An Bord Pleanála

BALLYKELLY BISON QUARRIES

Remedial Stage 1 Screening for Appropriate Assessment

40000205-RAAS.R03
APRIL 2025

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1. INTRODUCTION

1.1. BACKGROUND

WSP Consulting Ireland Ltd. (WSP) has been commissioned to prepare a remedial Appropriate Assessment Screening (rAAS) Report to inform a substitute consent planning application. This application covers activities undertaken between the 1st of January 2000 and the 31st of December 2006. It is submitted to An Bord Pleanála (ABP) in support of an application for substitute consent for an existing quarry located in the townland of Coolsickin or Quinsborough, Monasterevin, Co. Kildare ('the Project').

The substitute consent application will run concurrently with an application for further development consisting of importation of clean soil and stone to restore the quarry to agricultural lands under S.37L of the Planning and Development Act, 2000. The application for the further development is outside of the scope of this report and will be submitted separately.

In accordance with 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'), ABP is required to undertake a Screening for a remedial Appropriate Assessment (rAA), to determine whether the Project is likely to have had significant effects (likely significant effects hereafter abbreviated to 'LSEs') upon European sites, 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. The habitats and species for which European sites are designated are termed 'Qualifying Interests'[1].

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, the requirement for Appropriate Assessment (AA) Screening (AAS), and AA if required, is transposed into Irish law through Part XAB of the Planning and Project Act 2000 (as amended) ('The Planning Acts'), and the Planning and Project Regulations 2001 (as amended). Section 177U(1) of The Planning Acts places a duty upon 'Competent Authorities' (in this case ABP) when discharging their consenting responsibilities, to determine if there are LSEs upon European sites arising from projects or plans. The Competent Authority's AA Screening determination may be informed by this report.

Should AAS 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 AA to determine if the unauthorised activity associated with the project or plan has had adverse effect(s) 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 remedial Natura Impact Statement (rNIS), which would determine whether those LSEs had an adverse effect on the integrity of any European site, in light of their Conservation Objectives.

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

1.2. CONTRIBUTORS TO THIS REPORT

WSP is the lead consultant in the preparation of the Substitute Consent planning application documentation, including this remedial Appropriate Assessment Screening (rAAS) report and the remedial Environmental Impact Assessment Report (rEIAR), for the Applicant.

Field surveys and reporting were carried out by WSP ecologists, Alex Hayden (Consultant Ecologist), Lisa O'Dowd ACIEEM (Consultant Ecologist), and Steven Tooher ACIEEM (Principal Ecologist). Alex has two years' of experience in preparing AA reports. Lisa has four years' ecological consultancy experience. Steven has nine years' experience preparing AA reports for a range of projects in the Republic of Ireland, including those seeking planning retention via the substitute consent process.

1.3. LEGISLATIVE CONTEXT

1.3.1. EUROPEAN UNION HABITATS DIRECTIVE

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

Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site […], the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.

1.3.2. 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 Development shall be carried out by the competent authority to assess, in view of best scientific knowledge, if that Land use plan or Development, 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.

1.4. STAGES OF APPROPRIATE ASSESSMENT

An AA is a multi-stage process as described below. This report covers Stage 1, which involve screening for LSEs on European sites (Stage 1). Stage 2 (AA) involves the assessment of those LSEs to determine if they will adversely affect the integrity of any European sites. AA 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 or in-combination with other plans or projects, could have significant effects on a European site in view of the Existing Project'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 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:

1) must identify, in the light of the best scientific knowledge in the field, all aspects of the Project which can, by itself or in-combination with other plans or projects, affect the conservation objectives of the European site;
2) must contain complete, precise and definitive findings and conclusions and may not have lacunae or gaps; and
3) may only include a determination that the 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 Existing Project 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.

1.5. GUIDANCE

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. (DoEHLG, 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 (EcIA) 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.
- NPWS (2008) The Status of EU Protected Habitats and Species in Ireland, National Parks and Wildlife Service (NPWS).
- 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.

2. METHODOLOGY

2.1. DESKTOP STUDY

2.1.1. IDENTIFICATION OF RELEVANT EUROPEAN SITES

The OPR (2021) recommend that the scope of 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 for plans by DoEHLG (2009) but for certain 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 (European Commission, 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 located within or adjacent to habitat, which may be functionally linked to a European site[2]. For example, impacts on suitable foraging habitat up to 20 km outside the boundary of a SPA designated for pink-footed geese *Anser brachyrhynchus* and greylag geese *Anser anser* may be considered, based on the upper-range of their commuting distance (SNH, 2016).

For this rAAS, European sites with the potential to be affected by the 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., functionally linked land).

2.1.2. GATHERING QI DISTRIBUTION DATA

Based on the assessment of connectivity, data was collected on the distribution of qualifying habitats and species of European sites deemed to be connected to the Project. Sources included:

- 2019 Article 17 Spatial Data (NPWS, 2019);
- 2007 Article 17 Spatial Data (NPWS, 2008);
- National Survey of Native Woodlands 2003-2008 (NPWS,2008);
- National Biodiversity Data Centre (NBDC, 2024);
- Freshwater mussel Margaritifera Sensitive Area Mapping (NPWS, 2017);
- The Status and Distribution of Lamprey in the River Barrow SAC (King, 2006);

[2] In the context of this report, the term 'functionally linked' refers to the role or 'function' that land or sea (which may be beyond the boundary of a European site) might fulfil in terms of ecologically supporting the populations for which the site was designated or classified. Such land is therefore 'connected' to the European site in question because it provides an important role in maintaining or restoring the population of qualifying species at favourable conservation status.

- Fish Stock Assessment of the River Barrow Catchment (IFI, 2015); and
- Environmental Protection Agency (EPA) research (Quinn-Kelly et al., 2015).

Online records from the NBDC pertained to a circle with a 5-km radius around the Project Site. Species records were only considered if they were collected during the assessment period (i.e., from 2000 to 2006).

2.1.3. ESTABLISHING SITE CONDITIONS DURING ASSESSMENT PERIOD

To retrospectively build a narrative of the Project of the subject lands over the assessment period of 01 January 2000 to the 31 December 2006, publicly available resources have been reviewed - mapping and photography; anecdotal records from neighbouring landholders; and KCC planning files to obtain point-in-time descriptions of the Project Site.

Aerial imagery from Ordnance Survey Ireland (OSI), shows the Project Site conditions from 1995, 1996-2000, 2001-2005, 2006-2012, 2011-2013 and 2013-2018. Google Earth imagery shows the Project Site conditions from 2009, 2016, 2018 and 2022. The most relevant imagery for the purpose of this assessment is OSI 1996-2000 (i.e. before commencement of works - see Figure 2-1) and Google Earth 2009 (see Figure 2-2). It is noted that no aerial imagery exists depicting the Project Site conditions at the end of the assessment period (31 December 2006), but that the 2009 image is the closest available resource.

The habitat assemblages within the Project Site, as presented in the 2009 imagery, are not representative of the likely conditions on 31 December 2006. This is because the Project Site would have experienced substantial vegetative recolonisation in the 2-3 years (2006-2009) since operations ceased and the site was abandoned. Habitat assemblages on 31 December 2006 have been assigned based on the likelihood that the entire Project Site was subject to rigorous disturbance associated with extraction operations, including the extraction of rock, crushing/screening of aggregate, stripping and re-deposition of overburden, vehicle/machinery movements and various ancillary works. It is also noted that a small section of hedgerow was removed to accommodate access to the Project Site.

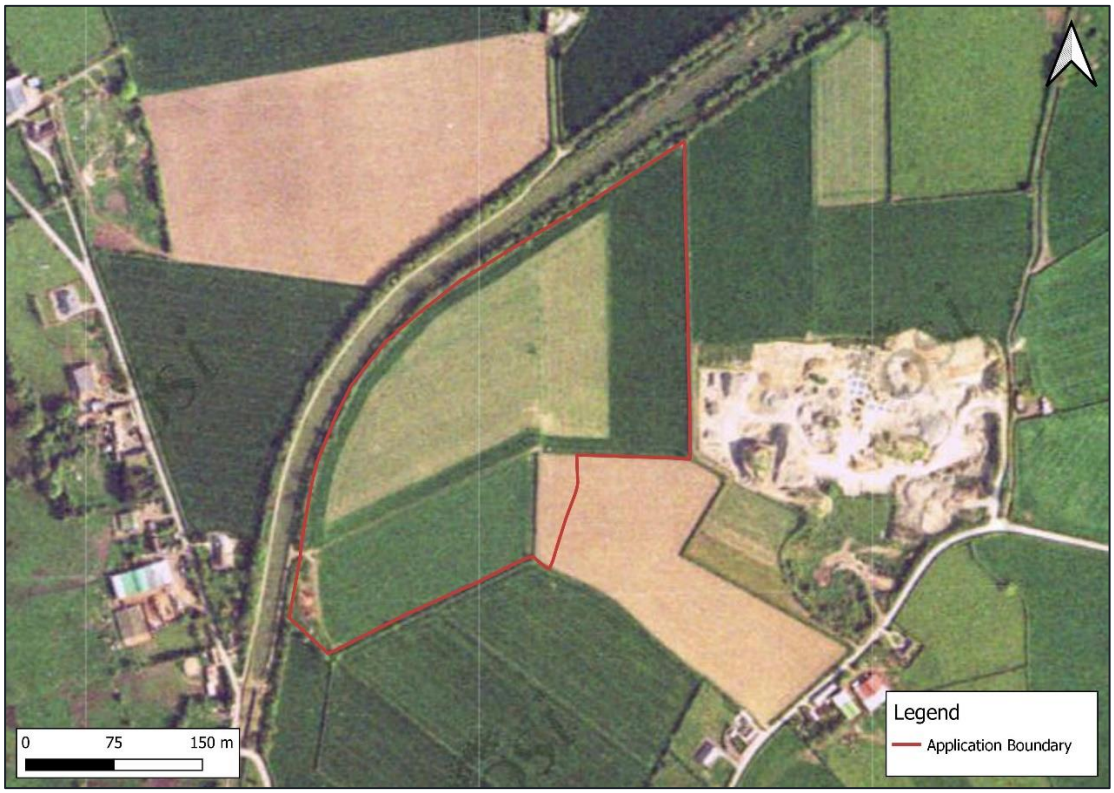

Figure 2-1 - Baseline Conditions (OSI 1996-2000)

Figure 2-2 - 2009 Conditions (Google)

2.2. FIELD SURVEYS

A suite of ecological surveys was carried out in 2023 and 2024, whose primary objective was to establish a baseline for use in the Section 37L application for the further quarry extraction project. These have been detailed in Chapter 4 of the associated rEIAR (see Appendix A).

2.3. ASSESSMENT OF LIKELIHOOD OF SIGNIFICANT EFFECTS (AA SCREENING)

AA screening is carried out in accordance with the below steps:

1. Establish whether the plan or project is directly connected with or necessary for the management of a European site, in accordance with Article 6(3) of the Habitats Directive;
2. Identify any European sites within the EZoI, in accordance with the conclusions of the desktop exercises as presented in Section 2.1;
    a. Exclude any European sites out with the EZoI;
3. Identify the impacts of the Project that may have resulted in likely significant effects (from the Project in isolation) on relevant European site(s);
4. Where effects are identified but are not determined to be significant, assess whether likely significant effects may arise from the Project **in combination** with other plans/projects;
5. Determine the requirement of AA, based on whether significant effects are deemed likely, or possible (in accordance with the precautionary principle).

3. OVERVIEW OF PROJECT

3.1. SITE LOCATION

The Project Site is wholly located in the townland of Coolsickin or Quinsborough, which is situated ca. 2.7 km north of Monasterevin and ca. 9 km southwest of Kildare Town. The grid reference coordinates (Irish Transverse Mercator) for the approximate centre of the Site are E663403, N713199. The site location is shown in Figure 3-1.

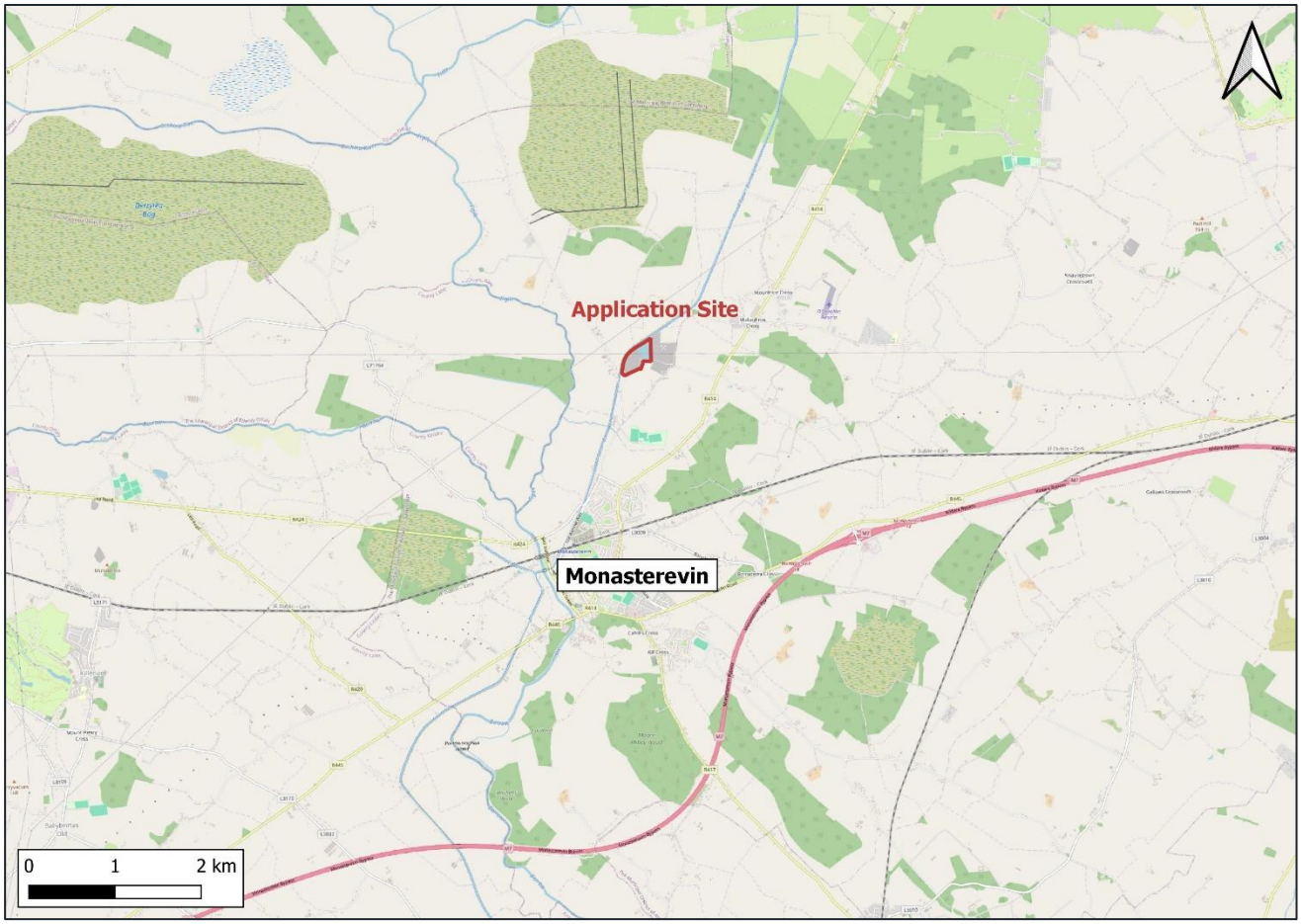

Figure 3-1 - Site Location

3.2. SITE ACCESS

The Project Site is accessed off the L7049 which runs southwest to east. The L7049 joins the R414 to the northeast and the R424 in the southwest. The R414 is a regional road linking Monasterevin and Rathangan and the R424, also a regional road, linking Monasterevin to Portarlington.

The current access route to the gravel pit is by means of a laneway/gravel road running adjacent to a stretch of agricultural land owned by the applicant. During the period of operation, the quarry was accessed through the adjoining quarry which is also accessed of the L7049 approximately 270 m north of the existing access.

The quarry site is accessed via a gravel-covered laneway from the L7049 road linking to the R414. The laneway is ca. 250 m long and bounded on both sides by agricultural fields. The laneway currently leads to an area of hummocky land with various tracks leading to the quarry.

3.3. PROJECT ACTIVITIES

The Project comprises a quarry and therefore there has been movement and stockpiling of soils / subsoils as well as extraction, crushing, and screening of aggregate and rock from the void area. It has been estimated, on a worst-case basis, that the Project conducted blasting within the quarry void twice a month and resulted in the extraction of 108,571 tonnes of material per annum, resulting in a total sum of 760,000 tonnes with approximately 46 truck movements per day during the assessment period.

3.3.1. MANAGEMENT OF SURFACE WATER

Management of surface water would have been incorporated into the design of standard features. A detailed description of surface water management can be found in Chapter 6 of the rEIAR (Appendix A). Relevant information for the purpose of this assessment have been listed below:

- The topography of the Project Site slopes towards the canal. There is a dip in the topography between the Project Site and canal, which acts as a drain. The incline between the dip and the canal prevents surface water from entering the canal.
- Considering the limestone bedrock, it is likely that the quarry void would have required dewatering. Although there is no record of the method used for dewatering, it is predicted that dewatering of the quarry void was executed by discharging to ground within the Project Site.

3.3.2. MANAGEMENT OF DUST

Management of dust would have been incorporated into the design of standard features. A detailed description of dust management can be found in Chapter 7 of rEIAR (Appendix A). The following list highlights relevant information required for the purpose of this assessment:

- Approximately 88.9% (a total loss of 212 m of hedgerow) of the existing treeline and hedgerows were maintained. This would have contained significant amounts of dust generated by the Project.
- Dust generation would have been reduced due to the high moisture nature of the sand and gravel extracted from the quarry.
- Removal of the subsoil would have created a void, such that dust would have been contained during blasting activities.

3.3.3. MANAGEMENT OF NOISE AND VIBRATION

Management of noise and vibration would have been incorporated into the design of standard features. Factors that would have influenced noise and vibration can be found in Chapter 2 and Chapter 9 of the rEIAR (see Appendix A). The following list highlights relevant information required for the purpose of this assessment:

- Hours of operation were 07:00 to 17:00 hours Monday to Friday, and 07:00 to 14:00 hours Saturday. There was no working on Sundays or Bank/Public Holidays. As such, any noise or vibration effects would have occurred within this timeframe only.

- Blasting would have caused the worst-case scenario effects related to noise and vibration. The frequency of blasting would have influenced the significance of these effects. It has been assumed that blasting occurred at most twice a month during the assessment period.
- The maintained hedgerow and the presence of quarry side slopes would have dampened noise caused by blasting to some degree.

4. RESULTS

4.1. DESKTOP STUDY

4.1.1. IDENTIFICATION OF RELEVANT EUROPEAN SITES

Table 4-1 provides details of the QIs of each European site identified within the EZoI of the Project, the approximate distance and direction of each European site, and assesses whether there is potential connectivity[3]. Only European sites established before the conclusion of the Project activities have been considered; therefore all sites within the EZoI of the Project were designated before January 2000 and no later than March 2003. The locations of these European sites in relation to the Project are shown in Figure 4-1.

The potential for groundwater connectivity is assessed initially based on whether the QIs associated with a European site are groundwater dependent. More detailed information on groundwater conditions and connectivity is provided later in this report (**Section 5.2**).

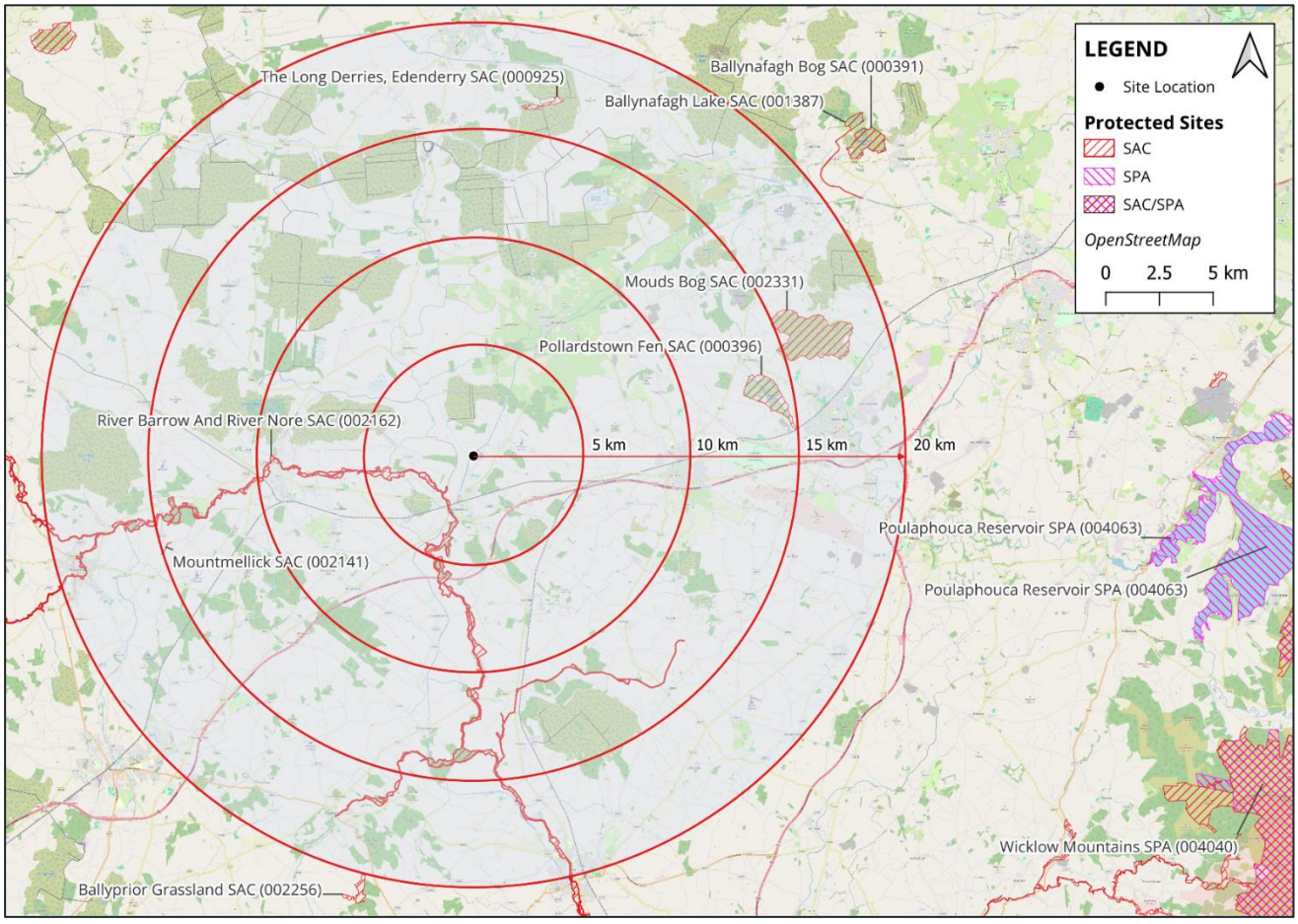

Figure 4-1 - European sites within the EZoI of the Project

[3] Information on designated sites was obtained from freely downloadable datasets from National Parks and Wildlife Service (NPWS). Available at: https://www.npws.ie/protected-sites (accessed December 2024).

Table 4-1 - European Sites Within the EZoI

Site Name and Code	Qualifying Interests [Habitats/Birds Directive Code]	Distance from 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]	1.6 km SW (direct) 25 km (via canal)	No surface watercourses are located within the Project Site boundary and surface water has not discharged from the Project Site at any stage during the assessment period, owing to the nature of the Project and resulting topography. There was therefore **no hydrological connectivity** between the Site and this SAC. The Site was situated above the Bagenalstown Upper groundwater body (EU Code: IE_SE_G_153). The area of SAC west of the Project Site is situated in the Cushina groundwater body (EU Code: IE_SE_G_048). The natural flow of the groundwater below the Project Site is in the west direction. There are two surface waterbodies to the west of the Site that flow into the SAC: the Grand Canal Barrow Line and the River Figile. The Grand Canal is situated approximately 3.65 m above the groundwater body, preventing hydraulic connectivity between the canal and the Project Site. There was some potential for hydraulic connection to exist between the Project Site and the River Figile; however, it is considered unlikely for the following reason: ▪ The River Figile was more likely to have been fed by the sand and gravel aquifer than the moderately productive (Ll) bedrock aquifer (see rEIAR Chapter 6, Appendix A).	**Y**

	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] **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]		Abstraction for the Monesterevin public water supply likely influences the groundwater to flow in a south-east direction away from the river. However, it is not known when abstraction began, although there is reference to at least two abstraction points in the Kildare Groundwater Protection Scheme of 2002. On this basis, in accordance with the precautionary principle, it is considered that **the potential for groundwater connectivity cannot be ruled out** as an impact pathway between the Project Site and this SAC for the entirety of the assessment period. The Institute for Air Quality Management (IAQM, 2016) state the following, which is relevant to determining connectivity for dust emissions: *"If there are no relevant receptors within 1 km of the operations, then a detailed dust assessment can be screened out. In such a case, it is considered that irrespective of the nature, size and operation of the site, the risk of an impact is likely to be "negligible" and any resulting effects are likely to be 'not significant'."* The SAC is 1.6 km from the Project Site. As such there was **no direct connectivity for dust emissions**. Indirect impacts from dust emissions cannot be evaluated without considering functional connectivity between the Site or the area of canal adjacent to the Site and the SAC given the proximity of the Site to the Grand Canal (Barrow Line) and the aquatic and semi-aquatic nature of nine of the QIs. It is considered that the canal potentially provided functionally linked land for aquatic and semi-aquatic species of the SAC if migration into the canal from the River Barrow occurred during the assessment period. The canal runs adjacent	

			to the Site and connects to the SAC via the River Barrow 25 km south, in Athy[4]. As per Chapter 7 of the assessment in the rEIAR (Appendix A), there were potential adverse effects to the canal area within 400m of the Site due to dust emissions. Although the magnitude of any effect would be very small (given the embedded measures described in Section 3 above). there is **potential indirect connectivity via dust emissions**. Given the potential functional connectivity, there is additionally, a potential pathway to effect from noise and vibration associated with (worst case) bi-monthly blasting activities described in Section 3. Therefore, there is **potential indirect connectivity via noise and vibration**.	
000396 Pollardstown Fen SAC	**Habitats** Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* [7210] Petrifying springs with tufa formation (Cratoneurion) [7220] Alkaline fens [7230] **Species** Geyer's Whorl Snail (*Vertigo geyeri*) [1013]	12.9 km E (direct)	There was **no hydrological connectivity** between the Site and the SAC. Fen habitats (7210 and 7230) and are groundwater-dependent terrestrial ecosystems (GWDTEs). Similarly, petrifying springs are groundwater-dependent aquatic habitats. 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 was located within the Bagenalstown Upper groundwater body. Given the Project Site and SAC	**N**

[4] It should be noted that the canal crosses over the River Barrow in two locations via aqueduct (in Monasterevin and just south of Vicarstown) before entering the River Barrow.

	Narrow-mouthed Whorl Snail (*Vertigo angustior*) [1014] Desmoulin's Whorl Snail [1016]		were not within the same groundwater bodies, there was **no groundwater connectivity**. Due to the distance involved, there was also **no conceivable connectivity for dust emissions**. The lack of hydrological connectivity means that there was also **no functional connectivity** for *Vertigo* snails.	
002141 Mountmellick SAC	**Species** Desmoulin's Whorl Snail *(Vertigo moulinsiana)* [1016]	14.6 km W (direct)	There was **no hydrological connectivity** between the Site and the SAC. The Site was situated within the Bagenalstown Upper groundwater body while the SAC lies within the Portlaoise groundwater body (IE_SE_G_107). Thus, **there was no groundwater connectivity** between the Site and SAC. Due to the distance involved, there was **no connectivity for dust emissions**. The lack of hydrological and groundwater connectivity means that there is also **no functional connectivity** for *V. moulinsiana*.	**N**
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 NE (direct)	The Site was situated approximately 14.9 km south-west of the SAC. **There was no hydrological connectivity** between the Site and the SAC. 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 Site was located within the Bagenalstown Upper	**N**

			groundwater body. Given the Site and SAC were not within the same groundwater bodies, there was **no groundwater connectivity**. Due to the distance between the Site and SAC being over 10 km, there was **no conceivable 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 N (direct)	**There was no hydrological connectivity** between the Site and the SAC. This SAC is designated for habitats only; there was therefore **no functional connectivity** with the Site. Due to the distance involved, there was **no conceivable connectivity for dust emissions**.	**N**

Following the assessment of connectivity, it has been determined that groundwater connectivity between the Project Site and the River Barrow and River Nore SAC could not be ruled out. In addition, indirect connectivity via dust emissions and noise/vibration between the Project Site and the Grand Canal (potentially used by QIs of the River Barrow and River Nore SAC) could not be ruled out. Therefore, further assessment is required to determine the likelihood of significant effects on the **River Barrow and River Nore SAC**.

No connectivity between the Site and any other European sites was found.

4.1.2. QI DISTRIBUTION AND 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 5).

Groundwater connectivity and indirect connectivity via dust emissions to potential functionally linked land were identified as impact pathways in **Section 2.1.1**.

Below are some factors to consider when discussing connectivity for QI via these impact pathways:

- Groundwater flowed in one of two directions depending on the presence of abstraction for the Monasterevin water supply: west or south-east. Only in the absence of abstraction was there potential for groundwater connectivity and the SAC. This pathway would have entailed water from the Project Site entering the Bagenalstown Upper groundwater body, flowing west into the and Cushina groundwater body, and up into the River Figile before flowing 1.4 km downstream into the SAC. This pathway was unlikely but could not be ruled out (see Chapter 6 of the rEIAR, Appendix A) and is considered further for QI in Table 4-2.
- The Grand Canal has been managed by Waterways Ireland (WI) since 2000. There are no records of the management of the canal adjacent to the Project Site during the assessment period. However, management practices within the Barrow catchment for the purpose of navigation were likely extended to the Grand Canal Barrow line. These practices included 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 Site and where the canal joins the SAC. These factors posed a significant barrier to migratory aquatic species; however, on a precautionary basis connectivity for QI are considered further in 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 93 km downstream from canal adjacent to the Project Site. For connectivity to have existed between the estuary habitat and the Site via the River Figile, there would need to have	N

	been groundwater connectivity to the River Figile. As discussed in **Section 2.1.1**, this is unlikely to have been the case. However, assuming there was groundwater connectivity, the downstream distance to the distribution and range of this habitat would have been 93.3 km. The length and nature of these potential pathways and the assimilative capacity of the watercourses between the Site and this habitat rule out the potential for connectivity between the estuary habitat and the Site during the assessment period. As such, there was **no connectivity** between the Site and the estuary habitat within the SAC.	
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 Site. Article 17 data from 2008, shows the downstream distribution and range of this habitat as 101.7 km via the River Figile directly west of the Site or 101 km via the canal adjacent to the Site. As discussed for estuaries, the downstream distance of 130 km and the assimilative capacity of the watercourses between the Site and this habitat rule out the potential for connectivity between the mudflats and sandflats habitat and the Site. As such, there is **no connectivity** between the Site and the mudflats and sandflats habitat within the SAC.	N
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 Article 17 data from 2008, the distribution and range for this habitat was 135.5 km downstream of the River Figile west of the Site or 133 km downstream of the canal adjacent the Site. Similarly to estuaries and the mudflat and sandflat habitats, the downstream distance of over 130 km and the assimilative capacity of the watercourses between the Site and this habitat rule out the potential for connectivity between the reefs in the SAC and the Site during the assessment period. As such, there was **no connectivity** between the 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 Site. Article 17 data from 2008, shows the downstream distribution and range of this habitat within the SAC was 101.7 km via River Figile directly west of the Project Site or 101 km via the canal adjacent to the Project Site.	N

	The downstream distance of at least 101 km and the assimilative capacity of the watercourses between the 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 Site during the assessment period. As such, there was **no connectivity** between the Project Site and *Salicornia* and other annuals colonising mud and sand within the SAC.	
Atlantic salt meadows [1330] Mediterranean salt meadows [1410]	These coastal habitats were present at the mouth of the River Suir in Waterford Harbour. The distribution and range of these habitats as defined by Article 17 data from 2008 was 109.1 km downstream of the River Figile immediately west of the project Site or 108.4 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 Site during the assessment period. As such, there was **no connectivity** between the Project Site and Atlantic or Mediterranean salt meadows within the SAC.	N
Water courses of plain to montane levels with the *Ranunculion fluitantis and Callitricho-Batrachion* vegetation [3260]	Article 17 (2008) range and distribution mapping covered the entire country, and Article 17 reporting concedes that the distribution of this habitat was not known. It is assumed it was present within the EZoI. Nonetheless, in order for connectivity via indirect dust emission between the habitat area within the SAC and the Project Site, dust would have had to settle on the canal adjacent to the Project Site and flow into the SAC. Give the minimum downstream distance between the canal adjacent to the Site and the SAC is 25 km and the assimilative capacity of the canal, **connectivity via indirect dust emission can be ruled out**. Although unlikely, there was **potential for connectivity via groundwater** and the River Figile which flows into the SAC where this habitat may be found.	**Y**
European Dry Heaths [4030]	European dry heaths within the SAC are currently unmapped. Article 17 data relevant to the review period shows a country wide range and distribution that covered the majority of the country with the exception of Meath, Westmeath, Longford, North Roscommon, South Leitrim, South Cavan, South Monaghan, and the majority of Louth. Given terrestrial nature of the habitat, the fact that there was no overlap between the Project Site and SAC boundaries,	N

	the distance between the SAC and Project Site was 1.6 km, there was **no connectivity** between areas of European dry heath within the SAC and the Site.	
Hydrophilous tall herb fringe communities [6430]	According to the Conservation Objectives for this SAC, the distribution of hydrophilious tall herb fringe communities is largely unknown, but the nearest mapped area in the SAC is in Carlow town, 42.8 km downstream via the canal adjacent to the Site or 43.4 km downstream via the River Figile. Article 17 data from 2008 shows the distribution and range for this habitat was 80.1 km downstream of the canal adjacent to the Project Site or 80.4 km downstream of the River Figile immediately west of the Project Site. Considering the lack of a direct hydrological connection between the Project Site and the SAC, the weak nature and length of the connection via groundwater and the River Figile to the closest mapped area of habitat being over 80 km, and the length of indirect connection via dust emissions being over 40 km, **no connectivity** between the Project Site and hydrophilous tall herb fringe communities habitat existed.	N
Petrifying springs with tufa formation [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 data from the assessment period shows that the distribution and range for this habitat had a downstream distance of 3.4 km via the River Figile or 77.8 via the canal adjacent to the Site. Given the length of the downstream distance via the canal and assimilative capacity of the canal and River Barrow, there was **no connectivity via indirect dust emission** between the distribution of petrifying springs with tufa formation and the Site during the assessment period. However, there was **potential for connectivity via groundwater** and the River Figile.	**Y**
Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0]	Based on Article 17 data from 2008, the distribution and range of this habitat lay 62.5 km south of the Site. In the Conservation Objectives document, the mapping for old sessile oak woods within the SAC was based on Perrin et al. (2008). It was found within the SAC along the River Delour, River Nore, and River Barrow[5]. The closest mapped area of this habitat within the SAC was 69.6 km south of the Site in Drummond Wood, Co. Carlow. However, this did not include	N

[5] NPWS (2011) Conservation Objectives for the River Barrow and River Nore SAC [002162], Version 1, National Parks and Wildlife Services (NPWS), Department of Arts, Heritage, and the Gaeltacht, https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002162.pdf.

	habitat 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 Site being 1.6 km, there was **no connectivity** between the Site and old sessile oak woods.	
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 Article 17 data from 2008, covered a large portion of the country. However, it is recognised in the Article 17 report (2008) that this habitat occurs in areas along lakes and rivers that are subject to flooding. The mapping for alluvial forest within the SAC for the purpose of setting Conservation Objectives in 2011 was based on Perrin *et al.* (2008). Given the data in this report was collected during the assessment period and is of higher resolution, 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 21.6 km via the River Figile or 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, and the weak nature and length of the connection via groundwater and the River Figile to the closest mapped area of habitat being over 21 km, and the length of indirect connection via dust emissions being approximately 40 km, **no connectivity** between alluvial forest habitat within the SAC and the Project Site existed.	N
Killarney Fern (*Trichomanes speciosum*) [1421]	According to the Article 17 (2008) data, the distribution and range for Killarney Fern was 63.2 km south of the Project Site. Given the terrestrial nature of this species, the fact that there was no overlap between SAC and the Project Site, and that the distance between the Project site and above distribution and range for this species during the assessment period, there was no connectivity to the Project site for Killarney Fern.	N
Aquatic Species		
White-clawed Crayfish [1092]	The canal adjacent the Site as well as the River Figile both fall within the distribution and range of white-clawed crayfish during the assessment period. Although there are no records of white-clawed crayfish within the Grand Canal Barrow Line, records on the River Figile (N624121; River Biologists' Database (EPA); 10/08/2006) and River Barrow (N622109; River Biologists' Database (EPA); 31/12/2003	**Y**

	and 10/08/2006) indicate that the species were present in the local area during Site operations. White-clawed crayfish are largely nocturnal and have a 10-year lifespan. Holdich (2003) describes in detail a refuge 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 *et al.*, 2009). Maintenance of the canal would likely reduce 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 *et al.,* 2009). The presence of SAC populations adjacent to the Project Site is considered unlikely given the fluvial distance between the area of canal adjacent to the Project Site and where the canal enters the SAC, the significant barriers present, and the fact that maintenance of the canal would likely limit the availability of refuge for this species. Nonetheless, some **connectivity cannot be entirely ruled**.	
Sea Lamprey [1095]	Using Article 17 data from the assessment period, the downstream distance of the distribution and range of sea lamprey was estimated as 53 km downstream via the River Figile and 53.3 km downstream via the canal. 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 Site and 66.6 km via the River Figile. Considering the distribution and range of this species and downstream distance to functionally connected habitats for this species, there was **no connectivity** between SAC sea lamprey populations and the Site during the assessment period.	N

River Lamprey [1099] Brook Lamprey [1096]	According to Article 17 data from the assessment period and King (2006), river and brook lamprey were present across the entirety of the Barrow catchment. 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 was considered limited during the assessment period due to the lack of suitable habitat. It was also considered likely that ammocoete populations were adversely impacted by the aforementioned maintenance practices by removing individuals and degrading habitat (King, 2006). Given the canal is clay-lined, the significant upstream barriers for lamprey species, canal maintenance practices, and navigation traffic, the presence of lamprey in the canal adjacent to the Site is highly unlikely. However, given the fact that lamprey are recorded throughout the catchment despite the lack of optimal habitat, **connectivity for these species cannot be entirely ruled out** during the assessment period.	Y
Twaite Shad [1103]	This species was confined to the tidal reaches of the Rivers Nore and Barrow (King, 2006; IFI, 2013). Article 17 data from the assessment period shows a distribution and range with a downstream distance of 80.4 km via the River Figile and 80.1 km via the canal adjacent to the Site. For the River Barrow, the tidal limit is St. Mullins (King & Roache, 2008), which was over 100 km downstream of the canal adjacent to the Site or the River Figile. 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 was **no connectivity** for twaite shad during the assessment period.	N
Salmon [1106]	Article 17 data from the assessment period show 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 require a variety of habitat conditions in close proximity to accommodate individuals in both 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	Y

	and pool area adjacent to a barrier in order for adults to negotiate the barrier (Hendry & Cragg-Hine, 2003). The canal did 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 watercourse long predate 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. Although it's unlikely that salmon used the canal as a spawning habitat or commuting route, **connectivity cannot be entirely ruled out** during the assessment period.	
Freshwater Pearl Mussel (FPM) [1029]	According to the Article 17 data published in 2008, the distribution and range of FPM lay approximately 43.3 km south of the Site. The downstream distances were 53.0 km via the River Figile or 52.3 km via the canal adjacent to the Site. Although canalised rivers can provide suitable habitat for freshwater pearl mussel, they are more often recorded in rivers that have not been canalised (Moorkens; 2000). FPM 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. FPM are not a mobile species and rely on host fish as glochidia. Shortly after release from the maternal FPM, 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 & Hastie, 2003). Considering the distribution and range of the species at the time, the significant barriers for host fish (and glochidia), the fluvial length between the known distribution of FPM within the SAC and the Project Site, and lack of suitable habitat for young mussels to settle in after encystment, it is unlikely that freshwater pearl mussel are present in the area of canal adjacent to the Site. As such, there was **no connectivity** between FPM SAC population(s) and the Project Site during the assessment period.	N

Nore Freshwater Pearl Mussel [1990]	The Conservation Objective document maps the habitat area for Nore FPM as stretches of the River Nore between Cappanacloghy and Ballyragget. Article 17 data from the assessment period reflect this. There is no direct hydrological connection between the River Figile or the canal adjacent to the Site and the distribution of Nore FPM population in the SAC. Therefore, **no connectivity** existed between the FPM SAC population and the Project Site during the assessment period.	N
Semi-aquatic Species		
Otter [1355]	Otters have been recorded across the entirety of the Barrow catchment (as seen on the NBDC). This is supported by Article 17 data for the assessment period. Otters can exit the water to travel over land. According to Reid *et al.* (2013), female otters in Ireland have a home range of 9 km and males a home range of 18.5 km. During the assessment period, otters could conceivably have travelled from the River Barrow into the canal at Monasterevin, which is ~2.5 km from the Site, or up the River Figile and out of the SAC. Breeding sites are associated with extensive reed beds, ponds and lakes, deciduous woodland, young conifer plantations or/and extensive areas of scrub and provide breeding otters with security from disturbance, natal den sites, play areas for cubs, safety from flooding, and a good food supply (Liles, 2003). The area of canal adjacent to the Project Site is not classified as any of the habitats associated with breeding sites. Canal use and maintenance would like cause too much disturbance for breeding otters. Non-natal holts are generally found next to aquatic areas with the exception of natal holts which may be located some distance from a waterbody (Chanin, 2003). Whilst the Application Site provided suitable holting habitat such as mature trees, the high level of disturbance associated with the project may have deterred any holting activity. Therefore, it is unlikely that a natal den is within 200 m of the Project Site along the canal or a non-breeding holt is present within 30 m. However, the Project Site, and the Canal, may have been used for commuting and foraging. Therefore, **connectivity was possible** between otter populations associated with the SAC and the Site during the assessment period.	**Y**
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. This is reflected in the Article 17 range and distribution data for this species available for the	N

	assessment period. The New Wood distribution pocket lies 45.6 km south-west of the Site with downstream distances of 77.5 km via the canal area adjacent to the Project Site and 78.2 km via the River Figile. The closest record within the SAC from the NBDC was in New Wood (All Ireland Non-Marine Molluscan Database, 28/10/2006). The Old Glass River distribution pocket lies approximately 62.9 km south with no direct hydrological connectivity to the canal adjacent to the Site. Desmoulin's whorl snail dispersal is believed to be primarily water-borne such that snails will float downstream attached to vegetation (Killeen, 2003). The Project Site was situated above a different groundwater body. In addition, the length of potential pathways between the Site and SAC populations of Desmoulin's whorl snail and the assimilative capacity of the watercourses between any potential functionally connected habitat for this species and the distribution of the species during the assessment period, means that **connectivity can be ruled out**.	

The distribution of QIs within River Barrow and River Nore SAC has been assessed. Based on this assessment, the QIs in **Table 4-3** will be carried forward to rAA screening, while all other QIs are screened out of further consideration.

Table 4-3 – QIs for Assessment of the Likelihood of Significant Effects

Qualifying Interest	Relevant Impact Pathway(s)		
	Groundwater	Functional[6]	Dust Emissions and Noise/Vibration[7]
Water courses of plain to montane levels with the *Ranunculion fluitantis and Callitricho-Batrachion* vegetation [3260]	x		
Petrifying springs with tufa formation [7220]	x		
White-clawed Crayfish [1092]	x		x
River Lamprey [1099]	x		x
Brook Lamprey [1096]	x		x
Salmon [1106]	x		x
Otter [1355]	x	x	x

[6] Direct functional connectivity to the Project Site as opposed to the canal adjacent to the Site.
[7] In consideration of the Grand Canal potentially comprising functionally linked land (used by QIs of the River Barrow and River Nore SAC).

5. ASSESSMENT OF LIKELIHOOD OF SIGNIFICANT EFFECTS

This section identifies whether the impacts associated with the Project are likely to have resulted in significant effects upon any of the European sites/QIs identified to have connectivity with the Site.

5.1. ARTICLE 6(3) STATEMENT – MANAGEMENT OF EUROPEAN SITES

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

5.2. CONSIDERATION OF ENVIRONMENTAL EFFECTS – RATIONALE

The screening assessment is based on the rationale set out below, in relation to ground water, indirect dust emissions, and noise/vibration emissions, and the resulting likelihood of significant effects on the identified QIs.

EFFECTS VIA GROUNDWATER

The potential for connectivity between the SAC and the Project Site via groundwater bodies and the River Figile prior to abstraction for the Monasterevin water supply in November 2002 could not be ruled out. The potential effects via this impact pathway would have been in relation to changes in groundwater availability and contamination as a result of hydrocarbon leaks from fuel storage tanks or the unmanaged spillage of fuels or lubricants from plant or vehicles. In order to evaluate the likelihood of significant effects via this impact pathway, metrics obtained under the Water Framework Directive (WFD) using data from the assessment period for the Bagenalstown Upper and Cushina groundwater bodies as well as the River Figile can be utilised in conjunction with the findings of the Water Chapter of the rEIAR (see Appendix A).

Under the WFD, the EPA are responsible for monitoring, assessing and reporting on the quality of waterbodies and watercourses in Ireland, including groundwater bodies and rivers. The earliest cycle for WFD reporting for groundwater bodies was 2007-2012. During this period, baseline data was collected by classifying groundwater bodies based on the objectives of the WFD using both chemical and quantitative status. Data collected between 2000 and 2007 was used to inform this classification. This process considered the ecological requirements for groundwater dependant terrestrial ecosystems including an assessment of adverse effects of groundwater abstraction and pollution. In order to have a good overall status, a groundwater body was required to have good status results for all classification tests. The groundwater body below the Project Site is the Bagenalstown Upper groundwater body, which had an overall status of good during the 2007-2012 period[8]. Similarly, the groundwater body to the west of the Project Site is the Cushina groundwater body, which also has an overall status of good during the 2007-2012 period[9].

In relation to river waterbodies, the earliest reporting period was the 2007 – 2009 period using data from 2005 – 2007 or 2003 – 2004 depending on data availability. The closest EPA monitoring station

[8] Available using WFD Water Quality Dashboards and searching for “Bagenalstown Upper”: https://www.catchments.ie/data/#/waterbody/IE_SE_G_153?_k=8uqhnz.
[9] Available using WFD Water Quality Dashboards and searching for “Cushina”: https://www.catchments.ie/data/#/waterbody/IE_SE_G_048?_k=nrcg44

that is hydrologically connected to the River Figile is Pass Bridge, which lies 2.2 km downstream. Biological quality interim status was classified by evaluating the status of macroinvertebrate, diatom, and fish, as well as considering the conservation status of the river. The invertebrate status represents the Q-values recorded during the assessment period. The 2007–2009 invertebrate status was considered good, which equates to a Q-value of 4. This status persisted into the following reporting cycle (2010-2012)[10].

INDIRECT DUST EMISSIONS

Indirect dust emissions would have had the potential to effect QI using functionally linked land (see **Table 4-1**) within either the Project Site (otter only) or the canal adjacent to the Site. In order to accurately assess the likelihood of significant effects due to dust emission, the distribution and likelihood of presence in the canal should be considered in conjunction with the results of the Air Quality Chapter of the rEIAR (Appendix A) and relevant WFD data.

Under the WFD, the EPA are responsible for monitoring, assessing and reporting on the quality of canal waterbodies in Ireland. The earliest cycle of WFD reporting for canals is for the 2009 – 2015 period. However, in order to establish a baseline, interim classifications on waterbodies were established in 2008. Artificial waterbodies (AWB), including canals, were classified differently to natural waterbodies to account for their artificial characteristics using the metric: ecological potential. This measures the degree to which an AWB achieves its maximum capacity for supporting aquatic ecosystems using macroinvertebrate, macrophyte, hydro-morphological and physicochemical data from 2006-2007[11]. The Grand Canal Barrow Line assessment was determined through monitoring and was reported to have Good Ecological Potential[12] during the assessment period and each consecutive assessment period to date.

Chapter 7 of the rEIAR has screened-in mineral dust, plant and machinery emissions as potential sources of emissions to air. The canal adjacent to the Site is considered an ecological receptor with high sensitivity to deposited dust and fine particles from the extraction activities due to the potential for it to comprise functionally linked land for aquatic and semi-aquatic QIs. Following IAQM (2016) guidelines, this assessment concluded that the risk of effect due to dust emissions on the canal adjacent to the site was low. As such, in the event of dust emission effects, the magnitude would comprise no more than a slight adverse effect considering the dust management incorporated into the design of standard features (see Section 3.3.2).

NOISE/VIBRATION

In accordance with the description of activities associated with the Project (Section 2.1.3), resulting noise and vibration may have had potential to cause disturbance of aquatic and semi-aquatic

[10] Available using WFD Overview Dashboards and searching for “BARROW_090”: https://www.catchments.ie/data/#/waterbody/IE_SE_14B011000?_k=e6jfmj.

[11] As per the Interim Classification of Ecological Potential and Identification of Measures for Ireland’s Artificial Water Bodies (AWBs) report prepared by Waterways Ireland, Central Fisheries Board, and the South East River Basin District for the Surface Water Status Group in December 2008. Available at: https://www.catchments.ie/download/status-2009-2015/.

[12] Available using WFD Water Quality Dashboards and searching for “Grand Canal Barrow Line”: https://www.catchments.ie/data/#/waterbody/IE_14_AWB_GCBL?_k=3lxclk

species utilising the canal for commuting and/or foraging. Semi-aquatic species may have also been using the Project Site itself.

No noise or vibration monitoring was conducted before or during quarry activities. Baseline conditions were obtained after quarry activities had ceased in 2024 at the closest residential receptors (each situated between 50 m and 295 m from the Site boundary). Noise prediction software, CadnaA, was then used to predict the noise levels at these receptors as per standard code of practice. Blasting was not accounted for in these predictions because there were no relevant historical complaints identified during the assessment period. The predicted noise levels were below the recommended noise limit value of 55 dBA (EPA, 2006) for daytime extraction activities.

Blasting would have been the main contributor to vibrational effects. However, no predictions were made for this activity due to the lack of complaints made.

5.3. EFFECTS IN ISOLATION

Table 5-1 - rAA Screening – Effects in Isolation for the River Barrow and River Nore SAC

Project Activity	Potential Impacts	Screening Assessment	LSEs
Habitat Degradation			
▪ Stripping, movement, and re-deposition of overburden ▪ Extraction of rock including drilling, blasting and rock breaking, crushing/screening of aggregate	Groundwater contamination as a result of hydrocarbon leaks from fuel storage tanks or the unmanaged spillage of fuels or lubricants from Site plant or vehicles leading to degradation of SAC habitats.	The quality of surface water is important for achieving the conservation objectives of the River Barrow and River Nore SAC. This includes maintaining favourable conditions for the water courses of plain to montane levels with the *Ranunculion fluitantis and Callitricho-Batrachion* vegetation [3260] and petrifying springs with tufa formation [7220],and restoring favourable conditions for white-clawed crayfish and salmon. Pathways to significant effects due to contamination as a result of hydrocarbon leaks from fuel storage tanks or unmanaged spills of fuels or lubricants to the SAC and the aquatic and semi-aquatic QI populations of the SAC would have been via two groundwater bodies and the River Figile. However, the likelihood of groundwater feeding the River Figile is very low (see Chapter 6 of the rEIAR, Appendix A). Once abstraction for Monasterevin public water supply became active, this pathway would have ceased. This created a short window of opportunity for a low likelihood pathway. In addition, all equipment was maintained, preventing any spills, leaks or other associated pollution events (see Chapter 2 of the rEIAR, Appendix A).This is reflected in the lack of reports of spills over the review period, the lack of evidence at the Project Site or within the groundwater body currently. This suggests that it was highly unlikely that a contamination event of the magnitude required to cause significant effect on groundwater quality occurred. This conclusion is	No LSE alone and no non-significant effects identified. No in-combination assessment required.

		supported by the groundwater and river waterbody statuses published in 2008. It is therefore considered likely that no contaminants reached the River Figile. On this basis, likely significant effects on the downstream SAC habitats can be ruled out.	
	Groundwater dewatering leading to degradation of SAC habitats	A stable hydrological regime, specifically the availability of groundwater and the height of the water table, is important for water courses of plain to montane levels with the *Ranunculion fluitantis and Callitricho-Batrachion* vegetation [3260] and petrifying springs with tufa formation [7220]. It is also important for aquatic species, such as white-clawed crayfish, FRM, and salmon. It is unknown which saturated zone was being dewatered from, but presumed to be from the upper weathered fracture zone. However, the SAC is unlikely to have been connected to the fractured bedrock aquifer and more likely to have been connected to the locally important gravel aquifer that lies beneath the SAC. There is also no gravel aquifer mapped beneath the Project Site. Additionally, the bedrock aquifer below the site was highly productive over the assessment period (see Chapter 6 of the rEIAR, Appendix A). The Bagenalstown Upper and Cushina groundwater bodies were also assigned good overall status during the baseline WFD assessment indicating no adverse effects from abstraction or dewatering from other projects. Therefore, it can be deduced that dewatering, regardless of the source including the Project, **did not effect** the hydrological regime for the above QI habitats.	No LSE alone and no non-significant effects identified. No in-combination assessment required.
	Dust emissions leading to potential habitat degradation in the forms of:	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.	No LSE alone. Potential for non-significant effects to act in-combination.

	▪ Changes in water turbidity. ▪ Changes in substrate composition. ▪ Changes in local water quality. ▪ Changes in prey availability.	Habitat degradation due to changes in water turbidity, substrate composition, and water quality within the SAC can be ruled out due to: ▪ The 25 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 Site before it converges with the SAC. As a result, only impacts on QI species occupying functionally linked land has the potential to undermine the achievement of the SAC's conservation objectives, such as through direct mortality or declines in reproduction rates. It is considered highly unlikely that localised changes to water quality would affect otters. There is no evidence to suggest the Project Site or canal adjacent to the Site is being used for breeding. The area of impact would neither disrupt commuting nor hinder successful foraging and represents only a small fraction of the foraging habitat available to this highly mobile species. Table 4-3 provided an analysis of the distribution, range, and habitat preferences of QI fish species. The findings indicated that these species are unlikely to inhabit the canal adjacent to the Site due to the absence of suitable spawning habitats. Any occurrence in the canal is expected to be brief and transient. Furthermore, Chapter 7 of the rEIAR (Appendix A), concluded that the risk of an adverse effect due to dust emissions was low during the assessment period. Considering this, in conjunction canal's low importance as a habitat for relevant aquatic QI species, it can be concluded that likely significant effects, which might undermine the achievement of the SAC conservation objectives, can be ruled out alone.	

Disturbance			
▪ Extraction of rock including drilling, blasting and rock breaking, crushing/screening of aggregate	Noise and vibration leading to disturbance of functionally connected QI species.	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. The habitat requirements for white-clawed crayfish, river and brook lamprey, salmon and otter have been described in **Table 4-2.** Due to the nature and management of the canal, it was concluded that the presence of white-clawed crayfish, river and brook lamprey, and salmon in the canal adjacent to the Project Site was highly unlikely due to lack of suitable habitat. However, in the unlikely event that these species were present in the canal adjacent to the Project Site during quarrying activities, the likelihood of significant effect as a result of noise and vibration needs to be evaluated. White-clawed crayfish are decapod crustaceans and are physiologically resilient to noise due to the lack of swim bladder or gas filled spaces withing their body (Popper *et al.*, 2001). Similarly, lamprey don't have swim bladder or gas filled spaces (Boroweic, 2021). As such, they are also more resilient to noise and vibration disturbance. Conversely, Salmon have swim bladders that are not utilised for hearing. They are therefore susceptible to barotrauma due to particle motion, not sound pressure (Popper *et al.*, 2014). The modelling for noise and vibration done for the rEIAR (see Chapter 9 in Appendix A) did not account for blasting, which would have been the most likely activity to cause the worst-case scenario effects: potential injury or mortality. In order for such effects to undermine the Conservation Objectives for salmon, the number of adult spawning fish and consequently the abundance of salmon fry would need to have been reduced. Considering the low potential outlined above of QI being present in the Canal, along with the infrequency of blasting activity, the likelihood of this occurring is considered to be negligible. Furthermore, it is unlikely that spawning salmon	No LSE alone. Potential for non-significant effects to act in-combination.

		would have been present in the canal adjacent to the Site and. As such it is considered highly unlikely that the blasting activity from the Project alone had a significant effect on the SAC populations of salmon. Otter habitat within the SAC lies 1.6 km south-west of the Site and therefore no likely significant effects to otters within the SAC itself will have materialised as a result of the Project. As described above, it is possible that the canal provided functionally linked land for otters and as such, otters could have been disturbed by increased levels of noise and vibration. Otters are known to rest in areas of moderate noise levels including nearby quarries (Chanin, 2003). As predicted noise levels were below the recommended noise limit value of 55 dBA (EPA, 2006) for daytime extraction activities, it is unlikely that they caused any disturbance to otters. However, the assessment did not account for potential impacts from blasting. While blasting could disturb otters using functionally linked land, the likelihood of significant effects undermining the restoration of favourable conditions within the SAC is considered unlikely due to the following factors: ▪ The frequency of blasting was low and the duration short. ▪ The Site or canal adjacent to the Site do not share characteristics of breeding sites meaning there would be no disturbance resulting in changes in reproduction rates. ▪ It is unlikely that non-breeding holts were present within 30 m of the project Site and otter activity was most likely restricted to commuting and foraging within the locality. ▪ The majority of otter commuting and foraging activity would have occurred at night, outside the schedule for day-time blasting activities. In the unlikely event otters were commuting or	

		foraging during blasting activities, given their highly mobile status, they would have been able to relocate if necessary.	

5.4. EFFECTS IN COMBINATION

With reference to the rationale presented in Table 5-1, it is concluded that the Project (in isolation) did not result in likely significant effects to any European sites. However, as well as considering the potential for LSEs from the Project in isolation, the AA 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, resulting in significant effects overall.

The following non-significant effects were identified as a result of the 'alone' assessment:

- Habitat degradation affecting QI using functionally linked land, due to dust emissions.
- Disturbance due to noise and vibration affecting QI using functionally linked land.

OTHER PLANS AND PROJECTS

The ZoI for each non-significant effect identified in **Table 5-1** was employed to search for developments with the potential to have an in-combination effect. The ZoI set for in mineral dust as well as noise and vibration was 400 m (see rEIAR Chapter 7 and 9, Appendix A). Therefore, all developments similar in nature and size within 400 m of the Project Site boundary were reviewed between 01/01/1995 and 31/12/2006 and recorded in **Table 5-2**. All withdrawn, deemed withdrawn, and rejected applications have been excluded. The following sources were used in the search:

- Planning Enquiry System – Kildare County Council[13]
- EIA Portal[14]

Table 5-2 – Applications Considered for In-Combination Effect Assessment

Application Number and Status	Distance to European Site	Description	Assessment
062729 – Granted	1.7 SW	Continued use of an existing stone quarry at a site of 9.82 ha in the townland of Ballykelly, Coolsicken/ Quinnsborough, Monasterevi	This application relates to the adjacent quarry. It is noted that no AAS was carried out for this project. An Environmental Impact Statement was submitted with this application. This document did not consider the River Barrow and River Nore SAC as a receptor. However, the results for dust, noise, and vibration can be used to deduce the likelihood of significant in-combination effects. Three of the four dust monitoring survey results showed that the air quality levels were within dust deposition guidelines of 350 mg/m^2/day for non-hazardous material (TA Luft, 1974). The fourth, situated south-west of the development in close

[13] https://webgeo.kildarecoco.ie/planningenquiry [Accessed: 18th April 2025]
[14] https://www.gov.ie/en/publication/9f9e7-eia-portal/?referrer=http://www.housing.gov.ie/planning/environmental-assessment/environmental-impact-assessment-eia/eia-portal [Accessed: 22nd April 2025]

		n, Co. Kildare	proximity to the canal, was above the deposition guideline and had the potential to affect the respiratory systems of human beings and agricultural animals. It is noted however that the results from a monitor placed on the northern quarry boundary adjacent to the Grand Canal were greatly below the deposition guidelines (28.4 mg/m^2/day). In light of the same embedded measures being available for the development as described for the Project (see Section 3), it is considered highly unlikely that there would be an alone effect from the quarry of a magnitude that would change the conclusions identified for the Project alone. This is substantiated by the conclusion drawn in Chapter 9 of the rEIAR (Appendix A), which predicts that cumulative noise levels would have remained below daytime target level (55 dB(A)L_{Aeq}). In-combination effects have therefore been ruled out. The noise assessment concluded that no significant impacts on noise emissions in the area were anticipated with the continuation of quarry work with best practice techniques. Similarly, the report concluded that vibration monitoring results were below industry standard. It is considered in light of these results, there was no potential for in-combination effects as a result of noise/vibration.

5.4.1. IN-COMBINATION CONCLUSION

It is concluded that the Project did not act in combination with other plans or projects to result in likely significant effects to any European site.

6. CONCLUDING STATEMENT

For the reasons set out in detail in this rAA Screening Report, in light of the best scientific knowledge in the field, all aspects of the Project in isolation, or in combination with other plans or projects, which may have affected the relevant European sites have been considered.

Given the nature, scale and duration of the Project, with reference to its low potential for connectivity to River Barrow and River Nore SAC, it has been concluded that the Project did not give rise to a likelihood of significant effects on this European site, alone or in combination with other plans or projects.

This rAA Screening Report contains information which the competent authority may consider in making its own complete, precise and definitive findings and conclusions. This rAA Screening Report is intended to be used by the competent authority to determine that all reasonable scientific doubt has been removed as to the likelihood of significant effects from the Project on the relevant European site.

It can be concluded beyond reasonable scientific doubt that there were no adverse effects on any European sites as a result of the Project, either alone, or in combination with other plans or projects. It is therefore determined that Appropriate Assessment is not required.

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Appendix A

SUPPORTING DOCUMENTS

From: Gerard Bayly
Sent on: 26 March 2025 14:07:49
To: O'Dowd, Lisa
Subject: RE: Hydrological Connectivity: Old Grange stream/ the Grand Canal

Lisa

Information as follows:

1. Clogheen Stream (14C23) between the townlands of Clogheen and Killinure:
   https://maps.app.goo.gl/3NYQxCvXXHPLpZdo7
   This is culverted under the canal at the county boundary

2. Sallyford Stream (14508) between the townlands of Fishertown and Courtwood:
   https://maps.app.goo.gl/j3SKSoFRA9Z9P1ec8
   I am not familiar with this culvert, however I can confirm there is no supplys entering the canal at or near this location so I assume it is culverted under the canal here or some location in close proximity. Sorry I can be clearer on this one.

Kind Regards
Gerard Bayly
Senior Engineer

For and on behalf of

Waterways Ireland
Uiscebhealaí Éireann Watterweys Airlann

T: 01 8823305
E: gerard.bayly@waterwaysireland.org
W: www.waterwaysireland.org
A: Floor 2, Block C, Ashtowngate, Navan Rd, Dublin 15

"Waterways Ireland, managing and promoting the inland waterways for the benefit of all..."

From: O'Dowd, Lisa <Lisa.O'Dowd@wsp.com>
Sent: 26 March 2025 14:01
To: Gerard Bayly <Gerard.Bayly@waterwaysireland.org>
Subject: RE: Hydrological Connectivity: Old Grange stream/ the Grand Canal

Hi Gerard,

Would you also be able to confirm whether the following are culverted beneath the Grand Canal, there is limited evidence online:

1. Clogheen Stream (14C23) between the townlands of Clogheen and Killinure:
   https://maps.app.goo.gl/3NYQxCvXXHPLpZdo7
2. Sallyford Stream (14508) between the townlands of Fishertown and Courtwood:
   https://maps.app.goo.gl/j3SKSoFRA9Z9P1ec8

Thank you for your help,
Lisa

From: O'Dowd, Lisa
Sent: Wednesday 26 March 2025 12:50

To: Gerard Bayly <Gerard.Bayly@waterwaysireland.org>
Subject: RE: Hydrological Connectivity: Old Grange stream/ the Grand Canal

Hi Gerard,

Thank you for your timely response, that is really helpful information.

Thanks,
Lisa

From: Gerard Bayly <Gerard.Bayly@waterwaysireland.org>
Sent: Wednesday 26 March 2025 12:43
To: O'Dowd, Lisa <Lisa.O'Dowd@wsp.com>
Subject: RE: Hydrological Connectivity: Old Grange stream/ the Grand Canal

Lisa

The stream here is culverted under the canal. It does not enter the canal or the backdrains.

I assume it flows direct to the River Figile from this point, however I cannot be certain of its route after it flows through the culvert under the canal.

Kind Regards
Gerard Bayly
Senior Engineer

For and on behalf of

Waterways Ireland
Uiscebhealaí Éireann Watterweys Airlann

T: 01 8823305
E: gerard.bayly@waterwaysireland.org
W: www.waterwaysireland.org
A: Floor 2, Block C, Ashtowngate, Navan Rd, Dublin 15

From: O'Dowd, Lisa <Lisa.O'Dowd@wsp.com>
Sent: 26 March 2025 12:31
To: Gerard Bayly <Gerard.Bayly@waterwaysireland.org>
Subject: RE: Hydrological Connectivity: Old Grange stream/ the Grand Canal

Hi Gerald,

Thank you so much for getting back to me. I really appreciate your help on this.

Find a pin from google maps here: https://maps.app.goo.gl/BduAGfnqH7F3dt4h8 and a link to the location on grid reference finder here: https://irish.gridreferencefinder.com?gr=N6308812311|N_s_63088_s_12311|1&t=N%2063088%2012311&v=r

Any other queries please let me know.

Looking forward to hearing from you.

Thanks,
Lisa

2 Project Description

2.1 Introduction

This section of the remedial Environmental Impact Assessment Report (rEIAR) has been prepared to provide a description of the development and operation of the project Site, a disused quarry located in the townland of Coolsickin or Quinsborough, Monasterevin, Co. Kildare. This description sets the basis against which the rEIAR has been carried out.

The development seeking substitute consent consists of extraction of sand, gravel and rock over an area of 7.87 ha through blasting, mechanical excavation and rock breaking along with aggregate processing and stockpiling.

The lands subject to this Substitute Consent application were acquired by the applicant, Bison Quarries Ltd in 2022. This substitute consent application will be accompanied by an application under Section 37L of the Planning and Development Act 2000 as amended for the restoration of the quarry footprint to land contours similar to previous topographical levels and to agricultural use. The restoration is proposed to be carried out through the importation of clean, uncontaminated soil and stone.

2.2 Site Setting

2.2.1 Site location

The Application Site is wholly located in the townland of Coolsicken or Quinnsborough, which is situated approximately 2.7km north of Monasterevin and approximately 9 km southwest of Kildare Town, The Site comprises a quarry void area which has been used for sand and gravel and limestone rock extraction between the years 2000-2006. The grid reference coordinates (Irish Transverse Mercator) for the approximate centre of the Site are E663403, N713199. The site location is shown in Figure 2.1.

2.2.2 Site Access

The Site is accessed off the L7049 which runs south-west to east. The L7049 joins the R414 to the northeast and the R424 in the southwest. The R414 is a regional road linking Monasterevin and Rathangan and the R424, also a regional road, linking Monasterevin to Portarlington.

The current access route to the gravel pit, (refer to Figure 2.2) is by means of a laneway/gravel road running adjacent to a stretch of agricultural land within lands owned by the applicant. During the period of operation, the quarry was accessed through the adjoining quarry which is also accessed of the L7049 approximately 270 m north of the existing access.

The quarry site is accessed via a gravel covered laneway from the L7049 road linking to the R414. The laneway is approximately 250 m long and bounded on both sides by agricultural

fields. The laneway currently leads to an area of hummocky land with various tracks leading to the quarry.

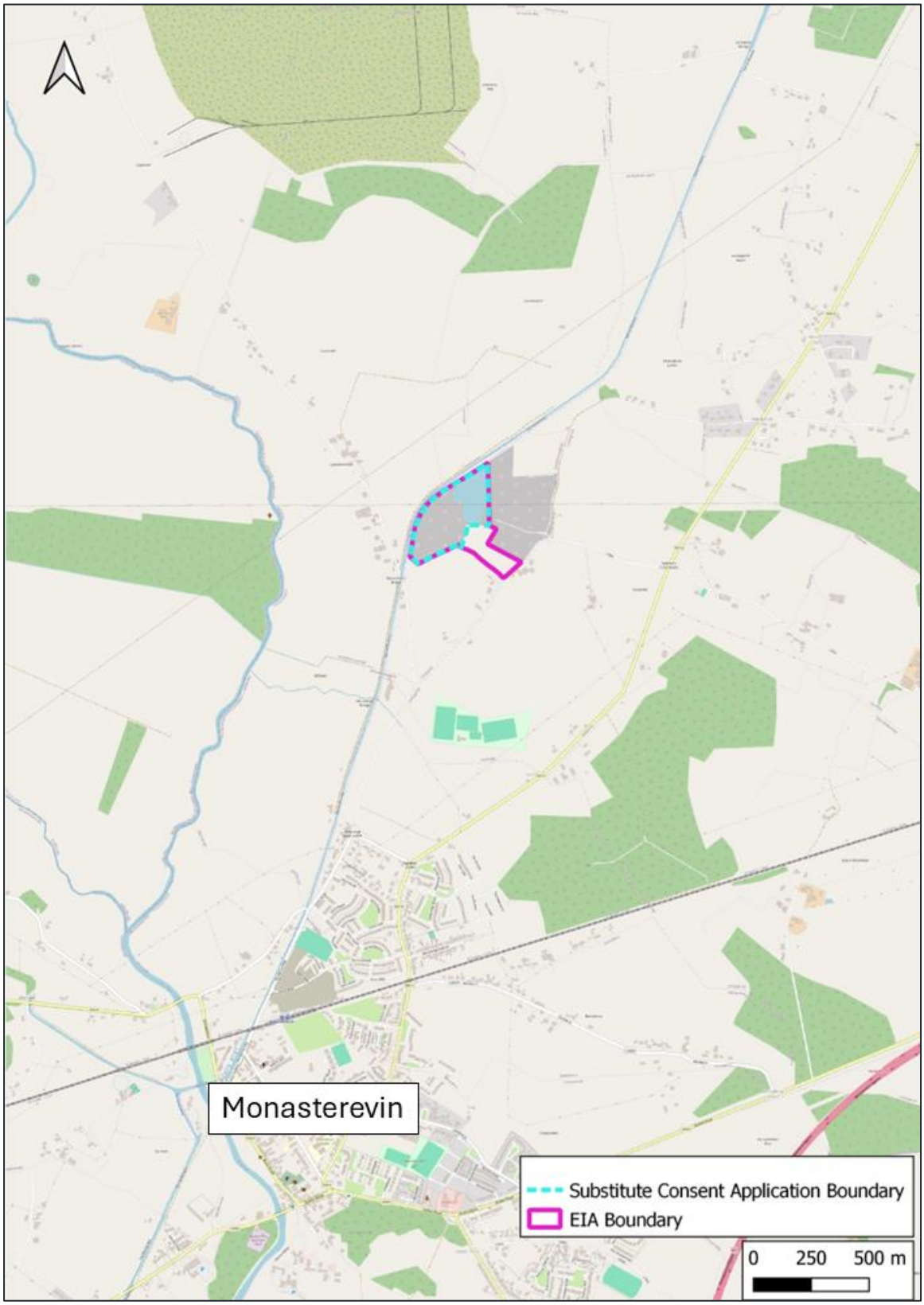


Figure 2.1: Site Location

2.2.3 Context and Landscape Character of Subject Lands

The Substitute Consent Application Site ('Application Site' or 'Site') extends to approximately 7.87 ha and reflect the historic operational site area including the extractable void area of 2.3 ha. Extraction of sand and gravel and following exhaustion of the former, limestone was worked to approximately 55 mOD, at its lowest point and since extraction has ceased, there is a resulting waterbody filling the extraction void which is fed predominantly by groundwater.

The Application Site is located within the rEIAR unit (i.e. lands within the EIA Boundary) which extends to 10.62 ha. The EIA Boundary is extended to the south within the rEIAR to include an agricultural field to the south of the Application Site (owned by the Applicant) to provide continuity with the EIAR prepared for the 37L application that addresses proposed future development.

The quarry void area consists largely of a quarry pond that currently extends to approximately 2.3 ha lying northeast of the Project Site and is groundwater fed.

A review of historic aerial photography and available mapping indicates that the lands that are the subject of this rEIAR were generally within a low-lying area in the local landscape, which sloped down to the north and northwest. It is noted that the highest point of the Project Site in 1990 was approximately 77 mOD and the lowest point at approximately 70 m OD (undisturbed ground).

The water level in the quarry void was recorded to be 63.9 mOD with the lowest ground level of the quarry pond recorded through bathymetric surveys to be 55mOD.

A number of site walkover visits were conducted at the site by WSP representatives during 2024 to inspect the site and record site observations. The current quarry void is located in the northeast of the EIA unit and is irregular in shape. The site is understood to be disused since prior 2006 according to neighboring landowners. The s.261A quarry assessment prepared by Kildare County Council (KCC) planning department in 2012 indicates that the quarry may have ceased operations by 28 July 2006, citing an unauthorized development file that is not presently available from KCC planning records.

There are currently no existing administration, maintenance, storage, or welfare facilities located on the site and no evidence from historical imagery that these facilities were in place during the operation stage of the quarry (see Figure 2.2). There was no visual or olfactory evidence of any spills or leaks identified anywhere on site. A quarry pond is the key identifiable characteristic of the site. The peripheral edges and boundaries have been left undisturbed to naturally restore since the cessation of quarrying activities. It is evident that no quarrying activities have occurred for some time as scrub and thick vegetation has been established across the site. A number of overburden and aggregate stockpiles ranging in size are present on site with access from the main access to the quarry pond in place. A security fence is present at the southside of the site with agricultural fencing along the remaining boundaries. The lands adjacent to the Site on the southern boundary are used for

agricultural purposes (including pasture and tillage) with a number of dwellings running along the L7049 to the west of the site entrance. The Site is bordered to the west and north by a mature mixed hedgerow which separates the site boundary from the Grand Canal. Beyond the Grand Canal to the west and north, lands are in agricultural use. The Site is bounded to the east by another existing disused quarry. Farmyards and one-off residential properties also occur in the vicinity of the Site.

In this way, the immediate character of the lands is rural, in nature with agricultural being the predominant land use along with low density, one-off ribbon type roadside housing and farmyards.

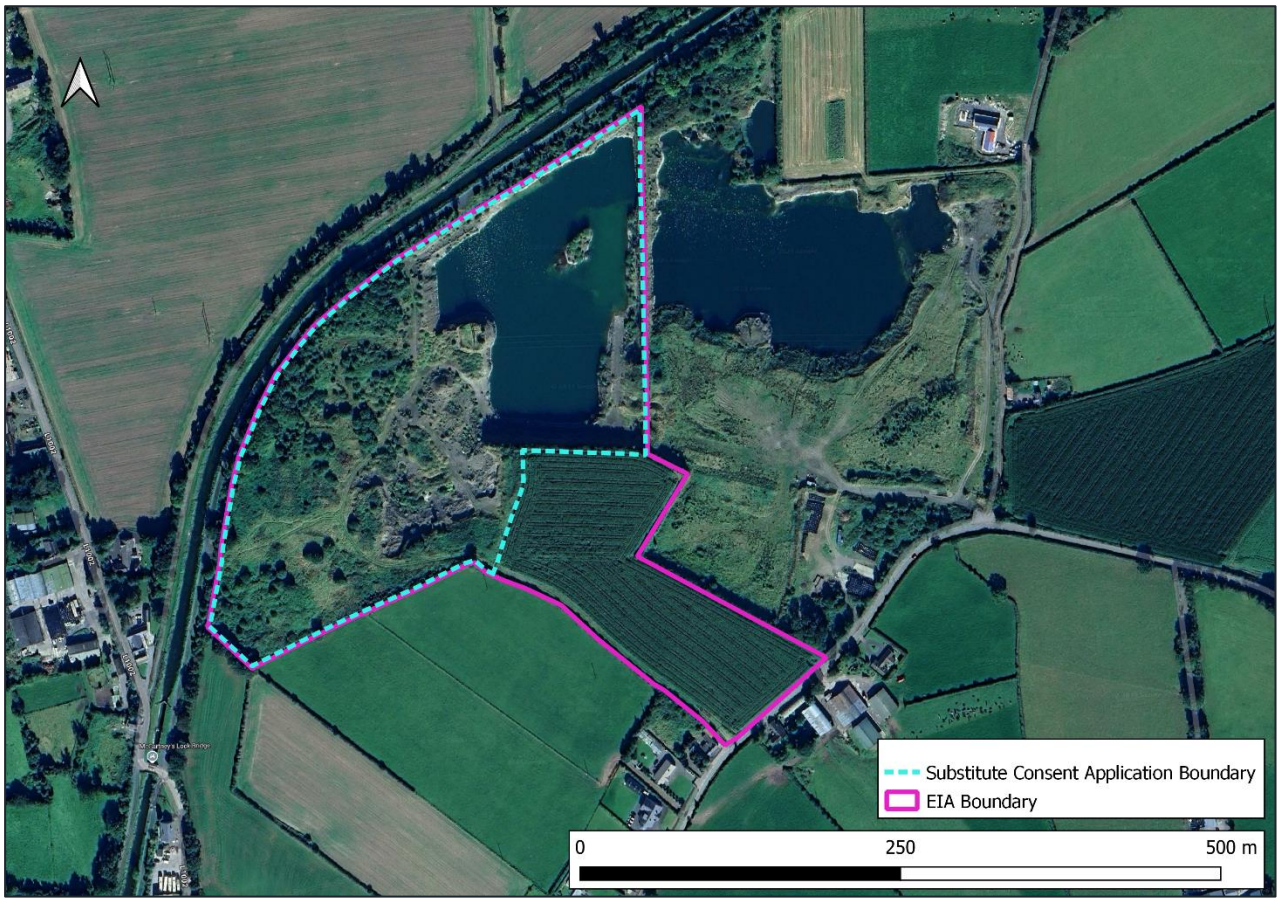


Figure 2.2: Conditions at the Application site in 2024

2.2.4 Site Development Background

The Site was acquired by the current owner (the Applicant) in 2022 with the aim of returning the lands to agricultural use and to make safe the quarry pond at the Site.

Quarrying at the Application site is understood from local anecdotal information to have commenced around 2000 and ceased within 2006. A review of the progression of the Project as inferred from Aerial imagery is provided in section 2.2.6.

Information pertaining to the development at the Site is limited as the Project was not subject to a valid planning permission. Information on the development of the site as a quarry was obtained from various sources including Kildare County Council (KCC) Section 261A quarry register, and KCC's 2012 Section 261A Quarry Assessment (see section 2.2.5 for information source details).

It is understood that the Site was assessed by Kildare County Council (KCC) under Section 261A of The Planning and Development Act, 2000 and assigned 261A quarry registration number QRA-21-002 under a Notice Pursuant to Section 261A(4)(a) of the Planning and Development Act 2000-2011 (as amended) dated 22 August 2012. This notice was issue to Michael Byrne who came into sole possession of lands within the Application Site in 2001 (Folio 15368). The site had not been operational for some time in 2012 when the notice was issued in 2012, and the Section 261A(4)(a) notice was not complied with. In 2012, Ireland was in the middle of an economic recession which resulted in many quarries not acting on Section 261A notices due to financial struggles and little or no construction activity occurring.

It is estimated that activities at the site included extraction of sand and gravel, limestone rock, and associated processing and temporary stockpiling of materials being stored prior to sale to market. The nature of extraction and associated works has been estimated from incomplete planning application for the Site from 2006. A review of the Kildare County Council (KCC) planning portal records indicates that three number incomplete or invalid planning applications for the Site are on record for the year 2006. These applications as follows:

- Planning application reference no. 06/741 was received on the 18/04/06 from William Condren and Pat Kinahan for 'quarrying and extraction of rock etc'.
- Planning application reference no 06/855 was received on the 04/06/06 from Patrick Kinahan and William Condren for 'extraction of rock for the production of aggregates, the erection of one mobile portacabin, crusher and ancillary works'.
- Planning application reference no. 06/1155 was received on the 08/06/06 from Roadfill Ltd for 'extension to and existing rock quarry for 2.14 ha and for retention permission for 2.62 ha of rock quarry for development'.

As part of a 261A assessment process of the Planning and Development Acts 2000-2011 (as amended), completed on the 22nd of August 2012 by KCC, the development of the Site was considered to have required an EIA (being a post-1990 development) and an AA (being

a post - 26th February 1997 development) to comply with the EIA and Habitats Directive. The operator was issued a notice under section 261A (4)(a) of the Act which determined that:

- The quarry commenced operation on or after 1 October 1964 and no permission was granted in respect of the quarry under Part III of this Act or Part IV of the Act of 1963, or
- If applicable, the requirements in relation to registration under section 261 were not fulfilled.

The 261A assessment (KCC 2012) states that:

'*The 2010 aerial photography suggests that the quarry is inactive and I have reviewed an unauthorised development files on the site, reference UD4203, which contained a report from Darren Hughes , Executive Engineer, dated 28th July 2006 confirming that the site had ceased works following an undertaking from the operator at the time Roadfill Ltd upon a pending court hearing. A court case was undertaken by Kildare County Council against the land owner and operator and a copy of the court order is attached to this file'.*

Neither the report from Darren Hughes nor the court order were available from the planning files held by KCC as of 2024 at which time WSP reviewed the documents at KCC offices in Naas. No further information is available and it is understood that quarrying activities ceased in 2006 on foot of threatened enforcement proceedings.

2.2.4.1 Development Principal Events

Section 2.2.4 sets out the site development background regarding planning history for the Application Site.

Section 2.3.2 sets down a timeline to present the progression of the Project at the Application Site in a coherent order. The estimated commencement of operations at the beginning of 2000 through to the cessation of Project Activities to the end of 2006 have been addressed in that section.

The principal projects in the vicinity of the Application Site during the predicted operational life of the Project are presented in Table 2-1.

Having regard to the EIAR requirement to assess in-combination and cumulative effects, significant projects in the area have been considered, and, where possible, the information submitted with those applications reviewed, to further aid in building a profile of the Application site over the Project lifetime.

Table 2-1 – Third Party Development in the vicinity of the Project (2000-2006)

Reference	Location	Description	Status / Decision date
06/2729	Ballykelly, Monasterevin, Co. Kildare	Continued use of an existing stone quarry at a site of 9.82ha in the townland of Ballykelly,	Granted with conditions 27/11/2008

Reference	Location	Description	Status / Decision date
		Coolsicken/Quinnsborough, Monasterevin Co.Kildare [Further details are provided below this table]	
02/2196	Quinsborough, Monasterevin, Co. Kildare	A dormer house and bio-disc effluent treatment system	Granted with conditions 21/02/2003
01/746	Quinsborough, Monasterevin ,Co. Kildare	A single storey dwelling house, domestic garage, septic tank with puraflo secondary water treatment system and associated site works	Granted with conditions 07/09/2001
05/2959	Ballykelly, Monasterevin, Co. Kildare	Two storey house, domestic garage and installation of approved effluent treatment system	Granted with conditions 12/12/2006
04/1790	Ballykelly, Monasterevin, Co. Kildare	Demolition of existing dwelling and replace it with a two storey house, garage/equipment store,septic tank,Bord na Mona Puraflo system and associated site works	Granted with conditions 20/04/2005
03/2667	Ballykelly, Monasterevin, Co. Kildare	To erect two storey dwelling, garage for domestic use, shared recessed entrance, proprietary effluent treatment plant and associated site development works	Granted with conditions 03/06/2004
03/2666	Ballykelly, Monasterevin, Co. Kildare	To erect single dwelling, garage for domestic use, recessed entrance, proprietary effluent treatment plant and associated site development works	03/06/2004
03/2352	Ballykelly, Monasterevin, Co. Kildare	Bungalow dwelling, domestic garage, septic tank and associated site works	04/11/2004

Development of the adjacent quarry site during the assessment period

With regards to the third-party quarry adjacent to the site, the following description of that operation is reproduced from the third party planners report from the 2006 planning submission (KCC planning reference: 06/2729) which seeks to address a continuation of works at the site:

The following is a summary of the operation process for which permission was granted with conditions:

- The site area is 9.83 ha with 3.75m tones of recoverable reserve.
- Proposed extraction of 250,000 tonnes annually.

- Rock extracted from ground by drilling and blasting. Extracted rock is then crushed and screened to produce various grades of aggregate. All stockpiled material is loaded onto HGV trucks for transportation offsite.
- Blasting conducted 1-2 times per month with 72 hours notice given to residents within 500m radius and an Garda Siochana attending all blasts for security & safety reasons. Vibration monitoring is conducted at two residential locations in the vicinity of the site.
- Surface water on site is pumped to onsite settlement lagoons (3 no. on site) and reused when required for dampening internal roads and stockpiles.
- The haulage routes are given: turn left onto L7094, which adjoins the Rathangan - Monasterevin regional road R414.
- Hours of Operation: 08.00-18.00 (Monday to Friday during Winter Months) 08.00 - 20.00 (Monday to Friday during remainder of year) 08.00-13.00 (Saturday all year) No activity on Sunday & Bank Holidays except on exceptional circumstances.
  Currently employ a total of 14 employees with an additional 25 indirect jobs created (haulage).

2.2.4.2 Development of Subject Site from Baseline

Section 3.6.1 of the 2022 EPA EIAR Guidance states that together: the description of the project *"…the description of the baseline scenario is the second of the two factual foundations of the EIAR.*"

In this instance, an rEIAR is presented and thus relates to development already undertaken. For this reason, the baseline scenario required to be described has passed.

In deference to the requirement for Environmental Impact Assessment arising since 1st February 1990, the baseline of this rEIAR has been set at the date whereby unauthorized extraction activities commenced. Therefore, the drawings submitted in support of the substitute consent application identify the Site as it existed 1 January 2000 (i.e. baseline conditions prior to extraction activities commencing onsite) and 31 December 2006 (i.e. existing conditions onsite at the most recent potential date of cessation of quarrying operations on the Application Site). Ground levels at baseline has been inferred from historic 6" maps and orthophotographs aerial imagery, site walkovers, anecdotal evidence, and tie-in with ground contour levels of surrounding lands. Exiting Site conditions at 31 December 2006 are predicted to be the same as for present given no further development has taken place onsite following closure of the quarry.

2.2.5 Sources of Information and Methodology

To retrospectively build a narrative of the development of the subject lands over the period of 01 January 2000 to the 31 December 2006 we have reviewed and rely upon publicly available resources; mapping and photography; anecdotal records from neighbouring landholders; and KCC planning files to obtain point in time descriptions of the Project Site.

Site visits and monitoring have been undertaken specifically for the preparation of this rEIAR.

Information, including maps, raster data and aerial photography in respect of ground levels, ground cover and development, is available from Ordnance Survey Ireland (OSI) provide an overlay of the substitute consent application boundary on available OSI aerial photographs from 1995, 1996-2000, 2001-2005, 2006-2012, 2011-2013 and 2013 - 2018 and Google Earth imagery from 2009, 2016, 2018,2022 and 2024 in order that an independent source of description information for the lands at baseline and during the intervening years could be made. A topographical survey of the Site was undertaken in 2024 providing a snapshot of the extent of the quarry today.

The baseline map submitted as part of the substitute consent application to represent the extent of the quarry void in 2000 was constructed using the topographical survey of the Site, the current OSI map for the area, and an estimation of ground levels from historic 6" maps and orthophotographs.

2.2.6 Progression of Development

2.2.6.1 Aerial Imagery from 1995 and 1996-2000

Historical aerial imagery indicates that the subject lands were predominately used for agricultural purpose (tillage) prior to development of a quarry in the early 2000s (See Figure 2-3 and Figure 2-4).

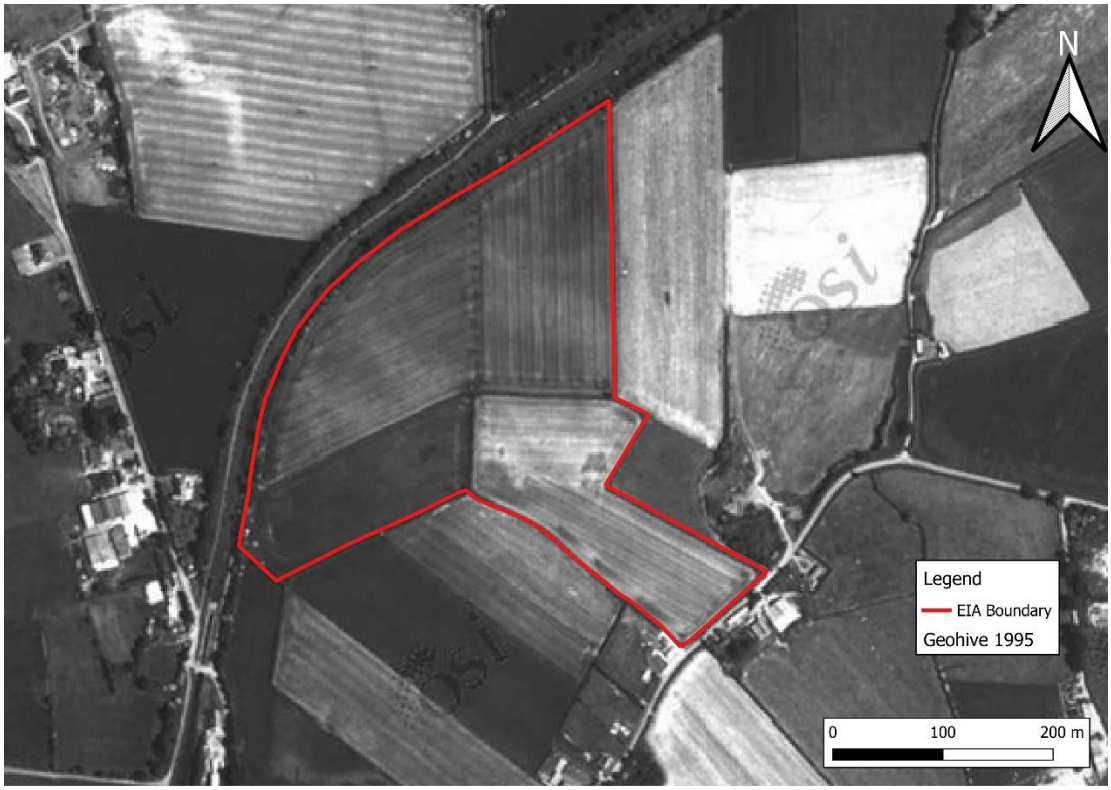


Figure 2-3 - GeoHive maps 1995

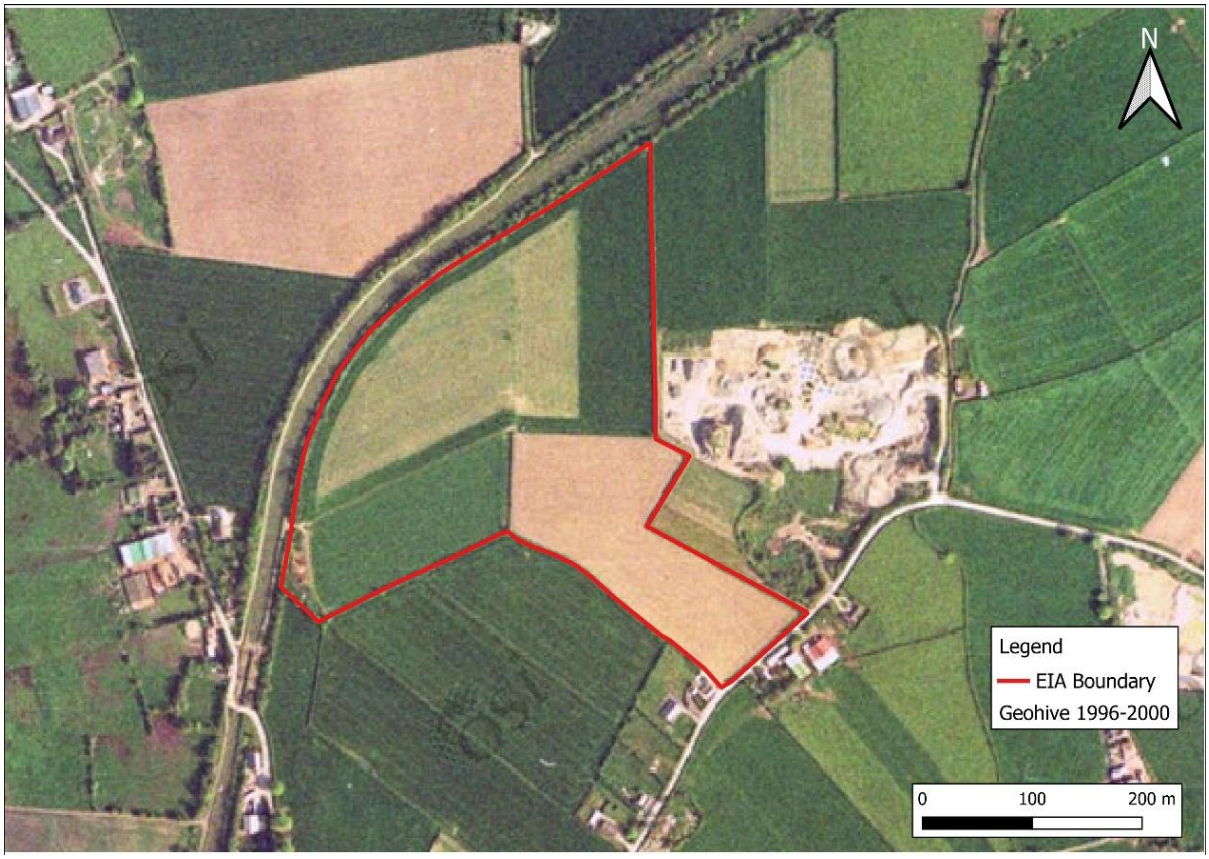


Figure 2-4 - GeoHive maps 1996-2000

2.2.6.2 Aerial Imagery from 2001-2005, 2006-2012, and 2009

The earliest aerial imagery indicating development of the (now disused) quarry by movement of soils, subsoils and extraction of aggregate and rock from the void area on the Site is dated 2001-2005 (see Figure 2-5). During this period quarrying commenced onsite in the northern section of the owned lands with quarrying activities continuing in the bordering site, to the east. Quarrying appears to occur in deeper graded sections in the northeastern section with shallower sections in the northwestern section.

An access route between the Project Site and the adjacent quarry site has been developed and removal of a short section of hedgerow (approximately 19 m) along the site boundary would have been required to facilitate this access (see Figure 2-5). It is noted that approximately 96 m of hedgerow has been removed from agricultural fields to the south of the application area, prior to extension of the development into this area as observed in aerials based from October 2009 (see Figure 2-7).

A section on north-south orientated hedgerow appears to have been removed (see Figure 2-5). Given that the quarry has not extended into the area where this hedgerow was removed from, and that the aerials show that lands are given over the agricultural use at that time, this indicates that hedgerow removal was likely to facilitate access/available lands

within agricultural lands. Therefore, it is considered unlikely that the section of hedgerow was removed to facilitate quarry development.

Figure 2-5 - GeoHive maps 2001-2005

The Geohive maps from 2006-2012 (See Figure 2-6) appear identical to the preceding maps for 2001-2005, possibly indicating the aerial imagery was not updated at that time, however Google earth images do indicate a noticeable change in 2009 (See Figure 2-7).

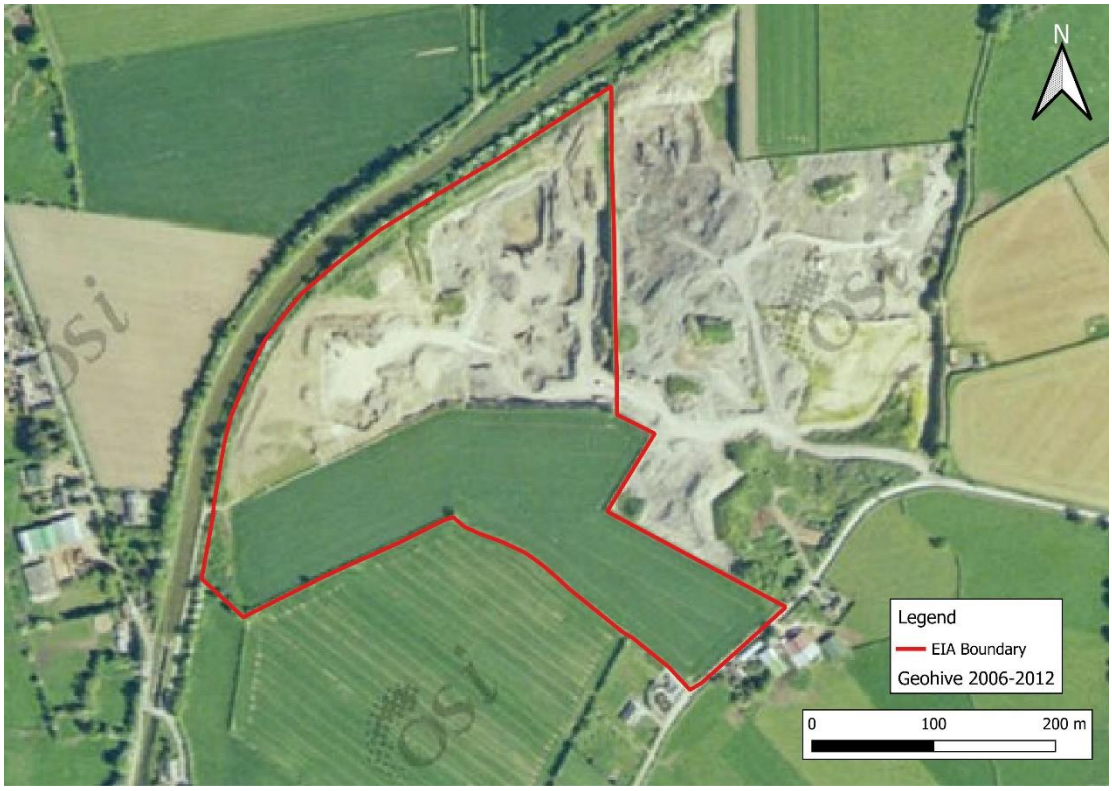


Figure 2-6 - GeoHive maps 2006-2012

By October 2009, ariel imagery shows collected waters are present on the quarry floor. The inundation of the working quarry floor indicates that extraction from the quarry void has ceased.

Areas within the southwest of the application site appear to have been given over to stockpiling of largely rock of low economic value (e.g. overburden) (see Figure 2-7). This interpretation is supported by observations from site visits carried out in 2024 by WSP where the stockpiles were observed *insitu*.

The October 2009 imagery indicates that approximately 86 m of hedgerow has been removed to provide space for stockpiling.

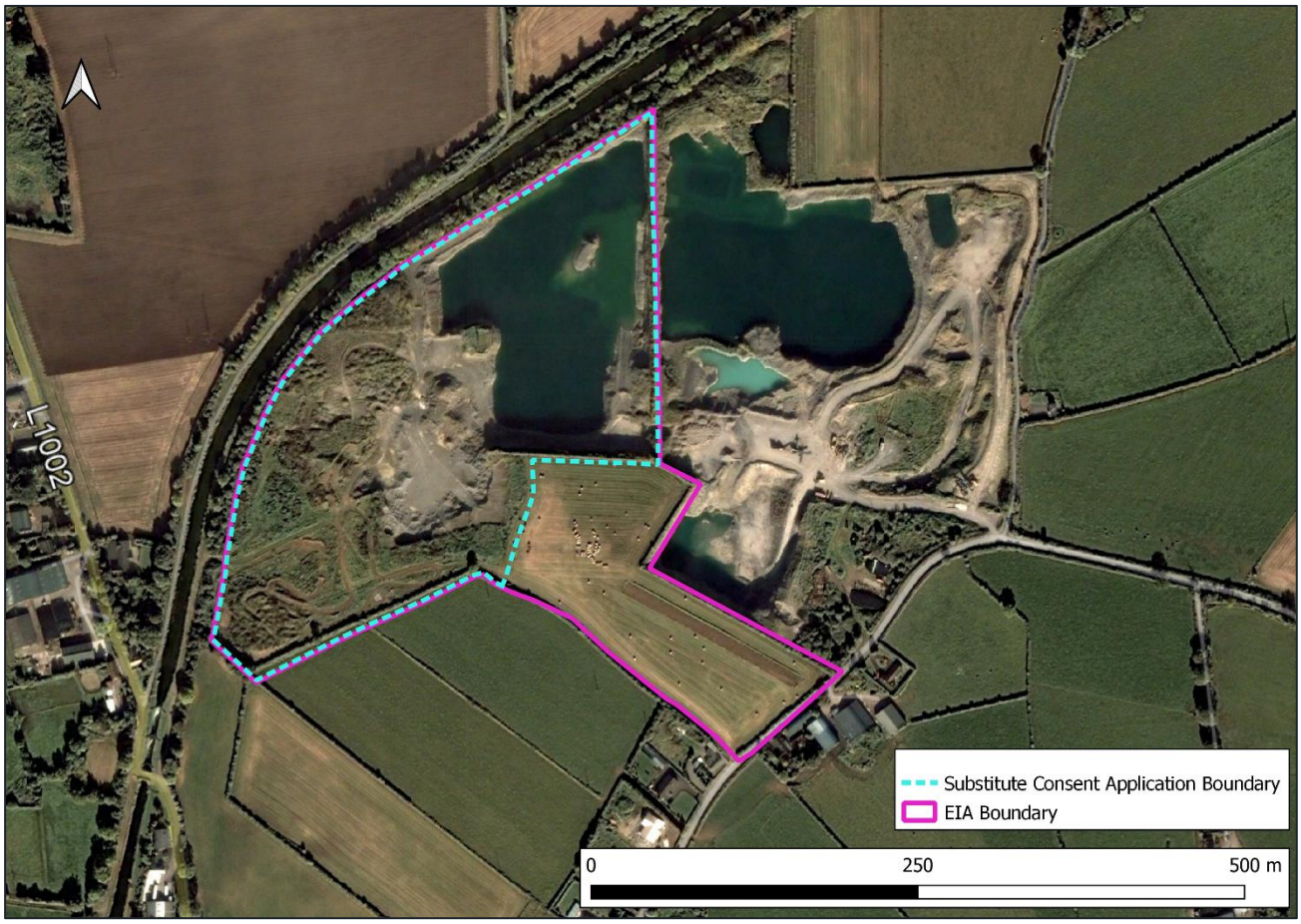


Figure 2-7 - Google Earth Imagery October 2009

Following the closure of the Project, the Application Site has undergone natural recolonisation and the quarry floor has been inundated by collected waters. The condition of the Application Site as of September 2024 is provided in Figure 2-8.

Publicly available ariel imagery covering the Project Site between 2011 to 2024 indicates that no further works associated with the Project was undertaken at the Site following the cessation of excavation activities in 2006. Prior to 2022, aerial imagery indicates that a small level of fly tipping and clearing has taken place in the south section of the Site. This is unrelated to Project activities.

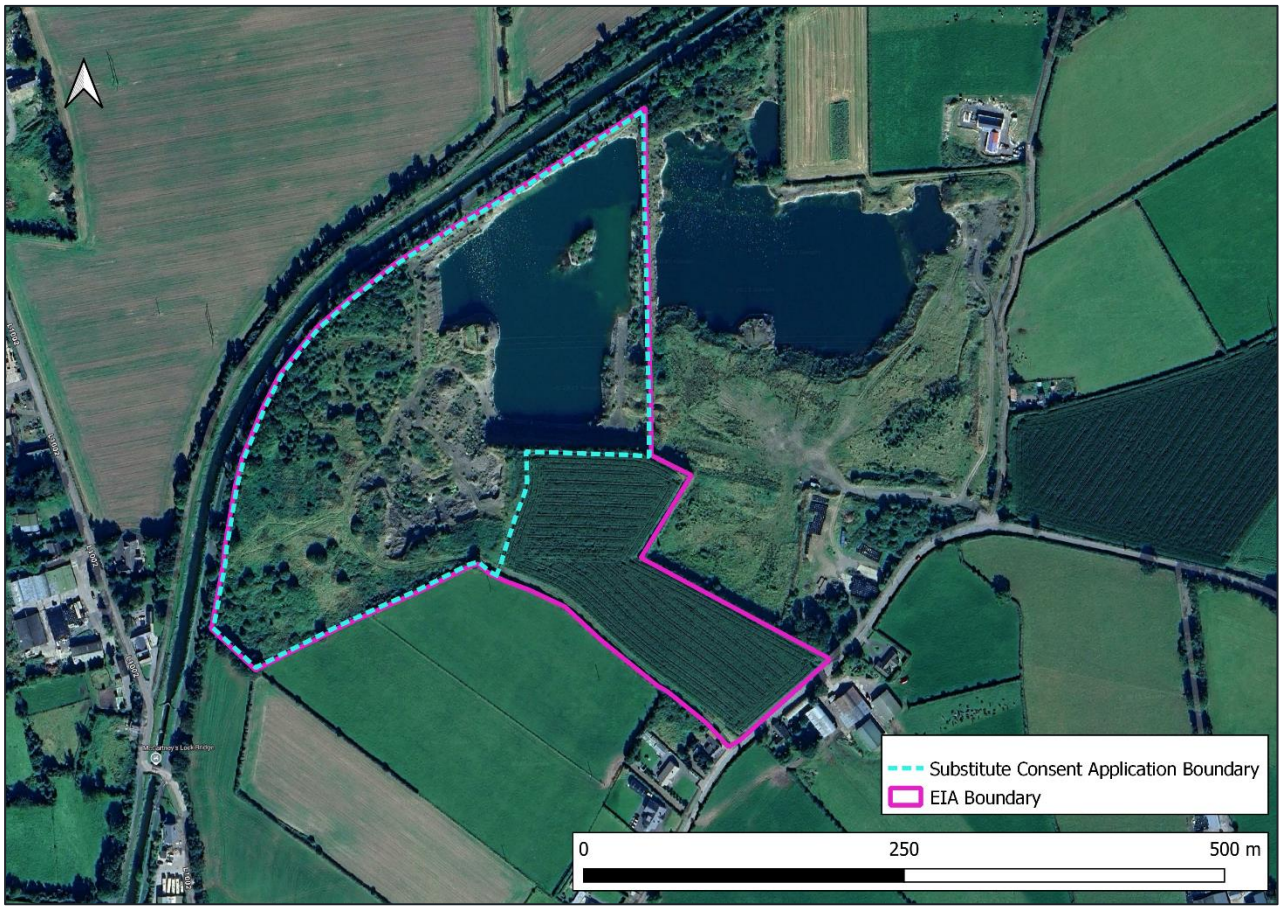


Figure 2-8 - Google Earth Imagery from September 2024

The Site Layout plans submitted as part of substitute consent application (planning drawing pack) for the Application Site present the baseline site conditions (at start 2000) and existing site conditions (at end 2006).

2.2.7 Site Development Progression

Using the information collated for the Site, including depth and extent of extraction, the rate of extraction and likely traffic flows generated over the lifetime of the development has been estimated where required to inform the application.

2.2.8 Summary of Progression of Extraction from Baseline to Current Time

The single most significant feature of the development, the subject of this rEIAR, is that it consists of a quarry and therefore there has been movement of soils / subsoils and extraction of aggregate and rock from the void area.

The amalgamation of historic mapping, current surveys and aerial photographs has provided a credible estimation of total volumes extracted from the Site since the year 2000 and provides an estimate of the amount of material recovered from the Project Site over time by measuring total void size, and the character of the material removed (e.g. bedrock).

Set out below is the methodology used to estimate the total volume of material extracted from the Project Site since the year 2000. In the interests of a precautionary approach, no wastage has been allowed for, and therefore it is expected that the estimated total volume extracted will be higher than was actually observed being processed and leaving the site i.e., an estimate of total extracted volume has been calculated here.

The method of estimation included consideration of:

- Estimated pre-extraction ground levels (estimated from OSI historic mapping);
- Observed current average working depth of approximately 55 mAOD from topographical survey of carried out in 2024;
- Estimated current void volumes of a total extraction of over approximately760,000 tonnes of aggregate from the lands over seven years from 2000-2006 (inclusive).
- The extraction direction of lands is likely to have begun on the eastern boundary from the point of access from the adjoining pit. Extraction appears to have continued in the west and north with most extraction occurring in the north and some expansion to the southwestern edge of the site, giving rise to a substitute consent area of approximately7.87 ha, which includes topsoil storage areas and buffer zones.

Estimated historic extraction rates from baseline (2000) to estimated cessation of operation (2006) are provided in Table 2-2.

Table 2-2 - Historical extraction rates

Year	Estimated Extraction* (Tonnes)
2000	108,571
2001	108,571
2002	108,571
2003	108,571
2004	108,571
2005	108,571
2006	108,571
Estimated Total: approximately 760,000 tonnes	
**The current operator purchased the business in 2022, and as a result there are no tonnage extraction records available for the period between 2000 to 2006. An estimate of 108,571 t/yr extraction has been applied to this period based the total tonnage over the 7 year operational period.*	

2.2.9 Traffic

It is understood that all traffic entering the quarry over the period of quarrying (2000-2006) entered from the adjoining quarry Site (permitted under Kildare planning reg. ref. 06/2729) from the L6030 and used informal haul routes internally within the quarry.

Based on local knowledge of the operations of the adjoining quarry, it is understood that over the period of the Development, HGVs travelling to and from the site east along the L7049 to join the R424 to access regional routes.

It is estimated that there was approximately 46 No. truck movements per day (23 inbound and 23 outbound over assessment period)[1], with approximately 6 No. staff/visitor cars movements in and out occurring over the period of the Project, on average.

2.2.10 Plant

The volume and type of plant and vehicles onsite has been estimated on the basis of comparison with similar development or similar scale from the early to mid-2000s. 1 No. excavator, 1 No. loader; 2 No. haulers (18T), 1 No. mobile crusher, 1 No. mobile screen.

There is no evidence from arial imagery or KCC planning records that processing of rock was carried out onsite. To conduct a robust assessment it has been assumed that dry processing was carried out onsite to an extent proportionate to the scale of Project.

Given the plant list above, it is estimated that there was approximately 40 plant movements a day within the Application Site. This estimate has been determined using professional judgment and is based on the plant list above and the configuration of the internal haul routes and quarry benches within the Application Site[2].

It is estimated that the Project may have required a pump and generator (see section 2.2.17 for details).

2.2.11 Blasting

Planning documents available from KCC do not indicate if blasting was carried out on the site. Given the nature of the bedrock at the Application site (i.e. limestones of the Allenwood Formation) it is considered likely that blasting was carried out periodically to produce blast rock for further processing on the Site. The frequency of blasting would likely have varied depending on market demands for aggregate product. For the purpose of this assessment it is assumed that blasting of bedrock took place within the quarry void 1-2 times a month.

[1] Assuming 18T trucks were adopted.

[2] As determined from ariel imagery and site walkovers carried out by WSP in 2024.

2.2.12 Hours of Operation

The operational hours for the adjoining Site through which vehicles accessed the application Site, were 07:00 to 17:00 hours Monday to Friday, and 07:00 to 14:00 hours Saturday. There was no working on Sundays or Bank/Public Holidays.

2.2.13 Employment

Direct and indirect employment is attributable to the rEIAR. Direct employment is in the categories of 2 No. directly employed staff operating plant and vehicles as set out in section 2.2.10.

Haulage and blasting requirements were likely met by independent contractors who did not have their permanent workplace on-site.

Allowance has been made for 2 No. visitor vehicle movements to site daily.

2.2.14 Fuel and Chemical Storage

There is limited historical knowledge available for the fuel and chemical storage on the application Site. It is understood from anecdotal information that refuelling occurred on the adjacent site by a visiting fuel bower. An application for development at the Site made under KCC PPRN. 06/1155 indicated a fuel storage area at the entrance to the Site from the adjoining facility however this application was deemed incomplete by Kildare County Council.

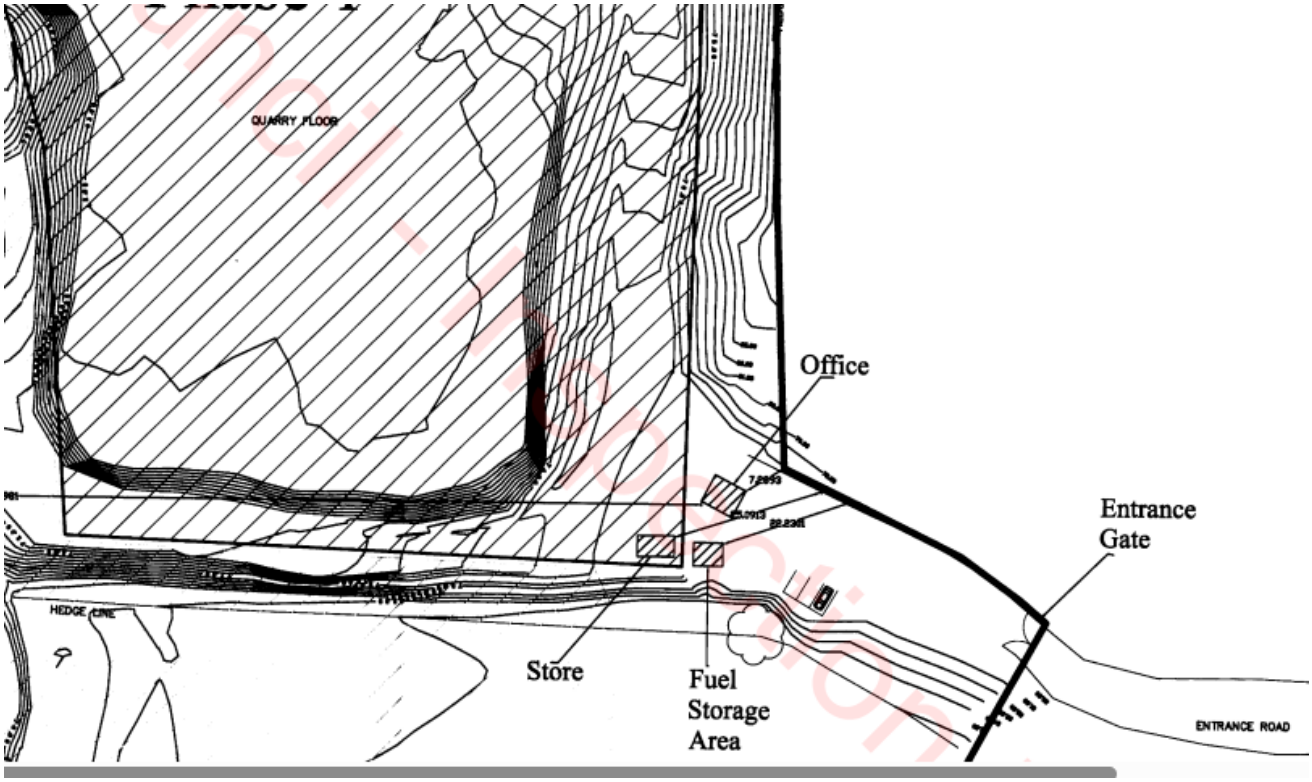


Figure 2-9 - Fuel storage area from KCC PPRN. 06/1155 application

2.2.15 Waste Management

No information is available on waste management activities at the Site however due to the nature of the extraction activities, it is expected that the waste arising on-site is municipal waste from staff activities.

Waste arising from broken plant or vehicles has not been observed during walkovers of the site undertaken by WSP in 2024 or in site photographs presented in KCC's 261A Assessment report dated 2012.

2.2.16 Waste Water

It is understood that the employees utilized the welfare facilities on the adjoining site. A review of aerial photography for the assessment period indicates no welfare or other facilities on Site.

2.2.17 Potable, Surface and Groundwater

The main body of water on site is contained in the extraction void and is understood to contain groundwater. There was no source of potable water on site. It is understood that potable water brought onto site for employee use.

There is no evidence of settlement ponds, lagoons, or soakaways having been in place on the Application Site. However, given that the quarry in the adjacent site required dewatering of the quarry floor during its operational life it is assumed for the purpose of this assessment that dewatering of the quarry void at the Application Site was undertaken where extraction occurs below the groundwater table. This approach has been adopted to ensure a precautionary assessment.

In order to adopt this precautionary approach the flowing plant has been assumed to be onsite.

The pump and generator proposed below are selected based on typical current day equipment in use for dewatering of similar projects of a similar scale:

- Estimated pump model: Xylem Flygt BIBO 2870 50hz, and,
- Estimated diesel generator model: FG Wilson XP150E

It is assumed for the purpose of assessment that the diesel generator powered the pump on the quarry floor. It is assumed that these would have been located in the lowest topographical levels of the quarry floor where water would be expected to collect.

It is assumed that any pumped water would have been discharged to ground within the Application Site at a suitable location constrained by topographical levels and the location of working areas/internal haul routes.

2.2.18 Power Supply and Telecommunications

There was no power supply provision on site. It is expected that plant and machinery requiring energy was in the form of diesel generator on site such a mobile crusher and screener. A 110KV power supply line enters the site overhead from the west.

2.2.19 Safety and Security

Access to the Site was via the adjoining quarry which was the only vehicular entrance in operation at the time. All vehicles entering and exiting the Site had to do so from the L7049 entrance, and travel along a dedicated private gravel covered access road to the site entrance. The Project Site is currently fully fenced, with any agricultural entrances permanently closed and locked

2.2.20 Rehabilitation

This rEIAR has been prepared for a substitute consent application for quarrying under S.261A of the Planning and Development Act, 2000 as amended. An application under section 37L of the Act is to be made concurrently with this application for substitute consent for the restoration of the site to agricultural use through importation of clean soil and stone to land level that are in keeping with surrounding land levels.

Given that rehabilitation of the quarry lands was not carried out at the time of the quarry closure (i.e. following 31 December 2006), a rehabilitation plan for the Project has been prepared to support this substitute consent application (see Appendix 2A. This plan is prepared cognizant of the after-use strategy for quarries post-closure as set out in the set out in the Kildare County Development Plan 2023-2029 ('KCC CDP 2023-2029') (see Section 9.9.1 therein).

Section 9.9.1 of the KCC CDP 2023-2029 states '*The conditions of quarry after-use and rehabilitation frequently involves the restoration of quarries, as far as possible, to their original appearance. This may result in the loss of key features that may ironically, have some ecological benefit or rich biodiversity interest*.'

The Rehabilitation Plan presented in Appendix 2A seeks to retain habitats that have developed onsite through natural recolonisation of the lands in the years following the Project closure on 31 December 20063. This approach is adopted to ensure the intrinsic ecological character of the site (i.e. fauna and floral onsite) are factored into the rehabilitation of the Site. Such features include:

- retaining the existing waterbody formed through collected waters within the disused quarry void.

[3] It is noted that the current habitats on site have been assessed and the present day baseline conditions on the Site are presented in detail in the EIAR prepared for the 37L Application.

- retaining a discontinuous shallow sand bank on sections of the uppermost levels of the southern and eastern quarry walls when quaternary deposits have been exposed through excavation. These banks are suitable for nesting birds such as sand martins.
- Retaining existing seedbank onsite to allow for natural recolonisation to continue within the site within habitats present on the Site.

A proposed rehabilitation plan is provided within Appendix 2A of this chapter.

2.3 Major Accidents and Disasters

The EIA Directive (Directive 2011/92/EU, as amended by Directive 2014/52/EU), requires that an assessment is made of '*the expected effects deriving from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project concerned*'. This is provided in Chapter 14 (Major Accidents and Disasters) on this rEIAR.

2.4 County Development Plans

The following county development plans were in effect during the assessment period

- Kildare County Development Plan 1999; and,
- Kildare County Development Plan 2005-2011.

Furthermore, the proposed restoration plan for the Application Site has been prepared cognisant of the after-use strategy for quarries post-closure as set out in the set out in the Kildare County Development Plan 2023-2029 (see section 2.2.20 herein for further detail).

2.4.1 Kildare County Development Plan 1999

2.4.1.1 Extractive industries

Section 2.29 for the Kildare County Development Plan (KCDP) 1999 deals with Extractive Industries and Section 2.29.1 addressed sand and gravel and rock quarrying and states:

'It is recognised that the gravel resources are important to the general economy and that the sand and gravel extraction industry is a valuable source of employment in some areas of the county. However, the industry can have seriously detrimental effects on the landscape, on the operation of bloodstock, and on residential amenities. The impact on the county road network has been substantial.'

'It is the policy of the Council that a survey and examination of both existing pit areas and potential sand and gravel deposits in the county be undertaken and to assess the interactions between the development of these resources and future land uses. To assist in the survey, it is intended that an aerial survey of all sand and gravel workings in the county will be made. This will establish the current extent of existing workings and will pinpoint areas where rehabilitation is needed. The survey results could be used as evidence against any future unauthorised sand and gravel developments. It is intended that this survey would be continually updated.

'No sand and gravel extraction will be permitted under Class A soils, in areas of high amenity (as defined in this Plan) and their environs, or where conflict with the bloodstock industry might arise. Apart from these exclusions, sand and gravel extraction will be considered on its merits elsewhere within the county, having regard to the policies of this Plan. Within the East Kildare Uplands Area, sand and gravel extraction will be permitted only in areas zoned for that purpose.

'It is the policy of the Council to ensure that all existing workings shall be rehabilitated to suitable land uses and that all future extraction activities will allow for the rehabilitation of pits and proper land use management. The use of landfilling with waste, other than topsoil, subsoil and builder's rubble, is not considered to be an acceptable method of rehabilitation of pits.

'*It is the policy of the Council to ensure that the full cost of road improvements which are* necessitated for this industry, shall be borne by the industry itself.

'It is Council policy to ensure that rock quarry workings should not detract from the visual quality of the landscape. It is Council policy that all such workings should be subjected to landscaping requirements, similar to those for sand and gravel workings, and that worked out quarries should be rehabilitated.

'*Detailed objectives and standards for the development and regulation of sand and gravel extraction are set out in Part 4, Section 4.22* [of the KCP 1999]'.

Section 2.29.2 of the KCDP 1999 covers the event of major mineral finds and is therefore not considered relevant to this rEIAR.

Part 4, Section 4.22 of the KCP 1999 states that in assessing planning applications for permission for sand or gravel deposits, the following will be the development control considerations:

- *Duration of Permissions* – nothing that the '*period will generally be of five year's duration, but may be for a shorter or longer duration. No permission will be given for a period in excess of ten years*'.
- *Rehabilitation* – noting '*all extractive sites shall be rehabilitated and landscaped, in phase with the extraction*' and be suitable for stated after-use. Furthermore KCC '*will not generally permit the after-use of the site for the processing of materials which have to be imported to the site*'.
- *Bonding* – there is a general requirement for operator of extractive sites to submit bonds
- *Submission Details* – should provide information as set out under the following headings; site layout work programme, landscape, working of the site, transport, and rehabilitation.

The Project's maximum duration is understood to be 7-years and therefore does not exceed the 10-year period.

This rEIAR and the wider Substitute Consent Application submission aims to the information required for the submission. A proposed Rehabilitation plan is provided in Appendix 2A.

Part 4, Schedule 2 of the KCP 1999 provides a list of specific objectives for sand and gravel pits. The Project/Application Site is not included within this list.

2.4.1.2 Transportation

Part 1, Section 1.17.1 of the KCP 1999 states: *'The Council proposes, in co-operation with the National Roads Authority and the Department of the Environment and Local Government, during the period of the Plan, to continue to design and construct major road systems which will in effect by-pass all major towns. The Council also proposes, where appropriate, to improve sections of the existing national road network. All these national roads will be to the standard dictated by traffic needs and consistent with national policy.'*

In relation to the N7 bypasses the KCDP states '*Alternative designs are under consideration, in conjunction with Laois County Council, affecting Monasterevin.'*

Part 2, Section 2.14.1 of the KCP 1999 states *'It is the policy of the Council to protect the traffic capacity of all public roads. For this purpose, it is the policy of the Council to restrict new access points and to restrict developments which are likely to give rise to traffic hazard.'*

It is noted the Project accessed the public road through the site entrance at a permitted quarry site located on adjacent lands and owned/operated by a third-party.

2.4.1.3 Tourism and amenities

The landscape of the county is considered a major attraction and two of the three separate tourist identified are present in the vicinity of the Project Site (Part 1, Section 1.22 of the KCP 1999):

- The Barrow - '*This tourist zone is based on the river and the canal link to the main Grand Canal line at Lowtown. The northern boundary runs through Lowtown. The main County Kildare towns in this zone are Droichead-Nua, Rathangan, Kildare, Athy, Castledermot, Ballitore, Moone, Monasterevin, Robertstown and Kilmeague.*'
- The Grand and Royal Canals – '*This tourist zone is based on the Grand and Royal Canals and their environs. They bisect the county, stretching from the County Kildare border near Celbridge and Leixlip to the River Shannon and it is contiguous to the Barrow zone to the south. The main Kildare towns in this zone are Leixlip, Celbridge, Maynooth, Kilcock, Clane, Prosperous, Robertstown, Rathangan, Monasterevin, Athy and Sallins. The canals are an invaluable tourism asset which is under-utilised at present.*'

In section 1.23 of the KCP 1999,the Valley of the River Barrow is recognised as an area of high amenity. *Section 1.25 of the KCP 1999 states 'County Kildare contains stretches of both the Royal and Grand Canals, the Barrow Navigation System, their feeders and links. The Grand Canal and the Barrow Line constitute important recreational and amenity facilities. They are both used extensively for boating and fishing and their towpaths provide walkways and potential linear parks'.*

Part 2, Section 2.22 of the KCP 1999 states that *'it is the Council's policy to encourage sustainable tourism, especially that based on the county's archaeological, historic and architectural heritage, and that based on the county's bloodstock and equine activities. It is also Council policy to promote the development of the canal system for tourist purposes'*

Section 2.26 states *'it is Council policy to protect items of architectural or industrial archaeological interest associated with the canals, such as bridges, navigation aids, locks, etc., and to develop the towpath system for walking routes.*

It is noted that the Project did not impinge on the public realm. Views of the Project from the Grand Canal towpath have been considered in the Landscape and Visual Impact Assessment in Chapter 11 of this rEIAR and effects are found to have been not significant.

2.4.1.4 Heritage

Part 2, Section 2.30 of the KCP 1999 states that '*it is the policy of the Council to preserve and protect items of artistic, historical, architectural, archaeological and scientific interest in the county*'.

Specific objective relating to the preservation and restoration of heritage items are set out in Part 3, Section 3.2 of the KCP 1999 which states '*it is an objective of the Council to preserve caves, sites, features and other objects of archaeological, geological or historical interest as set out in List A* [therein]'.

The tables does not contain items located in the townland of which the Project is located.

The section also states that it is the '*objective of the Council to preserve buildings, other structures or internal fixtures or features of artistic, historic or architectural interest as set out in list B* [therein]'.

The tables does not contain items located in the townland of which the Project is located.

Part 3, Section 3.3 of the KCP 1999 states that '*it is the objective of the Council to ensure the protection of these* [areas for preservation]*, and to exclude from them any development which would be inimical to the preservation of their essential characteristics. Applications for developments which would affect these areas will be considered in the light of this policy. These areas include comprise Natural Heritage Areas, Special Areas of Conservation, Areas of Scientific Interest and Areas of Scenic Interest. In the case of the first two types, these are also proposed to be designated, pursuant to E.U. Directives, by state agencies'.*

Section 3.3.1 sets out Natural Heritage Areas with Proposed Natural Heritage areas tabulated. The potential effects of the Project on Natural Heritage Areas and Proposed Natural Heritage areas is considered in Chapter 5 (Ecology and Biodiversity) of this rEIAR.

Section 3.3.2 sets out Special Areas of Conservation with Proposed Candidate Special Areas of Conservation tabulated. These are considered in the Stage 1 Screening for Appropriate Assessment that has been prepared to support the application for Substitute Consent.

Section 3.3.3 sets out Areas of Scientific Interest with Areas of Scientific Interest in County Kildare tabulated. None of the sites included are within the vicinity of the Site.

Section 3.3.4 sets out Areas of Scenic Interest with Areas of Scenic Interest in County Kildare (Trees and Woodlands and Historical Landscapes) tabulated. None of the sites included are within the vicinity of the Site.

Part 3, Section 3.4 of the KCP 1999 considers views and prospects and states '*it is an objective of the Council to preserve, improve and open up places or areas from which views of high amenity value may be enjoyed.*' Table 3 within this section considers views to and from all bridges on Grand Canal which the closest to the Application Site being the Barrow Bridge at Monasterevin. None of the scenic views to be preserved, as listed in this section, relate to the Townland in which the Project is located.

Part 2, Section 2.31 of the KCP 1999 states that '*it is the policy of the Council to co-operate with the Office of Public Works and the Wildlife Advisory Council in securing the conservation of wildlife in the county in accordance with the provision of the Wildlife Act 1976'*.

Section 2.31A states that it is '*the policy of the Council to protect and preserve existing hedgerows and to encourage the planting of new hedgerows, using traditional native species. The Council will promote the environmentally sensitive management of hedges, and it is the Council's policy to enforce strictly the prohibition of cutting hedgerows during the nesting season.*'

2.4.2 Kildare County Development Plan 2005-2011

Relevant policy sections include:

- Chapter 2: Economic Strategy
- Chapter 14: Extractive Industries
- Chapter 15: Development Control Standards
- Chapter 17: Heritage
- Chapter 18: Landscape Character Areas
- Chapter 19: Protected Views and Scenic Routes

Policy relating to heritage is provided in Chapter 10 (Cultural Heritage) of this rEIAR, where it is relevant.

Policy relating to landscape character areas, protected views and scenic routes is provided in Chapter 11 (Landscape and Visual) of this rEIAR, where it is relevant.

Economic Strategy

The CDP contains a strategic goal to *'make Kildare the first choice location for indigenous and foreign direct investment by developing locations in Kildare that will attract and sustain job creating investment. Thereby ensuring the provision of employment for Kildare's labour force'.*

Economic Strategy policy statement provides for the following policy relating to transport that are relevant to this rEIAR:

'ED 1 To support and implement the strategic development of identified dynamic clusters and towns in accordance with the Integrated Framework Plans for Land Use and Transportation (IFPLUT) as required under the NSS and supported in the draft Regional Planning Guidelines. Studies are currently under way for:

- *Newbridge/Kilcullen*
- *Athy*
- *Kildare/Monasterevin*
- *Leixlip/Celbridge/Maynooth/Kilcock.*

ED 3 To improve access of the labour market (local and remote) to the employment location.

ED 4 To improve access to Dublin Airport and Dublin Port.

ED 5 To improve movement within and between settlements in the county by all modes of transport.

ED 6 To promote more sustainable forms of transport.'

Economic Strategy policy statement provides for the following policy relating to Small and Medium Enterprise that are relevant to this rEIAR:

'ED 25 To encourage and facilitate at appropriate locations, small indigenous industries in recognition of their increasing importance in providing local employment and helping to stimulate economic activity within small communities.'

Extractive Industries

Section 14.1 states that *'The extraction of sand, gravel and rock is an economic activity that is vital for society, as it largely contributes to the provision of road and construction aggregates. The extractive industry also provides employment and economic growth in the local and regional economy and the Council recognises the vital contribution made by the extractive industry to the continued growth of County Kildare and the Eastern Region. [...]*

Although the extractive industry is a temporary use of land, it can have detrimental environmental effects including traffic generation, vibration, noise, dust, water pollution, visual intrusion and loss of groundwater supplies. The industry can seriously affect the landscape, the operation of the bloodstock industry and residential amenities. The impact on the road network is substantial.

It is also recognised that, by their nature, aggregates can only be worked where they occur. The deep sand and gravel deposits are typical in the east of the County while rock quarrying commonly takes place on the eastern uplands and in the Chair of Kildare.

Under Section 261 of the Planning and Development Act 2000-2004, registration of all quarries operating in the Country is required. This section commenced with effect from 28th

April 2004 and it is intended to bring all quarries - including those that have claimed exemption because they were operating before the 1963 Planning Act - within the planning system and thus deal with concerns regarding unauthorised sand and gravel quarries in the country. The registration process will enable the Planning Authority, subject to the financial resources of the county, to impose, modify or restate conditions on existing quarries and thus tackle environmental issues and concerns and will give the public the right to comment on the terms of the permission.'

The following goal and objectives were met by the Extraction Development at the Application Site.

'14.2 Goal: To ensure that adequate supplies of aggregates are available to meet the future needs of the County and Region, in line with the principles of sustainable development and environmental management.

14.3 Objectives:

(1) To support regional policy for the adequate supplies of aggregate resources to ensure the continued growth of the County and Region.

(2) To ensure that the extractive industry will minimise and/or mitigate any adverse visual and/or environmental impacts on the built or natural environment.'

Section 14.4 addresses 'Siting of Extractive Industries' in relation to changes of the appearance of the landscape and the potential for visual intrusion from changes to ground level, development of quarry faces, removal of vegetation, and use of plant. The section notes the sensitivity of elevated areas (e.g. ridgelines, hills, uplands, valley sides) to visual impacts from extraction activities.

Section 14.5 'Layout and Design of Extractive Industries' states that '*Ideally the overburden (topsoil, subsoil, and waste) should be located to enclose and screen the other elements so as to minimise visibility from the surrounding countryside. This aspiration must take account of the operation's reasonable requirement to minimise the length of haulage routes and to avoid double handling of material within the site.*

When located on hill slopes and eskers, quarries present a visual impact on the local landscape. The visibility however can be partially screened by occurring topography (i.e. the quarry will only be visible to one side of the hill, or screened by undulating lands in the case of quarrying eskers) and vegetation (i.e. forestry and planting will screen the lower quarry faces). Nevertheless, the visual impact of quarry works is likely to be significant on the local landscape'

The Application Site is located in the Southern Lowlands of Kildare and is set in a relatively flat lying area that is screened by surrounding topography. Additionally, the Application Site is largely screened from the local road, the Grand Canal, adjacent agricultural lands by established hedgerow and treelines. See Chapter 11 (Landscape and Visual) for further detail.

Section 14.7 states that '*Post Closure of Extractive Industry Rock quarries usually result in steep rock faces and a flooded pit. With reasonable and economic design these can become valuable local habitats and even recreation amenities. Sand and gravel workings, on the other hand, can easily be restored to agricultural use. However, designations to post closure uses must have regard to the likely land use context at the time of closure. Furthermore, allowing rehabilitation of quarry faces to take place parallel to extraction operations and providing planting on earth mounds at quarry entrances significantly reduces visual impacts while allowing for ecological and habitat recovery.'*

The Application Site was not subject to a Rehabilitation Plan at the time of closure. Lands south of the Application Site and located within the EIA boundary were in agricultural use (tillage) prior to, during and following closure of the extraction operation.

The following policies of the council as set out in Section 14.8 ('Policy Statement') are relevant to this rEIAR:

'EI 1 To carry out a survey and examination of both existing pit areas and potential sand and gravel deposits in the county, subject to the financial resources of the county. It is intended that this survey will be carried out in conjunction with the Geological Survey of Ireland (GSI) and that it will assess the interactions between the development of these resources and future land uses.

'EI 2 To safeguard resources by seeking to prevent incompatible land uses, that could be located elsewhere, from being located in the vicinity of the resource, since the extraction of minerals and aggregates is resource based.

'EI 3 To require that applicants demonstrate their commitment to good environmental management.

'EI 4 To ensure that the full cost of road improvements which are necessary for this industry, shall be borne by the industry itself and that the industry shall also contribute to the recreation and amenity of the county.

'EI 5 To ensure that the extractive industry minimises adverse effects on the road network in the area and contributes to their maintenance in accordance with Policy EI 4.

'EI 6 To ensure that the extraction of minerals and aggregates should minimise the detraction from the visual quality of the landscape.

'EI 7 To ensure that all existing workings be rehabilitated to suitable land uses and that all future extraction activities allow for the rehabilitation of pits and proper land use management. Land filling with inert material is the preferred method, however, each planning application in relation to extractive industries shall be considered on a case-by-case basis and, where relevant, will be dealt with under the Waste Management Strategy.

'EI 8 To prohibit extraction in areas classified as having Class A soils, except where it can be demonstrated that there are no suitable alternative sites. The Council will only consider such extraction if it can be demonstrated that the land can be returned to a similar

agricultural use following cessation of extraction activities. Any extraction in areas with Class A soils must be carried out under the guidance of a soil specialist.

'EI 9 To ensure that development for aggregates/mineral extraction, processing and associated concrete production does not significantly impact in the following areas: - Special Areas of Conservation (SACs), - Special Protection Areas (SPAs), - Natural Heritage Areas (NHAs), - Other areas of importance for the conservation of flora and fauna, - Areas of significant archaeological potential, - In the vicinity of a recorded monument, and - Sensitive landscapes as identified in chapter 18 [therein].

The Site is not listed within the Table 14.1 'List of Specific Objectives for Sand and Gravel Pits' which sets out site specific objectives are the pits listed.

Development Control Standards

Section 15 of the KCC CDP deals with design and development. The section includes the following relevant Development Control Standards policies in relation to sightlines, access onto public roads, and access requirements. No specific or bicycle parking standards are identified for quarry development.

The Development utilised access through the adjacent quarry lands to access the public road need at a single point of ingress/egress on the local road (see Chapter 11 (Traffic and Trasport) for details).

Section 15.16 addresses the Extractive Industry and states the following:

'Applications should submit information on the following items at application stage:

(1) Map(s) showing (a) total site area, (b) area to be excavated, (c) any ancillary proposed development, (d) nearest dwellings or any other development (within 1 km of the site.)

(2) Description of the aggregate(s) to be extracted, method of extraction, any ancillary processes (such as crushing, concrete manufacture, etc.), equipment to be used, stockpiles, storage of soil and overburden, storage of waste materials, settling ponds.

(3) Total and annual tonnage of extracted aggregates, expected life of the extraction, maximum extent and depth of working, phasing programme.

(4) Description of development works (buildings, fixed and mobile plant, roads, fuel tanks, water supply and drainage, earth mounds, etc.

(5) Description of water courses and water table depth, natural and cultural heritage, traffic impact and waste management.

(6) Description of cumulative impact when taken together with other quarries in the vicinity.
(7) Likely environmental effects.

(8) Proposed mitigation measures.

(9) Restoration and after-care proposals.'

The substitute consent application, including this rEIAR, provides the information listed above to the Board. Where data is not publicly available regarding extraction and associated works reasonable assumptions have been made using professional judgement, and based on similar development and applying the precautionary principle. This rEIAR set out where assumptions have been made in Chapter 2 (Project Description) and technical chapters, where relevant.

2.5 Limitations and Difficulties Encountered

Limitations and difficulties encountered in preparing this rEIAR having regard to the Planning and Development Regulations 2001 (as amended) and 2022 EPA Guidelines relate to the lack of operational design and practises, monitoring and survey data from the period that the subject lands were excavated and material processed. The Applicant holds limited information regarding the Project assessed in this rEIAR as it significantly predated their purchase of the lands within the Application Site. Furthermore, the Project was carried out by a third party.

Historic planning application and license files were inspected at the offices of Kildare County Council by WSP on 22 October 2024.Notwithstanding, consistent topographical survey and monitoring data for the subject lands from years prior to 2024 does not exist. The section 261A assessment prepared by KCC was carried out approximately 6 years after the quarry had ceased operations and cited reports from prior to 2012 relating to the Project that were unavailable to view within the planning file.

Further relevant difficulties or survey limitations specific to each study area have been identified therein, as appropriate.

Conservative assessments have been applied where information concerning methodology or program could not be fully determined.

As appropriate, information from publicly available sources has been used in the course of this assessment. This includes mapping sources such as the Environmental Protection Agency, Geological Survey of Ireland, Department of Communication, Climate Action and Environment, etc., and other information including Census returns. Due care has been taken in the review of these data sets however no responsibility can be taken for inaccuracies which may be present within this public data.

2.6 References

Kildare County Development Plan 1999. Available at: https://kildarecoco.ie/AllServices/Planning/DevelopmentPlans/ArchiveofDevelopmentPlans/KildareCountyDevelopmentPlan1999/

Kildare County Development Plan 2005-2011. Available at: https://kildarecoco.ie/AllServices/Planning/DevelopmentPlans/ArchiveofDevelopmentPlans/KildareCountyDevelopmentPlan2005-2011/

Kildare County Development Plan 2023-2029. Volume 1, Chapter 9. Available at: https://kildarecoco.ie/AllServices/Planning/DevelopmentPlans/KildareCountyDevelopmentPlan2023-2029/Volume1Chapters1-17/Chapter%209.%20Our%20Rural%20Economy.pdf

Kildare County Development (2025,) S261A Quarry Notices. Available at: https://kildarecoco.ie/AllServices/Planning/Quarries/Copy of S261A Quarry Notices Issued edited for the website 14102020.pd

Appendix 2A

Restoration Plan

Rehabilitation of site

Introduction

This Rehabilitation Plan seeks to retain and promote habitats that have developed onsite through natural recolonisation of the lands in the years following the Project closure on 31 December 2006. This approach is adopted to ensure the intrinsic ecological character of the site (i.e. fauna and floral onsite) are factored into the rehabilitation of the Site. These features comprise the following elements:

- Retaining the existing waterbody formed through collected waters within the disused quarry void.
- Retaining a discontinuous shallow sand bank on sections of the uppermost levels of the southern and eastern quarry walls when quaternary deposits have been exposed through excavation. These banks are suitable for nesting birds such as sand martins.
- Retaining existing seedbank onsite through allowing for natural recolonisation to continue within the site.

The rehabilitation plan drawing is provided at the end of this Appendix 2A.

Habitats present onsite (2024)

A habitat survey (sensu Fossitt classification) of the EIA study area was undertaken by WSP in 2024. The habitats are described in Chapter 4 (Ecology and Biodiversity) of this rEIAR. The 2024 habitat map is provided herein (see Figure 2A-1 and Chapter 4 (Ecology and Biodiversity)) as the proposed rehabilitation plan requires an a consideration of the present-day habitats at the Site.

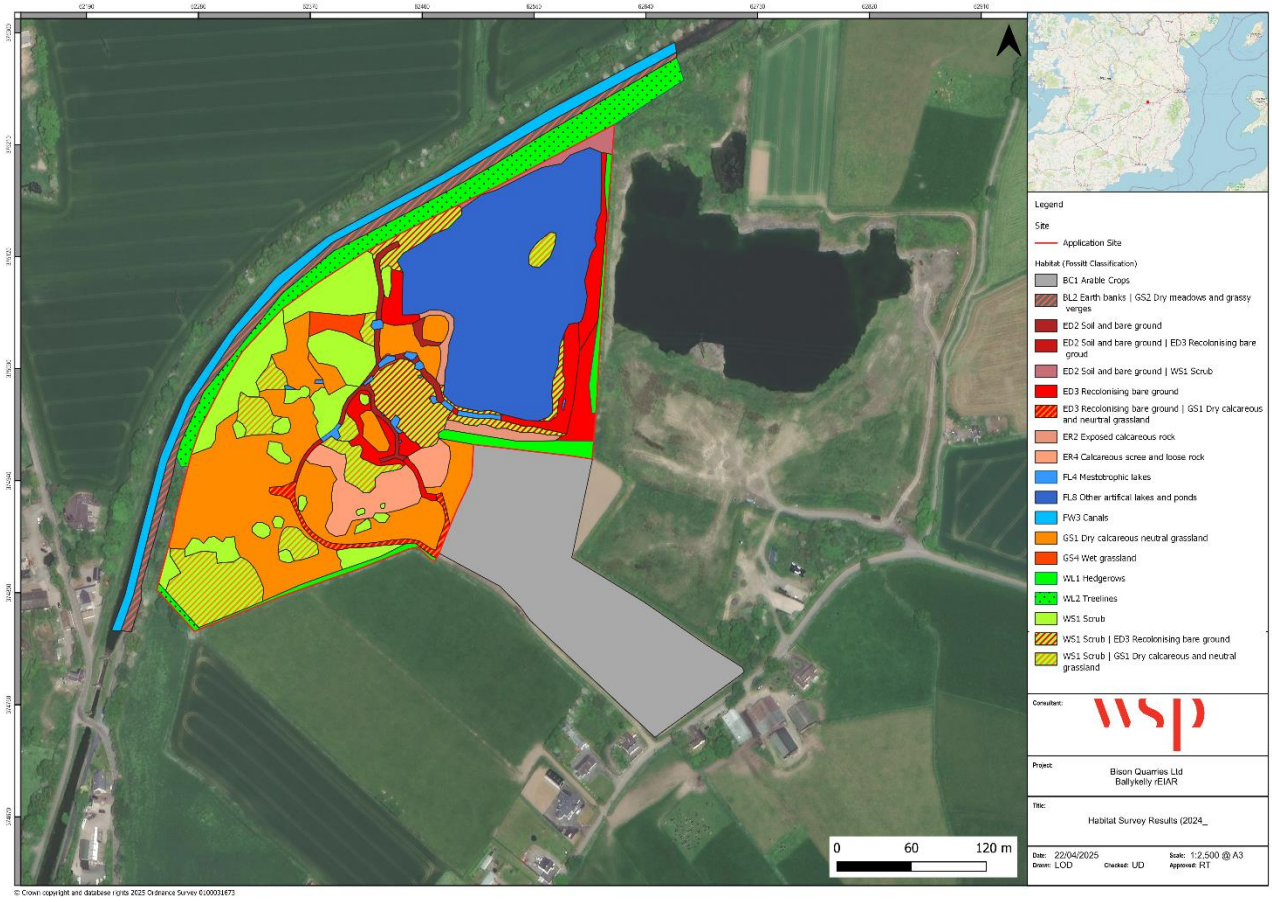


Figure 2A-1: Habitats sensu Fosset (2024)

Ground levels and Screening

The Site is largely screened from the local roads and the Grand Canal due to (1) the topography at, and surrounding, the Site and (2) existing present-day vegetation (e.g. hedgerow, treelines, scrub).

It is estimated that approximately 105 m of hedgerow may have been removed as a result of the project and it is proposed to plant approximately 96 m of hedgerow at the Application Site. Hedgerow planting is proposed on the Application Site boundaries on lands within the ownership of the Applicant to promote screening of the Site from adjacent land located to the south-east of the Site. It is anticipated this will also provide additional linear vegetation features at the Application Site favourable to bats and birds (e.g. provision of better-quality commuting habitat). Bolstering of existing hedgerow will be carried at the location shown on the drawings provided within this Appendix 2A.

The plan proposes to retain existing ground levels at the Site and utilise existing internal access tracks to facilitate continued access within the Site. It is noted that a habitats walkover survey and subsequent amphibian survey carried out at the Site by WSP in 2024 found standing puddles on short sections of the internal access tracks to be habitat suitable

for amphibians (see Chapter 5 Ecology and Biodiversity for details). This plan seeks to retain these features.

Hedgerow planting

Hedgerow planting is proposed along lengths of the new hedgerows and as infill to gaps within existing hedges. Species assemblages will be agreed with Kildare County Council and are proposed in Table 2A-1 below.

Table 2A-1: Proposed hedgerow planting species

Hedgerow Trees - br 120-150cm ht. Planted individually at approx. 10-15m c/cs through the hedges	Hedge - br60-90cm ht., planted in random groups of 5-15 at 5/lin m and double staggered
Malus sylvestris - 20%> *Pinus sylvestris* -10% *Quercus petrea* - 50% *Sorbus aucuparia* - 20%	*Corylus avellana* - Hazel - 10% *Crategus monogyna* - Hawthorn - 45% *Euonymus europaeus* - Spindle - 5% *Ilex aquifolium* - Holly - 3% *Ligustrum vulgare* - Privet- 10% *Prunus spinosa* - Blackthorn - 15% *Rosa canina* - Dog Rose - 2% *Viburnum opulus* - Guelder Rose- 10%

Roost Creation - Bat, Invertebrate and Bird Boxes / Reptile Refugia

The proposed plan seeks to increase the number of roosting opportunities for bats, invertebrates and birds on Site. Accordingly, 4 No. bat boxes (the 2F Schwegler generalist bat box, or similar) will be erected on suitable retained trees in the vicinity of the Site as indicated on the Rehabilitation Drawing. The boxes will be placed at a height of between 3 – 6 m in sheltered sunny locations and will be placed with clear flight-lines to the box. Four invertebrate boxes will also be placed in sheltered areas of the site as indicated on the Rehabilitation Drawing. The plan also provides for reptile refugia and basking habitat.

In addition, 4 No. bird boxes (the 2GR Schwegler nest box, or similar) will be erected on suitable retained trees in the vicinity of the Site as indicated on the Rehabilitation Drawing. The boxes will be placed at least 2 m above the ground, in locations sheltered from prevailing wind, rain, and strong sunlight, ensuring birds have unobstructed access to the box.

Security and access

Additional fencing is provided on the boundary of the Site where it abuts the Grand Canal to restrict site access from the public realm. The proposed outer fence lines tie into existing boundary fencing. It is proposed to use 1.8-meter security fencing.

Access to the Site will be via the existing present-day entrance which is secured by security gate and lock.

Signage will be maintained at the existing present day site entrance.

Internal access tracks will be maintained by periodically clearing of encroaching vegetation. This clearing will occur outside of sensitive ecological time periods, where required.

Emergency water access is be provided by two existing quarry benches which provide a ramp structure into the collected waters within the quarry void. These are located to the north-west and south-east of the quarry void respectively.

The rehabilitation plan drawing is provided overleaf.

OSI Licence No.
CYAL50192220

Projection / Spatial Reference:
==========
Projection= IRENET95_ITM

Centre Point Coordinates:
==========
X,Y= 663239.66,713123.43m

Reference Index:
==========
Map Series | Map Sheets
1:5,000 | 3657

Data Extraction Date:
==========
Date= 24-Apr-2024

Upgraded Fencing along Canal

Waterbody Emergency Egress

Existing Hedgerow

Existing Treeline

Aquatic and Marginal Habitat

Invertebrate, Bat and Bird Boxes

Waterbody Emergency Egress

Existing Recolonised Transitional Scrub Area

Recolonising Bare Ground

Invertebrate, Bat and Bird Boxes

Reptile Refugia

Planted Hedgerow

Site Access with Security Gate

Bolstered Hedgerow

Existing Recolonised Grassland

Access to Private Lane with Gate

LEGEND:
- LANDS UNDER CONTROL OF APPLICANT
- APPLICATION SITE BOUNDARY
- O/H POWER LINES
- CROSS SECTION (See Dwg. No. 05)
- EXISTING GROUND CONTOURS (mOD)
- VEGETATION

NOTES:
GRID REFERENCES ARE IN METRES & TO ITM COORDINATES.
LEVELS ARE IN METRES & TO O.S. DATUM.
DIMENSIONS ARE IN METRES.

CLIENT
BISON QUARRIES LTD

CONSULTANT
wsp

YYYY-MM-DD	2024-Dec-03
PREPARED	BVV
DESIGN	POB
REVIEW	RT
APPROVED	RT

PROJECT
QUARRY RESTORATION, COOLSICKEN, MONASTEREVIN, Co. KILDARE.

TITLE
Restoration Plan

PROJECT No. IE40000205
DRAWING No.
Rev. A

6 Water

6.1 Introduction

This Chapter of the remedial Environmental Impact Assessment Report (rEIAR) considers and assesses any potential impacts resulting from quarrying related activities that have been carried out at the project site; a disused quarry located in the townland of Coolsickin or Quinsborough, Monasterevin, County (Co.) Kildare (the 'Site'), on the water environment.

It is noted that activity at the Site involved the extraction of sand, gravel and rock through blasting, mechanical excavation and rock breaking along with aggregate processing and stockpiling (the 'Project').

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.

6.1.1 Technical Scope

The technical scope of this assessment is to consider the potential impacts and effects on the water environment that could have resulted because of the quarrying related activities carried out at the Site. This assessment considers the potential sources of change resulting from Project activities detailed in the project description (Chapter 2 of this rEIAR) on hydrological and hydrogeological receptors. This assessment considers water levels, flow regimes, water resources and uses, water quality, flood risk and water management.

The associated secondary potential impacts from changes in the water environment on human health are also considered in this chapter and in Chapter 3 (Population & Human Health). Potential secondary effects of changes in land quality on water quality is addressed in this chapter and in Chapter 5 (Land, Soils and Geology). Any secondary (i.e. indirect) effects on ecology or biodiversity due to changes in the water environment are considered in Chapter 4 (Ecology and Biodiversity).

6.1.2 Geographical and Temporal Scope

The geographical study area for the assessment covers the EIA boundary (identified on Figure 6-1) and with a study area extending 1 km around the EIA Site boundary. The buffer allows for identification of downstream or downgradient hydraulic connectivity with off-Site water features or users that may have been affected by Site related activities. In the context of this rEIAR, the Substitute Consent Application Boundary is located entirely within the EIA Boundary and contains lands which form the historical extraction area and quarry working areas (i.e. the historical stockpile areas).

Historical aerial mapping and documentation held by Kildare Country Council indicates extraction of aggregates within the Application Site is estimated to have commenced within the year 2000 and the operation had ceased during the year 2006. Accordingly, the baseline for this rEIAR has been set to 01 January 2000, and the rEIAR process has

assessed environmental impacts from that date to 31 December 2006 (see Chapter 2 Project Description for detail).

This assessment establishes what the baseline water environment conditions were for the Site and then assesses what impacts may have occurred due to subsequent activities at the Site during the review period.

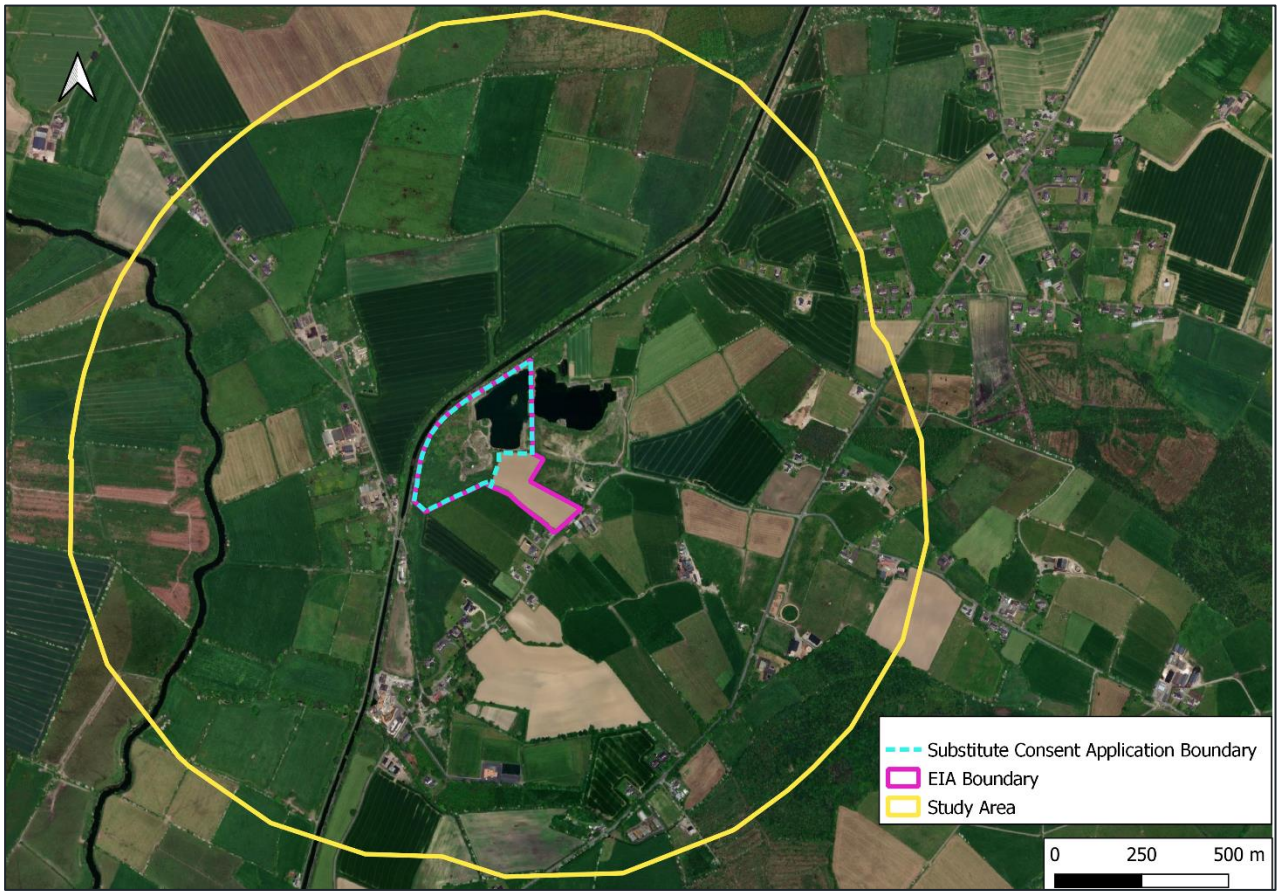


Figure 6-1 - Location of the Site (EIA Boundary) and the 1 km Study Area

6.1.3 Project Description Summary

The Project seeking substitute consent consists of extraction of sand, gravel and rock over an area of 7.87 ha through blasting, mechanical excavation and rock breaking along with aggregate processing and stockpiling. The Project was operational between the years 2000-2006.

A full project description is presented in Chapter 2 (Project Description).

6.2 Legislative and Policy 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 EIA 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,
    - 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 the Project, but it should be noted that a poor water quality can be naturally occurring due to the environmental setting.

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) 1999 is the strategy document for County Kildare which covers most of the temporal scope of this assessment period. The key policies and objectives of this plan are listed in Section 2.5.1 of the Project Description (Chapter 2).
The Kildare CDP 2005-2011 was adopted on 18 May 2005 and covers the temporal scope from this date to 31 December 2006. The key policies and objectives of this current plan are listed in Section 2.5.2 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:

- 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) - European Communities Environmental Objectives (Surface Waters) Regulations is the 2022 amendment (S.I. No. 288/2022).
- GTV - Groundwater Regulations (SI No. 9 of 2010 as updated by SI No. 366 of 2016)
- 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 Development on the water environment and to secondary associated soils, land and geology and human health receptors. 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, historical records of Site activities, previous hydrological and hydrogeological studies, historical monitoring data and recent monitoring and survey data collected to supplement the historical dataset. 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 have occurred to each receptor due to Site activities, identify source-pathway receptor linkages, and assign the magnitudes of impact. This stage considers embedded design mitigation, historical and existing site practices including good practice in construction environment management and pollution prevention;
4) Determine the effect significance of each potential impact on each sensitive receptor;
5) Consider the need for remedial measures if it is considered necessary to reduce the magnitude of any impact and associated effect. If remedial measures are considered necessary, a timeline will be presented in which the measures would be implemented;
6) Assess the residual impact magnitude and residual effect significance after all mitigation is carried out; and
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 Development, which is presented in Chapter 2 of this rEIAR. For the identification of receptor value/importance that completes Stage 2, and for 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), with some 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 have occurred 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. 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. 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 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.
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 occurred as a direct result of the activities on Site and was likely to have occurred at or near the Site 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 Site activities result 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 Site.

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

- Temporary – effect likely to last less than 1 year without intervention (i.e. less than the construction phase);
- Short term – effect likely to last 1 to 7 years without intervention;
- Medium term – effect likely to last 7 to 15 years without intervention;
- Long term – effect likely to last 15 to 60 years without intervention; and,
- Permanent – effect 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 removal of best and most versatile agricultural soils. 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 as long as 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. Where it includes two significance categories, reasoning is provided in the topic chapter if a single significance category is reported. 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.
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 current level of effect significance, additional mitigation measures (remedial 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 additional 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 (Stage 7) (see Section 6.9).

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 and Subsequent Conditions

This Section presents a summary of the baseline (01 January 2000) and subsequent conditions to 31 December 2006 for the water environment (hydrology, hydrogeology, and flooding).

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 vicinity of the Site (excluding the quarried areas) drops from ca. 80 m AOD in the east (vicinity of the Site access) to ca. 69 m AOD in the west (vicinity of the Grand Canal – Barrow Line).

Prior to the review period, the elevation of the ground in the vicinity of the present-day quarry void (and lake) was between 70 and 79 mAOD, with a gentle slope to the northwest. The present-day topography includes the quarry void, which has been allowed to fill with water post-cessation of mining at the end of the review period. The quarry void is understood to be ca. 15 m deep (below natural ground surface). The conceptual cross-sections presented in Section 6.5 help to present the changes in topography with baseline and subsequent conditions. The base of the quarry void in Figure 6-21 is ca. 55 mAOD.

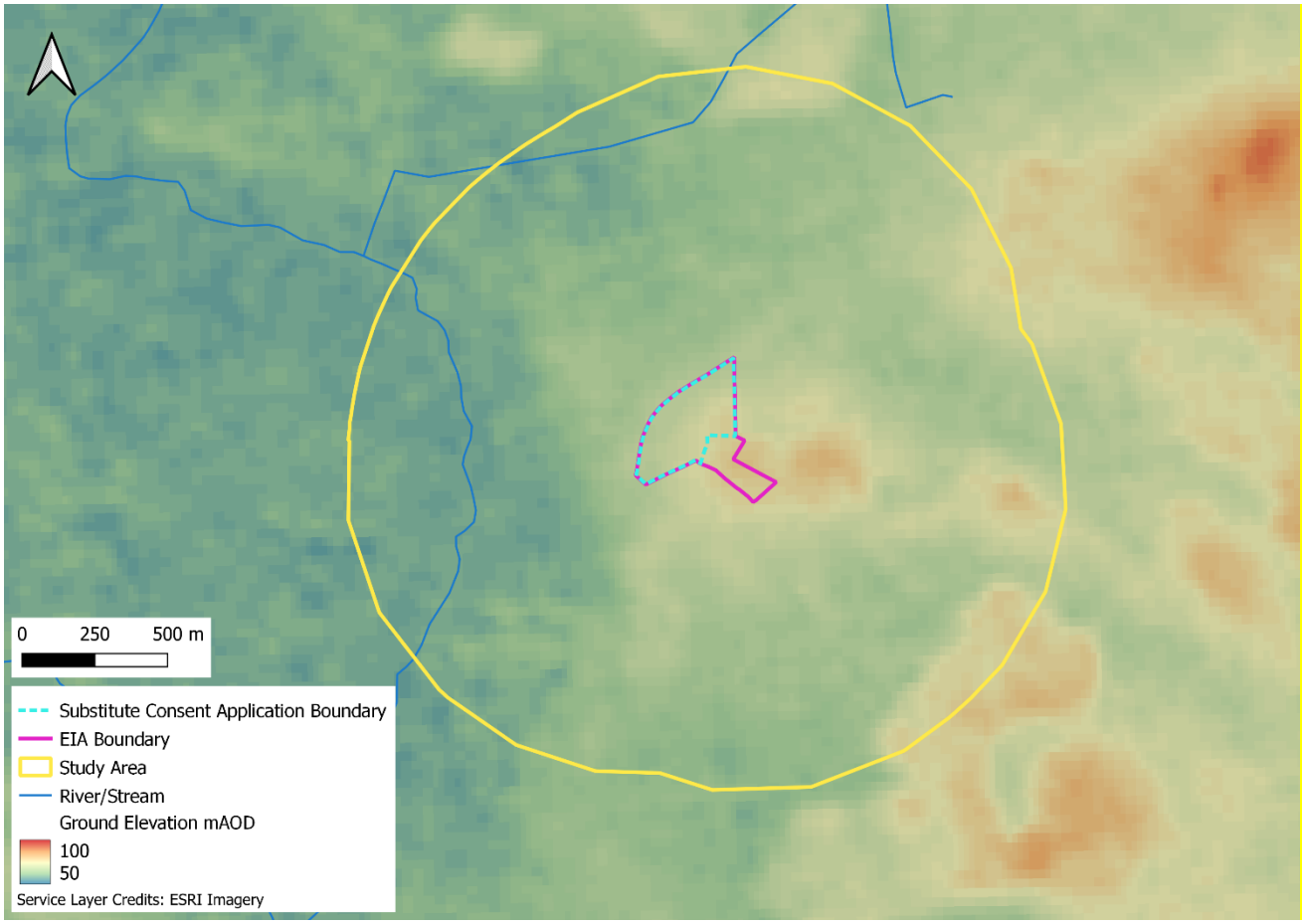


Figure 6-2 - Regional Topography and River Network

6.4.2 Land Use

A full description of land use change arising from the Project over the temporal assessment period, and to the present is provided in Chapter 2 (Project Description).

6.4.2.1 Baseline Conditions (1 January 2000) Land Use

Aerial imagery indicates that prior to the Project, the Application Site comprised agricultural lands consisting of fields bordered primarily by hedgerows. The private entrance located on

the local road (L7049) on the south of the EIA boundary is depicted as present (see Figure 6-3). The Grand Canal – Barrow Line, forms the northwestern boundary to the Site.

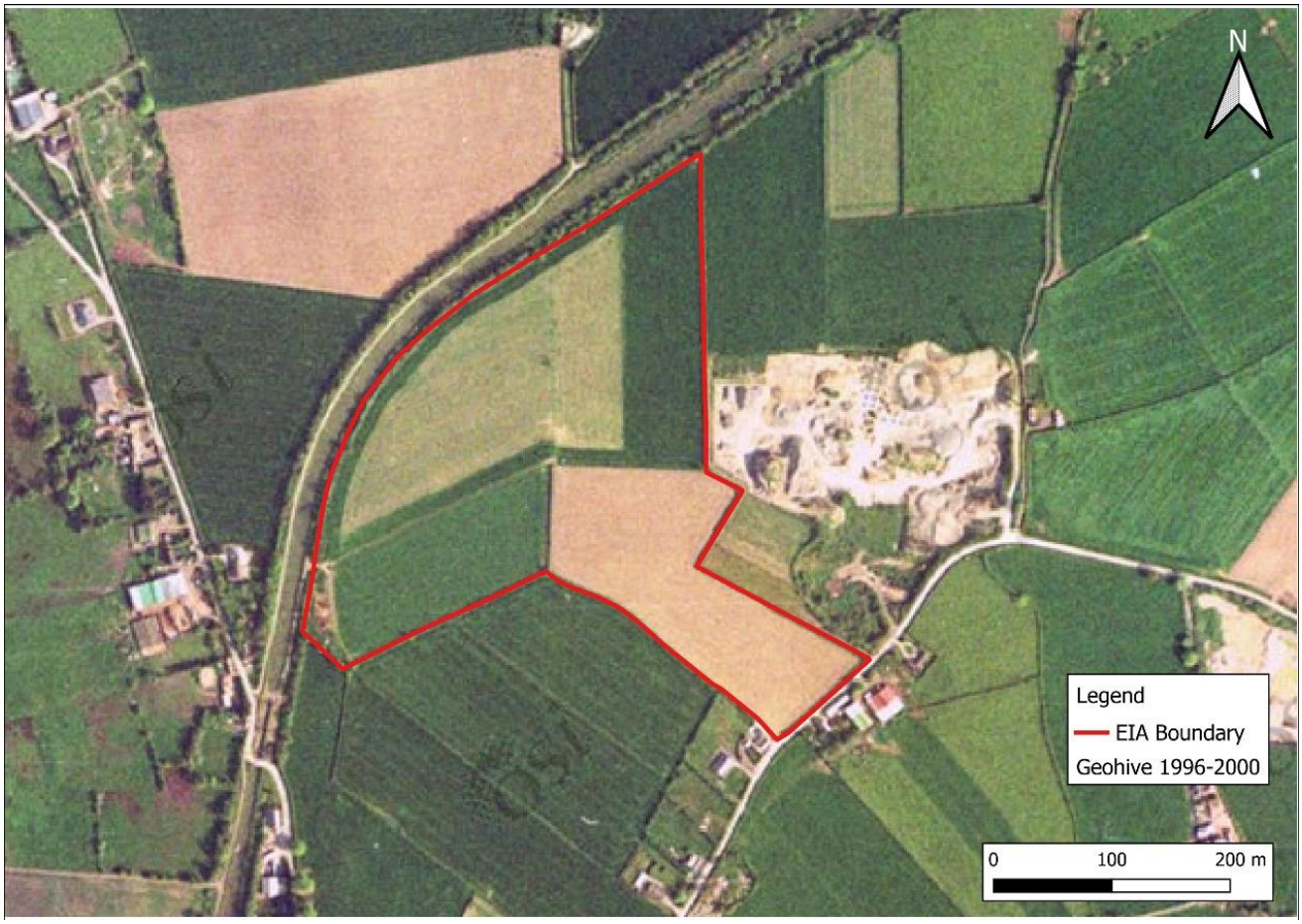


Figure 6-3 - Land use prior to the Project (Map Genie Imagery 1996-2000)

Historical mapping indicates that the Application Site was likely in agricultural use since at least 1834. Fields and field boundaries over the Application Site are shown in the 1829-1834 Cassini 6" mapping records and the 25" mapping series from 1897-1913 (Heritage Council Online heritage maps viewer, 2025). Historical mapping indicates changes to field boundary configurations have taken place on the Application Site since 1834.

6.4.2.2 Existing conditions (31 December 2006) Land Use

The earliest publicly available aerial imagery following the cessation of extraction activities on the application Site is from 2009 (Google Earth Satellite). The 2009 aerial imagery (see Figure 6-4), shows collected groundwater present in the quarry void. The image also shows the extent of the historic stockpiling areas on the Application Site. The Site continues to be bound by the Grand Canal to the northwest and agricultural fields to the south. There is an adjacent quarry along the eastern boundary, which has also been allowed to be filled with groundwater. It is understood, however, that works continued at this quarry beyond the end of the review period.

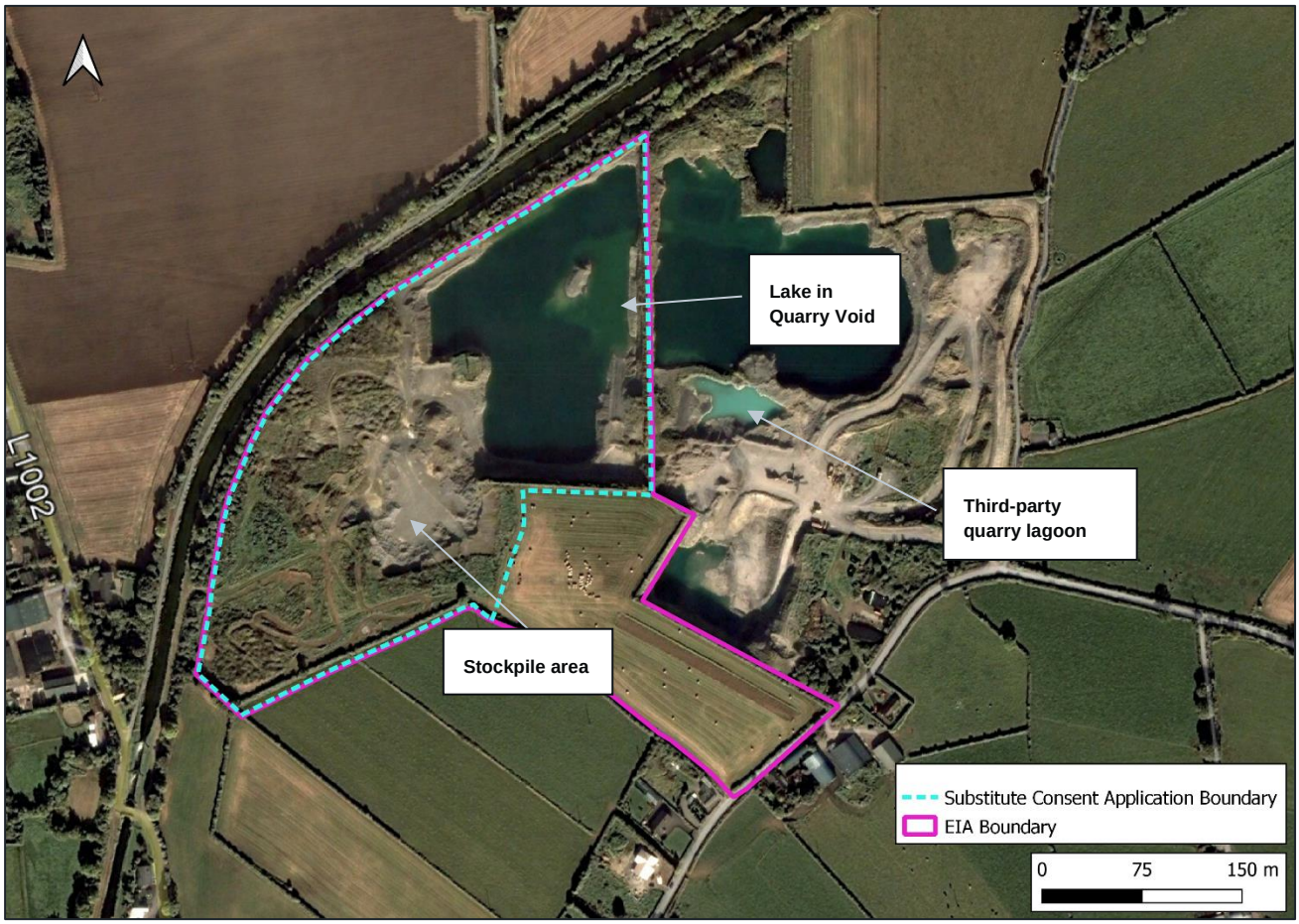


Figure 6-4 - EIA Boundary overlain on October 2009 (Google Earth)

6.4.3 Site Water Management

The earliest publicly available aerial imagery following the cessation of extraction activities (Figure 6-4), shows that the quarry void had filled with water. It is most likely that this is groundwater from the bedrock limestone aquifer beneath the Site (see Section 6.4.7).

This groundwater is likely to have been encountered over the review period during the extraction of limestone rock and would have required to be dewatered to some degree. However, there is no information on the rate of dewatering, the pump specification or the location of discharge at the Site. Making assumptions as to dewatering rates/volumes and potential locations of discharge have not been made in this report due to too many unknown variables.

However, information is available from the third-party quarry operation to the east of the Site. As part of their 2006 planning submission (planning ref 062729) report, they stated that surface water is pumped to onsite settlement lagoons (3 no. on site) and reused when required for dampening internal roads and stockpiles. Evidence of these lagoons can be seen in Figure 6-4. It is therefore likely that water pumped from the base of the quarry at the Site over the review period was discharged to a similar settlement/soakaway pond, although this cannot be confirmed.

6.4.4 Geology

The underlying geology of the Site is presented in Chapter 5 of this rEIAR. A brief summary of the geology is provided below.

6.4.4.1 Soils

Teagasc's Irish Soil Information System (SIS) shows alluvial lake soil cover over the entire Site area. This is representative of the baseline soils at the Site prior to activities within the extraction area.

6.4.4.2 Superficial Deposits

GSI (2025) data indicates that the subsoils underlying the Site are composed of gravels derived from Limestones and till derived from Limestones. In the northern section of the study area GSI mapping indicates there is cut over raised peat. To the west of the study area there are areas of alluvium and lacustrine sediments.

6.4.4.3 Bedrock

The GSI Bedrock Geology 1:100,000 map (Figure 6-5) indicates that the Site is underlain by the Carboniferous Allenwood Formation, which is described as consisting of pale-grey, generally massive shelf limestones and their dolomitised equivalents.

The area to the west of the study area is underlain by the Carboniferous Lucan Formation, which consists of dark-grey to black, fine-grained, occasionally cherty, micritic limestones that weather paler, usually to pale grey.

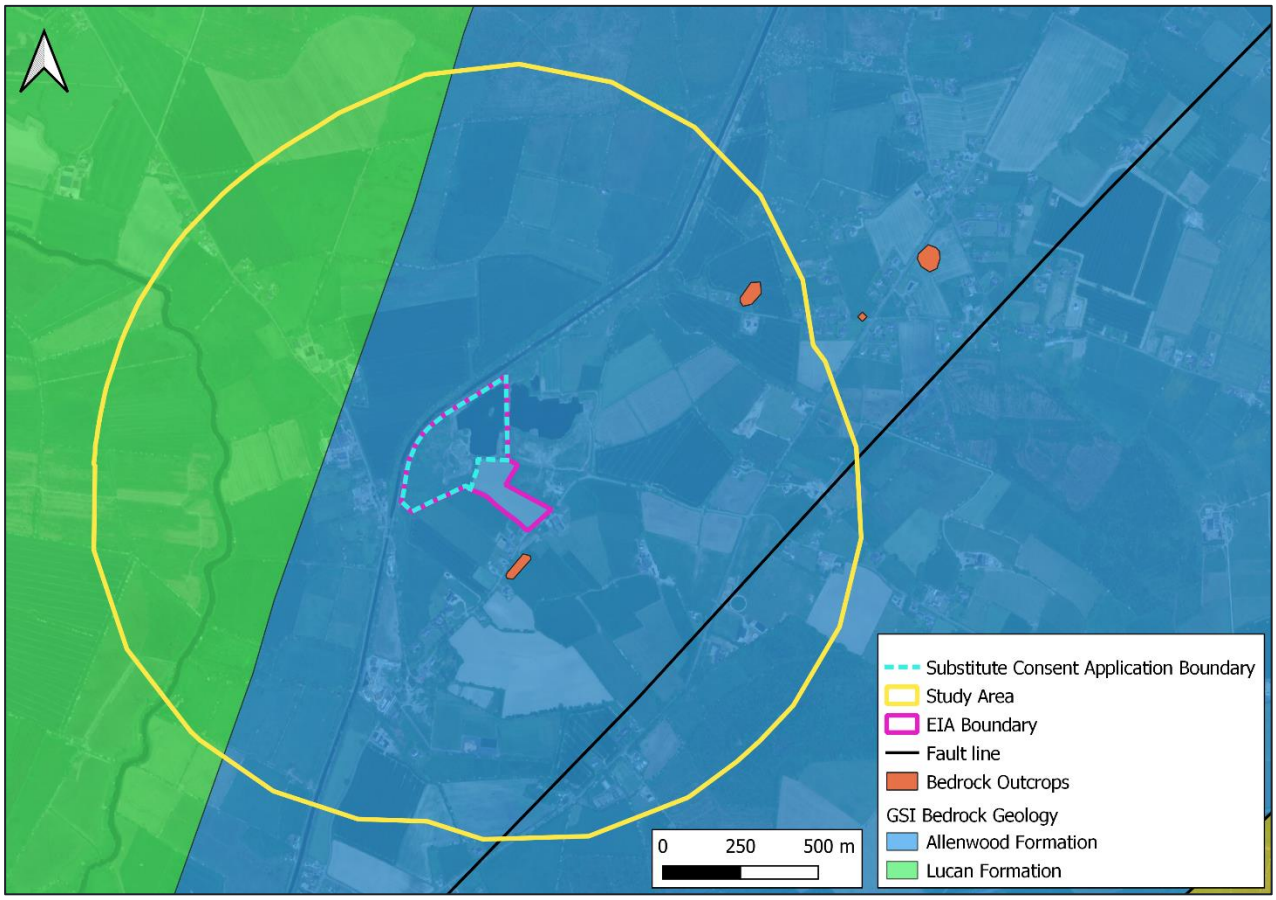


Figure 6-5 - Underlying Bedrock Geology (GSI, 2024) overlain on ESRI Satellite aerial.

6.4.5 Rainfall and Climate Data

Table 6-5 below presents rainfall data recorded at the NAAS (Osberstown) meteorological station (number 8423), which is located ca. 25 km east of the Site, for the period January 2000 to December 2006 (Met Eireann, 2025). The monthly rainfall totals over the review period are presented in Figure 6-6, alongside the long-term average from 1985 to 2006.

The yearly totals indicate that the 2000 rainfall total of 942 mm was significantly higher than totals over 2001 to 2006 and long-term historical average (1985 to 2006) of 824 mm per annum (mm/a). The monthly rainfall totals over the review period are reduced in comparison to the long-term average, apart from the average for May, July and October.

GSI mapping (2024) indicates an effective rainfall (rainfall minus actual evapotranspiration) value of 395 mm/a for the area of the Site, which is approximately half of the long-term average rainfall.

Table 6-5 - Monthly Rainfall Totals and Long-Term Averages

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Totals
2000	54	75	26	65	94	50	58	89	72	119	130	112	**942**
2001	41	47	37	66	38	49	58	67	23	72	21	24	**542**
2002	-	-	-	-	-	-	61	56	15	164	154	84	**534***
2003	54	39	45	38	107	85	118	9	44	119	53	77	**788**
2004	104	27	49	50	35	49	30	113	60	119	48	55	**739**
2005	82	47	42	65	112	21	64	46	68	135	62	54	**797**
2006	29	46	74	-	95	23	20	84	111	104	110	122	**820***
Avg.	**61**	**47**	**46**	**57**	**80**	**46**	**58**	**66**	**56**	**119**	**83**	**75**	**737**
Long-Term Avg.	**76**	**57**	**60**	**65**	**60**	**64**	**54**	**75**	**63**	**94**	**76**	**79**	**824**

Long-term average is taken from 1985 to 2006

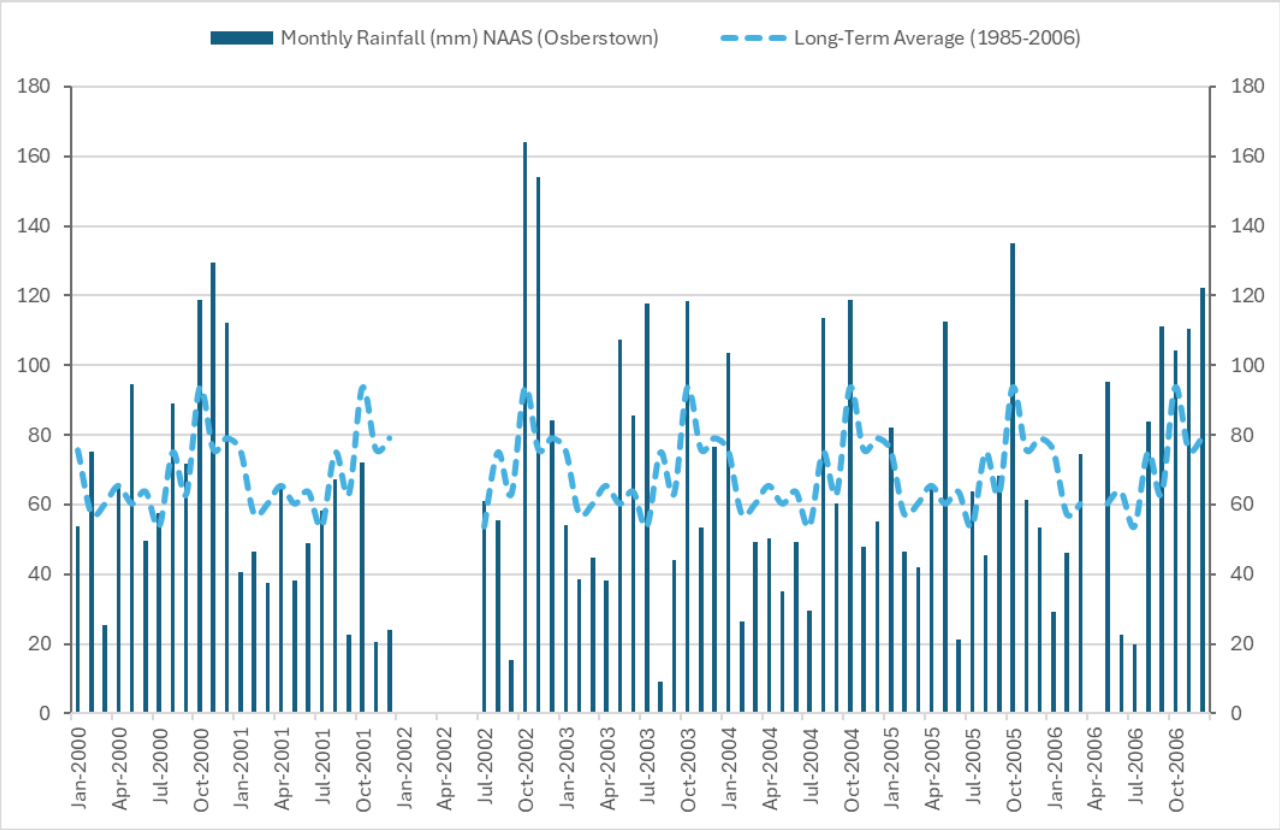


Figure 6-6 - Monthly Rainfall Graph for Review Period

6.4.6 Surface Water – Hydrology

6.4.6.1 Baseline Conditions (1 January 2000) Surface Water Features and Quality

The Site is located in the WFD (Water Framework Directive) Bagenalstown Upper Groundwater body (which is generally described as regionally important). The WFD (Water Framework Directive) designations has the Site situated within the River Sub-Basin Figile_080. There is a catchment divide to the southeast of the Site as depicted in Figure 6-7, with the River Sub-Basin Barrow_090 to the southeast of this divide.

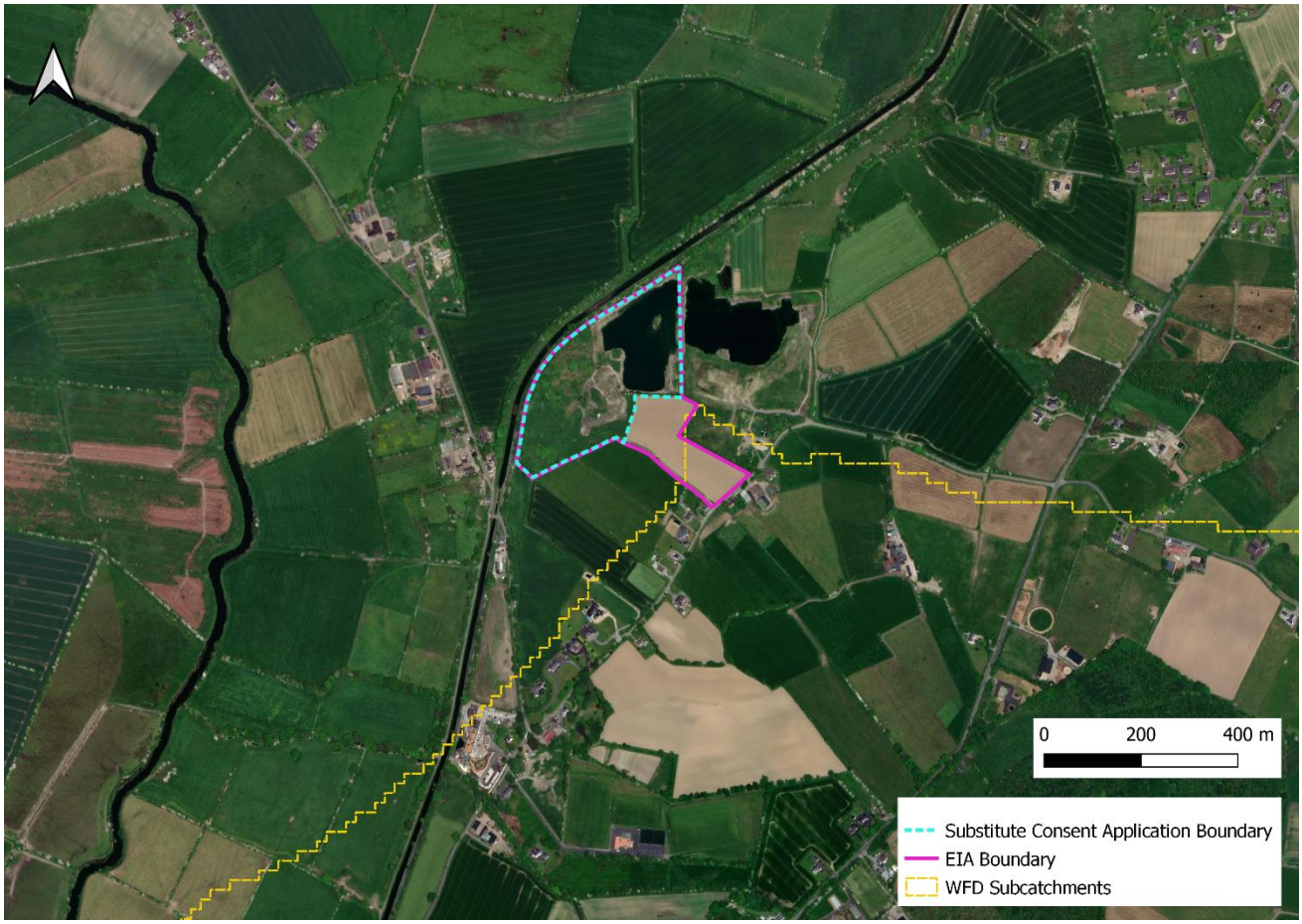


Figure 6-7 - WFD Sub-catchment Divide Across the Site (EPA, 2022)

The surface river network and Special Area of Conservation (SAC) in the area surrounding the Site is shown in Figure 6-8. There are no surface water bodies as designated by the EPA in the area shown. The closest surface water feature to the Site under baseline conditions was the Grand Canal, which runs adjacent to the northwest boundary and is designated as a pNHA (see Chapter 4 Ecology and Biodiversity). Any run-off event 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. In light of this, there is no means by which surface water run-off can enter the Grand Canal from the Site.

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 the south of the Site which is culverted beneath the Grand Canal, which is labelled in Figure 6-8.

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.

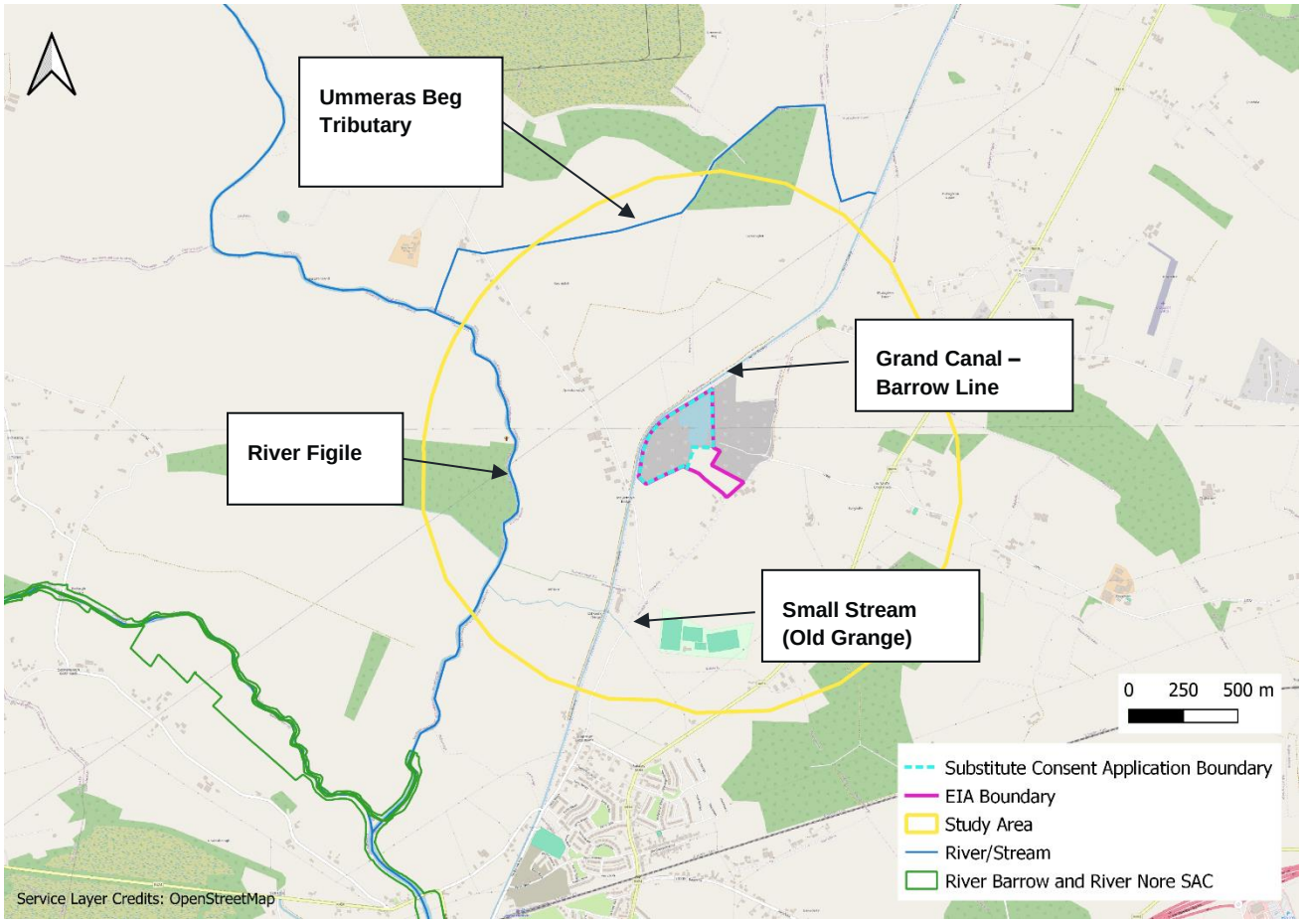


Figure 6-8 – River Network and SACs in the Vicinity of the Site (EPA, 2023)

Local Surface Water Quality

The surface water quality at the start of the review period (in 2000) has been derived using publicly available data from the EPA Geo Portal website.

The WFD Status is unavailable for baseline conditions. The baseline (2000) River Quality (Q) Values of surface water features in the vicinity of the Site, as assigned by the EPA, are shown in Figure 6-9 and summarised in Table 6-6.

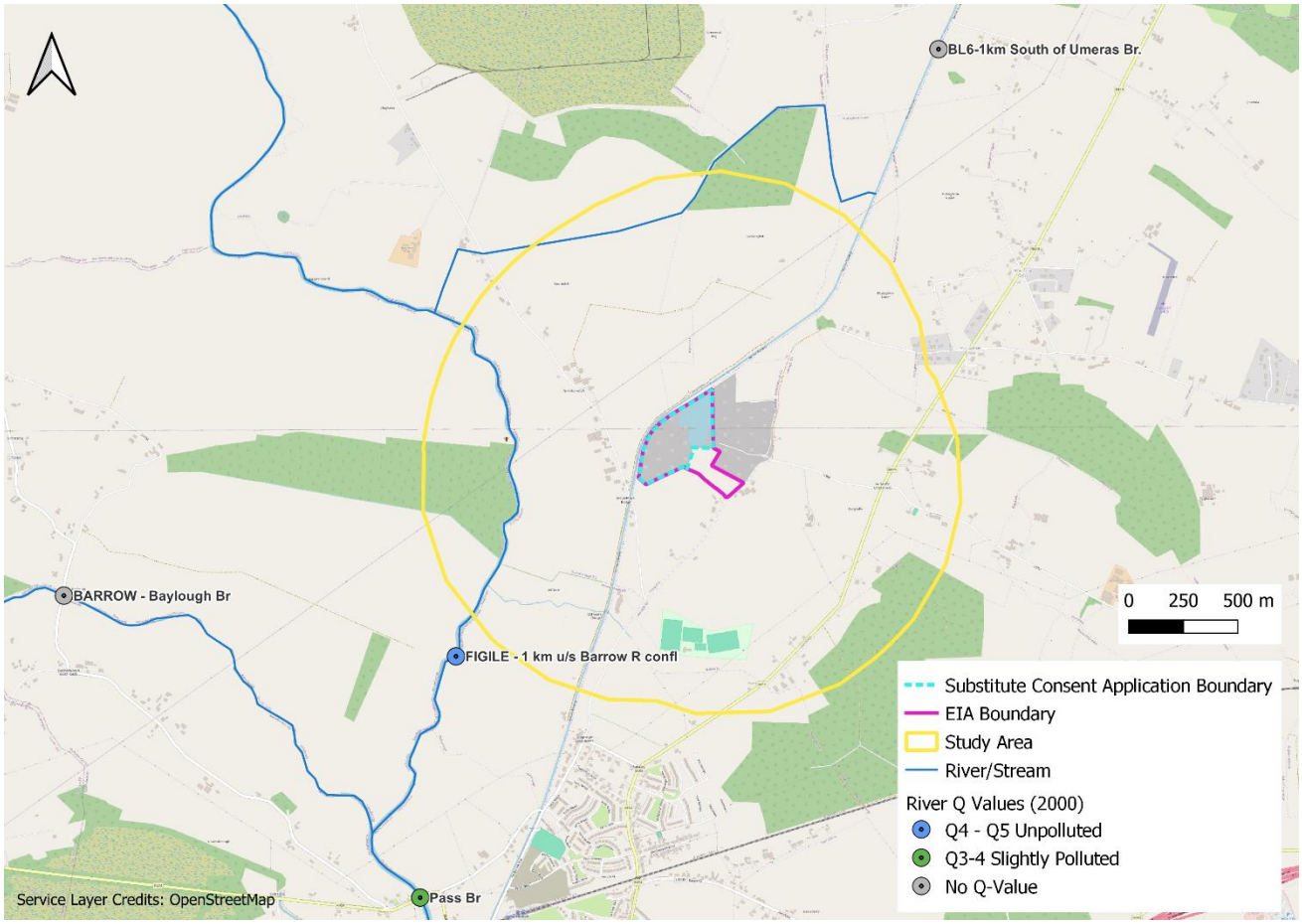


Figure 6-9 – Baseline EPA River Quality Values and EPA Monitoring Stations (EPA, 2000)

To the southwest of the Site, the River Quality (Q) status of the River Figile was Q4 'good' in 1993 and the downstream section of the River Barrow had a River Quality (Q) status of Q3-4 'moderate' in 2000.

Table 6-6 - Summary of WFD Status and Baseline River Q Value in Surface Water Features Close to Site (EPA, 2000)

River Name	WFD Status (N/A)	Station Name	River Q Value (2000)
Barrow	(N/A)	BARROW - Baylough Br	No Q-Value (N/A)
Barrow	(N/A)	Pass Br	3-4 - Moderate (2000)
Figile	(N/A)	FIGILE - 1 km u/s Barrow R confl	4 - Good (1993)

Grand Canal – Barrow Line	(N/A)	BL6-1km South of Umeras Br.	No Q-Value (N/A)

6.4.6.2 Existing conditions (31 December 2006) Surface Water Features and Quality

As discussed in Section 6.4.3, by the end of the review period the quarry void had reached its maximum extent, which subsequently infilled with groundwater following the cessation of dewatering. The quarry void lake is labelled in Figure 6-4 and was ca. 22,000 m^2 at the end of the review period. There is very little variation in the area of the lake following this (based on aerial imagery), which suggests that the lake level had already equilibrated with the groundwater table.

The lagoon in the neighbouring quarry will have also filled with groundwater over a similar period. Although these surface water features are not directly connected, it is likely both are connected through the permeable bedrock limestone separating the voids.

Local Surface Water Quality

The surface water quality at the end of the review period (in 2006) has been derived using publicly available data from the EPA Geo Portal website.

The WFD Status is available for the date range of 2007 to 2009. The 2006 River Quality (Q) Values of surface water features in the vicinity of the Site, as assigned by the EPA, are shown in Figure 6-10 and summarised in Table 6-7.

Figure 6-10 – Local River WFD Status (2007-2009), EPA River Quality Values and EPA Monitoring Stations (EPA, 2006)

To the southwest of the Site, the River Barrow is classified as 'good' under the WFD (2007-2009) Status. There is not, however, a WFD Status available for the River Figile.

To the southwest of the Site, the River Quality (Q) status of the River Figile was Q3-4 'moderate' in 2006 and the downstream section of the River Barrow also had a River Quality (Q) status of Q3-4 'moderate' in 2006.

Although these Q values indicate a slight drop in quality in the River Figile over the review period, it should be noted that there were similar variations in quality prior to the baseline result.

Table 6-7 - Summary of WFD Status (2007-2009) and River Q Value in Surface Water Features Close to Site (EPA, 2006)

River Name	WFD Status (2007-2009)	Station Name	River Q Value (2006)
Barrow	Good	BARROW - Baylough Br	No Q-Value (N/A)

Barrow	Good	Pass Br	3-4 - Moderate (2006)
Figile	(N/A)	FIGILE - 1 km u/s Barrow R confl	3-4 - Moderate (2006)
Grand Canal – Barrow Line	(N/A)	BL6-1km South of Umeras Br.	No Q-Value (N/A)

Site Surface Water Quality

The water quality in the quarry void lake has not been monitored historically, over the review period. Samples were therefore collected and analysed from the monitoring point labelled SW01 in Figure 6-11, from March to August 2024 as an indication of water quality in 2006, at the end of the review period.

Figure 6-11 - Surface Water Quality Monitoring

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 lake (SW01) were screened against GTV (2016) and AA-EQS (2019) thresholds. There are no recent 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 2024, rising to 22.8 mg/L in April 2024. These fluctuations are no larger than those seen in groundwater concentrations as presented in the tables in Appendix 6B and discussed in Section 6.4.7.5.

6.4.7 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; permeable limestone of the Allenwood Formation – Regionally important Aquifer – Karstified (diffuse) - RKd. The GSI aquifer designation (GSI, 2023) for bedrock aquifers underlying the Site and the sand and gravel to the southwest of the Site, is shown in Figure 6-12 below.

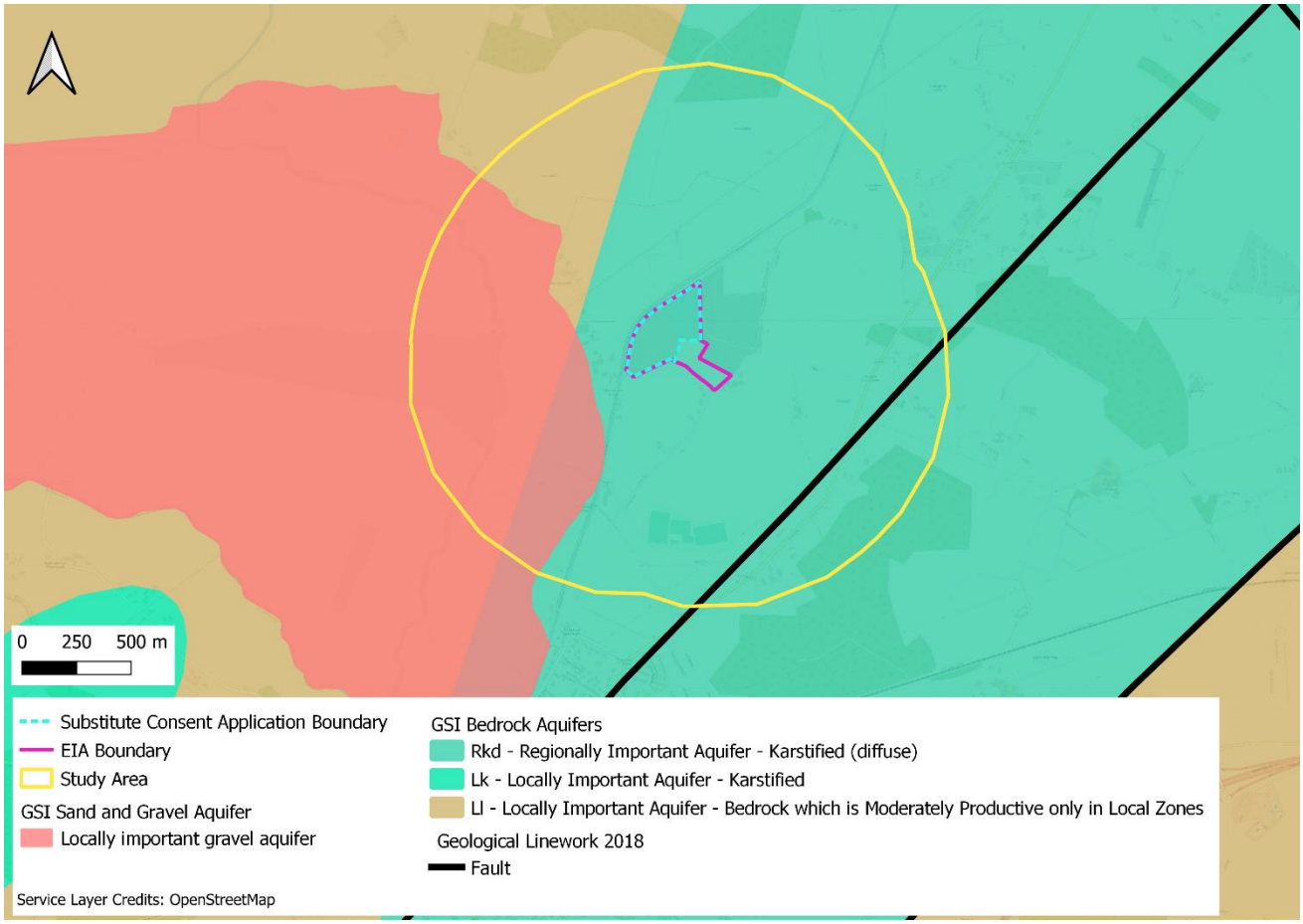


Figure 6-12 - Aquifer Designation Map (GSI, 2023)

6.4.7.1 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 locally important gravel aquifer shown below. It is likely that a higher fines/clay content in the sand and gravel beneath the Site result in lower permeabilities of the unit.

6.4.7.2 Bedrock Aquifer

Bedrock underlying the Site (the 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.

6.4.7.3 Groundwater Vulnerability

Groundwater Vulnerability (DELG/EPA/GSI, 1999) defines how easily groundwater may be contaminated by human activities. According to the GSI online mapping tool (GSI, 2023) the footprint of the Site is classified as 'High' to 'Extreme' (Figure 6-13). 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 to the northwest of the Site are characterised as having 'Moderate' to '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 at the surface within the quarry void, with extraction activities.

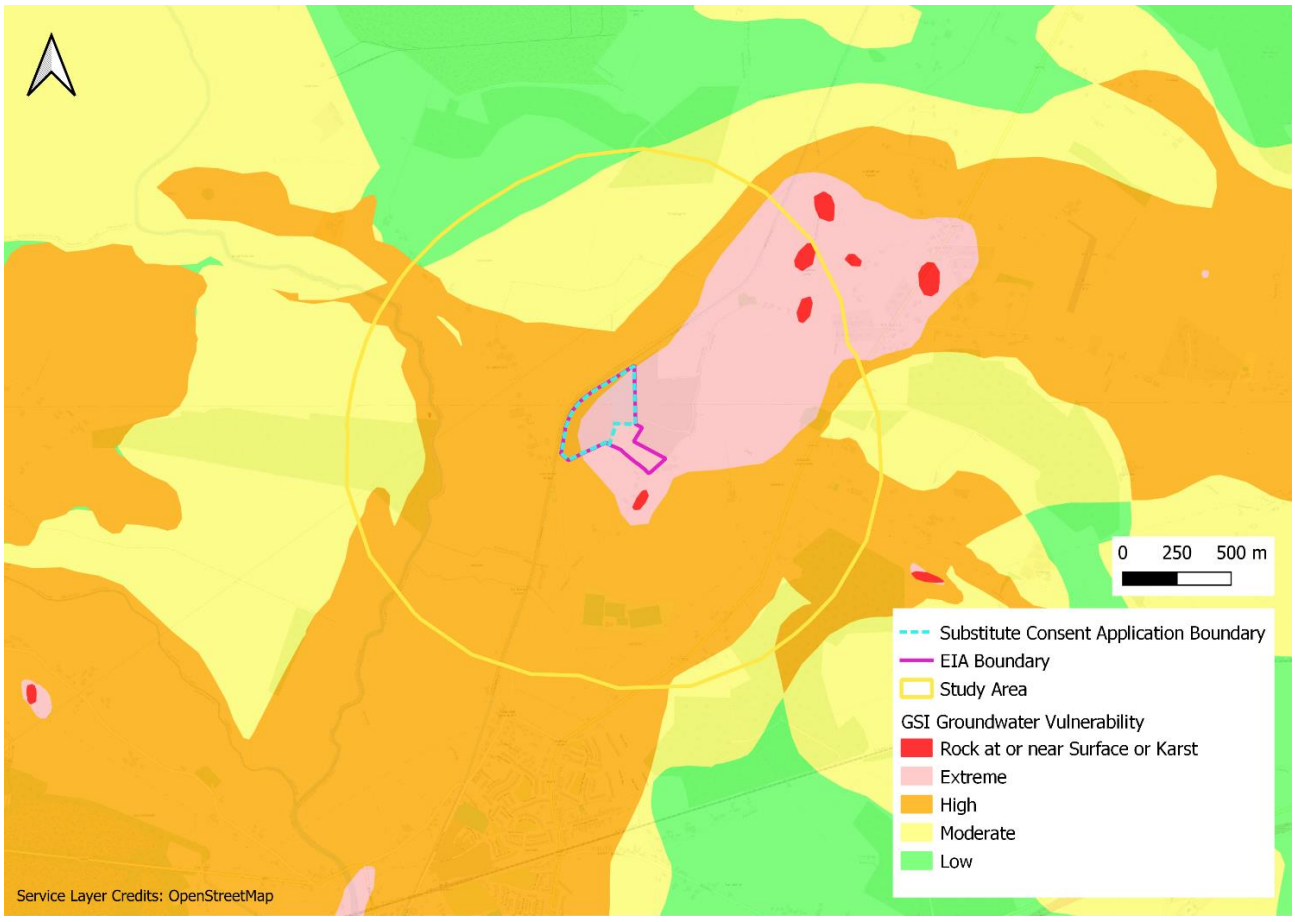


Figure 6-13 - Groundwater Vulnerability Map (GSI, 2023)

6.4.7.4 Groundwater Recharge

The groundwater recharge map for the Site is presented in Figure 6-14. The high GSI recharge range of 351-400 mm/a applies to the area of mapped gravels derived from limestones (see Chapter 5) beneath the Site. GSI mapping (2023) indicates an effective rainfall of approximately 395 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 now at the surface within the quarry void, with extraction.

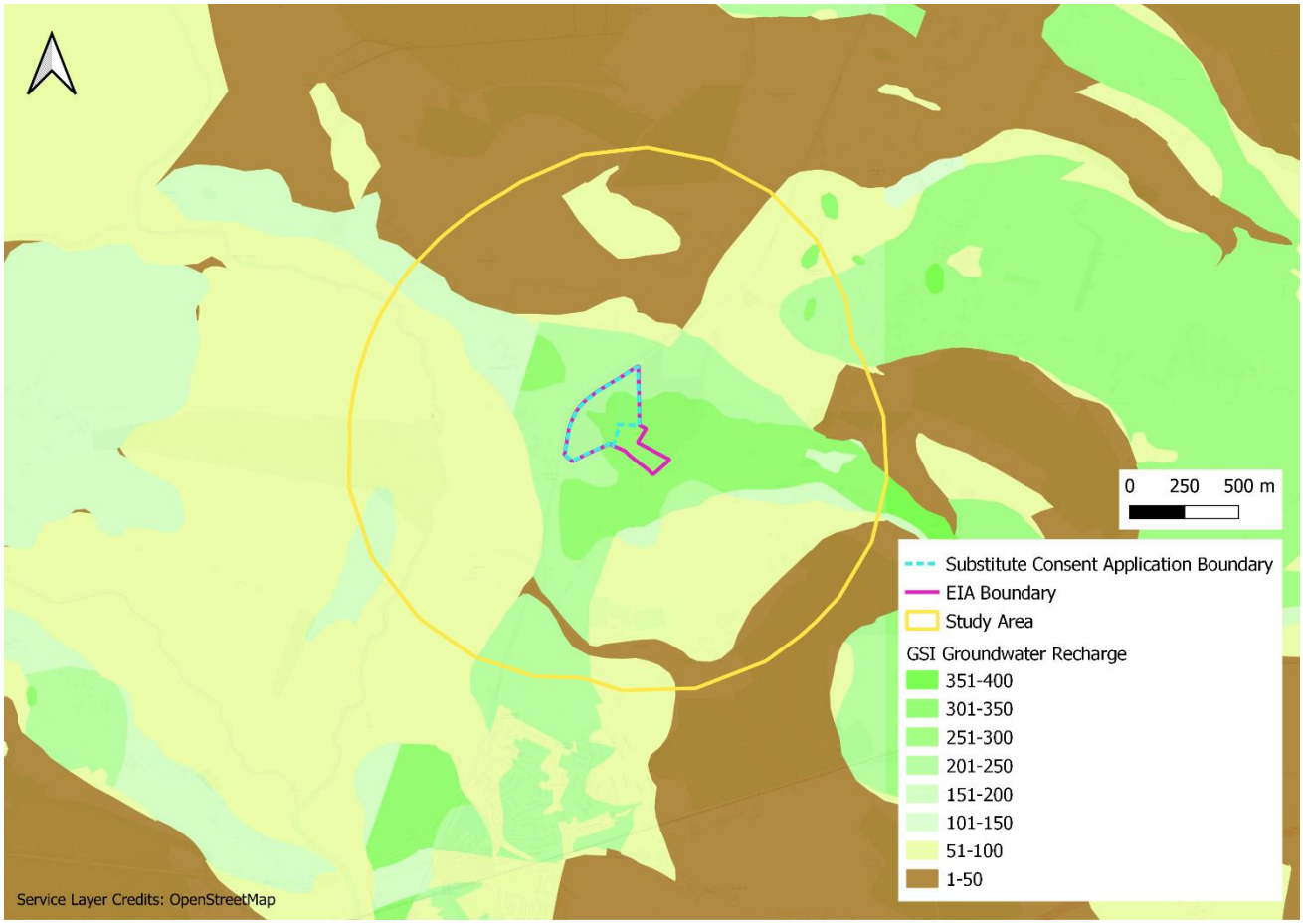


Figure 6-14 - Groundwater Recharge Map (GSI, 2023)

6.4.7.5 Groundwater Level and Quality Investigations

There is no groundwater level or quality data available from the Site over the review period. The following data presented is taken from 2023 and 2024, with the assumption that the present is reflective of the groundwater conditions at the end of the review period.

There are four monitoring wells available for water level and quality measurements. These monitoring wells were installed between February and March 2023. The locations of the existing monitoring wells are presented in Figure 6-15, with details on construction and lithology are provided in Table 6-8, 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 6-12, where the main sand and gravels aquifer is absent beneath the Site footprint.

Figure 6-15 - Monitoring Well Locations (including Surface Water Monitoring)

Table 6-8 – 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)
BH4	17	16.8 to 17.05	70.24	11.4 (58.84 mAOD) (in Light Grey Limestone)	14 to 17 (Light Grey Limestone)

Current Groundwater Elevations (2023 to 2024)

Recent manual groundwater elevations in Metres Above Ordnance Datum (m AOD) following the review period are displayed in Figure 6-16 alongside monthly rainfall totals, for the monitoring wells shown in Figure 6-15.

The present-day water levels appear to be seasonal, with groundwater highs in March and April 2024 and a decline in water levels during drier months of May and June 2024. The greatest water level fluctuations (1.12 m) are seen in BH3 and BH4 and both show a similar trend. The smallest fluctuations are seen in BH2 of 0.57 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. BH2 is 22 m south of the Grand Canal. The Grand Canal is at approximately 69 mAOD and likely to be ca. 1-2 m depth. The groundwater table is therefore ca. 3.65 m below the base of the Grand Canal, indicating that there is no hydraulic connectivity.

It is possible that abstractions in the region are currently influencing the water levels in the monitoring bores. BH4 is the closest monitoring well to an inner Source Protection Area (SPA), 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. More on this is discussed in Section 6.4.8.

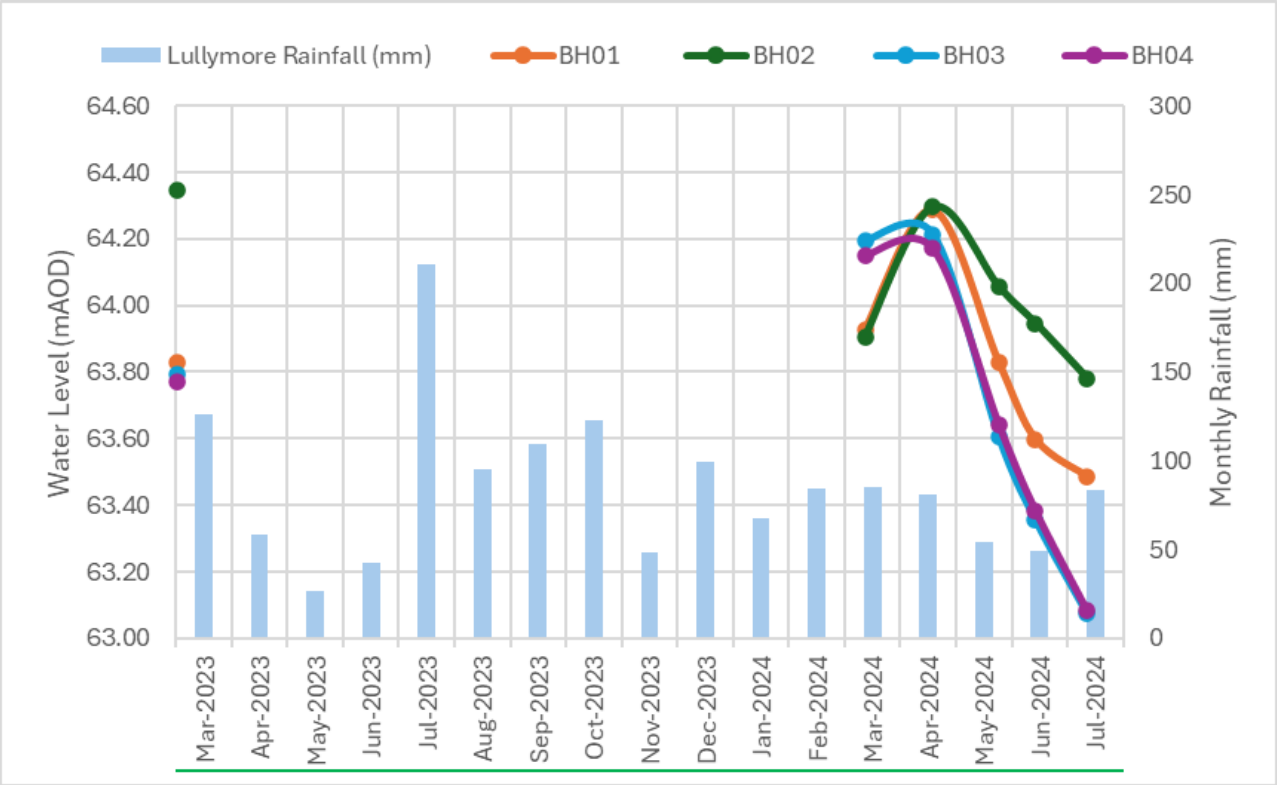


Figure 6-16 - Recent Groundwater Level and Monthly Rainfall

Groundwater Contours (2023 to 2024)

The recent groundwater contours are presented in Figure 6-17. These are taken during the summer low in July 2024, which could be representative of a period of lower rainfall. The groundwater contours show that there is a flow to the southeast of the Site, which supports the impact of the abstractions on 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 likely that the water levels beneath the Site are responding to the SPA abstractions shown in Figure 6-18, which are ca. 890 m to the southeast.

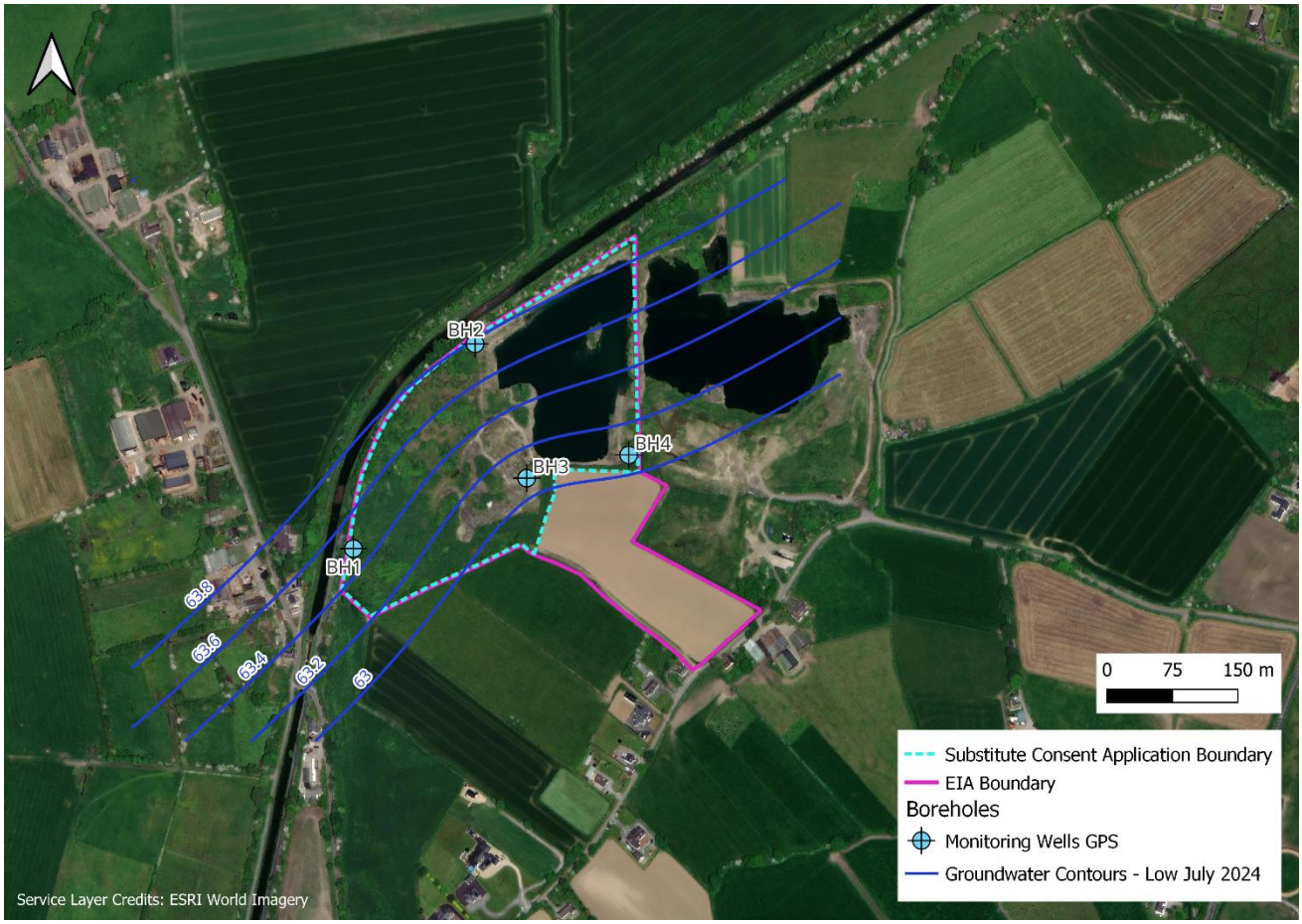


Figure 6-17 - Groundwater Contours July 2024 (Low) with aerial

Groundwater Quality (2024)

The four groundwater monitoring wells (Figure 6-15) have been used to monitor groundwater quality across the Site over a period of six months, from March to August 2024. Note that there is no groundwater quality results available over the review period (2000 to 2006). The recent results are therefore used as a guide to what the baseline and subsequent groundwater quality conditions may have been.

A summary of laboratory results with reference to GTV and AA-EQS threshold values is presented in Table 6-9. 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 (see Section 6.4.2 and Figure 6-15). 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 6-9 – 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

6.4.8 Designated Sites

On a regional scale, GSI mapping (2023) indicates that there are no groundwater source protection areas (SPAs) within the Site boundary. There is, however, an outer (SO) and inner (SI) source protection area within the 1 km study area, as shown in Figure 6-18. This SPA relates to four abstraction points that are part of the Monasterevin public water supply (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 Ml/day (K. T. Cullen & Co, 2001) from 4 wells. A review of the EPA abstractions database (December 2024) indicate Monasterevin wellfield's abstractions were registered in 2020 and they targeted the Bagenalstown Upper aquifer, rather than the Allenwood Formation aquifer, and has 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 prior to 2020 is unknown. It is unknown which abstractions were active over the review period.

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 PWS (see Figure 6-17). However, due to the lack of baseline water level monitoring, the timing of this switch or the abstraction wells information, this cannot be confirmed.

The River Barrow and River Nore SAC is also represented in Figure 6-18 and is approximately 1.6 km from the Site boundary. Under baseline conditions, it is possible that a hydraulic connection existed between the groundwater beneath the Site (within the bedrock aquifer) and the River Figile within the study area to the west of the Site. This section of the River Figile is, however, within the mapped sand and gravels aquifer (see Figure 6-12). 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 6-12.

Any significant connection between the Site groundwater and the SAC downstream of River Figile is, therefore, unlikely under the baseline conditions. With the potential onset of abstraction(s) over the review period, it is further less likely that a significant hydraulic connection existed 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 25 km downstream at SF 65573 55024 in Athy, Co. Kildare.

Figure 6-18 - Source Protection Areas (SPA) near Site and River Barrow and River Nore SAC (GSI, 2023)

6.4.9 Conceptual Cross-sections

Two conceptual cross-sections have been produced for the Site to assist in assessments of hydraulic connectivity and groundwater flow. With relation to local topography and geology. The locations of the two conceptual cross-sections are presented in Figure 6-19.

Figure 6-19 - Conceptual Cross-section Locations

The two cross-sections in Figure 6-20 and Figure 6-21 present the changes in the topography from baseline conditions (labelled original topography) to the present day (taken from topographic survey completed in April 2024), which is considered applicable to the end of the review period. In Figure 6-20, there are two areas where material was removed over the review period. The area around BH4 relates to the quarry void and the area west of BH3 could potentially relate to an area used as a soakaway. With no clear evidence of this and is purely theoretical, however.

Figure 6-20 presents the groundwater table during the summer low and conveys the slight gradient to the east, with the potential response to the PWS abstractions.

Figure 6-21 displays the water level within the quarry void lake taken in the April 2024 survey. The cross-section indicates that the lake surface is slightly depressed in comparison to the measured groundwater table (BH2 and BH4), which is possible given the potential for evaporation from the lake.

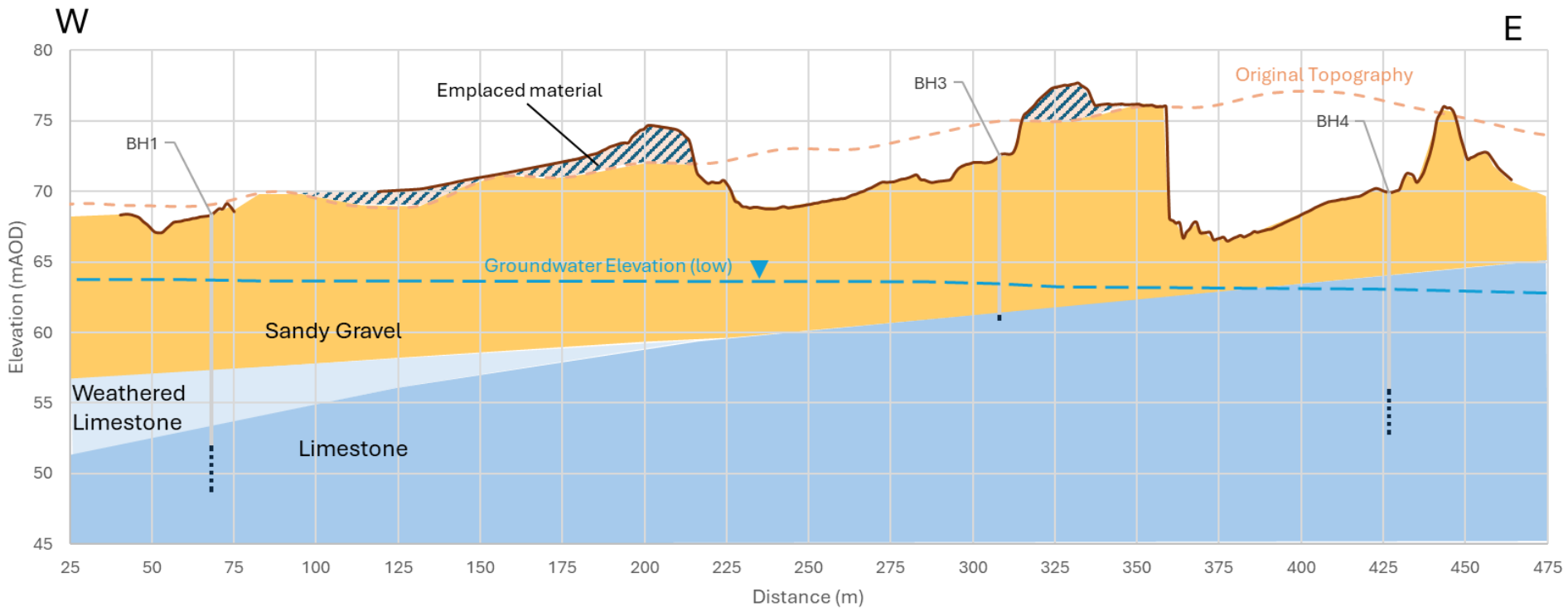


Figure 6-20 – Section A-A' West to East Conceptual Cross-Section

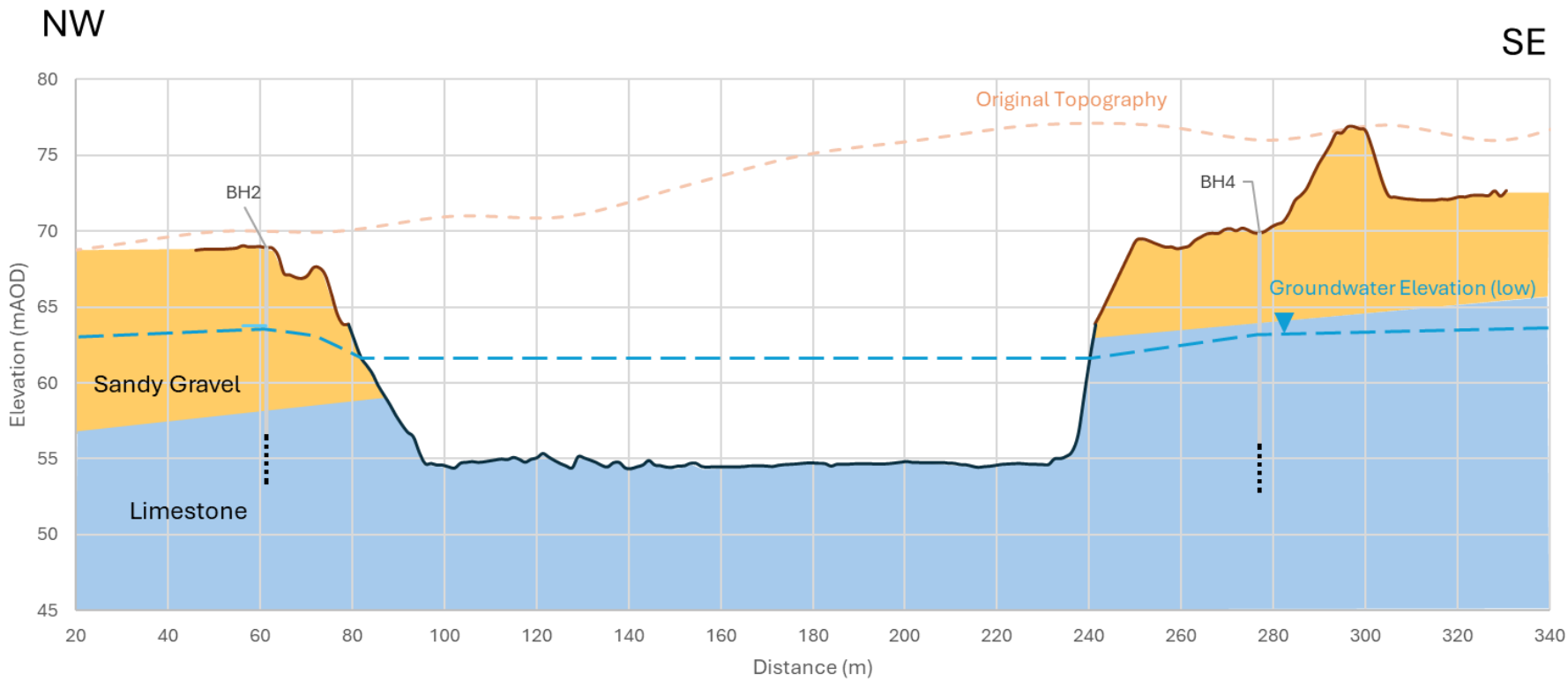


Figure 6-21 – Section B-B' Northwest to Southeast Conceptual Cross-Section

6.5 Selection of Sensitive Receptors

Taking account of the above and the receptor classification method described in Section 6.3.1, the receptors carried forward in this assessment and their assigned importance are presented in Table 6-10.

Table 6-10 – 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. Under baseline conditions the river and tributaries would have been hydraulicly down gradient and are potential sensitive receptors to impacts on the water environment at the Site. It is unlikely, however, that there is a connection between the Site rainfall run-off and there is also limited connectivity with the groundwater beneath the Site.	Low
Groundwater - Quality and availability	Bedrock under the Site is classified as a regionally important aquifer (Rkd) with karstification (diffuse), which is described as “significant source of groundwater” with high yielding wells. Recent water quality analysis does not indicate any residual groundwater pollution. The bedrock aquifer is highly productive, so any dewatering over the review period is unlikely to have negatively impacted the availability.	Low
Grand Canal - pNHA	Proposed National Heritage Area. Adjacent to the northwest Site boundary	Negligible
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. Any hydraulic connectivity between the Site and the SAC would be through groundwater. This is negligible over the review period given the change in groundwater flow direction in response to PWS 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	Negligible

	groundwater connectivity beneath the Site and the Old Grange stream, considering the likely groundwater flow directions based on topography and catchment divides.	
Flooding – changes in presence and impacts of water flows on infrastructure immediately adjacent and downstream of the Site.	It is not known if there were discharges of water from the quarry to the surface over the review period. It is possible that all discharged water from the quarry void was captured in a soakaway, returning to the groundwater. Change in Site topography redirecting Site run-off or creating pooling of water is unknown.	Negligible – Not enough information to inform of impacts over the review period
Monasterevin PWS – water availability and quality	The Monasterevin PWS consist of four abstraction wells that target the same limestone bedrock aquifer that is beneath the Site. Recent water quality analysis does not indicate any residual groundwater pollution. The bedrock aquifer is highly productive, so any dewatering over the review period is unlikely to have negatively impacted availability at the PWS supplies.	Negligible
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. No indication of lasting contamination associated with groundwater or surface water on-Site.	Low

6.6 Characteristics of the Project

The Project is described in Chapter 2 (Project Description).

6.7 Potential Effects

The main potential impacts and associated effects that are considered and assessed in the following sections relate to:

1) Activities or events that might have caused by hydrocarbon leaks from fuel storage tanks or the unmanaged spillage of fuels or lubricants from Site plant or vehicles;
2) Loss of superficial deposits and bedrock, resulting in changed Site topography; and
3) Dewatering of seepage water from the quarry void and any associated collection of discharge water.

6.7.1 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 6.15. Note that the potential impacts are referenced based on numbering in Section 6.7.

Combined with the sensitivities of the identified receptors, the potential adverse effects caused by the Site through the review period are mostly **Imperceptible** with only one level of effect identified as **Slight**. The Slight level of effect is understood to be temporary as groundwater availability within the sands and gravels will have returned to baseline conditions following cessation of dewatering.

Table 6-11 - Evaluation of Initial Impacts and their Effect Significance

Receptor	Sensitivity	Source of Impact/Assessment of Magnitude	Impact Magnitude	Level of Effect
Surface Water – Quality and availability	Low	Changes in quality caused by hydrocarbon leaks from fuel storage tanks or the unmanaged spillage of fuels or lubricants from Site plant or vehicles (1). *No recorded spills over the review period. Any leaks likely to be minor. No indication of lasting contamination in Site surface water quality.*	Negligible	Imperceptible
Surface Water – Quality and availability	Low	Changes in availability due to changed Site topography (2). *Sands and gravels still present across the Site and allow infiltration of majority of rainfall, as under baseline conditions. Surface run-off understood to have been minimal under baseline conditions.*	Negligible	Imperceptible
Groundwater - Quality and availability	Low	Changes in quality caused by hydrocarbon leaks from fuel storage tanks or the unmanaged spillage of fuels or lubricants from Site plant or vehicles (1). *No recorded spills over the review period. Any leaks likely to be minor. No indication of lasting contamination in Site groundwater quality*	Negligible	Imperceptible
Groundwater - Quality and availability	Low	Changes in quality due to changed Site topography (2). *Quarry void provides more direct connection between surface water and groundwater. No recorded spills over the review period. Any leaks likely to be minor. No indication of lasting contamination in Site groundwater quality.*	Negligible	Imperceptible
Groundwater - Quality and availability	Low	Changes in availability due to changed Site topography (2). *Sands and gravels still present across the Site and allow infiltration of majority of rainfall, as under baseline*	Negligible	Imperceptible

Receptor	Sensitivity	Source of Impact/Assessment of Magnitude	Impact Magnitude	Level of Effect
		conditions. Quarry void provides more direct connection between rainfall and groundwater. Possibly improved recharge to bedrock aquifer.		
Groundwater - Quality and availability	Low	Changes in availability due to dewatering and potential discharge and collection (3). *Most likely that discharge water collected on-Site and allowed to infiltrate back into groundwater, rather than being discharged off-Site over the review period. However, there is not enough information to confirm this. Neighbouring third-party quarry indicates some impact on users wells installed into sands and gravel, although cessation of pumping allowed levels to recover.*	Low	Slight
Grand Canal - pNHA	Negligible	Changes in quality caused by hydrocarbon leaks from fuel storage tanks or the unmanaged spillage of fuels or lubricants from Site plant or vehicles (1). *No indication of lasting contamination in Site surface water quality. Highly unlikely to be surface water connection between Site and Canal. No groundwater connectivity between Site and Canal.*	Negligible	Imperceptible
Grand Canal - pNHA	Negligible	Changes in availability due to changed Site topography (2). *Highly unlikely to be surface water connection between Site and Canal. Already limited surface run-off from Site under baseline conditions.*	Negligible	Imperceptible
Grand Canal - pNHA	Negligible	Changes in availability due to dewatering and potential discharge and collection (3). *The Canal is not in hydraulic connection with groundwater and the canal is understood to be lined.*	Negligible	Imperceptible
River Barrow and River Nore SAC	Negligible	Changes in quality caused by hydrocarbon leaks from fuel storage tanks or the unmanaged spillage of fuels or lubricants from Site plant or vehicles (1). *No indication of lasting contamination in Site surface water quality. Unlikely to be surface water connection between Site and Rivers. Limited groundwater connectivity between Site and Rivers upstream of SAC.*	Negligible	Imperceptible
Flooding – impacts of water flows on infrastructure	Negligible	Changes in water flows due to changed Site topography (2). *Already limited surface run-off from Site under baseline conditions. Large amount of sands and gravels remain*	Negligible	Imperceptible

Receptor	Sensitivity	Source of Impact/Assessment of Magnitude	Impact Magnitude	Level of Effect
immediately adjacent and downstream of the Site.		*across Site, which assist in retention of rainfall.*		
Monasterevin PWS –water availability and quality	Negligible	Changes in quality caused by hydrocarbon leaks from fuel storage tanks or the unmanaged spillage of fuels or lubricants from Site plant or vehicles (1). *No recorded spills over the review period. Any leaks likely to be minor. No indication of lasting contamination in Site groundwater quality. Site not within SPA of PWS. Minimal influence of PWS on groundwater beneath Site, therefore, minimal contribution.*	Negligible	Imperceptible
Monasterevin PWS –water availability and quality	Negligible	Changes in availability due to dewatering and potential discharge and collection (3). *Site not within SPA of PWS. Minimal influence of PWS on groundwater beneath Site, therefore, minimal contribution. Site dewatering would have been a fraction of that abstracted at PWS wells.*	Negligible	Imperceptible
Human Health	Low	Contact with contaminated water caused by hydrocarbon leaks from fuel storage tanks or the unmanaged spillage of fuels or lubricants from Site plant or vehicles (1). *No recorded spills over the review period. Any leaks likely to be minor. No indication of lasting contamination in Site groundwater or surface water quality.*	Negligible	Imperceptible

6.8 Remedial Mitigation and Monitoring

There are no effects on the land, soils and geology from the activities on the Site that require remedial measures.

6.9 Residual Effects

The assessment concludes that the Project activities have not given rise to significant adverse effects on the water environment at or surrounding the Site during the assessment period. In all cases the residual adverse effect is **not significant** and not greater than Slight.

6.10 Cumulative Impacts

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 Project with other similar developments in the locality during the assessment period.

It is understood that the neighbouring third-party quarry dewatered from the limestone bedrock in order to maintain dry workings. As detailed in Section 6.4.3, this potentially impacted nearby shallow wells, with reduced yields reported by owners. Over the review period it is feasible that there was a cumulative impact on water supply from the sands and gravels, with dewatering of both quarry voids. Cessation of abstraction of groundwater from both quarries between 2006 and 2007 is likely to have allowed recovery of groundwater within the sands and gravels.

6.11 Difficulties Encountered

There are no monitoring records for water quality or level at the Site over the review period. This assessment is therefore based on recently collected data and uses the present groundwater conditions on the Site as a key to those at the end of the review period.

There is very little known about the dewatering that is likely to have taken place to maintain dry workings in the quarry. There are, therefore, no estimates made on volumes of dewatering or seepage volumes, as they could be misleading and inaccurate. There is simply the acknowledgement that dewatering is likely to have taken place to some extent.

There is also no information on any potential hydrocarbon spills over the review period, so the assessment uses the good present day water quality and river quality as an indication of no major pollution events over the review period.

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.

6.12 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

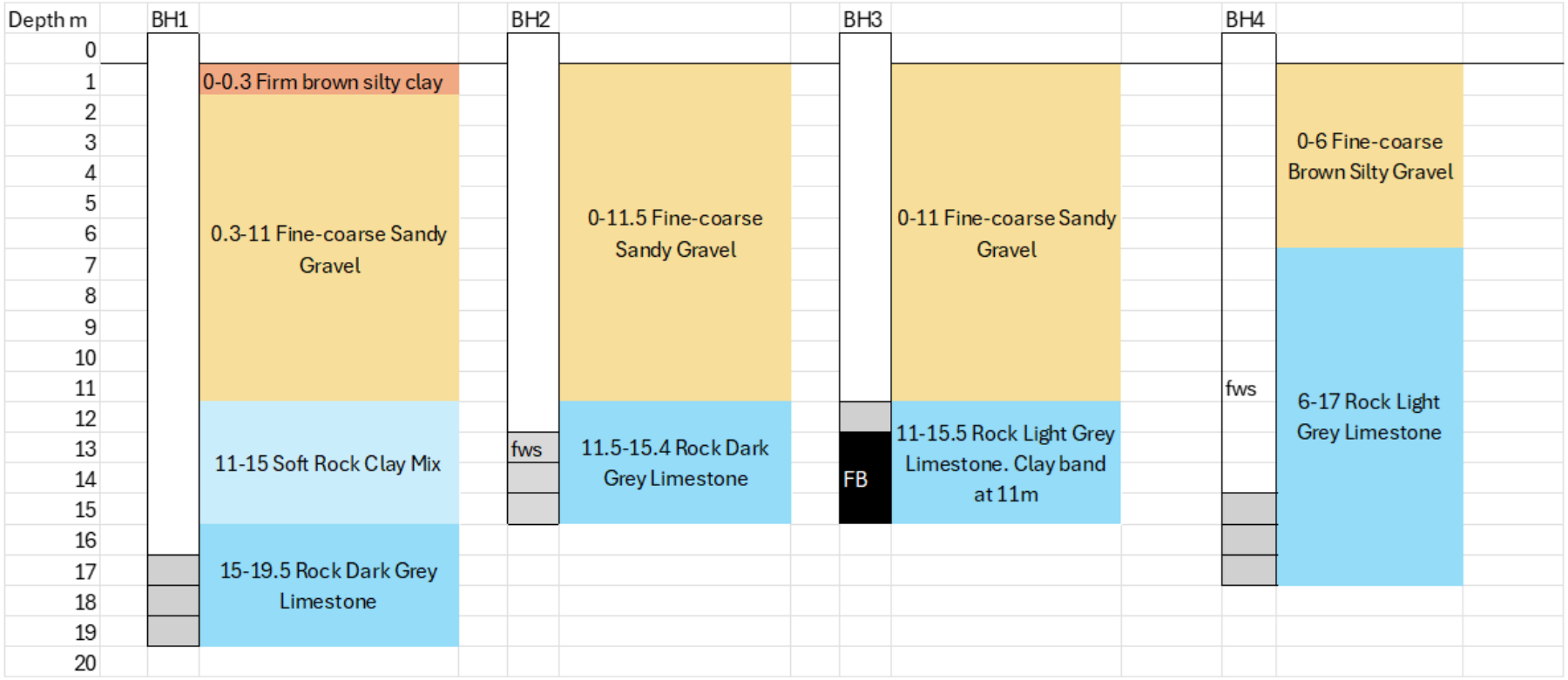
EPA online map viewer (EPA, 2023) [Accessed: March 2025]

GSI online map viewer (GSI, 2023) [Accessed: March 2025]

Kildare County Council, December 2002, Kildare Groundwater Protection Scheme. Volume I.

Appendix 6A

Borelogs


Depth m
BH1
BH2
BH3
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0
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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
Dissolved Manganese	ug/l		300	<2	<2	<2	<2	<2

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH4	SW01
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
Ethylbenzene	ug/l			<5	<5	<5	<5	<5

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH4	SW01
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
Aromatics								

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH4	SW01
>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
Nitrate as NO3	mg/l	37.5	50	16.2	2	19.5	28.9	2.1

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH4	SW01
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
Dissolved Manganese	ug/l			2	31	<2	<2	<2

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH4	SW01
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
Ethylbenzene	ug/l			<5	<5	<5	<5	<5

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH4	SW01
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
Aromatics								

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH4	SW01
>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
Nitrate as NO3	mg/l	37.5	50	44.7	7	12.4	22.8	2

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH4	SW01
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
Dissolved Manganese	ug/l		300	31	<2	97	<2	<2	<2

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH1 Dup	BH2	BH3	BH4	SW01
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
Ethylbenzene	ug/l			<5	<5	<5	<5	<5	<5

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH1 Dup	BH2	BH3	BH4	SW01
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
Aromatics									

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH1 Dup	BH2	BH3	BH4	SW01
>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
Nitrate as NO3	mg/l	37.5	50	79.6	79	2.3	8.2	29	1.6

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH1 Dup	BH2	BH3	BH4	SW01
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
Dissolved Manganese	ug/l		300	<2	167	<2	<2	<2

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH4	SW01
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
Ethylbenzene	ug/l			<5	<5	<5	<5	<5

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH4	SW01
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
Aromatics								

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH4	SW01
>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
Nitrate as NO3	mg/l	37.5	50	58.2	0.4	4.7	32.7	0.9

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH4	SW01
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
Dissolved Manganese	ug/l		300	4	74	22	23	<2	4

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH3 Dup	BH4	SW01
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
Ethylbenzene	ug/l			<5	<5	<5	<5	<5	<5

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH3 Dup	BH4	SW01
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
Aromatics									

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH3 Dup	BH4	SW01
>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
Nitrate as NO3	mg/l	37.5	50	32.5	0.3	5.8	6	33.4	0.7

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH3 Dup	BH4	SW01
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
Dissolved Manganese	ug/l		300	40	<2	22	<2	27

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH4	SW01
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
Ethylbenzene	ug/l			<5	<5	<5	<5	<5

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH4	SW01
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
Aromatics								

Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH4	SW01
>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
Nitrate as NO3	mg/l	37.5	50	27.2	0.9	3.8	21.5	0.5

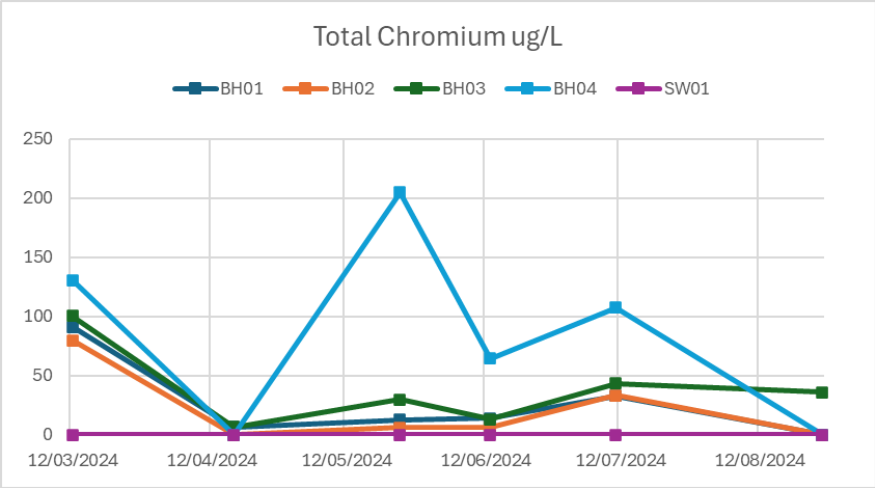
Parameter	Units	GTV [1]	EQS 2019 [2]	BH1	BH2	BH3	BH4	SW01
Nitrite as NO2	mg/l	0.375	0.2	0.16	<0.02	<0.02	<0.02	<0.02
Ortho Phosphate as PO4	mg/l			0.27	0.09	0.08	0.08	0.07
Ammoniacal Nitrogen as N	mg/l			0.16	<0.03	0.03	<0.03	<0.03
Hexavalent Chromium	ug/l	7.5	3.4	<6	<6	<6	<6	<6
Total Dissolved Chromium 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

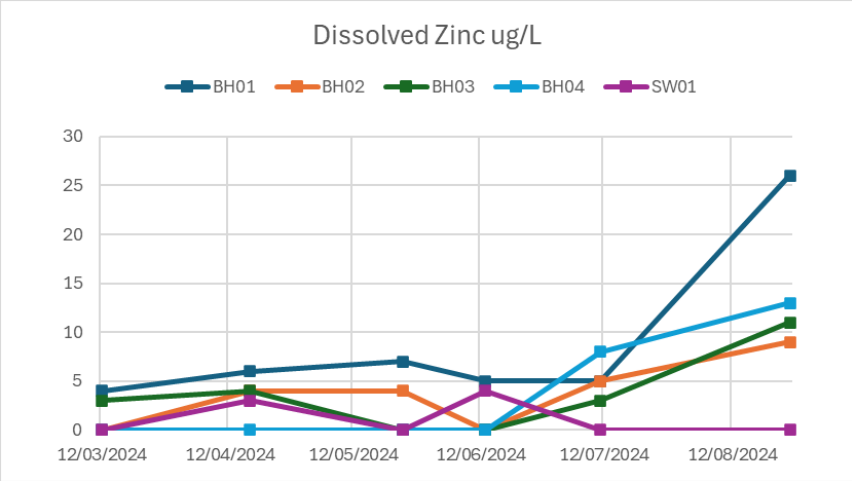
1 Groundwater Regulations 2010 (S.I. No. 9 of 2010) and amendment S.I. No. 366/2016.

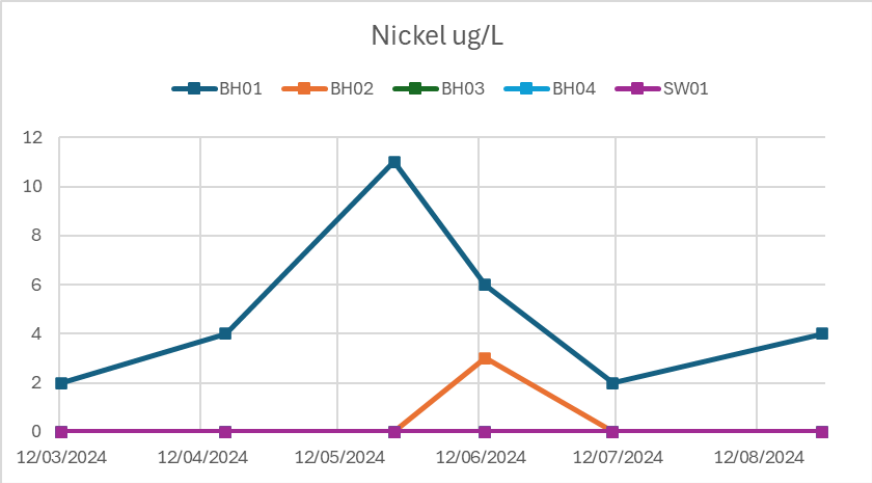
2 AA-EQS - European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272/2009 including amendments S.I. No. 327/2012, S.I. No. 386/2015 and S.I. No. 77/2019)

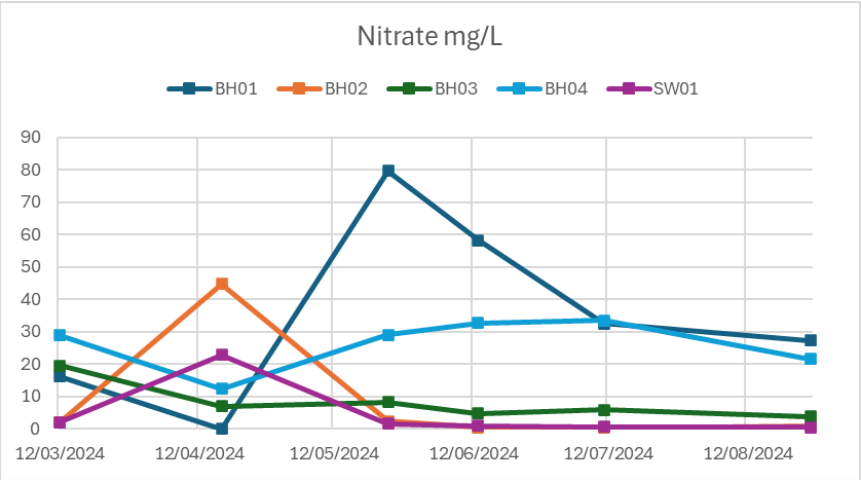
Appendix 6C

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.

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

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

#	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	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						

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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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W: www.element.com

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

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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 remedial Environmental Impact Assessment Report (rEIAR) has been prepared to accompany the substitute consent application for the disused quarry in the townland of Coolsickin or Quinsborough, Ballykelly, Monasterevin, Co. Kildare. The Project is located within the administrative boundary of Kildare County Council (KCC).

This chapter of the rEIAR has been prepared by WSP Ireland Consulting Ltd (WSP) and assesses the potential air quality impacts associated with the Project during the assessment period, 01st January 2000 to 31st December 2006. 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 years' experience.

7.1.1 Project Description Summary

The Project seeking substitute consent consists of extraction of sand, gravel and rock over an area of 7.87 ha through blasting, mechanical excavation and rock breaking along with aggregate processing and stockpiling. The Project was operational between the years 2000-2006.

A full project description is presented in Chapter 2 (Project Description).

7.1.2 Background

The Project Lands were acquired by Bison Quarries Ltd in 2022 with the aim of returning the lands to agricultural use and make safe the quarry pond at the Site. Information pertaining to the Project is limited as it was not subject to a valid planning permission. The quarry is reported to have been operated from approximately 2000-2006 and is no longer an active quarry. Previous activities at the Project Lands included the extraction of sand and gravel, limestone rock, and associated processing and temporary stockpiling of materials being stored prior to sale to market.

Information regarding former Project activities was obtained from various sources including local anecdotal knowledge, Kildare County Council Planning portal and mapviewer, geohive imagery and Kildare County Council section 261A quarry register.

7.1.3 Scope and Methodology

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 Project on the environment resulting from air pollutant emissions is provided.

The Project Lands, which are the subject of this rEIAR (i.e., lands within the Application Boundary) extend to approximately 7.87 ha and are located within the EIA boundary for the rEIAR. The existing quarry void extends to approximately 2.3 ha and is located entirely within the EIA boundary and the substitute consent Application Boundary.

Historical arial mapping and documentation held by Kildare Country Council indicates extraction of aggregates within the Project Lands is estimated to have commenced within 2000 and the operation had ceased within 2006. Accordingly, the baseline for this rEIAR has been set to 01 January 2000, and the rEIAR process has assessed impacts from that date to 31 December 2006 (see Chapter 2 Project Description for detail). Based on EPA guidance, this assessment period equates to approximately seven years and its duration is defined as 'short-term' (lasting one to seven years).

7.1.4 Sources of Emissions to Air

Various potential sources of emissions were reviewed to determine their relevance to this assessment.

These sources encompass emissions from both on-site activities and broader operational processes, contributing to particulate matter and gaseous pollutants.

7.1.4.1 Items Screened Into the Assessment

7.1.4.2 Mineral Dust

For quarry related activities, 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 materials. 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 mineral dust from the quarrying activities has been undertaken in line with Institute of Air Quality Management's (IAQM) 'Guidance on the Assessment of Mineral Dust Impacts for Planning'.

7.1.4.3 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.

7.1.4.4 Items Screened Out of the Assessment

7.1.4.5 Road Vehicle Emissions

Chapter 12 (Traffic and Transport) summarises the operational phase traffic data for the Project during the assessment period. There are two inbound and two outbound light-duty vehicle (LDV) trips per day as well as miscellaneous trips which account for two further LDV trips per day (one inbound and one outbound, i.e., an increase in LDV movements of 6 AADT (annual average daily traffic, vehicles per day). During the assessment period heavy-duty vehicle (HDV, >3.5t) movements accounted for an increase in 46 AADT, (23 inbound and 23 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.

7.1.4.6 Vehicle Trackout

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.

There are no sensitive receptors within 50m of the trackout route up to 250m from the Site's entrance (which is taken to be the section of the L7049 between the site entrance and the junction with the R414). Thus, assessment of vehicle trackout on sensitive receptors has been scoped out and is not considered further.

7.1.4.7 Odour Emissions

Inert materials have been excavated from the Project Lands during the assessment period, which do not give rise to odours, and no infilling of waste has taken place. Therefore, consideration of operational odour emissions have been screened out and are not considered further.

7.1.4.8 Point Source Emissions

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

7.2 Legislative and Policy Context

7.2.1 Legislation and Guidance

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.

There are a number of methods 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

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);
- 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.

7.2.1.4 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).

7.2.2 Local Policy

- The Kildare County Development Plan (CDP) 1999 is the strategy document for County Kildare which covers most of the temporal scope of this assessment period. The key policies and objectives of this plan are listed in Section 2.5.1 of the Project Description (Chapter 2).
- The Kildare CDP 2005-2011 was adopted on 18 May 2005 and covers the temporal scope from this date to 31 December 2006. The key policies and objectives of this current plan are listed in Section 2.5.2 of the Project Description (Chapter 2).

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 extraction 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). This source characterisation includes consideration of the routine management and mitigation measures which have been undertaken at the Project Lands.

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. The 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 400m 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 during the operation of the Project as a quarry (i.e. 2000 – 2006) (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
	Low Risk	Negligible Effect	Negligible Effect	Slight Adverse Effect
	Negligible Risk	Negligible Effect	Negligible Effect	Negligible Effect

7.3.2 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 site 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 Conditions Prior to Project

7.4.1 Site Location

The Project Lands are located in the townland of Coolsicken or Quinnsborough, which is situated 2.7km north of Monasterevin and 9km southwest of Kildare Town, it comprises a quarry void area which has been used for sand, gravel and limestone rock extraction between the years 2000-2006. The grid reference coordinates (Irish Transverse Mercator) for the approximate centre of the Site are E663403, N713199. The Project location is shown in **Figure 7-1.**

Figure 7-1: Site Location

7.4.2 Study Area

The land which is the subject of this rEIAR is located within the EIA project boundary (as a minimum) and is shown in **Figure 7-2**. The figure also includes the study areas for the items screened into the assessment (given above) and these are described below.

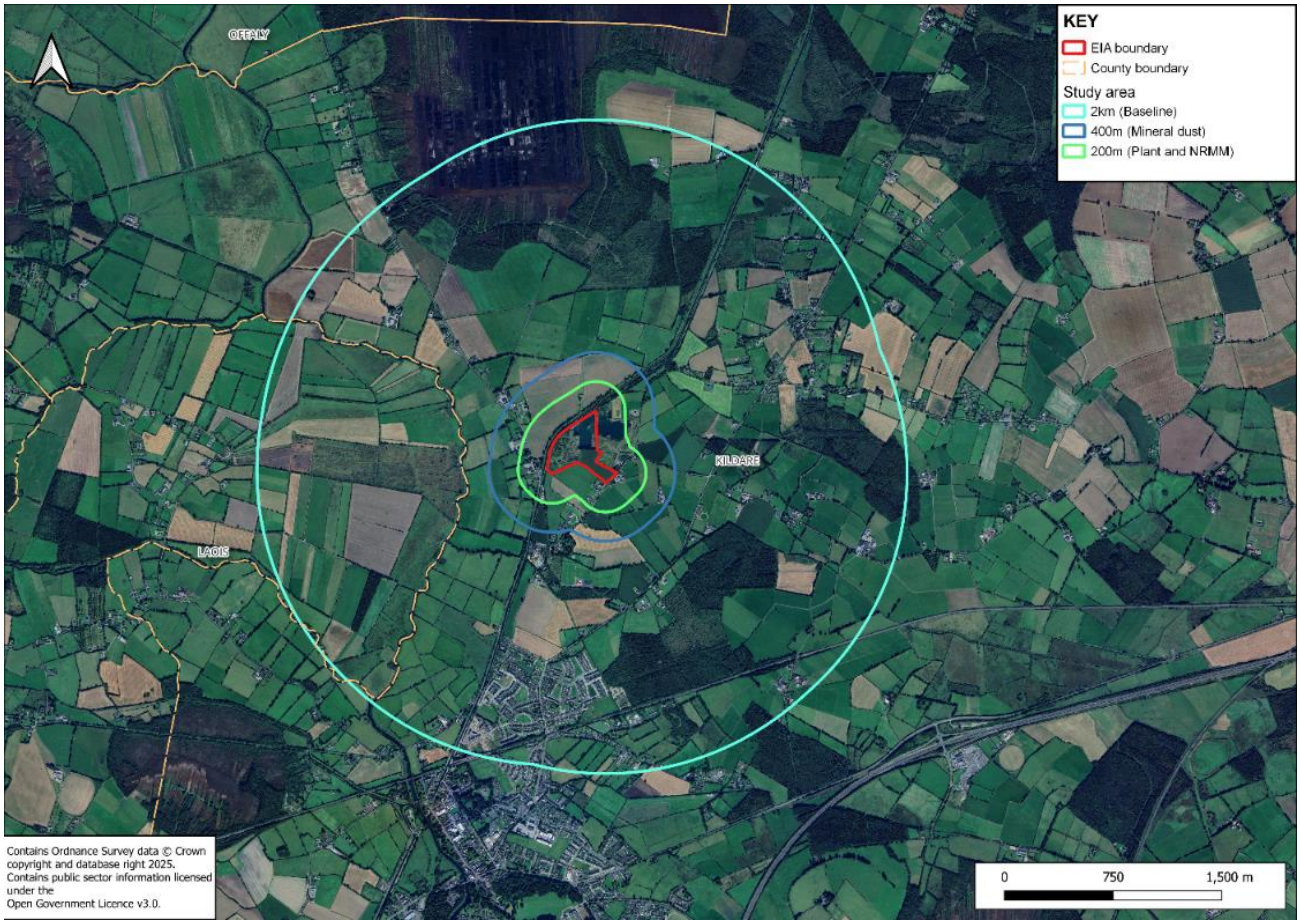

Figure 7-2: Assessment Study Areas

Different study areas have been used for the assessment of baseline conditions (i.e. the conditions on 1 January 2000 prior to extraction) and assessment of operational phase conditions (i.e. the worst case conditions during the period when the Project was operating as a quarry), including the impacts associated with mineral dust, 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.

7.4.2.1 Baseline

The baseline study area includes the area immediately surrounding the Project Lands.

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 Project Lands. Likewise, where data is not available for the assessment period (01st January 2000 to 31st December 2006) the best available data, i.e., data for period closest to the assessment period, has been used and this noted in the assessment.

7.4.2.2 Mineral Dust

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

7.4.2.3 Plant and Non-Road Mobile Machinery Emissions

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

7.4.3 Receptors

Sensitive locations are places where the public or sensitive ecological habitats may be exposed to pollutants resulting from activities associated with the Project Lands. These will include locations sensitive to increases in dust deposition and PM_{10} exposure resulting from mineral dust, 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 7.4.2.

7.4.3.1 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 Project lands, this includes the Barrow line canal towpath which is considered to be a sensitive receptor due to its valuable cultural and heritage use as an amenity for walkers and cyclists.

7.4.3.2 Sensitive Ecological Receptors

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

Table 7-7 - 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

Receptor Sensitivity	Types of Ecological Receptors
	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 Project Lands. The Project Ecologist identified that this is considered to be a high 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. The River Barrow and River Nore SAC and all other identified designated sites are located outside the 400 m Study Area for the assessment and are therefore not considered further as any impacts are anticipated to be not significant.

7.4.4 Climate at the Site

The climate at the Project Lands 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 at the Project Lands is typical of the Irish climate, which is temperate maritime.

The closest Met Éireann station is located at Casement Aerodrome, Baldonnell, County Dublin, approximately 45km northeast of the Project Lands. A wind rose based on daily averages of wind speed and wind direction observations for the periods 01st January 2000 to 31st December 2004 and 1st January 2006 to 31st December 2006 measured at Casement Aerodrome is presented in **Figure 7-3**. Data was not available for the 2005 year. This figure shows that the prevailing winds are from the south-west with a small easterly component.

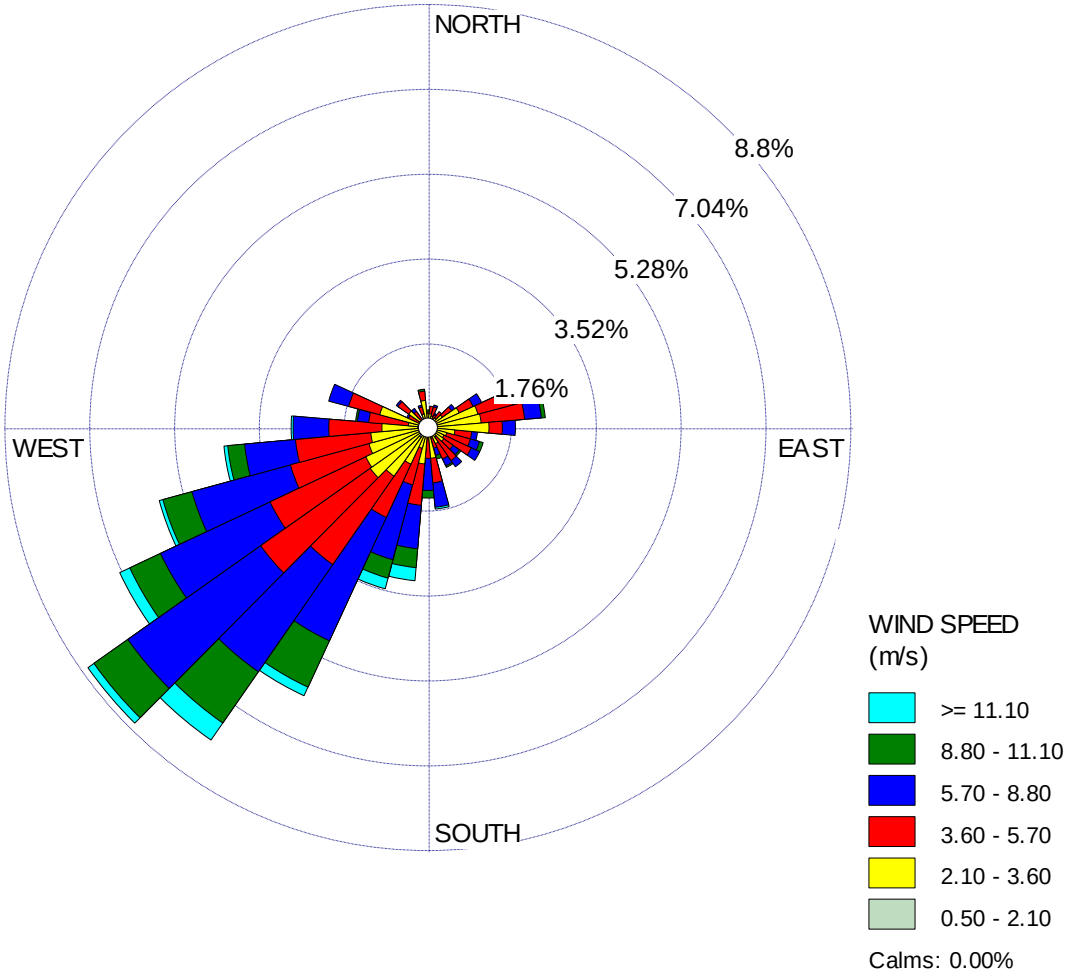

Figure 7-3 - Wind Rose for Casement Aerodrome (2000-2004 and 2006)

7.4.5 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. The Project Lands are located within a designated Zone D for air quality.

7.4.5.1 Primary Data - Project Lands Monitoring Data

It is understood that no boundary dust monitoring was taken at the Project lands during quarry operation. However, boundary dust monitoring was undertaken at the Project Lands on a monthly basis by BHP laboratories from 24 May 2024 to 23 August 2024 at a total of three locations which are described in **Table 7-8** and shown in **Figure 7-4**.

Table 7-8: 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 Project Lands, approximately 150m from the entrance.	663416	713011
DS02	Located near the north boundary of the Project Lands	663351	713233
DS03	Located near the southwest boundary of the Project Lands.	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 7-9**.

Table 7-9: 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 7-9**, there were two instances (at different monitoring locations) when the monitored dust concentration was more than 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, located close to the site entrance. 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.

There is variability in the deposition rates recorded across the monitoring months and locations. Furthermore, all monitoring was completed after quarrying activities ceased. As such, the quarry's contribution of recorded deposited dust is not represented within the monitoring data.

7.4.5.2 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.

During the assessment period (i.e., between 2000 to 2006), monitoring was undertaken at Naas in County Kildare approximately 27km northeast from the Project Lands. The reported data from the EPA ambient air monitoring station at Naas was undertaken between the 16 October 2003 and 22 April 2004 and is summarised in **Table 7-10**.

Table 7-10 - Air Quality Monitoring Data for Naas (2003-2004)

Pollutant	Averaging Period	Mass Concentration (µg/m^3)
NO_2	Average	25.9
	98%ile of hourly values	69.3
PM_{10}	Average	17.3
	98%ile of daily values	38.5
$PM_{2.5}$	Average	6.1
	98%ile of daily values	13.7

In the absence of local background data, the annual mean NO_2, PM_{10} and $PM_{2.5}$ monitoring data for period closest to the assessment period from other stations within the EPA National Ambient Air Quality Monitoring Network located in Zone D areas across Ireland are detailed in **Table 7-11**. Data is provided for 2013 as that is the year closest to the assessment period, for which data was available. The Project ceased operation prior to 2013.

Table 7-11 - Annual Mean Monitoring Data for Zone D Stations (2013)

Monitoring Location	Annual Mean Concentration (µg/m^3)		
	NO_2	**PM_{10}**	**$PM_{2.5}$**
Emo, Laois	4	ND	ND
Castlebar, Mayo	11	15	ND
Kilkitt, Monaghan	14	11	ND
Claremorris	ND	13	8
Longford	ND	ND	17
Note: ND denotes no data.			

All monitored concentrations in 2013 are below the relevant standards for NO_2, PM_{10} and $PM_{2.5}$ given in **Table 7-1**.

7.5 Characteristics of the Project

The Project is described in Chapter 2 (Project Description).

Details of any measures used to reduce the impact of potential dust emissions from the Project on the surrounding area and the sensitive receptors identified for the duration of the

assessment period are not available but based on a review of aerial imagery the following characteristics of the Development are considered to have been embedded design measures:

- Rock extraction has been conducted within the quarry void, with blasting activities primarily contained within the quarry walls to minimize external impact;
- The sand and gravel material extracted is expected to have a high moisture content, which inherently reduces the potential for dust generation; and,
- Existing treelines and hedgerows on field boundaries have acted as vegetation barriers and wind breaks to screen emissions from the quarry void onto the Canal and lands adjacent to the Development.

7.6 Potential Effects

7.6.1 Sources

The following section sets out sources in the context of the extraction and processing carried out within the Application Site and the plant used to facilitate this. Limited data is available regarding specific quarry operations at the Application Site from the early- to mid-2000s and assumptions have been made with regards to the type and number of plant that would have been use based on similar development from that time. See Chapter 2 (Project Description) for details.

7.6.1.1 Mineral Dust

The main potential impact on ambient air quality associated with extraction activities and aggregate processing is that associated with deposition of dust generated by the rock extraction and material transfer operations. Potential dust emissions associated with quarrying activities include:

- Mechanical handling operations, including crushing and grading processes, where in general the more powerful the machinery and the greater the volumes of material handled the greater the potential for dust emission;
- 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;
- Loading and movement of overburden to dump areas;
- Blasting and rock breaking; and
- Wind blow from paved areas, material stockpiles, unsurfaced internal haul roads and quarry floors.

The activities / sources within the Project have been assessed using the methodology outlined in Section 7.3 to identify the potential dust emission magnitude (prior to the implementation of mitigation), these are summarised below:

- Site preparation has been classified as a small magnitude source due to removal of topsoil and overburden with low dust potential from the relatively small sized working area (the quarry void area has a footprint of approximately 2.3 ha) and because there are less than 5 heavy plant items expected to have been operational at any one time;
- Mineral extraction has been classified as a medium magnitude source due to the average annual extraction rate of up to approximately 108,571 tonnes/year of sand, gravel and limestone (averaged over 7-years) within the working area and periodic drilling and blasting undertaken to extract;
- Material handling has been conservatively classified as a medium magnitude source due to there being less than 4 loading plant (1 no. excavator, 1 no. loader and 2 no. 18 tonne haulers) which operated during the 7-year operational phase within the quarry void;
- On-site transportation has been conservatively classified as a medium magnitude source as there has been conservatively estimated to be 100 HDV movements per day along internal unpaved haul routes, which includes 46 HDV entering the Site and 40 plant movements within the boundary. However, the length of the on-site roads are relatively short and some of these movements would have occurred within the quarry void, which would reduce the potential for dust generation off-site;
- Mineral processing has been classified as a medium magnitude source as mobile crushing and screening of the sand and gravel is expected to have taken place but this material is expected to have a low dust potential due to its high moisture content and the annual throughput of crushed and screened material is estimated to be low (maximum of 108, 571 tonnes per year assuming all material is processed);
- Stockpiles and exposed surfaces have been conservatively classified as a medium magnitude source as while the stockpiles were located entirely within the site, they may have been as close as 50 m from the EIA site boundary.; and
- Off-site transportation has been classified as a medium magnitude source as there are expected to have been 46 HDV movements per day. It is unknown if cleaning facilities were available.

7.6.1.2 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 site boundary. As shown in **Figure 7-5** there are 15 residential properties (where the air quality objectives apply) within 200m of the EIA site boundary within the boundary that could be affected by plant and NRMM emissions.

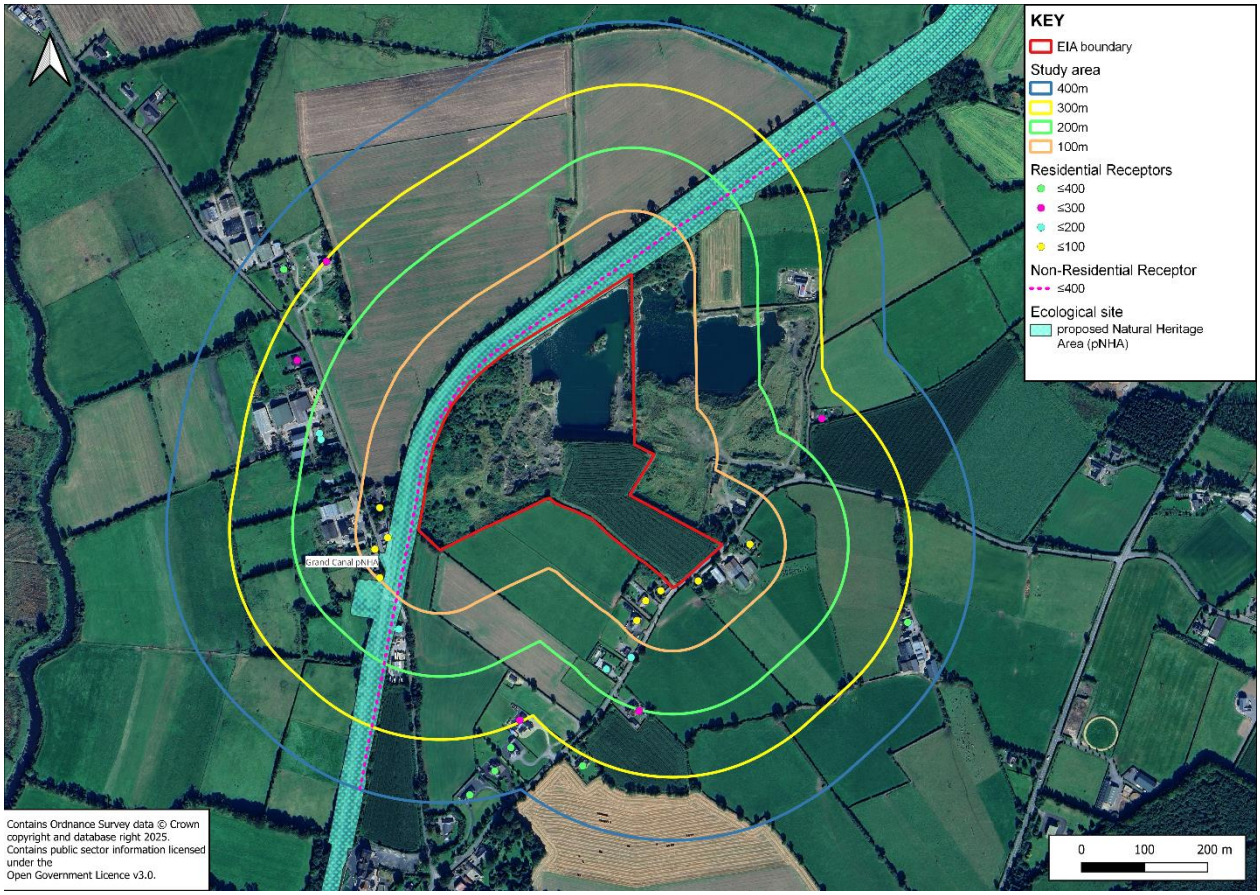

Figure 7-5 - Location of Receptors within the Assessment Study Areas that existed during the operation of the Project as a Quarry

As noted in **Chapter 2 Project Description**, there have been up to 6 items of plant and NRMM operating on site between 1st January 2000 and 31st December 2006. It is predicted that plant and NRMM requiring energy, including the pump used to dewater the void during the extraction of bedrock below groundwater table, operated using portable diesel-fired power generation.

Plant and NRMM are expected to have been used within the quarry's operating hours, so any emissions are expected to have been short-term and temporary (i.e., no longer than the working day: 07:00 hours and 17:00 hours, Monday to Friday and between 07:00 hours and 14:00 hours on Saturdays) in nature.

Most of the dewatering, material extraction and handling activities including blasting, crushing and screening occur on the quarry floor, i.e., below ground level, therefore the plant and NRMM tend to be operate correspondingly within the void. All plant and NRMM are assumed to have been routinely maintained to allow optimal operational condition.

7.6.2 Site Parameters

The risks of potential dust emissions associated with the Project being transported off-site are 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 Project Lands boundary; and
- Wind direction, to identify the areas over which particles are likely to travel.

As detailed in Section 7.4.4, the closest Met Éireann station to the Project Lands is located at Casement Aerodrome approximately 45km northeast of the Project Lands. 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 2000 to 31 December 2006. 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 Project Lands (shown in **Figure 7-5**) are given in **Table 7-12**. Residential receptors have been categorised as high sensitivity receptors and Non-residential receptors have also been categorised as medium sensitivity receptors.

Table 7-12 - 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	5	Distant	1	Moderately frequent	Ineffective
≤400m	6	Distant	0	Infrequent	Ineffective
Non-Residential Locations					
≤100m	1	Considered intermediate due to the	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
		presence of vegetation berms reducing exposure to on-site sources			
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 Project during the assessment period is summarised for each receptor in **Table 7-13**.

Table 7-13 - 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	Medium	Ineffective	Negligible Risk	High	Negligible

Receptor Type and Distance Band from Boundary	Maximum Residual Source Emissions	Pathway Effectiveness	Dust Impact Risk	Receptor Sensitivity	Magnitude of Dust Effects
≤200m	Medium	Ineffective	Negligible Risk	High	Negligible
≤300m	Medium	Ineffective	Negligible Risk	High	Negligible
≤400m	Medium	Ineffective	Negligible Risk	High	Negligible
Non-Residential Properties/Locations					
≤100m	Medium	Moderately Effective	Low Risk	Medium	Negligible
Ecological Sites					
≤100m	Medium	Moderately Effective	Low Risk	High	Slight adverse

Following the IAQM guidance, the nature of the 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 pHIA due to its classification as having high sensitivity. Further assessment of the sensitivity of this receptor is provided in Chapter 4 (Ecology and Biodiversity) .

7.6.2.2 Plant and Machinery Emissions

Based on the current local air quality in the baseline study area (given in Section 7.4.2.1), the limited number and proximity of sensitive human receptors to the EIA site boundary, the predominant location of plant and NRMM emissions, 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 Remedial Measures

There are no significant effects from the activities on the Site that required remedial measures.

The determination of significance refers to the EPA Guidelines; **Table 7-14** assesses the potential impacts associated with the operation of the Project on dust and local air quality that have been considered for the assessment period including the embedded mitigation.

The duration of these effects will have occurred in the medium term during the quarry's phased operations (i.e., during stripping, extraction and restoration).

Table 7-14 - Assessment of Impacts to Local Air Quality and Mitigation Measures Employed

Impact	Type of Effect	Quality of Effects	Significance of Effects	Duration of Effects
Mineral dust and PM_{10} associated with the extraction and handling of quarried material on sensitive human receptors	Direct	Negative	Imperceptible	S-T
Mineral dust and PM_{10} associated with the extraction and handling of quarried material on ecological receptors	Direct	Negative	Slight	S-T
Emissions of NO_X, PM_{10} and $PM_{2.5}$ from plant and NRMM	Direct	Negative	Imperceptible	S-T

7.8 Residual Effects

Due to the embedded mitigation measures, the residual effect of mineral dust and PM_{10} on sensitive human receptors is expected to be imperceptible (i.e., negligible) and unlikely to lead to a significant effect. There is a potential for slight effect at the Grand Canal pNHA but this would have been a short term effect during the duration of the project. Further discussion on the sensitivity of this pNHA is provided in Chapter 4, Ecology.

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

7.9 Cumulative Effects

Interactions between the Project and the adjacent existing quarry to the northeast may have the potential to cumulatively effect the local air quality, in particular both activities are expected to be sources of mineral dust, NOx, PM_{10} and $PM_{2.5}$ and the two quarries are understood to have shared an access route.

The embedded measures outlined in Section 7.7, provide sufficient mitigation for the Project against significant effects for human receptors. It is assumed that the neighbouring quarry also employs appropriate and proportionate mitigation measures as good practice, and therefore it is expected that any cumulative impact would be sufficiently minimised and not result in a significant effect for human receptors. The Grand Canal pNHA is located adjacent to both quarries but would only be downwind of both operations less than 10% of the time based on the wind rose provided in **Figure 7-3** and has a dense vegetation barrier along the

sides of both quarries, which would have acted as a wind break and reduced the potential for dust impacts at this location.

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

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9 Noise and Vibration

9.1 Introduction

This Chapter of the remedial Environmental Impact Assessment Report (rEIAR) considers the potential noise and vibration impacts associated with the operation of Ballykelly Quarry (referred to as 'the quarry' and the 'Project'). The disused quarry is located in the townland of Coolsickin or Quinsborough, Monasterevin, Co. Kildare (referred to as the 'Application Site' or 'Site').

The Project Site is wholly located in the townland of Coolsicken or Quinnsborough, which is situated ca. 2.7km north of Monasterevin and ca. 9 km southwest of Kildare Town. The Site comprises a quarry void area which has been used for sand and gravel and limestone rock extraction between the years 2000-2006. The grid reference coordinates (Irish Transverse Mercator) for the approximate centre of the Site are E663403, N713199.

Operations at the quarry are predicted to have consisted of the following Project activities:

- Stripping of soils and not economically valuable overburden from within the quarry void area and associated working areas and subsequently storage of this material within the Application Site.
- Extraction of sand, gravel and limestone rock through drilling, blasting, and mechanical breaking;
- Mobile crushing, and screening of the rock into specific aggregate sizes;
- Temporary stockpiling of screened aggregate;
- Loading aggregate materials onto road trucks for sale and distribution; and,
- Dewatering of the quarry void during extraction for bedrock.

A detailed description of quarry operations is provided in Chapter 2 (Project Description).

This Chapter of the rEIAR was prepared by SLR Consulting and authored by Alasdair Baxter, BSc. Hons (Dunelm), MSc., Member of the Institute of Acoustics. Alasdair has more than 20 years' experience in the assessment of environmental noise and vibration.

9.2 Technical Scope

The technical scope of this assessment is to consider the potential noise and vibration impacts associated with the operation of Ballykelly Quarry. This assessment considers the potential sources of change resulting from Project activities detailed in the project description (Chapter 2 of this rEIAR).

The scope of this chapter includes the following:

- Review of quarry activities, layout and available information;
- Review of historical noise and vibration monitoring records, where available;
- Review of site-specific noise and vibration limits (if applicable); and

- Prediction & evaluation of noise and vibration from the quarry that occurred during the quarries operational life time, based on the estimates set out in Chapter 2 of the rEIAR.

9.3 Geographical and Temporal Scope

Historical arial mapping and documentation held by Kildare Country Council indicates extraction of aggregates within the Application Site is estimated to have commenced within 2000 and the operation had ceased within 2006. Accordingly, the baseline for this rEIAR has been set to 01 January 2000, and the rEIAR process has assessed environmental impacts from that date to 31 December 2006 (see Chapter 2 Project Description for detail).

The study area considered in this assessment comprises a buffer approximately 400 metres beyond the Site Application Boundary (show in Figure 9-1). This area includes the receptors anticipated to have been impacted by quarry operations. The closest receptors are located approximately 120 metres west of the quarry boundary.

Representative Noise Sensitive Receptors (NSRs) considered within this assessment are shown in Figure 9-1 and are listed in Table 9-1.

Table 9-1 - Identified representative NSRs

Receptor	Representative of	X	Y
NSR1	House to the east of the quarry	663707	712935
NSR2	Houses south of the quarry	663827	713133
NSR3	Houses to the southwest of the quarry	663140	713013

Figure 9-1 - Study area and Noise Sensitive Receptors

9.4 Project Description Summary

The Project seeking substitute consent consists of extraction of sand, gravel and rock over an area of 7.87 ha through blasting, mechanical excavation and rock breaking along with aggregate processing and stockpiling. The Project was operational between the years 2000-2006.

A full project description is presented in Chapter 2 (Project Description).

9.5 Legislative and Policy Context

9.5.1 Legislation

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

- European Union Directive 2011/92/EU as amended by Directive 2014/52/EU – these Directives required that certain private and public projects which are likely to have significant resultant environmental impacts are subject to a formalised Environmental Impact Assessment prior to their consent.

- European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (SI No. 296 of 2018) which amended the Planning and Development Act, 2000, and the Planning and Development Regulations, 2001. The 2014/52/EU Directive was transposed into Irish law through this Directive.

9.5.2 Policies and Plans

The following relevant policies and plans have been considered:

- The Kildare County Development Plan (CDP) 1999 is the strategy document for County Kildare which covers most of the temporal scope of this assessment period. The key policies and objectives of this plan are listed in Section 2.5.1 of the Project Description (Chapter 2).
- The Kildare CDP 2005-2011 was adopted on 18 May 2005 and covers the temporal scope from this date to 31 December 2006. The key policies and objectives of this current plan are listed in Section 2.5.2 of the Project Description (Chapter 2).

9.5.3 Guidance

The following relevant guidance have been used and applied in this assessment:

9.5.3.1 Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4) (Jan 2016)

With regards to noise, the most recent Irish guidance was published in 2016 by the Environmental Protection Agency (EPA), Office of Environmental Enforcement (OEE), entitled 'Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)'.

NG4 sets methods for addressing noise from operations that fall under IPPC and Waste Licensing functions of the Environmental Protection Agency Office of Environmental Enforcement (OEE). NG4 provides detailed consideration of a range of noise related issues including basic background to noise issues, various noise assessment criteria and procedures, noise reduction measures, Best Available Techniques (BAT) and the detailed requirements for noise surveys. NG4 identifies typical limit values for noise from licensed sites as: Daytime (07:00 to 19:00hrs) – 55dB $L_{Ar,T}$; Evening (19:00 to 23:00hrs) – 50dB $L_{Ar,T}$; and, Night-time (23:00 to 07:00hrs) – 45dB $L_{Aeq,T}$.

NG4 identifies the following guidance as potentially appropriate for assessing noise, subject to the use of the methodology being considered and justified by a competent person:

- BS 4142: 2014 +A1 2019: Methods for rating and assessing industrial and commercial sound – evaluation of industrial and commercial noise sources at residential properties;
- BS 8233: 2014 Guidance on sound insulation and noise reduction for buildings – outline guidance on noise matters and deals specifically with noise within buildings; and
- BS 5228-1: 2009 + A1: 2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise – outline guidance on prediction and control of noise from construction and open sites.

9.5.3.2 BS5228:2009+A1:2014 Code of practice for noise and vibration control on open sites: Part 1 Noise and Part 2 Vibration

BS5228 provides a procedure for the estimation of construction noise and vibration levels and for the assessment of the significance of the predicted effects at the nearest sensitive receptors. Annex D of the Standard includes measured typical noise levels for a range of construction plant and activities.

Part 1 of the Standard provides several methods for the evaluation of the significance of construction noise effects. The ABC method considers significance by comparison to the measured baseline $L_{Aeq,T}$ noise level, rounded to the nearest 5 dB. Three categories of threshold values are provided; A, B and C, in increasing 5 dB bands, for the periods “daytime and Saturdays”, “evenings and weekends” and “night time”. Where the measured baseline exceeds the highest category (C), a 3 dB increase over baseline is considered significant. The evaluation periods are defined as follows:

- Daytime: 07:00 – 19:00 on weekdays and 07:00 – 13:00 on Saturdays.
- Evenings and weekends: 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays.
- Night-time: 23:00 - 07:00 (all days).

BS 5228-1:2009+A1:2014 describes several methods for assessing noise impacts during construction projects.

The approach utilised in this assessment is the threshold based “ABC” method. The method is detailed within BS 5228-1:2009+A1:2014, which specifies a construction noise limit based on the existing ambient noise level and for different periods of the day. Table 9-2, reproduced from BS 5228-1:2009+A1:2014 Table E.1, presents the criteria for selection of a noise limit for a specific receptor location.

Table 9-2 - Construction Noise Threshold Levels Based on the ABC Method (BS 5228:2009+A1:2014)

Assessment category and threshold value period (L_{Aeq})	Threshold value, in decibels (dB)		
	Category A[A)]	Category B[B)]	Category C[C)]
Night time (23.00 – 07.00)	45	50	55
Evenings and weekends (D)	55	60	65
Daytime (07.00 – 19.00) and Saturdays (07.00 – 13.00)	65	70	75
Sundays and Bank Holidays			
A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.			
B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.			
C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.			
D) 19.00–23.00 weekdays, 13.00–23.00 Saturdays and 07.00–23.00 Sundays.			

The “ABC method” described in BS 5228 establishes that there is no significant impact below the three thresholds presented above.

BS 5228 states:

“If the site noise level exceeds the appropriate category value, then a potential significant effect is indicated. The assessor then needs to consider other project-specific factors, such as the number of receptors affected and the duration and character of the impact, to determine if there is a significant effect.”

Part 2 of the Standard provides threshold levels at which vibration may be perceptible to people, through to becoming intolerable, and frequency-weighted thresholds at which vibration may cause cosmetic damage to structures.

The thresholds are dependent on frequency and the type of building, however, in the worst-case, residential or light commercial structures may see the onset of damage at 15 mm/s PPV at 4 Hz, increasing to 20 mm/s PPV at 15 Hz and above.

9.5.3.3 BS7385: Evaluation and measurement for vibration in buildings, Part1 1990 Guide for measurement of vibrations and evaluation of their effects on buildings and Part 2 1993 Guide to damage levels arising from ground borne vibration

BS 7385 states that there should typically be no cosmetic damage if transient vibration does not exceed 15 mm/s at low frequencies rising to 20 mm/s at 15Hz and 50 mm/s at 40 Hz and above.

BS7385 also provides further context with regards to air overpressure:

"Windows are generally the weakest parts of a structure exposed to air overpressure. Research by the United States Bureau of Mines has shown that a poorly mounted window that is pre-stressed can crack at around 150 dB(lin), with most windows cracking at around 170 dB(lin). Structural damage would not be expected at air overpressure levels below 180 dB(lin)."

9.5.3.4 BS7445-1:2003 Description and Measurement of Environmental Noise. Guide to Quantities and Procedures

BS7445 provides guidance on appropriate environmental noise monitoring, including specification of equipment and appropriate calibration intervals, suitable weather conditions and observations to note regarding the nature of the noise environment.

9.5.3.5 ISO 9613-2, Second Edition, 2024. Acoustics-Attenuation of sound during propagation outdoors-Part 2: General method of calculations

ISO 9613 describes a method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at a distance from a variety of sources. The method predicts the equivalent continuous A-weighted sound pressure level under meteorological conditions.

9.5.3.6 EPA, 2006, Environmental Management Guidelines-Environmental Management in Extractive Industry (Non Scheduled Minerals)

This guidance outlines primary sources of noise associated with quarrying and offers guidance in relation to the correct approach to be followed in respect of assessment and mitigation. Recommended noise limit values are 55dB $L_{Aeq,1hr}$ and 45dB $L_{Aeq,15min}$ for daytime and night-time respectively.

9.5.3.7 Design Manual for Roads and Bridges (DMRB)

DMRB provides standards and advice regarding the assessment, design and operation of roads in the UK and sets out screening criteria, by which percentage changes in traffic flow can be related to a predicted change in road traffic noise and vibration. The guidance also provides significance criteria, by which the percentage of people adversely affected by traffic noise can be related to the total noise or vibration level due to road traffic, or the increase over an existing level.

DMRB provides a method for predicting the Basic Noise Level (BNL), a measure of the source noise level of a road. The BNL is a function of the composition, flow and speed of traffic and the quality of the road surface. Changes in the BNL, arising from changes in traffic flow, may be used as a means of determining the significance of operational noise effects.

9.5.3.8 Other guidance

Other guidance reviewed as part of the assessment process include:

- Department of the Environment, Heritage and Local Government (DEHLG) – Quarries and Ancillary Activities: Guidelines for Planning Authorities, 2004;
- BS 6472:1992 - The Evaluation of Human Exposure to vibration in buildings;
- Department of the Environment, Heritage and Local Government – Quarries and Ancillary Activities: Guidelines for Planning Authorities, 2004; and
- Environmental Code (2005) Irish Concrete Federation (ICF). EPA guidelines in relation to blasting activities outlining the methodology and limits to be used for vibration measurement.

9.6 Assessment Methodology

9.6.1 Characterisation of Historical Baseline Noise Levels

Baseline noise data was not collected either before or during operations at the quarry. Baseline conditions at the closest residential receptors to the quarry have therefore been characterised using monitoring data collected after quarry operations ceased, during 2024.

This document presents a comprehensive noise assessment based on the criteria specified in the EPA's *'Advice notes on Current Practice in the Preparation of Environmental Impacts Statements' and the 'Guidelines on the Information to be contained in Environmental Impact Statements'* also published by the EPA and with reference to *'ISO 1996,2, 2007: Acoustics – Description, Measurement and Assessment of environmental noise'*.

9.6.1.1 Noise Measurement Indices

At the measurement positions, the following noise level indices have been recorded:

- LAeq,T – the A-weighted equivalent continuous sound pressure level over the measurement period T, effectively represents an "average" energy level of all the sampled levels. The ambient sound level is usually measured as an LAeq,T and is made up of all the sound in the area from sources near and far;
- LA90,T – the A-weighted noise level exceeded for 90% of the measurement period, T. This parameter is often used to describe the" background" noise level, it gives a clear indication of the underlying noise level, or the level that is almost always there in between intermittent noisy events; and
- LAmax,T – the A-weighted maximum noise level of the measurement period, T. This parameter is often used to identify single loud noise events.

9.6.1.2 Measurement Method

Monitoring was undertaken using a Cirrus Class I integrating sound level meter (SLM). The SLM was within its two-year laboratory calibration period, and a calibration check was performed before and after each measurement, with no drift in calibration noted.

Monitoring was undertaken at two noise monitoring positions (NMP) for a duration of 4 hours at NMP1 and c2hrs at NMP2. The noise indices L_{Aeq}, L_{A90} and L_{Amax} were recorded. Weather conditions were in accordance with the requirements of BS7445 and BS4142 throughout the survey with low wind speeds, no rain and dry roads. Noise monitoring locations are shown in Figure 8.1. Full monitoring data is provided in Appendix 9A.

9.6.1.3 Evaluation Criteria

Appropriate criteria have been adopted for the derivation of impact magnitude and are provided in Table 9-3. The criteria have been adapted from DMRB. DMRB provides criteria for construction phases of developments, which are appropriate for this evaluation.

Table 9-3 - Impact Magnitude Criteria

Exceedance of threshold value OR change in noise level, dB $L_{Aeq,T}$	**Subjective reaction**	**Impact Magnitude**
≥5	Clearly perceptible	High adverse
≥3, <5	Perceptible	Medium adverse
>0, <3	Barely perceptible	Low adverse
≤0	Inaudible	No change / none

The criteria in Table 9-3 have been used to determine the significance of noise effects for receptors of different sensitivities, as shown in Table 9-4.

Table 9-4 - Assumed sensitivity of representative NSRs

Magnitude	**Level of significance, relative to sensitivity of receptor**		
	Low	**Medium**	**High**
High	Moderate	Moderate/Large	Large
Medium	Slight	Moderate	Moderate
Low	Neutral	Slight	Slight
No change / none	Neutral	Neutral	Neutral

This assessment considers that effects of moderate and large significance are significant, and that effects of neutral and slight significance are not significant.

All NSRs considered in this assessment are assumed to be of 'High' sensitivity.

9.6.1.4 Target Noise Levels

The EPA has produced the Environmental Management Guidelines 2006. The document references to 'A Guidance Note for Noise in Relation to Scheduled Activities'. It deals with the approach to be taken in the measurement and control of noise and provides advice in relation to the setting of emission limits values and compliance monitoring.

In relation to quarry developments and ancillary activities, noise from the activities on site should not exceed the following noise limits at the nearest NSR:

- Daytime - 08:00 – 20:00. Target level - L_{Aeq1hr} = 55 dBA

9.6.1.5 Method of Prediction

A 3D model of the quarry was constructed within noise prediction software CadnaA and noise levels were predicted at the representative NSRs. The software enables prediction of noise levels under atmospheric conditions using the method provided in BS5228.

Appropriate source noise terms from BS5228 were applied to all plant present on site. Table 9-5 presents the sound power data and sources included in the noise model. The type and number of plant that operated within the quarry during its operation life have been estimated based on similar development from that time period (see Chapter 2 Project Description for Details)

Table 9-5 - Source Noise Terms

Item	Resultant sound power level, dBA	Data source	Effective Height, m	Utilisation, on-time, mins
Screen stockpiler	109.1	BS:5228 C10_15	2	615
Crusher	109.4	BS:5228 C1_14	2	615
Excavator	104.0	BS:5228 C2_2	2	615
Haul Trucks x 2	108.0	BS:5228 C2_32	2	615
Loader	102.2	BS:5228 C4_13	2	615
Generator for dewatering pump	101.7	BS_5228_2009_C4_84	1	615

The operational hours for the adjoining Site through which vehicles accessed the application Site, were 07.00 to 17:00 hours Monday to Friday, and 07.00 to 14:00 hours Saturday. There was no working on Sundays or Bank/Public Holidays.

Based on the above timing of activities one scenario has been modelled to establish baseline noise impacts during historic quarry operations.

In the absence of detailed information regarding activities at the adjacent quarry site, it has been assumed that similar activities, plant and equipment were in use at that site. Cumulative impacts have therefore been assessed based on concurrent operations at the site and the adjacent site.

9.6.1.6 Model settings

A typical air temperature of 10^{o}C and relative humidity of 70% have been assumed within the model. Ground absorption within the quarry has been assumed to be G=0, representative of hard ground conditions. The ground absorption for the area surrounding the site has been modelled as G = 0.5 representative of mixed ground conditions.

Local topography has been included within the model for all scenarios, using detailed contour line data provided by WSP.

9.6.2 Vibration

The most significant potential sources of ground borne vibrations generated during the operational phase of the development was the extraction of rock from the active face. Rock extraction requires the use of a pneumatic rock breaker and blasting techniques.

Vibration monitoring at nearby sensitive receptors was not conducted during blast events and monitoring data is required in order to assess potential vibration impacts. No evidence of complaints due to historical blasting at the quarry has been identified; vibration from quarry activities and blasting is, therefore, not considered further within this report.

9.7 Baseline Conditions and Existing Conditions

The results of the noise monitoring campaign from 2024 are presented in Table 9-6. In the absence of noise data from pre-2000 at the Application Site, data from 2024 is adopted as a proxy for baseline conditions prior to the Project commencement at the Application Site (see section 9.6 for detail).

Table 9-6 - Noise Survey Results 2024 – Monitoring position 1 (N1)

NMP	$L_{Aeq,T}$	$L_{Amax,T}$	$L_{A90,T}$
NMP1	45.2	73.7	36.0
NMP2	42.2	79.3	33.2

Predicted noise levels resulting from Project activities is presented in Section 9.8.

9.8 Potential Effects

9.8.1 Noise impacts

Recorded baseline noise levels (see section 9.6.1) include noise from all sources, including road traffic from the surrounding road network. Noise modelling has predicted noise from quarry activities only to determine the likely worst-case contribution of quarry operations to the noise environment. The predicted noise levels are presented in Table 9-7. The magnitude of impact and significance of effect have been determined with reference to criteria provided in Table 9-3 and Table 9-4 respectively.

Table 9-7 - Evaluation of Predicted worst-case levels for Scenario 1 against daytime target level

Noise Sensitive Receptor	Predicted Noise Level dB(A)	Predicted level minus target level, 55 dB(A) $L_{Aeq,1hour}$	Magnitude of Impact	Significance of effect
NSR1	50.3	-4.7	No change	Neutral
NSR2	48.4	-6.6	No change	Neutral
NSR3	45.8	-9.2	No change	Neutral

Predicted noise levels at all NSRs are below the daytime target level (55 dB(A) L_{Aeq}) during this conservatively predicted scenario for operations at the quarry up to 2006. The highest predicted levels were at NSR1, with predicted levels 4.8 dB below the daytime target level.

Noise effects at all NSRs associated with quarry operations during the daytime period have been evaluated as being of ‘neutral’ significance and are therefore ‘not significant’.

9.9 Remedial Monitoring and Mitigation

There are no effects from the Project that require remedial measures or monitoring.

9.9.1 Residual Effects

The assessment concludes that the Project has not given rise to significant adverse effects on NSRs during the assessment period of 01 January 2000 to 31 December 2006. In all cases the residual adverse effect is **Not Significant** and not greater than of ‘neutral’ significance.

9.10 Cumulative Impacts

Noise modelling has predicted noise from quarry activities at both the application site and the adjacent quarry site to determine the likely worst-case contribution of quarry operations to the noise environment. The predicted noise levels are presented in Table 9-8. The

magnitude of impact and significance of effect have been determined with reference to criteria provided in Table 9-3 and Table 9-4 respectively.

Table 9-8 - Evaluation of Predicted worst-case levels for cumulative operations against daytime target level

Noise Sensitive Receptor	Predicted Noise Level dB(A)	Predicted level minus target level, 55 dB(A) $L_{Aeq,1hour}$	Magnitude of Impact	Significance of effect
NSR1	53.5	-1.5	No change	Neutral
NSR2	53.7	-1.3	No change	Neutral
NSR3	46.7	-8.3	No change	Neutral

Predicted noise levels at all NSRs are below the daytime target level (55 dB(A) L_{Aeq}) during this conservatively predicted scenario for cumulative operations at the quarry and adjacent quarry up to 2006. The highest predicted levels were at NSR2, with predicted levels 1.3 dB below the daytime target level.

Cumulative noise effects at all NSRs associated with quarry operations during the daytime period have been evaluated as being of 'neutral' significance and are therefore 'not significant'.

9.11 Difficulties encountered

Due to the limited publicly available information held for the extraction activities carried out onsite in the early to mid-2000s, assumptions have been made with regards to the operational timeline for extraction and extraction processes. Assumptions have also been made with regards to the nature and volume of plant uses for extraction, stockpiling and processing activities. The rationale for these assumptions is set out in Chapter 2 (Project Description), and where relevant, within this chapter.

9.12 References

Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4) (Jan 2016)

BS5288: 2009+A1:2014 Code of practice for noise and vibration control on open sites: Part 1 Noise and Part 2 Vibration

BS 7385: Evaluation and measurement for vibration in buildings, Part1 1990 Guide for measurement of vibrations and evaluation of their effects on buildings and Part 2 1993 Guide to damage levels arising from ground borne vibration

BS7445-1:2003 Description and Measurement of Environmental Noise. Guide to Quantities and Procedures

ISO 9613-2, Second Edition 2024-12-15. Acoustics-Attenuation of sound during propagation outdoors-Part 2: General method of calculations

EPA, 2006, Environmental Management Guidelines-Environmental Management in Extractive Industry (Non-Scheduled Minerals)

Department of the Environment, Heritage and Local Government (DEHLG) – Quarries and Ancillary Activities: Guidelines for Planning Authorities, 2004

Design Manual for Roads and Bridges (DMRB)

BS 6472:1992 - The Evaluation of Human Exposure to vibration in buildings

Department of the Environment, Heritage and Local Government – Quarries and Ancillary Activities: Guidelines for Planning Authorities, 2004

Environmental Code (2005) Irish Concrete Federation. EPA guidelines in relation to blasting activities outlining the methodology and limits to be used for vibration measurement

Appendix 9A

Measured Noise Levels

Table 0-1 - Measured Noise Levels, NMP1

Time	LAeq (dB)	LAFMax (dB)	Ln3 (10) (dB)	Ln5 (90) (dB)	Instrument
07/06/2024 10:02	56.7	83.5	49.9	37.6	G053886
07/06/2024 10:15	50.3	73	47.1	37.6	G053886
07/06/2024 10:30	46.5	62.3	49	35.8	G053886
07/06/2024 10:45	45.8	73.7	42.4	36.7	G053886
07/06/2024 11:00	44.8	63.7	47.1	35.7	G053886
07/06/2024 11:15	43.8	61.3	46.8	35.9	G053886
07/06/2024 11:30	42.5	62.8	42.8	35.6	G053886
07/06/2024 11:45	41.9	64	43.9	35	G053886
07/06/2024 12:00	43.3	64.3	44.7	34.9	G053886
07/06/2024 12:15	42.3	59.2	45.1	35.5	G053886
07/06/2024 12:30	42.5	64.7	43.8	36.5	G053886
07/06/2024 12:45	48.5	68	45.3	35.2	G053886
07/06/2024 13:00	40.5	55.1	42.9	35.3	G053886
07/06/2024 13:15	45.8	65.8	44.6	36.8	G053886
07/06/2024 13:30	42.5	64.4	43.3	35.1	G053886
07/06/2024 13:45	45.3	63.8	46.1	35.4	G053886
07/06/2024 14:00	44.3	61.4	46.1	38.7	G053886
07/06/2024 14:15	45.7	61.7	47.8	37	G053886

Table 0-2 - Measured Noise Levels, NMP2

	Leq	Lmax	L10	L90
07/06/2024 11:40	47.6	78.6	45.3	33.4
07/06/2024 11:50	38.8	58.7	40.4	32.2
07/06/2024 12:00	39.5	61.1	38.4	31.1
07/06/2024 12:10	38.5	53.4	41.3	33.7
07/06/2024 12:20	41.3	56.2	44.7	31.6
07/06/2024 12:30	38.2	56	40.3	33.4
07/06/2024 12:40	43.3	63.7	39.8	32.5
07/06/2024 12:50	39.6	50.6	41.6	35.4
07/06/2024 13:00	37.7	61.1	38.8	33.1
07/06/2024 13:10	39.3	53	42.3	33.1
07/06/2024 13:20	40.6	59	43.5	34.6
07/06/2024 13:30	37.1	56.7	37.9	31.9
07/06/2024 13:40	35.2	47.8	37	31.9
07/06/2024 13:50	38.9	55.4	41.9	32.7
07/06/2024 14:00	48.6	79.3	46.1	37.6