remedial Environmental Impact Statement

Existing Sandstone Stone Quarry (ref: QR.01)

Drumkeeran Stone t/a Sandlewood Limited

Located at

Liscuillew Upper, Drumkeeran, County Leitrim

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FOREWORD

This remedial Environmental Impact Statement has being generated following current pertinent legislation on the preparation of rEIS (remedial Environmental Impact Statement), best current practice and applying reasonable skill, care and diligence within the limitations imposed by the techniques utilised and the resources devoted to it by agreement with the client. In using this rEIS the Client should consider that the conclusions and opinions included are based on data interpretation. The rEIS shall be used in support of an application for substitute consent in accordance with section 261a of the Planning and Development act 2000–2010 and the 2001–2012 regulations. The requirement for the application for substitute consent was established by An Bord Pleanala whom required that any such application be accompanied by an rEIS.

CONFIDENTIAL REPORT

This Report is issued in strict confidence. Circulation of this Report either in full or abstract may not be done without the prior agreement of the Client, Drumkeeran Stone, t/a Sandlewood Limited, Liscuilllew Upper, Drumkeeran, County Leitrim.
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NON TECHNICAL SUMMARY

1 SITE LOCATION AND DESCRIPTION

The quarry is located in the townland of Liscuillew Upper, Drumkeerin, County Leitrim approximately 3 km to the south of the village of Drumkeerin, ca. 19 km to the west of the town of Manorhamilton, County Leitrim. The entrance to the site is from the Local Road L4283, to the west of the regional Road R280 from Manorhamilton to Carrick-on-Shannon, County Leitrim (Grid Reference: 590813, 821002, see Map 2/1). The quarry is located on the northeast-facing slope of the Corrie Mountain, at elevations between 250 mOD and 294 mOD. It is separated from the adjoining lands by a 1-m high metallic fence, and by a 2-m high railing and gate at the site entrance. The surrounding fields are described as wet heath, dry heath, clear felled woodland, forestry and agricultural wet grassland (ovine grazing). There are low density scattered residential properties in the vicinity of the quarry, with the nearest residence located ca. 158M to the East of the operational area at a lower elevation. Lough Allen, is located at a minimum distance of ca. 3 km to the east of the site.

2 PROJECT DESCRIPTION

The quarry at Lisculliew Upper, Drumkeerin, Co. Leitrim is operated by Jim McPadden trading as Sandlewood Ltd employees 6 staff for the extraction, processing and delivery of dimension / building stone and by products. Normal operating hours are 08:00 to 18:00hrs Monday to Friday, 08:00 to 16:00hrs on Saturday. The quarry is closed on Sundays and Bank holidays. Stone not suitable for the production of building / dimension stone is screened and / or crushed for approximately 2 days per week there by converting potential waste into a commercially viable product, decorative chips and sand. The extraction process utilises tracked excavators fitted with excavation buckets to remove overburden on a 3 year cycle to facilitate access to the rock strata beneath creating a face of approximately 20m.
One accessed the rock strata are excavated from the face with a tracked excavator using a bucket with the material stored on the quarry floor prior to processing. The plant used on site consists of a screener, impact crusher, 3 track machines, loading shovel, rock breaker, bucket crusher, guillotine and forklift. Stone suitable for dimension stone is removed to the processing building where it is altered to the desired shape by a two man crew using a steinex guillotine. From here the stone is either placed in 1 ton bags or on pallets for nation wide delivery in 8 wheeler trucks, 6 wheeler trucks or artics. There is a dry canteen and office located inside the gate with a chemical toilet to the front. Water supply on site is via 2 rain water harvesting tanks with one located adjacent to the canteen and the other located beside the processing building, drinking water is brought to site in containers as no mains source or well present. Leitrim County
Council has issued a discharge license which imposes a specific physical and chemical standard on the water quality that is discharged from the lagoon system to the water course along the Northern boundary of the site. The quarry does not operate below the water table and therefore the only water discharged after treatment in the lagoons is precipitation based and consequently discharge only occurs during periods of rainfall. A rudimentary waste management plan exists on site which caters for waste oils, metals, batteries and general refuse. There is an extensive hydrocarbon (white diesel, red diesel and mineral oil) management system in place on site. Noise and dust monitoring that have already taken place on the site indicate that the current operation is operating well within the industry standard limits for those parameters.

3 HUMAN BEINGS

A socio-economic assessment was carried out as part of the reEIS for the quarry in the townland of Liscuillew Upper, County Leitrim. This chapter of the remedial Environmental Impact Assessment describes the socio-economic or human impacts of the quarry. To gain an understanding of the human impacts the quarry may have, the current socio-economics of Leitrim were analysed. The impact of the development was looked at in conjunction with, population, land use, employment, community facilities, education, infrastructure and tourism in Leitrim County and the Liscuillew townland. Information on the socio-economics of Leitrim was gathered by looking at a number of documents, including, the Leitrim County Development Plan 2009 - 2015, Carrick-on-Shannon Local Area Plan 2004 and also from the Central Statistics Office webpage. The small workforce employed to operate the quarry will not put a strain on the services proved by the nearest town, Drumkeeran. There also was, and is, very little traffic generated by the site, with an average of only nine loads leaving the site on a daily basis. In terms of local tourism, the Miners Way, a historical walking route, passes close to the quarry. It has been established that the visual impact of the quarry from certain sections of the walking route would be negligible. The infrastructure of the area can cope with the operations taking place at the quarry. The site is ideally located within 30 km of a national road, in this case the Dublin-Sligo N4 road. It has been established that overall, the quarry at Liscuillew Upper has not nor would have a negative impact on the socio-economics of the area and to a larger extent the county. Land use in the area will also not be affected as the site is the location of a pre 1964 continuously operated quarry.
4 FLORA AND FAUNA

The operational area of the quarry is circa 150M East of the Corry Mountain Bog Natural Heritage Area (002321). There are no Natura sites, SPA’s or SAC’s within 7.5Km of the quarry nor or there any direct links to such a site. There has being no significant negative impact to local habitats which are undesignated, common and not annexed. No species of national or international interest were identified as resident within the quarry or in proximity to it and, if present, are unlikely to have being, or would be, impacted by the operation.

The depth of overburden and rock outcropping indicate that dry heath and wet heath habitat have being impacted however there is ample availability of alternative habitats in the adjoining area to off set this. The worked areas that have being rehabilitated are reverting to their previous habitat type. There has being no impact, nor would there be, on the aquatic life of the surface water system in the area adjacent to the quarry as the mitigation measures employed (discharge license compliance, settlement lagoons, surface water interceptor channels, water recycling, absence of active dewatering, oil interceptors, bunds on tanks, bunded pallets) have negated the potential for any such significant impacts, positive or negative. Water quality at the EPA Owengar monitoring station RS260020200, which is located downstream of the quarry discharge had a Q4 rating in 2011 with a Water Frame Work Directive (WFD) status described as “Good”. The WFD also classified the groundwater as being of “Good Status” at not at risk.

5 GEOLOGY AND HYDROGEOLOGY

No sites of geological interest are located within the quarry or in its immediate proximity. The dominant morphological features of the region surrounding the site at Liscuillew Upper are the Corrie Mountain, on the eastern slope of which the quarry is located, and Lough Allen. The overburden is constituted of gravelly CLAY with angular boulders (up to ca. 50 cm) of sandstone, overlain by a maximum of 1 m of peat. Bedrock is outcropping at several locations in proximity of the site indicating the thin nature of the overburden that was present.

The quarry is extracting sandstone belonging reported to the Lackagh Sandstone Formation (LH), while the quarry floor is at the geological contact with the shales of the Gowlaun Shale Formation (GO). These bedrocks are interpreted as the result of deposition as river deltas of sediments originating from emerged uplands to the north. A NW-SE trending fault is mapped immediately to the east of the site. The closest mining activities, currently abandoned, is a coal pit situated ca. 2.5 km to the southwest of the site entrance. This abandoned coal pit has been nominated as a “County Geological Heritage Site”.

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Quarrying is relatively common in the area, both for dimension stones and for aggregate. The nearest quarry to the site is located in the townland of Curraghs North, County Leitrim, ca. 2 km to the northeast of the site, where clay was extracted for the making bricks and tiles.

The quarry and surrounding area drain into a tributary of the Owengar River, and eventually into Lough Allen. No data is available on the quality of water in the lake however the WFD has described its status as being “Good”. Available biological data from EPA monitoring station installed on the Owengar River indicate an overall "Unpolluted" Q4 status in 2002 which has being maintained with the last monitoring in 2011. In the classification of surface water carried out as part of the Water Framework Directive the Owengar River is considered to be of “Good” status and "probably not at significant risk" for abstraction and flow regulations, point pressures and diffuse pressures. With regards to morphological alterations, the Owengar River is classified as "probably not at significant risk" in its lower part. No active dewatering has being carried out at the quarry, nor it is there any planned for the future with no abstraction of water required.

No significant Quaternary Aquifers are reported to be present within or in the proximity of the area. The Lackagh Sandstone Formation and the Gowlaun Shale Formation have been provisionally classified as "Bedrock which is Generally unproductive except for Local Zones". The bedrock aquifers underneath the site have a vulnerability rating of “Extreme” due to the proximity of the bedrock to ground level. Groundwater in the area is considered to be "Probably Not at Significant Risk" for Abstraction and Saline Intrusion, Point Pressure and Diffuse Pressure.

Groundwater flow in the area immediately surrounding the quarry is inferred to be down slope toward the lake. No water wells are recorded in the GSI database for the area, nor is there any information available from Leitrim County Council Water Services. A well survey was carried out for this EIS and a total of six private water wells and one spring used as sources of water supply were identified along the road L4283.

It is considered that there has been no adverse impact on the quality and the quantity of water supply in the area nor is any expected due to the quarrying activities. Surface water run-off from the site is collected by interceptor drains and directed toward a primary treatment lagoon and then to settlement lagoons via an Oil Interceptor, which is serviced regularly by a licensed operator. Water from the lagoons is discharged into a local drain and eventually enters the Owengar River. A number of discharge to surface water licenses have being granted by Leitrim County Council the conditions of which has being complied with when considering the parameters analysed for.
6 AIR, DUST AND CLIMATIC FACTORS

The quarry has a low inherent potential for generation of airborne dust, due to the nature of the sandstone material, and the minimal crushing of rock undertaken at the quarry. Inspection of the existing quarry operation did not reveal any evidence of noticeable dust deposition, or detectible airborne dust at houses in the vicinity of the quarry. Dispersion modeling of surface deposition rates of fugitive dust indicate that there is unlikely to have been, nor is there or will there be, any impact at the nearest dwellings beyond the quarry boundary, empirical measurements have confirmed the findings of the modeling. An analysis of fugitive dust deposition rates was carried out periodically and results show deposition rates were well below the international limits with the maximum level recorded at the boundary being 182mg/M²/D and levels as low as 33mg /M²/D recorded. The dispersion of fine particulate matter (PM10) from the quarry was also modeled, and found to be insignificant at the nearest houses. Calculated pollutant levels at the nearest houses due to diesel powered equipment operating in the quarry were negligibly low. Incorporation of standard dust mitigation measures ensures negligible residual impact.

7 NOISE

Measurements were periodically made of quarry noise at the roadside beside the nearest noise sensitive location, the dwelling to the east. With all quarry equipment operating, the noise level at the nearest house was determined to be well within the standard limits. Noise levels were measured at the quarry, and this data was inputted into a computer noise model for the site. This model can predict noise levels for different quarry operation scenarios, and under different wind conditions. The dwellings considered in the assessment were the nearest house to the east (denoted H1), and the two houses to the north (H2 and H3). Both dwellings benefit from significant acoustic screening, due to the elevated terrain between the quarry and them, with no line of sight to the quarry noise sources. During normal operation of the quarry it was calculated that the mean noise levels of 41 to 45 dB(A) may be experienced at the dwellings. When houses are downwind of the quarry, the noise is expected to increase to 46 to 50 dB(A). When the crusher is operated the mean noise levels at the dwellings are predicted to range from 44 to 49 dB(A). When the dwellings are downwind of the quarry, the noise is expected to increase to 49 to 52 dB(A). The noise impact was assessed with reference to the EPA publication “Environmental Management in the Extractive Industry (Non scheduled minerals)”, 2007, which specifies a guideline daytime noise limit of 55 dB(A). It is concluded, that the quarry operated within the
standard noise limit of 55 dB(A), under worst case conditions, with all items of equipment operating, and with the receptor locations downwind of the quarry. Under normal quarry activity, and under moderately favourable sound propagation conditions, the mean noise levels at the receptors was expected to be 10 dB lower than the 55 dB(A) limit. Empirical noise measurements were periodically taken at the nearest noise sensitive locations indicate that the modeling may actually have over estimated the actual noise levels experienced at the dwellings which is attributed to a precautionary approach. Noise levels have being measured by AVA acoustics, ANV technologies and HMN Environmental Consultants Ltd. over a number of years with all measurements taken by the different consultants indicating that levels as measured at the nearest NSL (noise sensitive location) are well below the industry standard with no noise generated outside of the hours of operation as activity completely ceases outside of those hours. Quarry traffic is infrequent, and the average noise level at houses H2 and H3 was calculated to be 49 dB(A). This is a low traffic noise level, with negligible noise impact. The quarry traffic noise level at the house H1 to the east of the quarry was calculated to be less than 35 dB(A), which is negligibly low and due to the fact that no quarry traffic actually passes this dwelling either entering or leaving. It can be said with confidence that the operation of the quarry has not, is not, nor will it, have any significant impacts with respect to noise generated.

8 VIBRATION

No ground-borne vibration or air overpressure survey was undertaken, nor is any required, as no blasting has taken place at the quarry nor is any required and the level of activity at the site is limited. Vibration was not considered significant as the use of a rock breaker for example would only produce a ground vibration levels of approximately 4.5mm/s at a distance of 5M which falls to 0.4mm/s at 20M and 0.1mm/s at 50M and consequently would be undetectable outside the substitute consent area. Truck movements give vibration levels of less than 0.2mm/s at a distance of 20M.

9 LANDSCAPE AND RESTORATION

The location of the quarry is in exposed moorland, on the lower foothills of Corry Mountain, overlooking Lough Allen to the East. The general area is comprised of upland heath which rises above Lough Allen and lowland drumlin containing elements of heath plateau, hills and gentle farmed slopes. There are extensive views over vast areas of moorland plateau and over the
surrounding lowlands with the agricultural landscapes of the lower slopes hedgerows creating a more intimate landscape. The site would have been dominated by wet heath and dry heath species of Ling (Calluna vulgaris) and cross leaved heath (Erica tetralix).

It is important to be aware that the visibility and visual impact is strongly dependant on the prevailing viewing conditions and this is an area that would frequently experience haze, fog, cloudy conditions. The approach taken as part of the site assessment and methodology was to assess the quarry in terms of its visibility around the Lough Allen area. Important considerations were taken into account relating to the cultural heritage, amenity areas, way-marked walks and cycle trails, preserved views and structural dwellings.

Viewpoints chosen were
- R280 road between Drumshanbo and Drumkeeran
- Dwellings in the vicinity of the site
- preserved views under the greatest threat
- Amenity areas
- Miners Way and Leitrim Way
- Kingfishers Cycle Trail
- Drumkeeran village

The nearest potential viewing positions are the dwellings in the immediate vicinity of the quarry. In summation, it is judged the site of the quarry has a minimal effect on the general appearance of the landscape. Views from around Lough Allen highlight that that the visual impact of the quarry was and is negligible as defined in the main body of the report. The site visit and desktop study work would suggest the quarry remains comparatively small in magnitude against the windfarm on top of the Corry Mountain axis and in the wider landscape. It should be acknowledged the landscape is already much influenced by human activities and has lost a certain amount of its wilderness character with extensive forestry in the area. This can be attributed to peat cutting, mining, communications (power and telephone lines), road infrastructure networks, valley agricultural practices and ribbon type housing development. The existence of the quarry does not necessarily detract from the existing value of the landscape. Visual impact by its very nature is subjective with reaction dependent on the viewer's attitude.

10 TRAFFIC

The quarry at Liscuillew Upper is located off the local road L4283, which also constitutes the only road used by quarry traffic to connect it to the regional road R280. The assessment involved carrying out traffic counts on the R280 and L4283 and estimating the volumes of traffic that were and are anticipated to be generated by the existing quarry. Traffic flows on the roads adjacent to and serving the proposed development are low and all roads are operating with spare capacity.
The results of the capacity assessment conclude that the existing development could and is accommodated by the surrounding road network. Safety improvements to the site entrance at its junction with the L4283 have previously being recommended and carried out.

11 ARCHAEOLOGY

Substitute consent is being applied for regarding an existing continuously operated quarry. An Bord Pleanala have requested that the application for substitute consent be accompanied by a remedial Environmental Impact Statement, a part of which includes an Archaeological Impact Assessment.

The quarry is located circa 4 km south of Drumkeeran, in the townland of Liscuillew Upper. An examination of earlier Ordnance Survey maps, the Co. Leitrim Record of Monuments and Places, historical and documentary sources revealed nothing of archaeological or historical significance within or the vicinity of the quarry or located in the area that has been quarried. The nearest recorded archaeological monument, a rath, is located in excess of 2km to the east. Furthermore a walk-over survey of the existing quarry and the surrounding revealed no surface archaeological anomalies.
remedial ENVIRONMENTAL IMPACT STATEMENT

1 INTRODUCTION

The quarry has been producing stone and aggregates for both building and road construction since approximately the 1900’s. Stone from the quarry was used to construct the local roads, LS08272-1 and LP04283, to accommodate the transportation of road materials from the quarry for the construction of the R280 south of Drumkeeran Village to the county boundary in the 1960’s and 1970’s. Prior to 1967 both Leitrim County Council and the O’Rourke family operated in two different locations within the quarry. Between 1967 and 1974 a Mr. Ned Reilly of Lynns Bridge Mullingar operated the quarry under the trading name of “Stonefacings” and from 1975 to 1989 both Mr. Noel Flynn and Mr. O’Rourke extracted building stone and aggregate from the quarry. In 1990 a Mr. Leonard McNicholson operated the quarry for one year before it reverted to being operated by the O’Rourke family in 1991. Leitrim County Council used stone from the quarry in the 1980’s and 1990’s. In 2000 Mr Jim McPadden took over running the quarry from Mr. O’Rourke and currently operates it under the name of “Sandlewood” Ltd.

In April 2005 the quarry applied to be registered under section 261 of the 2000 Planning and Development Act (Ref: QR1). Under that registration process a number of conditions were imposed on the operation to mitigate potential environmental impacts on the 3rd of April 2007 which were largely complied with. On 28th March 2008 Jim McPadden of Drumkeeran Stone, t/a Sandlewood Limited lodged a planning application with Leitrim County Council for retention of the existing pre 1964 continuously operated stone quarry located in the townland of Liscuilliew Upper, Drumkeeran, County Leitrim. On 20th May 2008 Leitrim County Council requested Jim McPadden to “submit an Environmental Impact Statement to include consideration of the entire area of the leased land in which the quarry is located”.

An EIS was generated and submitted to Leitrim County Council however due to the European Court of Justice (ECJ) case C-215/2006 in July 2008, the implications of which was to render unlawful any retention planning permissions for which an environmental impact assessment (EIA) was required, removed that provision in Irish planning legislation and dictated that the planning application could not be progressed. The ECJ ruling however did allow for the regularisation of developments requiring EIA in exceptional circumstances. Part XA of the Planning & Development 2000 Act, as inserted by Section 57 of the Planning & Development (Amendment) Act 2010, makes provision for a substitute consent process for the regularisation of certain developments coming within the scope of EIA or appropriate assessment (AA). Section 177B (of Part XA) of the Act made provision for such applications to be made to An Bord Pleanála for substitute consent following notification from the planning authority to do so.
following consideration of specific planning matters relevant to the development. Section 75 of the 2010 Act inserted a new section 261A into the 2000 Act. Each planning authority had to determine which quarries in its administrative area would, having regard to the dates of implementation of the EIA Directive and the Habitats Directive, respectively, have required an EIA, a determination in relation to EIA and / or an Appropriate Assessment in relation to possible effects on the integrity of a European nature site, but which were not subject to such assessment/determination. Where a planning authority determined that a quarry came under such a category, the planning authority was required to make a further decision in relation to the planning status of the quarry, including registration status. Flowing from this decision, the planning authority had either to request an application for substitute consent or taken enforcement action requiring the quarry to cease operations. On the 18th of July 2012, under sub section (2)(a)(i) and section 261A of the Planning and Development Act, 2000, as amended by the insertion of section 75 of the Planning and Development (Amendment) Act 2010 and as further amended by the European Union (Environmental Impact Assessment and Habitats) Regulations 2011 and European Union (Environmental Impact Assessment and Habitats) Regulations 2012 Leitrim County Council requested the submission of a substitute consent application to An Bord Pleanala and that such an application should be accompanied by an rEIS (ref: QR.01). The determination of Leitrim County Council was appealed to An Bord Pleanala whom ratified that decision consequently it was requested by the Bord that a planning application accompanied by a remedial Environmental Impact Statement be submitted. This decision was based on the following,

(a) the submissions on file, including documentation on the review file (planning authority register reference number QR.01), aerial photography, and the report of the Inspector,

(b) the scale of the quarry, and the extent to which the area of extraction of the quarry expanded after 1st February 1990,

(c) the characteristics of the quarrying activity and of the potential impacts arising, the intensity of the extraction activity, the proximity of houses, the proximity of watercourses, and the location of the site in an Area of High Visual Amenity, as set out in the Leitrim County Development Plan 2009 - 2015,

(d) the European Communities (Environmental Impact Assessment) Regulations 1989 – 1999, and the Planning and Development Regulations 2001 (as amended), which, in Schedule 5, restate the prescribed classes of development requiring environmental impact assessment, and which, in Schedule 7, set out the criteria for determining whether a development would or would not be likely to have significant effects on the environment,

(e) the “Guidelines for Planning Authorities and An Bord Pleanálá on Carrying out Environmental Impact Assessment” issued by the Department of the Environment, Community and Local Government (2013), and

(f) the “Environmental Impact Assessment (EIA) - Guidance for Consent Authorities regarding Sub-threshold Development” issued by the Department of the Environment, Heritage and Local Government (2003),
1.1 Structure and Content of the rEIS

A remedial Environmental Impact Statement shall contain the following: (a) a statement of the significant effects, if any, on the environment, which have occurred or which are occurring or which can reasonably be anticipated to occur due to the development, the subject of the application for substitute consent, which was carried out; (b) details of (i) any appropriate remedial measures undertaken or proposed to be undertaken by the applicant for substitute consent to remedy any significant adverse effects on the environment; (ii) the period of time within which any proposed remedial measures shall be carried out by or on behalf of the applicant; (c) such information as may be prescribed under section 177N. For the purposes of clarity, this rEIS has been prepared in accordance with the Environmental Protection Agency (EPA) Guidelines (2002 & 2003) and the Planning and Development Regulations 2011 (as amended). In addition the rEIS was prepared with cognisance taken of the following Statutory Instruments:

➢ Guidelines on the Information to be contained in Environmental Impact Statements, Environmental Protection Agency (EPA 2002
➢ European Union (Environmental Impact Assessment and Habitats) Regulations 2011
➢ The Planning and Development Act, 2000 - 2010 section 261a.
➢ The Planning and Development Regulations 2001 – 2012
➢ Section 177F of the Planning and Development Act 2000 - 2010

The content of the rEIS has regard to the information specified in the 1989 Regulations, as amended by the Second and Third Schedules of the 1999 Regulations, and the Environmental Protection Agency’s “Guidelines on the Information to be Contained in Environmental Impact Statements (2000)” and "Advice Notes on Current Practice in the Preparation of Environmental Impact Statements". Furthermore, due attention has been afforded to the indications and guidelines contained within the Institute of Geologist of Ireland's "Geology in EIS – A guide (2002), and “Recommended Collection, Presentation and Interpretation of Geological and Hydrogeological Information for Quarry Developments (2007)", and within the "Environmental Code for the Aggregate and Concrete Products Industries (1996)" published by the Irish Concrete
Federation. The EIS has been prepared in the “Grouped Format” structure, which examines each aspect of the environment as a separate section referring to the existing environment, the quarry, likely impacts and mitigation measures. Each section of the rEIS has been systematically organised to provide the following information:

Section 1: Site Description

Section 2: A description of the receiving environment.

Section 3: Identification of the likely significant impacts that have occurred, are currently occurring or are likely to occur due to the quarry activity. The remedial measures that were implemented or are currently implemented to negate these.

Section 4: A description of the existing mitigation measures and recommended mitigation measures.

1.2 Difficulties in Compiling the Specified Information

No major difficulties were encountered in compiling the specified information as set out in Second and Third Schedules of SI No. 93 of 1999. Any relevant difficulty encountered has been identified in the respective sections of the rEIS, as appropriate.
1.3 Specialist Contributors

The following are the consultants involved in the compilation of the various sections of this remedial Environmental Impact Statement:

<table>
<thead>
<tr>
<th>Specialist Consultants</th>
<th>Sections of the rEIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paul Neary B.Sc. M.Sc.</td>
<td>Main Consultant and Description of the Development</td>
</tr>
<tr>
<td>North West Environmental</td>
<td>Geology &amp; Hydrogeology; Material Assets</td>
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<tr>
<td>Gerard Tobin</td>
<td>Flora and Fauna</td>
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<td>RWKelly &amp; Associates Ltd.</td>
<td>Traffic Assessment</td>
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<td>ANV Technology</td>
<td>Air, Dust and Climatic Factors; Vibration and Noise Assessment</td>
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<tr>
<td>Mary Henry Archaeological Services Ltd.</td>
<td>Archaeology &amp; Cultural Heritage</td>
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<tr>
<td>AVA Acoustics (co consultant)</td>
<td>Noise</td>
</tr>
<tr>
<td>Mcarthy Keville O’Sullivan Ltd. (co. Consultant)</td>
<td>Dust</td>
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</tbody>
</table>

1.4 Consultation

In 2008 the following state bodies and organizations were contacted with respect to any comments or observation that they may have with respect to the operation of the quarry.
➢ The Shannon Regional Fisheries Board;
➢ Failte Ireland North West;
➢ Arigna Leader;
➢ Rowanberry Enterprises Limited;
➢ The Development Application Unit of the Department of Environment, Heritage and Local Government.

In the preparation of the 2015 rEIS the following state bodies and organisations were re-contacted by letter inviting comments, observation and or submissions (see Appendix A):
➢ The Shannon Regional Fisheries Board;
➢ Failte Ireland North West;
➢ Arigna Leader;
➢ Rowanberry Enterprises Limited;
➢ The Development Application Unit of the Department of Environment, Heritage and Local Government.

A reply (see Appendix A) was received from Arigna Leader on 29th September 2008, raising the issue of preservation of the “Miners Way National Way”, which runs close to the quarry. This issue has been addressed in Sections 3, 4 and 11 below.

A reply (see Appendix A) was received from the Development Application Unit of the Department of the Environment, Heritage and Local Government on 16th October 2008, raising the issue of “the effect of the existing quarry on the architectural heritage of the locality”, and recommending that an assessment of this issue “is carried out by someone with competence to make that assessment”. This issue has been dealt with in Section 12 of the remedial Environmental Impact Statement.

To date no comments or observations were received with respect to the 2015 letters regarding the compiling of the rEIS.

1.5 Need for the Quarry

The quarry at Liscuillew, Drumkeeran, County Leitrim has a long history of operations, as extraction has been continued at the site since the early 1900s, supplying materials for the construction industry both locally and nationwide. The rock extracted by Drumkeeran Stone, t/a Sandlewood Ltd. at the quarry in Liscuillew Upper, Drumkeeran, county Leitrim is mainly represented by dimension stone, to be used where the visual aspect is of high importance, such as buildings stone-facing and pavements. Aggregate for other purposes only represents a minor aspect of the quarry output as it is constituted by material which, either for its visual aspect or its physical dimensions, can not be used as dimension stone. The dimension stone provided by Drumkeeran Stone, t/a Sandlewood Ltd. is held in high consideration by the construction industry for its visual quality, with orders originating nationwide, for developments of various scale and typology. The construction industry in Ireland had previously gone through an unprecedented period of growth. The Central Statistic Office estimated that in the period 2000-2005 the value of output in the construction industry was almost €32 billion, an increase of 80 % compared with 2000. Data published from the Central Statistic Office indicate that the construction industry employed until recently, up to 13.1 % of the Irish workforce, and ca. 93,000 housing units were built in the year 2006. This has been reflected in the local economy with an unprecedented level of construction of both houses and commercial developments throughout the whole country.

It has been forecasted that the requirement for aggregate for the construction industry in the medium to long term is going to be substantial, as aggregate represents the basic material for the
construction industry, with over 100 million tonnes required annually to meet the demand of the Irish construction market, to build roads, houses, hospitals, etc. In the last number of years, the construction industry has seen a reduction of its rate of growth, with a decrease in the level of employment (now <10 % of the Irish workforce) and in the number of houses built (down to 8,000 in 2014 from 78,000). However, the dimension stone extracted at the quarry in Liscuillew Upper, Drumkeeran, county Leitrim constitutes a very value product, and Drumkeeran Stone, t/a Sandlewood Ltd. operates in a specialised niche market. As such, the demand for this material has remained relatively consistent, and has not been affected to the extent that other quarries have being by the downturn experienced by the construction sector.

1.6 Site Selection and Consideration of Alternatives

Quarrying must, of necessity, be carried out where the suitable material occurs and in this instance the presence of the continuously operated pre 1964 quarry dictates that alternatives could not realistically be considered as the application for substitute consent applies only to existing quarries.

None the less the quarry represents a significant rural resource, which contributes to the economic development of the county and it is essential for future development, as it is also recognised both in the Leitrim County Development Plan 2003-2009, and in the Leitrim County Development Plan 2009-2015. We have been informed by the management of Drumkeeran Stone, t/a Sandlewood Ltd. that the quarry at Liscuillew Upper, Drumkeeran, County Leitrim has been in continuous operation since the early 1900s. The Corrie Mountain, where the existing quarry is located, have been identified in Leitrim County Development Plan 2009-2015 as an "area of High Visual Amenity (Ref. B7)", and therefore as an area “to be protected and where to restrict development to the categories identified in the policy statement 2.7(b)”. Policy 2.7 b states “It is the policy of the Council to permit development in an Area of High Visual Amenity only where the applicant has demonstrated a very high standard of site selection, site layout and design and where the planning authority is satisfied that the development could not be accommodated in a less sensitive location”. In the same policy it is also stated: “In order to support the survival and continued development of sustainable communities, the Council will consider new developments to be acceptable within these areas, where applicants are currently living and/or working in the area”. Drumkeeran Stone, t/a Sandlewood Ltd. is strongly committed to operate the quarry at Liscuillew Upper, Drumkeeran, County Leitrim applying best practice in the quarrying operation and implementing an appropriate Environmental Management System, in order to ensure that impacts on the environment were reduce to a minimum or avoided completely where possible. An assessment of the whole site and of surrounding areas was undertaken in relation to the following criteria:

a. The low density of dwellings in the area, with regard to the likely impact on residential activities;
b. A review of the site in context of the County Development Plan, with particular regard to areas, sites, structures or views within or in the vicinity of the site designated for protection or preservation which may preclude or affect the extension of the rock quarry;
c. Accessibility to the Regional Road Network;
d. The potential impact on the visual and rural amenities of the area.

The material quarried by Drumkeeran Stone, t/a Sandlewood Ltd. at Liscuillew Upper, Drumkeeran, County Leitrim has a unique visual aspect, which is held in high value in the construction industry, and hence constitutes a high-added value product, occupying a specialised niche in the market. This kind of rock is not widely available, as it is part of the geological formation named “Lackagh Sandstone Formation”, mapped by the Geological Survey of Ireland only at the Kilronan Mountain to the south, and at the Slieve Anierin- Bencroy of Gubnavageagh-Benbrack mountain complex to the east, in addition to this site at the Corrie Mountain. Moreover, according to the GSI's “Quarry Directory, 2001”, and “Geology of Sligo-Leitrim, 1996”, this site is the only existing quarry in this geological formation. A quarry, operated by Hillstreet Quarries Ltd. has been noticed to be located in the townland of Gubbarudda, on the eastern slope of Kilronan Mountain, approximately 5 km to the southwest. It appears that this quarry may extract material from the same geological formation exploited at Liscuillew Upper. However Hillstreet Quarries Ltd. produced only crushed stone for pathways and driveways at that quarry, as the visual quality of the stone is inferior, and its bedding does not allow for a viable production of dimension stone. Furthermore, the site at Liscuillew Upper is the only land leased by Drumkeeran Stone, t/a Sandlewood Ltd. where this material can be extracted. Relocation of the quarry is therefore not feasible, both from an economical and logistical point of view. An assessment of the environmental sensitivity of geographical areas likely to be affected, as set out in Article 2 of the Third Schedule of SI No. 93 of 1999, has also been undertaken. In this regard, no part of the site is situated within the boundaries of areas which would be defined or designated as wetlands, coastal zones, nature reserves and parks, Special Protection Areas, Special Areas of Conservation, areas in which the environmental quality standards laid down in the legislation of the European Union have already been exceeded, or densely populated areas. The total land leased by Drumkeeran Stone, t/a Sandlewood Ltd. is bordered to the south and southwest by a Natural Heritage Area (No. 002321 Corrie Mountain Bog), with the closest part of the active extraction area being at ca. 150 m to the east of the NHA. An examination of Leitrim County Development Plan County Development Plan 2009-2015, and enquiries within the Planning Section of Leitrim County Council and the Irish Geological Heritage Section of the Geological Survey of Ireland indicated that there are no areas designated as County Geological Heritage Site within or in the proximity of the site, as the closest site constituted by disused coal pits at Altagowlan, Co. Roscommon, approximately 2.5 km to the southwest of the quarry.
The quarrying activities carried out on site relate to the production mainly of dimension stone to be utilised for decorative purposes, such as in building stone-facing, pavements and kerbs. This material is extracted by removing rock from the quarry face in a North West / West direction. Quarrying is carried out exclusively by using excavators, without the need for blasting. The resulting stone blocks are then reduced to the desired size by rock-breakers and guillotine. Some of the quarried material which is not usable as dimension stone, either because of its size or it is of a substandard quality, is processed or sold as decorative aggregate and sand. Quarry management informed us that this constitutes approximately 10% of the quarry output. It is the intention of the quarry management to continue to extract stone following the requirements of the construction industry. The quarry activity has moved in a Westerly / North -westerly direction following the desired rock strata.

1.7 Description of the Characteristics of the Site

In accordance with Article 2(a)(i) of SI No. 99 of 1999, a description of the physical characteristics of the whole site and the land use requirements during the construction and the operational phases is provided in Section 3 of the rEIS.

1.8 Characteristics of the Production Processes, Including Nature and Quantity of Materials

In accordance with Article 2(a)(ii) of the Second Schedule of SI No. 93 of 1999, a description is provided in Section 3 of the main characteristics of the production processes and the nature and quantity of material produced.

1.9 Main Characteristics of the Production Processes

The impact of the extraction and production processes are addressed in the relevant sections of this rEIS. The principal characteristics of the production process, which involves the extraction of stone, are described in Section 3 below.

1.10 Estimated Type and Quantity of Residues and Emissions (Including Water, Air and Soil Pollution, Noise, Vibration, Light, Heat, and Radiation) Resulting from the Quarry

In accordance with Article 2(a)(iii) of the Second Schedule of SI No. 93 of 1999, this EIS has addressed the estimated type and quantity of residue and emissions that have occurred or are arising from the quarry activity. These matters are addressed in Sections 3, 6, 7, 8 and 9.
2 DESCRIPTION OF THE SITE

2.1 Site Location

The site is located in the townland of Liscuillew Upper, Drumkeeran, County Leitrim, approximately 3 km to the south of the village of Drumkeeran, ca. 19 km to the west of the town of Manorhamilton, County Leitrim, and ca. 12 km to the north west of the village of Drumshambo, county Leitrim. The entrance to the site is located on the west side of the Local Road 4283, to the west of the regional Road R280 from Manorhamilton to Carrick-on-Shannon, County Leitrim (Grid Reference: G900210, see Map 2/1).

2.2 Site Context and Characterisation

The site is located on the northeast-facing slope of a mountain complex (Corrie Mountain) with a general orientation NW-SE. The top of Corrie Mountain reaches an altitude of 426 mOD approximately 1 km to the SSW of the site entrance. The other main topographical feature of the area is the water expanse of Lough Allen, located ca. 3 km to the east, at elevations of ca. 50 mOD. Topographical elevations within the site raise from ca. 250 mOD near the site entrance, to the highest elevation in excess of 294 mOD along the site southern boundary.

The area traditionally and currently used for quarrying are located to the West / North West of the site. An extracted area, currently no longer active has been restored in consultation with Leitrim County Council requirements and is located at the eastern end of the site. The quarry face presents two benches: an upper bench, with a height variable between 4 m and 7 m, and a lower bench, generally 10 m high, with a maximum of 20 m at the southeastern end of the site. The material extracted from the upper bench is processed and sold as decorative aggregate or sand, while dimension stone is provided by the bedrock exposed at the lower bench. In the past, material has been removed from the slope in the southeastern part of the site, leaving behind a steep cut which at its maximum height is ca. 18 m above the quarry floor level however excavation in this area has now ceased. This portion of the site has an extractive industrial character, with spoils of quarried material, quarry machinery and sub vertical excavated slopes, up to ca. 20M high. Several heaps of excavated and screened material are present on site. A workshop is located in close proximity to the rehabilitated area mid way along the South Eastern part of the site. This structure is and was used for maintenance of the quarry machinery, cutting of stone blocks to the desired dimension with a guillotine, and for storage of machinery parts and other tools. Four 200 litre barrel of lube-oil for use in the quarry are stored in a bunded area in the southwestern corner of the workshop-shed. Two metal, double-shelled oil storage tanks are located in a dedicated bunded area adjacent to the eastern wall of the shed, to cater for the
quarry machinery. Both these tanks are divided into four sealed compartments, which allows for storage of different liquids if necessary. The total capacity of these tanks is 12,000 litres but only up to 6,000 litres of diesel is stored at anytime. The remaining space was used for storage of lubricant oil and waste oil, prior to appropriate disposal.

The site is separated from adjoining lands by bermes, a 1-m high metallic fence with wooden posts, and by a 2-m high railing and gate at the site entrance.

The surrounding fields constitute of blanket bog/wet heath/clear, forestry, felled woodland and as ovine wet grassland pasture.

There are scattered residential properties in the vicinity of the site, with the nearest residence located over 158m to the South East of the extraction area, along the local road L4283 at a significantly lower elevation. The village of Drumkeeran, is located approximately 3 km to the north of the site entrance.

Lough Allen, designated as "Area of High Visual Amenity" in the Leitrim County Development Plan 2009-2015, is located at a minimum distance of ca. 3 km to the east of the site.

3 DESCRIPTION OF THE PROJECT

3.1 Introduction

The quarry at Lisculliew Upper, Drumkeeran, Co. Leitrim, currently operated by Mr. Jim McPadden trading under the name of Sandlewood Ltd, has being in continuous operation since the 1900’s. In 1927 there was a court case between the quarry operators of that time however there are no details as to the nature of the dispute between the operators. Traditionally the quarry was and continues to be used for the production of building stone and to a lesser extent road making material, sand and decorative chips. One blast has taken place in the quarry in approximately 1957 however this practice was discontinued as it proved unsuccessful and rendered the stone unusable for the production of dimension stone. Prior to 1967 Leitrim County Council and the O’Rourkes both operated from the quarry at the same time. Between 1967 and 1974 Ned Reilly of Lynn’s Bridge, Mullingar operated the quarry under the name of Stonefacings. From 1975 to 1989 both Mr. O’Rourke and Mr. Noel Flynn quarried building stone and road making material. In 1990 the quarry was occupied by Mr. Leonard McNicholas. Subsequent to this in 1991 Mr. O’Rourke operated the quarry until it was taken over by Jim McPadden whom currently operates the site. Leitrim County Council and Coillte have used material from the site through the 1980’s and 1990’s.

On the 7th April 2005 an application to register the quarry in accordance with Section 261 of the Planning and Development Act 2000 was submitted to Leitrim County Council. Subsequent to the registration application Leitrim County Council on the 7th February 2006 requested the making of a Planning Application and the submission of an Environmental Impact Statement
(see Appendix B). A submission to Leitrim County Council with respect to this requirement (see appendix C) negated this requirement as Leitrim County Council were satisfied that under current legislation and given the nature, scale and extent of the operation it was not having a significant effect on the environment and therefore neither an EIS or the making of a planning application were in order. The quarry was duly registered under Section 261 of the planning and development act 2000 (Leitrim County Council reference number QR1) and the operation subject to 21 conditions (see appendix D). An EIS was previously generated and submitted to Leitrim County Council however due to the European Court of Justice (ECJ) case C-215/2006 in July 2008, the implications of which was to render unlawful any retention planning permissions for which an environmental impact assessment (EIA) was required, removed that provision in Irish planning legislation and dictated that the planning application could not be progressed. The ECJ ruling however did allow for the regularisation of developments requiring EIA in exceptional circumstances. Part XA of the Planning & Development 2000 Act, as inserted by Section 57 of the Planning & Development (Amendment) Act 2010, makes provision for a substitute consent process for the regularisation of certain developments coming within the scope of EIA or appropriate assessment (AA). Section 177B (of Part XA) of the Act made provision for such applications to be made to An Bord Pleanála for substitute consent following notification from the planning authority to do so following consideration of specific planning matters relevant to the development. Section 75 of the 2010 Act inserted a new section 261A into the 2000 Act. Each planning authority had to determine which quarries in its administrative area would, having regard to the dates of implementation of the EIA Directive and the Habitats Directive, respectively, have required an EIA, a determination in relation to EIA, or an Appropriate Assessment in relation to possible effects on the integrity of a European natura site, but which were not subject to such assessment/determination. Where a planning authority determined that a quarry came under such a category, the planning authority was required to make a further decision in relation to the planning status of the quarry, including registration status. Flowing from this decision, the planning authority had either to request an application for substitute consent or taken enforcement action requiring the quarry to cease operations. On the 18th of July 2012, under sub section (2)(a)(i) and section 261A of the Planning and Development Act, 2000, as amended by the insertion of section 75 of the Planning and Development (Amendment) Act 2010 and as further amended by the European Union (Environmental Impact Assessment and Habitats) Regulations 2011 and European Union (Environmental Impact Assessment and Habitats) Regulations 2012 Leitrim County Council requested the submission of a substitute consent application to An Bord Pleanala and that such an application should be accompanied by an rEIS (ref: QR.01). The determination of Leitrim County Council was appealed to An Bord Pleanala whom ratified that decision consequently it
was requested by the Bord that a planning application accompanied by a remedial Environmental Impact Statement be submitted

3.2 The Existing Quarry

The existing operation has three separate areas, the worked (of which a proportion has being rehabilitated), working and workable area of the quarry. Production is predominantly confined to building / dimension stone for paving slabs, the construction of walls or facing of buildings which dictates that the quarry produces low volumes of a high value product. The operation employs 6 personnel, 4 located in the quarry operation and 2 employed in deliveries. Normal operating hours are 08:00 hrs – 18:00 hrs Monday – Friday, 08:00 hrs – 16:00 hrs on Saturday with the quarry being closed on Sundays and bank holidays. There is no haulage or processing of material outside of these times. Approximately every 3 years overburden was stripped from over the quarry face, which is approximately 20 m high and moving in a Westerly / North westerly direction (see Map 3-1) to facilitate access to the sandstone strata beneath. This overburden was used for the construction of noise, dust and visual impact abatement berms with some of the peaty soils used in the rehabilitation of spent/worked areas. An area of approximately 0.249 ha located at the South East end of the quarry has already being rehabilitated using overburden and has being prepared for planting. Excess overburden was occasionally sold as fill. Once the overburden has being stripped a Doosan 360 tracked excavator fitted with an excavation tooth bucket removes the top 1-2m of sandstone. This top 1-2m strata is unsuitable for the production of building stone/dimension stone and is screened using a Chieftain Warrior 1400 power screener and impactor to produce 6mm, 10mm, 14mm, 20mm 30mm decorative chips and sand thus negating any possible waste and is generally only carried out for up to 2 days per week. The nature of the activity dictates that, although overburden is stripped every 3 years, the unusable 1-2 m of sandstone is removed monthly to facilitate access to the more suitable strata beneath which are used for the production of dimension/building stone. Once the suitable rock strata are accessed they are excavated, from the face and stored temporarily on the quarry floor where it is sorted, moved or riddled using an 18T JCB fitted with a riddle bucket, a Doosan 360 tracked excavator fitted with a grab. It should be noted that no blasting occurs on site as this process would render the aggregate unusable for the production of building / dimension stone. Where the stone excavated for the face produces sizes that are too large for the next stage of the process, guillotining, it is further reduced in size by a monabert rock breaker on the quarry floor to produce a more manageable size.
This stone is then transported by a Daewoo Mega 300V wheeled loading shovel from here to the 11.5 m x 33.38 m processing building where the stone is manually sorted, guillotined (using a two man operated Steinex guillotine) to the required size and placed in 1 ton bags. The bags are moved from the processing building with a forklift and stored along the North side of the processing building. From here the 1 ton bags are loaded on to 8 wheelers, 6 wheelers or artics for delivery nation wide.

All vehicles exiting the site turn left on to the L4283 which has previously being up graded to facilitate quarry traffic. The L4283 is also one of the primary haulage routes for timber extraction from the area. In a snap shot of quarry out put the maximum number of artics to leave the site in one day was 2, maximum number of 8 wheelers to leave the site in one day was 3 and the maximum number of 6 wheelers was 17. The maximum number of combined heavy vehicle movements on any day was 18 for this period with the minimum being zero truck movements. The truck movements convert to a minimum of zero tons per day to 360tons per day. The current and projected annual tonnage from the operation is approximately 55,000 tons which is consistent with the levels of production and is similar to the historical extraction rates within the quarry. There is no haulage from the quarry outside normal operating hours. A link-a-sweep is permanently retained on site to remove any detritus or extraneous material that may egress on to the public road.

3.3 Constraints on the Proposed Extraction Area

The extraction direction has follow the rock strata that are suitable for the production of building / dimension stone within the existing quarry while the direction of extraction has increased the separation distance between the operation and existing dwellings. Constraints and possible impacts on the surrounding land and structures from extraction and processing include:

- Restriction imposed by planning authorities (if applicable)
- Impacts on groundwater and surface water
- Noise and vibration
- Dust
- Potential for ground movement
- Proximity to inhabited dwellings.

The closest inhabited dwelling is 158m down gradient to the South East of the working face with the dwelling to the North of the quarry at a distance of 223m from the working face and is also down gradient. Given the separation distances and the shielding effect of the topography the operation is not projected to have had an impact on these dwellings thus negating them as a constraint.
No dewatering of the quarry is required with only precipitation based water flow to be considered, which is currently subject to a discharge licence from the on site lagoon system with such discharge intermittent and dependant on rain fall.

No blasting occurs on site therefore vibration is not of consideration particularly as the industry stand permits blasting to within 150 m of dwellings [the ppv (peak particle velocity) can be controlled to an acceptable level for dwelling to within 150 m].

The nature of the operation produces relatively low volumes of high value products which require minimal processing therefore noise and dust levels have not presented an issue.

3.4 Phasing of Excavation and Rehabilitation

Historically over burden was removed from a strip measuring approximately 170m long by 20m deep at the top of the 20 m quarry face every 3 years. This facilitates access to the sandstone strata below for extraction. The overburden was removed using a Hitachi 360LC or Doosan 360 tracked excavator fitted with a bucket. The overburden is stored on the quarry floor where it was utilised in three separate ways:

- The overburden was, and is, utilised in the construction of environmental berms for the control of noise, dust and visual impact abatement measures.
- The peaty top soil was used for the purposes of rehabilitating worked of spent areas in the quarry. A section measuring approximately 0.249Ha in the South East corner of the site has being rehabilitated using the overburden and is now ready for planting with indigenous species.
- Excess over burden was sold as fill which temporarily increases traffic volumes for a short duration during this time.

The overburden was stripped in this manner to facilitate the mechanical extraction of the aggregate in a series of benches along the quarry face at varying levels over the next 3 successive years. There was no overburden stripping along approximate 70m of the quarry face situated to the South of the face as no aggregate extraction occurred there for a considerable period of time.

3.5 Excavation Process

Once the overburden was removed the aggregate was, and is, mechanically removed using one Doosan 360 tracked excavators fitted with a tooth bucket which operates at varying heights (approximately 3 m intervals) along the quarry face and works in a top down direction. This is not a continuous process and only occurs subject to demand or when stockpiles are low and may only occur for 2 days per week. The extracted stone is then stockpiled on the quarry floor for the next stage of the process.
3.6 Processing of Aggregates and Processing Plant

The top 1-2 m of the sandstone strata are unsuitable for the production of dimension/building stone and is therefore processed in a separate manner. It is generally processed and sold decorative chips or sand post screening and washing in a Chieftain Warrior 1400 fitted with a recycling impactor, this effectively means that the extraction process does not produce any waste or unusable material. The sandstone suitable for the production of dimension / building stone is graded and screened using a Doosan 360 tracked excavator fitted with a grab or an 18T JCB fitted with a riddle bucket.

This process results in 4 separate aggregate types which are all treated in a different manner:

(1) Sandstone stone unsuitable for the production of building / dimension stone was treated the same as the top 1-2M of the rock strata.

(2) Sandstone that is the correct size and dimensions for building stone may be packed directly into 1 ton bags or stockpiled for direct supply.

(3) Sandstone which is too large for processing or use as in (1) and (2) above is further reduced to a workable size using the rock breaker on the quarry floor and transported to the processing building using a Daewoo Mega 300V wheeled loading shovel.

(4) Sandstone that is suitable for the production of dimension / building stone but which is either the incorrect shape or too large (but does not require adjustment with the rock breaker) is transported directly to the processing building. The processing building contains the 2 man operated Steinex guillotine which breaks the stone into the correct dimensions.

3.7 Materials Storage

Aggregates that have undergone adjustment in the processing building are placed into one ton bags or on to pallets which are transported by fork lift to the East side of the processing building for storage prior to sale. Aggregates that are usable for building stone produced in the breaking out are processed into washed 6mm, 10mm, 14mm, 20mm, 30mm chips and sand which are stockpiled and stored on the quarry floor.

3.8 Current Facilities

Located at the entrance to the quarry inside the gate are a dry canteen (non cooking) and a small administrative office. To the front of the canteen and office is a chemical toilet which has being supplied by Aesthetic Services Ltd. whom are also responsible for its maintenance. The processing building which contains the Steinex guillotine measures approximately 11.5 m x 33.5 m. Inside the entrance on the North Western side of the processing building are two small
segregated rooms a bunded mineral oil storage area measuring approximately 2.6 m x 1.5 m directly inside the entrance with a tool shed directly behind this measuring approximately 2.6 m x 4 m. Directly behind the processing building along the South Eastern side is located the main hydrocarbon bunded roofed tank which has 4 compartments (only two of which are used) measuring approximately 2.2 m x 6.3m. There is no wheel wash or weigh bridge located in the quarry however the operator is in the process of installing a wheel wash which will be completed in 2015.

3.9 Existing Hydrocarbons Storage and Management

There is an extensive hydrocarbon control system currently operated on site. Both red and green diesel is stored in a 12,000 liter tank which is housed at the southeastern end of the processing building in a roofed and concrete bunded area the volume of which is 15.246 m³ (15,246 litres) which exceeds the required 110% volume of the tank. In addition to this the following is currently management system is utilised on site.

- Dead mans handle on nozzles used to fill machinery
- All mineral oils are stored in a concrete bunded area with drip trays (see photograph) adjacent to the processing building. The volume of the bund is 1.794 m³ (1,794 litres) which far exceeds the minimum mandatory industry standard of 110% the volume of the drums.
- All cloths, materials, gloves etc. contaminated with hydrocarbons are stored in a separate specifically designated container for and is collected by the permitted and licensed operator ENVA with the C.1 forms retained on site.
- Preventative maintenance on machinery to prevent oils or hydraulic fluid spill from burst pipes.
- A Spill kit is retained on site with all employees trained in its use
- Permits, licences and C.1 of company employed to dispose of waste oil or oil contaminated material are retained on site with the C.1 also.
- No maintenance of plant to takes place on quarry floor.
- All haul roads are such as not to create a situation where fuel tanks on haulage trucks can become damaged by extraneous material.
- Hydrocarbon storage tanks are housed and are located away from heavy machinery thereby making accidental rupture impossible.
- The by pass hydrocarbon interceptor is inspected by ENVA with water contaminated with hydrocarbons removed for off site treatment.
3.10 Water Supply and Management On-Site

No excavation have taken place below the water table and as a consequence no dewatering of the quarry takes place. The result of this is that only precipitation based water requires management which is achieved through two processes.

- A 1.5 m deep surface water interceptor drain is located to the North of the quarry face which intercepts all clean water from entering into the quarry area from the undisturbed areas to the West / North West.
- All precipitation on to the quarry floor is diverted via a concrete channel surface interceptor drain to a primary treatment lagoon and then through a by pass oil interceptors to the lagoons located at the North end of the Quarry. These lagoons discharge to a water course that runs along the North of the quarry. The discharge of the water from the lagoons is under license from Environmental section of Leitrim County Council WPL/08/01. The oil interceptors are routinely inspected by ENVA with any hydrocarbon contaminated water removed for disposal and C.1 forms issued to the quarry operator.
- Water used in the processing of the decorative chips and is recycled from the primary treatment lagoons with excess treated prior to discharge to the main settlement lagoons. As discharge is directly related to precipitation there is no discharge during dry weather periods. All fresh water requirements of the quarry are supplied by two tanks (one located along the South East side of the processing building and the other located to the rear of the office and canteen buildings) which collect rain water from the roofs of the buildings to which they are adjacent.

3.11 Existing Facilities

With respect to the current operation there are no further facilities required over what is currently present on site for the extraction and processing of aggregates. The operators have indicated that a wheel wash will be constructed on site inside the gate in 2015.

3.12 Existing Refuse, Waste Metal and Exhaust Batteries Management

The nature of the operation dictates that the volumes of refuse, waste batteries and waste metals are extremely low. Not withstanding this the following waste management practices for these are employed on site. General refuse and litter is collected on site by Barna Waste. A waste battery container is located in the processing building and has being supplied by ENVA Ireland Ltd. Whom also remove and dispose of the batteries.
Erin Recycling based in Sligo have been retained for the purpose of disposing of waste and scrap metal which are occasionally and temporarily stored to the North West of the canteen and Office.

### 3.13 Mitigation Measures and Monitoring

A rudimentary waste management plan currently exists on site however this should be upgraded to a full EMS (environmental management system) and shall address all environmental aspects of such operations ensuring that the continued operation complies with the most recent industry standards. Noise, Dust and water discharges have all been monitored with levels well within the industry standards. Monitoring was suspended due to the uncertainty invoked by Section 261A of the 2000 Planning and Development Act.

#### 3.13.1 Noise

There are currently no Noise Sensitive locations contiguous to the site boundary however the closest dwelling is approximately 158 m to the South East of the working face. As the noise source is external in nature and its dimensions are small compared to the above locations then as the sound energy is radiating it will spread over an area that is proportional to the square of the distance. As this is an inverse square law then the sound level will decline by 6dB for each doubling of distance. In addition the activity is located in an area that has previously been artificially lowered by as much as 3 m thus the surrounding boundary relief will act as a natural “baffle mound” further negating noise emissions. The times of operation are 08:00 – 20:00 Monday to Friday and 08:00-1600 on Saturday thus there will be no noise emissions outside of these times and the EPA standard of Laeq (15min) of 45dB(A) by night was not, nor will it be breached. Monitoring has been carried out by a number of independent agencies with the results indicating that the noise levels at the NSL’s as a result of the operation of the quarry were well within the industry standards for both day time and night time measurements. Should such monitoring indicate that 5% of all noise measured exceed an Laeq (1 hour) of 55dB(A) by day or any individual noise exceeds the limit value by more than 2dB(A) when measured from the boundary of the identified receptors (noise sensitive locations (NSL’s)) then remedial action shall be taken. Such action would be in the form of noise baffle construction close to the area of operation to prevent noise radiation at source. Other noise mitigation measures employed include (but are not limited to) acoustic screening of equipment, low gradient haul roads and planting of sound absorbing vegetation. Regular maintenance of equipment combined with a one-way system shall neutralize audible tonal or impulsive components in noise emissions. All monitoring and noise monitoring equipment shall, and did, conform to ISO 1996: Acoustics Descriptions and
Measurements of Environmental Noise. Noise monitoring completed by AVA Acoustics, ANV technologies and HMN Environmental consultants, at separate dates, all indicate that the noise levels at the nearest NSL (noise sensitive location) was well within the industry standards at Laeq(30min) 43dB(A).

3.13.2 Fugitive Dust

Fugitive dust generated from the activity could be described as inert and harmless in the chemical context and would not contain any of the harmful compounds as described and listed in Atmospheric Emissions by T.A. Luft, (1986), section 2.3. The main concerns with respect to dust are generally experienced within 100 m of the dust source. As the proposed activity is a minimum of 158 m from any receptors it is not envisaged that dust generated presented any nuisance. None the less the standard limit of 350 mg/M²/day of total dust deposition (soluble and insoluble) when averaged over 30 days, measured at the site boundary in accordance with the internationally recognised German TA Luft Air Quality Standard method (Bergerhoff) was observed. Mitigation measures that were and may be implemented with respect to dust generated include, but are not limited to, enclosing of equipment to prevent dust escaping, water misting of conveyors and crusher, wheel washing of vehicles leaving site, spraying or covering of fine loads leaving site and landscape mounds on the periphery of the site. As with (3.13.1) above the surrounding boundary relief will act as a natural barrier in the prevention of fugitive dust escaping the site.

Monitoring was carried out on site at the locations indicated in Map 7-2 and yielded results of 142 mg/m²/day in the South East corner with 182 mg/m²/day at the gate measured during stripping of overburden (which tends to be the phase of quarrying that produces the most fugitive dusts). Further dust monitoring by McCarthy Keville O’Sullivan Ltd gave results significantly below this with one result giving a value of 33 mg/M²/day for normal quarry operations in 2011.

3.13.3 Water Management

The existing water management practices on site are adequate for the operation. The discharge from the lagoons to the watercourse to the North shall observe the conditions and frequency of sampling in accordance with the Discharge Licence WPL/08/01 issued by Leitrim County Council. Chemical toilets are going to be used on-site for the quarry personnel, so reducing the possibility of groundwater and surface water pollution by wastewater. Surface water interceptor concrete channels have been constructed at the periphery of the site to ensure that there is no uncontrolled water egress from the quarry floor.
3.13.4 Hydrocarbons Storage and Management

The existing on site hydrocarbon management plan shall be entirely complied with. In addition the operator shall ensure that the hydrocarbon storage bunds are rendered on the inside.

3.13.5 Maintenance of the Public Road

No extraneous material from the quarry is permitted on to any public road. The public road must was inspected twice daily (before 12:00 and at 17:30). Where extraneous material has being deposited on the public road corrective action has been taken immediately to remove it i.e the road sweeper that is retained on site.

3.13.6 Permits and Licences

All permits and licenses, and discharge licenses issued by the Local Authority are retained on site for reference by employees or inspection by members of the public as requested.

No waste oils or metals were permitted to leave the site unless the relevant transportation and waste permits have first being obtained from the contractor responsible. All such permits are retained on site for inspection by the local authority if requested.

3.13.7 Complaints Register

A complaints register is and shall be operated and maintained as part of the EMS. The register shall document all external and internal observations, concerns or complaints. Where such observations, concerns or complaints are received it the responsibility of the site manager to investigate the merit of these and act on them appropriately.

3.13.8 Other Wastes

The current practices of managing other wastes arising form the operation shall continue as these have ensured that there have been no impacts on the environment from such wastes. These management practices shall be incorporated into the EMS and shall be adjusted to comply with the relevant industry standards where applicable.

3.13.9 Visual Impact

Section 10 of this EIS deals with the visual impact abatement measures.
3.14 Employment and Hours of Operation

The quarry employs a total of 6 personnel in the extraction, processing and delivering of aggregate and dimension stone. Normal operating hours are 08:00 to 18:00 hrs Monday to Friday, 08:00 to 16:00 hrs on Saturday. The quarry is closed on Sundays and Bank holidays.

4 HUMAN BEINGS

This chapter of the Environmental Impact Statement describes the possible socio-economic or human impacts of the proposed quarry. Possible impacts on the human environment that may have arisen from this type of project typically involve the effect on land-use, economy, tourism, population and associated parameters. Therefore, the impact of the development is described in terms of the following:

- Population
- Land use
- Employment
- Community Facilities
- Education
- Economy
- Infrastructure
- Tourism

4.1 Legislation and Planning Policy Guidance

Relevant national legislation, regional and local area policies, programs and plans were reviewed in the preparation of report.

4.1.1 National Policy and Guidance

4.1.1.1 National Spatial Strategy 2002-2020

The National Spatial Strategy 2002-2020 (NSS) sets out a strategy for balanced development throughout Ireland. The focus of the NSS is to bring people, jobs and services closer together in order to provide for a better quality of life for everyone with less traffic, less commuting, better environmental care and easier access to services like health, education and leisure. The National Development Plan 2009-2015 established a number of strategically situated cities and/or towns throughout the country as 'gateways' for development throughout their zone of influence. The NSS designated four new national level gateways. The NSS also established nine additional hubs
located within the gateways zone of influence. The purpose of the hubs are to are strengthened by the designated of nearby towns that have been identified as ‘hubs’. Carrick-On-Shannon, the largest town in Leitrim, has been acknowledged as a regional strategic residential, employment, administrative and other service functions town under the NDP.

4.1.1.2 National Development Plan 2007-2013
The National Development Plan (NDP) 2007-2013 entitled ‘Transforming Ireland - A Better Quality of Life for All’ builds on the previous NDP 2000-2006. The plan sets the framework for the sustainable development of the country, through defining and implementing key strategies and polices that will affect positive sustainable economic growth, an increased level of social inclusion and balanced development throughout the regions. The NDP policies and objectives for balanced regional development have been formulated in close alignment with the objectives of the NSS 2002-2012. A key objective of the plan is to achieve a greater balance between the regions in terms of economic and social development.

4.1.2 Leitrim County Development Plan 2009 - 2015
The County Development Plan sets out an overall strategy for the proper planning and sustainable development of county Leitrim. The Leitrim County Development Plan recognises the importance of new industry and employment opportunities within the county. The plan identifies four distinct type or tiers of towns as determined by size and function etc. Carrick-On-Shannon is a tier 1 town and the only town is this category as it has a population of over 2,500 people. It is key service, administrative and retail centre in the county.

The Development Plan seeks to establish a framework for the future development of the county as a thriving rural community, with a rich heritage and vibrant and diverse social, cultural and economic aspects. The formation of the Development Plan aims to:

“The Council will seeks to achieve through appropriate planning policies, an improving quality of life for those who live, work and move to County Leitrim. The Council will facilitate the development of a diverse and vibrant local economy whilst protecting and enhancing the environment and the natural, archaeological, built and cultural heritage”.

The Development Plan outlines specific strategic goals concerning the environment, economy, transport of which socio-economics is centrally affected by all.

4.2 Methodology and Assessment Criteria

4.2.1 Baseline Studies

This assessment forms part of a remedial Environmental Impact Statement carried out in compliance with European Communities (Environmental Impact Assessment) Regulations, 1998
(S.I. No. 351 of 1998) which amends Article 25 of the European Communities (Environmental Impact Assessment) Regulations 1989 (S.I. No. 349). The method adopted in the assessment included the following key elements: collection and analysis of data in order to prepare an initial local profile of the study area.

4.2.2 Impact Magnitude
Magnitude describes the intensity or severity of an environmental effect. It may be described as the amount of change in a measurable parameter relative to the baseline condition. The impact magnitude is described using the following terms: negligible, low, moderate, high. The criteria for assessment of impact magnitudes are outlined in Table 4-1.

Table 4-1 Impact magnitude

<table>
<thead>
<tr>
<th>Impact Magnitude</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negligible</td>
<td>No detectable change from baseline conditions</td>
</tr>
<tr>
<td>Low</td>
<td>Slight change in typical baseline conditions but well within normal socio-economic fluctuations</td>
</tr>
<tr>
<td>Moderate</td>
<td>Change in typical baseline conditions but well within normal socio-economic fluctuations or to cause a detectable change in social or economic parameters within the range of natural variability</td>
</tr>
<tr>
<td>High</td>
<td>Change predicted to exceed established normal socio-economic fluctuations, or to cause a detectable change in social or economic parameters</td>
</tr>
</tbody>
</table>

With regard to the duration of impacts, the Environmental Protection Agency guidance (Environmental Protection Agency, 2002) describes them in the following manner:
- Temporary impact – impact lasting one year or less
- Short-term impact – impact lasting one to seven years
- Medium-term impact – impact lasting seven to fifteen years
- Long-term impact – impact lasting fifteen to sixty years
- Permanent impact – impact lasting over sixty years.
4.2.3 Receptor Sensitivity

The sensitivity of characteristics within the receiving environment is assessed as follows:

Table 4-2 Receptor sensitivity

<table>
<thead>
<tr>
<th>Receptor sensitivity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Not operating at capacity, able to absorb the increase in population.</td>
</tr>
<tr>
<td>Moderate</td>
<td>Approaching capacity, capable of absorbing small population increases.</td>
</tr>
<tr>
<td>High</td>
<td>At capacity, unable to absorb any additional population increases.</td>
</tr>
</tbody>
</table>

4.2.4 Significance Evaluation

Using professional judgment, and based on the criteria outlined above, the magnitude and receptor sensitivity for each impact is predicted. The level of significance is then assigned to each impact.

Table 4-3 Impact significance evaluation

<table>
<thead>
<tr>
<th>Receptor Sensitivity</th>
<th>High</th>
<th>Moderate</th>
<th>Low</th>
<th>Negligible</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Very Substantial</td>
<td>substantial</td>
<td>High Moderate/Minor</td>
<td>Minor</td>
</tr>
<tr>
<td>Moderate</td>
<td>Substantial</td>
<td>Moderate</td>
<td>Minor</td>
<td>Minor/ Negligible</td>
</tr>
<tr>
<td>Low</td>
<td>Moderate/Minor</td>
<td>Minor</td>
<td>Minor/ Negligible</td>
<td>Negligible</td>
</tr>
</tbody>
</table>
4.3 Receiving Environment

4.3.1 Site Location

The quarry is situated in the Liscuillew townland near the village of Drumkeeran, a tier 3 village, which is approximately 3km from the quarry. Carrick-On-Shannon, a tier 1 town and the largest town in the county is situated approximately 25km to the south of the quarry.

4.3.2 Population Statistics

The entire population of County Leitrim was an estimated at 28,950 persons as of the Census in 2006 which increased 31,798 in 2011 an increase of 9.8% in the County population.

Population projections are a critical indicator for the future requirements of an area in terms of educational facilities, housing, development of residential and commercial land etc. From a local perspective, information on the population area of Carrick-On-Shannon is available from local area development plan 2004 and Census data. These population projections were based on different assumptions on migration, fertility rates and economic activity. If the population of Carrick-on-Shannon Town is expected to grow at its current rates, by 2020 it will be 6,200, an increase of 145%. More recent population data, as made available from the CSO 2006 Census, indicates a growing population with a 9.8% increase between the years 2006 and 2011. In 2006 the total population of Carrick-On-Shannon Town was 2,595.

Table 4-4 Towns with their population, 2002 and 2006

<table>
<thead>
<tr>
<th>Town</th>
<th>2002</th>
<th>2006</th>
<th>Changes in population 2002 - 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Persons</td>
<td>Persons</td>
<td>Males</td>
</tr>
<tr>
<td>Carrick-On-Shannon</td>
<td>1,842</td>
<td>2,595</td>
<td>1,259</td>
</tr>
</tbody>
</table>

Despite its close proximity to Carrick-On-Shannon, the site is actually situated in Liscuillew townland, with the closest town being Drumkeeran. Errore: sorgente del riferimento non trovata.

Table 4-5 provides information on the population.
Table 4-5 Population of Carrowmore Electoral Division, 2002 & 2006

<table>
<thead>
<tr>
<th>Town</th>
<th>2002</th>
<th>2006</th>
<th>Changes in population 2002 - 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Persons</td>
<td>Persons</td>
<td>Males</td>
</tr>
<tr>
<td>Drumkeeran</td>
<td>242</td>
<td>249</td>
<td>125</td>
</tr>
</tbody>
</table>

4.3.3 Land Use

Land use in the general Drumkeeran area comprises a mix of single dwelling houses and agriculture land with extensive forestry plantation.

4.3.4 Housing Density

The quarry is located about 3km off the western side of the R280 road en-route to Drumkeeran (Droim Caorthainn—meaning ‘Ridge of the Rowans’) village. Access to the site is from the L4283 road that runs off the R280 road. The housing density in the area is low as typical of a rural area. This road has 5 dwellings on it with another 2 dwellings next to the site at either side, where the house on the Eastern side of the site is for sale.

4.3.5 Community facilities

Although the quarry is located in Liscuillew Upper townland, the closest actual town is Drumkeeran, a tier 3 village, situated 3km away. As such Liscuillew is dependent on the town for provision of services, goods, and amenities. Drumkeeran village has a limited range of commercial and community facilities. Carrick-On Shannon, the county’s principle administrative centre with a wide range of commercial and community services and facilities, ranging from sports and leisure, arts and culture to retail and public services.
4.3.6 Education

There are a large number of both primary and post primary schools servicing the educational needs of County Leitrim. The County is served by 43 primary and 9 secondary schools. This amount of education facilities is recognised as a large amount for the County’s population. Carrick-on-Shannon accommodates one post primary school and two primary schools. There are also a Teacher Training Centre, offering a range of courses, and a full pre-day care facility and a number of seasonal facilities operating in the town. Schools in the area are in general not at full capacity.

4.3.7 Economy

Agriculture remains the principle employment sector in the county. The industry in characterised by small land holdings. Commercial forestry has also grown over the last twenty years. Until recently, Leitrim had been unsuccessful in developing a strong industrial and commercial base. Poor access, poor infrastructure, lack of a prosperous agricultural industry and a weak urban structure have all militated against the development of industrial and other commercial development. Carrick-On-Shannon is the biggest town in a 30km radius and serves not just County Leitrim but large parts of North Roscommon in terms of retail, administration and services. The single biggest private employer is the MBNA Bank. Recent information on employment sectors in the county are available from Census 2006.

Table 4-6 Persons aged 15 years and over in the labour force in Leitrim, classified by broad occupational group.

<table>
<thead>
<tr>
<th>Occupational Group</th>
<th>2002</th>
<th>2006</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total in labour force</td>
<td>10,939</td>
<td>13,781</td>
<td>11,972</td>
</tr>
<tr>
<td>Looking for first regular job</td>
<td>120</td>
<td>164</td>
<td>217</td>
</tr>
<tr>
<td>All occupations</td>
<td>10,819</td>
<td>13,617</td>
<td>11,755</td>
</tr>
<tr>
<td>Farming, fishing and forestry</td>
<td>1,309</td>
<td>1,196</td>
<td>1,194</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>1,406</td>
<td>1,608</td>
<td>1,210</td>
</tr>
<tr>
<td>Building &amp; construction</td>
<td>1,156</td>
<td>1,801</td>
<td>643</td>
</tr>
</tbody>
</table>
The number of persons working in the county increased between the years 2002 and 2006, and this has impacted throughout the range of employment sectors with a healthy growth notable for all. However since 2006 the numbers in most sectors reduced most notably the construction sector. The clerical, managing and government sector continues to dominate, closely followed by the professional, technical and health sector.

### 4.3.8 Tourism in the Region

According to the Leitrim County Plan 2009 - 2015 the area has a potentially strong but as yet underdeveloped tourism industry. This is due to poor access, proximity to the border and lack of an accommodation base. The County of Leitrim is renowned for its natural beauty, excellent angling and boating opportunities. On a more local basis, the quarry is situated close to The Miners Way, a series of way-marked long distance walking routes that form a network of paths through three of Ireland’s most picturesque and unspoilt counties of Leitrim, Roscommon and Sligo. The quarry site is not visible along the walking route nearest the quarry. It would be classified as having a neutral impact.

### 4.3.9 Infrastructure

From a regional perspective, transport links to northwest Mayo have until recently been below par. Weak transport links was considered by many to be a major debilitating factor in the economic development of the region. However, the upgrade of the N4 national road facilitates the development of the region, with growing opportunity to attract greater investment and to improve tourism and regional development. Public transport in the area consists of Bus Eireann, private bus operators. There is a single line railway which accesses the Sligo-Dublin national rail route at Carrick-On-Shannon. Sligo airport is located approximately 60km to the west of the site. The
Airport provides a major gateway to the west of Ireland and is hugely important in the sustainable economic development of the western region. In terms of local and site infrastructure, access to the site will be from the old L4283 road that runs off the R280. The R280 leads to the N4, the main Dublin road.

4.4 Quarrying Activities

The nature of the operations carried out on site was to extract rock to provide materials to the construction industry. The extraction process at this location is carried out at a small scale, entailing the following:

➢ rock is excavated from the quarry face with an excavator and bucket.
➢ suitable stone is transported into the shed where it is guillotined to appropriate size. It is then bagged into 1-ton bags and stored on quarry floor.
➢ Unsuitable stone is stored in heaps on the quarry floor, screened and crushed and sold as decorative stone or sand. During screening operation, crushing of bigger boulders may take place on occasions using the crusher bucket on the quarry floor.

A more detailed description of the stone extraction process and of the ancillary quarrying activities is included in Section 3 of this remedial Environmental Impact Statement.

4.5 Impacts

4.5.1 Population

The number of jobs provided at the quarry is 6. This number has not and will not impact on the local population.

4.5.2 Land use

The quarry is evidence of the sandstone landscape of the wide open hilly areas of this area of County Leitrim. It can be said that the socio-economic impact of the change of land use has and is likely to result in a low impact magnitude, and will and has had a corresponding low socio-economic impact on receptors. Overall, the effect of the quarry on land use is of minor significance.

4.5.3 Community Facilities

The quarry operation has not and is not likely to impact on community facilities in the area. The population increase generated by the proposed facility will not be sufficient to place pressure on existing community facilities. Therefore, the impact on local community facilities was, is and will be negligible.
4.5.4 Education
The quarry operations are not likely to impact on educational facilities in the area. The population increase generated by the proposed facility will not be sufficient to place pressure on existing educational facilities. Therefore, the impact on local educational facilities is negligible.

4.5.5 Economy
The quarry will not impact negatively on the economy of the area. If anything it has and would provided a benefit as there will be need for local services i.e. fuel, food and at times perhaps accommodation.

4.5.6 Tourism
The quarry has not and is unlikely to impact on tourism in the northwest region. The quarry’s impact on the visual landscape is negligible. The impact on tourism in the region is therefore negligible.

4.5.7 Infrastructural Impacts
The only infrastructural impact is on the road infrastructure of the area. However, this impact is dealt in detail in Section 11 of the rEIS.

4.5.8 Environmental Impacts
The impact on human beings also relates to nuisances and/or health implications from noise, dust and visual impacts all of which are referred to specifically in separate sections of the rEIS.

4.5.8.1 Air quality
The air quality impacts have been assessed elsewhere in this impact statement. The potential for dust generation is thought to be insignificant due to the nature of the operations.

4.5.8.2 Noise and Vibration
A number of noise assessments have been carried out at the site and the levels recorded were below the recommended limits. The impact of vibration is not applicable to the quarry as blasting does not take place.

4.5.8.3 Water
All hazardous materials and wastes are stored in the appropriate areas and bunds therefore mitigating any contamination of water systems. There is also an extensive water management system in place and a discharge to surface water license to ensure that there is no impact on lentic and lotic systems in the area.
4.6 Mitigation Measures

It is considered that the quarry has not, is not and will not have any negative impact on the society or the economy of the area. On the contrary, it is considered that this quarry has benefited the socio-economic development of the area. Hence, no mitigation measures are recommended.

References

• The National Spatial Strategy 2002-2020, Department of Environmental, Heritage and Local Government
• The National Development Plan (NDP) 2007-2013 entitled ‘Transforming Ireland - A Better Quality of Life for All’
• Environmental Protection Agency (2002) Guidance on the information to be contained in Environmental Impact Statements
• Central Statistics Office
  Census 2006, Volume 1 – Population Classified by Area
  Census 2006, Volume 7 – Principal Economic Status and Industries
  Census 2006, Volume 8 – Occupations
• Leitrim County Development Plan 2003-2009, Leitrim County Council
• Carrick-On-Shannon Local Area Plan, 2004, Leitrim County Council
5 FLORA AND FAUNA

5.1 Site Description

The following is the result of field work carried out. Substitute Consent is being sought for a quarry in the townland of Luiscuillew Upper, Drumkeeran, County Leitrim, to the south west of Drumkeeran village in the town land of Luiscuillew Upper. Boundaries to the north, west and south are formed by blanket bog /wet heath/dry heath/clear felled woodland and to the east by a small road.

Rock is quarried and processed on-site. The site is located 150M from the boundaries of the Corry Mountain Bog NHA (Site Code 002321), which consists primarily of wet heath, dry heath with flushes upland blanket bog and has being compromised by wind farm development and sitka spruce plantations.

5.2 Methodology

Field visits were undertaken to all points within the site. Binoculars (7x50) and telescope (x500) were used and visual, auditory, olfactory and spraint evidence was used to determine the presence of species. Conservation status of species was ascertained using NPWS Data, “The Irish Red Data Book 2: Vertebrates” Whilde A., HMSO Belfast and “Exploring Irish Mammals” Hayden T and Harrington R., Town House and Country House Ltd, 2000. Habitats were identified using "A Guide to Habitats in Ireland", Fossitt J., The Heritage Council, 2000.

A Magellan Explorist handheld GPS unit was used to mark the location of items of interest on-site. The accuracy of GPS locations may be compromised by heavy tree cover. A digital camera was used to document items of interest. 10 meter square (M2) quadrants were sampled within the habitats on-site and in the adjacent lands to establish the floral species composition at those points.

5.3 Survey Constraints

A different floristic diversity may have been evident if the survey was undertaken over the course of a year however legislative constrains prohibit this. Weather conditions on the day of the field visit were extremely wet and this may influence the findings.
5.4 Description of the Existing Environment

5.4.1 Flora
This flora is not intended to be an exhaustive species list as the inclusion of seasonal variations could yield a more detailed floral list.
The habitats surrounding the substitute consent application area form a contiguous unit with each individual habitat grading into the next. In places it is possible to see Blanket Bog, Wet Heath, Dry Heath and active quarry all forming a mosaic of habitats. A habitat map has been compiled (Map 5-1) and each of the following sections is referred to this map.

5.4.1.1 Active Quarry and Mines (ED4)

Because of the level of disturbance due to the active quarry activity, the colonisation by plants and animals is almost entirely prevented within the active quarry area. Some Foxgloves (Digitalis purpurea), Broad Buckler Fern (Dryopteris dilatata) and Sedges (Carex spp.) are found in some relatively undisturbed areas.

5.4.1.2 Wet Heath (HH3)
Peat depth < 50cms
10m2 quadrant
Bog cotton (Eriophorum angustifolium) 5%
Heather (Calluna vulgaris) 30%
Bog Moss (Sphagnum spp.) 30%
Purple Moor Grass (Molinia caerulea) 12%
Tormentil (Potentilla erecta) 1%
Sedge (Carex spp.) 1%
Cross leaved heath (Erica tetralix) 2%
Rushes (Juncus spp) 4%
Purple loosestrife (Lythrum salicaria) 15%
In places Bilberry (Vaccinium spp.) can be found extensively throughout this habitat.
5.4.1.3 Blanket Bog (PB2)

10m2 quadrant
Peat depth > 1 metre (see Photo 5-1)
Bog mosses (Sphagnum spp) 40%
Rush (Juncus spp) 20%
Cross leaved heather (Erica tetralix) 10% (see Photo 5-2)
Purple Moor Grass (Molinia caerulea) 15%
Sedges (Carex spp) 5%
Bog cotton (Eriophorum spp) 10%
This area of bog is traversed by drainage ditches and subject to ovine grazing.

Photo 5-1: Depth of Peat in flushes
Photo 5-2: Cross Leaved Heath

Photo 5-3: View northwest over blanket bog
5.4.1.4 Dry Heath (HH2)
10m² quadrant Peat depth < 15cms
Heather (Calluna spp) 20%
Purple Moor grass (Molinia caerulea) 10%
Rushes (Juncus spp) 5%
Tormentil (Potentilla erecta) 10%
Willow (Salix spp) 5%
Bog Moss (Sphagnum spp) 10%
Plantain (Plantago spp) 5%
Thistle (Cirsium spp) 5%
Dock (Rumex spp) 5%
Grasses (Agrostis spp, Festuca spp, Dactyls spp) 15%
Purple loosestrife (Lythrum salicaria) 5%
Foxglove (Digitalis purpurea) 5%
All floral habitats have in the past been grazed by sheep other habitats found on-site include drainage ditches (FW4) and coniferous woodland WD4 (on the boundaries and small areas inside site to the south and south east).
The woodland is comprised of a mono-culture of Sitka (Picea sitchensis) (see Photo 5-4) with some floral diversity supplied by Willow and Briar (Rubus Spp.). The age range of this woodland varies from approximately 10 years old to greater than 20 years old.

Photo 5-4: Sitka Woodland
5.4.2 Fauna

Fauna was identified by visual, and spraint evidence and the probable presence of certain species was ascertained by the availability of suitable habitat. Vertebrate Fauna on-site can be assumed to be mobile and capable of movement between the various habitats with the quarry area giving little by way of forage or nesting / roosting opportunity. Fauna mobility and the presence of large tracts of habitat to the West and South dictate that the quarry has not, is not and will not impacted on those species.

5.4.2.1 Birds

Sedge Warbler (Acrocephalus schoenobaenus) (summer)
Stone chat (Saxicola torquata)
Meadow pipit (Anthus pratensis)
Skylark (Alauda arvensis)(summer)
Pied wagtail (Motacilla alba)
Kestrel (Falco tinnunculus)
Raven (Corvus corax)
Thrush (Turdus philomelos)
Blackbird (Turdus merula)
Blue Tit (Parus caerulus)
Great Tit (Parus major)
Chaffinch (Fringilla coelebs)
Greenfinch (Carduelis chloris)
Magpie (Pica pica)
Jackdaw (Corvus monedula)
Hooded Crow (Corvus corone)
Rook (Corvus frugilegus)
Sparrow Hawk (Accipiter nisus)
Robin (Erithacus rubecula)
Starling (Sturnus vulgaris)
Wren (Troglodytes troglodytes)
Woodpigeon(Columba palumbus)
Pheasant (Phasianus colchicus)
Cuckoo (Cuculus canorus) (summer)
Snipe (Gallinago gallinago)

were all either seen, heard or could be expected to occur.
Hen Harriers possibly use the mountainside for forage purposes. No breeding, foraging or nesting activity of that species was witnessed during field visits and surrounding and conifer woodland is no longer a suitable habitat to facilitate nesting Hen Harriers. No substantial areas of scrub exist within the quarry or in the area adjacent to it.

5.4.2.2 Mammals

No suitable forage or roosting areas were observed for Bats (Chiroptera). Pine marten (Martes martes) Hare (Lepus timidus hibernicus) Fox (Vulpes vulpes) Rat (Rattus norvegicus) Hedgehog (Erinaceus europaeus) Field mouse (Apodemus sylvaticus) Pygmy shrew (Sorex minutus) Rabbit (Oryctolagus cuniculus) or Stoat (Mustela erminea) are present within the quarry area with the undisturbed exposed mountain side also reflecting this.

5.4.2.3 Amphibians
Frog (Rana temporaria)

5.5 Quarrying Activities

The nature of the operations carried out on site is to extract rock to provide materials to the construction industry. The extraction process at this location is carried out on a small scale, entailing the following:
➢ rock is excavated from the quarry face with an excavator fitted with a tooth bucket.
➢ suitable stone is transported into the shed where it is guillotined to appropriate size. It is then bagged into 1-ton bags and stored on quarry floor.
➢ Unsuitable stone is stored in heaps on the quarry floor, screened and crushed and sold as washed decorative stone or sand. During screening operation, crushing of bigger boulders may take place on occasions using the crusher bucket on the quarry floor.

A more detailed description of the stone extraction process and of the ancillary quarrying activities is included in Section 3 of the remedial Environmental Impact Statement.

5.6 Impact Prediction

5.6.1 Flora
Little significant negative impact to local flora has occurred because these habitats are common locally with rehabilitated areas becoming recolonised by those species. No annexed species were found on site or in the area adjacent to it.
5.6.2 Terrestrial Fauna

Fauna in the footprint of the quarry is unlikely and any that may have been present would have relocated off-site. There is ample alternative habitat available off-site to accommodate any such species consequently it can be deduced that the quarry has not, is nor will it have a negative impact on any such populations.

5.6.3 Aquatic Fauna

Increased particulate loading, siltation and run-off from the development could adversely affect local watercourses however the water management practices employed have negated this potential. Settlement lagoons and surface water interceptor channels have been constructed on-site and these intercept surface run off and allow the suspended solids to settle out before eventual draining under a discharge license to a local watercourses. The creation of the settlement lagoons increased the habitat availability and diversity for aquatic species both animal and plant.

5.6.4 Adjoining agricultural land

It is unlikely that there has been any significant impact, positive or negative on adjoining lands.

5.7 Mitigation Measures

No mitigation measures are required above those already implemented with the following list intended to supplement those already implemented.

➢ No existing boundary hedgerows were or shall be removed in the substitute consent area.
➢ No unnecessary removal of scrub cover was or should be undertaken.
➢ Small areas of scrub should be created on the boundaries berms of the site providing new habitat.
➢ The discharge license conditions shall be observed
➢ Exhausted quarry areas have and should be rehabilitated and allowed to naturally re-vegetate.
6 SOIL AND WATER

6.1 Introduction

An Bord Pleanala required a Planning Application for substitute consent to be submitted and accompanied by a rEIS for the quarry located in the townland of Liscuilew Upper, Drumkeeran, County Leitrim.

6.2 Site Description

The site is located on the northeast-facing slope of a mountain complex (Corrie Mountain) with a general orientation NW-SE. The top of Corrie Mountain reaches an altitude of 426 mOD approximately 1 km to the SSW of the site entrance. The other main topographical feature of the area is the water expanse of Lough Allen, located ca. 3 km to the east, at elevations of ca. 50 mOD. Topographical elevations within the site raise from ca. 250 mOD near the site entrance, to the highest elevation in excess of 294 mOD along the site southern boundary.

The area within the substitute consent application boundary is currently used for quarrying with the face located on the Western side. A worked area to the East of the quarry has already being rehabilitated following previous advice from Leitrim County Council. In the areas affected by quarrying activities, the quarry face presents two benches: an upper bench, with a height variable between 4 m and 7 m, and a lower bench, generally 10 m high, with a maximum of 18 m at the southeastern end of the site. The material extracted from the upper bench is sold as aggregate, while dimension stone is provided by the bedrock exposed at the lower bench. In the past, material has been removed from the slope in the southeastern part of the site, leaving behind a steep cut which at its maximum height is ca. 18 m above the quarry floor level. Excavation in this area has now ceased and the applicant has no plans of reactivating excavation in this section.

The site has an extractive industrial character, with spoils of quarried material, quarry machinery and subvertical excavated slopes, up to ca. 18 m high. Several heaps of excavated and screened material are present on site. A workshop is located in the eastern part of the site. This structure is used for maintenance of the quarry machinery, cutting of stone blocks to a desired dimension with a guillotine, and for storage of machinery parts and other tools. Four 200 liter barrel of lube-oil for use in the quarry are stored in a partially bunded area in the southwestern corner of the workshop-shed. Two metal, double-shelled oil storage tanks are located in a dedicated bunded area adjacent to the eastern wall of the shed, to cater for the quarry machinery. Both these tanks are divided into four sealed compartments, which allows for storage of different liquids if necessary. The total capacity of these tanks is of 12,000 litres of diesel, but only up to 6,000 litres are stored at anytime, as it is the intention of the quarry operator to use the remaining space for storage of lubricant oil and waste oil, prior to appropriate disposal. The site is separated from adjoining lands by a 1-m high metallic fence with wooden posts, and by a 2-m high railing and...
gate at the site entrance. The surrounding fields constitute of forestry, blanket bog/wet heath/clear felled woodland and are in agricultural use as ovine pasture. There are scattered residential properties in the vicinity of the site, with the nearest residence located ca. 158M to the South East of the operational area. The village of Drumkeeran, is located approximately 3 km to the north of the site entrance. Lough Allen, designated as "Area of High Visual Amenity" in the current Leitrim County Development Plan 2003-2009 and in the Draft version of the Leitrim County Development Plan 2009- 2015, is located at a minimum distance of ca. 3 km to the east of the site.

6.3 Description of the Existing Environment – Soil and Rock

6.3.1 Overburden Geology

The Geological Survey of Ireland "Geology of Sligo-Leitrim, A Geological Description of Sligo, Leitrim, and Adjoining Parts of Cavan, Mayo and Roscommon, to Accompany the Bedrock Geology 1:100,000 scale Map Series, Sheet 7, Sligo-Leitrim", published in 1996, indicates that like most of Ireland, during the last glacial period of the Quaternary Age the area surrounding the site was covered by a ice-sheet which has been calculated to have reached the thickness of over 650 m at locations. This ice sheet was composed by a number of major and minor ice domes, and counties Sligo and Leitrim were covered by ice deriving from the most northern of the major domes, which was centered on a line extending from Carrick-on-Shannon to Lough Neagh, to the south east of the site under consideration. A minor influence was also exercised by a smaller ice dome flowing from the Donegal Mountains. The general direction of ice-flow in the area was from the southeast to the northwest, with significant variations near Sligo town, to the southeast of the Cuilcagh Mountains and to the south of the alignment afore mentioned. Melting of the ice at the end of the glacial period left behind not just classic U-shaped valley, of which the valley containing Lough Allen and having the Corrie Mountain to its western side is a good example, but also non-cohesive glacial and fluvioglacial sediments, which shape the today's landscape. So, Lough Allen, the main feature of the landscape of the area, is the result of ice erosion and deposition, as it owns it origin to a moraine deposited during the retreat of the ice at the end of the last glacial period. No landslides are recorded for the area of the site or its immediate proximity in the "Landslides in Ireland - A Report of the Irish Landslides Working Group" published in 2006 by the GSI. However, bog flows have been reported, even in the recent past, at a number of locatins in the Corrie Mountain. An enquiry within the Quaternary Section of the Geological Survey of Ireland (GSI) and a consultation of the "Geology of Sligo-Leitrim, A Geological Description of Sligo, Leitrim, and Adjoining Parts of Cavan, Mayo and Roscommon, to Accompany the Bedrock Geology 1:100,000 scale Map Series, Sheet 7, Sligo-Leitrim", indicated that the overburden cover in upland areas such as the area of the site and its surroundings, is very thin, with bedrock frequently outcropping. It is also reported that the overburden in these
uplands consists of glacial drift. This information is consistent with observations carried out during an examination of the exposed section of the overburden overlying the upper bench of the quarry face, and a walk-over of the site and surrounding area. Thickness of the overburden is extremely variable, with areas where bedrock is very close to the surface or even outcropping, and other areas where the overburden thickness can be in excess of 2 m. The overburden is made up of grey, firm gravelly CLAY with angular boulders (up to ca. 50 cm) of sandstone (maximum thickness of ca. 2 m), overlain by a maximum of 1 m of peat.

6.3.2 Slope Stability Assessment
A slope stability assessment of the overburden in the area to the west of the site, above the quarry face was commissioned and completed by Ground Engineering Consultants Ltd (AGEC). The assessment was carried out on 17th October 2008. The findings of the assessment indicate that there are no apparent signs of shear failure at/around the mineral soil interface, which is the most prevalent horizon for shear failure. The above indicates that there has been no previous failure, and that the current workings are not destabilising the thin overburden (see full report in Appendix E).

6.3.3 Bedrock Geology
In the above-mentioned "Geology of Sligo-Leitrim" is it is indicated that the region surrounding the quarry at Liscuillew (see Map 6/1) is characterised by the presence of the almost unfolded rocks of the so-called Leitrim Group, deposited within the Lough Allen Basin. These rocks, of middle Carboniferous age (338-325 Ma), underlain most of the area included in the eastern part of the "Bedrock Geology 1:100,000 scale Map Series, Sheet 7, Sligo-Leitrim". The geological formations of the Leitrim Group are the result of the deposition of sediments deriving from the erosion of emerged uplands in the north, carried by rivers toward the shoreline and deposited as deltas in originally shallow-water restricted basins and in arid conditions. A steady and sometimes rapid tectonic deepening allowed for an enlargement of the depositional basin, with consequent higher uniformity of rock types. The finest sediments (represented on the Corry Mountain by the shales of the Carraun Shale Formation, Dergvone Shale Formation and Gowlauan Shale Formation) were deposited in steadily and sometimes rapidly deepening seas, at times deeper than 100 m, and often with conditions unsuitable for life on the sea floor. Deposition rates were in some occasions quite high, as in the case of the Dergvone Shale Formation. In between the deposition of the shale, a supply of coarser material allowed for a southward advance of the delta, mainly through turbidity currents which carried sand down the delta front and towards deeper waters. Three main stages of delta-advance are recognised, all marked by the deposition of sandstones. These sandstones are represented by the Glenade Sandstone Formation (GD), which is older than the Carraun Shales Formation, the Briscloonagh Sandstone Formation (BR), which was deposited
between the Dergvone Shale Formation and the Gowlaun Shale Formation, and the Lackagh Sandstone Formation. As these sandstones were deposited in much more confined areas than the shales, generally channels, their presence is restricted to where these channels were located. This explains the absence of the Glenade Sandstone Formation and the Briscloonagh Sandstone Formation from the area of Liscuillew. Finally, the presence of coal in the Lackagh Sandstone Formation indicates that the area was at times emerged. In more detail the quarry and immediately surrounding areas are underlain by the lithotypes of the following geological formations (from the oldest to the most recent):

➢ Carraun Shale Formation (CN): grey to black fossiliferous shales and mudstones with thin subordinate limestones and dolomites.
➢ Dergvone Shale Formation (DE): rhythm sequence of dark pyritic shale with goniatites, unfossiliferous shales, shales with ironstones and micaceous and silty shale.
➢ Gowlaun Shale Formation (GO): dark calcareous shale, grey unfossiliferous shale with ironstones, micaceous and silty shales.
➢ Lackagh Sandstone Formation (LH): cyclothemic sequence of dark grey mudstones, silty mudstones, interbedded fine sandstones and siltstones, thickly-bedded medium sandstone (the dominant lithology), seatearths and coals. In the above-mentioned "Geology of Sligo-Leitrim" the quarry at Liscuillew Upper is mapped within the Gowlaun Shale Formation (GO), in close proximity to the geological contact with the Lackagh Sandstone Formation (LH) (see location of working quarry 1392 on Map 6/1). However, an examination of the bedrock exploited at the quarry, its comparison with the characteristic of the bedrock of the two geological formations as reported in the above-mentioned booklet, and examination of the cutting resulting from a borehole drilled on-site during site investigation (see Map 6-3), indicate that the quarry is extracting rock from the Lackagh Sandstone Formation (LH), while the quarry floor is at the geological contact with the Gowlaun Shale Formation (GO). This is also consistent with information obtained from Mr. McPadden, who reported that extraction is not carried out at elevations lower than the current quarry floor because the quality of the bedrock at those elevations is "not suitable".

The GSI geological map for Sligo-Leitrim indicates that the carboniferous rocks are affected by two separate set of major faults: the oldest, probably associated to the Caledonian orogeny, has a NE-SW trend. To this set belong the Belhavel Fault, mapped approximately 8 km to the northwest of the site entrance. The Curlew Fault, mapped ca. 9 km to the south, probably belongs to the second group, which has an East-West trend. It is believed that the faults associated with this group postdate the other group. A minor set of faults, with a NW-SE trend, of a more recent origin than the previous two groups, also affects the carboniferous rocks present in the area. Faults belonging to this group are mapped both to the southwest and northeast of the site. Mining activity was quite widespread in the general area, with coal extraction being the main form of mining. An abandoned coal pit is mapped approximately 2.5 km to the southwest of the site, in
the townland of Altago, Co. Roscommon. This abandoned coal pit has been nominated as a “County Geological Heritage Site”. Quarrying is reported to be quite common in the area, both for dimension stones (i.e. stone for different uses in the building industry, such as cladding, roofing, building and gravestone) and for aggregate (used mainly in the construction industry for production of concrete, as foundation material or for agricultural purposes). The closest quarry to the site is located in the townland of Curraghs North, County Leitrim, ca. 2 km to the northeast of the site, where clay was extracted for the making bricks and tiles. This quarry is not included in the Register of Quarry for County Leitrim, nor in the GSI’s “Quarry Directory, 2001”.

6.3.4 Quarrying Activities
The nature of the operation carried out on site is to extract rock to provide materials to the construction industry. The extraction process at this location is carried out at a small scale, entailing the following:
➢ rock is excavated from the quarry face with an excavator fitted with a tooth bucket.
➢ suitable stone is transported into the shed where it is guillotined to appropriate size. It is then bagged into 1-ton bags and stored on quarry floor.
➢ unsuitable stone is stored in heaps on the quarry floor, screened and crushed and sold as washed decorative stone or sand. During screening operation, crushing of bigger boulders may take place on occasions using the crusher bucket on the quarry floor.
A more detailed description of the stone extraction process and of the ancillary quarrying activities is included in Section 3 of this EIS.

6.3.5 Impacts
Quarrying within the substitute consent area location involves removal of bedrock using an excavator for processing. This will result in a permanent, direct negative impact on the natural resources of the area. However the quarrying activity cannot be carried out without such an impact. The potential Health and Safety issue associated with this practice is acknowledged, both for the operational phase and for the final restoration of the site after cessation of quarrying activities.

6.3.6 Mitigation Measures
The quarry management has previously retained the services of a reputable and fully qualified geotechnical engineering company to carry out a full slope stability assessment and implemented the recommendations of that company in order to minimise and prevent the risk of slope failure. No further excavation is going to be carried out in the South Eastern area of the site, with the substitute consent application not involving any areas outside of the currently disturbed area.
6.4 Description of the Existing Environment – Water

6.4.1 Surface Water
A stream is located close to the southeastern boundary of the site. This stream flow toward the northeast joins the Owengar River approximately 2.5 Km to the northeast of the site entrance and eventually discharges into Lough Allen, approximately 3.5 km to the NE of the site entrance. Another, smaller stream is located to the north of the site. This stream runs west to east and collects the water from two drains excavated in the bog area above the active quarry face, to the west of the site. It also collects the water discharged from the settlement lagoons located in the northern section of the site, and eventually discharges into the above-mentioned bigger stream, ca. 200 m to the east of the quarry entrance. There are two EPA river quality monitoring stations on the Owengar River: the first (Station No. 0100) is located approximately 2.2 km to the NE of the site, at Barragh bridge on the R280. The second station (Station No. 0200) is located ca. 1 km upstream confluence of the river into Lough Allen, approximately 3.5 km to the NE of the quarry site. The classification of the Owengar River water quality based on biological data collected in 2002 (monitoring by the EPA) was “Unpolluted” (Q value 4-5) at the first station, as indicated in the EPA "River Water Quality Reports 2002". The classification at Station 0200 in year 2002 was “Unpolluted” (Q value 4). The more recent survey carried out in 2011 indicates that the Q4 status was maintained. A consultation of the "Article 5 Characterisation Summary Report" published as part of the Shannon River Basin District Project, carried out under the requirements of the Water Framework Directive, indicates that the Owengar River is classified as "hard water with high to very high slopes". The same Report also indicates that the river is considered to be "probably not at significant risk" for abstraction and flow regulations, point pressures (i.e. old landfills, mines, contaminated industrial sites, trade effluents and urban wastewater discharge), diffuse pressures (i.e. pressures originating from agricultural activities, unsewered human populations, and dangerous substances from all land use sectors). With regards to morphological alterations (i.e. channellisation and dredging, flood protection and embankments, impounding, water regulation, intensive land use), the Owengar River is classified as "probably not at significant risk" in its lower part, but as "probably at significant risk" in its higher part. The WFD indicates that the overall status of the Owengar river down stream from the quarry is of “Good” status, the general physio-chemical status is “High”, macroinvertabrate status is “Good” and the overall chemical status is “Good” in the 2009 to 2015 period which indicates that the quarry has not nor will it impact on surface water quality.

Lough Allen is located on the east of the site, at a minimum distance of approximately ca. 3 km. There is no available empirical information on the water quality of the lake in the latest EPA.
“Water Quality in Ireland”. Some information are contained in the above-mentioned "Summary Characterisation and Analysis Report", where it is indicated that the lake is characterised as of a "high alkalinity, shallow and large" type, and considered to be "probably not at significant risk" for abstraction and flow regulation, for morphological alterations, for point pressures and for diffuse pressures. The WFD RBMP 2009 – 2015 indicate that the status of the lake is “Moderate” however its physico – chemical and nutrient status are considered “Good” with the over all chlorophyll status considered “High”. Given that the quarry activity could only affect the physico – chemical status then it can be stochastically inferred that the quarry activity has not had any impact on Lough Allen. This is further borne out by the Risk assessment by the WFD which indicates that the Lake is not at risk from point sources of pollution (worst case scenario).
Taking into consideration the lithology of the overburden and of the bedrock, the topography of the site, the local rainfall rate and after a site investigation, it is believed that the ponding water is constituted entirely by rainfall.
Two drains have excavated in the peat above the active quarry face (see Map 2-2). These drains intercept water from the undisturbed area above the quarry and discharge it into the ditch running W-E to the north of the site and ultimately into the Owengar River, via the small stream running to the south of the site. Surface water is also present in two drains located to the south and north of the active extraction area (see Map 2-2).
Concrete channels on the quarry floor collect water run-off and discharge into a primary settlement lagoons located in the Eastern section of the site, where it is automatically treated with Magnafloc 351 (a flocculant), prior to discharge to the final settlement lagoons via an oil interceptor located to the north of the workshop.
6-2 Concrete surface water interceptor channel

From the final settlement lagoons the water is discharged under license (WLP/08/01 which was reviewed on the 16th Aug 2012) from Leitrim County Council into a small drain and eventually in the stream running to the south of the site. The discharge from the final settlement lagoons is strictly regulated and must be performed manually through the opening of valves. Prior to opening the valves the pH of the water in the lagoon is measured by Raymond McPadden to ensure discharge license compliance. Leitrim County Council monitored the discharge on a regular basis and the results as indicated in the table 6-3.

Table 6-3 Discharge Results

<table>
<thead>
<tr>
<th>Parameter</th>
<th>BOD mg/L</th>
<th>COD mg/L</th>
<th>Hydrocarbons mg/L</th>
<th>pH</th>
<th>SS mg/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>13/10/2011</td>
<td>1.3</td>
<td>3</td>
<td>&lt;0.1</td>
<td>4.76</td>
<td>1</td>
</tr>
<tr>
<td>30/11/2011</td>
<td>0</td>
<td>9</td>
<td>&lt;0.1</td>
<td>4.8</td>
<td>33</td>
</tr>
<tr>
<td>29/02/2012</td>
<td>0.32</td>
<td>2</td>
<td></td>
<td>6.39</td>
<td>9</td>
</tr>
<tr>
<td>19/04/12</td>
<td>1.1</td>
<td>3</td>
<td>&lt;0.1</td>
<td>6.42</td>
<td>9</td>
</tr>
<tr>
<td>04/07/12</td>
<td>0.56</td>
<td>17</td>
<td></td>
<td>6.41</td>
<td>1</td>
</tr>
<tr>
<td>26/09/12</td>
<td>0.69</td>
<td>1</td>
<td>&lt;0.14</td>
<td>6.45</td>
<td>2</td>
</tr>
<tr>
<td>29/01/2013</td>
<td>0.48</td>
<td>0</td>
<td>0.02</td>
<td>5.48</td>
<td>5</td>
</tr>
</tbody>
</table>

Although there appears that the pH levels in the discharge are low i.e. outside the discharge license parameters the nature of the biochemistry of the receiving water has to be factored in. Bogs have a lower pH, generally < 5.0, low Ca concentrations, and chloride (Cl) and sulphate
(SO₄) as the main inorganic anions, with vegetation dominated by Sphagnum mosses, calcifuge Cyperaceae and ericaceous shrubs (Wheeler and Proctor, 2000; Bragazza et al., 2003). Consequently raising the pH to 6.5 or above would not reflect the chemistry of the receiving water. Surface water analysis in the vicinity of the quarry gave pH levels of 4.7 – 5.6. For all other parameters the discharge was compliant with the license requirements. The results obtained for BOD, COD, SS and hydrocarbons are all well within the discharge licence limits. The Road side drain to the East of the quarry along with the Mullaghcashel order 1 stream (26M81), to the South / South East were inspected. These displayed characteristics associated with naturally occurring iron reducing bacteria. There are a number of different Iron Bacteria which metabolise in this way which includes Thiobacillus ferrooxidants and Leptospirillum ferrooxidants. They will grow in water with Iron concentration down to 0.1mg/L, the surface water in this area is naturally high in Iron with samples from Leitrim County Council giving results for Iron of 11.7mg/L. The presence of Iron bacteria is characterised by the following.

1. Iron bacteria will usually cause yellow, orange, red, or brown stains and colour in water.
2. Sometimes it is possible to see a rainbow coloured, oil-like sheen on the water.
3. Iron bacteria produce a sticky slime which is typically rusty in coloured, but may be yellow, brown, or grey.
4. A feathery or filamentous growth may also be seen, particularly in standing water.

The presence of the Iron bacteria and the by products of their metabolism is not toxic to aquatic life nor does it pose an environmental health risk. Rana temporaria returns annually to the lentic / lotic system in which it was spawned to reproduce often traversing relatively large distances. It is internationally recognised that the species is very pollution sensitive with the photographs of the road side drain indicating that there is a healthy population of that species present in these water features and further indicates that there has been no impacts of the quarry on those water features.

Photograph 6-1 road side drain
Photograph 6-2 road side drain

Photograph 6-3 water course to East
Photograph 6-4 Water course to East

6.4.2 Groundwater - Overburden Hydrogeology
No significant Quaternary Aquifers are reported to be present within or in the proximity of the area, according to preliminary information and classification by the GSI. The characteristics of the overburden and on-site visual observations indicate that a part of the rainfall infiltrates through the quarry floor and either recharge the bedrock or emerges at lower elevations. Most of rainfall is instead collected by the drains mentioned above and discharged into the settlement lagoons. The characteristics of the overburden allow only for the accumulation of a limited amount of groundwater, entirely in the peat horizon. Taking into consideration the topography of the site and of the surrounding areas, any groundwater flow is expected to be downhill toward the lake.

6.4.3 Groundwater - Bedrock Hydrogeology
In Section 6.3.2 of the rEIS is indicated that the site is underlain mainly by the lithotypes of the Gwolau Shale Formation (shale), with the Lackagh Sandstone Formation (sandstone and siltstones) outcropping at the quarry face. The Dergvone Shale Formation has been classified by the GSI as "Bedrock which is Generally Unproductive (Pu)", while the Lackagh Sandstone Formation (LH), the Carraun Shale Formation (CN) and the Gwolau Shale Formation (GO) have been classified as "Bedrock which is Generally unproductive except for Local Zones" (see Map 6/2). Groundwater circulation in this kind of bedrock is strictly confined to the uppermost weathered bedrock horizons, and to areas of intense fracturing, with the shale content likely to limit the yield of water wells. The Ground Water Protection Scheme (GWPS) indicates that the ground water has a vulnerability rating of "Extreme", with near surface rock being mapped within the site quarry area which would be anticipate as the quarry activity involved the removal of the
overburden (soil and sub soil). The GWPS indicates that the area surrounding that for which substitute consent is being sought has a vulnerability rating of “High”.

A consultation of the "Article 5 Characterisation Summary Report" published as part of the Shannon River Basin District Project, carried out under the requirements of the Water Framework Directive, indicates that groundwater in the area surrounding the site is considered to be "probably not at significant risk" for abstraction and saline intrusion, for point pressures (i.e. old landfills, mines, contaminated industrial sites, trade effluents and urban wastewater discharge) and diffuse pressures (i.e. pressures applied by nutrients from agricultural activities, unsewered human populations, and dangerous substances from all land use sectors). The WFD has classified the groundwater as being of “Good” status. No direct information is available on the overall groundwater flow direction in the general area. However, considering the location of the site, on the top of a steep slope, and the presence at the bottom of this valley of the main surface water feature in the area, represented by the Lough Allen, it can be inferred that groundwater flows generally eastward toward the lake.

There are no wells installed within the site boundaries, and it was not possible to measure depth to water in the wells located in the private dwellings in proximity of the site. A borehole was drilled on the quarry floor (see Map 6-3). A limited ingress of water was encountered at 2 m below ground level. However, this was water considered more likely to be surface water infiltrated through the quarry floor entering the borehole through a small fracture, rather then permanent groundwater. The borehole was drilled to a depth of 30 m below ground level, without any further water ingress.

6.4.4 Well Survey

The closest water well listed in the GSI water wells database is located in the townland of Drommangarvagh, approximately 3 km to the east of the site, in proximity of the shore of Lough Allen. An enquiry within the Water Services Section of Leitrim County Council revealed that there is no public source or supply of water in this area. Similarly, there is no record of any privately-run established Group Water Scheme in the area. A well survey was carried out by North West Environmental along the local road which runs in front of the quarry entrance, for ca. 1 km in each direction, and also along the two local roads running northeast-southwest in proximity of the quarry entrance on 25th September 2008. This well survey has identified a total of six well and one spring (see Map 6-3).

It should be noticed that in the case of the house located at Liscuillew Upper, access to the property was denied and the presence of two wells is reported only on the basis of information provided by the inhabitants. There are two more private dwellings in proximity of the entrance to the quarry, which may have water wells. However, it was not possible to ascertain the presence of water wells at these dwellings, due to the absence of the inhabitants. The available information
on these wells is summarised in Table 6-1 below. No reliable information is available on the depth of the wells and their construction details. Only in the case of the fifth well listed in the Table 6-1 the depth to water, which was of 14.71 m, while the total depth of the well was measured to 48.50M.

During the well survey the existence of a group water scheme which may still be used at some of the dwellings was reported to North West Environmental. However, the source of water of this scheme has not been identified, and no information is available within the Water Section of Leitrim County Council on this scheme. On the basis of the wells' co-ordinates it appears that all the wells and the springs listed in Table 6-1 are not located within the Lackagh Sandstones Formation, but rather within the underlying shale formations.

Table 6-1 – Well Search Results

<table>
<thead>
<tr>
<th>Townland</th>
<th>Easting</th>
<th>Northing</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liscuillew Upper</td>
<td>91014</td>
<td>20987</td>
<td>well</td>
</tr>
<tr>
<td>Liscuillew Upper</td>
<td>91014</td>
<td>20987</td>
<td>well</td>
</tr>
<tr>
<td>Moneenatieve</td>
<td>90360</td>
<td>21540</td>
<td>spring</td>
</tr>
<tr>
<td>Liscuillew Lower</td>
<td>90850</td>
<td>22328</td>
<td>well</td>
</tr>
<tr>
<td>Liscuillew Lower</td>
<td>90849</td>
<td>22850</td>
<td>well</td>
</tr>
<tr>
<td>Liscuillew Lower</td>
<td>90686</td>
<td>22653</td>
<td>well</td>
</tr>
<tr>
<td>Greaghnaslieve</td>
<td>91571</td>
<td>21052</td>
<td>well</td>
</tr>
</tbody>
</table>

6.4.5 Impact Prediction

No water abstraction or active quarry dewatering is or has taken place at present or planned to be carried out in the future. Hence, it is believed that this development has not had nor would have a negative impact on the quality or quantity of surface water in the area. There are dry-toilet
facilities installed on-site for the quarry employees, with the sewage being collected regularly by a licensed operator (details of the contract with this operator can be made available by the quarry management upon request). Therefore no significant risk of pollution of surface or groundwater can derive from the discharge of sewage. The potential for surface water and groundwater pollution caused by an accidental oil spillage is identified. Provisions have already been being put in place to minimise this potential risk, with the installation of an oil interceptor, bunds, regularly serviced by a licensed operator (see Section 3 for more details). Furthermore, the applicant maintains an adequate oil spill kit for intervention in the case of small, accidental oil spillages. The applicant has also entered into a contract with a 24-hour emergency oil spillage contractor to deal with potential oil escapes of greater magnitude (details of this contract can be provided by the quarry management upon request). The bedrock present in the exposed quarry walls does not show evidence of significant mineralisation. Therefore there is no risk of heavy metals pollution of surface water and/or groundwater arising from quarrying activities at the proposed development. The risk of suspended solids entering the streams to the east and the south of the site, carried by surface water discharged from the settlement lagoons has already been addressed as has the control of surface water within the substitute consent area.

6.4.6 Mitigation Measures

The existing mitigation measures and surface water control measures should be maintained with no further mitigations measures required for the continued operation of the quarry.
7 AIR, DUST AND CLIMATIC FACTORS

7.1 Introduction

ANV Technology was commissioned to undertake an air quality impact assessment for the quarry operations of Drumkeeran Stone t/a Sandlewood Ltd. The report considers the potential air quality impacts arising from the quarry including:

- Generation of dust, and dispersion of dust from the site, and consequent potential soiling of surfaces
- Generation and dispersion of fine particulate dust from the site (PM10).
- Air pollution from quarry diesel engine equipment and vehicle exhausts.

7.2 Air Quality Assessment Methodology

In reviewing existing air quality, reference was made to published EPA air quality data for rural areas. A visual inspection carried out of operations and the potential for dust generation within the site. There is currently a dust deposition monitoring programme underway, and results from these gauges are used to verify future compliance with guideline dust deposition limits. Dispersion of dust and diesel engine combustion pollutants from the quarry site was modelled using the German TA-Luft Gaussian model. This is a screening grade dispersion model which provides a reliable indication of any potential significant air quality impacts. The model was run based on a mean wind speed of 5m/s, and assumes neutral atmospheric stability. The dispersion model considers both dust deposition, which refers to particle sizes in excess of 10 microns, and dispersion of the fine particulate fraction, of size less than 10 microns.

7.2.1 Assessment Criteria – Dust Deposition Limits

Dust deposition impacts are assessed in accordance with guidelines in the EPA publication “Environmental Management in the Extractive Industry”. This document specifies a dust deposition limit value of 350 mg/m²/day, and provides environmental management guidelines to minimise the creation of dust by planning and design. The environmental impact of deposited dust is due to visual nuisance associated with soiling of surfaces, rather than human health effects.

7.2.2 Assessment Criteria – Airborne Pollutants Limits

The impact on air quality was assessed by comparison with the requirements of the Air Quality Standards Regulations 2002 (SI 271/02). These regulations assign limit values for the common pollutants associated with combustion. The regulations specify limit values (as annual means and
short-term averages) with a sliding implementation scale until the final limits apply in 2010. Limit values, which will apply in 2010, are shown in Table 7-1. Exceedance of a limit value as a consequence of a development would be considered a significant adverse impact. In assessing whether a change in pollutant concentration is of significance, reference is made to the U.K. Design Manual for Roads and Bridges (DMRB) criteria. For nitrogen dioxide, an additional load of 4 μg/m3 is considered negligible.

Table 7-1 Limit Values From Air Quality Standards Regulations SI 271/02

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Limit Value 2010 Annual Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulphur Dioxide, SO2</td>
<td>20μg/m3</td>
</tr>
<tr>
<td>Nitrogen Dioxide, NO2</td>
<td>40μg/m3</td>
</tr>
<tr>
<td>Fine Particulates1:</td>
<td></td>
</tr>
<tr>
<td>PM10</td>
<td>40 μg/m3</td>
</tr>
<tr>
<td>PM2.5</td>
<td>25 μg/m3</td>
</tr>
<tr>
<td>Lead, Pb</td>
<td>0.5 μg/m3</td>
</tr>
<tr>
<td>Benzene C6H6</td>
<td>5 μg/m3</td>
</tr>
<tr>
<td>Carbon Monoxide CO</td>
<td>10 mg/m3</td>
</tr>
<tr>
<td></td>
<td>(8- hr max value)</td>
</tr>
</tbody>
</table>

1 new limits for particulate matter introduced in 2008 by EU Directive 2008/50/EC, which will be transposed into Irish law by 2010

7.3 The Existing Development

The nature of the operations carried out on site is to extract rock to provide materials to the construction industry. The extraction process at this location is carried out at a small scale, entailing the following:
➢ rock is excavated from the quarry face with an excavator fitted with an excavation bucket.
➢ suitable stone is transported into the shed where it is guillotined to appropriate size. It is then bagged into 1-ton bags and stored on quarry floor.
➢ Unsuitable stone is stored in heaps on the quarry floor, screened and crushed and sold as washed decorative stone or sand. During screening operation, crushing of bigger boulders may take place on occasions using the crusher bucket on the quarry floor. A more detailed description
of the stone extraction process and of the ancillary quarrying activities is included in Section 3 of this remedial Environmental Impact Statement.

7.4 Receiving Environment

7.4.1 Climate

The magnitude of impacts of emissions from the development is substantially influenced by the local meteorological conditions, in particular by precipitation rates, wind speed and direction; therefore an evaluation of climatological conditions at the site is important when completing an assessment of the type being undertaken in this study. The climate in Ireland is subject to strong maritime influence, with the effects decreasing as the distance from the Atlantic coast increases. Since there is no part of the island more than 120 km from the sea, the range of mean temperatures across the country is narrow. Data collected from Met Eireann indicate that January and February are usually the coldest months of the year, and that in this part of the country rainfall is in the order of 1,000-1,200 mm/year, with peaks of up to 2,000 mm/year in the mountain areas.

The closest synoptic weather station is located at Knock, ca. 40 km to the southwest. While both the synoptic station at Knock Airport and the site are located at a distance from the sea, and therefore somewhat sheltered from extreme weather conditions deriving from exposure to the ocean, it is likely that the site at Liscuillew Upper benefits from a higher level of protection from westerly and southwesterly winds, due to its location on the eastern-facing slope of the Corrie Mountain. However, this effect may be partially compensated by the fact that the site is located at a higher elevation. It is therefore considered the Knock Weather Synoptic Station provides data which can be appropriate in the climatic description of the site. An analysis of the meteorological data from the station at Knock for the period 1961-1990 shows that the dominant wind direction is from the west. The average yearly wind speed is 4.53 m/s, with a maximum gust speed of almost 49 m/s, recorded in the month of January. Mean monthly temperature at the Knock weather station ranges between 4.3 °C and 14.3 °C, with an annual mean value of 8.9 °C. Mean monthly precipitation rate is in the range 62.3-124.6 mm, with an annual mean of 1,143.2 mm.

7.4.2 Sensitive Receptors

The nearest sensitive receptors are the houses labelled H1, H2, and H3, as indicated in Map 7-1. H1 is located to the east of the quarry site, and is in excess of 100m from the quarry yard areas in which dust could potentially be generated. The quarry floor is elevated by at least 20m relative to the local road, and the intervening sloped terrain contains trees and dense vegetation which act as natural dust interceptors. H2 and H3 are located to the north of the quarry site, on the western side of the road. These houses are in excess of 150m from the quarry yard areas where dust
could be generated. The intervening terrain is raised and vegetated, providing a natural control on dust dispersion. The main potential issue at these houses would be dust generated by quarry vehicles passing the dwellings.

Map 7-1 Sensitive Receptors Locations

7.4.3 Existing Air Quality – Review of Published EPA Data

The site is located in a rural area. There are no other significant local sources of industrial or other anthropogenic generated air pollution. The EPA and local authorities are responsible for monitoring national air quality. For monitoring purposes, the country is divided into four air quality zones: A (Dublin), B (Cork), C (large towns), and D (small towns and rural). The rural parts of County Leitrim are classified as zone D. The most recent published national air quality data is contained in the EPA publication “Air Quality Ireland 2010”. Monitoring focuses mainly on zones A, B and C, where air pollution levels are likely to be highest. The zone D stations in 2007 were located at Ferbane, Navan, Cork Harbour, Kilkitt, and Shannon Estuary. At all zone D monitoring stations in 2007, the air quality was found to be within the applicable standards. The areas of
Navan, Cork Harbour and Shannon Estuary have much higher densities of industrial development, population, and road traffic than the subject site. For the rural location at which the quarry is located, the ambient air quality is likely to similar to that at other rural locations documented by the EPA, such as at Ferbane (Co. Offaly) and Kilkitt (Co. Monaghan). In 2007, at Ferbane and Kilkitt the concentrations of nitrogen dioxide were 6 ug/m3 and 2 ug/m3 respectively (annual means). These were very low concentrations, and very comfortably within the air quality limit of 40 ug/m3. The concentrations of PM10 at Ferbane and Kilkitt were 21 and 10 ug/m3 respectively. These are within the EU limit value of 40 ug/m3. Elevated PM10 levels do not imply a diminution in air quality, as there is a substantial component of non-hazardous natural particulate matter, such as marine salts, which are not accounted for in the simple gravimetric measurement method.

7.5 Receiving Environment

7.5.1 Existing Airborne Dust and Dust Deposition

During the site visit there were no visible dust emissions from operations at the quarry. During operation of the impact crusher and screener there was no visible significant dust emission. Ground conditions were wet during the site visit. During prolonged periods of dry weather there would be a potential for local generation of dust in the yards within the site, due to vehicle movements.

There was no visible dust deposition at the roadside at properties H1 to H3. A dust deposition monitoring program is currently in place as part of the Environmental management System. Two dust Bergerhoff gauges are located at the boundary of the site: Dust 1 at the most northeastern corner and Dust 2 at the site entrance gate (see Map 7-2). Dust deposition measurement during the period of October 2008 were of 142 mg/m2/day at Dust 1 and 182 mg/m2/day (see Appendix G for analyses certificates), in both cases well below the set maximum acceptable limit of 350 mg/m2/day. During this period of dust measurement, removal of the uppermost 1-2 m of bedrock was undertaken. This procedure, which takes place only once a year generated an anomalous amount of dust, which is believed to be the cause of the relatively high levels of dust as measured in the dust gauges. It is therefore our opinion that the values measured during overburden stripping constitute a worst case scenario. Analysis of further monitoring carried out on site yielded the following results:
7.5.2 Review of Potential Sources of Dust and Airborne Pollutants

7.5.2.1 Dust Emissions from Excavation and Processing

In the context of potential airborne dust, the operations at the quarry have a low potential for generating airborne dust. The sandstone rock generates relatively large grains and flakes when broken. Consequently, there is little potential for airborne dust. To provide a quantitative basis for the dispersion modelling, standard emission factors were used from the U.S. EPA emissions factor database (AP-42). There is no data provided in this database for quarries which produce building and dimension stone, presumably because these sites are not significant dust generators. As a worst case estimate, data was taken from the crushed stone processing database. The potential generation of dust due to screening and crushing is 0.152 kg per Tonne.
of product of total suspended particulate matter (TSP), and 0.006 kg per Tonne of product of fine particulate matter (PM10). Only a small fraction of the material excavated at the quarry is crushed, and the resulting calculated dust concentrations are therefore likely to be significantly overestimated.

7.5.2.2 Dust Generated on Haul Routes and Fugitive Dust Emissions

The main potential source of airborne dust at quarries is due to dust agitated by vehicles on haul routes within the site, and on the road near the entrance, during prolonged dry spells. Material deposited on the road near the site entrance can, following a prolonged dry spell, become agitated by passing traffic, and lead to local dust nuisance at the roadside properties. This form of dust generation is readily controlled through ensuring that trucks leaving the site are wheel washed as required to ensure mud is not tracked out of the site, and by road sweeping and spraying as required. Fugitive dust generation from the building stone stockpiles would be minimal. In very windy conditions, following a prolonged dry spell, wind whipping of dust could possibly occur in the yard areas. This surface dust would settle within the quarry site, and would pose little potential for dispersion beyond the quarry boundary.

7.5.2.3 Other Sources of Air Pollutants

Diesel powered equipment at the quarry generate combustion pollutants. The combustion pollutant considered in detail was nitrogen dioxide (NO2), which is the most significant pollutant in terms of potential impact on air quality. When a screening assessment determines negligible impact for NO2, it can be concluded that all other combustion pollutants will also be comfortably within applicable limits.

7.5.3 Dust Dispersion Characteristics at Site

An indication of general wind dispersion characteristic for the site can be deduced from data for the Met Eireann synoptic station at Knock County Mayo. The wind rose for Knock is illustrated in Figure 7-1, superimposed on the site. The dominant wind direction at the site is likely to be from the west and south, with consequent dispersion of airborne emissions mainly towards the east and north/northeast. The mean wind speed in 2007 was 4.9m/s, which would ensure good dilution and rapid dispersal from the site. As indicated by the analysis of wind speed statistics in Figure 7-2, wind speeds are likely to exceed 2m/s for 93% of the time. There were just 5 calm hours recorded in 2007; there is little dispersion under calm conditions. The elevation of the quarry floor above the houses will result in greater dilution of airborne pollutants than would be the case for releases over a flat terrain.
Note the wind rose is shown in the figure above as wind flow vector (wind blowing to). The main direction of dispersion from the site is towards the eastern and north/northeastern sectors.
7.5.4 Modelled Dust Dispersion from Quarry

7.5.4.1 Dust Deposition

The modeled dust dispersion from the existing quarry operation is presented in Figure 7-3, with dust fall rates expressed in units of milligrams per square meter per day (mg/m²/day). Dust deposition rates decrease rapidly with distance beyond the quarry boundary, and are not likely to be detectable above background deposition rates from natural sources. At house H1 to the east of the quarry, the predicted deposition rate is less than 30 mg/m²/day. At house H2 the predicted deposition rate is 16 mg/m²/day, and at H3, the predicted rate is 10 mg/m²/day. These rates of dust deposition would not result in noticeable surface soiling, and are comfortably with the guideline limit value of 350 mg/m²/day. It should be noted that the model represents a worst case
situation. It does not allow for the significant suppression of dust that will occur due to rainfall, or interception of dust by the terrain and vegetation. The values presented are therefore likely to be significant overestimates. It is therefore concluded that the impact of dust deposition beyond the site boundary will be negligible.

7.5.4.2 Dispersion of Airborne Dust PM10

The modelled PM10 concentrations are presented in Figure 7-4. The predicted concentrations at the nearest houses range from 2 to 4 ug/m³. These are negligibly low values compared with the limit value of 40ug/m³. These values are also likely to be significant overestimates, as crushing occurs only on a monthly basis, and this is the only process which is capable of generating very fine particles. It is concluded that the impact of PM10 on local air quality is negligible.

Figure 7-3 Maximum estimate of surface dust deposition rate due to emissions from within quarry site mg/m²/day.
Based on TA-Luft Gaussian model, windspeed 5m/s. Dust sources were assigned emission factors from U.S. EPA emissions factors database for crushed stone: 0.006 kg PM10/Tonne.

**7.5.4.3 Dispersion of Diesel Exhaust Pollutants**

A number of engine combustion pollutants are emitted from diesel powered plant and machinery. These include nitrogen dioxide (NO2), fine particulate matter (PM10) and carbon monoxide (CO). However, the emissions of NO2 from diesel engines are of greater significance relative to limit values than the other combustion pollutants. Hence, the impact on air quality is assessed using emissions factors database for crushed stone: 0.006 kg PM10/Tonne.
NO2 as an indicator. The dispersion from the site was determined using the German TA-Luft Gaussian dispersion model. The model was based on an NO2 emission factor of 9.2g/kWhr from diesel engines. The model was based on a mean continuous machinery power output of 750kW during the working day, which is likely to be an overestimate for a small quarry such as this. The calculated NO2 concentrations at the houses are presented in Table 7-2. The calculated NO2 concentration due to quarry operations at the houses range from 0.6 to 1.5 μg/m3. The calculated total NO2 concentrations range from 4.6 to 5.5 μg/m3. These concentrations are very low compared with the limit value of 40 μg/m3, and are comfortably below the lower assessment threshold of 26 μg/m3. The impact on air quality from the quarry is negligible.

Table 7-2 Analysis of impact on air quality of emissions of nitrogen oxides from diesel powered equipment within the quarry site, and from quarry traffic on the N59.

<table>
<thead>
<tr>
<th>House</th>
<th>Modeled NO2 concentrations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(a) Quarry Plant and Vehicles</td>
</tr>
<tr>
<td>H1 (east)</td>
<td>1.5</td>
</tr>
<tr>
<td>H2 (north)</td>
<td>0.9</td>
</tr>
<tr>
<td>H3 (north)</td>
<td>0.6</td>
</tr>
</tbody>
</table>

7.5.5 Radon

In a nationwide survey conducted by the Radiological Protection Institute of Ireland ("Radon Results by County", available on the website www.rpii.ie), the area of the proposed development is included in the "1-5 % zone". This means that between 1 % and 5 % of workplaces and houses in the area are expected to have a concentration of Radon gas above the reference level of 200 Bq/m3. The existing quarry activity take place as open-air pit, and therefore, it is expected that there will be no possibility of dangerous accumulation of Radon in the working environment. Furthermore, the activities carried out on site do not have the potential of increasing the release of Radon into the environment.
7.6 Mitigation Measures

The impact of dust deposition at houses off-site is considered to be negligible, due to the nature of the materials extracted, the small scale of the site, and the distances to the houses. The empirical measurement combined with mathematical modeling ratifies this supposition. Rainfall in the area provides a natural source of dust suppression. During dry periods, when there may be potential for generation of wind-blown dust, boundary embankments and vegetation will be effective in intercepting dust blown at ground level, and will prevent movement ground level dust beyond the site boundary. In accordance with best practice, the mitigation measures provided in the EPA guidance document – “Environmental Management in the Extractive Industry” should be consulted, and applied as appropriate to ensure a minimal impact.

The following standard mitigation measures are already implemented and should be maintained:

- Minimise dust creation by site planning and design. Measures should include the location of haul routes and stockpiles away from sensitive receptors and the effective use of screening. Planting additional trees/vegetation at boundaries, to supplement those already planted, and on rehabilitated areas of the site will further assist in intercepting any locally generated dust clouds.
- Minimise dust escaping from processing plant
- Construct good quality internal haul routes
- Spraying of haul routes/road during prolonged dry conditions
- Road sweeping service as required which is already implemented
- Ensure wheels are washed to ensure mud is not tracked out of the site which is due to be completed in 2015
- Enforce the on site speed restriction (<20 kph) in order to limit the generation of fugitive dust emissions
- Include regular monitoring of dust deposition in the environmental management system

A dust monitoring programme has been commenced at the quarry, and Bergerhoff dust gauges are in position at the boundaries. However due to the confusion caused by section 261a this has been suspended. It is recommended that a background dust gauge should also be positioned at a suitable location to determine ambient dust fall levels at a location remote from the quarry. This will provide useful information to assist in interpreting the results from the quarry gauges. Natural levels of dust, and in particular dissolved solids in rainfall, can on occasions exceed 100 mg/m²/day, which should be allowed for in assessing compliance with dust deposition limit values. In practice, any significant generation of dust which could potentially exceed limit values would be readily visible as a dust cloud, and action can be taken to suppress the dust as required. This would only likely to occur due to vehicles travelling in the yard areas during prolonged periods of dry weather.
8 ENVIRONMENTAL NOISE

8.1 Introduction
ANV Technology, AVA Acoustics and HMN Environmental Consultants Ltd. have all made measurements of noise levels at the quarry at different times. The noise levels have been mathematically modeled with direct measurements made subsequent to the modeling. The initial section of this report considers the modeling phase with results of subsequent measurements also included.

8.2 Noise Survey Methodology
The methodology used for this assessment is outlined as follows:
- The existing ambient noise levels were measured in accordance with ISO 1996 "Description and measurement of environmental noise", and EPA guidance documents on Environmental Noise 2003, and 2006
- Measurements were made at the nearest house H1, when all of the excavation, rock-breaking and screening equipment was operating. This represents normal daily quarry operations, at maximum operating capacity. A separate measurement was also made of the noise level at house H1 when the crusher was operating.
- Noise levels due to extraction and processing operations in the quarry were calculated using a computer noise propagation model, in accordance with ISO 9613 “Attenuation of sound during propagation outdoors”. Noise sources were input to the model based on measured data at the site
- Quarry traffic noise levels were calculated in accordance with BS 5228 “Noise and vibration control on open and construction sites”
- The noise impact was assessed with reference to the EPA publication “Environmental Management Guidelines – Environmental Management in the Extractive Industry (Non scheduled minerals) which specifies a guideline noise limit of 55 dB(A)
- All noise levels in the text of this report refer to time averaged noise levels (LAeq), unless otherwise indicated. An explanation of acoustics terminology is provided at the end of this Section.

8.3 Receiving Environment
8.3.1 Description of Quarry Activities
The quarry is used for extraction of building stone. Production volumes are relatively low for a quarry, with a production capacity of approximately 8 truck loads per day. While this quarry is on a much lower scale of production compared with a typical commercial quarry, the noise sources are similar, albeit with lower overall noise emissions. No blasting is carried out at the quarry. Stone is extracted by mechanical excavators/rippers at the top bench on approximately up to two
per week. The extracted stone is broken into suitable sizes by a rockbreaker on the quarry floor for approximately one day per week. Dimension stone is hand cut to required sizes using a guillotine within a building on the site.

Following screening, stones too small for building use are stockpiled on site and screened / crushed in batches on site at intervals of approximately two days per week, and transported off-site to be used decorative stone and sand. Crushed fine materials are not produced on site. It is intended that operations at the quarry will continue unchanged in the future. There is no proposed expansion of production capacity or changes in processing on site. This report considers the noise impact of the quarry in terms of the noise levels generated at the nearest houses due to quarry extraction and processing activities within the site, and also due to the traffic noise generated by the trucks serving the site. Potential for vibration impact is also considered.

8.3.2 Noise Sensitive Locations

The nearest noise sensitive dwellings are the houses labeled H1, H2, and H3, as indicated in Figure 8-1. H1 is located to the South East of the quarry site. The house is located on the eastern side of the road, and is below road level (eyes of roof level with road). The quarry floor is approximately 20m above road level, and there is a steep slope from the eastern side of the quarry down to the road. Consequently there is no line of sight from the house to the main quarry noise sources, and there is very substantial acoustic screening provided by the raised terrain. The distance from the house to the main noise sources within the quarry is approximately 158m.

H2 is located to the north of the quarry site, on the western side of the road. It is approximately 220m from the main quarry noise sources. There is substantial acoustic screening provided by the intervening terrain.

H3 is located further north, at a distance of approximately 260m from the main quarry noise source. There is very substantial acoustic screening provided by the intervening terrain.
8.4 Noise Survey

For the purposes of noise modeling a survey was carried out on the 29th and 30th September 2008. Details of the survey are provided in Table 8-1. A sound level meter was positioned at the eastern boundary near the entrance to the quarry (M1, as indicated in Map 8-1), from 18.30 on 29th September to 15.30 on 30th September. This meter logged noise levels continuously at 15 minute intervals. Measurements were made with a second sound level inside the quarry site to determine noise emissions from the machinery, and at the roadside at nearest house to the east, H1, to determine the component of quarry noise at this house. The wind was light to moderate, with occasional gusts, at sheltered locations, such as at the house H1 to the east. While there was substantial interference from wind noise at house H1 on occasions, it was possible to make a reliable measurement of quarry noise in the lulls when the wind was light. The wind was from a northwesterly direction. This favoured sound propagation in the direction of house H1. At the elevated quarry site the wind was fresh. However this had little influence on the measurements of noise emission from the equipment, as measurements were made at reference distances of 10m
to 20m, where noise levels were sufficiently high that the interference from wind noise was negligible.

### Table 8-1 Survey Conditions and instrumentation details

<table>
<thead>
<tr>
<th>Survey Conditions</th>
<th>Instrument Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survey period 18:30, 29th September to 15:30, 30th September 2008</td>
<td>Instrumentation Details</td>
</tr>
<tr>
<td>Weather conditions Wind light to moderate (Beaufort 2 to 3) in the evening of 29th becoming strong during the night. Light to moderate (Beaufort 2 to 4) northwesterly breeze on the 30th in sheltered locations, with fresh winds at elevated locations (Beaufort 5). Occasional showers. 16 °C, 59 %RH.</td>
<td>Manufacturer: Svatneke, SLM 947 (Type 1) Calibrated by AV Calibration Calibration reference 0806337 Last Lab. Calibration 09/06/2008</td>
</tr>
<tr>
<td>Operating Conditions The quarry was operating normally on the 30th, apart from tests in the late morning when it was arranged that all machinery was operating simultaneously. The crusher was not scheduled for operation, and was operated on request for test purposes.</td>
<td>Manufacturer: Svatneke, SLM 955 (Type 1) Calibrated by AV Calibration Calibration reference 0806336 Last Lab. Calibration 09/06/2008</td>
</tr>
<tr>
<td>Measurement period 15 minute at roadside boundary and house Ca. 2 minutes when measuring noise emissions from equipment.</td>
<td>Manufacturer: Bruel &amp; Kjaer Calibrator 4231 serial no. 1859044 Calibrated by AV Calibration Calibration reference 03905 Last Lab. Calibration 20/05/2008</td>
</tr>
</tbody>
</table>

8.4.1 Noise Survey Results

The noise environment in the vicinity of the quarry on the day of the survey was determined mainly by wind noise. This would be a normal feature of this elevated location, where mean wind speeds would be expected to be in excess of 5m/s. Quarry noise was audible at a low level at the nearest house. As there is negligible traffic on the local road, and no audible distant traffic, the quarry noise would be the only significant component to the ambient noise under calm wind conditions. Detailed measurement results are presented in Table 8-2.
8.4.1.1 Noise Measurements at H1

For the first test at house H1, at 12.20, it was arranged that all items of equipment at the quarry were operated continuously, apart from the rockcrusher. The items of equipment operating were as follows:
- rockbreaker
- two excavators
- screener loaded by excavator
- loading shovel.

In addition, drilling was in progress at the quarry on the day of the survey, in connection with a ground water study at the site. The measured noise level at the roadside beside the house H1 under these conditions was 52 dB(A) LAeq. While this measurement was confined to light wind conditions (in lulls), there was still audible wind noise in the trees. The component of quarry noise was therefore likely to be less than 52 dB(A). In the afternoon, at 14.45, it was arranged for the crusher to operate for a period, while normal work was also in progress in the quarry. The measured noise level at the roadside beside house H1 was 53 dB(A).

8.4.1.2 Noise Measurements at Quarry Entrance

A plot of noise levels measured at the quarry entrance, M1, is shown in Figure 8-1. The average noise level (LAeq) was affected by wind noise throughout the survey, and as this was an automated unattended monitor, it was not possible to reliably differentiate quarry noise from wind noise in these readings. However, a reliable estimate of the steady underlying quarry noise component can be made from the measured LA90 parameter. During the operational hours of the quarry, from 08:00 until the end of the survey at 15:30, the steady noise component detected at the boundary was in the range 45 to 53 dB(A) LA90. This contained a contribution from wind noise also, and may therefore overestimate the steady quarry noise component.

During the equipment noise emissions tests in the morning, all of the equipment, including the crusher, was operating continuously at the quarry from 11.10 to 11.40, which resulted in a relatively steady overall noise emission. The measured steady noise component detected at the quarry entrance during this period was 52 dB(A) LA90.

During the first test at house H1 at 12.20 when all of the quarry equipment was operating (except the crusher), the steady noise component measured at the quarry entrance was again approximately 52 dB(A), which agrees with the measured level at house H1.

When the crusher was operating in the afternoon at 14:45, the steady noise level detected at the boundary monitor was 50 dB(A), which was a little less than the value measured at the house. This may be due to variable sound propagation due to the wind. During the lunchtime period from
13.00 to 14.00, the residual wind noise component was measured to be 54 dB(A) LAeq, with an underlying steady noise level of 43 dB(A) LA90, recorded in lulls.

### 8.4.1.3 Noise Source Measurements

Measurements were made of equipment noise emissions between 11.10 and 12.00 hours. Measurements were made at reference positions within the quarry, and at reference distances from specific items of equipment, as shown in Table 8-2. The results were used to calculate sound power emissions, for use in the computer noise propagation model.
Table 8-2 Measured noise levels

<table>
<thead>
<tr>
<th>Location</th>
<th>Description</th>
<th>Time</th>
<th>File</th>
<th>$L_{eq}$</th>
<th>$L_{A90}$</th>
<th>$L_{A10}$</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise sensitive location</td>
<td>H1, nearest house to east</td>
<td>12.20</td>
<td>342</td>
<td>52</td>
<td>48</td>
<td>54</td>
<td>Rockbreaker audible, excavators barely audible, measured under light wind conditions with some interference from wind noise in trees</td>
</tr>
<tr>
<td></td>
<td></td>
<td>14.45</td>
<td>343</td>
<td>53</td>
<td>48</td>
<td>56</td>
<td>Rockcrusher audible, other works in quarry not clearly audible, measured under light wind conditions with some interference from wind noise in trees</td>
</tr>
<tr>
<td>Adjacent noise sources</td>
<td>Eastern embankment</td>
<td>11.20</td>
<td>336</td>
<td>70</td>
<td>67</td>
<td>72</td>
<td>All equipment operating (including crusher). Line of sight to noise sources, approximately 60m away</td>
</tr>
<tr>
<td></td>
<td>At 20m from crusher/excavator</td>
<td>11.40</td>
<td>338</td>
<td>78</td>
<td>75</td>
<td>78</td>
<td>Continuous crushing, fed by excavator</td>
</tr>
<tr>
<td></td>
<td>At 10m screeners and two excavators</td>
<td>11.50</td>
<td>339</td>
<td>80</td>
<td>78</td>
<td>82</td>
<td>Continuous operation</td>
</tr>
<tr>
<td></td>
<td>At 15m rockbreaker and excavator</td>
<td>11.52</td>
<td>340</td>
<td>83</td>
<td>73</td>
<td>85</td>
<td>Continuous operation</td>
</tr>
<tr>
<td>Eastern embankment</td>
<td></td>
<td>11.59</td>
<td>341</td>
<td>67</td>
<td>63</td>
<td>70</td>
<td>All equipment operating (except crusher). Line of sight to noise sources, approximately 60m away</td>
</tr>
</tbody>
</table>
8.5 Noise Modelling

To determine a reliable estimate of quarry noise levels, under various operational scenarios, a noise propagation model was developed for the site, in accordance with ISO 9613. The noise model for the quarry was based on measured noise levels at reference distances from the quarry equipment. The noise model allows for sound attenuation due to distance spreading, screening by terrain and obstacles, ground absorption, and atmospheric absorption. The model was run in the standard meteorological default setting which calculates an average noise level, allowing for moderately favourable average sound propagation due to wind and temperature gradient effects. The model permits calculation of quarry noise levels under various scenarios, which reflect the quarry operating conditions, namely:
• General Quarry Works: The general daily works at the quarry include use of excavators to handle material on the quarry floor, rockbreaking, screening, transport of materials in the site, and cutting of stone in the shed.

• General Works and Extraction of Rock On approximately two days per week, fresh rock is extracted by ripping/excavating from the top bench of the quarry.

• General Works, Extraction, screening and crushing On approximately two days per week.

8.5.1 Predicted Noise Levels at Measurements Locations

The predictions of the noise model at the measurement positions are detailed in Table 8-3.

• Accuracy of Model and Wind Effects

At the reference position at the eastern embankment there was good agreement between the model prediction and the measured noise levels. At this reference position, there was good line of sight to the major noise sources. At the quarry entrance monitoring position the model prediction was 2 dB lower than the measured steady quarry noise level, which is in reasonable agreement. At the roadside position near house H1, the noise model predicted a noise level of 49 dB(A), compared with a measured noise level of 52 to 53 dB(A). This measurement position was downwind of the quarry, and there was consequently enhanced sound propagation in this direction. The effect of enhanced sound propagation would typically be to increase the noise level by approximately 5 dB. At this site, the predominant wind direction is from the western and southern sectors, and house H1 would be approximately downwind of the quarry for 30% of the time.

A previous noise survey carried out at the quarry by AVA Acoustics in December 2007 measured a quarry noise level of 43 dB(A) adjacent to this house. The wind direction was from the southeast (2.9 m/s) during the AVA survey, which would have resulted in reduced sound propagation towards the house. Overall it is concluded that the predictions from the model are consistent with measured noise levels, allowing for the normal range of meteorological effects.

Table 8-3 Comparison of predicted quarry noise levels with measured levels

<table>
<thead>
<tr>
<th>Measurement Position</th>
<th>Measured Quarry Noise dB(A)</th>
<th>Model Prediction dB(A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastern embankment</td>
<td>67 to 72</td>
<td>72</td>
</tr>
<tr>
<td>Roadside at H1</td>
<td>52 to 53</td>
<td>49</td>
</tr>
<tr>
<td>Quarry entrance M1</td>
<td>52</td>
<td>50</td>
</tr>
</tbody>
</table>
8.5.2 Noise Propagation in Surrounding Countryside

The noise map representing quarry noise levels is shown in Figure 8-2. This noise map represents the noise propagation with all items of quarry equipment operating simultaneously (i.e. general works on the quarry floor, excavation and crushing). In this noise map, the high noise region at the southwestern side represents the noise generated by ripping/excavation of rock from the upper bench. There is no line of sight from the top of the quarry to the nearest house, and hence there is a good degree of acoustic screening. Noise generated by equipment on the quarry floor is screened by the quarry face to the southwest, and decreases rapidly in an easterly direction beyond the edge of the elevated floor of the quarry site. This is due to the substantial acoustic screening provided by the terrain, i.e. there is no line of sight from road level to the noise sources at the quarry. There is also a lower noise region visible in the noise map on the eastern side of the local road. This is due to the lower level of the terrain to the east of the road.

8.5.3 Predicted Noise Levels at Houses

The noise model predictions at houses H1, H2 and H3 are presented in Table 8-4, along with the estimated range of expected noise levels under upwind and downwind conditions.

The predictions are presented for three scenarios, namely:

- General quarry works (everyday)
- General quarry works, plus excavation/ripping at top of quarry bench (about two days per week)
- General quarry works, plus excavation/ripping at top of quarry bench, plus screening and crushing (about two days per week)

**House H1:**

The predicted mean noise level at house H1 is 41 dB(A), for everyday general quarry works. Depending on wind direction, the noise level at the house may range from 36 to 46 dB(A). Approximately twice per week, when screening and crushing are in progress, the mean noise is predicted to be 44 dB(A), and could range from 39 to 49 dB(A) due to wind factors. The only suitable accessible position for carrying out noise monitoring for this house is at the roadside. At this roadside position, the noise level is calculated to be 5 dB higher than at the house, as the house is underneath the road level, and there is consequently additional noise screening at the house. The mean noise level at the quarry entrance is predicted to be 46 dB(A) for general quarry works, increasing to 49 dB(A) twice per week when extraction, screening and crushing are in progress. Allowing for wind effects, the noise level could be expected to range from 44 to 54 dB(A).
Houses H2 and H3:
The predicted mean noise levels at these houses are 44/45 dB(A) for general quarry works. Allowing for variable wind direction, the noise levels may range from 39 to 50 dB(A). Approximately twice per week, when screening, extraction and crushing are in progress, the mean noise is predicted to be 47/48 dB(A) at these houses, and could range from 42 to 52 dB(A) due to wind factors.

Table 8-4 Predicted noise levels at houses from computer noise model

<table>
<thead>
<tr>
<th>Location</th>
<th>General Quarry Works</th>
<th>General Works + Excavation</th>
<th>Daily Works + Excavation + Crushing</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1 at nearest house mean</td>
<td>41</td>
<td>42</td>
<td>44</td>
</tr>
<tr>
<td>H1 at nearest house range</td>
<td>36 to 46</td>
<td>37 to 47</td>
<td>39 to 49</td>
</tr>
<tr>
<td>M1 quarry entrance mean</td>
<td>46</td>
<td>47</td>
<td>49</td>
</tr>
<tr>
<td>M1 quarry entrance range</td>
<td>41 to 51</td>
<td>42 to 52</td>
<td>44 to 54</td>
</tr>
<tr>
<td>H2 mean</td>
<td>45</td>
<td>46</td>
<td>48</td>
</tr>
<tr>
<td>H2 range</td>
<td>40 to 50</td>
<td>41 to 51</td>
<td>43 to 53</td>
</tr>
<tr>
<td>H3 mean</td>
<td>44</td>
<td>45</td>
<td>47</td>
</tr>
<tr>
<td>H3 range</td>
<td>range: 39 to 49</td>
<td>40 to 50</td>
<td>42 to 52</td>
</tr>
<tr>
<td>Operation Frequency</td>
<td>Daily</td>
<td>Once/week</td>
<td>Once/month</td>
</tr>
</tbody>
</table>

1 General quarry works: excavators, screening, rockbreaking The effect of the wind is to add or subtract approximately 5 dB, depending on whether the house is downwind or upwind of the quarry, which gives rise to the range in predicted noise levels.
Figure 8-2 Calculated noise map for quarry operations at Liscuillew (all equipment operating: extraction at top of quarry bench, works on quarry floor, screening and crushing)
8.6 Impact Prediction
8.6.1 Compliance with Guideline Noise Limit
During normal daytime operation, the quarry is expected to generate mean noise levels of 41 to 45 dB(A) at the houses in the vicinity of the quarry. Allowing for wind and meteorological effects, the received noise level could vary by approximately 5 dB from these mean values. The highest expected noise levels under normal daytime operation of the quarry are therefore in the range 46 to 50 dB(A) at the houses. On the one day per month when the crusher is operated, the mean noise levels at the houses are expected to range from 44 to 49 dB(A). Allowing for wind and meteorological effects, the received noise level could vary by approximately 5 dB from these mean values, and the highest levels expected are in the range 49 to 54 dB(A). It is concluded, that the quarry can operate within the standard noise limit of 55 dB(A), under worst case conditions, with all items of equipment operating, and with the receptor locations downwind of the quarry. Under everyday quarry operating conditions, and under moderately favourable sound propagation conditions, the mean noise levels at the receptors are expected to be 10 dB lower than the 55 dB(A) limit. Table 8-5 and 8-6 indicate the results of subsequent noise measurements which ratify the modeling.

Table 8-5

<table>
<thead>
<tr>
<th>Date: 05/06/12</th>
<th>QUARRY OPERATING</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOCATION 1 @ H1 Quarry Boundary at NSL</td>
<td>L_{eq} (15min) 38.0dB(A) 14:42 – 14:57 Aeroplanes over head, Bees, Sheep, Waterfall, Distant RTN from R280 road (2.5Km East)</td>
</tr>
<tr>
<td>LOCATION 2 Quarry Floor</td>
<td>L_{eq} (15min) 69.4dB(A) 14:09 – 14:24 Doosan 18ton excavator on quarry face, Loading shovel, Guillotine,</td>
</tr>
<tr>
<td>INSIDE OF PROCESSING BUILDING</td>
<td>L_{eq} (15min) 59.6dB(A) 13:50 – 14:05 Guillotine operating (only), radio audible (low volume).</td>
</tr>
</tbody>
</table>
From the results in the table it can be seen that the existing operation has not had a significant impact on the environment and given that the process within the quarry have not changed, with respect to levels of production or processes, then it can be stochastically inferred that the operation of the quarry is not nor would it have a significant impact on the environment when noise propagation is considered. The results confirm that wind noise is a significant part of the noise levels in the area.

8.6.2 Noise Impact of Quarry Traffic
Trucks leaving the quarry turn north on the local road in the direction of Drumkeerin. The typical production rate of seven truck loads per day would correspond to fourteen 2-way movements. On this basis, it is unlikely that there would be more than 4 truck movements in any given hour. The resulting hourly average traffic noise level at houses H2 and H3 to the north is calculated to be 49 dB(A). This is a low traffic noise level, with negligible noise impact. The quarry traffic noise level at the house H1 to the east of the quarry is calculated to be less than 35 dB(A), which is negligibly low as no trucks pass this dwelling eiter entering or leaving the site.
8.7 Mitigation Measures
While the mean noise levels from quarry are comfortably within the guideline limit, standard best practice mitigation measures as detailed in the EPA guidance document “Environmental Management in the Extractive Industry” should be implemented to ensure noise is minimised as much as possible. Environmental noise levels should be reviewed at regular intervals, or if there are significant changes in the works and action taken if systematic increases are detected at noise sensitive locations. The existing noise mitigation measures employed on site ensure compliance with national standards and do not require supplementing. The advent of section 261A, and the uncertainty that it introduced, resulted in the noise monitoring being temporarily suspended.

Noise Terminology

**dB(A)** a logarithmic noise scale (decibel). The "A" indicates that a frequency weighting has been applied to take account of the variation in the sensitivity of the human ear as a function of frequency.

**LAeq** the average noise level during the measurement period, which includes all noise events. The LAeq value has been found to correlate well with human tolerance of noise, and is the value normally used in setting and monitoring industrial noise limits. All noise levels in this report are LAeq,1hr parameters unless otherwise indicated.

**LA90** the noise level exceeded for 90% of the time. It is used in BS 4142 as being representative of the steady background noise at a location. It tends to exclude short events such as cars passing, dogs barking, aircraft flyovers etc.

**LA10** the noise level exceeded for 10% of the time. It is a measure of the higher noise levels present in the ambient noise. The LA10 parameter is used in the U.K. traffic noise model (CRTN)

**Total Noise Level**
The total noise level due to all noise sources (also called ambient noise).

**Specific Noise Level**
A component of the ambient noise that can be attributed to a specific source, e.g. quarry

**Residual Noise Level**
The component of the total noise that exists in the absence of the specific noise

**Sound Emergence**
The increase in the total noise due to the addition of a specific noise source
9 VIBRATION

The operations at this quarry consist of the excavation of bedrock from the quarry face with the use of excavator and rock breaker, transportation of the rock within the shed/workshop where it guillotined to the appropriate size, bagged in to 1 ton bags and then stored on pallets on the quarry floor. Stone from the quarry face that is not suitable is stored on the quarry floor. This is screened or crushed on two days each week and sold as decorative stone or sand. No blasting take place at this location nor it is intended to be undertaken in the future. The "Environmental Management Guidelines – Environmental Management in the Extractive Industry (Non-Scheduled Minerals)" published by the EPA requires that a vibration and air overpressure survey is carried out in areas where rock blasting is undertaken. As there is no blasting carried out at this quarry, consequently no issues arise with respect to blast vibration or overpressure. No mention is made in the same Guidelines in relation to vibration deriving from quarry machinery or from quarry-generated traffic. The ground vibration generated by equipment and vehicles at the site is imperceptible at distances of 20m from the equipment. Consequently there is no potential for perceptible ground vibration to be transmitted to nearby houses. Quarry trucks passing houses H2 and H3 to the north of the site will generate low levels of ground vibration. From measurements made at other sites, it is found that truck vibration is below the threshold of perception at distances of 10m from the road edge. Vibration of windows may on occasion occur when trucks are passing houses, however this is due to the low frequency airborne sound from the vehicle, rather than the ground vibration. Overall, the vibration impact of quarry operations is negligible.

10 LANDSCAPE AND RESTORATION

10.1 Introduction

This report provides an assessment of the landscape and visual impacts of an existing pre-1964 stone quarry under the rEIS section of 261a of the Planning and Development Act 2000. The purpose of this study is to appraise the existing landscape of the subject site and assess the impacts (if any) on the landscape character and visual amenities of the area arising from the existing development. Mitigation measures aimed at reducing impact, if required, of the current development and incorporating these into the surrounding landscape character of the area are also considered. This report presents the findings of a Landscape and Visual Impact Study carried out and identifies and assesses any likely significant impacts that have occurred or would occur that are significant to the landscape character within the study area. This study seeks to examine the following:
• Identify present landscape designations and planning policies that may concern the site and its environs.
• Assess the existing landscape character of the site and its surroundings.
• Assess the visual impact of the development.
• Determine strategies that would mitigate against significant adverse landscape and visual effects and assess their effectiveness.

10.2 Methodology
The landscape and visual impact study examines and evaluates the implications of the current development in terms of landscape character and visual alterations, arising from its presence in the landscape.

The methodology used in conducting the landscape and visual impact assessment for this proposed development is based on the following quantitative and qualitative appraisal measures:

- Leitrim County Development Plan 2009-2015;
- County Leitrim Heritage Plan 2003-2008;
- Landscape Assessment of County Leitrim (2002)
- Drumkeeran Local Area Plan (LAP)
- Lough Allen Restoring the Heart of County Leitrim (Catchment plan) (2008)
- Historic Landscape Character Assessment (2005) Dublin Institute of Technology;
- Landscape Character Assessment in Ireland: Baseline Audit and Evaluation (2006)
- Desktop study to assess the development through a combination of historical and current OS maps, aerial photographs, site plans, cultural heritage, geology and soil maps, ecology, topographical analysis and drainage features.
- Site visits to determined:
  > the extent of visibility
  > localised screening effects
  > viewpoints within the study area accompanied by photos
  > woodland, tree and hedgerow cover
  > other landcover forms and land use
  > field boundaries and artefacts
  > archaeological, historical and cultural features
  > access and rights of way
  > the consideration of seasonal screening effects
Consultations with land and homeowners in the immediate vicinity and surrounding areas where the quarry is visible in the landscape was also carried out. The DoEHLG (2000) document recommend baseline studies to describe, classify and evaluate the existing landscape and visual resources, focusing on its sensitivity and ability to accommodate change. This is established through a combined process of desktop study and onsite survey work, in addition to photographic and plan surveying and analysis. The proposed development is then applied to the baseline conditions to allow for the identification of potential impacts, prediction of their magnitude and assessment of their significance. Mitigation measures may therefore be identified to reduce or eliminate where possible, the potential visual impacts. The landscape impact assessment includes:

- Appraising the direct impacts upon specific landscape elements within the vicinity of the site and adjacent to the site;
- Impacts on any special interests in and around the site.

The visual impacts include:

- Direct impacts of the proposed development upon protected views in the landscape;
- Overall impact on visual amenity, residential dwellings, cultural heritage and way-marked access routes.

In order to undertake the visual impact assessment of the proposed development on the surrounding area, a zone of visual influence needed to be determined, which would comprise the general area surrounding the site and assess the potential impact of the development on the area. The topography of the area is a primary determining factor for consideration in establishing the sphere of this zone. Following the initial visual assessment of the area, the zone for visual assessment was adjusted accordingly.

10.3 Description of the Receiving Environment

10.3.1 Landscape Setting

The quarry is located about 3 km off the western side of the R280 road en-route to Drumkeeran (Droim Caorthainn – meaning ‘Ridge of the Rowans’) village (see Map 2-1Errore: sorgente del riferimento non trovata). The site of the quarry is easily accessible via the third class road L4283. The site overlooks the western shores of Lough Allen at the northern end from the upper foothills in the townland of Liscuillew Upper at an elevation between 290-380 m O.D. Lough Allen is the prominent landscape feature looking east from the site (see Map 2-2 Errore: sorgente del riferimento non trovata).
The quarry is involved in the production of dimension stone. The quarry floor face is slopes from northeast to southwest. At the southern end of the site the area of land has been rehabilitated (see Photo 10-1) as has a section Eastern area along the local access road. The quarry is evidence of the sandstone landscape of the wide open hilly areas of this area of County Leitrim.

**Photo 10-1: Area of quarry that has been rehabilitated**

The site is situated at the base of the upper foothills of Corry Mountain within rural townland of Liscuillew Upper which is characterised by low dispersed settlement located amongst forestry plantation and pockets of pasture land on the northern side of the townland. The site is located in the ‘Corry Mountain Character Area’ as outlined in the ‘Landscape Assessment of County Leitrim’. This area has been described as an ‘upland area which rises above Lough Allen and lowland drumlins…contains elements of heathy platea, hills and gentle farmed slopes…mountain roads to infrastructure developments offer extensive views over vast areas of moorland plateau and over the surrounding lowlands,…the agricultural landscapes of the lower slopes hedgerows create more intimate landscapes.’ (upland area which rises above Lough Allen and lowland drumlins…contains elements of heathy platea, hills and gentle farmed slopes…mountain roads to infrastructure developments offer extensive views over vast areas of moorland plateau and over
the surrounding lowlands (A fully operational wind farm is located approximately 1km to the south-west of the site. This is not visible from the site),...the agricultural landscapes of the lower slopes hedgerows create more intimate landscapes.’ (ERM 2002, 74). There is extensive landform ranging views from the North-West to the South-East from the site. Overlooking beyond the lake there are mountainous areas to be seen ranging from the North-East to the East-South-East. The area is sparsely populated where small houses are associated with outbuildings are apparent on the lower gentler farmed slopes. The land use in the immediate vicinity of the site is predominately forestry belt plantations (conifer type) from the North to the South South-East. The land use in the lower plains to the North is comprised of a mix of forestry (coniferous and deciduous) and pasture land. This belt of forestry obscures views of the quarry approaching off the R280. It would appear that there is semi natural woodlands on the steeper inclines and around farms. The majority of soils display significant limitations to agriculture. Field boundaries create strong patterns on lower hill slopes though show signs of dereliction in places. A modern field drain cuts the blanket peat land along the west of the site to prevent heavy rainwater flowing down over the quarry face and on to the site. Instead the water from the bog is channeled away in a northerly direction. Originally the site would have comprised of blanket peat. There are present extensive areas of plateau, particularly to the south of the site, which are covered by heath, blanket bog and abandoned cutaway bog. Scrub invasion occurs in rough pastures on the lower slopes. Otherwise the land in the immediate area remains largely uncultivated and is grazed upon by sheep with signs of field boundaries enclosed largely by post and wire fences. Mining of coal and iron has occurred on Corry Mountain. There appear to be possible signs of extraction along Miner’s Way (see Photo 10-2).

Post and wire fences are used in preference to earthen banks at higher altitudes for the small field enclosures. Seasonal boolies represent the only real evidence of settlement on the uppermost slopes. There are occasional abandoned and derelict houses. On the lower sloped scattered fertile areas at the beginning of the time of the plantations, the landscape of county
Leitrim changed from one which was relatively untouched by the indigenous population to a terrain where land was walled off by immigrant settlers. There influence produced reformed and rationalised field systems. After 1880 widespread centralised intervention led to long term reorganisation of the rural landscape. It is to this period of reorganisation that the majority of the current field systems, rural settlement patterns and hedgerows in county Leitrim date, superseding the open fields and rundale system of the pre-famine era. Restructuring gathered pace following a well publicised near famine in the west of Ireland in 1889-90 which led to the establishment of the Congested Districts Board (CBD). The CDB initiated infrastructure development, agricultural improvement and promoted far-reaching changes in the countryside by re-modelling the landscape and encouraging the dispersion of farms. Land-holdings were reorganised; the clustered farm settlements and rundale holdings were replaced by owner occupied strip holdings, each with a new farm house located on re-planned roads. It is to this period that the farm cottages which are found throughout county Leitrim date. The Land Commission, formed from the older CBD, completed the transfer of the rural landscape to owner occupancy. In relation to the modern day, county Leitrim’s rural landscapes have escaped industrialisation. The landscape remains deeply rural, with part time farmers maintaining small farms comprised of hedges, fields and modest farm and out-buildings.

Photo 10-2: Signpost marking out the walk and an old trackway off the miners way walk.
10.3.2 The Wider Landscape Character
This section deals with the wider area such as Lough Allen and the village of Drumkeeran. The village of Drumkeeran is sited in a slight upland setting amongst drumlins and mountains. The village lies in the valley of the Diffagher River above the North-West shore of Lough Allen. The village falls in the Northern Glens, Central Lowlands and Lough Allen character area, which extends from the shores of Lough Allen to the Tullaghan Coast and is bordered by a number of mountain complexes. The traits of this character area could be described as being undulated drumlin covered lowlands and glens confined by sharp break in slope and mountainous areas. There are small masses of some coniferous plantations and deciduous woodland visible. Linear settlements are lined along the R207 and R208 regional roads which traverse through the lowlands. The glens and lowlands are economically and culturally significant in the area as they provide communication links through the surrounding relatively inhospitable terrain. The mountains and glens are predominant landmarks among the drumlins and are a backdrop against the small enclosed pastures. The drumlins are mainly covered in pasture. Hedgerows define the small field systems, some showing signs of rush growth from abandonment. A well wooded landscape character epitomises the areas around Lough Allen, Drumkeeran and Corry Mountain area the location of the quarry. Lough Allen as mentioned is visible from the existing quarry. Looking west from Lough Allen’s eastern shoreline the lower slopes of the hills show an interaction of fields, hedgerows and woodlands. The upper slopes are more barren with reddish brown hues of heather and grasses with clusters and bands of coniferous forest plantation. Wind farms are visible along the mountain tops.

10.3.3 Site Visibility
The height and extent of the hedgerow and trees make the site barely perceivable from the R280 when driving along it. However, the site is discernable from a number of houses along the road in the Drummanlaughan, Knockacosan and Barragh Beg locality. The most eye-catching feature is the wind turbines on top of Corry Mountain. The site is not visible on the approach road (third class) to the south of the site, due to the topography and the quarry at the southern side not being overly quarried but instead left for rehabilitation. The site is not visible from the L4283 third class road on approach to the site from the North because of forestry. However, the exception being the junction of the R280 and the L4283 where there is situated a dwelling. The quarry is not visible from the road classified ‘other road’ as marked in the OS Discovery Series map 26 1:50,000 at grid reference G907213, which runs in conjunction with the way marked walk ‘Miners Way’ about a half kilometre south-east of the site. The site is visible from the grounds of the church in Drumkeeran. It is also not visible from the local GAA ground on the L8249 third class road North-west of Lough Allen or from the parking area at Corry Strand situated on the North-
eastern shoreline of Lough Allen. The site is not visible along the R200 road between Drumkeeran and Dowra due to the topography and the curvature of the road. The site can barely be spotted below the wind turbines at stages along the R207. There is very little access from this road to Lough Allen. The site is just about visible from Fahy point on the eastern side of Lough Allen. The site is not visible along the way marked walk the ‘Leitrim Way’ the stretch that passes between the eastern side of Lough Allen and the northern side of Slieve Anierin Mountain. The site of the quarry is no longer in view at the location of Cormongan shore on the eastern side of Lough Allen.

10.3.4 Landscape Planning Context
In order to assess the planning context of the site location, the Leitrim County Development Plan 2009-2015 and the Drumkeeran Village Framework Plan 2006 reports were the main planning documents to be consulted with regard to the landscape and visual references.

The county of Leitrim contains uniquely significant areas of landscape. A landscape character assessment of the county has been carried out. This was assessed as part of this study for the area in question. The landscape character assessment of County Leitrim is utilised for its policies and guidance in relation to wind farms and afforestation development. In the context of this development (a quarry) Leitrim County Council in the Leitrim County Development Plan 2009-2015 under the heading of ‘Quarrying and Mining’ (2.06.07) recognise ‘aggregates (stone, sand and gravel) and concrete products industry contribute significantly to the economic development of the county’, whereby under Policy 6.7a the Council supports the policy to ‘facilitate the further development of the industry by permitting the continuation and extension of existing quarries...where such development does not adversely impact on the environment...and the amenity value of neighbouring lands’. The quarry is screened by forestry depending on ones proximity. The site contours and levels are not severe so as to cause an obvious impediment or eyesore in the landscape. The wind farm on top of Corry Mountain detracts the view of the quarry and avoids the skyline which is centred on the wind farm. The quarry does not adversely impact on views from the opposite side of Lough Allen, especially on sunny days; haze blurs the visual impact of the quarry on the eastern side of Lough Allen.

10.3.5 Preserved Views
The quarry is not situated in those areas of outstanding natural beauty as outlined and prescribed in the Leitrim County Development Plan 2009-2015. However, the site is located in an area classified as ‘Areas of High Visual Amenity’, the zone being B7 – Corry Mountain on Map 7 in the Development Plan. Protected views and prospects V21 (View towards Lough Allen from the R280) and V22 (View towards Lough Allen from the R200) as in the development plan were visited to see if there was any severe visual impact. There was no view of the quarry from V21.
V22 contained no immediate view due of the quarry due to its location and because of the topography. The wind farm on Corry Mountain was the immediate observation. The ‘major public amenity area’ identified in the development plan North of Lough Allen known as Corry Strand does contain a view of the quarry. However, for the tourist or visitor to Corry Strand the most prominent and impressive feature is the lake. Though, in the direction of the development the wind farm atop Corry Mountain are the most striking features. The site is visible but its impact is exceptionally minor. The following prospects i.e. prominent landscapes or areas of high visual amenity value, areas of outstanding natural beauty or special interest which are visible from the site located in the townland of Liscuillew Upper and the surrounding area are protected under the Leitrim County Development Plan 2009-2015 and are as follows:

- O’Donnell’s Rock and Boleybrack;
- Corry Mountain;
- River Shannon, Derrycarne and environs;
- Lough Allen, Sliabh an Iarainn, Bencroy and environs.

10.4 Description of the Proposed Development

The nature of the operations carried out on site is to extract rock to provide materials to the construction industry. The extraction process at this location is carried out at a small scale, entailing the following:

- rock is excavated from the quarry face with an excavator fitted with a bucket.
- suitable stone is transported into the shed where it is guillotined to appropriate size. It is then bagged into 1-ton bags and stored on quarry floor.
- unsuitable stone is stored in heaps on the quarry floor, screened and crushed during approximately two days per week and sold as decorative stone and sand. During screening operation, crushing of bigger boulders on the quarry floor using a crushing bucket may take place on occasions. A more detailed description of the stone extraction process and of the ancillary quarrying activities is included in Section 3 of the rEIS.

10.5 Impact of the Development

This section examines the potential landscape and visual effects that are likely to arise from the presence of the quarry, in addition to the overall significance on the surrounding landscape and visual characteristics. The effects of the site may reflect in a negative, positive, cumulative, residual way, and all effects are assessed on a permanent or temporary basis. In addition, the potential impacts may have different levels of significance i.e. local, regional and national level.
10.5.1 Landscape Impacts

The impact on the landscape is dependent upon the context, the level of sensitivity and vulnerability of the affected landscape, its tolerance to change and its importance within a local, region, national or global context. Therefore, the following factors need to be examined in determining the significance of the impact on the landscape:

- The level of sensitivity of the affected landscape and visual resources
- The scale of change
- The altering of existing patterns of landscape elements and features.

In order to indicate the degree of visibility of the site from various locations, the scale has been divided into 6 categories:

- **None**: no view (no part of the site is discernible);
- **Negligible**: only a minor area of the site is discernible and/or the view is transient or at such a distance that it is difficult to perceive in the wider view, or sequence of views;
- **Slight**: the site forms a relatively small proportion of a wider view. The site does not make a marked contribution to visual amenity;
- **Moderate**: there are open views of part of the site such that it is easily visible as part of the wider view;
- **Substantial**: there are open views of the site such that it forms a substantial part (is a dominant element) of the overall view and affects its overall character and visual amenity;
- **Major**: the site is the dominant feature of the view, to which other elements become subordinate and where the site/proposed development significantly affects or changes the character of the view.

10.5.2 Visual Impact

The existing quarry has the potential to be visually obtrusive in the landscape as a result of the sensitivity of the receiving environment. The assessment of the visual impact describes the change in character of the views resulting from the sites presence, and the change in the visual amenity of the visual receptors. The County Development Plan 2009-2015 identifies prospects and views, which are considered of such significant importance that they are consequently awarded preservation under the Plan. An extensive number of preserved views have been identified and mentioned in Section 10.3.5 above. These preserved views and prospects area located in Landscape Character Area number 11 (see Map 10-1). In light of the location of the quarry, it will not impact at all on the preserved views and prospects outlined in this report. Therefore, no further assessment of these prospects and views was undertaken in respect of this report.
10.5.2.1 Preserved Views and Landscape Character Area

In total there are 28 protected views and prospects in County Leitrim. Within Landscape Character Area No. 11, (where the quarry is located) there is one ‘outstanding protected view and prospect (V21)’. As part of this visual impact study, an initial appraisal was undertaken to assess the preserved views in the immediate area and environs of the quarry from the Development Plan under the greatest potential visual threat, due to the presence of the quarry in the landscape. Following a desktop review and on site assessment of the quarry, site locality and environs. It is determined that of the 28 protected views and prospects two required to be visited and an assessment determined for the purposes of this report.

10.5.2.1.1 Preserved View V21

This view is outlined in the Leitrim County Development Plan as ‘view toward Lough Allen from the R280’. It looks out in the direction of the lake. The view encapsulates Lough Allen, Bencroy and Sliabh an Iarainn mountains. However, the impact the quarry has on this preserved view from looking westward in the direction of Corry Mountain and the quarry is *none*.

10.5.2.1.2 Preserved View V22

V22 is classified in the Leitrim County Development Plan as a ‘view towards Lough Allen from the R200’. Upon various stoppages along this route it was assessed that the roadside trees and hedging obstructed the view of the quarry. The distance of the viewing location from the site of the quarry and the height of the hedgerow and trees along suggest that the impact of the quarry on this preserved view is *none* also.

Another point of note was that within Landscape Character Area 9 ‘The Northern Glens, Central Lowlands and Lough Allen’ is situated Corry Strand, a major public amenity spot. From here the quarry is barely visible. It would be classified as having a *slight* impact (see Photo 10- 5 Errore: sorgente del riferimento non trovata).
Photo 10-3: View from R280 toward the site of the quarry

Photo 10-4: Preserved View ‘V22’ towards the site of the quarry from the R200
10.5.2.2 Miners' Way
The Miner's Way and Historical Trail is a series of waymarked long distance walking routes that form a network of paths through three of Ireland's most picturesque and unspoilt counties of Leitrim, Roscommon and Sligo. The Miners Way follows many of the paths used by the miners in the Arigna coal mines. It traverses over various terrains across forestry, heathland, bog, lowland pasture and road. The Miners Way trial passes to the south-east of the quarry along a narrow steep third class road before it meets the R280 and follows this road to Drumkeeran. The site is visible along a particular section of the walking route nearest the quarry. It would be classified as having a slight impact (see Photo 10-6P). A section of the Miners way walking trail leaves Drumkeeran to merge with the Leitrim Way, North of Dowra. There are views of the quarry along this part of the trail. The first view is from Drumkeeran GAA pitch (see Photo 10-8Plate ). The visual impact in this case would be negligible. At the ruinous historical church in Killadiskert the visual impact would be determined as slight (see Photo 10-9P). Views are hindered in the direction of the quarry looking South by the topography and vegetation nearing the Dowra side of the trail.
Photo 10-6: Quarry looking NW from the Miners’ walkway

Photo 10-7: Miners’ way marked walk
Plate 10-8: View from Drumkeeran GAA club of the quarry

Photo 10-9: View from the ruins of a medieval church Leitrim Way
The Leitrim Way begins in the village of Drumshanbo, Co. Leitrim and follows a path along the Eastern side of Lough Allen through Dowra, then on through the Owennayke river valley, across Barlear and on to Manorhamilton. The main stretch of the walkway where the quarry might have been visible is from after Cleighran More and the section of the Kingfisher Trial southwest of Dowra. Therefore, views were obtained from various vantage points between the two locations in order to assess the likely visual impacts. The first view was from Cleighran More (see Photo 10-13), here the quarry is hidden by a point. The impact in this instance can be attributed as none. The next location was along the Leitrim Way, where because of the distance of the quarry, the visual impact was none (see Photo 10-10).

The next view was from a historic burial ground near the eastern shore of Lough Allen at Fahy point (see Photo 10-11). The visual impact in this instance was none. The quarry is screened by vegetation on the lower foothills of Corry Mountain.

Photo 10-10: View to the west in the direction of the quarry
10.5.2.3 Kingfisher Trail
This is a cycle trail in conjunction with the start of the Leitrim Way in Drumshanbo before leaving the Leitrim Way at Cleighran Beg to follow the R200 road. However, the trail then leaves this road at Greaghnaafarna following a third class road in a loop back on to the R200 road before Dowra. The view of the quarry is greatly hindered due to vegetation and the roadside ditches. The view in the direction of the quarry from a standing position on the trail (see Photo 10-12) highlighted that the visual impact was none.
In summary, the overall visual impact of the quarry on along the various cycle and walking trails is determined as *none to slight*.
10.5.2.4 Visual Impact at Drumkeeran

In Drumkeeran, the visual impact of the quarry is none in relation to the village centre; however the view from the amenity area on entering the village from Drumshanbo would be classified as *negligible*. At the church the visual impact would be determined as negligible also.

Photo 10-14; View in a south westerly direction of the quarry

![View in a south westerly direction of the quarry](image1014.jpg)

Photo 10-15: View to the south-west of the quarry

![View to the south-west of the quarry](image1015.jpg)
10.5.2.5 Visual Impact on Residential Dwellings

As part of this study, it is important to assess the impact (if any) of the quarry on residential dwellings in the vicinity of the proposed development that may be impacted. This involved, where possible, meeting residents of houses to gather information. This is an essential component of a study such as this in seeking understanding and agreement about key issues, and it helps to highlight local interests and values, which may be otherwise overlooked. Following a desktop review and a site assessment of the area surrounding the quarry, it was determined that there are two residential houses in the immediate vicinity of the quarry site that will be potentially impacted upon.

Dwellings on along the L4283 the principal haul route were assessed for visual impacts and residents consulted. In addition, consultations were carried out with residential houses on the eastern side of Lough Allen also.

The dwellings closest to the quarry were assessed first (see Photo 10-16). Dwelling no. 1 to the North of the site is unoccupied and is currently for sale (see Photo 10-17). The house is fronted by a road which leads to the quarry entrance. In studying the photo it can be seen that the house is down gradient of the site and is screened. The visual impact is negligible. The next closest dwelling is dwelling no. 2 which lies to the SE of the site. This dwelling is on the roadside. This road leads in the direction of the quarry entrance. This dwelling is far better screened by vegetation and trees as evident in Photo 10-18. Furthermore, on account of the siting of the house in the landscape, overlooking Lough Allen, and because the house is down gradient of the quarry it is proposed that the visual impact in this case for dwelling no. 2 is classified as none.

The next set of dwellings assessed were those along the L4283. Dwellings on along this route were screened by planted forestry (see Photo 10-19). The roads falls from the quarry until it meets the R280. The dwellings on this road are well nestled in the landscape. The topography of the landscape allows a limited view of the lower foothills of Corry Mountain where the quarry is sited. One resident knew of the quarry and believed it did not pose any disturbance or inconvenience to their way of life. The resident informed the author that one dwelling on the road was a holiday home. Furthermore, many residents living on the road were absent suggesting they worked outside of the area. The planted forestry serves to act as a visual barrier (see Photo 10-20) in the direction of the quarry. However, the wind turbines atop of Corry Mountain are visible and this was pointed out to the author during the course of consultations. For the purposes of this report the quarry was visible from dwelling no. 3 (see Photo 10-21) located at the junction of the L4283 and the R280 (see Photo 10-22). The visible impact in this case is seen to be negligible. Consultations with residents living on the eastern shore of Lough Allen highlighted that even
though they were aware of the quarry in the landscape it did not they feel was as noticeable as the wind turbines and that that it did not impact on them in anyway.

Photo 10-16 Location of dwellings no 1 and 2 to the quarry
Photo 10-18: View to the quarry from dwelling no.2

Photo 10-19: Map showing dwellings outlined by blue rectangles along L4283
Photo 10-20: Forestry screening dwellings along L4283 from quarry

Photo 10-21: Map showing dwelling no.3
Photo 10.22: View of quarry from dwelling no.3

Photo 10-23: View of the quarry from residence on eastern side of Lough Allen
The visual impacts in relation to the quarry for the dwellings no. 1 and no.2 are as outlined above negligible for dwelling no. 1 and none for dwelling no.2. As for those dwellings along the L4283 they would be classified none, due the topography, gradient and forestry acting as a screening buffer. The exception to this is dwelling no. 3 which would be classified as negligible.

10.5.2.6 Conclusions and Recommendations
The landscape character assessment (LCA) of County Leitrim categorises the area in which the quarry is situated to be in the Corry Mountain character area, classified as a high visual amenity area. The LCA outlines key significant issues with regard to landscape character protection preservation measures;
- The impact of new buildings on the countryside
- Changes to landscape settings and settlements
- The erosion of distinctive rural landscape patterns and features
- The impacts of afforestation and infrastructure developments
- Pressures for tourist and recreation developments.
These issues raised in the report have both a partial and impartial significance in the context of this study. The quarry is absorbed to a certain extent, depending on ones position in the landscape, into the surrounding landscape on account of the topography, local vegetation and nature, and the surrounding planted forestry. The most striking feature in the landscape is the windfarm, located within the Corry Mountain character area. It portrays the emergence of a ‘new’ landscape form, creating a uniquely different environmental habitat. The existence of the windfarm in this location of the landscape suggests this particular area within the Leitrim landscape would be seen to have minimal impacts from a visual and landscape perspective. Furthermore, the opportunity exists to redesign the forestry plantations so as to minimise and desensitise the quarrys impact on the landscape and from an aesthetic perspective. This would involve the collaboration between various parties (i.e. Council, private forestry and Coillte). The LCA advocates this idea and also the view that ‘new woodland plantings, may…bring benefits to other parts of the landscape, such as abandoned farmland, amenity landscapes, the settings of settlements and areas degraded by industrial or infrastructure development’ (ERM 2002, 96) The adoption of such an approach is well supported, given that the landscape where the quarry sits is surrounded by forestry.

10.5.2.6.1 View from the various walkings and cycle trails
The visual impact of the quarry on these trails which are found the environs of Lough Allen is limited, and the overall impact is considered none to slight. The very nature of a quarry in such a landscape impacts on the character of the area, as a quarry is out of character to the character of the topography. However, improved screening measures, such as the further planting of
vegetation in the vicinity of the site would assist in minimising the visibility of the site, and in addition positively merge the site into the surrounding environment.

10.5.2.6.2 Impacts on preserved views
Following an assessment of the County Development Plan, it was determined that there are 2 preserved views in the vicinity of the site that may be impacted upon from a visual perspective. Further onsite assessment of the potential visual impact was undertaken and it was determined the likely visual impacts of the proposed development on the preserved views are as follows:

- Impact on Preserved View No.21 is *none*;
- Impact on Preserved View No.22 is *none*;

There will be no impact visually on the preserved views nos. 21 & 22 (as located in Map 10-1 and shown in Photos 10-24 and 10-25). The impact on preserved view no. 21 will be minimal, and the overall view will not suffer to a large extent as the quarry is situated to the Northwest and the preserved view ‘V21’ looks out in an easterly direction over Lough Allen and across the mountains, which overlook Lough Allen.

The impact of the quarry on preserved view ‘V22’ is *none to negligible* based on the distance and angle at which the view overlooks the lake. This preserved view in relation to the quarry is located to the southeast overlooking the eastern side of Lough Allen. The siting of the quarry is on a northwest to southeast axis helping to screen it from the preserved view ‘V22’. It is important to add that when there is hazy/foggy weather in this area of Leitrim, distant views from either side of Lough Allen of the landscape lead to conditions of low visibility.

Photo 10.24: Preserved View no. 21
Following an assessment of the residential dwellings in the vicinity of the site, it was determined that there are two residential dwellings that the proposed development will impact upon from a visual perspective. Further assessment of the potential visual impact was undertaken and it was determined that the likely visual impacts of the proposed development on the surrounding dwellings as follows:

- Impact on Dwelling No. 1 is *negligible*;
- Impact on Dwelling No. 2 is *none*;
- Impact on Dwelling No. 3 is *negligible*;

Those dwellings along the principal haul route, L4283 were screened by either vegetation or forestry. The visual impact on these dwellings is classified as being *none*. In addition, the landscaping as proposed in this report will assist in screening the quarry from those surrounding residential dwellings most affected and thus, over the medium to long term, the impact will not increase. The removal of this forestry would increase the visibility of the quarry from these dwellings. However, forestry practices advocate the policy of phased felling, thereby ensuring that any impact would be minimal as replanting would be undertaken. This will allow for a minimal increase in adverse impacts on those dwellings. In this regard close co-operation between private planted foresters, Coillte, residents of the said dwellings and the Council to effectively put in place a suitable strategy to manage the planting of suitable species so as to improve the aesthetic character of the area from a visual and landscape perspective from the quarry development.
10.6 Impact of the Development

It is important to realise that in this landscape and visual impact study mitigation measures ideally should be incorporated in the initial design process and planning of a development. This would be seen as best practice in order to avoid adverse visual impacts of a development on the surrounding environs. However, because of the pre-existing nature of this subject development a suitably efficient environmental design is less achievable than if it had been considered from the outset of the project. The existing development has had a negligible impact on the landscape and given the topography and vegetation is unlikely to have an impact that exceeds that characterization. Some broad leaf planting has already being undertaken to reduce the visual impact. Nonetheless, mitigation measures can be implemented which will further reduce any adverse visual impacts that the subject development is currently having on the immediate local landscape. The definitive mitigation strategy for the purposes of this report is remediation undertaken in a progressive or phased approach. Outlined below are suitably applicable mitigation practices that will help achieve remediation of the subject site but are only supplementary to those already in place.

10.6.1 Landscaping and Planting

It is recommended that all landscaping and plantings comprise of suitable indigenous broad-leaved species local to the area where there is upland bog (this would include dwarf shrubs), heath (ling and crossed-leaved heath) and forestry. The planting of broadleaved trees is recommended in the Landscape Character Assessment (LCA) of County Leitrim, as a means in helping to improving the local landscape character. This should also be taken on board to see what type species may exist in the area. Planting should be carried out keeping in mind the existing ecosystems, habitats and biodiversity of the area. It is recommended that all landscape plantings within the quarry site consist primarily of indigenous species already existing in the locality. This will assist in ensuring that the quarry is in keeping with the existing character of the surrounding area, while simultaneously providing improved environmental value to the local ecology. It is important long-term control and management be secured to include ‘off-site’ measures such as habitat restoration/planting, proposed on lands outside the quarry’s control as advocated in the County Development Plan and LCA, to ensure greater mitigation to minimise the negative change in visual amenity.

The following species are suitable for plantation in exposed upland areas:

- **Acer pseudoplatanus** (Sycamore)
- **Betula species** (Birch)
- **Calluna vulgaris** (Heathers)
- **Corylus avellana** (Hazel)
- **Crataegus monogyna** (Hawthorn)
• **Erica species** (Heathers)
• **Ilex aquifolium** (Holly)
• **Larix species** (Larch)
• **Pinus contorta** (Pine)
• **Prunus spinosa** (Blackthorn)
• **Quercus cerris** (Oak)
• **Salix caprea** (Willow)
• **Sorbus aucuparia** (Rowan)
• **Ulex gallii** (Gorse)
11 TRAFFIC

11.1 Site Location
Map 2-1 shows the location of the quarry. The quarry is approximately 25 km north of Carrick-on-Shannon along the R280 and 28 km southeast of Sligo. The access road to the quarry is via the L4283 County Road from its junction with the R280. This quarry has been in operation for over 60 years and provides dimension stone to the construction industry. Smaller quantities of decorative chips and sand are also provided as by-products of the quarry process. The stone is of a high value and production volumes are low. On average over a two month period (measured June/July) the quarry deliveries resulted in approximately 40 HGV per week leaving the site i.e. 80 HGV movements per week on the L4283 to and from the quarry site.

Photo 11-1 below shows the existing gravel access road to the quarry site, while Map 2-2 shows the quarry site layout.

Photo 11-1 Existing Site access road

11.2 Description of the Site
The site is located on the northeast-facing slope of a mountain complex (Corrie Mountain) with a general orientation NW-SE. The top of Corrie Mountain reaches an altitude of 426 mOD approximately 1 km to the SSW of the site entrance. The other main topographical feature of the
area is the water expanse of Lough Allen, located ca. 3 km to the east, at elevations of ca. 50 mOD. Topographical elevations within the site rises from ca. 250 mOD near the site entrance, to the highest elevation in excess of 294 mOD along the site southern boundary. The site currently used for quarrying with an area of extinct excavation, currently no longer active and in the process of being rehabilitated following Leitrim County Council requirements, is located at the eastern end of the site. This part of the site also includes access and internal roads, and storage of excavated and screened material. The site is separated from adjoining lands by a 1-m high metallic fence with wooden posts, and by a 2-m high railing and gate at the site entrance. There are scattered residential properties in the vicinity of the site, with the nearest residence located ca. 50 m to the south of the site entrance. The village of Drumkeeran, is located approximately 3 km to the north of the site entrance.

11.3 Receiving Environment

11.3.1 Existing Road Network
The location of the quarry in the context of the local road network, is detailed in Map 2-1. The access point to the site of the quarry is via the Local Road L4283, off the Regional Road R280. The destinations of quarry product are split 50/50 approximately with destinations north along the R280 to Sligo / N4 and south along the R280 to Carrick-on-Shannon and onwards to the N4. The R280 is a relatively good standard regional road with a 100kph speed limit along most of its length. The carriageway is 7.0 m wide with 1.0 m shoulders however the road exhibits significant horizontal/vertical curvature and limited overtaking sections (see Photo 11-2).

Photo 11-2: View of the R280
11.3.2 Junctions (Nodes) and Roads (Links)

The study area for the assessment is limited to the following two junctions:

- Junction 1: R280 / L4283
- Junction 2: Site entrance L4283

The following is a brief description of each junction.

Junction 1: R280 / L4283

This is an at grade T junction. Visibility is good but needs to be improved by trimming back vegetation as the R280 is a 100Kph speed road at this location. See photos below of the junction looking north and south from a 4.5 m set back on the L4283.
Junction 2: Site entrance L4283

The site entrance forms a T junction to the L4283 exit sight distance have been improved. Photos 11-5 and 11-6 below show the junction with the view north and south from a 2.5m set back on the site access road.

Photo 11-5 Site entrance from L4283- view north

Photo 11-6 Site entrance from L4283- view south
11.4 Description of the Proposed Development

The nature of the operations carried out on site is to extract rock to provide materials to the construction industry. The extraction process at this location is carried out at a small scale, entailing the following:

➢ rock is excavated from the quarry face with an excavator and a tooth bucket.
➢ suitable stone is transported into the workshop where it is guillotined to appropriate size. It is then bagged into 1-ton bags and stored on quarry floor.
➢ unsuitable stone is stored in heaps on the quarry floor, screened and crushed to produce decorative chips and sand.

During screening operation, crushing of bigger boulders may take place on occasions on the quarry floor using a crushing bucket. This quarry has been in operation for over 60 years producing a high quality dimension stone for the building industry. Production rates are low and traffic generation from the quarry is low.

However the standard of the county road serving the quarry is poor with significant horizontal and vertical curves as well as steep gradients. The surface quality is good and has being improved over the last 2 years with a number of “pull ins” provided and exhibits no significant base failure is evident. The quarry generates approximately 20 car trips per day and 9 HGV trips per day on average. The maximum HGV generation over one day during the period surveyed was 18 HGV’s. This volume of traffic generation from the quarry accounts for approximately 50% of the car traffic and most of the HGV traffic on the L 4283 from the quarry entrance to the R280. The volumes of traffic generated by the quarry over the periods June/July/August are represented in Table 11-1 below.
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11.5 Traffic Survey & Impacts

11.5.1 Traffic Conditions
There were no existing traffic surveys suitable for use as a basis for the Traffic Assessment. Consequently, in order to establish the existing traffic volumes on the local road network in the vicinity of the site and to assess the impact of traffic movements associated with the proposed development, a one day traffic count was undertaken at the junction of the R280 / L4283 by an independent third party. Capacity is expressed in numbers of vehicles or Passenger Car Units (PCU). Vehicles vary in performance and the amount of road space they occupy. The basic unit is the passenger car and other vehicles are counted as their PCU equivalent, so that a bus is classified as 2.0 PCU, a HGV as 2-3 PCU and a pedal cycle 0.1 PCU. From the counts, PCU Factors were applied to gain a total flow for each movement (see Table 11-2 below for values).

Table 11-2 Passenger Car Unit Factors

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The peak traffic volume on the local road network was identified as between 0800hrs - 0900 and 1700hrs - 1800hrs on Wednesday 17th September. The traffic impact considerations have been limited to the two junctions listed below follows:
- Junction 1: R280 / L4283
- Junction 2: Site Entrance / L 4283

11.5.2 Proposed Trip Distribution
Trip distribution describes the number or proportion of trips from an origin zone spread amongst all destination zones. There is a 50% /50% split traffic entering and exiting the site. With 50% of
all trips travelling north of the site with an origin/destination in Sligo and its hinterland and 50% south of the site with an origin/destination in Carrick-on-Shannon and its hinterland. Map 11-1 above outlines the directional split of development trips at the R280/L4283 junction as proposed above.

### 11.5.3 Assessment Years
As per the National Roads Authority “Traffic and Transport Assessment Guidelines, September 2007”, analysis years have been taken as follows:
- Base Year 2008; Operating year (2013); Operating Year + 5 (2018); + 10 (2028)

The existing traffic volumes obtained from the traffic count, inflated to 2013, 2018 and 2028 using national growth factors from the National Roads Authority “Future Traffic Forecasts 2002-2040”, would be suitable for use as a basis for the Traffic and Transport Assessment.

### Table 11-3 Future Traffic Growth Factors Rebased

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<td>1.17</td>
<td>1.24</td>
<td>1.36</td>
</tr>
<tr>
<td>Non-National</td>
<td>-</td>
<td>-</td>
<td>1.00</td>
<td>1.07</td>
<td>1.14</td>
</tr>
<tr>
<td>(Rebased)</td>
<td>-</td>
<td>1.00</td>
<td>1.07</td>
<td>1.14</td>
<td>1.23</td>
</tr>
<tr>
<td>Total HGV's</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>Both directions PCU's/ hr</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 11.5.4 Junction Impacts of the Existing Operations
As stated above the traffic count was conducted at the junction of the R280 Regional Road / L4283 County Road servicing the quarry. This count was carried out on the 17th of September 2008. The results of the count are summarised in the Table 11-4, and Figures 11-1 and 11-2 below.

**Table 11.4 Peak period traffic count totals – pcu’s**

<table>
<thead>
<tr>
<th>Time</th>
<th>R280 Northward Total PCU’s</th>
<th>R280 Southward Total PCU’s</th>
<th>Total HGV’s Both directions PCU’s/ hr</th>
<th>Two way PCU’s/ hr</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.00-10.00 am</td>
<td>232</td>
<td>236</td>
<td>24</td>
<td>156</td>
</tr>
<tr>
<td>4.00-6.00 pm</td>
<td>150</td>
<td>228</td>
<td>19</td>
<td>189</td>
</tr>
</tbody>
</table>

Computer analysis of the junction have not been undertaken as traffic counts would indicate that the junction is operating well within capacity (Ref fig 6.4 of Traffic Planning and Engineering C.A
O Flaherty) – minor road flows with AADT less than 1000 AADT and Major Road Flows less than 5000 – a simple T junction operates well within capacity.

Figure 11-1 AM peak hour traffic flows on R280/L 4283 junction – vehicles per hour
11.5.5 Traffic Capacity of Rural Roads

While the previous section dealt with the capacity of the junctions (nodes) within the vicinity of the site this section will check the capacity of the roads (links). Reference has been made to An Foras Forbartha “Geometric Design Guidelines (Classification, Alignment, Cross Section)”. This Advice Note gives the maximum hourly vehicle capacity for various types of Rural Roads. As a result, the capacities can be used as a guide to the capacity of existing rural roads as well as act as starting points in the design and assessment of new trunk road links.

The following table, Table 11-5, outlines the level of service, percentage sight distance, carriageway width, capacity of the road and comparison with the maximum usage with the maximum traffic to and from the development in place.
Applying NRA growth factors, shown in Table 11-5 above, the base flows for 2013 Operating Year, and Operating Year plus 15 years respectively are shown in tables 8 and 9 below (Figure 11-3 shows the 2008 A.M. peak base flows).

Note: Level of service (LOS) is a measure by which transportation planners determine the quality of service on transportation devices, or transportation infrastructure. Whilst the motorist is, in general, interested in speed of his journey, LOS is a more holistic approach, taking into account several other factors. As a result LOS is regarded a measure of traffic density (or a measure of congestion). The R280 Regional Road would be classified as LOS C given its design speed, cross section and low traffic volumes.

Figure 11-3 2013 A.M. Flows
The resulting 2013, and 2028 Do Something inflated flows shown in the Figures above indicate that peak hour two way traffic flows on the R280 in 2028 are approximately 220 two way vehicles per hour. The capacity of a rural single carriageway S2 class road (Table 3 TD 27/11 – DMRB) is of the order of 10,000 AADT or 1,000 veh/hour and up to 1,500 veh/hr depending on Level of Service (Table 11.2 – RJ Salter – Highway Traffic Analysis Design).

The above Figures indicates that the Regional Road (R280) is well within capacity in 2028 operating at LOS C or higher. In conclusion the R280 has sufficient capacity to sustain the ongoing quarry operations to 2028 and beyond without compromising the capacity of the route.

11.6 Mitigation Measures
Infrastructural requirements or modifications are not considered to be necessary for the R280/L4283 junction as the junction is not expected to operate over-capacity during the assessment period. Computer analysis of the junction have not been undertaken as traffic counts would indicate that the junction is operating well within capacity. Trimming back of vegetation on the north and south sides of the junction along the R280 is however recommended.

The L4283/Site access requires improvements to the junction surface and exit sight distances need to be improved by setting back and clearing sight lines to the north of the access as shown...
The L4283 from the site entrance to its junction with the R280 was too narrow to accommodate passing HGV's or a passing car and HGV. Passing bays were constructed along the haul route section of the L4283 at appropriate locations with good forward visibility of oncoming traffic. These bays are located along the route at approximately 200 -300m intervals see photo 11-6.

Photo 11-6 View of pull in bay

Photo 11-7 View of the local road L4283
11.6.1 Road Safety

Following an inspection of the local road network it is clear that the L4283 access road has some sub-standard geometric and gradient issues typical of many County Roads in the area. These roads are generally unsuitable for the use of high volumes of laden HGV traffic. The Road was also deficient in width for two-way HGV movements over most of its length between the R280 and the quarry entrance however this was addressed through the installation of pull in bays. See Photo 11-7 above, and Photos 11-8 and 11-9 below.

However this route has been in use by the quarry operations for many years and indeed was originally constructed to serve the quarry and forestry in the area. The current operations has not being generating high volumes of truck movements (nine per day on average), the surface condition of the road is good for a County Road. It is therefore concluded that the route could continue to be used to service the quarry subject to some local improvements. The most appropriate course of action was to construct passing bays along the haul route on the L4283 at appropriate locations with good forward visibility of oncoming traffic. These bays are located along the route at 200 -300m intervals. A survey of the R280/L4283 junction and the L4283/Quarry entrance junction has been carried out and a sight triangle drawings are provided in appendix 1 and 2. It can be seen from the drawings that improvements need to be made in particular to the site access/L4283 junction as described above. The design sketches in Figures 11-5 and 11-6 show the extent of the required boundary set back and sight distances to achieve adequate safe sight distance from a 2.4m set back within a 50Kph speed limit area and 4.5m setback within the 100Kph section of the R280.

The improvements that have being made along with those outlined here and in the appendix design sketches then these access points can operate safely within the 50Kph and 100kph speed limit areas.

Photo 11-8 L4283 County Road (Quarry Access Road)
11.6.2 Internal Layout

The internal layout should be designed in accordance with the "Department of Environment Traffic Management Guidelines" with a design speed of 30kph. The internal design of the layout has kept road user intervisibility as an important factor. Sufficient set-backs have been incorporated so as not to hinder any visibility between pedestrians, and drivers. Road widths of 6.0 metres are provided to cater for two approaching vehicle to pass in a safe manner. The internal layout has been designed with a design speed for 30kph. The car parking requirements have been calculated from the Leitrim County Development Plan Table 10 below outlines the number of parking spaces required by the Development Plan and the number that is proposed to be provided in the development.

Table 11-6 Car Parking requirements for the development

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Development Plan Requirement</th>
<th>Required Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing Industry - parking</td>
<td>2009 - 2015</td>
<td>1 space per 50/60m²</td>
</tr>
<tr>
<td>Manufacturing Industry - Service</td>
<td>2009 - 2015</td>
<td>90m² per 2000m² gfa</td>
</tr>
</tbody>
</table>
Figure 11-5  Sight Triangle 60M SD X 2.4m set back at quarry entrance road with L4283 junction
Figure 11-6  Sight Triangle 220m X 4.5m set back at R280 Regional Road / L4283 junction
12 ARCHAEOLOGY & CULTURAL HERITAGE

12.1 Introduction
The Archaeological and Cultural Heritage Assessment describes the findings from an Assessment undertaken and forms part of a remedial Environmental Impact Statement (rEIS) for an existing pre 1964 continuously operated quarry at Liscuillew, Drumkeeran, Co. Leitrim. The owner of the site is seeking substitute consent for an existing quarry including a portacabin for office and staff, staff toilet, collection of stormwater and pollution control measures to include oil interceptor and settlement lagoons. An Bord Pleanala have requested the submission of an application for substitute consent under section 261A of the 2000 Planning and Development Act which should be accompanied by a rEIS.

12.2 Site Description
Overall, the area within the existing quarry covers an area measuring in excess of 7 hectares. The quarry is predominantly involved in the production of dimension stone, which is extracted from the face with an excavator and tooth bucket and transported to the processing area using a loading shovel where it is sorted and bagged for sale. Non-suitable stone is processed into decorative chips and sand. Overburden is utilised to rehabilitate quarried areas on site. Two lagoons are on site. There is no blasting within the quarry.

12.3 The Receiving Environment
The existing quarry is located in the townland of Liscuillew Upper, the parish of Inishmagrath, within the barony of Drumhaires and in the county of Leitrim. It is sited within the northern part of the townland. The eastern townland boundary is defined by a stream, whilst the quarry is approached by an internal access road leading off the public road. Situated circa 4km south of Drumkeeran, the quarry is accessed from a third class road, which leads off the Drumkeeran/Drumshanbo regional road (R280). The site is located circa 3km west of Lough Allen. It is predominantly situated between the 200 and 300m contour level (see Map 2-1), on the foothills of Seltannasaggart or Corry Mountain. Set within a thinly populated, rural landscape, the terrain is undulating and rough, much of it boggy.

12.4 Local History and Archaeological Heritage
Cartographic and documentary sources were consulted to determine any indication of archaeological or historical activity within or close to the quarry site. This quarry is located in the townland of Liscuillew Upper, which is within the parish of Inishmagrath. Inishmagrath parish derives its name from the Irish Ionas Mac Rátha, which is believed to signify the “Island of
McGrath”1, an island from within Lough Allen. St. Brigid is the patron saint of the parish. It is noted in the 1836 Ordnance Survey letters (OSL) several antiquity sites survive in the parish including an old abbey in ruins in the townland of Cartronbeg, an old church in Kiladeescart townland called Cill Bhrihide and a well near the church, as well as St. Patrick’s Church in the townland of Curraghs1. Regarding the island in Lough Allen from which the parish takes its name, there are the ruins of a church, according to tradition, built by St. Beo-Aodh, and a disused graveyard2. Regarding the townland where the quarry is located, there are few direct references it. In the Places Names of County Leitrim it is noted the townland derives its name from the Irish Lios- Coilleagh which translates as the “Fort of the Wood”4. In the Ordnance Survey Namebooks it is noted the townland name of Liscuillew Upper was spelt Liscolley in the Down Survey3. It is also remarked in the Namebooks that “…this townland belongs to Major Butler, who holds it under a deed forever, about half of which is cultivated, the remainder is bog. It pays to the County Cess £2. 9.7…”5. Equally, an examination of the 2nd Edition (1910) revealed nothing of archaeological or cultural interest within or close to the confines of the existing quarry (see Map 12-1). The north part of the townland comprises a number of small fields whilst its remainder consists an open, mountainous expanse. An examination of the Sites and Monuments Record (SMR) and Record of Monuments and Places (RMP) for Co. Leitrim (sheets 17, 18 & 20 [see Map 12-1]) and the adjoining County Roscommon sheet (2) confirmed the nearest monument to the quarry site is located in excess of 2km to the east. This recorded monument is described as follows:

<table>
<thead>
<tr>
<th>RMP No.</th>
<th>Townland</th>
<th>Parish</th>
<th>Grid Ref.</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>LE018-043</td>
<td>Drummanasooan</td>
<td>Inishmagra</td>
<td>19336-32075</td>
<td>Rath</td>
</tr>
</tbody>
</table>

Description:
This rath is located at the north end of a north/south drumlin ridge on the west shore of Lough Allen. The site comprises a rushcovered sub-circular area. It measures 44m (N/S) x 38m (E/W). It is defined by an overgrown scarp, 500-700mm high. There is a modern entrance, 3m wide at the southeast side of the rath where the site is skirted by a northeast/southwest aligned laneway7.

12.5 Findings of the Archaeological and Cultural Heritage Survey

In addition to undertaking a desktop study of the known archaeological sites and the history of the area, cartographic, historical and archival sources were consulted. On completion of the desktop study, a walkover survey was carried out. Weather conditions and visibility were good, although
Underfoot conditions were in places very soft due to recent heavy rainfall. The quarry site is accessed via an entrance off the public road, which leads to its northern side. The existing quarry is aligned east/west and of elongated shape. An existing workshop, an office and staff portacabin is close to where the access road leads into the quarry. Internal access tracks extend through the quarry. There are two rock piles associated with the quarry present extraction face (see Photos 12-2 and 12-3) towards the southern edge of the site. Located to the west of the access road leading off the public road are two lagoons surrounded by a ditch (see Photo 12-4). A modern wooden stock fence with double stranded barbed wire segregates the quarry from the upland rough grazing heath. In places, the existing quarry has been excavated to depths of between 10m and 25m. The lands to the south, southwest and west mainly comprises a shoulder gently sloping southwest to the northeast (see Photos 12-5 and 12-6). The most southerly aspect comprises the lower 10-15m of the steep hillside. The ground can be considered a typical mountainous landscape; rough and at best suitable for very limited sheep grazing. Underfoot conditions were very soft when field walked. Vegetation consists of dense mountain grasses, heather, rushes and other wetland species (see Photo 12-7).

Photo 12-1: Looking Southeast at quarry. Lough Allen in background
Photo 12-2: Looking East at part of extraction face

Photo 12-3 Looking Northeast at existing quarry
Photo 12-4 Looking North at the two lagoons

Photo 12-5 View of southwestern part
Photo 12-6 View of Southern side

Photo 12-7 Typical vegetation
Upslope to the south and west, there are some drains following the downwards slope of the site (see Photo 12-9). On the day of the walkover survey they were partially in-filled with water and vegetation and revealed stones at their bases. The soil in section comprised a very dark thin brown peaty soil. There is a distinct absence of trees growing within the environs of the quarry, although located *circa* 1km to the east is a modern plantation and an area of plantation recently harvested. There is also evidence for recent harvesting of coniferous trees to the north of the quarry.

Photo 12-9 Land drain up slope of quarry
The northern area to be extended comprises the base of a valley containing a very short, shallow north side (see Photos 12-10 and 12-11) with two quarry lagoons are located in this area. Ground within this area is very rough, wet and totally colonised with dense cover of rushes and some heather. The north side of this valley has recently been felled of coniferous trees, leaving a scar on the landscape (see Photos 12-10 and 12-11).

Photo 12-10 View of Northern area of the quarry.

[Image]

Photo 12-11 Looking North

[Image]

As elsewhere man-cut drains extend down slope in order to facilitate drainage (see Photo 12-12). The section of the drains revealed a very dark brown thin peaty soil.
An examination of the RMP and SMR for Counties Leitrim and Roscommon confirmed the absence of any recorded archaeological monument close to the quarry site. The nearest site, a rath (LE018-043), is over 2km to the east. It is marked on both the 1st and 2nd edition Ordnance Survey maps. The results from the field walk survey revealed no potential surface archaeological sites. The quarrying operation to date appears to have no negative impact on the archaeological heritage of the area. There has not being nor would there be a negative impact on the archaeological heritage.

12.6 Recommended Mitigation Measures

It is considered that no specific archaeological mitigation measures are required for this quarry operation or the area of substitute consent.

References
4 Rev. J. Pinkman. Place Names of County Leitrim. ND.
5-6 J. O’Donovan. Ordnance Survey Field Namebooks. 1835.
13 MATERIAL ASSETS

This section of the rEIS is essentially an overview of the material and amenity resources within the site and in the adjoining area. It has been considered more appropriate to address the impacts of the quarry, either positive or negative, on the receiving environment in the relevant sections of the rEIS. The effect of any development on the material assets of the locality is influenced both by the location and nature of the development. The material assets of the area which have been identified as potentially affected by quarry activities are human beings (see Section 4), water (see Section 6), soil (see Section 6), air (see Section 7), landscape (see Section 10), the local road network (see Section 11) and the cultural heritage (see Section 12). These aspects of the environment are addressed in detail in the relevant sections of this rEIS.

This section addresses the impact of the quarry on the land use in the area surrounding the site.

13.1 Land Use and Amenity Areas

The site of the development is currently an existing quarry, including the area occupied by services and access roads. The area contiguous to the site has a rural and agricultural character, being represented by blanket bog, wet and dry heath. This part of the site is occasionally used for pasture of sheep.

This site has a long history of quarry extraction at a various scale, dating back to the beginning of the 20th century, as detailed in Section 3 of this rEIS. The continued operation of the quarry would not cause any significant impact on the general public given the mitigation measures already employed on the site and the fact that it is not open to public use.

There are scattered residential properties in the vicinity of the site, primarily one-off dwellings along the county roads network. The land adjoining the site is used as pasture. Continuation of the quarrying activities will entail the construction of noise, fugitive dust dispersion and visual impact abatement measures, including plantation of trees of suitable species, as detailed in Section 10 above. These measures will enhance the amenity aspect of the area.

The quarry design and operation has been such as to minimise any adverse impact on the receiving environment. Taken into conjunction with the mitigation measures already in place to avoid or minimise potential impacts, there should be no significant adverse impacts on the environment, amenities and land use of the area from the continued operation of the quarry nor has the operation given rise to any such impacts.
14 INTERACTION OF THE FOREGOING

Each of the various environmental and related topics has been discussed separately. This chapter identifies the impacts of the mitigation measures included in the rEIS on interdependencies in the existing environment. These have been identified in the following table.

Table 14-1 - Matrix to Summarises Inter-relation of

<table>
<thead>
<tr>
<th>Activity</th>
<th>Receptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Beings</td>
<td>● ● ● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>Flora &amp; Fauna</td>
<td>● ● ● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>Soil &amp; Water</td>
<td>● ● ● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>Air Quality</td>
<td>● ● ● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>Noise &amp; Vibration</td>
<td>● ● ● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>Visual Impact</td>
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</tr>
<tr>
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</tr>
<tr>
<td>Archeology</td>
<td>● ● ● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
</tbody>
</table>

Key interactions/interrelationships effects highlighted.

The various interactions identified in this chapter have been discussed in each of the previous chapters in terms of the manner in which they affect each other.