspected and quarantined prior to use in infilling of void		
		Leaks and spills from plant/vehicles that may have pathway to groundwater. *An interceptor will be installed prior to reaching soakaway.*	Negligible (adverse)	Imperceptible
Groundwater - Availability	Low	Direct recharge from the quarry pit into the groundwater body may be reduced when the fill material is introduced. *Fill material used will be sized to match that of the bedrock aquifer and allow recharge.*	Negligible (adverse)	Imperceptible
Abstractions within 1km – Groundwater Availability	High	Direct recharge from the quarry pit into the bedrock groundwater body may be reduced when the fill material is introduced. *Fill material used will be sized to match that of the bedrock aquifer and allow recharge.*	Low	Slight (lower designation selected based on embedded design)
River Barrow and River Nore SAC - Quality	Negligible	Import of potentially contaminated construction materials leading to change in groundwater quality that may support SAC via River Figile. *All material will be inspected and quarantined prior to use in infilling of void*	Negligible (adverse)	Imperceptible

Receptor	Sensitivity	Source of Impact/Assessment of Magnitude/*Embedded Mitigation Measures*	Impact Magnitude (taking embedded mitigation into consideration)	Level of Effect Post Mitigation Measures
		Leaks and spills from plant/vehicles that may have pathway through groundwater to SAC via River Figile. *An interceptor will be installed prior to reaching soakaway. Limited connectivity between groundwater and River Figile.*	Negligible (adverse)	Imperceptible
Flooding – impacts of water flows on infrastructure immediately adjacent and downstream of the Site.	Low	Possibility of water level rising above surface with filling of material or increased surface run-off. *The groundwater table is ~5m below ground level and linked to the water level in the waterbody. The high productivity of the bedrock aquifer means that it will respond quickly to changes in volume in the waterbody and disperse quickly.*	Low	Slight
Human Health	High	Contact with contaminated water caused by unmanaged spillage of fuels Site plant or vehicles. *Any leaks likely to be minor.*	Negligible (adverse)	Slight

6.10 Mitigation Measures and Monitoring

Additional mitigation and/or management is intended to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment. The initial assessment of potential effects (taking into account embedded mitigation) has not identified any significant adverse effects (i.e. those that have been evaluated as 'large' or 'profound').

The groundwater monitoring dataset used for this assessment is limited and does not include a full winter and summer period. Therefore, maximum groundwater levels during peak rainfall and recharge have not been identified. The following monitoring is proposed:

- Groundwater level monitoring at the onsite boreholes (BH1, BH2, BH3 and BH4) for at least 1 month prior to enabling works, using pressure transducers (data logger and barometric pressure logger).
- Groundwater quality monitoring at the onsite boreholes (BH1, BH2, BH3 and BH4) for at least 1 month prior to enabling works
- Discrete monthly manual groundwater level measurements at onsite boreholes. To assist in logger calibration and then check impact on water levels with construction.
- Quarterly sampling of surface water within the collected waters within the quarry void is recommended for construction phase to capture seasonal fluctuations in chemical concentration. Check for any changes which may be linked to the project construction.
- Quarterly sampling of groundwater is recommended for construction phase to capture seasonal fluctuations in chemical concentration. Check for any changes which may be linked to the project construction.
- The water monitoring programme will be agreed with the Environmental Health Officer (EHO).

6.11 Residual Effects

The assessment concludes that the Proposed Project will not give rise to significant adverse effects on the water environment at or surrounding the Site. There are no further mitigation measures required at this stage.

6.12 Cumulative Effects

Assuming other developments in the area have incorporated widely adopted good design, practice and mitigation measures it is considered that there have been no significant cumulative effects of the Proposed Project.

6.13 Difficulties Encountered

There was a large amount of sediment sat in the base of the monitoring wells prior to 2024 sampling round, following drilling and install in 2023. This resulted in initially high readings for non-dissolved analytes, when well purging techniques were used. Repeated purging helped clear the monitoring wells of sediment to some extent. In the August 2024 sampling

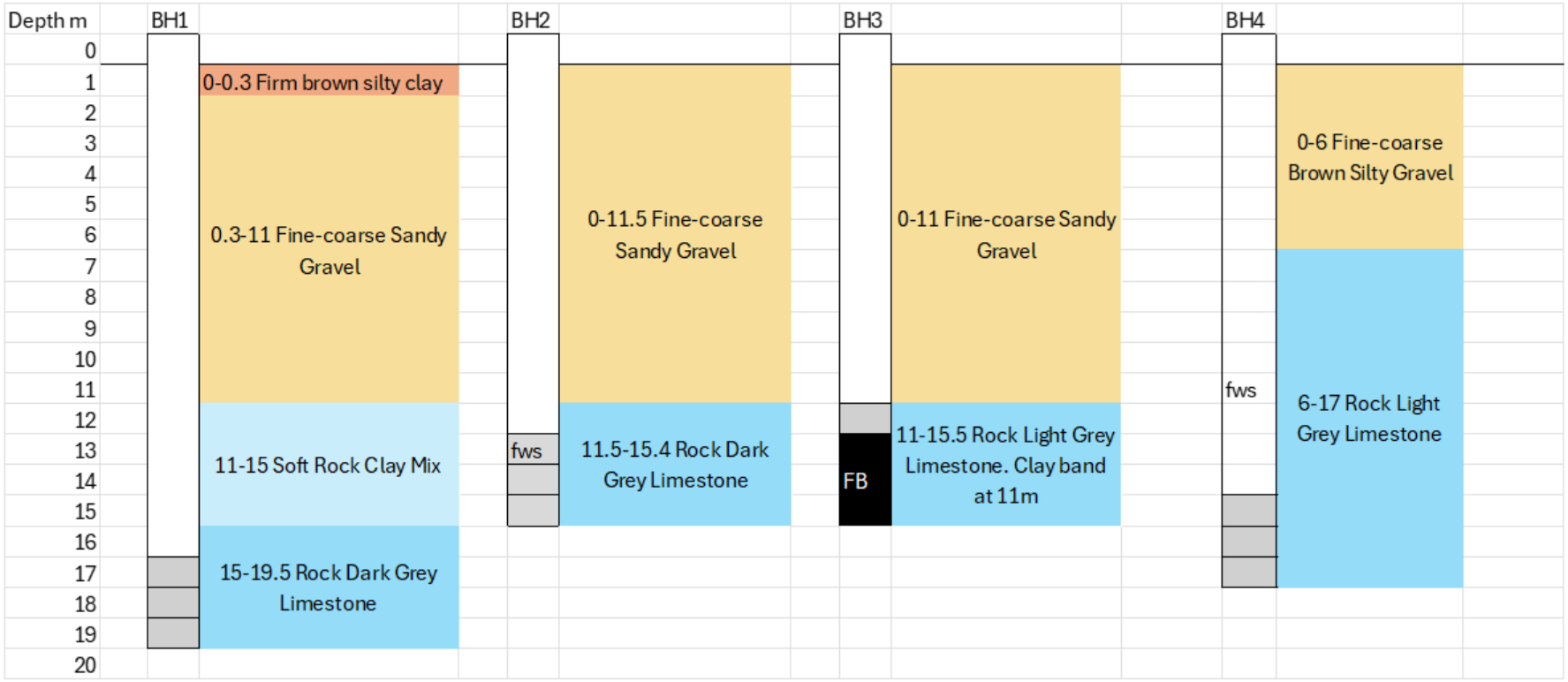
round, passive sampling techniques were used, which significantly reduced the disturbance of the water column.

6.14 References

- Environmental Protection Agency, 2022, EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports
- Environmental Efficiency, 2008, Response to Clarification of Further Information Request for Panning Reference 06/2729
- K. T. Cullen & Co. Ltd, 2001, Source Protection Plan Monasterevin Wellfield Co. Kildare
- EPA online map viewer (EPA, 2023) [Accessed: May 2025]
- GSI online map viewer (GSI, 2023) [Accessed: May 2025]
- Kildare County Council, December 2002, Kildare Groundwater Protection Scheme. Volume I.

Appendix 6A

Borelogs


Depth m
BH1
BH2
BH3
BH4
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
0-0.3 Firm brown silty clay
0.3-11 Fine-coarse Sandy Gravel
11-15 Soft Rock Clay Mix
15-19.5 Rock Dark Grey Limestone
fws
0-11.5 Fine-coarse Sandy Gravel
11.5-15.4 Rock Dark Grey Limestone
FB
0-11 Fine-coarse Sandy Gravel
11-15.5 Rock Light Grey Limestone. Clay band at 11m
fws
0-6 Fine-coarse Brown Silty Gravel
6-17 Rock Light Grey Limestone

Appendix 6B

Laboratory Results

Table 6B-1 - Laboratory Results – March 2024

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH4	SW01
Dissolved Arsenic	ug/l	7.5	50	<2.5	<2.5	<2.5	<2.5	<2.5
Dissolved Barium	ug/l		100	47	68	23	22	26
Dissolved Beryllium	ug/l			<0.5	<0.5	<0.5	<0.5	<0.5
Dissolved Boron	ug/l		2000	61	<12	27	28	22
Dissolved Cadmium	ug/l		3	<0.5	<0.5	<0.5	<0.5	<0.5
Dissolved Calcium	mg/l			145.7	108.9	76.2	96.5	48.7
Total Dissolved Chromium	ug/l	37.5	30	<1.5	<1.5	<1.5	2.3	<1.5
Dissolved Copper	ug/l		30	<7	<7	<7	<7	<7
Total Dissolved Iron	ug/l		1000					
Dissolved Lead	ug/l	7.5	10	<5	<5	<5	<5	<5
Dissolved Magnesium	mg/l			12	16.1	5.1	9.3	10.4

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH4	SW01
Dissolved Manganese	ug/l		300	<2	<2	<2	<2	<2
Dissolved Mercury	ug/l	0.75	1	<1	<1	<1	<1	<1
Dissolved Nickel	ug/l		50	2	<2	<2	<2	<2
Dissolved Potassium	mg/l			15.4	2	1.7	0.8	2.2
Dissolved Selenium	ug/l			<3	<3	<3	<3	<3
Dissolved Sodium	mg/l			8.6	8.4	5	7.9	9
Dissolved Vanadium	ug/l			<1.5	<1.5	<1.5	<1.5	<1.5
Dissolved Zinc	ug/l	75	100	4	<3	3	<3	<3
Total Chromium	ug/l			91.5	80	100.3	130.6	<1.5
Total Iron	ug/l			109247	95803	111426	130244	<20
MTBE	ug/l	10		<5	<5	<5	<5	<5
Benzene	ug/l		10	<5	<5	<5	<5	<5
Toluene	ug/l	525	74	<5	<5	<5	<5	<5

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH4	SW01
Ethylbenzene	ug/l			<5	<5	<5	<5	<5
m/p-Xylene	ug/l		30	<5	<5	<5	<5	<5
o-Xylene	ug/l		30	<5	<5	<5	<5	<5
Aliphatics								
>C5-C6 (HS_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C6-C8 (HS_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C8-C10 (HS_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C10-C12 (EH_CU_1D_AL)	ug/l			<5	<5	<5	<5	<5
>C12-C16 (EH_CU_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C16-C21 (EH_CU_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C21-C35 (EH_CU_1D_AL)	ug/l			<10	<10	<10	<10	<10
Total aliphatics C5-35 (EH_CU+HS_1D_AL)	ug/l			<10	<10	<10	<10	<10

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH4	SW01
Aromatics								
>C5-EC7 (HS_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC7-EC8 (HS_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC8-EC10 (HS_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC10-EC12 (EH_CU_1D_AR)	ug/l			<5	<5	<5	<5	<5
>EC12-EC16 (EH_CU_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC16-EC21 (EH_CU_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC21-EC35 (EH_CU_1D_AR)	ug/l			<10	<10	<10	<10	<10
Total aromatics C5-35 (EH_CU+HS_1D_AR)	ug/l			<10	<10	<10	<10	<10
Total aliphatics and aromatics (C5-35) (EH_CU+HS_1D_Total)	ug/l			<10	<10	<10	<10	<10
Sulphate as SO4	mg/l	187.5	200	15.1	35.3	7.1	22.4	21.5
Chloride	mg/l	187.5	250	15.3	19.6	9.9	14.8	19.4

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH4	SW01
Nitrate as NO3	mg/l	37.5	50	16.2	2	19.5	28.9	2.1
Nitrite as NO2	mg/l	0.375	0.2	<0.02	<0.02	<0.02	<0.02	<0.02
Ortho Phosphate as PO4	mg/l			<0.06	<0.06	<0.06	<0.06	<0.06
Ammoniacal Nitrogen as N	mg/l			0.03	0.1	0.36	0.04	<0.03
Hexavalent Chromium	ug/l	7.5	3.4	<6	<6	<6	<6	<6
Total Dissolved Chromium III	ug/l		4.7	<6	<6	<6	<6	<6
Total Alkalinity as CaCO3	mg/l			5062	966	340	1622	142
COD (Settled)	mg/l			13	21	20	11	<7
Total Suspended Solids	mg/l		50	12376	2748	2328	5486	<10

1 Groundwater Regulations 2010 (S.I. No. 9 of 2010) and amendment S.I. No. 366/2016.

2 AA-EQS - European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272/2009 including amendments S.I. No. 327/2012, S.I. No. 386/2015 and S.I. No. 77/2019)

Table 6B-2 - Laboratory Results – April 2024

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH4	SW01
Dissolved Arsenic	ug/l	7.5	50	<2.5	<2.5	<2.5	<2.5	<2.5
Dissolved Barium	ug/l		100	80	81	18	21	26
Dissolved Beryllium	ug/l			<0.5	<0.5	<0.5	<0.5	<0.5
Dissolved Boron	ug/l		2000	61	<12	24	27	15
Dissolved Cadmium	ug/l		3	<0.5	<0.5	<0.5	<0.5	<0.5
Dissolved Calcium	mg/l			140.7	122.8	59.8	96	48.4
Total Dissolved Chromium	ug/l	37.5	30	<1.5	<1.5	<1.5	<1.5	<1.5
Dissolved Copper	ug/l		30	<7	<7	<7	<7	<7
Total Dissolved Iron	ug/l		1000	<20	<20	<20	<20	<20
Dissolved Lead	ug/l	7.5	10	<5	<5	<5	<5	<5
Dissolved Magnesium	mg/l			12.3	17.2	4.1	9.3	10.1

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH4	SW01
Dissolved Manganese	ug/l			2	31	<2	<2	<2
Dissolved Mercury	ug/l	0.75	1	<1	<1	<1	<1	<1
Dissolved Nickel	ug/l		50	4	<2	<2	<2	<2
Dissolved Potassium	mg/l			35.1	2	1.2	0.7	2.1
Dissolved Selenium	ug/l			<3	<3	<3	<3	<3
Dissolved Sodium	mg/l			9.1	11.3	3.9	6.8	8.3
Dissolved Vanadium	ug/l			<1.5	<1.5	<1.5	<1.5	<1.5
Dissolved Zinc	ug/l	75	100	6	4	4	<3	3
Total Chromium	ug/l			6.9	<1.5	6.7	<1.5	<1.5
Total Iron	ug/l			3653	384	2691	95	<20
MTBE	ug/l	10		<5	<5	<5	<5	<5
Benzene	ug/l		10	<5	<5	<5	<5	<5
Toluene	ug/l	525	74	<5	<5	<5	<5	<5

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH4	SW01
Ethylbenzene	ug/l			<5	<5	<5	<5	<5
m/p-Xylene	ug/l		30	<5	<5	<5	<5	<5
o-Xylene	ug/l		30	<5	<5	<5	<5	<5
Aliphatics								
>C5-C6 (HS_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C6-C8 (HS_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C8-C10 (HS_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C10-C12 (EH_CU_1D_AL)	ug/l			<5	<5	<5	<5	<5
>C12-C16 (EH_CU_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C16-C21 (EH_CU_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C21-C35 (EH_CU_1D_AL)	ug/l			<10	<10	<10	<10	<10
Total aliphatics C5-35 (EH_CU+HS_1D_AL)	ug/l			<10	<10	<10	<10	<10

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH4	SW01
Aromatics								
>C5-EC7 (HS_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC7-EC8 (HS_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC8-EC10 (HS_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC10-EC12 (EH_CU_1D_AR)	ug/l			<5	<5	<5	<5	<5
>EC12-EC16 (EH_CU_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC16-EC21 (EH_CU_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC21-EC35 (EH_CU_1D_AR)	ug/l			<10	<10	<10	<10	<10
Total aromatics C5-35 (EH_CU+HS_1D_AR)	ug/l			<10	<10	<10	<10	<10
Total aliphatics and aromatics (C5-35) (EH_CU+HS_1D_Total)	ug/l			<10	<10	<10	<10	<10
Sulphate as SO4	mg/l	187.5	200	23.1	58.3	4.9	22	21.7
Chloride	mg/l	187.5	250	16.4	21.2	6.7	10.7	19.8

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH4	SW01
Nitrate as NO3	mg/l	37.5	50	44.7	7	12.4	22.8	2
Nitrite as NO2	mg/l	0.375	0.2	<0.02	<0.02	<0.02	<0.02	<0.02
Ortho Phosphate as PO4	mg/l			0.22	<0.06	<0.06	<0.06	<0.06
Ammoniacal Nitrogen as N	mg/l			0.04	0.18	0.03	<0.03	<0.03
Hexavalent Chromium	ug/l	7.5	3.4	<6	<6	<6	<6	<6
Total Dissolved Chromium III	ug/l		4.7	<6	<6	<6	<6	<6
Total Alkalinity as CaCO3	mg/l			868	544	206	950	148
COD (Settled)	mg/l			13	9	<7	10	10
Total Suspended Solids	mg/l		50	2562	842	830	2802	<10

1 Groundwater Regulations 2010 (S.I. No. 9 of 2010) and amendment S.I. No. 366/2016.

2 AA-EQS - European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272/2009 including amendments S.I. No. 327/2012, S.I. No. 386/2015 and S.I. No. 77/2019)

Table 6B-3 - Laboratory Results – May 2024

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH1 Dup	BH2	BH3	BH4	SW01
Dissolved Arsenic	ug/l	7.5	50	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Dissolved Barium	ug/l		100	108	94	83	13	14	19
Dissolved Beryllium	ug/l			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dissolved Boron	ug/l		2000	84	85	18	22	21	20
Dissolved Cadmium	ug/l		3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dissolved Calcium	mg/l			132.8	134.9	107.4	55.2	84.9	43.8
Total Dissolved Chromium	ug/l	37.5	30	<1.5	6.8	<1.5	<1.5	<1.5	<1.5
Dissolved Copper	ug/l		30	<7	7	<7	<7	<7	<7
Total Dissolved Iron	ug/l		1000	<20	<20	<20	<20	<20	<20
Dissolved Lead	ug/l	7.5	10	<5	<5	<5	<5	<5	<5
Dissolved Magnesium	mg/l			15.4	15.6	15.2	4	8.5	9.6

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH1 Dup	BH2	BH3	BH4	SW01
Dissolved Manganese	ug/l		300	31	<2	97	<2	<2	<2
Dissolved Mercury	ug/l	0.75	1	<1	<1	<1	<1	<1	<1
Dissolved Nickel	ug/l		50	11	6	<2	<2	<2	<2
Dissolved Potassium	mg/l			70.1	71.7	1.8	1	0.6	2
Dissolved Selenium	ug/l			<3	<3	<3	<3	<3	<3
Dissolved Sodium	mg/l			12.9	13.5	10	4	6.9	8.3
Dissolved Vanadium	ug/l			<1.5	<1.5	<1.5	<1.5	<1.5	<1.5
Dissolved Zinc	ug/l	75	100	7	5	4	<3	<3	<3
Total Chromium	ug/l			12.8	13.1	6.3	30	204.6	<1.5
Total Iron	ug/l			7627	2985	3175	24461	204054	<20
MTBE	ug/l	10		<5	<5	<5	<5	<5	<5
Benzene	ug/l		10	<5	<5	<5	<5	<5	<5
Toluene	ug/l	525	74	<5	<5	<5	<5	<5	<5

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH1 Dup	BH2	BH3	BH4	SW01
Ethylbenzene	ug/l			<5	<5	<5	<5	<5	<5
m/p-Xylene	ug/l		30	<5	<5	<5	<5	<5	<5
o-Xylene	ug/l		30	<5	<5	<5	<5	<5	<5
Aliphatics									
>C5-C6 (HS_1D_AL)	ug/l			<10	<10	<10	<10	<10	<10
>C6-C8 (HS_1D_AL)	ug/l			<10	<10	<10	<10	<10	<10
>C8-C10 (HS_1D_AL)	ug/l			<10	<10	<10	<10	<10	<10
>C10-C12 (EH_CU_1D_AL)	ug/l			<5	<5	<5	<5	<5	<5
>C12-C16 (EH_CU_1D_AL)	ug/l			<10	<10	<10	<10	<10	<10
>C16-C21 (EH_CU_1D_AL)	ug/l			<10	<10	<10	<10	<10	<10
>C21-C35 (EH_CU_1D_AL)	ug/l			<10	<10	<10	<10	<10	<10
Total aliphatics C5-35 (EH_CU+HS_1D_AL)	ug/l			<10	<10	<10	<10	<10	<10

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH1 Dup	BH2	BH3	BH4	SW01
Aromatics									
>C5-EC7 (HS_1D_AR)	ug/l			<10	<10	<10	<10	<10	<10
>EC7-EC8 (HS_1D_AR)	ug/l			<10	<10	<10	<10	<10	<10
>EC8-EC10 (HS_1D_AR)	ug/l			<10	<10	<10	<10	<10	<10
>EC10-EC12 (EH_CU_1D_AR)	ug/l			<5	<5	<5	<5	<5	<5
>EC12-EC16 (EH_CU_1D_AR)	ug/l			<10	<10	<10	<10	<10	<10
>EC16-EC21 (EH_CU_1D_AR)	ug/l			<10	<10	<10	<10	<10	<10
>EC21-EC35 (EH_CU_1D_AR)	ug/l			<10	<10	<10	<10	<10	<10
Total aromatics C5-35 (EH_CU+HS_1D_AR)	ug/l			<10	<10	<10	<10	<10	<10
Total aliphatics and aromatics (C5-35) (EH_CU+HS_1D_Total)	ug/l			<10	<10	<10	<10	<10	<10
Sulphate as SO4	mg/l	187.5	200	91.4	82	28.9	3.9	23.9	21
Chloride	mg/l	187.5	250	28.1	25.1	21.5	5.8	13.5	19.4

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH1 Dup	BH2	BH3	BH4	SW01
Nitrate as NO3	mg/l	37.5	50	79.6	79	2.3	8.2	29	1.6
Nitrite as NO2	mg/l	0.375	0.2	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Ortho Phosphate as PO4	mg/l			0.41	0.6	<0.06	<0.06	<0.06	<0.06
Ammoniacal Nitrogen as N	mg/l			0.16	0.17	<0.03	0.03	0.03	<0.03
Hexavalent Chromium	ug/l	7.5	3.4	<6	<6	<6	<6	<6	<6
Total Dissolved Chromium III	ug/l		4.7	<6	7	<6	<6	<6	<6
Total Alkalinity as CaCO3	mg/l			1464	1046	388	238	2390	148
COD (Settled)	mg/l			<7	9	<7	<7	<7	9
Total Suspended Solids	mg/l		50	3406	2884	348	1866	6800	<10

1 Groundwater Regulations 2010 (S.I. No. 9 of 2010) and amendment S.I. No. 366/2016.

2 AA-EQS - European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272/2009 including amendments S.I. No. 327/2012, S.I. No. 386/2015 and S.I. No. 77/2019)

Table 6B-4 - Laboratory Results – June 2024

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH4	SW01
Dissolved Arsenic	ug/l	7.5	50	3.6	4	<2.5	3.1	<2.5
Dissolved Barium	ug/l		100	97	79	10	22	22
Dissolved Beryllium	ug/l			<0.5	<0.5	<0.5	<0.5	<0.5
Dissolved Boron	ug/l		2000	75	<12	23	24	15
Dissolved Cadmium	ug/l		3	<0.5	<0.5	<0.5	<0.5	<0.5
Dissolved Calcium	mg/l			126.8	105.7	50.3	100.4	46.4
Total Dissolved Chromium	ug/l	37.5	30	<1.5	<1.5	<1.5	<1.5	<1.5
Dissolved Copper	ug/l		30	<7	<7	<7	<7	<7
Total Dissolved Iron	ug/l		1000	<20	<20	<20	<20	<20
Dissolved Lead	ug/l	7.5	10	<5	<5	<5	<5	<5
Dissolved Magnesium	mg/l			15	15.8	3.7	10.1	10.5

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH4	SW01
Dissolved Manganese	ug/l		300	<2	167	<2	<2	<2
Dissolved Mercury	ug/l	0.75	1	<1	<1	<1	<1	<1
Dissolved Nickel	ug/l		50	6	3	<2	<2	<2
Dissolved Potassium	mg/l			61.3	1.8	0.8	0.7	2.1
Dissolved Selenium	ug/l			<3	<3	<3	<3	<3
Dissolved Sodium	mg/l			12.1	9.5	3.5	7.3	8.2
Dissolved Vanadium	ug/l			<1.5	<1.5	<1.5	<1.5	<1.5
Dissolved Zinc	ug/l	75	100	5	<3	<3	<3	4
Total Chromium	ug/l			14.2	6.5	13.2	64.7	<1.5
Total Iron	ug/l			12057	3214	5516	49276	53
MTBE	ug/l	10		<5	<5	<5	<5	<5
Benzene	ug/l		10	<5	<5	<5	<5	<5
Toluene	ug/l	525	74	<5	<5	<5	<5	<5

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH4	SW01
Ethylbenzene	ug/l			<5	<5	<5	<5	<5
m/p-Xylene	ug/l		30	<5	<5	<5	<5	<5
o-Xylene	ug/l		30	<5	<5	<5	<5	<5
Aliphatics								
>C5-C6 (HS_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C6-C8 (HS_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C8-C10 (HS_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C10-C12 (EH_CU_1D_AL)	ug/l			<5	<5	<5	<5	<5
>C12-C16 (EH_CU_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C16-C21 (EH_CU_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C21-C35 (EH_CU_1D_AL)	ug/l			<10	<10	<10	<10	<10
Total aliphatics C5-35 (EH_CU+HS_1D_AL)	ug/l			<10	<10	<10	<10	<10

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH4	SW01
Aromatics								
>C5-EC7 (HS_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC7-EC8 (HS_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC8-EC10 (HS_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC10-EC12 (EH_CU_1D_AR)	ug/l			<5	<5	<5	<5	<5
>EC12-EC16 (EH_CU_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC16-EC21 (EH_CU_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC21-EC35 (EH_CU_1D_AR)	ug/l			<10	<10	<10	<10	<10
Total aromatics C5-35 (EH_CU+HS_1D_AR)	ug/l			<10	<10	<10	<10	<10
Total aliphatics and aromatics (C5-35) (EH_CU+HS_1D_Total)	ug/l			<10	<10	<10	<10	<10
Sulphate as SO4	mg/l	187.5	200	72.5	22.3	3.2	27.9	21.7
Chloride	mg/l	187.5	250	24.9	21.6	4.6	16	19.6

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH4	SW01
Nitrate as NO3	mg/l	37.5	50	58.2	0.4	4.7	32.7	0.9
Nitrite as NO2	mg/l	0.375	0.2	<0.02	<0.02	<0.02	<0.02	<0.02
Ortho Phosphate as PO4	mg/l			0.41	<0.06	<0.06	<0.06	<0.06
Ammoniacal Nitrogen as N	mg/l			0.06	0.09	<0.03	0.03	0.05
Hexavalent Chromium	ug/l	7.5	3.4	<6	<6	<6	<6	<6
Total Dissolved Chromium III	ug/l		4.7	<6	<6	<6	<6	<6
Total Alkalinity as CaCO3	mg/l			1446	482	214	1138	140
COD (Settled)	mg/l			12	<7	<7	<7	<7
Total Suspended Solids	mg/l		50	3351	820	1273	3145	15

1 Groundwater Regulations 2010 (S.I. No. 9 of 2010) and amendment S.I. No. 366/2016.

2 AA-EQS - European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272/2009 including amendments S.I. No. 327/2012, S.I. No. 386/2015 and S.I. No. 77/2019)

Table 6B-5 - Laboratory Results – July 2024

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH3 Dup	BH4	SW01
Dissolved Arsenic	ug/l	7.5	50	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Dissolved Barium	ug/l		100	70	70	14	16	27	27
Dissolved Beryllium	ug/l			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dissolved Boron	ug/l		2000	51	<12	16	25	28	21
Dissolved Cadmium	ug/l		3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dissolved Calcium	mg/l			127.6	96.4	53	52.9	101.6	44.4
Total Dissolved Chromium	ug/l	37.5	30	<1.5	5	<1.5	<1.5	6	<1.5
Dissolved Copper	ug/l		30	<7	<7	<7	<7	<7	<7
Total Dissolved Iron	ug/l		1000	<20	<20	<20	<20	<20	<20
Dissolved Lead	ug/l	7.5	10	<5	<5	<5	<5	<5	<5
Dissolved Magnesium	mg/l			10.9	12.7	3.7	3.8	9.7	9.9

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH3 Dup	BH4	SW01
Dissolved Manganese	ug/l		300	4	74	22	23	<2	4
Dissolved Mercury	ug/l	0.75	1	<1	<1	<1	<1	<1	<1
Dissolved Nickel	ug/l		50	2	<2	<2	<2	<2	<2
Dissolved Potassium	mg/l			35.8	1.8	0.8	0.8	0.8	2
Dissolved Selenium	ug/l			<3	<3	<3	<3	<3	<3
Dissolved Sodium	mg/l			8.7	9.2	4.2	4.2	7.7	8.2
Dissolved Vanadium	ug/l			<1.5	<1.5	<1.5	<1.5	<1.5	<1.5
Dissolved Zinc	ug/l	75	100	5	5	3	5	8	<3
Total Chromium	ug/l			33	33.3	43.5	54.7	107.6	<1.5
Total Iron	ug/l			39152	28726	38875	52187	115584	25
MTBE	ug/l	10		<5	<5	<5	<5	<5	<5
Benzene	ug/l		10	<5	<5	<5	<5	<5	<5
Toluene	ug/l	525	74	<5	<5	<5	<5	<5	<5

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH3 Dup	BH4	SW01
Ethylbenzene	ug/l			<5	<5	<5	<5	<5	<5
m/p-Xylene	ug/l		30	<5	<5	<5	<5	<5	<5
o-Xylene	ug/l		30	<5	<5	<5	<5	<5	<5
Aliphatics									
>C5-C6 (HS_1D_AL)	ug/l			<10	<10	<10	<10	<10	<10
>C6-C8 (HS_1D_AL)	ug/l			<10	<10	<10	<10	<10	<10
>C8-C10 (HS_1D_AL)	ug/l			<10	<10	<10	<10	<10	<10
>C10-C12 (EH_CU_1D_AL)	ug/l			<5	<5	<5	<5	<5	<5
>C12-C16 (EH_CU_1D_AL)	ug/l			<10	<10	<10	<10	<10	<10
>C16-C21 (EH_CU_1D_AL)	ug/l			<10	<10	<10	<10	<10	<10
>C21-C35 (EH_CU_1D_AL)	ug/l			<10	<10	<10	<10	<10	<10
Total aliphatics C5-35 (EH_CU+HS_1D_AL)	ug/l			<10	<10	<10	<10	<10	<10

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH3 Dup	BH4	SW01
Aromatics									
>C5-EC7 (HS_1D_AR)	ug/l			<10	<10	<10	<10	<10	<10
>EC7-EC8 (HS_1D_AR)	ug/l			<10	<10	<10	<10	<10	<10
>EC8-EC10 (HS_1D_AR)	ug/l			<10	<10	<10	<10	<10	<10
>EC10-EC12 (EH_CU_1D_AR)	ug/l			<5	<5	<5	<5	<5	<5
>EC12-EC16 (EH_CU_1D_AR)	ug/l			<10	<10	<10	<10	<10	<10
>EC16-EC21 (EH_CU_1D_AR)	ug/l			<10	<10	<10	<10	<10	<10
>EC21-EC35 (EH_CU_1D_AR)	ug/l			<10	<10	<10	<10	<10	<10
Total aromatics C5-35 (EH_CU+HS_1D_AR)	ug/l			<10	<10	<10	<10	<10	<10
Total aliphatics and aromatics (C5-35) (EH_CU+HS_1D_Total)	ug/l			<10	<10	<10	<10	<10	<10
Sulphate as SO4	mg/l	187.5	200	29.9	20	3.7	3.9	26.1	20.3
Chloride	mg/l	187.5	250	13.1	20.9	5.1	5.4	15.3	19.4

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH3 Dup	BH4	SW01
Nitrate as NO3	mg/l	37.5	50	32.5	0.3	5.8	6	33.4	0.7
Nitrite as NO2	mg/l	0.375	0.2	<0.02	0.03	<0.02	<0.02	<0.02	<0.02
Ortho Phosphate as PO4	mg/l			0.2	<0.06	<0.06	<0.06	<0.06	<0.06
Ammoniacal Nitrogen as N	mg/l			0.34	0.05	<0.03	<0.03	0.03	<0.03
Hexavalent Chromium	ug/l	7.5	3.4	<6	<6	41	<6	<6	<6
Total Dissolved Chromium III	ug/l		4.7	<6	<6	<6	<6	6	<6
Total Alkalinity as CaCO3	mg/l			764	500	208	254	1200	136
COD (Settled)	mg/l			10	<7	<7	<7	<7	21
Total Suspended Solids	mg/l		50	1447	828	828	1027	3074	<10

1 Groundwater Regulations 2010 (S.I. No. 9 of 2010) and amendment S.I. No. 366/2016.

2 AA-EQS - European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272/2009 including amendments S.I. No. 327/2012, S.I. No. 386/2015 and S.I. No. 77/2019)

Table 6B-6 - Laboratory Results – August 2024

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH4	SW01
Dissolved Arsenic	ug/l	7.5	50	5.4	<2.5	<2.5	<2.5	<2.5
Dissolved Barium	ug/l		100	85	63	8	18	23
Dissolved Beryllium	ug/l			<0.5	<0.5	<0.5	<0.5	<0.5
Dissolved Boron	ug/l		2000	55	17	17	19	13
Dissolved Cadmium	ug/l		3	<0.5	<0.5	<0.5	<0.5	<0.5
Dissolved Calcium	mg/l			121.3	96.1	42.5	89.1	42.6
Total Dissolved Chromium	ug/l	37.5	30	4.6	6.6	6.9	<1.5	<1.5
Dissolved Copper	ug/l		30	<7	<7	<7	<7	<7
Total Dissolved Iron	ug/l		1000	<20	<20	<20	<20	<20
Dissolved Lead	ug/l	7.5	10	<5	<5	<5	<5	<5
Dissolved Magnesium	mg/l			10.9	12.5	3.1	8.1	10.1

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH4	SW01
Dissolved Manganese	ug/l		300	40	<2	22	<2	27
Dissolved Mercury	ug/l	0.75	1	<1	<1	<1	<1	<1
Dissolved Nickel	ug/l		50	4	<2	<2	<2	<2
Dissolved Potassium	mg/l			31.4	2	0.7	0.6	2.1
Dissolved Selenium	ug/l			<3	<3	<3	<3	<3
Dissolved Sodium	mg/l			8.9	9.3	4.5	7.1	8.4
Dissolved Vanadium	ug/l			<1.5	<1.5	<1.5	<1.5	<1.5
Dissolved Zinc	ug/l	75	100	26	9	11	13	<3
Total Chromium	ug/l			<1.5	<1.5	35.9	<1.5	<1.5
Total Iron	ug/l			1018	536	25033	198	26
MTBE	ug/l	10		<5	<5	<5	<5	<5
Benzene	ug/l		10	<5	<5	<5	<5	<5
Toluene	ug/l	525	74	<5	<5	<5	<5	<5

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH4	SW01
Ethylbenzene	ug/l			<5	<5	<5	<5	<5
m/p-Xylene	ug/l		30	<5	<5	<5	<5	<5
o-Xylene	ug/l		30	<5	<5	<5	<5	<5
Aliphatics								
>C5-C6 (HS_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C6-C8 (HS_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C8-C10 (HS_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C10-C12 (EH_CU_1D_AL)	ug/l			<5	<5	<5	<5	<5
>C12-C16 (EH_CU_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C16-C21 (EH_CU_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C21-C35 (EH_CU_1D_AL)	ug/l			<10	<10	<10	<10	<10
Total aliphatics C5-35 (EH_CU+HS_1D_AL)	ug/l			<10	<10	<10	<10	<10

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH4	SW01
Aromatics								
>C5-EC7 (HS_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC7-EC8 (HS_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC8-EC10 (HS_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC10-EC12 (EH_CU_1D_AR)	ug/l			<5	<5	<5	<5	<5
>EC12-EC16 (EH_CU_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC16-EC21 (EH_CU_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC21-EC35 (EH_CU_1D_AR)	ug/l			<10	<10	<10	<10	<10
Total aromatics C5-35 (EH_CU+HS_1D_AR)	ug/l			<10	<10	<10	<10	<10
Total aliphatics and aromatics (C5-35) (EH_CU+HS_1D_Total)	ug/l			<10	<10	<10	<10	<10
Sulphate as SO4	mg/l	187.5	200	23.3	19.1	2.5	19.5	20.4
Chloride	mg/l	187.5	250	14.2	20.1	3.8	15	19.1

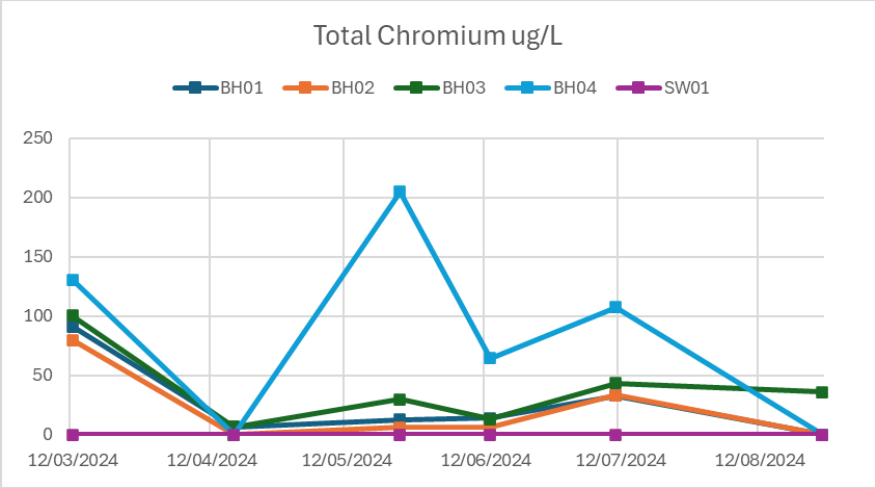
Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH4	SW01
Nitrate as NO3	mg/l	37.5	50	27.2	0.9	3.8	21.5	0.5
Nitrite as NO2	mg/l	0.375	0.2	0.16	<0.02	<0.02	<0.02	<0.02
Ortho Phosphate as PO4	mg/l			0.27	0.09	0.08	0.08	0.07
Ammoniacal Nitrogen as N	mg/l			0.16	<0.03	0.03	<0.03	<0.03
Hexavalent Chromium	ug/l	7.5	3.4	<6	<6	<6	<6	<6
Total Dissolved Chromium III	ug/l		4.7	<6	7	7	<6	<6
Total Alkalinity as CaCO3	mg/l			352	258	160	208	122
COD (Settled)	mg/l			14	18	<7	21	25
Total Suspended Solids	mg/l		50	55	24	548	15	<10

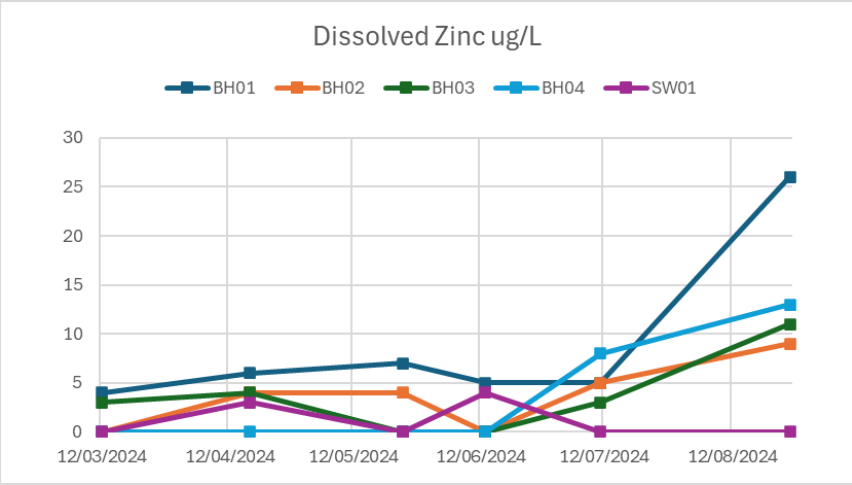
1 Groundwater Regulations 2010 (S.I. No. 9 of 2010) and amendment S.I. No. 366/2016.

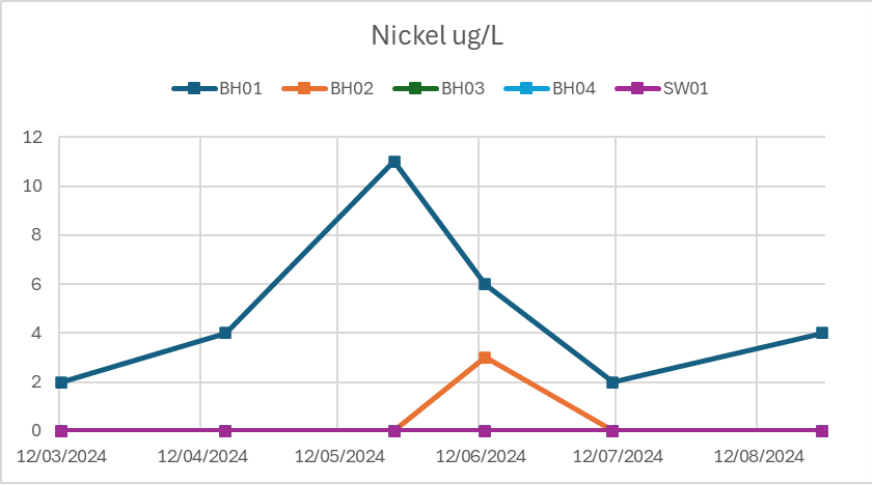
2 AA-EQS - European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272/2009 including amendments S.I. No. 327/2012, S.I. No. 386/2015 and S.I. No. 77/2019)

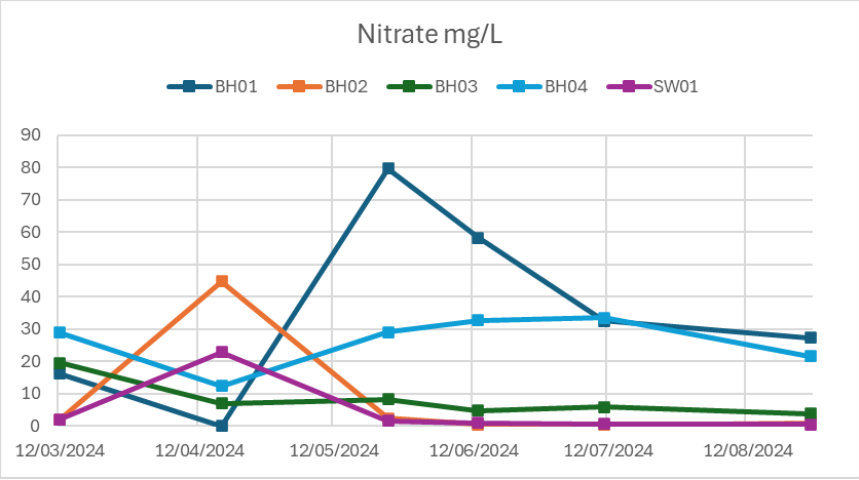
Appendix 6C

Water Quality Graphs


Total Chromium ug/L
BH01
BH02
BH03
BH04
SW01
250
200
150
100
50
0
12/03/2024
12/04/2024
12/05/2024
12/06/2024
12/07/2024
12/08/2024


Dissolved Zinc ug/L
BH01
BH02
BH03
BH04
SW01
30
25
20
15
10
5
0
12/03/2024
12/04/2024
12/05/2024
12/06/2024
12/07/2024
12/08/2024


Nickel ug/L
BH01
BH02
BH03
BH04
SW01
12
10
8
6
4
2
0
12/03/2024
12/04/2024
12/05/2024
12/06/2024
12/07/2024
12/08/2024


Nitrate mg/L
BH01
BH02
BH03
BH04
SW01
90
80
70
60
50
40
30
20
10
0
12/03/2024
12/04/2024
12/05/2024
12/06/2024
12/07/2024
12/08/2024

Appendix 6D

Laboratory Water Quality Certificates

Element Materials Technology
Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

P: +44 (0) 1244 833780
F: +44 (0) 1244 833781
W: www.element.com

WSP Environmental
Town Centre House
Dublin Road
Naas
Co Kildare
Ireland

Attention :	John Moran
Date :	26th March, 2024
Your reference :	400000205
Our reference :	Test Report 24/4542 Batch 1
Location :	Ballykelly
Date samples received :	14th March, 2024
Status :	Final Report
Issue :	202403260917

Five samples were received for analysis on 14th March, 2024 of which five were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

The greenhouse gas emissions generated (in Carbon – Co2e) to obtain the results in this report are estimated as:

Scope 1&2 emissions - 9.846 kg of CO2

Scope 1&2&3 emissions - 23.27 kg of CO2

Authorised By:

Paul Boden BSc
Senior Project Manager

Client Name: WSP Environmental
Reference: 400000205
Location: Ballykelly
Contact: John Moran
EMT Job No: 24/4542

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

EMT Sample No.	1-5	6-10	11-15	16-20	21-26						LOD/LOR	Units	Method No.
Sample ID	BH01	BH02	BH03	BH04	SW01								
Depth													
COC No / misc													
Containers	V H P G	V H P G	V H P G	V H P G	V H HN P G								
Sample Date	12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024								
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Surface Water								
Batch Number	1	1	1	1	1								
Date of Receipt	14/03/2024	14/03/2024	14/03/2024	14/03/2024	14/03/2024								
Dissolved Arsenic #	<2.5	<2.5	<2.5	<2.5	<2.5						<2.5	ug/l	TM30/PM14
Dissolved Barium #	47	68	23	22	26						<3	ug/l	TM30/PM14
Dissolved Beryllium	<0.5	<0.5	<0.5	<0.5	<0.5						<0.5	ug/l	TM30/PM14
Dissolved Boron	61	<12	27	28	22						<12	ug/l	TM30/PM14
Dissolved Cadmium #	<0.5	<0.5	<0.5	<0.5	<0.5						<0.5	ug/l	TM30/PM14
Dissolved Calcium #	145.7	108.9	76.2	96.5	48.7						<0.2	mg/l	TM30/PM14
Total Dissolved Chromium #	<1.5	<1.5	<1.5	2.3	<1.5						<1.5	ug/l	TM30/PM14
Dissolved Copper #	<7	<7	<7	<7	<7						<7	ug/l	TM30/PM14
Dissolved Lead #	<5	<5	<5	<5	<5						<5	ug/l	TM30/PM14
Dissolved Magnesium #	12.0	16.1	5.1	9.3	10.4						<0.1	mg/l	TM30/PM14
Dissolved Manganese #	<2	<2	<2	<2	<2						<2	ug/l	TM30/PM14
Dissolved Mercury #	<1	<1	<1	<1	<1						<1	ug/l	TM30/PM14
Dissolved Nickel #	2	<2	<2	<2	<2						<2	ug/l	TM30/PM14
Dissolved Potassium #	15.4	2.0	1.7	0.8	2.2						<0.1	mg/l	TM30/PM14
Dissolved Selenium #	<3	<3	<3	<3	<3						<3	ug/l	TM30/PM14
Dissolved Sodium #	8.6	8.4	5.0	7.9	9.0						<0.1	mg/l	TM30/PM14
Dissolved Vanadium #	<1.5	<1.5	<1.5	<1.5	<1.5						<1.5	ug/l	TM30/PM14
Dissolved Zinc #	4	<3	3	<3	<3						<3	ug/l	TM30/PM14
Total Chromium	91.5	80.0	100.3	130.6	<1.5						<1.5	ug/l	TM30/PM14
Total Iron	109247_{AA}	95803_{AA}	111426_{AA}	130244_{AA}	<20						<20	ug/l	TM30/PM14
MTBE #	<5	<5	<5	<5	<5						<5	ug/l	TM36/PM12
Benzene #	<5	<5	<5	<5	<5						<5	ug/l	TM36/PM12
Toluene #	<5	<5	<5	<5	<5						<5	ug/l	TM36/PM12
Ethylbenzene #	<5	<5	<5	<5	<5						<5	ug/l	TM36/PM12
m/p-Xylene #	<5	<5	<5	<5	<5						<5	ug/l	TM36/PM12
o-Xylene #	<5	<5	<5	<5	<5						<5	ug/l	TM36/PM12
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL) #	<10	<10	<10	<10	<10						<10	ug/l	TM36/PM12
>C6-C8 (HS_1D_AL) #	<10	<10	<10	<10	<10						<10	ug/l	TM36/PM12
>C8-C10 (HS_1D_AL) #	<10	<10	<10	<10	<10						<10	ug/l	TM36/PM12
>C10-C12 (EH_CU_1D_AL) #	<5	<5	<5	<5	<5						<5	ug/l	TM5/PM16/PM30
>C12-C16 (EH_CU_1D_AL) #	<10	<10	<10	<10	<10						<10	ug/l	TM5/PM16/PM30
>C16-C21 (EH_CU_1D_AL) #	<10	<10	<10	<10	<10						<10	ug/l	TM5/PM16/PM30
>C21-C35 (EH_CU_1D_AL) #	<10	<10	<10	<10	<10						<10	ug/l	TM5/PM16/PM30
Total aliphatics C5-35 (EH_CU+HS_1D_AL) #	<10	<10	<10	<10	<10						<10	ug/l	TM5/TM36/PM12/PM16/PM30

Please see attached notes for all abbreviations and acronyms

Client Name: WSP Environmental
Reference: 400000205
Location: Ballykelly
Contact: John Moran
EMT Job No: 24/4542

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, HN=$HN0_3$

EMT Sample No.	1-5	6-10	11-15	16-20	21-26							
Sample ID	BH01	BH02	BH03	BH04	SW01							
Depth												
COC No / misc												
Containers	V H P G	V H P G	V H P G	V H P G	V H HN P G							
Sample Date	12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024							
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Surface Water							
Batch Number	1	1	1	1	1							
Date of Receipt	14/03/2024	14/03/2024	14/03/2024	14/03/2024	14/03/2024							

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
TPH CWG													
Aromatics													
>C5-EC7 (HS_1D_AR)#	<10	<10	<10	<10	<10						<10	ug/l	TM36/PM12
>EC7-EC8 (HS_1D_AR)#	<10	<10	<10	<10	<10						<10	ug/l	TM36/PM12
>EC8-EC10 (HS_1D_AR)#	<10	<10	<10	<10	<10						<10	ug/l	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR)#	<5	<5	<5	<5	<5						<5	ug/l	TM5/PM16/PM30
>EC12-EC16 (EH_CU_1D_AR)#	<10	<10	<10	<10	<10						<10	ug/l	TM5/PM16/PM30
>EC16-EC21 (EH_CU_1D_AR)#	<10	<10	<10	<10	<10						<10	ug/l	TM5/PM16/PM30
>EC21-EC35 (EH_CU_1D_AR)#	<10	<10	<10	<10	<10						<10	ug/l	TM5/PM16/PM30
Total aromatics C5-35 (EH_CU+HS_1D_AR)#	<10	<10	<10	<10	<10						<10	ug/l	TM5/TM36/PM12/PM16/PM30
Total aliphatics and aromatics(C5-35) (EH_CU+HS_1D_Total)#	<10	<10	<10	<10	<10						<10	ug/l	TM5/TM36/PM12/PM16/PM30
Sulphate as SO4#	15.1	35.3	7.1	22.4	21.5						<0.5	mg/l	TM38/PM0
Chloride#	15.3	19.6	9.9	14.8	19.4						<0.3	mg/l	TM38/PM0
Nitrate as NO3#	16.2	2.0	19.5	28.9	2.1						<0.2	mg/l	TM38/PM0
Nitrite as NO2#	<0.02	<0.02	<0.02	<0.02	<0.02						<0.02	mg/l	TM38/PM0
Ortho Phosphate as PO4#	<0.06	<0.06	<0.06	<0.06	<0.06						<0.06	mg/l	TM38/PM0
Ammoniacal Nitrogen as N#	0.03	0.10	0.36	0.04	<0.03						<0.03	mg/l	TM38/PM0
Hexavalent Chromium	<6	<6	<6	<6	<6						<6	ug/l	TM38/PM0
Total Dissolved Chromium III	<6	<6	<6	<6	<6						<6	ug/l	TM0/PM0
Total Alkalinity as CaCO3#	5062	966	340	1622	142						<1	mg/l	TM75/PM0
COD (Settled)#	13	21	20	11	<7						<7	mg/l	TM57/PM0
Total Suspended Solids#	12376	2748	2328	5486	<10						<10	mg/l	TM37/PM0

Element Materials Technology

Notification of Deviating Samples

Client Name: WSP Environmental
Reference: 400000205
Location: Ballykelly
Contact: John Moran

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 24/4542						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.
It is a requirement under ISO 17025 that we inform clients if samples are deviating i.e. outside what is expected. A deviating sample indicates that the sample 'may' be compromised but not necessarily will be compromised. The result is still accredited and our analytical reports will still show accreditation on the relevant analytes.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 24/4542

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 37°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a requirement of our Accreditation Body for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.
Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

Age of Diesel

The age of release estimation is based on the nC17/pristane ratio only as prescribed by Christensen and Larsen (1993) and Kaplan, Galperin, Alimi et al., (1996).
Age estimation should be treated with caution as it can be influenced by site specific factors of which the laboratory are not aware.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above quantitative calibration range. The result should be considered the minimum value and is indicative only. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x10 Dilution

HWOL ACRONYMS AND OPERATORS USED

HS	Headspace Analysis.
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent.
CU	Clean-up - e.g. by florisil, silica gel.
1D	GC - Single coil gas chromatography.
Total	Aliphatics & Aromatics.
AL	Aliphatics only.
AR	Aromatics only.
2D	GC-GC - Double coil gas chromatography.
#1	EH_Total but with humics mathematically subtracted
#2	EU_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +).
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry.

EMT Job No: 24/4542

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM0	Not available	PM0	No preparation is required.				
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16/PM30	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE/Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5/TM36	please refer to TM5 and TM36 for method details	PM12/PM16/PM30	please refer to PM16/PM30 and PM12 for method details	Yes			
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified				
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified	Yes			
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM37	Modified methods - TSS: USEPA 160.2 (1965), EN872:2005 and APHA SMEWW 2540D:1999 22nd Edition; VSS: USEPA 1684 (Jan 2001), USEPA 160.4 (1971) and SMEWW 2540E:1999 22nd Edition. Gravimetric determination of Total Suspended Solids (TSS) and Volatile Suspended Solids (VSS). Sample is filtered through a 1.5um pore size glass fibre filter and the resulting residue is dried and weighed at 105°C for TSS and 550°C for VSS.	PM0	No preparation is required.	Yes			
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM0	No preparation is required.				
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM0	No preparation is required.	Yes			
TM57	Modified US EPA Method 410.4. (Rev. 2.0 1993) Comparable with ISO 15705:2002. Chemical Oxygen Demand is determined by hot digestion with Potassium Dichromate and measured spectrophotometerically.	PM0	No preparation is required.	Yes			

EMT Job No: 24/4542

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM75	Modified US EPA method 310.1 (1978). Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.	Yes			

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WSP Environmental
Town Centre House
Dublin Road
Naas
Co Kildare
Ireland

Attention :	John Moran
Date :	2nd May, 2024
Your reference :	40000205
Our reference :	Test Report 24/7056 Batch 1
Location :	Ballykelly
Date samples received :	25th April, 2024
Status :	Final Report
Issue :	202405021325

Six samples were received for analysis on 25th April, 2024 of which six were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

The greenhouse gas emissions generated (in Carbon – Co2e) to obtain the results in this report are estimated as:

Scope 1&2 emissions - 11.584 kg of CO2

Scope 1&2&3 emissions - 27.376 kg of CO2

Authorised By:

Paul Boden BSc
Senior Project Manager

Client Name: WSP Environmental
Reference: 40000205
Location: Ballykelly
Contact: John Moran
EMT Job No: 24/7056

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, HN=$HN0_3$

EMT Sample No.	1-6	7-12	13-18	19-24	25-30	31-36					LOD/LOR	Units	Method No.
Sample ID	SW01	BH01	BH02	BH03	BH04	SW01D							
Depth													
COC No / misc													
Containers	V H HN P G	V H HNUF P G	V H HNUF P G	V H HNUF P G	V H HNUF P G	V H HN P G							
Sample Date	17/04/2024	17/04/2024	17/04/2024	17/04/2024	17/04/2024	17/04/2024							
Sample Type	Surface Water	Ground Water	Ground Water	Ground Water	Ground Water	Surface Water							
Batch Number	1	1	1	1	1	1							
Date of Receipt	25/04/2024	25/04/2024	25/04/2024	25/04/2024	25/04/2024	25/04/2024							
Dissolved Arsenic #	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5					<2.5	ug/l	TM30/PM14
Dissolved Barium #	26	80	81	18	21	26					<3	ug/l	TM30/PM14
Dissolved Beryllium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					<0.5	ug/l	TM30/PM14
Dissolved Boron	15	61	<12	24	27	22					<12	ug/l	TM30/PM14
Dissolved Cadmium #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					<0.5	ug/l	TM30/PM14
Dissolved Calcium #	48.4	140.7	122.8	59.8	96.0	48.6					<0.2	mg/l	TM30/PM14
Total Dissolved Chromium #	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5					<1.5	ug/l	TM30/PM14
Dissolved Copper #	<7	<7	<7	<7	<7	<7					<7	ug/l	TM30/PM14
Total Dissolved Iron #	<20	<20	<20	<20	<20	<20					<20	ug/l	TM30/PM14
Dissolved Lead #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM30/PM14
Dissolved Magnesium #	10.1	12.3	17.2	4.1	9.3	10.3					<0.1	mg/l	TM30/PM14
Dissolved Manganese #	<2	2	31	<2	<2	<2					<2	ug/l	TM30/PM14
Dissolved Mercury #	<1	<1	<1	<1	<1	<1					<1	ug/l	TM30/PM14
Dissolved Nickel #	<2	4	<2	<2	<2	<2					<2	ug/l	TM30/PM14
Dissolved Potassium #	2.1	35.1	2.0	1.2	0.7	2.0					<0.1	mg/l	TM30/PM14
Dissolved Selenium #	<3	<3	<3	<3	<3	<3					<3	ug/l	TM30/PM14
Dissolved Sodium #	8.3	9.1	11.3	3.9	6.8	8.3					<0.1	mg/l	TM30/PM14
Dissolved Vanadium #	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5					<1.5	ug/l	TM30/PM14
Dissolved Zinc #	3	6	4	4	<3	<3					<3	ug/l	TM30/PM14
Total Chromium	<1.5	6.9	<1.5	6.7	<1.5	<1.5					<1.5	ug/l	TM30/PM14
Total Iron	<20	3653	384	2691	95	<20					<20	ug/l	TM30/PM14
MTBE #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM36/PM12
Benzene #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM36/PM12
Toluene #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM36/PM12
Ethylbenzene #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM36/PM12
m/p-Xylene #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM36/PM12
o-Xylene #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM36/PM12
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL) #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM36/PM12
>C6-C8 (HS_1D_AL) #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM36/PM12
>C8-C10 (HS_1D_AL) #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM36/PM12
>C10-C12 (EH_CU_1D_AL) #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM5/PM16/PM30
>C12-C16 (EH_CU_1D_AL) #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/PM16/PM30
>C16-C21 (EH_CU_1D_AL) #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/PM16/PM30
>C21-C35 (EH_CU_1D_AL) #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/PM16/PM30
Total aliphatics C5-35 (EH_CU+HS_1D_AL) #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/TM36/PM12/PM16/PM30

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: WSP Environmental
Reference: 40000205
Location: Ballykelly
Contact: John Moran
EMT Job No: 24/7056

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

EMT Sample No.	1-6	7-12	13-18	19-24	25-30	31-36							
Sample ID	SW01	BH01	BH02	BH03	BH04	SW01D							
Depth													
COC No / misc													
Containers	V H HN P G	V H HNUF P G	V H HNUF P G	V H HNUF P G	V H HNUF P G	V H HN P G							
Sample Date	17/04/2024	17/04/2024	17/04/2024	17/04/2024	17/04/2024	17/04/2024							
Sample Type	Surface Water	Ground Water	Ground Water	Ground Water	Ground Water	Surface Water							
Batch Number	1	1	1	1	1	1							
Date of Receipt	25/04/2024	25/04/2024	25/04/2024	25/04/2024	25/04/2024	25/04/2024							
TPH CWG													
Aromatics													
>C5-EC7 (HS_1D_AR)#	<10	<10	<10	<10	<10	<10					<10	ug/l	TM36/PM12
>EC7-EC8 (HS_1D_AR)#	<10	<10	<10	<10	<10	<10					<10	ug/l	TM36/PM12
>EC8-EC10 (HS_1D_AR)#	<10	<10	<10	<10	<10	<10					<10	ug/l	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR)#	<5	<5	<5	<5	<5	<5					<5	ug/l	TM5/PM16/PM30
>EC12-EC16 (EH_CU_1D_AR)#	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/PM16/PM30
>EC16-EC21 (EH_CU_1D_AR)#	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/PM16/PM30
>EC21-EC35 (EH_CU_1D_AR)#	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/PM16/PM30
Total aromatics C5-35 (EH_CU+HS_1D_AR)*	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/TM36/PM12/PM16/PM30
Total aliphatics and aromatics(C5-35) (EH_CU+HS_1D_Total)*	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/TM36/PM12/PM16/PM30
Sulphate as SO4#	21.7	23.1	58.3	4.9	22.0	22.6					<0.5	mg/l	TM38/PM0
Chloride#	19.8	16.4	21.2	6.7	10.7	19.0					<0.3	mg/l	TM38/PM0
Nitrate as NO3#	2.0	44.7	7.0	12.4	22.8	1.9					<0.2	mg/l	TM38/PM0
Nitrite as NO2#	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02					<0.02	mg/l	TM38/PM0
Ortho Phosphate as PO4#	<0.06	0.22	<0.06	<0.06	<0.06	<0.06					<0.06	mg/l	TM38/PM0
Ammoniacal Nitrogen as N#	<0.03	0.04	0.18	0.03	<0.03	<0.03					<0.03	mg/l	TM38/PM0
Hexavalent Chromium	<6	<6	<6	<6	<6	<6					<6	ug/l	TM38/PM0
Total Dissolved Chromium III	<6	<6	<6	<6	<6	<6					<6	ug/l	TM0/PM0
Total Alkalinity as CaCO3#	148	868	544	206	950	150					<1	mg/l	TM75/PM0
COD (Settled)#	10	13	9	<7	10	10					<7	mg/l	TM57/PM0
Total Suspended Solids#	<10	2562	842	830	2802	<10					<10	mg/l	TM37/PM0

Please see attached notes for all abbreviations and acronyms

Client Name: WSP Environmental

Reference: 40000205

Location: Ballykelly

Contact: John Moran

Matrix : Liquid

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
24/7056	1	BH01		7-12	Mercury, Metals	Sample holding time exceeded
24/7056	1	BH02		13-18	Mercury, Metals	Sample holding time exceeded
24/7056	1	BH03		19-24	Mercury, Metals	Sample holding time exceeded
24/7056	1	BH04		25-30	Mercury, Metals	Sample holding time exceeded

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

It is a requirement under ISO 17025 that we inform clients if samples are deviating i.e. outside what is expected. A deviating sample indicates that the sample 'may' be compromised but not necessarily will be compromised. The result is still accredited and our analytical reports will still show accreditation on the relevant analytes.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 24/7056

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 35°C ±5°C.

Where Mineral Oil is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil is quoted, this refers to Total Aliphatics C10-C40.

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Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a requirement of our Accreditation Body for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.
Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

Age of Diesel

The age of release estimation is based on the nC17/pristane ratio only as prescribed by Christensen and Larsen (1993) and Kaplan, Galperin, Alimi et al., (1996).
Age estimation should be treated with caution as it can be influenced by site specific factors of which the laboratory are not aware.

Tentatively Identified Compounds (TICs)

Where Tentatively Identified Compounds (TICs) are reported, up to 10 Tentatively Identified Compounds will be listed where there is found to be a greater than 80% match with the NIST library. The reported concentration is determined semi-quantitively, with a matrix specific limit of detection. Note, other compounds may be present but are not reported.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above quantitative calibration range. The result should be considered the minimum value and is indicative only. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

HWOL ACRONYMS AND OPERATORS USED

HS	Headspace Analysis.
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent.
CU	Clean-up - e.g. by florisil, silica gel.
1D	GC - Single coil gas chromatography.
Total	Aliphatics & Aromatics.
AL	Aliphatics only.
AR	Aromatics only.
2D	GC-GC - Double coil gas chromatography.
#1	EH_Total but with humics mathematically subtracted
#2	EU_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +).
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry.

EMT Job No: 24/7056

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM0	Not available	PM0	No preparation is required.				
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16/PM30	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE/Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5/TM36	please refer to TM5 and TM36 for method details	PM12/PM16/PM30	please refer to PM16/PM30 and PM12 for method details	Yes			
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified				
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified	Yes			
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM37	Modified methods - TSS: USEPA 160.2 (1965), EN872:2005 and APHA SMEWW 2540D:1999 22nd Edition; VSS: USEPA 1684 (Jan 2001), USEPA 160.4 (1971) and SMEWW 2540E:1999 22nd Edition. Gravimetric determination of Total Suspended Solids (TSS) and Volatile Suspended Solids (VSS). Sample is filtered through a 1.5um pore size glass fibre filter and the resulting residue is dried and weighed at 105°C for TSS and 550°C for VSS.	PM0	No preparation is required.	Yes			
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM0	No preparation is required.				
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM0	No preparation is required.	Yes			
TM57	Modified US EPA Method 410.4. (Rev. 2.0 1993) Comparable with ISO 15705:2002. Chemical Oxygen Demand is determined by hot digestion with Potassium Dichromate and measured spectrophotometerically.	PM0	No preparation is required.	Yes			

EMT Job No: 24/7056

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM75	Modified US EPA method 310.1 (1978). Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.	Yes			

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WSP Environmental
Town Centre House
Dublin Road
Naas
Co Kildare
Ireland

Attention :	John Moran
Date :	17th June, 2024
Your reference :	40000205
Our reference :	Test Report 24/9124 Batch 1
Location :	Ballykelly
Date samples received :	29th May, 2024
Status :	Final Report
Issue :	202406171326

Seven samples were received for analysis on 29th May, 2024 of which six were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

The greenhouse gas emissions generated (in Carbon – Co2e) to obtain the results in this report are estimated as:

Scope 1&2 emissions - 11.729 kg of CO2

Scope 1&2&3 emissions - 27.718 kg of CO2

Authorised By:

Simon Gomery BSc
Senior Project Manager

Client Name: WSP Environmental
Reference: 40000205
Location: Ballykelly
Contact: John Moran
EMT Job No: 24/9124

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

EMT Sample No.	1-6	7-12	13-17,30	18,31-35	19-24	25-29					LOD/LOR	Units	Method No.
Sample ID	BH01	BH03	BH01D	SW01	BH02	BH04							
Depth													
COC No / misc													
Containers	V H HNUF P G	V H HNUF P G	V H HNUF G P	P V H HN G	V H HN P G	V H HNUF P							
Sample Date	24/05/2024	24/05/2024	24/05/2024	24/05/2024	24/05/2024	24/05/2024							
Sample Type	Ground Water	Ground Water	Ground Water	Surface Water	Ground Water	Ground Water							
Batch Number	1	1	1	1	1	1							
Date of Receipt	29/05/2024	29/05/2024	29/05/2024	29/05/2024	29/05/2024	29/05/2024							
Dissolved Arsenic #	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5					<2.5	ug/l	TM30/PM14
Dissolved Barium #	108	13	94	19	83	14					<3	ug/l	TM30/PM14
Dissolved Beryllium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					<0.5	ug/l	TM30/PM14
Dissolved Boron	84	22	85	20	18	21					<12	ug/l	TM30/PM14
Dissolved Cadmium #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					<0.5	ug/l	TM30/PM14
Dissolved Calcium #	132.8	55.2	134.9	43.8	107.4	84.9					<0.2	mg/l	TM30/PM14
Total Dissolved Chromium #	<1.5	<1.5	6.8	<1.5	<1.5	<1.5					<1.5	ug/l	TM30/PM14
Dissolved Copper #	<7	<7	7	<7	<7	<7					<7	ug/l	TM30/PM14
Total Dissolved Iron #	<20	<20	<20	<20	<20	<20					<20	ug/l	TM30/PM14
Dissolved Lead #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM30/PM14
Dissolved Magnesium #	15.4	4.0	15.6	9.6	15.2	8.5					<0.1	mg/l	TM30/PM14
Dissolved Manganese #	31	<2	<2	<2	97	<2					<2	ug/l	TM30/PM14
Dissolved Mercury #	<1	<1	<1	<1	<1	<1					<1	ug/l	TM30/PM14
Dissolved Nickel #	11	<2	6	<2	<2	<2					<2	ug/l	TM30/PM14
Dissolved Potassium #	70.1	1.0	71.7	2.0	1.8	0.6					<0.1	mg/l	TM30/PM14
Dissolved Selenium #	<3	<3	<3	<3	<3	<3					<3	ug/l	TM30/PM14
Dissolved Sodium #	12.9	4.0	13.5	8.3	10.0	6.9					<0.1	mg/l	TM30/PM14
Dissolved Vanadium #	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5					<1.5	ug/l	TM30/PM14
Dissolved Zinc #	7	<3	5	<3	4	<3					<3	ug/l	TM30/PM14
Total Chromium	12.8	30.0	13.1	<1.5	6.3	204.6					<1.5	ug/l	TM30/PM14
Total Iron	7627	24461AA	2985	<20	3175	204054AB					<20	ug/l	TM30/PM14
MTBE #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM36/PM12
Benzene #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM36/PM12
Toluene #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM36/PM12
Ethylbenzene #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM36/PM12
m/p-Xylene #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM36/PM12
o-Xylene #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM36/PM12
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL) #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM36/PM12
>C6-C8 (HS_1D_AL) #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM36/PM12
>C8-C10 (HS_1D_AL) #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM36/PM12
>C10-C12 (EH_CU_1D_AL) #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM5/PM16/PM30
>C12-C16 (EH_CU_1D_AL) #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/PM16/PM30
>C16-C21 (EH_CU_1D_AL) #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/PM16/PM30
>C21-C35 (EH_CU_1D_AL) #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/PM16/PM30
Total aliphatics C5-35 (EH_CU+HS_1D_AL) #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/TM36/PM12/PM16/PM30

Please see attached notes for all abbreviations and acronyms

Client Name: WSP Environmental
Reference: 40000205
Location: Ballykelly
Contact: John Moran
EMT Job No: 24/9124

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

EMT Sample No.	1-6	7-12	13-17,30	18,31-35	19-24	25-29					LOD/LOR	Units	Method No.
Sample ID	BH01	BH03	BH01D	SW01	BH02	BH04							
Depth													
COC No / misc													
Containers	V H HNUF P G	V H HNUF P G	V H HNUF G P	P V H HN G	V H HN P G	V H HNUF P							
Sample Date	24/05/2024	24/05/2024	24/05/2024	24/05/2024	24/05/2024	24/05/2024							
Sample Type	Ground Water	Ground Water	Ground Water	Surface Water	Ground Water	Ground Water							
Batch Number	1	1	1	1	1	1							
Date of Receipt	29/05/2024	29/05/2024	29/05/2024	29/05/2024	29/05/2024	29/05/2024							
TPH CWG													
Aromatics													
>C5-EC7 (HS_1D_AR)#	<10	<10	<10	<10	<10	<10					<10	ug/l	TM36/PM12
>EC7-EC8 (HS_1D_AR)#	<10	<10	<10	<10	<10	<10					<10	ug/l	TM36/PM12
>EC8-EC10 (HS_1D_AR)#	<10	<10	<10	<10	<10	<10					<10	ug/l	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR)#	<5	<5	<5	<5	<5	<5					<5	ug/l	TM5/PM16/PM30
>EC12-EC16 (EH_CU_1D_AR)#	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/PM16/PM30
>EC16-EC21 (EH_CU_1D_AR)#	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/PM16/PM30
>EC21-EC35 (EH_CU_1D_AR)#	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/PM16/PM30
Total aromatics C5-35 (EH_CU+HS_1D_AR)#	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/TM36/PM12/PM16/PM30
Total aliphatics and aromatics(C5-35) (EH_CU+HS_1D_Total)#	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/TM36/PM12/PM16/PM30
Sulphate as SO4#	91.4	3.9	82.0	21.0	28.9	23.9					<0.5	mg/l	TM38/PM0
Chloride#	28.1	5.8	25.1	19.4	21.5	13.5					<0.3	mg/l	TM38/PM0
Nitrate as NO3#	79.6	8.2	79.0	1.6	2.3	29.0					<0.2	mg/l	TM38/PM0
Nitrite as NO2#	0.02	<0.02	<0.02	<0.02	<0.02	<0.02					<0.02	mg/l	TM38/PM0
Ortho Phosphate as PO4#	0.41	<0.06	0.60	<0.06	<0.06	<0.06					<0.06	mg/l	TM38/PM0
Ammoniacal Nitrogen as N#	0.16	0.03	0.17	<0.03	<0.03	0.03					<0.03	mg/l	TM38/PM0
Hexavalent Chromium	<6	<6	<6	<6	<6	<6					<6	ug/l	TM38/PM0
Total Dissolved Chromium III	<6	<6	7	<6	<6	<6					<6	ug/l	TM0/PM0
Total Alkalinity as CaCO3#	1464	238	1046	148	388	2390					<1	mg/l	TM75/PM0
COD (Settled)#	<7	<7	9	9	<7	<7					<7	mg/l	TM57/PM0
Total Suspended Solids#	3406	1866	2884	<10	348	6800					<10	mg/l	TM37/PM0

Please see attached notes for all abbreviations and acronyms

Client Name: WSP Environmental

Reference: 40000205

Location: Ballykelly

Contact: John Moran

Matrix : Liquid

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
24/9124	1	BH04		25-29	EPH	Sample received in inappropriate container
24/9124	1	BH04		25-29	Mercury, Metals	Sample holding time exceeded

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

It is a requirement under ISO 17025 that we inform clients if samples are deviating i.e. outside what is expected. A deviating sample indicates that the sample 'may' be compromised but not necessarily will be compromised. The result is still accredited and our analytical reports will still show accreditation on the relevant analytes.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 24/9124

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 35°C ±5°C.

Where Mineral Oil is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a requirement of our Accreditation Body for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.
Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

Age of Diesel

The age of release estimation is based on the nC17/pristane ratio only as prescribed by Christensen and Larsen (1993) and Kaplan, Galperin, Alimi et al., (1996).
Age estimation should be treated with caution as it can be influenced by site specific factors of which the laboratory are not aware.

Tentatively Identified Compounds (TICs)

Where Tentatively Identified Compounds (TICs) are reported, up to 10 Tentatively Identified Compounds will be listed where there is found to be a greater than 80% match with the NIST library. The reported concentration is determined semi-quantitively, with a matrix specific limit of detection. Note, other compounds may be present but are not reported.

ABBREVIATIONS and ACRONYMS USED

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SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above quantitative calibration range. The result should be considered the minimum value and is indicative only. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x5 Dilution
AB	x20 Dilution

HWOL ACRONYMS AND OPERATORS USED

HS	Headspace Analysis.
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent.
CU	Clean-up - e.g. by florisil, silica gel.
1D	GC - Single coil gas chromatography.
Total	Aliphatics & Aromatics.
AL	Aliphatics only.
AR	Aromatics only.
2D	GC-GC - Double coil gas chromatography.
#1	EH_Total but with humics mathematically subtracted
#2	EU_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +).
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry.

EMT Job No: 24/9124

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM0	Not available	PM0	No preparation is required.				
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16/PM30	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE/Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5/TM36	please refer to TM5 and TM36 for method details	PM12/PM16/PM30	please refer to PM16/PM30 and PM12 for method details	Yes			
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified				
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified	Yes			
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM37	Modified methods - TSS: USEPA 160.2 (1985), EN872:2005 and APHA SMEWW 2540D:1999 22nd Edition; VSS: USEPA 1684 (Jan 2001), USEPA 160.4 (1971) and SMEWW 2540E:1999 22nd Edition. Gravimetric determination of Total Suspended Solids (TSS) and Volatile Suspended Solids (VSS). Sample is filtered through a 1.5um pore size glass fibre filter and the resulting residue is dried and weighed at 105°C for TSS and 550°C for VSS.	PM0	No preparation is required.	Yes			
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM0	No preparation is required.				
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM0	No preparation is required.	Yes			
TM57	Modified US EPA Method 410.4. (Rev. 2.0 1993) Comparable with ISO 15705:2002. Chemical Oxygen Demand is determined by hot digestion with Potassium Dichromate and measured spectrophotometerically.	PM0	No preparation is required.	Yes			

EMT Job No: 24/9124

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM75	Modified US EPA method 310.1 (1978). Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.	Yes			

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WSP Environmental
Town Centre House
Dublin Road
Naas
Co Kildare
Ireland

Attention :	John Moran
Date :	26th June, 2024
Your reference :	40000205
Our reference :	Test Report 24/10504 Batch 1
Location :	Ballykelly
Date samples received :	19th June, 2024
Status :	Final Report
Issue :	202406261504

Six samples were received for analysis on 19th June, 2024 of which six were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

The greenhouse gas emissions generated (in Carbon – Co2e) to obtain the results in this report are estimated as:

Scope 1&2 emissions - 12.453 kg of CO2

Scope 1&2&3 emissions - 29.429 kg of CO2

Authorised By:

Paul Boden BSc
Senior Project Manager

Client Name: WSP Environmental
Reference: 40000205
Location: Ballykelly
Contact: John Moran
EMT Job No: 24/10504

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, HN=$HN0_3$

EMT Sample No.	1-6	7-12	13-18	19-24	25-30	31-36					LOD/LOR	Units	Method No.
Sample ID	BH01	BH02	BH03	BH04	SW01_D	SW01							
Depth													
COC No / misc													
Containers	V H HN P G	V H HN P G	V H HN P G	V H HN P G	V H HN P G	V H HN P G							
Sample Date	13/06/2024	13/06/2024	13/06/2024	13/06/2024	13/06/2024	13/06/2024							
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Surface Water	Surface Water							
Batch Number	1	1	1	1	1	1							
Date of Receipt	19/06/2024	19/06/2024	19/06/2024	19/06/2024	19/06/2024	19/06/2024							
Dissolved Arsenic #	3.6	4.0	<2.5	3.1	<2.5	<2.5					<2.5	ug/l	TM30/PM14
Dissolved Barium #	97	79	10	22	22	22					<3	ug/l	TM30/PM14
Dissolved Beryllium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					<0.5	ug/l	TM30/PM14
Dissolved Boron	75	<12	23	24	15	15					<12	ug/l	TM30/PM14
Dissolved Cadmium #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					<0.5	ug/l	TM30/PM14
Dissolved Calcium #	126.8	105.7	50.3	100.4	46.3	46.4					<0.2	mg/l	TM30/PM14
Total Dissolved Chromium #	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5					<1.5	ug/l	TM30/PM14
Dissolved Copper #	<7	<7	<7	<7	<7	<7					<7	ug/l	TM30/PM14
Total Dissolved Iron #	<20	<20	<20	<20	<20	<20					<20	ug/l	TM30/PM14
Dissolved Lead #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM30/PM14
Dissolved Magnesium #	15.0	15.8	3.7	10.1	10.6	10.5					<0.1	mg/l	TM30/PM14
Dissolved Manganese #	<2	167	<2	<2	<2	<2					<2	ug/l	TM30/PM14
Dissolved Mercury #	<1	<1	<1	<1	<1	<1					<1	ug/l	TM30/PM14
Dissolved Nickel #	6	3	<2	<2	<2	<2					<2	ug/l	TM30/PM14
Dissolved Potassium #	61.3	1.8	0.8	0.7	2.1	2.1					<0.1	mg/l	TM30/PM14
Dissolved Selenium #	<3	<3	<3	<3	<3	<3					<3	ug/l	TM30/PM14
Dissolved Sodium #	12.1	9.5	3.5	7.3	8.2	8.2					<0.1	mg/l	TM30/PM14
Dissolved Vanadium #	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5					<1.5	ug/l	TM30/PM14
Dissolved Zinc #	5	<3	<3	<3	4	4					<3	ug/l	TM30/PM14
Total Chromium	14.2	6.5	13.2	64.7	<1.5	<1.5					<1.5	ug/l	TM30/PM14
Total Iron	12057	3214	5516	49276$_{AA}$	48	53					<20	ug/l	TM30/PM14
MTBE #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM36/PM12
Benzene #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM36/PM12
Toluene #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM36/PM12
Ethylbenzene #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM36/PM12
m/p-Xylene #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM36/PM12
o-Xylene #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM36/PM12
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL) #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM36/PM12
>C6-C8 (HS_1D_AL) #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM36/PM12
>C8-C10 (HS_1D_AL) #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM36/PM12
>C10-C12 (EH_CU_1D_AL) #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM5/PM16/PM30
>C12-C16 (EH_CU_1D_AL) #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/PM16/PM30
>C16-C21 (EH_CU_1D_AL) #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/PM16/PM30
>C21-C35 (EH_CU_1D_AL) #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/PM16/PM30
Total aliphatics C5-35 (EH_CU+HS_1D_AL) #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/TM36/PM12/PM16/PM30

Please see attached notes for all abbreviations and acronyms

Client Name: WSP Environmental
Reference: 40000205
Location: Ballykelly
Contact: John Moran
EMT Job No: 24/10504

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

EMT Sample No.	1-6	7-12	13-18	19-24	25-30	31-36						
Sample ID	BH01	BH02	BH03	BH04	SW01_D	SW01						
Depth										Please see attached notes for all abbreviations and acronyms		
COC No / misc												
Containers	V H HN P G	V H HN P G	V H HN P G	V H HN P G	V H HN P G	V H HN P G						
Sample Date	13/06/2024	13/06/2024	13/06/2024	13/06/2024	13/06/2024	13/06/2024						
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Surface Water	Surface Water						
Batch Number	1	1	1	1	1	1				LOD/LOR	Units	Method No.
Date of Receipt	19/06/2024	19/06/2024	19/06/2024	19/06/2024	19/06/2024	19/06/2024						
TPH CWG												
Aromatics												
>C5-EC7 (HS_1D_AR)#	<10	<10	<10	<10	<10	<10				<10	ug/l	TM36/PM12
>EC7-EC8 (HS_1D_AR)#	<10	<10	<10	<10	<10	<10				<10	ug/l	TM36/PM12
>EC8-EC10 (HS_1D_AR)#	<10	<10	<10	<10	<10	<10				<10	ug/l	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR)#	<5	<5	<5	<5	<5	<5				<5	ug/l	TM5/PM16/PM30
>EC12-EC16 (EH_CU_1D_AR)#	<10	<10	<10	<10	<10	<10				<10	ug/l	TM5/PM16/PM30
>EC16-EC21 (EH_CU_1D_AR)#	<10	<10	<10	<10	<10	<10				<10	ug/l	TM5/PM16/PM30
>EC21-EC35 (EH_CU_1D_AR)#	<10	<10	<10	<10	<10	<10				<10	ug/l	TM5/PM16/PM30
Total aromatics C5-35 (EH_CU+HS_1D_AR)#	<10	<10	<10	<10	<10	<10				<10	ug/l	TM5/TM36/PM12/PM16/PM30
Total aliphatics and aromatics(C5-35) (EH_CU+HS_1D_Total)#	<10	<10	<10	<10	<10	<10				<10	ug/l	TM5/TM36/PM12/PM16/PM30
Sulphate as SO4#	72.5	22.3	3.2	27.9	22.0	21.7				<0.5	mg/l	TM38/PM0
Chloride#	24.9	21.6	4.6	16.0	19.5	19.6				<0.3	mg/l	TM38/PM0
Nitrate as NO3#	58.2	0.4	4.7	32.7	0.9	0.9				<0.2	mg/l	TM38/PM0
Nitrite as NO2#	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02				<0.02	mg/l	TM38/PM0
Ortho Phosphate as PO4#	0.41	<0.06	<0.06	<0.06	<0.06	<0.06				<0.06	mg/l	TM38/PM0
Ammoniacal Nitrogen as N#	0.06	0.09	<0.03	0.03	0.05	0.05				<0.03	mg/l	TM38/PM0
Hexavalent Chromium	<6	<6	<6	<6	<6	<6				<6	ug/l	TM38/PM0
Total Dissolved Chromium III	<6	<6	<6	<6	<6	<6				<6	ug/l	TM0/PM0
Total Alkalinity as CaCO3#	1446	482	214	1138	140	140				<1	mg/l	TM75/PM0
COD (Settled)#	12	<7	<7	<7	<7	<7				<7	mg/l	TM57/PM0
Total Suspended Solids#	3351	820	1273	3145	12	15				<10	mg/l	TM37/PM0

Client Name: WSP Environmental
Reference: 40000205
Location: Ballykelly
Contact: John Moran

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 24/10504						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.
It is a requirement under ISO 17025 that we inform clients if samples are deviating i.e. outside what is expected. A deviating sample indicates that the sample 'may' be compromised but not necessarily will be compromised. The result is still accredited and our analytical reports will still show accreditation on the relevant analytes.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 24/10504

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 35°C ±5°C.

Where Mineral Oil is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a requirement of our Accreditation Body for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.
Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

Age of Diesel

The age of release estimation is based on the nC17/pristane ratio only as prescribed by Christensen and Larsen (1993) and Kaplan, Galperin, Alimi et al., (1996).
Age estimation should be treated with caution as it can be influenced by site specific factors of which the laboratory are not aware.

Tentatively Identified Compounds (TICs)

Where Tentatively Identified Compounds (TICs) are reported, up to 10 Tentatively Identified Compounds will be listed where there is found to be a greater than 80% match with the NIST library. The reported concentration is determined semi-quantitively, with a matrix specific limit of detection. Note, other compounds may be present but are not reported.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above quantitative calibration range. The result should be considered the minimum value and is indicative only. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x10 Dilution

HWOL ACRONYMS AND OPERATORS USED

HS	Headspace Analysis.
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent.
CU	Clean-up - e.g. by florisil, silica gel.
1D	GC - Single coil gas chromatography.
Total	Aliphatics & Aromatics.
AL	Aliphatics only.
AR	Aromatics only.
2D	GC-GC - Double coil gas chromatography.
#1	EH_Total but with humics mathematically subtracted
#2	EU_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +).
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry.

EMT Job No: 24/10504

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM0	Not available	PM0	No preparation is required.				
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16/PM30	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE/Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5/TM36	please refer to TM5 and TM36 for method details	PM12/PM16/PM30	please refer to PM16/PM30 and PM12 for method details	Yes			
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified				
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified	Yes			
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM37	Modified methods - TSS: USEPA 160.2 (1985), EN872:2005 and APHA SMEWW 2540D:1999 22nd Edition; VSS: USEPA 1684 (Jan 2001), USEPA 160.4 (1971) and SMEWW 2540E:1999 22nd Edition. Gravimetric determination of Total Suspended Solids (TSS) and Volatile Suspended Solids (VSS). Sample is filtered through a 1.5um pore size glass fibre filter and the resulting residue is dried and weighed at 105°C for TSS and 550°C for VSS.	PM0	No preparation is required.	Yes			
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM0	No preparation is required.				
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM0	No preparation is required.	Yes			
TM57	Modified US EPA Method 410.4. (Rev. 2.0 1993) Comparable with ISO 15705:2002. Chemical Oxygen Demand is determined by hot digestion with Potassium Dichromate and measured spectrophotometerically.	PM0	No preparation is required.	Yes			

EMT Job No: 24/10504

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM75	Modified US EPA method 310.1 (1978). Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.	Yes			

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WSP Environmental
Town Centre House
Dublin Road
Naas
Co Kildare
Ireland

Attention :	John Moran
Date :	24th July, 2024
Your reference :	40000205
Our reference :	Test Report 24/12294 Batch 1 Schedule A 24/12294 Batch 1 Schedule B
Location :	Ballykellly
Date samples received :	17th July, 2024
Status :	Final Report
Issue :	202407241506

Six samples were received for analysis on 17th July, 2024 of which six were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

The greenhouse gas emissions generated (in Carbon – Co2e) to obtain the results in this report are estimated as:

Scope 1&2 emissions - 12.525 kg of CO2

Scope 1&2&3 emissions - 29.6 kg of CO2

Authorised By:

Paul Boden BSc
Senior Project Manager

Element Materials Technology

Client Name: WSP Environmental
Reference: 40000205
Location: Ballykellly
Contact: John Moran
EMT Job No: 24/12294

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

EMT Sample No.	1-6	7-12	13-18	19-24	25-30	31-36					LOD/LOR	Units	Method No.
Sample ID	BH01	BH02	BH03	BH04	SW01	BH03_D							
Depth													
COC No / misc													
Containers	V H HN P G	V H HN P G	V H HN P G	V H HN P G	V H HN P G	V H HN P G							
Sample Date	11/07/2024	15/07/2024	11/07/2024	15/07/2024	11/07/2024	11/07/2024							
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Surface Water	Ground Water							
Batch Number	1	1	1	1	1	1							
Date of Receipt	17/07/2024	17/07/2024	17/07/2024	17/07/2024	17/07/2024	17/07/2024							
Dissolved Arsenic #	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5					<2.5	ug/l	TM30/PM14
Dissolved Barium #	70	70	14	27	27	16					<3	ug/l	TM30/PM14
Dissolved Beryllium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					<0.5	ug/l	TM30/PM14
Dissolved Boron	51	<12	16	28	21	25					<12	ug/l	TM30/PM14
Dissolved Cadmium #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					<0.5	ug/l	TM30/PM14
Dissolved Calcium #	127.6	96.4	53.0	101.6	44.4	52.9					<0.2	mg/l	TM30/PM14
Total Dissolved Chromium #	<1.5	5.0	<1.5	6.0	<1.5	<1.5					<1.5	ug/l	TM30/PM14
Dissolved Copper #	<7	<7	<7	<7	<7	<7					<7	ug/l	TM30/PM14
Total Dissolved Iron #	<20	<20	<20	<20	<20	<20					<20	ug/l	TM30/PM14
Dissolved Lead #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM30/PM14
Dissolved Magnesium #	10.9	12.7	3.7	9.7	9.9	3.8					<0.1	mg/l	TM30/PM14
Dissolved Manganese #	4	74	22	<2	4	23					<2	ug/l	TM30/PM14
Dissolved Mercury #	<1	<1	<1	<1	<1	<1					<1	ug/l	TM30/PM14
Dissolved Nickel #	2	<2	<2	<2	<2	<2					<2	ug/l	TM30/PM14
Dissolved Potassium #	35.8	1.8	0.8	0.8	2.0	0.8					<0.1	mg/l	TM30/PM14
Dissolved Selenium #	<3	<3	<3	<3	<3	<3					<3	ug/l	TM30/PM14
Dissolved Sodium #	8.7	9.2	4.2	7.7	8.2	4.2					<0.1	mg/l	TM30/PM14
Dissolved Vanadium #	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5					<1.5	ug/l	TM30/PM14
Dissolved Zinc #	5	5	3	8	<3	5					<3	ug/l	TM30/PM14
Total Chromium	33.0	33.3	43.5	107.6	<1.5	54.7					<1.5	ug/l	TM30/PM14
Total Iron	39152 AA	28726 AA	38875 AA	115584 AB	25	52187 AB					<20	ug/l	TM30/PM14
MTBE #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM36/PM12
Benzene #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM36/PM12
Toluene #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM36/PM12
Ethylbenzene #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM36/PM12
m/p-Xylene #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM36/PM12
o-Xylene #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM36/PM12
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL) #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM36/PM12
>C6-C8 (HS_1D_AL) #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM36/PM12
>C8-C10 (HS_1D_AL) #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM36/PM12
>C10-C12 (EH_CU_1D_AL) #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM5/PM16/PM30
>C12-C16 (EH_CU_1D_AL) #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/PM16/PM30
>C16-C21 (EH_CU_1D_AL) #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/PM16/PM30
>C21-C35 (EH_CU_1D_AL) #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/PM16/PM30
Total aliphatics C5-35 (EH_CU+HS_1D_AL) #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/TM36/PM12/PM16/PM30

Please see attached notes for all abbreviations and acronyms

Client Name: WSP Environmental
Reference: 40000205
Location: Ballykellly
Contact: John Moran
EMT Job No: 24/12294

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

EMT Sample No.	1-6	7-12	13-18	19-24	25-30	31-36					LOD/LOR	Units	Method No.
Sample ID	BH01	BH02	BH03	BH04	SW01	BH03_D							
Depth													
COC No / misc													
Containers	V H HN P G	V H HN P G	V H HN P G	V H HN P G	V H HN P G	V H HN P G							
Sample Date	11/07/2024	15/07/2024	11/07/2024	15/07/2024	11/07/2024	11/07/2024							
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Surface Water	Ground Water							
Batch Number	1	1	1	1	1	1							
Date of Receipt	17/07/2024	17/07/2024	17/07/2024	17/07/2024	17/07/2024	17/07/2024							
TPH CWG													
Aromatics													
>C5-EC7 (HS_1D_AR)#	<10	<10	<10	<10	<10	<10					<10	ug/l	TM36/PM12
>EC7-EC8 (HS_1D_AR)#	<10	<10	<10	<10	<10	<10					<10	ug/l	TM36/PM12
>EC8-EC10 (HS_1D_AR)#	<10	<10	<10	<10	<10	<10					<10	ug/l	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR)#	<5	<5	<5	<5	<5	<5					<5	ug/l	TM5/PM16/PM30
>EC12-EC16 (EH_CU_1D_AR)#	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/PM16/PM30
>EC16-EC21 (EH_CU_1D_AR)#	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/PM16/PM30
>EC21-EC35 (EH_CU_1D_AR)#	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/PM16/PM30
Total aromatics C5-35 (EH_CU+HS_1D_AR)#	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/TM36/PM12/PM16/PM30
Total aliphatics and aromatics(C5-35) (EH_CU+HS_1D_Total)#	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/TM36/PM12/PM16/PM30
Sulphate as SO4#	29.9	20.0	3.7	26.1	20.3	3.9					<0.5	mg/l	TM38/PM0
Chloride#	13.1	20.9	5.1	15.3	19.4	5.4					<0.3	mg/l	TM38/PM0
Nitrate as NO3#	32.5	0.3	5.8	33.4	0.7	6.0					<0.2	mg/l	TM38/PM0
Nitrite as NO2#	<0.02	0.03	<0.02	<0.02	<0.02	<0.02					<0.02	mg/l	TM38/PM0
Ortho Phosphate as PO4#	0.20	<0.06	<0.06	<0.06	<0.06	<0.06					<0.06	mg/l	TM38/PM0
Ammoniacal Nitrogen as N#	0.34	0.05	<0.03	0.03	<0.03	<0.03					<0.03	mg/l	TM38/PM0
Hexavalent Chromium	<6	<6	41	<6	<6	<6					<6	ug/l	TM38/PM0
Total Dissolved Chromium III	<6	<6	<6	6	<6	<6					<6	ug/l	TM0/PM0
Total Alkalinity as CaCO3#	764	500	208	1200	136	254					<1	mg/l	TM75/PM0
COD (Settled)#	10	<7	<7	<7	21	<7					<7	mg/l	TM57/PM0
Total Suspended Solids#	1447	828	828	3074	<10	1027					<10	mg/l	TM37/PM0

Please see attached notes for all abbreviations and acronyms

Client Name: WSP Environmental
Reference: 40000205
Location: Ballykellly
Contact: John Moran

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 24/12294						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.
It is a requirement under ISO 17025 that we inform clients if samples are deviating i.e. outside what is expected. A deviating sample indicates that the sample 'may' be compromised but not necessarily will be compromised. The result is still accredited and our analytical reports will still show accreditation on the relevant analytes.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 24/12294

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 35°C ±5°C.

Where Mineral Oil is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a requirement of our Accreditation Body for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.
Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

Age of Diesel

The age of release estimation is based on the nC17/pristane ratio only as prescribed by Christensen and Larsen (1993) and Kaplan, Galperin, Alimi et al., (1996).
Age estimation should be treated with caution as it can be influenced by site specific factors of which the laboratory are not aware.

Tentatively Identified Compounds (TICs)

Where Tentatively Identified Compounds (TICs) are reported, up to 10 Tentatively Identified Compounds will be listed where there is found to be a greater than 80% match with the NIST library. The reported concentration is determined semi-quantitively, with a matrix specific limit of detection. Note, other compounds may be present but are not reported.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above quantitative calibration range. The result should be considered the minimum value and is indicative only. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x5 Dilution
AB	x10 Dilution

HWOL ACRONYMS AND OPERATORS USED

HS	Headspace Analysis.
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent.
CU	Clean-up - e.g. by florisil, silica gel.
1D	GC - Single coil gas chromatography.
Total	Aliphatics & Aromatics.
AL	Aliphatics only.
AR	Aromatics only.
2D	GC-GC - Double coil gas chromatography.
#1	EH_Total but with humics mathematically subtracted
#2	EU_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +).
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry.

EMT Job No: 24/12294

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM0	Not available	PM0	No preparation is required.				
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16/PM30	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE/Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5/TM36	please refer to TM5 and TM36 for method details	PM12/PM16/PM30	please refer to PM16/PM30 and PM12 for method details	Yes			
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified				
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified	Yes			
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM37	Modified methods - TSS: USEPA 160.2 (1985), EN872:2005 and APHA SMEWW 2540D:1999 22nd Edition; VSS: USEPA 1684 (Jan 2001), USEPA 160.4 (1971) and SMEWW 2540E:1999 22nd Edition. Gravimetric determination of Total Suspended Solids (TSS) and Volatile Suspended Solids (VSS). Sample is filtered through a 1.5um pore size glass fibre filter and the resulting residue is dried and weighed at 105°C for TSS and 550°C for VSS.	PM0	No preparation is required.	Yes			
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM0	No preparation is required.				
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM0	No preparation is required.	Yes			
TM57	Modified US EPA Method 410.4. (Rev. 2.0 1993) Comparable with ISO 15705:2002. Chemical Oxygen Demand is determined by hot digestion with Potassium Dichromate and measured spectrophotometerically.	PM0	No preparation is required.	Yes			

EMT Job No: 24/12294

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM75	Modified US EPA method 310.1 (1978). Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.	Yes			

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WSP Environmental
Town Centre House
Dublin Road
Naas
Co Kildare
Ireland

Attention :	John Moran
Date :	9th September, 2024
Your reference :	40000205
Our reference :	Test Report 24/14693 Batch 1
Location :	Ballykelly
Date samples received :	28th August, 2024
Status :	Final Report
Issue :	202409091506

Six samples were received for analysis on 28th August, 2024 of which six were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

The greenhouse gas emissions generated (in Carbon – Co2e) to obtain the results in this report are estimated as:

Scope 1&2 emissions - 13.539 kg of CO2

Scope 1&2&3 emissions - 31.996 kg of CO2

Authorised By:

Simon Gomery BSc
Senior Project Manager

Client Name: WSP Environmental
Reference: 40000205
Location: Ballykelly
Contact: John Moran
EMT Job No: 24/14693

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

EMT Sample No.	1-6	7-12	13-18	19-24	25-30	31-36					LOD/LOR	Units	Method No.
Sample ID	BH01	BH02	BH03	BH04	SW01	SW01_DUP							
Depth													
COC No / misc													
Containers	V H HN P G	V H HN P G	V H HN P G	V H HN P G	V H HN P G	V H HN P G							
Sample Date	26/08/2024	26/08/2024	26/08/2024	26/08/2024	26/08/2024	26/08/2024							
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Surface Water	Surface Water							
Batch Number	1	1	1	1	1	1							
Date of Receipt	28/08/2024	28/08/2024	28/08/2024	28/08/2024	28/08/2024	28/08/2024							
Dissolved Arsenic #	5.4	<2.5	<2.5	<2.5	<2.5	<2.5					<2.5	ug/l	TM30/PM14
Dissolved Barium #	85	63	8	18	23	23					<3	ug/l	TM30/PM14
Dissolved Beryllium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					<0.5	ug/l	TM30/PM14
Dissolved Boron	55	17	17	19	13	16					<12	ug/l	TM30/PM14
Dissolved Cadmium #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					<0.5	ug/l	TM30/PM14
Dissolved Calcium #	121.3	96.1	42.5	89.1	42.6	42.8					<0.2	mg/l	TM30/PM14
Total Dissolved Chromium #	4.6	6.6	6.9	<1.5	<1.5	<1.5					<1.5	ug/l	TM30/PM14
Dissolved Copper #	<7	<7	<7	<7	<7	<7					<7	ug/l	TM30/PM14
Dissolved Lead #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM30/PM14
Dissolved Magnesium #	10.9	12.5	3.1	8.1	10.1	10.1					<0.1	mg/l	TM30/PM14
Dissolved Manganese #	40	<2	22	<2	27	27					<2	ug/l	TM30/PM14
Dissolved Mercury #	<1	<1	<1	<1	<1	<1					<1	ug/l	TM30/PM14
Dissolved Nickel #	4	<2	<2	<2	<2	<2					<2	ug/l	TM30/PM14
Dissolved Potassium #	31.4	2.0	0.7	0.6	2.1	2.1					<0.1	mg/l	TM30/PM14
Dissolved Selenium #	<3	<3	<3	<3	<3	<3					<3	ug/l	TM30/PM14
Dissolved Sodium #	8.9	9.3	4.5	7.1	8.4	8.3					<0.1	mg/l	TM30/PM14
Dissolved Vanadium #	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5					<1.5	ug/l	TM30/PM14
Dissolved Zinc #	26	9	11	13	<3	3					<3	ug/l	TM30/PM14
Total Chromium	<1.5	<1.5	35.9	<1.5	<1.5	<1.5					<1.5	ug/l	TM30/PM14
Total Iron	1018	536	25033$_{AA}$	198	26	29					<20	ug/l	TM30/PM14
MTBE #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM36/PM12
Benzene #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM36/PM12
Toluene #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM36/PM12
Ethylbenzene #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM36/PM12
m/p-Xylene #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM36/PM12
o-Xylene #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM36/PM12
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL) #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM36/PM12
>C6-C8 (HS_1D_AL) #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM36/PM12
>C8-C10 (HS_1D_AL) #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM36/PM12
>C10-C12 (EH_CU_1D_AL) #	<5	<5	<5	<5	<5	<5					<5	ug/l	TM5/PM16/PM30
>C12-C16 (EH_CU_1D_AL) #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/PM16/PM30
>C16-C21 (EH_CU_1D_AL) #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/PM16/PM30
>C21-C35 (EH_CU_1D_AL) #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/PM16/PM30
Total aliphatics C5-35 (EH_CU+HS_1D_AL) #	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/TM36/PM12/PM16/PM30

Please see attached notes for all abbreviations and acronyms

Client Name: WSP Environmental
Reference: 40000205
Location: Ballykelly
Contact: John Moran
EMT Job No: 24/14693

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

EMT Sample No.	1-6	7-12	13-18	19-24	25-30	31-36					LOD/LOR	Units	Method No.
Sample ID	BH01	BH02	BH03	BH04	SW01	SW01_DUP							
Depth													
COC No / misc													
Containers	V H HN P G	V H HN P G	V H HN P G	V H HN P G	V H HN P G	V H HN P G							
Sample Date	26/08/2024	26/08/2024	26/08/2024	26/08/2024	26/08/2024	26/08/2024							
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Surface Water	Surface Water							
Batch Number	1	1	1	1	1	1							
Date of Receipt	28/08/2024	28/08/2024	28/08/2024	28/08/2024	28/08/2024	28/08/2024							
TPH CWG													
Aromatics													
>C5-EC7 (HS_1D_AR)#	<10	<10	<10	<10	<10	<10					<10	ug/l	TM36/PM12
>EC7-EC8 (HS_1D_AR)#	<10	<10	<10	<10	<10	<10					<10	ug/l	TM36/PM12
>EC8-EC10 (HS_1D_AR)#	<10	<10	<10	<10	<10	<10					<10	ug/l	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR)#	<5	<5	<5	<5	<5	<5					<5	ug/l	TM5/PM16/PM30
>EC12-EC16 (EH_CU_1D_AR)#	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/PM16/PM30
>EC16-EC21 (EH_CU_1D_AR)#	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/PM16/PM30
>EC21-EC35 (EH_CU_1D_AR)#	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/PM16/PM30
Total aromatics C5-35 (EH_CU+HS_1D_AR)#	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/TM36/PM12/PM16/PM30
Total aliphatics and aromatics(C5-35) (EH_CU+HS_1D_Total)#	<10	<10	<10	<10	<10	<10					<10	ug/l	TM5/TM36/PM12/PM16/PM30
Sulphate as SO4#	23.3	19.1	2.5	19.5	20.4	20.4					<0.5	mg/l	TM38/PM0
Chloride#	14.2	20.1	3.8	15.0	19.1	19.1					<0.3	mg/l	TM38/PM0
Nitrate as NO3#	27.2	0.9	3.8	21.5	0.5	0.5					<0.2	mg/l	TM38/PM0
Nitrite as NO2#	0.16	<0.02	<0.02	<0.02	<0.02	<0.02					<0.02	mg/l	TM38/PM0
Ortho Phosphate as PO4#	0.27	0.09	0.08	0.08	0.07	0.07					<0.06	mg/l	TM38/PM0
Ammoniacal Nitrogen as N#	0.16	<0.03	0.03	<0.03	<0.03	0.03					<0.03	mg/l	TM38/PM0
Hexavalent Chromium	<6	<6	<6	<6	<6	<6					<6	ug/l	TM38/PM0
Total Dissolved Chromium III	<6	7	7	<6	<6	<6					<6	ug/l	TM0/PM0
Total Alkalinity as CaCO3#	352	258	160	208	122	122					<1	mg/l	TM75/PM0
COD (Settled)#	14	18	<7	21	25	12					<7	mg/l	TM57/PM0
Total Suspended Solids#	55	24	548	15	<10	<10					<10	mg/l	TM37/PM0

Please see attached notes for all abbreviations and acronyms

Client Name: WSP Environmental
Reference: 40000205
Location: Ballykelly
Contact: John Moran

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 24/14693						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.
It is a requirement under ISO 17025 that we inform clients if samples are deviating i.e. outside what is expected. A deviating sample indicates that the sample 'may' be compromised but not necessarily will be compromised. The result is still accredited and our analytical reports will still show accreditation on the relevant analytes.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 24/14693

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 35°C ±5°C.

Where Mineral Oil is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a requirement of our Accreditation Body for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.
Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

Age of Diesel

The age of release estimation is based on the nC17/pristane ratio only as prescribed by Christensen and Larsen (1993) and Kaplan, Galperin, Alimi et al., (1996).
Age estimation should be treated with caution as it can be influenced by site specific factors of which the laboratory are not aware.

Tentatively Identified Compounds (TICs)

Where Tentatively Identified Compounds (TICs) are reported, up to 10 Tentatively Identified Compounds will be listed where there is found to be a greater than 80% match with the NIST library. The reported concentration is determined semi-quantitively, with a matrix specific limit of detection. Note, other compounds may be present but are not reported.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above quantitative calibration range. The result should be considered the minimum value and is indicative only. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x5 Dilution

HWOL ACRONYMS AND OPERATORS USED

HS	Headspace Analysis.
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent.
CU	Clean-up - e.g. by florisil, silica gel.
1D	GC - Single coil gas chromatography.
Total	Aliphatics & Aromatics.
AL	Aliphatics only.
AR	Aromatics only.
2D	GC-GC - Double coil gas chromatography.
#1	EH_Total but with humics mathematically subtracted
#2	EU_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +).
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry.

EMT Job No: 24/14693

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM0	Not available	PM0	No preparation is required.				
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16/PM30	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE/Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5/TM36	please refer to TM5 and TM36 for method details	PM12/PM16/PM30	please refer to PM16/PM30 and PM12 for method details	Yes			
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified				
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified	Yes			
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM37	Modified methods - TSS: USEPA 160.2 (1965), EN872:2005 and APHA SMEWW 2540D:1999 22nd Edition; VSS: USEPA 1684 (Jan 2001), USEPA 160.4 (1971) and SMEWW 2540E:1999 22nd Edition. Gravimetric determination of Total Suspended Solids (TSS) and Volatile Suspended Solids (VSS). Sample is filtered through a 1.5um pore size glass fibre filter and the resulting residue is dried and weighed at 105°C for TSS and 550°C for VSS.	PM0	No preparation is required.	Yes			
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM0	No preparation is required.				
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM0	No preparation is required.	Yes			
TM57	Modified US EPA Method 410.4. (Rev. 2.0 1993) Comparable with ISO 15705:2002. Chemical Oxygen Demand is determined by hot digestion with Potassium Dichromate and measured spectrophotometerically.	PM0	No preparation is required.	Yes			

EMT Job No: 24/14693

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM75	Modified US EPA method 310.1 (1978). Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.	Yes			

7 Air Quality

7.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) considers the potential air quality impacts as a result of the Proposed Project.

The Proposed Project is the restoration of disused quarry lands using clean soil and stone from construction and demolition. The Application Site (also referred to as 'Site') includes a disused quarry void and associated historical working areas. It also includes a private access road that connects the disused quarry to the public road network, and agricultural lands to the east of that road where it is proposed to locate the temporary facilities required to manage the importation of clean soil and stone required for the Proposed Project.

All lands within the Application Site are within the ownership of the Applicant, Bison Quarries Ltd (BQL). The Application Site is located in townland of Coolsickin or Quinsborough, Co. Kildare

This EIAR is submitted in support of an application under Section 37L of the Planning and Development Act 2000, as amended.

This chapter of the EIAR has been prepared by WSP Ireland Consulting Ltd (WSP) and assesses the potential air quality impacts associated with the Proposed Project. It should be read together with Chapter 2 (Project Description), Chapter 4 (Ecology and Biodiversity), Chapter 8 (Climate), and Chapter 12 (Traffic and Transport).

The assessment has been prepared by and Shivank Mishra (BE, MTech) and reviewed by Katie Armstrong (BSc, MSc). Katie is a member of the Air and Waste Management Association (A&WMA) and has over 18 years of experience preparing air quality assessments. Shivank is a Member of Institution of Environmental Sciences (IES) and a Member of the Institute of Air Quality Management (IAQM); he has over a year experience.

7.1.1 Technical Scope

The EIA Directive (Directive 2011/92/EU, as amended by Directive 2014/52/EU) requires that a description of the likely significant effects of the Proposed Project on the environment resulting from air pollutant emissions is provided.

The technical scope of this assessment is to consider the potential air quality impacts associated with the Proposed Project. This assessment considers the potential sources of change resulting from the Proposed Project activities detailed in the project description (Chapter 2 of this EIAR) and summarised in section 7.1.3.

7.1.1.1 Items Screened into the Assessment

Mineral Dust

The most likely emissions to air are dust and particulate matter (e.g., PM_{10} and $PM_{2.5}$) which arise predominantly from the handling and transport of fill materials during the construction phase. These tend to be fugitively dispersed source emissions rather than specific point source emissions and this dictates the mitigation measures required. Consequently, a qualitative assessment of dust impacts associated with dust from the quarry restoration activities has been undertaken in line with Institute of Air Quality Management's (IAQM) 'Guidance on the Assessment of Mineral Dust Impacts for Planning'.

Vehicle Trackout

Vehicle trackout refers to the transport of dust and dirt from the Application Site onto the public road network. In this project, heavy duty vehicles (HDVs) will be used to import infill material such as clean soils and stones. As these vehicles enter and exit the Site, there is potential for dusty material to spill or for mud and dust to be transferred onto the road from the site surface. These materials can then be re-suspended by passing traffic, leading to potential local air quality impacts.

The IAQM's guidance on the 'Assessment of Dust from Demolition and Construction' requires consideration of sensitive human receptors within 50m of the route(s) used by vehicles on the public highway, up to 250m from the Site entrance(s). For sensitive ecological receptors, which are defined in the guidance as including Ramsar sites, Special Protection Areas (SPA), Special Areas of Conservation (SAC) or any other ecological sites identified as sensitive to dust deposition the same criteria are used.

Plant and Non-Road Mobile Machinery Emissions

The IAQM's guidance on the 'Assessment of Dust from Demolition and Construction' guidance states that:

"Experience of assessing the exhaust emissions from on-site plant (NRMM) and site traffic suggests that they are unlikely to make a significant impact on local air quality, and in the vast majority of cases they will not need to be quantitatively assessed".

Consequently, impacts associated with the operation of site plant and non-road mobile machinery (NRMM) emissions during the operational life of the quarry have been assessed qualitatively.

7.1.1.2 Items Screened Out of the Assessment

Road Vehicle Emissions

Chapter 12 (Traffic and Transport) summarises the operational traffic data for the Proposed Project. There are three inbound and three outbound light-duty vehicle (LDV) trips per day as well as miscellaneous trips which account for four further LDV trips per day (two inbound and two outbound, i.e., an increase in LDV movements of 10 AADT (annual average daily

traffic, vehicles per day). During the operational period heavy-duty vehicle (HDV, >3.5t) movements from material import activities will also for an increase in 36 AADT, (18 inbound and 18 outbound trips per day).

Consequently, the change in operational traffic flows do not exceed the indicative scoping criteria given for determining the need for a detailed air quality assessment provided in the Environmental Protection UK (EPUK) / IAQM 'Land-Use Planning and Development Control: Planning for Air Quality' guidance. Therefore, the potential impacts form operational traffic emissions can be considered as having an insignificant effect on local air quality.

Odour Emissions

Clean soil and stone will be used for quarry restoration during the Proposed Project, which do not give rise to odours. Therefore, consideration of operational odour emissions has been screened out and are not considered further.

Point Source Emissions

No substantial stationary combustion processes or point source emissions to air will form part of the operations of the Proposed Project, therefore consideration of emissions to air have also been screened out of this assessment and are not considered further.

Carparking Area

The Proposed Project includes the construction of associated temporary operational facilities required to facilitate the quarry restoration (e.g. site facilities, site management, site access upgrades).

The duration of the construction works for the car park and associated site infrastructure would only consist of a couple of months and best practice mitigation measures to limit the generation of construction dust and PM_{10}, as outlined in the IAQM guidance, will be employed throughout to minimise the risk of any impacts at sensitive receptors, e.g., the use of a water bowser to suppress dust.

Taking this into consideration, together with the remote location of the Site and limited number of sensitive human receptors in close proximity, no significant residual effect is anticipated and further consideration of the impacts arising from this element of the proposals have been screened out and are not considered further.

7.1.2 Geographical and Temporal Scope

The land which is the subject of this EIAR is located within the EIA project boundary (as a minimum) and is shown in Figure 7-1. The figure also includes the study areas for the items screened into the assessment (given above) and these are described below.

Different study areas have been used for the baseline and construction phase assessments covering consideration of the impacts associated with quarry restoration activities, trackout, plant and NRMM emissions on sensitive human receptors. The study areas have been

defined through reference to the appropriate guidance (given above), beyond these distances no significant effects are anticipated.

The Application Site extends to approximately 6.63 ha and is located within the EIA boundary for the EIAR (approximately 10.62 ha). The proposed fill area is approximately 6.05 ha and is located entirely within the EIA boundary and the Application Boundary.

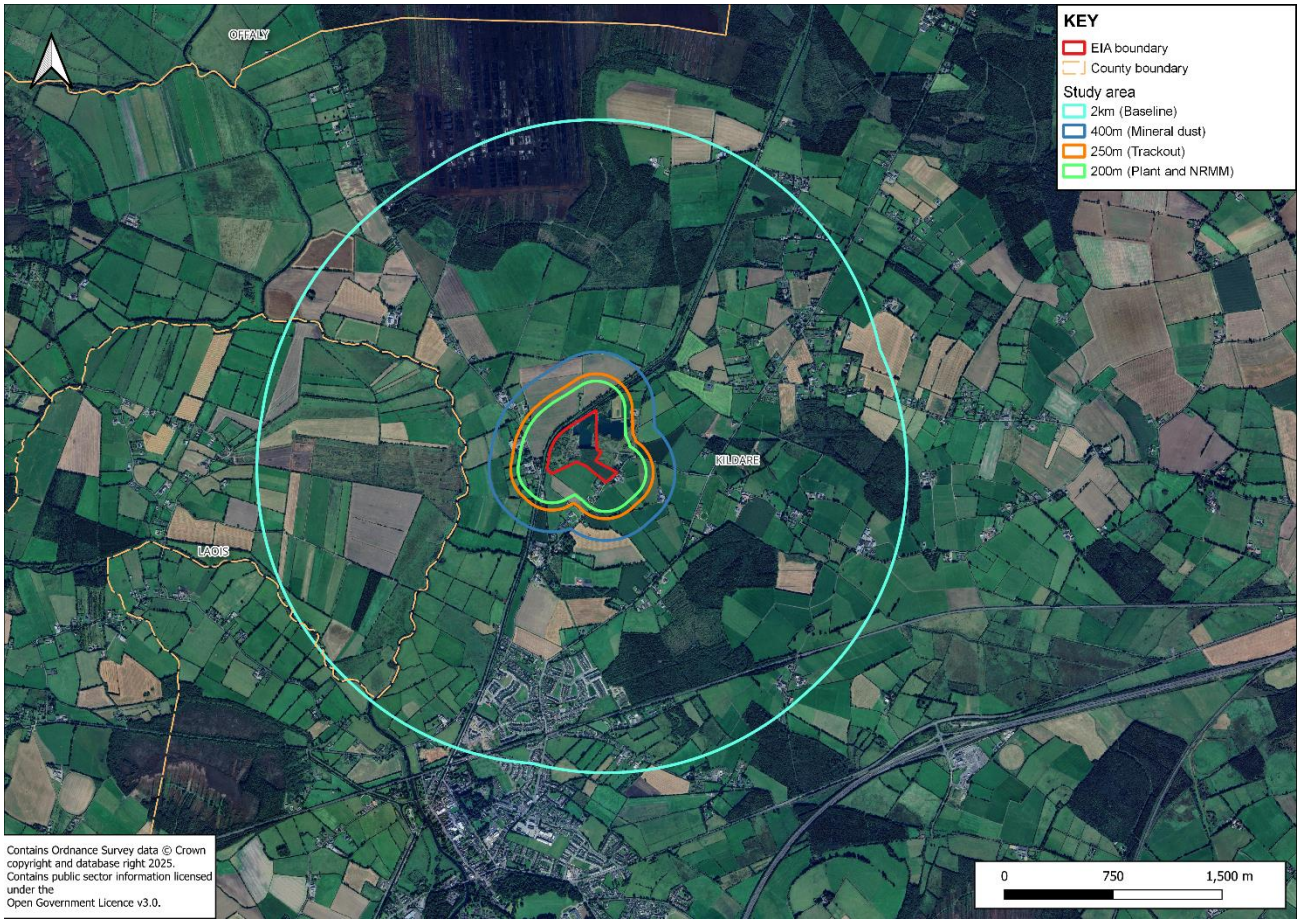


Figure 7-1: Assessment Study Areas

7.1.2.1 Geographical Scope

Baseline

The baseline study area comprises lands within 2 km of the EIA boundary. Where air quality data is unavailable, the study area has been extended as required to allow for the inclusion of additional data, e.g., monitoring data, indicative of conditions at the Proposed Project. Likewise, where data is not available for the assessment period, the best available data, i.e., most recent, has been used and this noted in the assessment.

Mineral Dust

The study area for the assessment of dust from construction activities extends 400m from the EIA boundary; this area includes both non-sensitive, i.e., commercial premises and businesses, and sensitive human receptors, i.e. residential properties.

Trackout

The study area for the assessment of dust from track out extends 50m from the route used by Site vehicles on the public highway, up to 250m from the site entrance; this area includes both non-sensitive, i.e., commercial premises and businesses, and sensitive human receptors, i.e. residential properties.

Plant and Non-Road Mobile Machinery (NRMM) Emissions

The study area for the assessment of plant and NRMM emissions extends 200m from the EIA boundary; this area includes sensitive human receptors (residential properties).

7.1.2.2 Temporal Scope

The temporal scope of the assessment covers 10 years of construction activities and its duration is defined as 'medium-term' (lasting seven to 15 years). It is noted that there will be a further three years of aftercare and maintenance of the lands as part of the Aftercare and Maintenance Phase but no major air emission sources associated with this phase and it has therefore not been considered further in this assessment.

Full details of the Proposed Project to be carried out within the Application Site are provided in Chapter 2 (Project Description) and summarised in section 7.1.3. Proposed Project activities and development include:

- Enabling works carried out at the start of the construction phase. This comprises installation of the site office and temporary site facilities required to facilitate the import of clean soil and stone;
- Acceptance of clean soil and stone to the Application Site during construction phase. All soils to be imported are to be greenfield or equivalent greenfield;
- Construction phase works required to restore ground contours at the Site to levels similar to those predicted to have been present prior to the historical extraction activities carried out to the north of the Application Site, i.e., infilling of an existing quarry void space and immediately surrounding lands using with clean soil and stone; and
- Topsoil stripping and/or stockpiling during construction phase.

7.1.3 Project Description Summary

The Proposed Project consists of the restoration of lands through the import of approximately 720,000 tonnes clean soil and stone as by-product (non-waste) from development sites to infill a disused historical quarry and raise ground levels to tie in with ground levels of surrounding land.

Restoration of the lands will be to agricultural grassland, an artificial waterbody, and a hedgerow habitat with the lands returned to their pre-extraction agricultural use.

The proposed duration of infilling is 10 years depending on market conditions for the anticipated acceptance of clean soil and stone, and a further 3 years for the completion of final restoration activities.

The Application Site is located in the townland of Coolsickin or Quinsborough, Co Kildare. The Application Site is accessed by a privately-owned access road connecting to a local road (L7049).

The following temporary facilities will be installed and maintained during the life of the development:

- office and fully serviced welfare facilities;
- weighbridge and associated portacabin;
- closed-system wheel wash;
- 6 no. parking bays;
- 2 no. waste inspection bays and 1 no. bunded waste quarantine area;
- hardstanding area (vehicle movement and storage);
- surface water drainage infrastructure from hard standing and discharge to ground, including 2 no. interceptors and 2 no. soakaways;
- Security features, including security gates and fencing; and.
- Power supply. It is intended that approval will be sought for a connection to the ESB Network for the office and fully serviced welfare facilities. Diesel generators will be used to power mobile lighting, if required.

The Proposed Project site entrance and private access road will be upgraded and realigned. These will be retained following to completion of the Proposed Project.

A full project description in provided in Chapter 2 of this EIAR.

7.2 Legislative and Policy Context

7.2.1 Legislation

7.2.1.1 Nuisance Dust

The impact of dust is usually monitored by measuring rates of dust deposition. According to the Environment Protection Agency (EPA) guidance 'Environmental Management in the Extractive Industries', there are currently no Irish statutory standards or EPA guidelines relating specifically to dust deposition thresholds for inert mineral dust.

A number of methods are available to measure dust deposition but only the German TA Luft Air Quality Standards specify a method of measuring dust (nuisance) deposition – the Bergerhoff Method (German Standard VDI 2119).

On this basis, the EPA recommend a boundary dust deposition limit value of 350 mg/m^2/day (when averaged over a 30-day period (one month), +/- two days).

7.2.1.2 Air Pollutants

European Air Quality Directives

The European Union (EU) Directive on Ambient Air Quality Assessment and Management came into force in September 1996 (96/62/EC) and defines the policy framework for 12 air pollutants known to have harmful effects on human health and the environment. Air quality

limit values (ambient pollutant concentrations not to be exceeded after a given date) for the pollutants are set through a series of Daughter Directives. The first Daughter Directive (1999/30/EC) sets limit values for NO_2 and PM_{10} (amongst other pollutants) in ambient air.

Following the Daughter Directives, EU Council Directive 2008/50/EC on ambient air quality and cleaner air for Europe (known as the 'CAFE' Directive) came into force in June 2008, consolidating the existing air quality legislation, making provision for Member States to postpone attainment deadlines and allowing exemption from the obligation to limit values for certain pollutants, subject to strict conditions and assessment by the European Commission. Directive 2008/50/EC was transposed into Irish legislation in 2011 through The Air Quality Standards Regulations 2011. The Directive merged the four daughter directives and EU Council decision into a single directive on air quality. The new Directive also introduced a new limit value for $PM_{2.5}$ but does not change the existing air quality standards.

National Air Quality Legislation

The Air Pollution Act 1987 is the primary legislation relating to air quality in Ireland and provides the means for local authorities to take the measures that they deem necessary to control air pollution.

SI 180/2011 - Air Quality Standards Regulations (2011) transpose the Directive on ambient air quality (2008/50/EC) into Irish law. These regulations establish limit values and thresholds for various pollutants in ambient air, the relevant air quality standards used in this assessment are given in **Table 7-1**.

Table 7-1 - Relevant Air Quality Standards

Air Pollutant	Averaging Period	Standard (µg/m^3)
Nitrogen dioxide (NO_2)	Annual	40
	1-hour	200 (Not to be exceeded more than 18 times in a year)
Particulate Matter (PM_{10})	Annual	40
	24-hour	50 (not to be exceeded more than 35 times a year)
Particulate Matter ($PM_{2.5}$)	Annual	20

The EPA monitor the levels of pollutants against the standards set out in EU and Irish legislation and act as the 'competent authority' for annual reporting to the Minister for the Environment, Climate and Communications.

There are four air quality Zones in Ireland, defined for air quality management and assessment purposes. Highly populated areas are classified as Zone A, with sparsely

populated areas as Zone D. The Proposed Project is located within a designated Zone D for air quality reflecting its rural setting.

7.2.1.3 Other Relevant Legislation

The relevant legislation considered in the assessment include:

- European Communities (Environmental Impact Assessment Regulations) 1989 (SI No. 349/1989);
- Section 177F of the Planning & Development Act 2000 (as amended);
- Directive 2014/52/EU of the European Parliament and of the Council (amending Directive 2011/92/EU);
- European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018, SI 296/2018;
- Planning and Development Regulations 2001 (as amended); and
- Mines and Quarry Act 1965.

7.2.2 Relevant Policies and Plans

Kildare County Council have published a country development plan covering the initial temporal period of the assessment (up to 2029). The plan policies of relevance to this assessment are given below.

7.2.2.1 Kildare County Development Plan 2023-2029

The Kildare County Development Plan 2023-2029 contains the council's current policies relating to planning and sustainable development across their administrative area. KCC has adopted policies and objectives within the development plan in relation to the protection of environs from adverse environmental impact from extractive industry.

The plan acknowledges the potential environmental effects of the aggregate industry and importance of protecting surrounding residential and natural amenities. It identifies that gravel resources are important to the general economy providing a valuable source of employment in some areas of the county. It acknowledges that there is an increasing demand for aggregates and that areas for extraction of aggregates and minerals are needed in the county. To address this the plan identifies that planning policies should be carefully considered to avoid adverse effects on aggregate resources and related extractive industries. It notes that it is necessary to ensure that aggregates can be sourced without significantly damaging the landscape, environment, groundwater and aquifer sources, road network, heritage and / or residential amenities of the area.

KCC policies relevant to the assessment of air quality in respect to the extraction industry include:

- ***RD P8*** – (It is the policy of KCC to) *Support and manage the appropriate future development of Kildare's natural aggregate resources in appropriate locations to ensure*

adequate supplies are available to meet the future needs of the county and the region in line with the principles of sustainable development and environmental management and to require operators to appropriately manage extraction sites when extraction has ceased.

- ***RD O42*** – (It is the policy of KCC to) *Ensure that development for aggregate extraction, processing and associated concrete production does not significantly impact the following:*
  - *Special Areas of Conservation (SACs);*
  - *Special Protection Areas (SPAs);*
  - *Natural Heritage Areas (NHAs);*
  - *Other areas of importance for the conservation of flora and fauna;*
  - *Zones of Archaeological Potential;*
  - *The vicinity of a recorded monument;*
  - *Sensitive landscape areas as identified in Chapter 13 of this Plan;*
  - *Scenic views and prospects;*
  - *Protected Structures;*
  - *Established rights of way and walking routes; and*
  - *Potential World Heritage Sites in Kildare on the UNESCO Tentative List, Ireland.*
- ***RD O44*** – (It is the policy of KCC to) *Require applications for mineral or other extraction to include (but not limited to):*
  - *An Appropriate Assessment Screening where there is any potential for effects on a Natura 2000 site;*
  - *An Environmental Impact Assessment Report (EIAR); and*
  - *An Ecological Impact Assessment may also be required for subthreshold developments to evaluate the existence of any protected species / habitats on site*.
- ***RD O49*** – (It is the policy of KCC to) *Have regard to the following guidance documents (as may be amended, replaced, or supplemented) in the assessment of planning applications for quarries, ancillary services, restoration and after-use:*
  - *Quarries and Ancillary Activities: Guidelines for Planning Authorities, DeHLG (2004). - Environmental Management Guidelines;*
  - *Environmental Management in the Extractive Industry (Non-Scheduled Minerals), EPA (2006). - Archaeological Code of Practice between the DeHLG an ICF (2009);*
  - *Geological Heritage Guidelines for the Extractive Industry (2008); and*

- *Wildlife, Habitats, and the Extractive Industry – Guidelines for the protection of biodiversity within the extractive industry, NPWS (2009).*

7.2.3 Relevant Guidance

This assessment has been undertaken with reference to the following guidance:

- Environmental Protection Agency 'Annual Air Quality in Ireland Report' (2023);
- Health and Safety Authority Safe Quarry 'Guidelines to the Safety, Health and Welfare at Work (Quarries) Regulations' (2008);
- Department of the Environment, Heritage and Local Government 'Quarries and Ancillary Activities - Guidelines for Planning Authorities' (2004);
- IAQM 'Guidance on the Assessment of Dust from Demolition and Construction' (2024);
- EPA 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports' (2022);
- EPUK / IAQM 'Land-Use Planning and Development Control: Planning for Air Quality' (2017);
- IAQM 'Guidance on the Assessment of Mineral Dust Impacts for Planning' (2016);
- European Commission 'Climate Change and Major Projects' (2016);
- Department for Environment, Food and Rural Affairs (Defra, UK) 'Process Guidance Note 3/16 (12) - Secretary of State's Guidance for Mobile Crushing and Screening' (2012); and
- EPA 'Environmental Management in the Extractive Industries' (2006).

7.3 Assessment Methodology and Significance Criteria

7.3.1 Mineral Dust

The following section details the IAQM methodology used for assessing the impacts of deposited dust and fine particulates from the quarry restoration activities. It follows a standard source-pathway-receptor methodology.

The residual source emissions have been characterised based on the scale of the operations and the Project activities and are classified as either small, medium or large. Guidance on the appropriate scale of the residual source is provided in the 2016 IAQM guidance (in Appendix 4 therein).

The pathway from the source to the receptor has been assessed considering the distance and direction of receptors to the source relative to the prevailing wind and local meteorology. Local meteorological data has also been used to assess the frequency of the winds in each direction. The guidance states that it is commonly accepted that the greatest impacts will occur within 100m of the source and that deposited dust does not generally travel beyond 400 m therefore all (sensitive and non-sensitive) receptors within this distance of the boundary are considered.

The criteria for the categorisation of the frequency of potentially dusty winds (given in Table 7-2) and the receptor distance from source (given in Table 7-3) is used to define the pathway effectiveness (given in Table 7-4). The residual source emissions and the pathway effectiveness are then combined to predict the Dust Impact Risk as shown in Table 7-5.

Table 7-2- Categorisation of Potentially Dusty Winds

Pathway	Criteria
Infrequent	Frequency of winds (>5 m/s) from the direction of the dust source on dry days are less than 5%
Moderately Frequent	Frequency of winds (>5 m/s) from the direction of the dust source on dry days are between 5% and 12%
Frequent	Frequency of winds (>5 m/s) from the direction of the dust source on dry days are between 12% and 20%
Very Frequent	Frequency of winds (>5 m/s) from the direction of the dust source on dry days are greater than 20%

Table 7-3 - Categorisation of Receptor Distance from Source

Category	Criteria
Distant	Receptor is between 200m and 400m in an unobstructed direction from the dust source
Intermediate	Receptor is between 100m and 200m in an unobstructed direction from the dust source
Close	Receptor is less than 100m in an unobstructed direction from the dust source

Table 7-4 - Pathway Effectiveness

		Frequency of Potentially Dusty Winds			
		Infrequent	**Moderately Frequent**	**Frequent**	**Very Frequent**
Receptor Distance Category	**Close**	Ineffective	Moderately Effective	Highly Effective	Highly Effective
	Intermediate	Ineffective	Moderately Effective	Moderately Effective	Highly Effective
	Distant	Ineffective	Ineffective	Moderately Effective	Moderately Effective

Table 7-5 - Estimation of Dust Impact Risk

		Residual Source Emissions		
		Small	**Medium**	**Large**
Pathway Effectiveness	**Highly Effective**	Low Risk	Medium Risk	High Risk
	Moderately Effective	Negligible Risk	Low Risk	Medium Risk
	Ineffective Pathway	Negligible Risk	Negligible Risk	Low Risk

The last step is to assess the likely magnitude of the dust effects associated with the proposed activities (as given in Table 7-6). This is determined using both the dust impact risk and the receptor sensitivity. Receptor sensitivity is classified as either low, medium or high based on the receptor type.

Table 7-6 - Descriptors for Magnitude of Dust Effects

		Receptor Sensitivity		
		Low	**Medium**	**High**
Dust Impact Risk	**High Risk**	Slight Adverse Effect	Moderate Adverse Effect	Substantial Adverse Effect
	Medium Risk	Negligible Effect	Slight Adverse Effect	Moderate Adverse Effect

		Receptor Sensitivity		
		Low	**Medium**	**High**
	Low Risk	Negligible Effect	Negligible Effect	Slight Adverse Effect
	Negligible Risk	Negligible Effect	Negligible Effect	Negligible Effect

7.3.2 Vehicle Trackout

Step 1 - Screening the need for a Detailed Assessment

An assessment will normally be required where there are:

- 'Human receptors' within 50m of the route(s) used by Project vehicles on the public highway, up to 250m from the site entrance(s); and/or
- 'Ecological receptors' within 50m of the route(s) used by Project vehicles on the public highway, up to 250m from the site entrance(s).

Where the need for a more detailed assessment is screened out, it can be concluded that the level of risk is "negligible".

Step 2 - Define the Potential Dust Emission Magnitude

Table 7-7 shows how the potential dust emission magnitude for vehicle trackout can be defined; it should be noted that not all the criteria need to be met for a particular class. Other criteria may be used if justified in the assessment.

Table 7-7: Examples of Human Receptor Sensitivity to Project Impacts

Dust Emission Magnitude	Criteria
Large	>50 HDVs out / day, dusty surface material (e.g. clay) >100m unpaved roads
Medium	20 - 50 HDVs out / day, moderately dusty surface material (e.g. clay) 50 -100m unpaved roads
Small	<20 HDVs out / day, non-dusty soil <50m unpaved roads

Step 2b - Define the Sensitivity of the Area

Table 7-8, Table 7-9 and Table 7-10 present the IAQM assessment methodology to determine the sensitivity of the area to dust soiling, human health and ecological impacts respectively. The IAQM Construction Dust Guidance provides guidance to allow the

sensitivity of individual receptors to dust soiling and health effects to assist in the assessment of the overall sensitivity of the study area.

Table 7-8: Sensitivity of the Area to Dust Soiling Effects

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)	
		<20	<50
High	>100	High	High
	10-100	High	Medium
	1-10	Medium	Low
Medium	>1	Medium	Low
Low	>1	Low	Low

Table 7-9: Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} Concentration ($\mu g/m^3$)	Number of Receptors	Distance from the Source (m)	
			<20	<50
High	>32	>100	High	High
		10-100	High	High
		1-10	High	Medium
	28-32	>100	High	High
		10-100	High	Medium
		1-10	High	Medium
	24-28	>100	High	Medium
		10-100	High	Medium
		1-10	Medium	Low
	<24	>100	Medium	Low
		10-100	Low	Low

Receptor Sensitivity	Annual Mean PM_{10} Concentration ($\mu g/m^3$)	Number of Receptors	Distance from the Source (m)	
			<20	<50
		1-10	Low	Low
Medium	>32	>10	High	Medium
		1-10	Medium	Low
	28-32	>10	Medium	Low
		1-10	Low	Low
	24-28	>10	Low	Low
		1-10	Low	Low
	<24	>10	Low	Low
		1-10	Low	Low
Low	-	>1	Low	Low

Table 7-10: Sensitivity of the Area to Ecological Impacts

Receptor Sensitivity	Distance from the Sources (m)	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

STEP 2C - Define the Risk of Impacts

The dust emissions magnitude determined at Step 2A should be combined with the sensitivity of the area determined at Step 2B to determine the risk of impacts without mitigation applied. The matrix in Table 7-11 provide a method of assigning the level of risk for. For those cases where the risk category is 'negligible' no mitigation measures beyond those required by legislation will be required.

Table 7-11: Risk of Dust Impacts

Sensitivity of surrounding area	Dust Emission Magnitude		
	Large	**Medium**	**Small**
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

STEP 3 - Site Specific Mitigation

Having determined the risk, it is possible to determine the site-specific measures to be adopted. These measures will be related to whether the site is considered to be a low, medium or high-risk site. The IAQM Construction Dust Guidance details the mitigation measures required for high, medium and low risk sites as determined in Step 2C.

Step 4 – Determine Significant Effects

Once the risk of dust impacts has been determined in Step 2C and the appropriate dust mitigation measures identified in Step 3, the final step is to determine whether there are significant effects arising from the trackout. The application of effective mitigation should prevent any significant effects occurring to sensitive receptors and therefore the residual effect will normally be negligible.

7.3.3 Plant and Non-Road Mobile Machinery Emissions

The qualitative assessment of operational phase plant and NRMM on sensitive human receptors within 200m of the EIA boundary has considered the number of plant/vehicles operating on-site, their typical operating hours and their locations when determining whether a significant effect is likely to occur.

7.4 Baseline Conditions

7.4.1 Do Nothing Scenario

If the Proposed Project does not proceed, the Site will remain in its current condition as a disused quarry. No construction or infilling activities would take place, and the land will continue to be characterised by the existing quarry void, collected surface water, and naturally regenerated vegetation.

In this scenario, while there may be wind generated dust from exposed quarry surfaces, no mechanical emissions of dust, odour, or combustion-related pollutants would occur, and there would be no additional impact on local air quality or the surrounding environment. The site would remain undisturbed, and existing environmental conditions would be maintained.

7.4.2 Site Location

The Application Site is located in the townland of Coolsickin or Quinsborough, which is situated 2.7km north of Monasterevin and 9km west of Kildare Town. The grid reference coordinates (Irish Transverse Mercator) for the approximate centre of the Site are E663403, N713199. The Proposed Project location is shown in Figure 7-2.

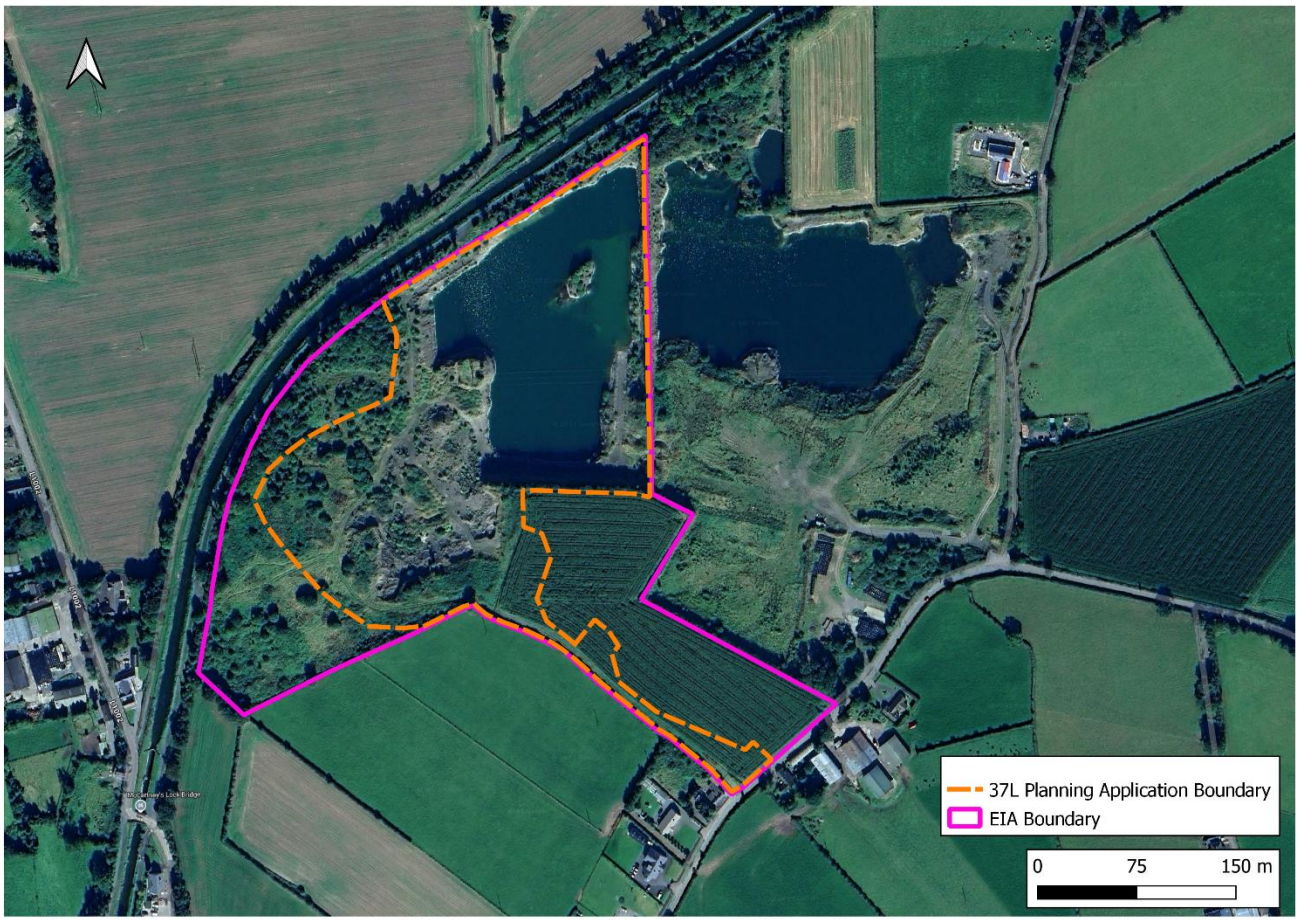


Figure 7-2: Site Location[1]

7.4.3 Climate at the Site

The climate within the Application Site is summarised in Chapter 8 Climate and the local wind field, i.e., the prevailing wind speed and wind direction, which influences the dispersion of dust and air pollutants is summarised below.

The Irish climate is subject to strong maritime influences, the effects decrease with increasing distance from the Atlantic coast. The climate within the study area is typical of the Irish climate, which is temperate maritime.

[1] The Application Site is shown by the '37L Planning Application Boundary'.

A representative Met Éireann station is located at Casement Aerodrome, Baldonnell, County Dublin, approximately 45km northeast of the Application Site. A wind rose based on daily averages of wind speed and wind direction observations for the periods 01 January 2024 to 31 December 2024 measured at Casement Aerodrome is presented in Figure 7-3. This figure shows that the prevailing winds are from the south-west with a small easterly component.

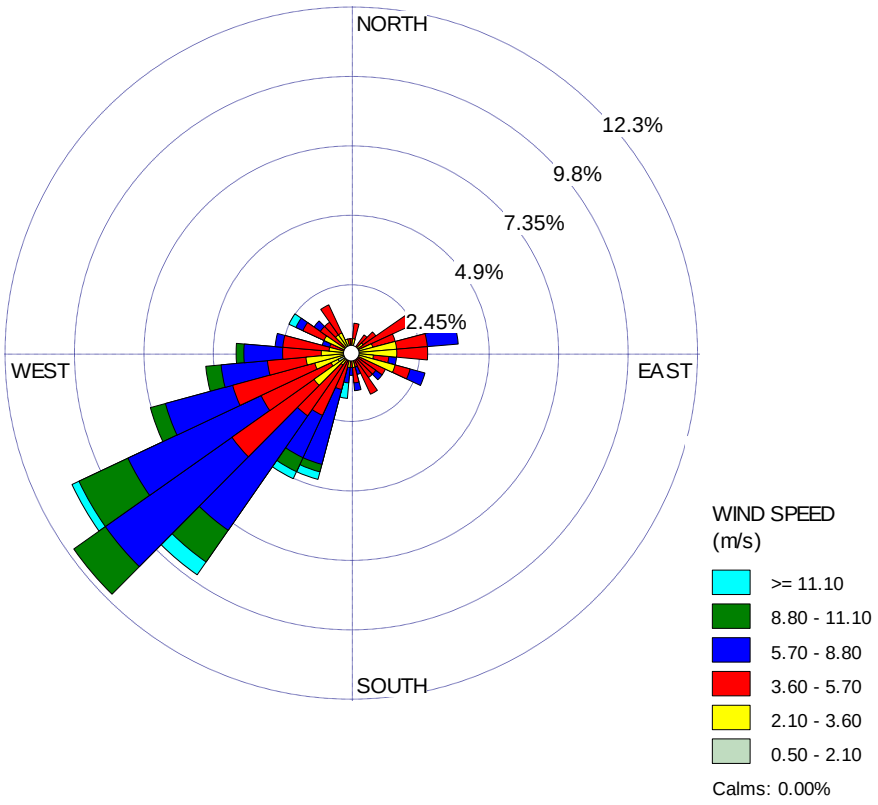


Figure 7-3 - Wind Rose for Casement Aerodrome 2024

7.4.4 Background Air Quality

There are four air quality Zones in Ireland, defined for air quality management and assessment purpose. Highly populated areas are classified as Zone A, with sparsely populated areas as Zone D. Lands within the EIA Boundary are located within a designated Zone D for air quality.

7.4.4.1 Primary Data – Application Site Monitoring Data

Boundary dust monitoring was undertaken at the Application Site on a monthly basis by WSP Ireland Consulting Ltd from 24 May 2024 to 23 August 2024 at a total of three locations which are described in **Table 7-12** and shown in **Figure 7-4.** Laboratory analysis of dust monitoring samples was carried out by BHP laboratories.

Table 7-12: Dust Monitoring Locations

Monitoring Location	Description	Site coordinates (based on ITM grid reference, m)	
		X	Y
DS01	Located in the south boundary corner of the Application Site, approximately 150m from the entrance.	663416	713011
DS02	Located near the north boundary of the Application Site.	663351	713233
DS03	Located near the southwest boundary of the Application Site.	663207	713004

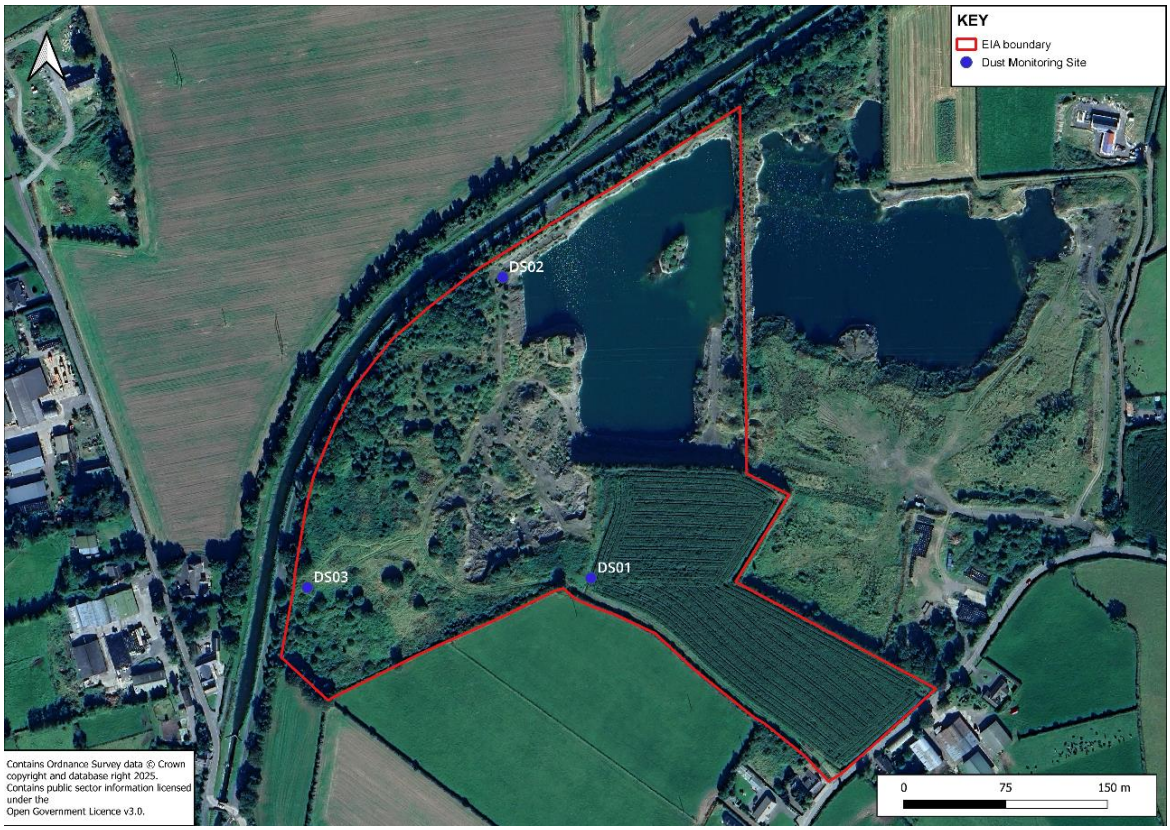


Figure 7-4 - Dust Monitoring Locations

As noted in Section 7.2.1.1, the EPA recommend a boundary dust deposition limit value of 350 mg/m^2/day measured using the Bergerhoff method, the monitoring results are summarised in Table 7-13.

Table 7-13: Recorded Boundary Deposited Dust (mg/m^2/day)

Monitoring Period		Recorded Boundary Deposited Dust (mg/m^2/day)		
Start Date	**End Date**	**DS01**	**DS02**	**DS03**
24-05-2024	24-06-2024	**700**	80	118
24-06-2024	25-07-2024	118	188	**441**
25-07-2024	23-08-2024	23	20	28
Average		**280.3**	**96.0**	**195.7**

Notes:

Monitoring data provided by the BHP laboratories.

The number precision report is based on the data reported by analyst in the accompanying reports.

Bold text denotes boundary dust deposition levels above **350** mg/m^2/day.

Based on the data presented in Table 7-13, there were two instances (at different monitoring locations) when the monitored dust concentration exceeded 350mg/m^2/day and seven samples remained within the limit. One of the exceedances occurred during the May–June sampling period at monitoring location DS01. The second exceedance was recorded during the June–July sampling period at monitoring location DS03. The exceedances and high dust concentrations during the first two months of monitoring are believed to be due to local agricultural activities in the surrounding fields at the time of monitoring.

7.4.4.2 Secondary Data - EPA Monitoring

A review of publicly available information published by the Irish EPA indicates that background monitoring has historically been undertaken at three locations in Kildare, Celbridge, Naas and Newbridge. None of these are currently active and none are located within the 2km baseline study area.

The most recent monitoring was undertaken at Celbridge in County Kildare approximately 17km north from the Proposed Project, although monitoring ceased in 2011. The last reported data from the EPA ambient air monitoring station at Celbridge was undertaken between the 12 July 2010 and 10 April 2011 and is summarised in Table 7-14, no $PM_{2.5}$ monitoring was undertaken at this location.

Table 7-14 - Air Quality Monitoring Data for Celbridge (2010-2011)

Pollutant	Averaging Period	Mass Concentration (µg/m^3)
NO_2	Average	13.5
	99.7%ile of hourly values	79.3
PM_{10}	Average	19.5
	90.4%ile daily average*	37.3
Note: *The 90.4%ile of PM_{10} daily mean concentrations is the 36th highest value in a series of PM_{10} daily mean concentrations; it is related to the PM_{10} daily limit value, which allows for 35 exceedances of the 50µg/m^3 threshold in a year.		

In the absence of local background data, the most recent annual mean NO_2, PM_{10} and $PM_{2.5}$ monitoring data from other stations within the EPA National Ambient Air Quality Monitoring Network located in Zone D areas across Ireland are detailed in Table 7-15. There are also monitoring stations located in Naas and Newbridge, but these have been omitted as they are in Zone B locations.

Table 7-15 - Annual Mean Monitoring Data for Zone D Stations (2023)

Monitoring Location	Annual Mean Concentration (µg/m^3)		
	NO_2	PM_{10}	$PM_{2.5}$
Tipperary Town	ND	10.8	6.7
Shannon Estuary/Askeaton, Co. Limerick	ND	8.4	4.8
Carrick-on-Shannon	10.0	8.9	5.4
Enniscorthy	ND	13.3	9.0
Birr	11.3	13.1	8.3
Macroom	ND	11.3	7.3
Castlebar	6.6	9.9	ND
Cobh Carrignafoy	ND	11.8	6.8
Claremorris	ND	8.1	5.2
Kilkitt	1.7	7.1	ND

Monitoring Location	Annual Mean Concentration (µg/m^3)		
	NO_2	PM_{10}	$PM_{2.5}$
Cavan	ND	10	6.4
Roscommon Town	ND	9.7	6.4
Edenderry	8.6	16.3	12.4
Mallow	ND	10.5	6.1
Longford	ND	13.1	9.2
Cobh Cork Harbour	ND	11.4	ND
Killarney, County. Kerry	ND	8.9	5.4
Malin Head	ND	12.8	6.8
Cork Glanmire Road	ND	ND	7.6
Shannon Estuary / Askeaton, County Limerick	ND	ND	4.8
Emo Court Co. Laois	2.3	ND	ND
Briarhill	16.1	ND	ND
Note: ND denotes no data.			

All monitored concentrations in 2023 are below the relevant standards for NO_2, PM_{10} and $PM_{2.5}$ given in Table 7-1.Taking a conservative approach, and assuming no reduction in emissions of these pollutants in the future, levels of all pollutants would remain below the relevant standards.

7.4.5 Receptors

Sensitive locations are places where the public or sensitive ecological habitats may be exposed to pollutants resulting from activities associated with the Proposed Project. These will include locations sensitive to increases in dust deposition and PM_{10} exposure resulting from mineral dust and trackout, and gaseous pollutants from operational emissions due to plant and NRMM. An assessment is undertaken where there are sensitive receptors within the study areas defined in Section 7.1.2.

7.4.5.1 Sensitive Human Receptors

In terms of locations that are sensitive to dust and air pollutants, these will include places, such as residential properties, where members of the public are likely to be regularly

present over the period of time prescribed in Table 7-1. For instance, on a footpath where exposure will be transient (for the duration of passage along that path) comparison with a short-term standard, i.e., 1-hour mean, may be relevant. At a school or adjacent to a private dwelling, where exposure may be for longer periods, comparison with a long-term standard (such as the 24-hour or annual mean) may be more appropriate.

For the study area, this includes residential receptors, categorised as high-sensitivity receptors, located along roads L1002 and L7049. Barrow line canal towpath is considered to be a medium sensitive receptor due to its valuable cultural and heritage use as an amenity for walkers and cyclists.

7.4.5.2 Sensitive Ecological Receptors

The IAQM guidance defines the types of sensitive ecological receptors to be considered in the assessment.

Table 7-16 - Ecological Receptor Sensitivity and Types

Receptor Sensitivity	Types of Ecological Receptors
High	Locations with an international designation, e.g., a Ramsar site, where the designated features may be affected by dust soiling. Locations where there is a community of a dust sensitive species such as vascular plants. Indicative examples include SAC designated for acid heathlands adjacent to a source of alkaline dusts.
Medium	Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown. Nationally designated site and the designated features may be affected by dust deposition, indicative examples include SSSIs or local wildlife sites with very specific sensitivities.
Low	Locations with a local designation where the features may be affected by dust deposition. An indicative example is a local Nature Reserve with dust sensitive features.

The nearest ecological site is the Grand Canal proposed Natural Heritage Area (pNHA) which is located just beyond the northern boundary of the EIA Boundary. This is considered to be a medium sensitive receptor under the IAQM guidance as it serves to provide functional connectivity for otters, salmon and Twaite Shad which are a designated feature of the River Barrow and River Nore SAC[2]. The River Barrow and River Nore SAC and all other identified designated sites are located outside the 400 m Study Area for the

[2] See Chapter 4 of this EIAR (Ecology and Biodiversity) for details.

assessment and are therefore not considered further as any impacts are predicted to be not significant.

7.5 Characteristics of the Proposed Project

Chapter 2 Project Description provides detailed information on the activities associated with the Proposed Project including the following Construction Phase activities.

- Key activities: Site clearance, topsoil stripping, infilling, and installation of site facilities;
- Plant used (type and number);
- Inherent mitigation measures;
- Operational hours; and
- Stockpile locations and haul routes.

7.6 Potential Effects

7.6.1 Sources

The following section sets out sources in the context of the quarry restoration activities carried out within the Application Site and the plant used to facilitate this.

7.6.1.1 Mineral Dust

Based on the activities detailed in Chapter 2 Project Description, it is anticipated that dust generating activities, associated with quarry restoration, will influence the air quality in Site vicinity during the operation of the Proposed Project. These are expected to include:

- Handling of clean soil and stone: Loading, unloading, and movement of clean soil and stone;
- Haulage, where the weight of vehicles, their speed of passage and number of wheels in contact with the ground, and the nature and condition of road surfaces or haul routes affect the amount of dust emitted;
- Site preparation and grading: Earthworks like levelling or spreading materials can release particulates; and
- Wind erosion from exposed surfaces or stockpiles: Uncovered materials or bare soil can contribute to fugitive dust.

The activities / sources within the Proposed Project have been assessed using the methodology outlined in Section 7.3 to identify the potential dust emission magnitude these are summarised below:

- It is anticipated that three items of loading plant, i.e., one bulldozer, one excavator and one tractor, would operate on-site for unloading/reloading of clean soils and stones during the construction phase of the Proposed Project. The material has low dust potential, and the majority of activities will take place within the quarry void with any temporary stockpiles placed over 50m from the site perimeter to manage potential off-site

dust impacts. The residual source emission for material handling is therefore classed as ‘medium’;

- Material will be transported across the Application Site via existing internal haul routes including unpaved roads and the private access road, which will be upgraded from aggregate to paved surface. It is estimated that there will be approximately 36 heavy-duty vehicle (HDV) movements per day along internal roads. On-site traffic will be limited to 10km/h to minimise dust generation. The residual source emission for on-site transportation is therefore classified as ‘large’’;
- Existing stripped topsoil and imported topsoil will be temporarily stockpiled on-site. It is not intended to stockpile clean soil and stone used for land raise onsite, however, this assessment considers the potential as a ‘worst case’ scenario where it may in exceptional periods be temporarily stockpiled on-site. Topsoil is fine-grained and often dry when stockpiled, with a high proportion of loose particles, giving it a high dust potential. Given the scale of stockpiling and the potential for dust emissions, the residual source emission for stockpiling is therefore classed as ‘medium’; and
- There will be approximately 18HDV outward movements on the site access road each day. The access road will be paved, and a vehicle wash-down area will be available for HDVs exiting the site. Considering these, the residual source emission for off-site transportation is classified as 'small'.

Table 7-17 provides a summary of the residual source emission determined for each activity considered.

Table 7-17 – Residual Source Emissions Classification

Activity	**Demolition**
Material Handling	Medium
On-Site Transportation	Large
Stockpile and Exposed Surface	Medium
Off- Site Transportation	Small

7.6.1.2 Trackout

The IAQM assessment methodology outlined in Section 7.3, has been used to determine the potential dust emission magnitude for the trackout.

All trucks will access the site via the L7049 from/to the east and the junction with the R414, Figure 7-5 illustrates trackout route. It is predicted due to the required works that there will be approximately 18HDV (>3.5t) outward movements in any one day. The private access

road is being upgraded with a paved surface. Therefore, the potential dust emission magnitude is Small for trackout.

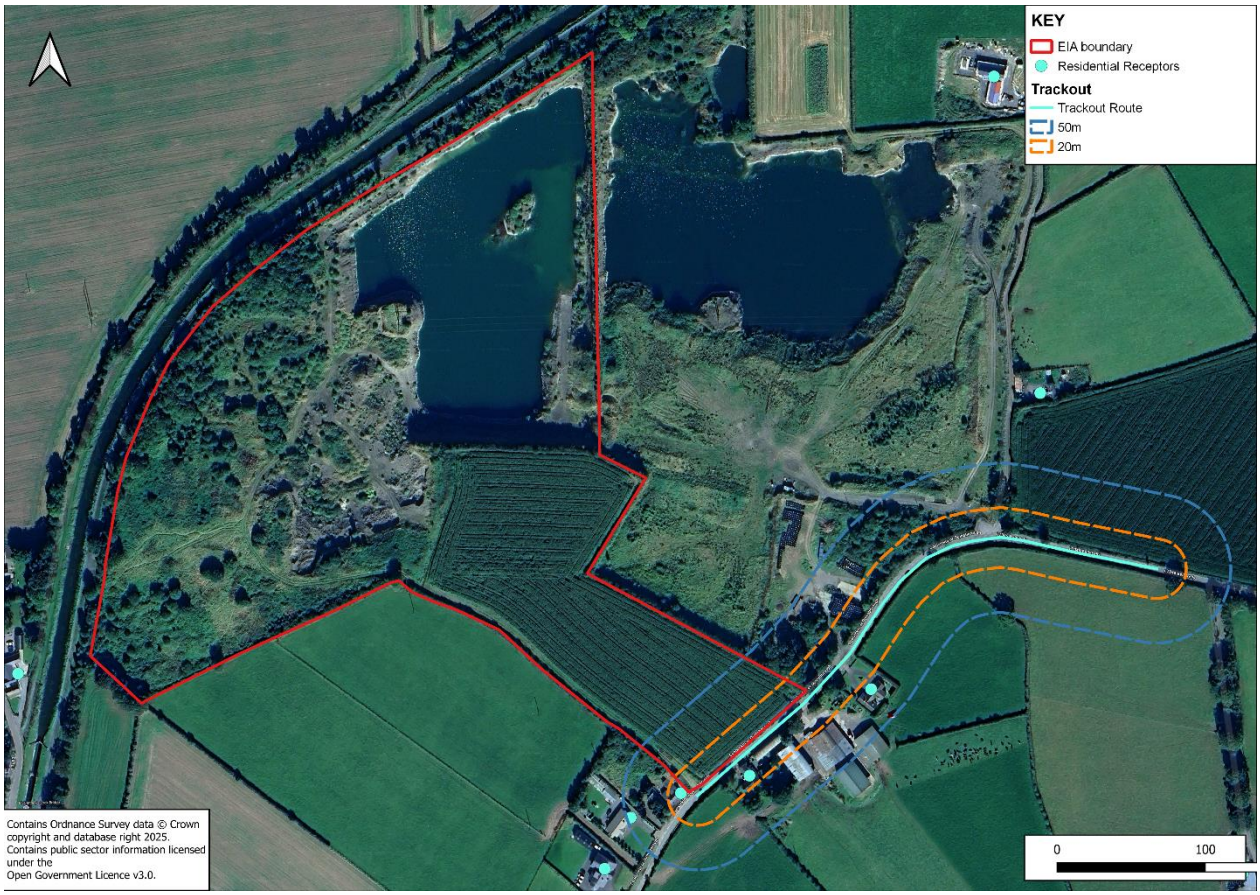


Figure 7-5 - Trackout dust assessment

7.6.1.3 Plant and Machinery Emissions

Emissions of oxides of nitrogen (NO_X) and particulate matter from site plant and NRMM have the potential to increase NO_2, PM_{10} and $PM_{2.5}$ concentrations at locations within 200m of the EIA boundary. As shown in Figure 7-6 there are 15 residential properties (where the air quality objectives apply) within 200m of the EIA boundary within the boundary that could be affected by plant and NRMM emissions.

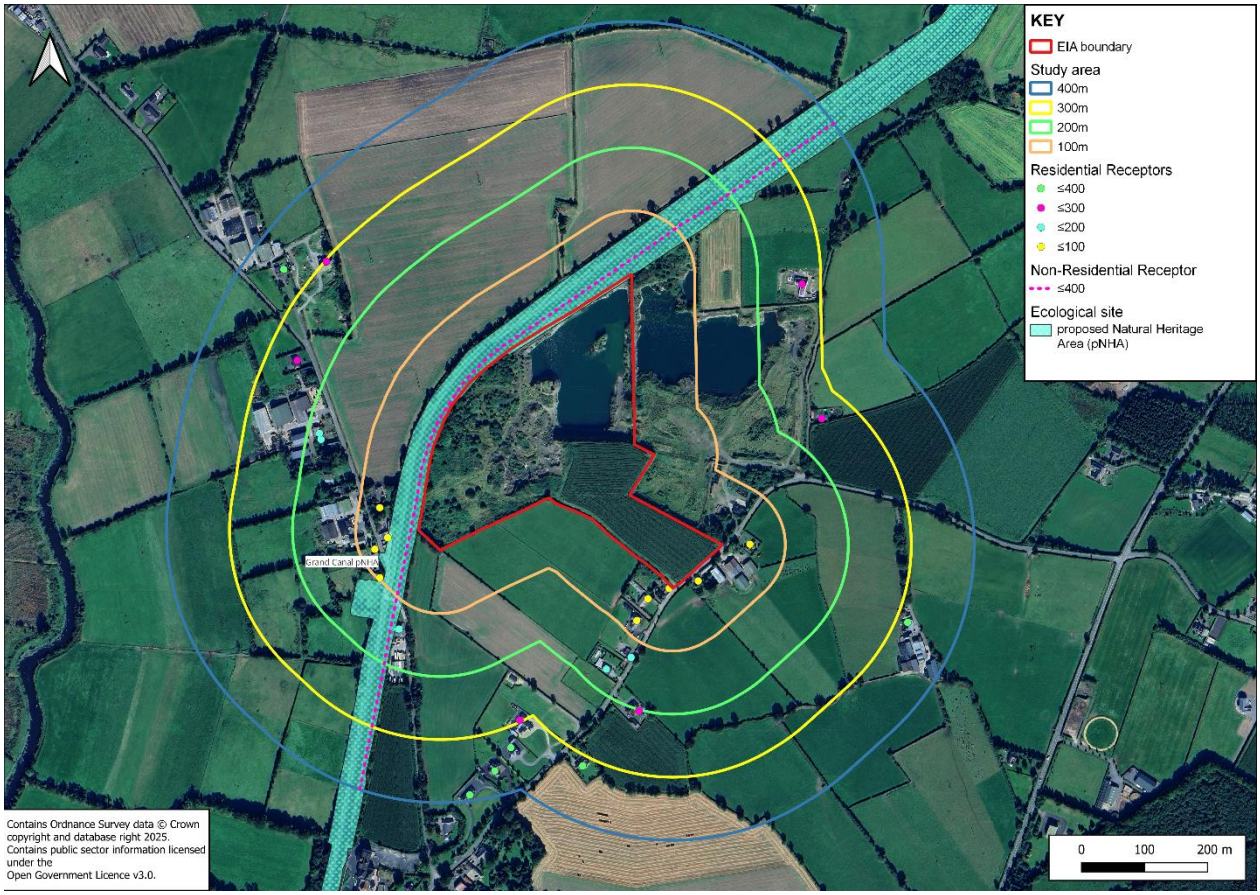


Figure 7-6 - Location of Receptors within the Assessment Study Areas

As noted in Chapter 2 Project Description, there will be up to 4 items of plant and NRMM operating on site during the Proposed Project. It is predicted that plant and NRMM requiring energy will operate using portable diesel-fired power generation and generators will also be used to power mobile lighting, if required.

Plant and NRMM are expected to be used during working hours only (as detailed in Chapter 2), so any emissions are expected to have been short-term and temporary (i.e., no longer than the working day: 07:30 hours and 18:00 hours, Monday to Friday and between 08:00 hours and 14:00 hours on Saturdays) in nature.

7.6.2 Site Parameters

The risks of potential dust emissions associated with the Proposed Project is largely determined by the local atmospheric conditions and the distance from the source to the receptor.

The conditions considered in the assessment include:

- Wind speed, to determine the likely occurrence of particles travelling beyond the Application Site boundary;

- Frequency of winds from the direction of the dust source to assess how often winds are likely to disperse dust towards sensitive receptors; and
- Wind direction, to identify the areas over which particles are likely to travel.

As detailed in Section 7.4.3, a representative Met Éireann station close to the Application Site is located at Casement Aerodrome approximately 45km northeast of the Application Site. Wind speed and wind direction are measured at the station and a wind-rose is presented in Figure 7-3 based on daily data from 01 January 2024 to 31 December 2024. Analysis of the data shows that the prevailing wind direction is from the southwest.

7.6.2.1 Mineral Dust Assessment

The receptors within 400m of the Application Site (shown in Figure 7-6) are given in Table 7-18. Residential receptors have been categorised as high sensitivity receptors and Non-residential receptors have also been categorised as medium sensitivity receptors.

Table 7-18 - Receptors within the Mineral Dust Study Area

Receptor Type and Distance Band	Number of Receptors in Group	Category of Receptor distance	Number of Receptors in Prevailing Wind Direction (NE of boundary or haul route)	Frequency of dusty winds	Pathway Effectiveness
Residential Properties					
≤100m	9	Close	0	Infrequent	Ineffective
≤200m	6	Intermediate	0	Infrequent	Ineffective
≤300m	6	Distant	2	Moderately frequent	Ineffective
≤400m	6	Distant	0	Infrequent	Ineffective
Non-Residential Locations					
≤100m	1	Considered intermediate due to the presence of vegetation berms reducing exposure to on-site sources	1	Moderately frequent	Moderately effective

Receptor Type and Distance Band	Number of Receptors in Group	Category of Receptor distance	Number of Receptors in Prevailing Wind Direction (NE of boundary or haul route)	Frequency of dusty winds	Pathway Effectiveness
Ecological Sites					
≤100m	1	Considered intermediate due to the presence of vegetation berms reducing exposure to on-site sources	1	Frequent	Moderately Effective

The category of receptor distance is defined based on the criteria in Table 7-3 of the methodology and the frequency of dusty winds is determined based on the criteria in Table 7-2 of the methodology. The receptor distance category and the frequency of dusty winds are then combined using Table 7-4 of the methodology to define the pathway effectiveness.

Assessment of the disamenity dust associated with the operation of the Proposed Project during the assessment period is summarised for each receptor in Table 7-19.

Table 7-19 - Assessment of Dust Disamenity Effects at Receptors

Receptor Type and Distance Band from Boundary	Maximum Residual Source Emissions	Pathway Effectiveness	Dust Impact Risk	Receptor Sensitivity	Magnitude of Dust Effects
Residential Properties					
≤100m	Large	Ineffective	Low Risk	High	Slight Adverse
≤200m	Large	Ineffective	Low Risk	High	Slight Adverse
≤300m	Large	Ineffective	Low Risk	High	Slight Adverse
≤400m	Large	Ineffective	Low Risk	High	Slight

Receptor Type and Distance Band from Boundary	Maximum Residual Source Emissions	Pathway Effectiveness	Dust Impact Risk	Receptor Sensitivity	Magnitude of Dust Effects
					Adverse
Non-Residential Properties/Locations					
≤100m	Large	Moderately Effective	Medium Risk	Medium	Slight Adverse
Ecological Sites					
≤100m	Large	Moderately Effective	Medium Risk	Medium	Slight adverse

Following the IAQM guidance, the nature of the Proposed Project, the magnitude of any deposited dust effects will be slight adverse at all human receptor locations but have the potential to be slight adverse at the Grand Canal pNHA due to its classification as having high sensitivity and frequency of winds. Further assessment of the sensitivity of this receptor is provided in Chapter 4 (Ecology and Biodiversity) of this EIAR.

7.6.2.2 Trackout

Assessment of Sensitivity of the Study Area

There are 3 highly sensitive residential receptors within 20m and 4 highly sensitive residential receptors within 50m of traffic routes up to 250m from the Application Site. These receptors include residential premises along the L7049. Hence, for trackout, the sensitivity of the area to dust soiling and human health impacts is classed as medium and low respectively.

Taking the above into account and following the IAQM assessment methodology, the sensitivity of the area to changes in dust, PM_{10} and $PM_{2.5}$ has been derived and the results are shown in Table 7-20.

Table 7-20 - Sensitivity of the Study Area

Potential Impact	Sensitivity of the Surrounding Area
Dust Soiling	Medium
Human Health	Low

The predicted dust emission magnitude has been combined with the defined sensitivity of the area to determine the risk of impacts during the Proposed Project, prior to mitigation. Table 7-21 provides a summary of the risk of dust impacts for the Proposed Project. The risk category identified for trackout and has been used to determine the level of mitigation required.

Table 7-21 - Summary Dust Risk Table to Define Site Specific Mitigation

Potential Impact	Risk
Dust Soiling	Low Risk
Human Health	Negligible

The results of the trackout assessment indicate that there is a **Low risk** of impacts on dust soiling during operation of the Proposed Project and there is a **Negligible risk** of impacts to human health.

7.6.2.3 Plant and Machinery Emissions

Based on the current local air quality in the baseline study area (given in Section 7.1.2.1), the limited number and proximity of sensitive human receptors to the Application Site boundary, the predominant location of plant and NRMM emissions during construction phase, i.e., within the quarry void, the number and hours of operation, the impact of plant and NRMM emissions on local air quality is considered to be negligible and not significant.

7.7 Mitigation Measures and Monitoring

7.7.1 Mitigation Measures

Details of the mitigation measures that will be employed to reduce the impact of potential dust emissions from the Proposed Project on the surrounding area and the sensitive receptors identified for the duration of the assessment period are summarised below (further mitigation measures are also listed in Chapter 2 Project Description) and are consistent with the good practice mitigation measures given in the IAQM guidance:

- Dust monitoring will be undertaken at consistent monitoring locations on a routine basis;
- A water bowser will be used for dust suppression as required;
- On site speed restrictions (<10km/h) will be maintained to limit the generation of fugitive dust emissions;
- All HGVs exiting the Proposed Project will pass through a wheel-wash to minimise trackout;
- Stockpiles will be located away from the active infilling area and positioned to avoid any temporary adverse visual impact or dust nuisance; and
- Soil and stone materials will be brought to the Site in covered trucks to avoid the generation of windblown dust on the approach roads and within the Site.

In addition to the mitigation measures that will be employed, basic good practice mitigation measures given in the IAQM guidance are as follows:

MANAGEMENT

- A Dust Management Plan (DMP) to be agreed with the EHO and adhered to. A DMP provides a strategy to minimise the generation of dust and to control its release during the construction phase. At a minimum it should include the following
  - A description of the site and the surrounding area;
  - An assessment of the risks associated with dust due to construction activities;
  - Site-specific mitigation measures and a procedure for their implementation;
  - The roles and responsibilities of construction personnel;
  - Construction site and equipment layout;
  - Training requirements for site personnel;
  - A community engagement plan and complaints procedure, including standard reporting templates;
  - A dust monitoring plan; and
  - Operational requirements for on-road vehicles and NRMM.
- Effective site management practices are critical to demonstrate the willingness of the operator to control dust emissions and provides a mechanism for auditing of site operations. Such management procedures should be outlined within the DMP; and
- Record all dust and air quality complaints, identify causes, take appropriate measures to reduce emissions in a timely manner, and record the measures taken.

TRAINING

- Provide training to the site personnel on dust mitigation. Training should also cover ‘emergency preparedness plans’ to react quickly in case of any failure of the planned dust mitigation.

COMMUNICATION

- Maintain good communication to help alleviate anxieties between the operators and the surrounding communities. Set up regular, accessible liaison arrangements and providing information as freely as possible.

PLANNING OF ACTIVITIES

- Some activities should ideally be planned only during favourable weather conditions. Where possible, particularly dusty activities should be avoided during extended periods of dry and windy conditions.

VEHICLE MOVEMENTS

Site traffic is often the greatest source of dust on sites. Standard good practices for site haulage include:

- Avoiding abrupt changes in direction;
- Regular clearing, grading and maintenance of haul routes; and
- Evenly loading vehicles to avoid spillages.

MATERIAL HANDLING

- Minimize drop heights when unloading material to reduce dust generation;
- Regularly clear spillages to prevent the accumulation of loose dry material;
- Store fine materials under cover where possible or use wind barriers; and
- Spray exposed surfaces of stockpiles regularly to maintain surface moisture.

The determination of significance refers to the EPA Guidelines; **Table 7-22** assesses the potential impacts associated with the operation of the Proposed Project on dust and local air quality that have been considered for the assessment period with and without mitigation. The duration of these effects will have occurred in the medium term during the quarry's restoration.

Table 7-22 - Assessment of Impacts to Local Air Quality and Mitigation Measures Employed

Impact	With/ without mitigation	Type of Effect	Quality of Effects	Significance of Effects	Duration of Effects
Mineral dust and PM_{10} associated with the quarry restoration activities on sensitive human receptors	Without	Direct	Negative	Slight	M-T
	With	Direct	Negative	Imperceptible	M-T
Mineral dust and PM_{10} associated with the	Without	Direct	Negative	Slight	M-T

Impact	With/ without mitigation	Type of Effect	Quality of Effects	Significance of Effects	Duration of Effects
quarry restoration activities on ecological receptors	With	Direct	Negative	Imperceptible	M-T
Emission of Dust, PM_{10} and $PM_{2.5}$ from trackout	Without	Direct	Negative	Slight	M-T
	With	Direct	Negative	Imperceptible	M-T
Emissions of NO_X, PM_{10} and $PM_{2.5}$ from plant and NRMM	Without	Direct	Negative	Slight	M-T
	With	Direct	Negative	Imperceptible	M-T

Notes:

- Type of effect - direct and indirect.
- Quality of effects - positive; neutral and negative.
- Significance of effects - imperceptible; not significant; slight effects; moderate effects; significant effects; very significant; and profound effects.

Duration of effects - momentary effects (seconds to minutes); brief effects (less than a day); temporary effects (less than a year); short-term effects (1 to 7 years); medium-term effects (7 to 15 years); long-term effects (15 to 60 years); and permanent effects (lasting over 60 years).

Without mitigation measures it is considered that dust impacts from Proposed Project may not affect the character of an environment but would result in noticeable changes. Through the implementation of the existing site's environmental management programme, it has been demonstrated that the dust from various activities has an effect which causes noticeable changes in the character of the environment without affecting its sensitivity.

It should be noted, however, that once the project is complete, overall dust generation in the study area is expected to reduce due to the reduction in exposed ground and increased vegetation, resulting in less potential for wind generated dust.

7.7.2 Monitoring

A dust monitoring plan will need to be incorporated into the Dust Management Plan. It should cover the duration of the construction phase and will need to be agreed with the EHO in advance of the Project. A high-level summary of the required contents is provided below. This is to comprise daily visual inspections and boundary dust monitoring.

Daily visual inspections

Daily visual inspections are to be carried out by the operator during the construction phase. A log of all visual inspections is to be kept using the proforma given in 0 (or similar). This activity is to include inspection of:

- Paved areas within the site and in the vicinity of the site access to ensure that these are free of dirt and debris;

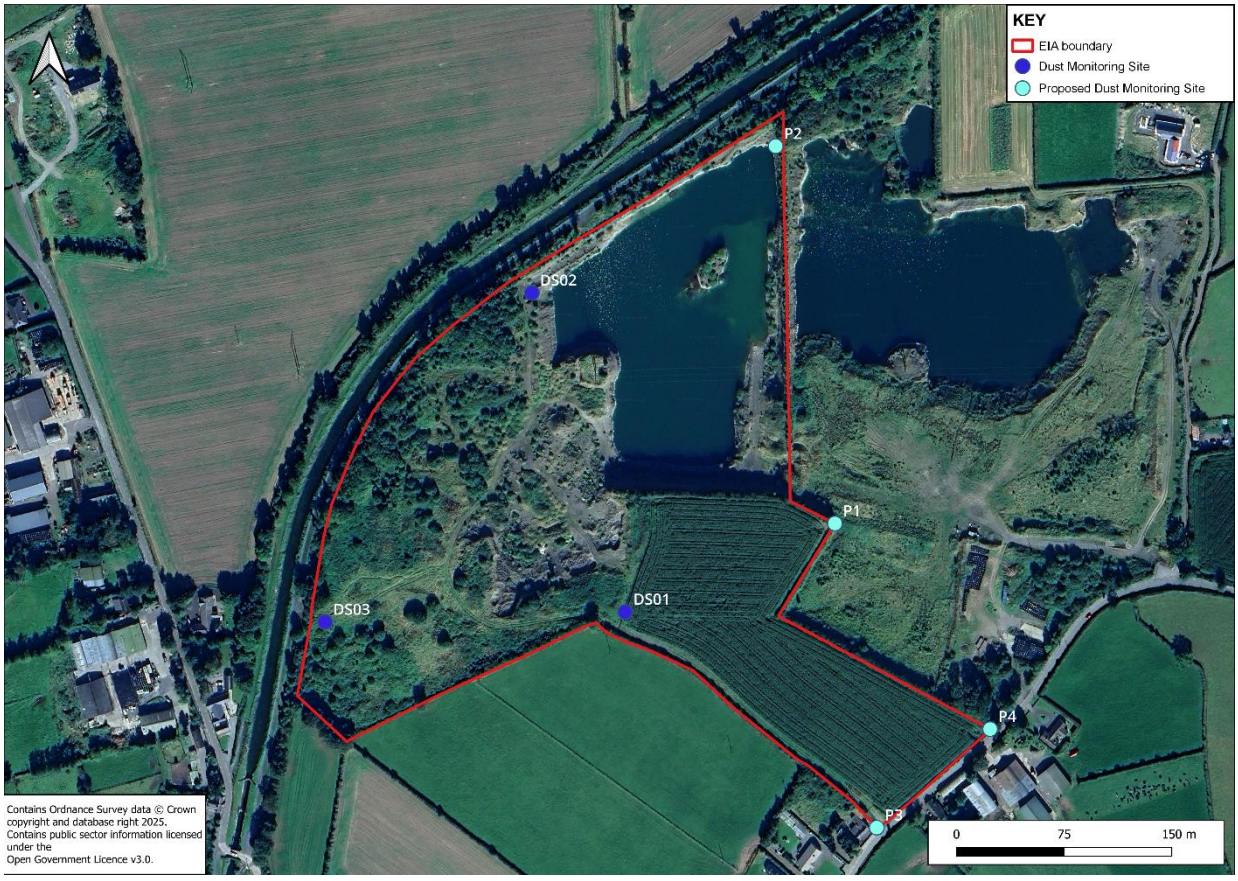
- Ongoing activities and dust control measures to ensure that measures are limiting visual dust emissions; and
- Exposed surfaces around the site (e.g., cars, windowsills etc) for evidence of dust soiling that could attributed to site activities.

Boundary dust monitoring

Dust monitoring was previously undertaken at the Application Site for a period of three months. Given the potential for Slight effects in the absence of mitigation, it is recommended that dust monitoring be continued during the construction phase to confirm the mitigation is working effectively. Monitoring should continue at the existing locations, with two additional monitoring points installed along the southwestern boundary, considering the predominant south-westerly wind direction. This setup will help capture both upwind and downwind dust deposition.

The current and proposed monitoring locations are shown in **Figure 7-7**. It is also recommended that the location of dust monitors be periodically reviewed throughout the operations of the Proposed Project to reflect the evolving nature of site activities.

Figure 7-7 - Proposed dust monitoring locations



The EPA recommend a boundary dust deposition limit value of 350 mg/m^2/day measured using the Bergerhoff method. In the event of the dust deposition limit being exceeded, the

exceedance is to be investigated through a review of on-going activities to identify the source and ensure appropriate remedial measures are implemented. Details of any exceedances, the cause and remedial measures taken should be documented in a site dust log (0).

Reporting

Monitoring data are to be collated on a monthly basis and a short summary report is to be produced. The monthly reports are to include the dust monitoring results, details of any exceedances and a summary of any remedial action taken to address on-site dust.

7.8 Residual Effects

With the application of the proposed mitigation measures, the residual effect of mineral dust and PM_{10} on sensitive human receptors is predicted to be imperceptible (i.e., negligible) and **unlikely to lead to a significant effect**. The proposed future monitoring activities will confirm this effectiveness.

Likewise, the impact of emissions of dust, PM_{10} and $PM_{2.5}$ from trackout and NO_X, PM_{10} and $PM_{2.5}$ from NRMM plant is expected to be imperceptible (negligible) and unlikely to lead to a significant effect.

7.9 Cumulative Effects

There are no existing industrial activities in the immediate surrounding area although surrounding agricultural activities may periodically generate dust due to farming activities.

The mitigation measures outlined in Section 7.7, provide sufficient mitigation for the Proposed Project against significant effects for human receptors.

As a result, cumulative effects are considered to be **Not Significant.**

7.10 Difficulties Encountered

Where suitable information was not available, professional judgement has been used in the completion of the assessment.

7.11 References

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Appendix 7A

DUST LOG REPORT FORM

Dust Log					
Date **Site** **Name**	**Weather**	Dry		Wet	
	Wind Direction (from)	N	S	E	W
		NE	NW	SE	SW
	Wind Speed	Calm	Low	Moderate	High

Daily Site Activities
This section should outline the planned daily activities on the site for the day.

Incidents/Complaints/Alerts
Record details of the incident/complaint/alert, to whom and how it was reported and what time. What was the cause of the incident/complaint/alert and where did it take place? Add detail to Dust Complaint Form.

Action Undertaken
Who undertook the site inspection, at what time and was the elevated dust due to site activities or off-site activities? What was done to minimise the dust levels and was this effective?

Follow-Up Action
Where there any follow up actions undertaken such as informing stakeholders, re-training staff, request for an updated to the DMP or contacting the complainant if necessary?