

14.0 MITIGATION AND MONITORING MEASURES

14.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) has been prepared by Golder Associates Ireland Ltd (Golder) for the L Behan Aggregates and Recycling Ltd (LBAR) Section 37L Application (of the Planning and Development (Amendment) (No. 2) Regulations 2015) to An Bord Pleanála, (ABP). The Application has been made for the proposed quarrying activities (the Proposed Development) located at the lands at Windmillhill, south of Rathcoole in South Dublin (the Site).

The purpose of this chapter is to collate the mitigation and monitoring measures identified in the EIAR that are considered necessary to protect the environment during the continued extraction and restoration phases of the Proposed Development.

The design of the Proposed Development takes environmental constraints and considerations into account, with embedded mitigation a fundamental component of the design that enables many potential environmental impacts to be avoided entirely. Where environmental impacts cannot be avoided by embedded mitigation, additional mitigation and monitoring measures have been recommended in the EIAR. These are collated and presented in this chapter.

The EIAR Project Team contributed to the compilation of this chapter.

14.2 Mitigation Measures

Mitigation and environmental commitments have been identified as general requirements which will help to avoid, reduce or offset potential impacts and are relevant to a number of the environmental aspects addressed in the EIAR.

General environmental mitigation measures specified within the EIAR are provided in Table 14.1.

Specific mitigation measures specified within the EIAR technical assessments are provided in Table 14.2 to Table 14.12 below.

The timing of the implementation of the mitigation measures is indicated within the tables as:

Operational Phase: During the ongoing continued extraction at the Proposed Development, (10-15 years, medium-term); and

Restoration Phase: The undertaking of the physical works to fully restore the extracted site upon cessation of extraction activities, (2-5 years, short-term).

The term of duration has been identified in accordance with the 'Guidelines on the information to be contained in environmental impact assessment reports', published in 'draft' by the Environmental Protection Agency (EPA) in August 2017.

14.3 Monitoring Measures

A number of environmental monitoring activities are to be continued during the operational and restoration phases. These monitoring activities are required to confirm the effectiveness of the mitigations, to define the quality of the surrounding environmental, and to establish if there are any trends in environmental parameters.

Environmental monitoring requirements have been identified in the specific chapters of the EIAR. The frequency of these monitoring requirements have been collated and provided in a schedule displayed in Table 14.13.

Table 14.1: General Environmental Mitigation Requirements

Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
GM1	<p>The Applicant will implement the Environmental Management Plan (EMP) at their Site. The purpose of the system is to:</p> <ul style="list-style-type: none"> ■ Minimise the environmental impact of the operation. ■ Ensure compliance with environmental legislation. <p>The EMP contains the mitigation measures and plans identified in the EIAR, and the following Sections. LBAR shall incorporate into the EMP and implement the conditions set out in the planning approval. The EMP shall set out all the intended methods to manage potential environmental impacts from the operation and restoration of the Proposed Development. The EMP is a live document and will be reviewed on a regular basis and updated accordingly by LBAR, in particular the document shall be reviewed on receipt of planning approval in accordance with the relevant planning conditions.</p>	Operational and Restoration Phase
GM2	<p>The key elements of the EMP that will be updated accordingly throughout the duration of the Proposed Development include: Appointment of and maintenance of an Environmental Officer by LBAR for the duration of the activities. The documentation and record of any environmental incidents on Site, and the actions taken for implementing appropriate corrective and preventative measures. The review and application of relevant guidance that have inform the environmental performance of the Proposed Development. Ongoing training of environmental awareness for all staff. The documentation, compilation and review of environmental monitoring results. Periodic review of the EMP.</p>	Operational and Restoration Phase
GM3	<p>The appointed Environmental Officer shall ensure that the EMS is fully implemented during the operation and restoration phases in agreement with South Dublin County Council (SDCC), to prevent or reduce the impacts identified in the impact assessment.</p>	Operational and Restoration Phase
GM4	<p>The Applicant will implement the Restoration Plan at their Site. This plan will identify the methods by which the restoration works will be managed to meet these commitments and requirements. The Restoration Plan will be carried out in accordance with the provisions of the EMP.</p>	Operational and Restoration Phase
GM5	<p>The appointed Environmental Officer shall ensure that the Restoration Plan is fully implemented during the restoration phase in agreement with SDCC, to ensure that the Site is restored in the interest of environmental sustainability, visual amenity, traffic safety, adjoining residential amenity, and proper planning and sustainable development of the area..</p>	Restoration Phase
GM6	<p>NOTE: Any further general environmental mitigation measures within authorisation or consents to be included in this section and adhered to.</p>	Operational and Restoration Phase

Table 14.2: Specific Environmental Mitigation Requirements – Population and Human Health

Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
PHH1	<p>Population Nuisance to the local population from noise, vibration, dusts, landscape and visual impacts, and impacts to groundwater and surface waters will be mitigated during the operation at the Proposed Development as per the specific mitigation measures and best practices identified in the respective chapters of the EIAR, (Land, Soils and Geology (Chapter 5), Water (Chapter 6), Air Quality and Climate (Chapter 7), Noise and Vibration (Chapter 8); Traffic (Chapter 11) and Landscape and Visual (Chapter 10)). A revised EMP will be developed for the Site in line with further conditions resulting from the grant of planning permission for the Site. The EMP shall provide provisions for the mitigation of nuisance and the management of the Site in respect to the local environment and local population.</p>	Operational and Restoration Phase
PHH2	<p>Employment and Economic Factors Employment and other economic factors related to the proposed continuation have been determined to have beneficial impacts, therefore no mitigation measures are proposed for the operation and restoration of the proposed development.</p>	Operational and Restoration Phase
PHH3	<p>Amenity Nuisance to the local amenity and recreation areas from noise, vibration, dusts and traffic will be mitigated during the operation. Specific mitigation measures and best practices have been discussed in the respective chapters of the EIAR, Air Quality and Climate (Chapter 7), Noise and Vibration (Chapter 8) and Material Assets (Chapter 12).</p>	Operational and Restoration Phase
PHH4	<p>Land Use There are no specific mitigation measures identified in relation to Land Use.</p>	Operational and Restoration Phase
PHH5	<p>Human Health, and Health and Safety Good environmental practice for water, air, and noise and vibration management have been specified in the Water, Air Quality and Climate, and Noise and Vibration chapters of the EIAR. Measures will be detailed in the EMP and followed during the operation and restoration at the Site.</p>	Operational and Restoration Phase
PHH6	<p>Air - Fine particulates such as PM_{2.5} and PM₁₀ have a potential for negative effects on human health and may arise primarily from vehicle emissions. Of these finer particulates, the IAQM (2016) guidance states that quarries are more likely to experience suspended dust in the sub-coarse fraction (PM₁₀-PM_{2.5}) as opposed to the fine (PM_{2.5}) fraction. The suspension of fine particulates will be managed through the same mitigation measures employed for the management of deposited dust, (See Table 14.6).</p>	Operational and Restoration Phase
PHH7	<p>Water – For the protection of groundwater and local wells, it is proposed that the mitigation measures (See Table 14.5) which are currently in place at the Site are continued into the future.</p>	Operational and Restoration Phase
PHH8	<p>Noise and Vibration - Noise and vibration from the Site can also have indirect impacts to surrounding residential developments</p>	Operational and Restoration Phase

Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
	through annoyance and effects on mental health. Blasting takes place in the quarry in order to extract rock. If managed incorrectly this activity has the potential to impact off-site sensitive receptors and damage property. It is proposed that the mitigation measures (See Table 14.7 and Table 14.8) which are currently in place at the Site are continued into the future.	
PHH9	<p>Health and Safety - The predominant health and safety concerns for the human environment relates to the possibility of humans and livestock straying into the quarry area and from blast related activity at the Site. To mitigate against such events the following are in place at the Site:</p> <ul style="list-style-type: none"> ■ Fencing will continue to be actively maintained at the Site to ensure that the risk of injury to civilians and livestock is minimised. The entrance gate will continue to be locked and controlled by the sites' management; ■ Exposed edges in the proposed extension will be appropriately protected with safety berms. These edges will also be sign-posted appropriately to identify any potential hazard; and ■ Blasting will take place at the Site using licenced and experienced operators, (See Table 14.8). 	Operational and Restoration Phase
PHH10	Health and Safety Training - The applicant is committed to providing appropriate information, training and supervision to employees who will be operating at the Application Site.	Operational and Restoration Phase
PHH11	Site Personal Protective Equipment - All site employees, contractors and subcontractors are required to wear a minimum personal protective equipment (PPE) whilst on-site, these are steel toed boots and a high visibility jacket or vest. Other task specific PPE which will be used at the Application Site include, safety glasses/goggles, hard hats, gloves and hearing protection.	Operational and Restoration Phase
	NOTE: Any further mitigation measures related to Population and Human Health detailed within authorisation or consents to be included in this section and adhered to.	Operational and Restoration Phase

Table 14.3: Specific Environmental Mitigation Requirements – Ecology and Biodiversity

Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
EB1	<p>Hydrocarbons/Chemical Safeguards & Protection of Site water</p> <p>Proposed mitigation measures are outlined as follows (these are already implemented at the existing quarry Site):</p> <ul style="list-style-type: none"> ■ All soil / overburden stockpiles will be covered (i.e. vegetated) to minimise the risk of rain / wind erosion; ■ Restoration of topsoil and overburden will be carried out on a phased basis to speed up restoration biodiversity value as defined in the restoration plan; ■ All plant and machinery will continue to be regularly serviced before being used on Site; ■ Mobile plant fuelling will take place in a designated area of the Site with appropriate drip trays/nappies in place. Static plant or tracked excavators will refuel over a drip tray with an absorbent mat. In addition, spill kits will be maintained on site to deal with all spills and leaks, and spill training will be provided to relevant staff members; ■ Mobile bowsers, tanks and drums will be stored in secure, impermeable storage areas away from open water; ■ Fuel and oil containers will be stored within a secondary containment system, e.g. bunds for static tanks or a drip tray for mobile stores; ■ Containers and bunding for storage of hydrocarbons and chemicals will have a holding capacity of 110% of the volume to be stored; ■ Fuel and oil stores including tanks and drums will be regularly inspected for leaks and signs of damage; ■ Drip-trays will be used for fixed or mobile plant such as pumps and generators to retain oil leaks and spills; ■ Only designated trained operators will be authorised to refuel mobile plant on Site; ■ Procedures and contingency plans will be set up to deal with emergency accidents or spills; and, ■ An emergency spill kit (including absorbers) will be available for use in the event of an accidental spill on the quarry floor and key personnel trained in their use. 	Operational and Restoration Phase
EB2	<p>Protection of Retained Habitat</p> <p>To protect retained hedgerows and trees, such vegetation will be protected with secure fencing prior to the commencement of extractive works on Site. This protection will be designed following NRA guidance (NRA, 2005), in particular, with regard to root protection areas and fencing specifications (unless otherwise advised by a suitably qualified arboriculturalist). Dust suppression will be implemented in accordance with best practice guidance (CIRIA, 2016).</p>	Operational and Restoration Phase
EB3	<p>Habitat Compensation</p> <p>Planting will be required to mitigate for required tree and hedge removal and a restoration plan will require replacement of any trees and shrub species removed on a “like for like” basis (as a minimum). Consideration will be given towards hawthorn, blackthorn mix with individual alder and birch (to form native tree hedges) and deciduous trees (native tree species include oak, alder, birch). Full details are provided in the accompanying restoration plan.</p>	Operational and Restoration Phase

Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
EB4	<p>Mammals</p> <p>Bat activity surveys including passive monitoring will be undertaken for a minimum of five nights and emergence surveys at structures identified with potential to host roosting bats (B_01 to B_03) will also be undertaken. Transect surveys will be carried out at emergence and/or re-entry to gather information on bat activity and to identify any activity which may indicate the presence of a roost or key commuting routes.</p> <p>Monitoring will be carried out to understand the ecological context and significance of the identified main badger sett and the impact of further loss of badger foraging habitat, including a bait marking study. A camera trap survey at the sett will be carried out (under appropriate license) to seek to determine if breeding is occurring within the sett.</p>	Operational and Restoration Phase
EB5	<p>Birds</p> <p>A breeding bird (including Peregrine Falcon) survey for the Site is currently being undertaken. Preliminary results indicate that a female Peregrine is again at the Site sat on eggs. The result of this work will form the basis of a Peregrine falcon management and monitoring plan for the Site.</p>	Operational and Restoration Phase
EB6	<p>Invasive Species</p> <p>Measures will be implemented throughout Site works to safeguard against the spread of any invasive non-native species (such as buddleia, cotoneaster, Japanese knotweed or rhododendron). Indeed, where possible such plants will be removed from the Site (and disposed of appropriately, following an appropriate method statement). As such, an invasive species survey will be undertaken within the appropriate window for this type of work which is likely to be within the growing season (April to September inclusive).</p>	Operational and Restoration Phase
EB7	<p>NOTE: Any further mitigation measures related to Ecology and Biodiversity detailed within authorisation or consents to be included in this section and adhered to.</p>	Operational and Restoration Phase

Table 14.4: Specific Environmental Mitigation Requirements – Land, Soils and Geology

Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
LSG1	If evidence of previously unidentified potential contamination (either visual or olfactory) is identified during works, construction good practice and management procedures will be followed that may include investigation and assessment works	Operational and Restoration Phase
LSG2	The management of the existing quarry faces, and silt ponds will be in accordance with the Health and Safety Authority's <i>'Guidelines to the Safety, Health and Welfare at Work (Quarries) Regulations 2008, (as amended),</i> and the recommendations of geotechnical appraisals carried out on site	Operational and Restoration Phase
LSG3	The Applicant will maintain a Complaints Register. This register will record complaints of an environmental nature related to the operation. In each entry the Applicant will record the date and time of the complaint, the name of the complainant (if provided), and will give details of the nature of the complaint. A record shall also be kept of any response made in the case of each complaint	Operational and Restoration Phase
LSG4	NOTE: Any further mitigation measures related to Land, Soils and Geology detailed within authorisation or consents to be included in this section and adhered to.	Operational and Restoration Phase

Table 14.5: Specific Environmental Mitigation Requirements – Water

Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
W1	Sludge from the wheel washes should be collected and disposed of correctly, if there are any concerns over potential contamination in the sludge, this should be tested to determine an appropriate disposal route. Wastewater from the wheel washes should be discharged via the on-site hydrocarbon interceptor.	Operational and Restoration Phase
W2	Vehicles and plant on Site will be well maintained, vehicle check should be carried out to assess the condition, fuelling should take place in the refuelling area with appropriate drip trays/ nappies.	Operational and Restoration Phase
W3	Maintenance of vehicles and plant on site should be carried out on hardstanding in the refuelling area where the hydrocarbon interceptor is located.	Operational and Restoration Phase
W4	An emergency spill kit (including absorbers) will be available for use in the event of an accidental spill on the quarry floor and key personnel trained in their use.	Operational and Restoration Phase
W5	Any disused / redundant boreholes on the site should be properly decommissioned as to not pose additional potential pathways for surface contamination to reach the groundwater table.	Operational and Restoration Phase
W6	Discharges to the on-site culvert should be further delineated to determine the flow path once it has been discharged from the Site and joined the M7 roadway drainage system.	Operational and Restoration Phase
W7	Welfare facilities and septic tanks will continue to be well maintained to reduce the potential for leaks.	Operational and Restoration Phase
W8	Dewatering and pumping from the quarry pits should be kept to a minimum (volume and duration) to avoid changes to the groundwater elevation and flow direction and to further protect the supply for other water users.	Operational and Restoration Phase
W9	Bottled water should continue to be used for drinking water on-site	Operational and Restoration Phase
W10	Establish an Environmental Management Plan (EMP) for the Site and establish good record keeping of incidents and water use including pumping rates during future activities	Operational and Restoration Phase
W11	Berms constructed of topsoil and overburden should be covered until vegetation is established to minimise the risk of rain/wind erosion and sediment loading of quarry ponds.	Operational and Restoration Phase
W12	Stockpiles on the floor of the quarry area should be covered to minimise the risk of rain/wind erosion and potential migration of material, if storage in this area is for long time periods (i.e. not temporary)	Operational and Restoration Phase

Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
W13	The Silt ponds should be inspected regularly for signs of any hydrocarbon contamination or for structural defects that may cause a leak of material or collapse of infrastructure;	Operational Phase
W14	Material in the silt ponds should be tested to ensure no contamination is present prior to reworking during the restoration phase. If any contamination is present the material should be removed from site using an appropriate disposal route rather than reworked.	Restoration Phase
W15	Bi-annual groundwater monitoring shall be undertaken to ensure that no off-site pollution of groundwater water is occurring. This will include measurements of groundwater levels and groundwater quality.	Operational and Restoration Phase
W16	Monthly water quality monitoring of the discharge water will be undertaken to ascertain the quality of the water exiting the Site.	Operational Phase
W17	Daily records will be kept of on-site abstraction, water usage and discharge volumes.	Operational Phase
W18	Waste production on-site should be minimised and all residual waste is handled in accordance with relevant legislation and is removed from the Site by licensed hauliers	Operational and Restoration Phase
W19	All plant and machinery utilised will continue to be regularly serviced and maintained. This regular servicing and inspection of machinery will reduce the risk of leakages from plant and machinery impacting ground conditions.	Operational and Restoration Phase
W20	NOTE: Any further mitigation measures related to Water detailed within authorisation or consents to be included in this section and adhered to.	Operational and Restoration Phase

Table 14.6: Specific Environmental Mitigation Requirements – Air Quality and Climate

Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
AQC1	Dust monitoring will continue to be carried out monthly at the designated monitoring locations, however their exact locations may change as excavation progresses. These will be repositioned within the site boundary at the closest location to the relevant sensitive receptor;	Operational and Restoration Phase
AQC2	The timing of operations will be optimised in relation to meteorological conditions, for example overburden/topsoil will not be stripped during dry periods to reduce potential dust emissions;	Operational and Restoration Phase
AQC3	Material in outdoor stockpiling will be located within the quarry floor to take advantage of shelter from the wind to minimise dust erosion;	Operational and Restoration Phase
AQC4	Overburden mounds will be seeded to eliminate wind-blown dust;	Operational Phase
AQC5	Safety/screening berms will remain 2 m high and 2 m wide, and seeded to eliminate wind-blown dust;	Operational Phase
AQC6	A water bowser will be available on Site for dust suppression/dampening to minimise dust blow during working hours;	Operational and Restoration Phase
AQC7	Conveyors will remain partially enclosed where possible	Operational Phase
AQC8	Crushing and screening equipment are fitted with dust suppression systems;	Operational Phase
AQC9	Plant will be regularly maintained;	Operational and Restoration Phase
AQC10	On site speed restrictions (<15 kph) will be maintained in order to limit the generation of fugitive dust emissions; and	Operational and Restoration Phase
AQC11	All vehicles exiting the existing site will exit through the existing wheel-wash.	Operational and Restoration Phase
AQC12	Emissions monitoring of the asphalt manufacturing plant should be undertaken to provide an indication of the actual impact of the plant. There is currently no actual monitoring data available for the plant.	Operational Phase
AQC13	Emissions from vehicles during the extraction and restoration phases of quarrying activities can add to the receiving air environment. With regards to climate impacts, it is anticipated that CO ₂ will be emitted from vehicle exhausts during the construction, operational and restoration phases of existing and proposed development. As CO ₂ is a key gas linked to climate change, the following mitigation measures will be put in place to limit vehicle and plant emissions from the mining activities:	Operational and Restoration Phase
AQC14	No vehicles or plant will be left idling unnecessarily;	Operational and Restoration Phase

Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
AQC15	Vehicles and plant will be well maintained. Should any emissions of dark smoke occur (except during start up) then the relevant machinery will be stopped immediately, and any problem rectified before being used;	Operational and Restoration Phase
AQC16	Engines and exhaust systems will be regularly serviced according to the manufacturer's recommendations and maintained to meet statutory limits/opacity tests; Full loads used in road haulage in order to minimise the carbon footprint per load of exported materials; and	Operational and Restoration Phase
AQC17	Minimising the double handling of materials.	Operational and Restoration Phase
AQC18	Carbon release from the progressive stripping of soil and overburden will be minimal, however it's contribution to carbon emissions is noted. Overburden will be stockpiled on the quarry site within the screening berms, which will be planted. Coupled with the ecological screening areas set aside, the perimeter berms will ensure that the carbon loss through soil stripping is neutral. In addition, during extraction of greywacke, excess topsoil and overburden generated will be used in the progressive restoration of worked-out areas.	Operational Phase
AQC19	Soils stripping during wetter periods will also ensure that carbon losses are reduced compared with warmer drier periods.	Operational Phase
AQC20	NOTE: Any further mitigation measures related to Air Quality detailed within authorisation or consents to be included in this section and adhered to.	Operational and Restoration Phase

Table 14.7: Specific Environmental Mitigation Requirements – Noise

Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
N1	A noise monitoring programme will be maintained at N1 bi-annually. This will determine compliance with threshold noise levels specified in the EPA Guideline Document for Extractive Industries (2006), and the Irish Concrete Federation Environmental Code (2 nd Edition, 2005)	Operational and Restoration Phase
N2	Site activities will only take place during the permitted hours of operation and will be monitored to determine compliance with the conditioned noise limits. There will be no activities on site on Sundays or Public Holidays;	Operational and Restoration Phase
N3	Perimeter screening berms will be constructed along the boundaries of the proposed extended operational area to reduce noise propagation beyond the quarry boundary;	Operational and Restoration Phase
N4	All haul roads will be kept clear and maintained in a good state of repair to minimise noise from rattling and bouncing of mobile plant;	Operational and Restoration Phase
N5	Heavy goods vehicles entering and leaving the quarry will have tailgates securely fastened;	Operational and Restoration Phase
N6	Plant will be operated in a proper manner with respect to minimising noise emissions, e.g. minimisation of drop heights, no unnecessary revving of engines, plant used intermittently not left idling;	Operational and Restoration Phase
N7	Plant will be subject to regular maintenance, i.e. all moving parts kept well lubricated, the integrity of silencers and acoustic hoods maintained;	Operational and Restoration Phase
N8	Internal haul roads will be designed so as to have as low a gradient as possible so as to minimise excessive revving of vehicle engines on-site;	Operational and Restoration Phase
N9	The use of vehicle horns will be discouraged during the daytime period and is banned during the early morning periods before 10:00;	Operational and Restoration Phase
N10	Out of hours activity (where permitted by the local authority) will only include the loading of trucks from stockpiles and the operation of the asphalt plant, which are relatively low noise activities. Quarry operations such as blasting, excavation or crushing will not occur outside normal operating hours;	Operational Phase
N11	10 kmph speed limit on access road;	Operational and Restoration Phase
N12	All site plant, machinery and vehicles will shut down when not in use;	Operational and Restoration Phase

Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
N13	All pneumatic rock breakers will be fitted with dampeners;	Operational Phase
N14	Pumps and mechanical static plant will be housed in acoustic enclosures;	Operational Phase
N15	Drop heights for materials will be minimised; and	Operational and Restoration Phase
N16	Low noise level reverse warning alarms consistent with site safety to be utilised.	Operational and Restoration Phase
N17	NOTE: Any further mitigation measures related to Noise detailed within authorisation or consents to be included in this section and adhered to.	Operational and Restoration Phase

Table 14.8: Specific Environmental Mitigation Requirements – Vibration

Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
V1	Blast events will be conducted by an approved blasting contractor in accordance with best practice in this field, and potential impacts associated with the activity will therefore be minimised.	Operational Phase
V2	The use of delayed blasting techniques whereby each blast event takes place in a series of timed small blasts rather than a single large blast will be employed to minimise vibrations in the rock body.	Operational Phase
V3	All shot holes will be drilled to exact specifications by specialist contractors. Any features encountered during drilling such as cavities or soft material will be recorded by the drilling contractor and this information will be subsequently passed on to the shot-firer so that the correct charge will be used. This will ensure safe and efficient blasting of the rock face.	Operational Phase
V4	In addition to implementing the necessary blast specifications, the quarry operator will provide appropriate advance warning of blasts to neighbouring residents, undertake required environmental monitoring and record any complaints arising, as detailed below.	Operational Phase
V5	A warning sign will be posted at the quarry entrance on the day of each blast and will be removed following each blast;	Operational Phase
V6	Residents will be notified of blasting times by means of a phone call or text message prior to the blast taking place;	Operational Phase
V7	The blast operator signals 30 seconds prior to each blast;	Operational Phase
V8	The blast operator signals after each blast under Garda supervision;	Operational Phase
V9	Blasting will occur between 09:00 to 18:00 Monday to Friday. Blasting does not take place on Saturdays;	Operational Phase
V10	Vibration monitoring records will continue to be maintained by the Quarry Manager and will be available for display to local residents that may have been affected by site operations;	Operational Phase

Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
V11	The quarry manager will maintain a written complaints log in which all complaints made by local residents are detailed. This will ensure that the concerns of local residents who may be affected by site activities are considered during the management of activities at the quarry site.	Operational Phase
V12	NOTE: Any further mitigation measures related to Vibration detailed within authorisation or consents to be included in this section and adhered to.	Operational and Restoration Phase

Table 14.9: Specific Environmental Mitigation Requirements – Cultural Heritage

Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
CH1	Geophysical survey of the two additional extraction areas to be undertaken. The results of this geophysical survey will inform the development of the mitigation strategy, including the need for further intrusive archaeological investigation. If required, this may range from archaeological supervision of soil stripping work by a licensed archaeologist, to trial trenching and targeted evaluation, to broader, more extensive archaeological excavation.	Operation Phase
CH2	To ensure the protection of assets AR-01, AR-02, AR-03, AR-04 and AR-05 from inadvertent direct impacts, the area will be clearly demarcated and the presence, significance and protections afforded to these assets will be communicated to all staff working on site, as part of their environmental induction.	Operation Phase
CH3	NOTE: Any further mitigation measures related to Cultural Heritage detailed within authorisation or consents to be included in this section and adhered to.	Operation and Decommissioning Phase

Table 14.10: Specific Environmental Mitigation Requirements – Landscape and Visual Impact

Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
LV1	Management/Improvement of the retained site boundary hedgerows and trees: The existing site boundary hedgerows and trees to be surveyed and appraised in terms of (a) species mix - for biodiversity and maximum screening (height, density of foliage), and (b) intactness/continuity. Generic improvements and spot fixes to be made where required to optimise the health of the hedgerows, their biodiversity value and visual screening function.	Operational Phase
LV2	Reprofiling of the existing mounds on the south-eastern and south-western boundaries of the Site, where required, in order to help reduce the prevalence of these structures on views within the locality.	Operational Phase
LV3	Woodland planting added to existing and new earth mounds (within the Proposed Development). These will be planted with a woodland species mix (including tree and shrub species), to form a substantial belt of woodland along the hillside. This will soften the form of the constructed mound, add to the height of the mound as a visual screen, and contribute to vegetation/habitat in the landscape generally.	Operational Phase
LV4	Annual review/management of the new boundary planting to ensure that it becomes established and provides adequate visual screening, with generic improvements and spot fixes (including supplementary planting, or thinning) to be implemented where required.	Operational Phase
LV5	Management/Improvement of site boundary hedgerows: A final survey and appraisal of the site boundary hedgerows in terms of (a) species mix - for biodiversity and maximum screening (height, density of foliage), and (b) intactness/continuity. Generic improvements and spot fixes to be made where required to optimise the health of the hedgerows, their biodiversity value and visual screening function.	Restoration Phase
LV6	Management/Improvement of woodlands on the mounds: A final survey of the woodland planted earth mounds, with generic improvements and spot fixes (including supplementary planting or thinning) to be implemented where required.	Restoration Phase
LV7	Re-vegetation/colonisation of site outside of excavation: In accordance with current best practice recommendations the areas between the excavation and the woodland-planted earth mounds around the perimeter of the site will be allowed to re-vegetate/colonise naturally. This results in greater biodiversity and habitats most appropriate to the site conditions.	Restoration Phase
LV8	Removal of built infrastructure: All buildings and redundant infrastructure to be removed from site and the lands prepared for natural re-vegetation/colonisation.	Restoration Phase
LV9	Lake formation in quarry void to a level of 155mAOD: Engineered shallow areas on the floor of the quarry will initially provide islands and will ultimately be covered by water as the quarry fills to its natural level (determined by the water table), forming a permanent lake. The	Restoration Phase

Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
	shallow areas will provide suitable substrate for aquatic invertebrates, with gentle grading of shoreline and marginal planting added (to be determined at the time, with the advice of an ecologist).	
LV10	Quarry benches: At a number of locations (to be determined at the time, with the advice of an ecologist) a mixture of trees and shrub species will be planted in an engineered substrate to form patches of habitat. This will create a platform for a more diverse flora to develop naturally and provide habitat and food resources for birds, mammals, insects and other invertebrates.	Restoration Phase
LV11	Quarry faces: Whilst recognising the geological heritage value of the exposed quarry faces, it is proposed that some native tree and shrub species be planted in/on fissures and ledges, to help break up the bare profile of the quarry face. Other plant species will be allowed to find and colonise the area by natural means and these will include various mosses, lichens, algae, ferns, flowering plants, etc. The gradually increasing plant diversity over time will in turn ensure that a corresponding diverse list of animal species (birds, mammals, butterflies and other insects, other invertebrates, etc.), can become established.	Restoration Phase
LV12	Safety measures: An agricultural fence to be installed around the edge of the excavation, to act as a visual indicator of the edge and a physical barrier for people and animals. Signage as required around edges to notify of danger.	Restoration Phase
LV13	NOTE: Any further mitigation measures related to Landscape and Visual Impacts detailed within authorisation or consents to be included in this section and adhered to.	Operational and Restoration Phase

Table 14.11: Specific Environmental Mitigation Requirements – Traffic

Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
T1	<p>Following geometric assessment of the current left-in/left-out junction arrangement on the N7, the following amendments shall be necessary on the westbound on-slip:</p> <ul style="list-style-type: none"> ■ Nose length of 75m with a ratio of 1:25 to be provided; ■ Auxiliary lane to be extended to 160m; and ■ Auxiliary Lane Taper to be extended to 75m. 	Operational and Restoration Phase
T2	NOTE: Any further mitigation measures related to Cultural Heritage detailed within authorisation or consents to be included in this section and adhered to.	Operational and Restoration Phase

Table 14.12: Specific Environmental Mitigation Requirements – Material Assets

Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
MA1	Consultation will be undertaken with Irish Water prior to commencing the excavations proposed in the north of the Site. The methods and precautionary measures required to protect water supply infrastructure and facilitate these works will be agreed with Irish Water. The agreed measures will be updated in the EMP.	Operational and Restoration Phase
MA2	Any works required to other material assets on or around the Proposed Development (electricity, telecommunications, etc.) will be carried out in conjunction with the relevant provider to ensure minimal disruption to the existing users.	Operational and Restoration Phase
MA3	Mitigation measures regarding discharges to the on-site culvert will be implemented.	Operational Phase
MA4	NOTE: Any further mitigation measures related to Material Assets detailed within authorisation or consents to be included in this section and adhered to.	Operational and Restoration Phase

14.4 Monitoring Measures

A number of environmental monitoring activities are to be continued during the operational and restoration phases. These monitoring activities are required to confirm the effectiveness of the mitigations, to define the quality of the surrounding environment, and to establish if there are any trends in environmental parameters.

Environmental monitoring requirements have been identified in the specific chapters of the EIAR. The frequency of these monitoring requirements have been collated and provided in a schedule displayed in Table 14.13

Population and Human Health

Monitoring for the protection of population and human health during the operational and restoration phase will be carried out in accordance with the wider environmental monitoring programme for the protection of water, air quality, noise and vibration.

Further monitoring in respect to the site health and safety will be dependent on the specific site practices and tasks being carried out. Monitoring will be in accordance with the site specific safety statement and associated risk assessments (LBAR, Safety Statement, Revision 08 January 2020).

Ecology and Biodiversity

Bat activity surveys including passive monitoring will be undertaken for a minimum of five nights and emergence surveys at three structures identified with potential to host roosting bats will also be undertaken. Transect surveys will be carried out at emergence and/or re-entry to gather information on bat activity and to identify any activity which may indicate the presence of a roost or key commuting routes.

Monitoring will be carried out to understand the ecological context and significance of the identified main badger sett and the impact of further loss of badger foraging habitat, including a bait marking study. A camera trap survey at the sett will be carried out (under appropriate license) to seek to determine if breeding is occurring within the sett.

A breeding bird (including Peregrine Falcon) survey for the Site is currently being undertaken. Preliminary results indicate that a female Peregrine is again at the Site sat on eggs. The result of this work will form the basis of a Peregrine falcon management and monitoring plan for the Site.

Land, Soils and Geology

The monitoring programme at the Site will include regular stability surveys of the quarry faces and regular monitoring of groundwater quality in monitoring wells.

Water

The following water monitoring will be carried out at the Site going forward:

- Groundwater level – groundwater levels should be monitored at the four borehole locations (BH1-BH4) and also at the on-site ponds (SW1-SW2) on a minimum of a quarterly basis to monitor the effects of pumping and dewatering from the excavated areas.
- Groundwater quality – groundwater quality should be monitored on a minimum of a quarterly basis to capture any off-site migration of impacts on water quality. As a minimum, monitoring should be completed at the four borehole locations (BH1-BH4) and also at the on-site ponds (SW1-SW2).
- Discharge water quality – monthly quality samples should be collected at the culvert discharge point to assess the quality of water leaving the Site. Reassessment of the effect should be carried out if quality exceeds surface water EQS threshold values for inland waters.

- Abstraction, usage and discharge volumes – daily records of abstractions, discharges and on-site water usage should be kept going forward, in order to appropriately characterise water movements on-site and off-site.

Air Quality and Climate

Dust monitoring will continue to be carried out monthly at the designated monitoring locations, however their exact locations may change as excavation progresses. These will be repositioned within the site boundary at the closest location to the relevant sensitive receptor.

It is recommended that emissions monitoring of the asphalt manufacturing plant is undertaken in order to understand the actual emissions resulting from its operation.

Noise

A noise monitoring programme will be maintained at N1 bi-annually. This will determine compliance with threshold noise levels specified in the EPA Guideline Document for Extractive Industries (2006), and the Irish Concrete Federation Environmental Code (2nd Edition, 2005).

Free-field noise levels attributable to the operation of the entire quarry complex, when measured at the nearest noise sensitive receptor, shall not exceed 55 dB (A) (60 minute L_{Aeq}) during permitted operating hours, and shall not exceed 45 dB(A) (15 minute L_{Aeq}) at any other time.

No audible or impulsive noise shall be permitted outside permitted operating hours.

Vibration

Vibration blast monitoring will be undertaken during blast activities at the closest NVSRs to blasting locations.

Monitoring of vibration levels at local residences will be conducted in agreement and with the consent of local residents.

Vibration blasting monitoring will record PPV, air overpressure, distance to each blast and maximum instantaneous charge levels (MIC).

The vibration levels from blasting should not exceed a peak particle velocity of 12 mm/sec when measured in any three mutually orthogonal directions at sensitive receptors.

Blasting should not give rise to air overpressure values at sensitive locations which are in excess of 125 dB(Lin) max peak. To allow for wind fluctuations and weather conditions, 95% of all air over-pressure levels measured at the nearest noise sensitive locations should conform to the specified limit value. No individual air over-pressure value should exceed the limit value by more than 5 dB(Lin).

Cultural Heritage

Beyond the phased archaeological mitigation strategy, no long-term or on-going monitoring for cultural heritage is proposed.

Traffic and Transport

Since there are no significant effects anticipated, no monitoring has been proposed with respect to effects from operational traffic associated with the Proposed Development.

Landscape and Visual

Ongoing monitoring and maintenance measures will be required as per the mitigation measures outlined previously in this chapter.

Material Assets

There are no specific monitoring measures required or proposed in relation to material assets other than those identified above for the protection of surrounding utilities from blasting effects at the Site. These measures will be employed to ensure that significant negative effects on material assets will be avoided, prevented or reduced during the continued operation of the Proposed Development.

Table 14.13: LBAR - Environmental Monitoring Schedule

LBAR Environmental Monitoring	Q1			Q2			Q3			Q4		
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Groundwater (Levels) <i>Quarterly</i>												
Groundwater (Quality) <i>Quarterly</i>												
Discharge Water (Quality) <i>Monthly</i>												
Dust Monitoring <i>Monthly</i>												
Noise Monitoring <i>Bi-annual</i>												
Vibration Monitoring <i>Monitoring conducted during each blast.</i>												
Boundary Inspections <i>Monthly</i>												