CHAPTER 17

MITIGATION AND MONITORING

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QUARRY CONSULTING

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INTRODUCTION

17.1 This chapter on 'Mitigation and Monitoring' is a critical component of the Environmental Impact Assessment Report (EIAR), designed to outline the specific actions and strategies that will be implemented to mitigate potential environmental impacts identified during the assessment phase of the proposed development. Following the Environmental Protection Agency's (EPA) guidelines, this chapter emphasises the importance of clarity, specificity, and commitment in presenting all mitigation and monitoring measures.

17.2 Mitigation measures are actions taken to avoid, reduce, or compensate for environmental impacts. Monitoring measures, on the other hand, are implemented to track the effectiveness of mitigation actions and ensure ongoing environmental protection throughout the lifespan of the development. Together, these measures play a pivotal role in safeguarding environmental resources and ensuring the sustainability of the project.

17.3 For organisational clarity and ease of reference, the chapter is structured to include a comprehensive compendium of all mitigation and monitoring commitments. The detailed elaboration on each measure is addressed within the main body of the EIAR.

17.4 Proposed Mitigation Measures are provided in Table 17.1. Proposed Monitoring requirements are provided in Table 17.2.

Table 17-1: Mitigation Measures

Topic	Mitigation Measures
Population and Human Health	Radon • Periodic workplace testing will be undertaken in accordance with the guidelines set out in the Protocol for Measurement of Radon in Homes & Workplaces, EPA, 2019. Silica Dust • Existing health and safety policies and procedures will continue to be reviewed and updated to ensure it is in keeping with best practice and current legislation. Unplanned Events • Existing emergency procedures will continue to be reviewed and updated to ensure it is in keeping with best practice and current legislation.
Biodiversity	To ensure the preservation of the peregrine falcon nesting ledge, that has been occupied consistently since 2016, the proposed extraction area has been designed to avoid the loss of this feature through any continuation and extension of quarrying operations. To ensure compliance with Wildlife Act 1976 (as amended) prohibiting the killing, injuring or taking; the damage, destruction or taking of nests in use or being built; and the taking or destruction of eggs, all shrubs and ground vegetation with the potential to support nesting birds will be removed outside the bird breeding season wherever practically. However, if any vegetation clearance take place during the bird breeding season (March to the end of August) the area will be inspected for any evidence of nesting activity by an experienced ecologist / ornithologist. Any identified nest will be marked and an appropriately sized exclusion zone for the relevant species delineated around all such nest site(s). No vegetation clearance will be permitted within any exclusion zone until such time as the young have fledged and left the nest. Given the likely nesting species at this site the exclusion zone is unlikely to exceed beyond a 20m radius of any nesting site. A Peregrine Falcon Management Plan was prepared for this site in 2020 that included the establishment of 125m buffer around the nesting site, when the nest is active (March to June), excluding blasting within this area. This Management Plan has been revised as part of this planning application maintaining this buffer zone.

Land, Soils and Geology	The following mitigation measures have been proposed to ensure the safe and sustainable operation, restoration, and long-term environmental management of the quarry site: 1. **Geotechnical Stability and Quarry Design:** ○ A detailed working scheme and restoration plan has been prepared, adhering to standard design criteria for face slopes and boundary standoffs. ○ The final quarry face angles will be assessed by a geotechnical engineer to ensure long-term stability, informed by the observed stability of existing quarry faces in this geological environment. 2. **Scientific and Educational Access:** ○ Scientists may request access to quarry faces during extraction (subject to Health and Safety requirements) to examine newly exposed stratigraphies and geological features. ○ Consideration will be given to leaving a representative section of the quarry face at the end of operations or installing information panels to promote geological awareness, tourism, or educational use, depending on the site's future use. 3. **Geoheritage and Geological Value:** ○ Should significant geological features be identified, the quarry operator will collaborate with the Geological Survey of Ireland (GSI) to preserve rock exposures where feasible, in line with safety regulations and engineering constraints. 4. **Restoration and After-Use:** ○ No mitigation measures are required for restoration, as this is a planned phase of the development. ○ The final restoration will create a secure wildlife refuge/amenity with a water feature, supporting aquatic life and birds, thereby enhancing the site's ecological value. ○ Upper benches will be seeded with suitable shrubs and climbers to create vegetated ledges, promoting natural colonisation and reducing the visual impact of exposed rock faces. 5. **Pollution Prevention:** ○ Fuels are stored in bunded areas to prevent contamination. ○ During the restoration enabling phase and site demobilisation, all potential sources of contamination will be removed from the site.
Water	The following mitigation measures have been proposed to prevent potential impacts on water quality, groundwater, and hydrological systems during quarry operations and restoration: 1. **Groundwater and Resource Management:** ○ No additional mitigation measures are required regarding groundwater vulnerability, as the region naturally has thin soil cover and exposed limestone.

- The quarrying of the Burren Formation limestone, which is regionally extensive and thick, is inconsequential in terms of regional resource depletion.
- The water balance indicates that the volume intercepted and managed at the site is less than 0.1% of the regional groundwater volume, with no potential impact on groundwater or surface waters.

2. **Blasting and Water Quality:**
   - Blasting is controlled by Gardaí and conducted by industry specialists.
   - Residual nitrogen species (Nitrate, Ammonia, Nitrite) resulting from blasting are within regulatory thresholds and are unlikely to impact local water quality.
3. **Pollution Prevention and Site Infrastructure:**
   - Fuelling, lubrication, and storage areas, as well as site offices, are located away from surface water features, the floor sump, and settlement lagoons.
   - All fuel tanks and refuelling activities are bunded and equipped with spill kits, with bunds designed to hold at least 110% of the tank capacity or 25% of the aggregate capacity.
   - Waste and hazardous materials are stored in designated, isolated areas with secondary containment systems, and waste oils and chemicals are stored in sealed containers.
   - Petrol interceptors are regularly maintained by licensed contractors, and visual monitoring of the quarry sump and settlement tank is conducted to prevent contamination.
4. **Water Management System:**
   - The site's established water management system consists of a quarry floor sump, settlement lagoon, oil interceptor, and infiltration area, ensuring water quality before discharge.
   - The quarry sump and settlement lagoon have sufficient capacity to manage all waters, including those from extreme rainfall events, with the void on the quarry floor acting as additional attenuation.
   - Discharge is carried out under the existing Section 4 Licence (2013), with monitoring requirements ensuring compliance with regulatory limits.
5. **Operational Practices:**
   - Excavation, machinery maintenance, and blasting follow best management practices to minimise the risk of water contamination.
   - The closed-loop water system at the concrete batching plant ensures no cement-based products enter surface waters.
6. **Stormwater and Flood Risk:**
   - The void in the quarry floor can accommodate extreme rainfall events, with additional roadside drainage installed by the OPW on the R339 to mitigate flood risks.

	○ If flooding is detected in the surrounding area, the quarry can halt licensed discharges until the floodwaters recede. ○ A site-specific Flood Risk Assessment (2025) concluded that the site does not pose a flood risk and is not vulnerable to external flooding. 7. **Restoration and Long-Term Management:** ○ Site restoration will be phased as extraction areas are completed, with final grading to harmonise with the surrounding landscape and installation of perimeter silt fences. ○ Restored areas will be vegetated to enhance stability and ecological value, with the quarry void functioning as a rainfall attenuation system that will gradually fill with water over approximately 41 years.
Climate	The Proposed Development will include the following mitigation measures: • A surfacewater management plan for the site has been prepared (refer to Environmental Report Chapter 8 - Hydrology). • All plant and vehicles regularly serviced to ensure they are running as efficiently as possible. • Strict adherence to good operational practice such as switching off plant and vehicles when not in use. • Implement Restoration plan (Appendix 3.1) to offset vegetation loss and increase net biodiversity.
Air Quality	• A Dust management plan has been prepared; refer to Chapter 10 Air Quality. • Minimise drop heights when handling materials. • Soils placed directly into screening berms or in progressive works. Avoid working in adverse/ windy conditions. • Minimise distances of onsite haul routes. • Use of water sprays / tractor & bowser to moisten surfaces during dry weather. • Restrict vehicle speeds through signage / staff training. • Location of haul routes away from sensitive receptors. • Use of road sweeper to reduce the amount of available material for re-suspension. • Existing truck wheelwash. • Existing paved access road. • Processing plant located within quarry void.

	• Limit mechanical disturbance. • Retention of hedgerows. • Existing perimeter berms. • Avoid working in adverse weather conditions. • Locate plant within quarry void, where possible.
Noise & Vibration	Best practice noise mitigation measures will form part of site management practices to ensure noise from on-site operations do not cause a noise nuisance at the nearest NSR, the following measures are recommended: • Existing screening banks and screening / planting around the facility will be retained to act as acoustic barriers. Existing / temporary berms should be inspected on a regular basis and maintained as necessary. • Regular maintenance of items of plant to ensure that they are operating efficiently; • Location of noisy items of plant at the lowest part of the working quarry floor and as close to the quarry face as possible to provide optimum noise screening; • Design of internal haul roads with as low a gradient as possible to minimise excessive revving of vehicle engines travelling on-site. • Regular maintenance of haul routes to avoid potholes and uneven surfaces; • Avoiding unnecessary revving of engines, reducing speed of vehicle movement and keeping lorry tailgates closed where possible; • All mobile equipment is throttled down or switched off when not in use; • Use of rubber linings in chutes, dumpers, transfer points etc. to reduce the noise of rock falling on metal surfaces; • Using simple baffles around washing drums, rubber mats around screening and crushing plants; • Enclosing pumps, covering conveyors, cladding the plant and keeping noise control hoods closed when machines are in use;

	• Within the constraints of efficient production, limiting the use of particularly noisy plant, limiting the number of items in use at any one time, starting plants one-by-one and switching off when not in use, and; • Pointing directional noise away from sensitive areas where possible. Operational Phase Vibration In line with best practice measures, the following will form part of the blast design process: • Laser profiling will be conducted to establish an accurate geometry of the quarry face, thereby enabling the optimum burden and spacing to be applied for the blast; • Ensure that the optimum blast ratio is maintained and the maximum amount of explosive on any one delay, the 'maximum instantaneous charge' is optimised so that the ground vibration levels are kept below those specified; • Explosive charges are properly and adequately confined by using a sufficient quality of aggregates for stemming; • No blasting is carried out at weekends or public holidays; • All blasts are measured (ground vibration & air overpressure) in the area of at least two sensitive receptors to ensure compliance with the appropriate limits; • Notice of all blasts given to local residents prior to the blast taking place; • Continue to adapt the monitoring requirements during blasting in line with existing conditions. • All monitoring equipment calibrated regularly to ensure that peak particle velocity and air overpressure generated from each blast is accurately measured; and, • Blasting is carried out by professionally trained blast engineers.
Landscape	The main mitigation measure employed in this instance is via 'mitigation by avoidance'. The proposed extraction area is contained within the existing quarrying facility, that is located in a robust and well-contained rural area that also avails of both terrain and hedgerow screening such that the proposed development will not be visually prominent within the surrounding landscape. Indeed, all works related to the proposed development will be contained within the existing site boundary and will not result in an increase in the overall extent of the existing quarry facility. In this respect, the proposed development is not perceived to impose itself on the existing landscape pattern.
Traffic	**Junction Markings Maintenance**

	Regular maintenance of road markings at the L7109/R339 junction to ensure clear visibility and guidance for road users. Includes repainting worn markings, such as stop lines, to maintain junction safety, particularly given the higher volume of HGV movements. **Signage Compliance** Installation and maintenance of appropriate warning signs to enhance road safety, including: • "Side Road Ahead" warning sign (W002L) on the westbound approach to the L7109/R339 junction for improved visibility. • "Agriculture Machinery" warning signs (W158) with supplementary "Concealed Entrance" plates (P059) on approaches to the quarry access to alert drivers of slow-moving HGVs. **Vegetation Management** Regular trimming and maintenance of vegetation near the L7109/R339 junction to ensure optimal visibility for drivers, particularly to the south where sightlines are limited by the horizontal alignment.
Material Assets	The following waste management procedure should be extended to include waste generated at the application site: A. Categorise waste according to type - hazardous/non-hazardous, recyclable, non-recyclable, compostable. B. Store waste appropriately - waste should be stored and labelled according to categorises set out above. All waste containers should be stored on a an Impermeable surface and protected from the risk of accidental leaks. C. Transport & Disposal: An appropriately licenced and trained operator should be responsible for the transport and disposal of all waste generated at the site. If hazardous waste is being disposed off, a hazardous waste Identification number must be assigned. D. Plan for emergencies: Maintain spill and appropriate emergency response equipment In an accessible area. E. Training: All employees and contractors should be trained In the waste management procedure, including the plan for emergencies. F. Keep records: Records should be kept to ensure that waste Is stored, transported and disposed of according to the procedures set out in the waste management plan.

Proposed Environmental Monitoring

17.5 Proposed Monitoring requirements are provided in Table 17.2.

Table 17-2: Proposed Monitoring: Refer to Figure 17.1 for locations

Proposed Environmental Monitoring	
General Monitoring	Environmental sampling, monitoring, and testing as required, with records maintained on-site.
Biodiversity	No specific ecological monitoring is deemed necessary during the proposed continuation and extension of the existing limestone quarry and continuance of use of the concrete manufacturing facility at Barrettspark. However, in accordance with the Peregrine Falcon Management Plan breeding surveys will be conducted in years 1, 2, 3, 5, and 10 of the development.
Dust Monitoring	Undertaken at the site with locations reviewed and revised as necessary.
Water Monitoring	Routine monitoring of Groundwater Quality and Levels and Quality on a Quarterly basis for the four Long Term Groundwater Monitoring Wells Water discharge monitoring in compliance with the Conditions of the Section 4 Licence for the site (W/469/13, 2013).
Meteorological Monitoring	Utilisation of data from Athenry weather station.
Noise & Vibration Monitoring	Carried out at the site with locations reviewed as necessary.
Stability and Settlement Monitoring	Visual inspections of quarry faces and screening berms.
Aftercare and Monitoring	2-year aftercare program for tree planting and monitoring of restoration success.

Water Quality Monitoring

17.6 With respect to groundwater monitoring, there is routine monitoring of Groundwater Quality and Levels and Quality on a Quarterly basis for the four Long Term Groundwater Monitoring Wells and that will continue. The three new MWs drilled in 2024 are not suitable locations for monitoring because there was no groundwater encountered to the -27m OD elevation at which the wells terminated The only reason it is possible to sample groundwater from the four perimeter BHs routinely monitored is because those wells terminated at depths of the reported 320 to 460ft (which is c.100 to 140m deep) and all groundwater strikes were in conduit elevation ranges of -14 to -100 mOD. Therefore, the groundwater monitored represents the groundwater flow system beneath the proposed -5m OD floor elevation. There is no groundwater in the elevation from ground level to -5m OD. Therefore, no groundwater

monitoring can be proposed additional to that which is already taking place for the deep system.

17.7 With respect to discharge monitoring, the Conditions of the Section 4 Licence for the site (W/469/13, 2013) specify monitoring and this is completed by a contracted accredited laboratory.

17.8 Monitoring measures will continue as usual and they verify whether the development is impacting on the hydrological and/or hydrogeological, and that the mitigation measures are effective.

17.9 The site's Standard Operation Management Plan addresses all potentially polluting activities and includes an emergency response procedure.

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

- EPA (2006) Environmental Management Guidelines for the Extractive Industry (Non-Scheduled Minerals).
- CIRIA, 2011. Control of Water Pollution from Construction Sites, Guidance for Consultants
- CIRIA, 2005. Environmental Good Practice on Site (C650).
- EI, 2005. Oil Storage Guidelines (BPGCS005).
- Environment Agency, 2004. UK Pollution Prevention Guidelines (PPG).

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

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

17.13 The quarry manager understands that it is part of his work and overall responsibility to ensure that all operations are carried out in such a way as to minimise potential impacts water receptors. The quarry manager is in constant communication, and works in the same office, as the operative monitoring the performances of pollution control measures adopted to ensure that the proposed development is not impacting on the environment.

Proactive Monitoring and Compliance Verification

17.14 In line with the EPA guidelines, monitoring in the context of an EIAR should be a structured process to verify that the project adheres to EIA predictions and complies with consent conditions. Monitoring should ideally commence post-consent, ensuring that the project operates as intended and allowing early detection of any unforeseen effects.

17.15 Monitoring programs should avoid excessive reliance on reactive measures, as this can unintentionally alter project operations outside the scope originally assessed. Instead, monitoring should ensure compliance with defined performance criteria, emission limits, and other operating conditions. Importantly, monitoring should not defer essential information gathering that is critical for initial project assessments and consent.

17.16 All monitoring plans should follow an "if-then" approach, specifying the triggers that would prompt remedial actions and clearly defining roles. For instance, if air quality monitoring identifies that particulate emissions exceed the specified limit, then dust suppression measures will be immediately intensified, with oversight from the developer.

17.17 In scenarios where effects continue to exceed thresholds despite intervention, the developer and consent authority may jointly assess further measures or modifications needed to restore compliance.

17.18 It is recommended to adopt the specific limits from the 2006 EPA guidelines for dust deposition, noise, vibration, and air overpressure in quarry developments. The following limits and methods, based on these guidelines, will inform the monitoring and mitigation actions to ensure compliance and minimise environmental impact:

Dust Deposition

- **Measurement Method**: The Bergerhoff Method (German Standard VDI 2119, 1972), as recommended by the EPA.
- **Dust Deposition Limit**: 350 mg/m²/day, averaged over a 30-day period, measured at site boundaries.

17.19 This limit will help control dust nuisance, with exceedances triggering enhanced dust suppression measures, such as increased watering or windbreak installation at sensitive points.

Noise

- **Measurement Periods**:
    - **Daytime (08:00 - 20:00)**: Noise levels should not exceed **55 dB(A) LAeq (1h)** at the nearest noise-sensitive receptor.
    - **Night-time (20:00 - 08:00)**: Noise levels should not exceed **45 dB(A) LAeq (1h)** at the nearest receptor.
- **Allowable Exceedance**: 95% of all measured noise levels must meet these values, with no single measurement exceeding the limit by more than 2 dB(A).

17.20 Exceedances will lead to operational adjustments such as equipment relocation, timing modifications, or the installation of additional noise barriers.

Blasting: Vibration and Air Overpressure

17.21 For blasting activities, the following Environmental Limit Values (ELVs) apply at the nearest sensitive location (e.g., residential properties):

- **Ground-borne Vibration**: Peak particle velocity (PPV) should not exceed **12 mm/s** in any of the three mutually orthogonal directions, for vibrations below 40 Hz.
- **Air Overpressure**: Should not exceed **125 dB (linear maximum peak)**, with a 95% confidence limit.

17.22 If measurements approach or exceed these ELVs, the blasting schedule or charge size will be adjusted, with further consultation with the consent authority if continued exceedances occur.

FIGURES

Notes:

Legend:

- Application Area
- Noise Monitoring Points
- Dust Monitoring Points

Coshla Quarries

Extension and continuation of use of an existing limestone quarry

Monitoring Locations

Figure 17.1

Drawn By: RB	Checked By: PK
Scale: 1:10,000	Date: January 2025

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