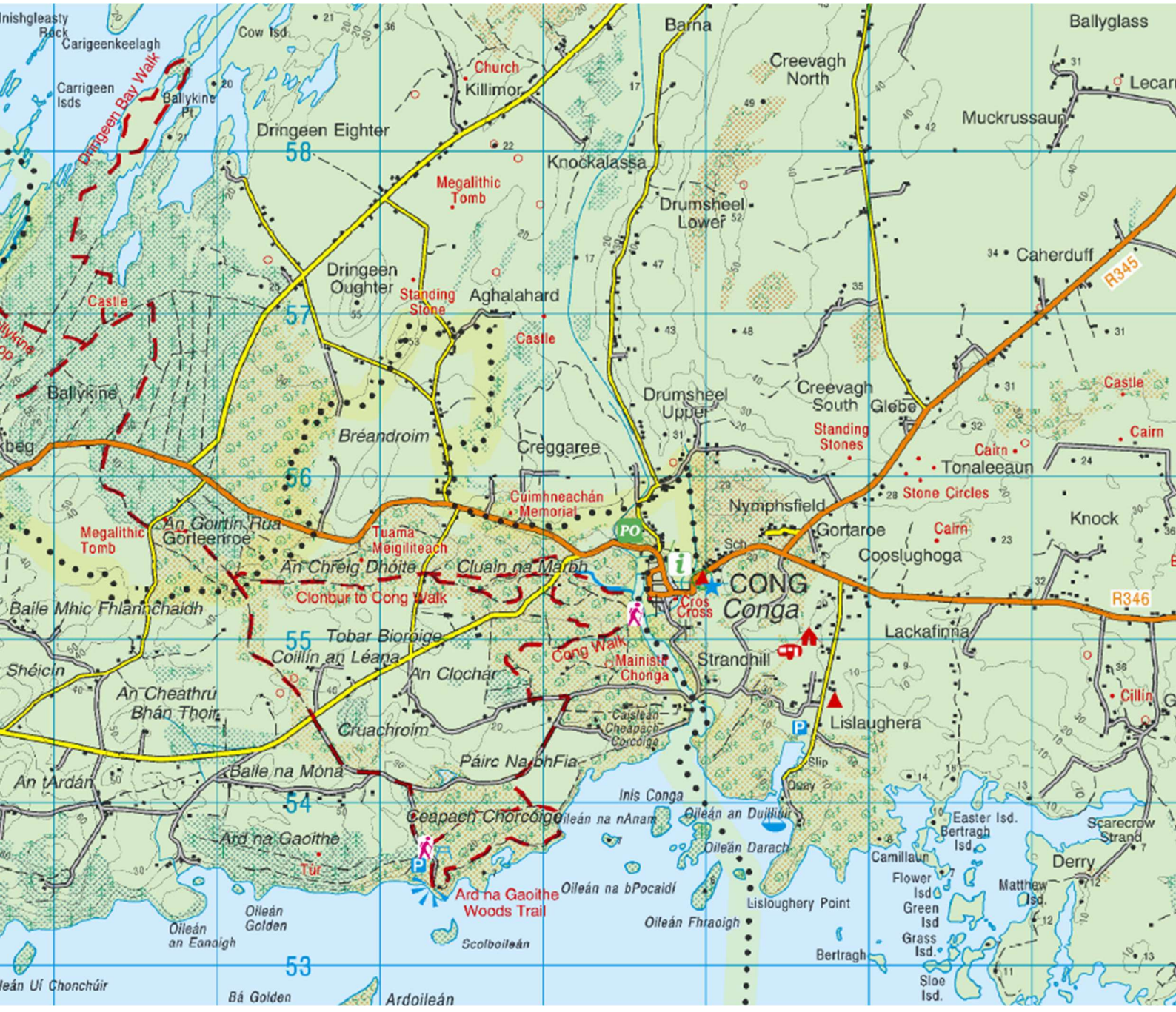
CHAPTER 17

MITIGATION AND MONITORING



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 (2022), 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	Monitoring 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.	The site will continue to operate an Environmental Management System (EMS) – ISO14001,

LSG	**Extraction of Bedrock (Long-term Stability)** • A detailed working scheme and restoration plan have been prepared. • Final quarry face angles will be assessed by a geotechnical engineer to ensure long-term stability. • The stability of restored faces in the existing quarry indicates satisfactory stability for the final quarry faces. **Extraction of Bedrock (Geological Heritage)** • Access to quarry faces for scientists to monitor new stratigraphy. • If significant geological features are exposed, arrangements will be made with the Geological Survey of Ireland (GSI) for their preservation. • The final restoration will minimise ecological and visual impacts. **Landscaping and Restoration of Residual Faces** • Restoration of land to a water-filled void as part of the planned development. • Final restoration will create a secure wildlife refuge/amenity with a water feature. • Restoration will include vegetated ledges and natural colonisation to break up exposed rock faces progressively as quarrying progresses. **Fuel Tank Failure or Large-scale Spillage (Contamination of Exposed Bedrock)** • Fuels are stored in bunds. • Refuelling and lubrication of semi-mobile plant and haulage vehicles are carried out by a trained operative. • Control measures are in place as part of standard operating procedures.	
Water	**1. Operational Phase** • **Extraction of Bedrock**: o No mitigation required as the activity is planned and aligns with existing resource extraction. • **Blasting of Bedrock**:	• **Environmental Management System (EMS)** McGraths Limestone (Cong) Ltd. operates an ISO 14001:2015 accredited EMS, ensuring effective management of all activities on-site through

	○ Blasting is controlled by industry specialists and the Gardai. ○ Nitrogen species concentrations are calculated and shown to be microscopically low, ensuring compliance with Environmental Quality Standards (EQSs) for surface water. • Use of Quarrying Machinery: ○ All fuel storage and refuelling activities are bunded. ○ Spill kits are readily available and used during refuelling and maintenance. ○ Waste materials are stored in designated, isolated areas away from surface water features. • Quarry Dewatering: ○ The dewatering process will have minimal impact on local groundwater levels, with no significant effects on third-party wells or spring flows. ○ All discharged waters are managed under a Section 4 licence. • Use of Settlement Ponds: ○ Existing settlement ponds are maintained to remove particulate matter from water before it leaves the site. ○ Regular monitoring and discharge conditions are managed under the Section 4 licence. • Use of Wheelwash: ○ Wheelwash facilities are maintained to prevent the migration of suspended solids to surface waters. • Use of Hydrocarbon Interceptors: ○ Infrastructure for managing hydrocarbons is already in place, with regular monitoring and maintenance to prevent contamination of surface waters. • Pumped Discharge of Quarry Waters:	comprehensive Standard Operating Procedures (SOPs). • Groundwater Monitoring Routine monitoring is carried out on groundwater quality and levels at four Long-Term Groundwater Monitoring Wells, with monthly reports to track conditions. • Discharge Monitoring As per the conditions of the Section 4 Licence (W/391/05_R1, 2019), the site conducts continuous monitoring of discharge parameters including pH, temperature, turbidity, flow, and electrical conductivity. Weekly reports are sent to Hydro-G, and spot sampling is conducted for discharge quality to ensure compliance with Environmental Limit Values (ELVs), with results analysed by an accredited laboratory. Additionally, upstream and downstream Cong Canal river water is sampled to assess assimilation capacity in receiving waters. • Mitigation Effectiveness Ongoing monitoring verifies that the development has no adverse impact on the hydrological and hydrogeological environment, and that mitigation measures are effective in controlling potential impacts. • Emergency Response & SOPs The site has an Emergency Response Procedure and a Standard Operation Management Plan to address potentially polluting activities, with all personnel trained to implement these procedures. The plan follows international best practices, including EPA guidelines, CIRIA standards, and UK Pollution Prevention Guidelines.

	○ The quarry has sufficient capacity to manage extreme rainfall events, reducing the risk of flooding and deterioration of water quality. • Use of Concrete Batching Plant: ○ The concrete batching plant operates a closed-loop water system, preventing the discharge of cement-based products into surface waters. 2. Restoration Phase • Removal of Plant and Machinery: ○ No mitigation required for the removal of semi-mobile and mobile plant. ○ Dismantling and removal of fixed plant and machinery are positive steps to eliminate hydrocarbon sources. • Landscaping and Stockpile Management: ○ Perimeter silt fences will be installed to prevent sediment migration. ○ Vegetation will be used to enhance stability and prevent soil erosion. • Cessation of Pumping & Discharge: ○ Groundwater levels will return to baseline levels, reducing flood risk and ensuring ecological benefits through the creation of open waterbodies. 3. Unplanned Events • Major Spillage: ○ Spill kits are available, and bunded storage areas will be used to prevent hydrocarbon contamination of surface waters and groundwater. • Fire: ○ Contaminated firefighting water will be contained and disposed of by a licensed contractor. • Intense Rainfall Events:	• Infrastructure Maintenance Hydrocarbon and silt interceptors are regularly maintained by an independent licensed contractor. Inspections of infrastructure such as settlement ponds, hardstanding areas, and drainage systems are conducted by a designated person to ensure functionality and prevent pollution. • Site Management Oversight The quarry manager is responsible for ensuring operations minimise environmental impacts, particularly on water receptors. The manager is in constant communication with the pollution control operative to ensure effective implementation of monitoring and mitigation measures.

	○ The quarry floor can accommodate high rainfall volumes, and pumps will be shut off to prevent flooding during storm events.	
Climate	**Flooding Risks** Flooding due to rising groundwater levels and extreme rainfall events could result in asset damage and loss of containment of hazardous substances. However, the site has the following mitigation measures in place: • **Water Management System:** The site is equipped with an effective water management system designed to accommodate extreme rainfall events, with sufficient capacity to handle increased discharge rates as anticipated due to climate change. The system has a daily discharge limit of 10,000 m³/day, with the average daily discharge at 2,145 m³/day and a peak of 7,347 m³/day recorded in January 2024 (Chapter 8 – Hydrology). • **Flood Risk Management:** According to Chapter 8 – Hydrology, no flood risk is presented by the development proposal. **High Wind Speeds Risks** Severe winds may cause accidents due to windblown debris. The mitigation measures include: • **Geotechnical Design Standards:** The development will be designed in accordance with appropriate geotechnical design standards to withstand wind forces on systems and structures. **Lightning Risks** Lightning strikes could cause fires, equipment damage, and harm to people. Mitigation measures include: • **Safety in Design:** The development will adhere to relevant safety codes, standards, and directives to ensure protection against lightning risks. This includes measures to prevent fires and minimise the risk to both on-site and off-site personnel.	**Monitoring Fuel Consumption and CO2 Emissions** The quarry will monitor fuel consumption for all on-site machinery and transport, estimating CO2 emissions to identify opportunities for improving fuel efficiency and reducing emissions. Regular reviews will ensure that fuel consumption and CO2 emissions remain within acceptable limits. **Periodic Carbon Footprint Analysis** A periodic carbon footprint analysis will be conducted to assess the total greenhouse gas emissions from the quarry, including direct emissions from fuel use and indirect emissions from electricity and transport. This analysis will help identify opportunities for reducing emissions and improving sustainability.

	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.	
Air Quality	**Excavators/HDV** • Minimise drop heights when handling materials. • Avoid working in adverse/windy conditions.	Monitor dust levels with Bergerhoff gauges.
	Onsite Vehicles • Minimise distances of onsite haul routes. • Use water sprays / tractor & bowser to moisten surfaces during dry weather. • Restrict vehicle speeds through signage and staff training. • Location of haul routes away from sensitive receptors.	
	Road Vehicles (Transfer Offsite) • Use of road sweeper to reduce the amount of available material for re-suspension. • Existing paved access road and wheelwash (with side and overhead spray bars).	
	Stockpiles • Locate stockpiles within the quarry void. • Limit mechanical disturbance.	
	Processing Plant • Retention of hedgerows. • Existing landscaped perimeter berms (approx. 8m high). • Avoid working in adverse weather conditions. • Locate plant within quarry void. • Screening berms seeded and planted.	

Noise & Vibration	• A barrier with a minimum height of 5 to 6 meters has been constructed around the development area and proposed quarry activities. • All main noise sources (crushing systems, screening, conveyors, washing, concrete batching plant, blocking plant, asphalt plant, lime plant, trucking, and extraction) are located on the quarry floor, which provides a significant acoustic barrier with attenuation effects of over 20dBA at multiple points. The asphalt plant is housed. • Rubber lining has been installed on all transfer points of the crusher/screener systems, and several crushers and conveyors are housed. • Motors and pulleys are regularly maintained to avoid tonal or impulsive noise emissions. • All mobile plant on-site are equipped with well-maintained silencers. • Machinery is throttled down or turned off when not in use. • Several crushers and conveyors are housed inside Kingspan sheeting. • Pre-blasting management procedures, loading management procedures, and blasting management procedures are consistently followed by experienced contractors. • Blasts are conducted only between 11:00 hrs and 16:00 hrs, Monday to Friday. No blasting occurs on weekends or bank holidays. • Prior to drilling any blast, face profiling or a trigonometric bench height measurement is carried out for all blasts. • The position of boreholes and the blast number are marked on the ground as per the approved blasting plan. • A blasting plan is issued by the blasting manager for agreement with the driller and blasting manager prior to drilling.	Regular noise monitoring at sensitive receptors (residential properties, schools). Monitor vibration levels.

	• Only certified personnel with appropriate qualifications operate the blasting programs. • A driller's log is maintained at all times. • A site-specific scale distance regression is continuously developed as blasting progresses over the quarry's lifespan. • Monitoring locations for ground vibration and air overpressure are agreed upon before each blast, with monitoring data used to adjust blast parameters if needed. • All seismographs are calibrated and certificates are maintained for each seismograph. • Residents are given a 24-hour advance warning of any blasting. • The maximum instantaneous charge (MIC) is optimised to keep ground vibration levels within regulatory limits. • Explosive charges are properly confined using angular chippings and/or a combination of chippings and plugs. • Face surveys and accurate placement of explosives ensure proper confinement of charges. • Overcharging is avoided by calculating charge weight based on depth, burden, and spacing. • Exposed detonating cords are not used on the surface. • The initiation sequence is designed to progress away from sensitive locations and structures. • Powder and energy factors are chosen to ensure safety, confinement, and productivity. • Borehole deviation studies are conducted to minimise potential deviations. • Only necessary sub-drilling (1 to 1.5 m) is used to achieve optimal breakage, avoiding excessive sub-drilling. • Decked charges are used when necessary to reduce the MIC.	
Landscape	• **Site Selection**: The proposed development is sited within an existing quarry to avoid environmental impacts associated with the development of a new site without a history of excavation.	

	This approach minimises new land disturbance and utilises an already disturbed area. • **Screening Berms**: The existing screening berms along the perimeter of the proposed extraction area will be retained to help mitigate noise, dust, and visual impacts. Additionally, any gaps in the existing vegetation along the perimeter will be filled in to enhance the effectiveness of the screening. • **Stockpile Redistribution**: Upon completion of extraction, any existing overburden piles will be redistributed within the quarry floor to facilitate the restoration process. This will help ensure the area is restored efficiently and in line with environmental goals.	
Traffic	1. Operational Phase The following mitigation measures have been and will be implemented to minimise the impacts of the proposed project: • Car Parking: Sufficient car parking spaces are provided within the quarry for current staff levels, ensuring no additional parking demand on the public road network. • Access and Traffic Management: Adequate space has been provided between the R345 carriageway edge and the gates at the site to accommodate 1 LV clear of by-passing traffic, maintaining smooth traffic flow and safety. • Pedestrian Facilities: Safe pedestrian facilities are provided within the quarry in line with the quarry's Health and Safety Plan. • Visibility and Signage: Existing visibility splays and a “Caution Quarry Entrance Ahead” sign will be maintained. Regular clearance of shrubs will be undertaken to ensure clear signage. • Dust Control: Quarry products loaded onto open-back trucks using wheel loaders will be covered where necessary to reduce dust emissions.	

	• Wheel Wash: An existing wheel wash located within the quarry will be maintained and used to reduce dust and material carry-out. **2. Decommissioning Phase** The following mitigation measures will be implemented during the decommissioning phase: • Car Parking for Decommissioning Staff: Sufficient car parking will be provided for staff associated with the decommissioning works. • Local Sourcing of Materials and Plant: Materials and plant will be sourced locally to reduce road traffic impacts and minimise environmental impacts.	
Material Assets	The following waste management procedure should be extended to include waste generated at the application site: • **Categorisation of Waste**: Waste should be categorised according to type – hazardous/non-hazardous, recyclable, non-recyclable, and compostable. • **Waste Storage**: Waste should be stored and labeled according to categories, ensuring all waste containers are stored on an impermeable surface and protected from accidental leaks. • **Waste Transport and Disposal**: An appropriately licensed and trained operator should handle the transport and disposal of all waste. Hazardous waste disposal should include assigning a hazardous waste identification number. • **Emergency Response Planning**: Spill and emergency response equipment should be maintained in an accessible area. • **Training**: All employees and contractors should be trained in the waste management procedure, including emergency response planning. • **Record Keeping**: Records should be kept to ensure waste is stored, transported, and disposed of according to the procedures set out in the waste management plan.	

17.5 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.

17.6 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.

17.7 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.

17.8 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.

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.
Dust Monitoring	Undertaken at the site with locations reviewed and revised as necessary.
Water Monitoring	Implementation of an Environmental Management System (EMS) for water sampling.
Meteorological Monitoring	Utilisation of data from Claremorris weather station.
Noise 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	5-year aftercare program for tree planting and monitoring of restoration success.

17.9 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:

- **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.

17.10 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).

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

Blasting: Vibration and Air Overpressure

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.

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

Figure 17.1: Monitoring Locations