6. EXISTING OPERATIONS AND ENVIRONMENTAL MANAGEMENT - WATER, DUST, NOISE 2

6. EXISTING OPERATIONS AND ENVIRONMENTAL MANAGEMENT - WATER, DUST, NOISE

6.1 Introduction & Methodology

This rEIS Chapter in relation to the subject Quarry owned by Patton bros Quarry Limited, addresses the existing quarry operations and the environmental management regime at the quarry and covers the areas of water, air, dust and noise.

6.2 Method of quarry operation

The method of quarry operation is the opencast extraction of stone. Site operations include the extraction, crushing and screening of local aggregate. The quarry remains small scale and supplies some of the regional stone requirements of northeast Donegal

6.3 Existing Quarry Operations

6.3.1 Trade Emissions

Patton Bros Quarry maintain aTrade emission License (Lwat 63) in compliance with Section 261 for the discharge of trade emission waters after treatment, to be discharged via a small stream and tributary of the River Finn. The results of monitoring for the Discharge of Trade Emission (License No. LWat 63) is contained in the annual reports issued by the DCC Chemistry Lab and show that the quarry has operated the treatment of trade discharge in compliance with parameters as set by the local authority Donegal County Council and the EPA.

6.3.2 Dust Monitoring

Dust monitoring was introduced to measure dust discharge from the operational quarry, sampling has been carried out in accordance with VDI 2119 using Bergerhoff dust deposition monitors located (3 monitors) at specific locations close to the site perimeter. Sampling was undertaken initially from 2008 by BHP, Limerick and from 2014 to 2015 by Catherine Storey as part of EIA assessment on monthly basis.

The locations of the dust monitoring are shown in Plate 6.1 below.

Plate 6.1 Dust monitoring locations

6.3.3 Existing land drainage regime

Surface water Collection and disposal

Surface water from the quarry floor will be drained into settlement ponds. The settlement ponds filter levels of siltation through two graded settlement ponds before entering the local drainage system. Care is taken to avoid flooding within the area, maintaining the existing drainage channels along the track roadside.

Silt

Silt consist of small sand particles <75 microns. Silt material is suitable as a growing medium and has been retained within site for the restoration of grassland habitat at de-commissioning.

Oil Interceptors and mud traps

Maintenance of site machinery is unavoidable on site due to need for servicing or because of breakdown, use of oil interceptors to trap leaks etc is advisable. Care should be taken to intercept possible oil spill or oil contamination of the quarry floor. If accidental spill or leak should occur and immediate cleanup of contaminated sand gravels involving the safe disposal of contaminated material. Barley straw is kept on site in case of spill event.

Plate 6.2. Operational settlement Lagoons

The River Finn is co-managed via the Lough Agency based in Derry city Northern Ireland and EPA in Ireland. Trade Emissions license Lwat 63 monitoring for this quarry has remained compliant. With 6 monthly reports submitted to the Chemistry Laboratory at Donegal County Council.

Now in 2017 it can be confirmed that the present settlement ponds are working sufficiently and that the quarry trade discharge license is compliant. In addition, there are no recorded spills on site.

6.4 Existing Environmental Management

The existing operational quarry has incorporated the required environmental management into their quarry management. Environmental Management at Patton Bros quarry is ongoing with bi-annual and annual reports submitted to Donegal County Council addressing the following issues: -

1. Trade Emissions Lwat63
2. Dust Monitoring
3. Quarry operations Noise
4. Blast event (Air over pressure)
5. Pre blast warning to local residents

6.5 Noise

The existing ambient noise occurring within the local area of Gortleteragh is from wind gusts blowing through the trees and normal agricultural activity. This section of the EIA addresses the impacts if, any, which the proposed development may have been created on the existing environment.

Due to the outdoor workings of quarry operations, the noise of operational plant and associated machinery in the operational processes of producing crushed rock aggregate, noise is an unavoidable product. Environmental Legislation Regulations are enforced by the Environmental Protection Agency (nationally) and European Communities (EC)

Environmental Protection Agency Act 1992 (No.7 of 1992) and Regulations 1994 (S.I. No. 179 of 1994)

Section 108 of this Act and Section 107 set out powers of a Local Authority or the EPA to require measures to be taken to prevent and limit noise. Under Section 106 the minister has the power to make regulations concerned with the prevention and limitation of noise.

Road Traffic (Construction, Equipment and use of vehicles) Regulations, 1963 (S.I. No. 190 of 1963)

Articles 29 and 85 of these regulations provide for controls on vehicles so as not to cause excessive noise when in use.

European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations, 1988 (S.I. No. 320 of 1988)

These regulations (through the Minister of Industry and Commerce) give legal effect to EC.

Directives of permissible noise level of construction plant and equipment i.e. compressors, tower cranes, welding generators, power generators, powered hand held concrete breakers and picks, hydraulic excavators, rope operated excavators, dozers, loaders and excavator-loaders designed for use in or about civil engineering or building sites.

6.5.1 The existing environment

The quarry has been in existence since 2000. Noise monitoring at two locations proximate to the operational quarry site show that quarry noise remains within the operations compliance limit daytime of Laeq <55dB.

The main contribution to noise in the local environment will be that of onsite machinery and delivery trucks.

The prevailing wind direction is away from local residencies thereby ensuring low risk of dust emission affecting any residencies during the course of the quarry life. Due to the elevation of the site and topography it is improbable that any houses will be built at a higher level than those that already exist. The quarry will have no impact on future or potential developments in the area.

On days of heavy snow loads which normally incidence with times of least demand by the building sector there will be no activity in the quarry.

6.5.2 Noise - Pre Blast warnings

Before blast events at the quarry prior warning is given to the local community of Gortleteragh. The expert professional team carry out the blast according to a pre specified date and time. The blast event is recorded (air over Pressure) events at the neighbouring houses to the quarry.

Blast events are carried out on a six monthly basis to free quarry face rock. The blast is pre designed and planned by explosive professionals.

6.5.3 Precautionary Further mitigation required

It is recommended that visitors and walkers to the nearby Coillte woodland walk at Gortletteragh should be notified of all blasting events.

6.5.4 Blast Event

- Health and Safety during and after the blast event must be adhered to by all quarry staff.
- No over hangs on the quarry face are allowed.
- Records from each blast event including air over pressure and vibration documents are retained at the quarry office as part of the quarry's Environmental Management recording system and for inspections as required.

6.5.5 Noise in the environment

Noise testing was carried out by BHP Engineering consultants at two site locations. The quarry operations were not audible at either location. The results of the monitoring and the locations of the monitoring points are set out in Appendix 6.1.

6.5.6 Mitigation

Monitoring of all blast events to be recorded.

All residential properties within 1m of the quarry to be notified two days in advance of all blast events in accordance with conditions of previous grants of permission.

6.6 Air Quality and Climate

The climatic conditions in Donegal are characterised by three meteorological elements: sunshine, rainfall and wind speed, being one of the better areas of Europe to harvest wind energy.

Meteorological statistics for Malin Head show that rainfall in this region to be higher than average compared with the rest of Ireland during the winter months and the average air temperature is 9 degrees celsius in January and warmest period of 14 degrees Celsius in August. Onshore winds are generally from the West and south westerly direction. Climate is determined by the off shore weather systems of the Atlantic ocean, that is renowned for the mild winter weather systems that are determined by the Gulf Stream. The winters of 2009 and 2010 displayed a variation to regular weather trends.
The winter of 2014 was mild with cold spring with frequent gales in early 2015, a brief good weather period early April followed by cool damp weather until June.

The winter of 2009 and 2010 has been the coldest winters experienced in Ireland, since records, began. Cold winters also stretched across Britain and Europe with constant sub-zero night time temperatures recorded for extended periods. The winter of 2009 commenced with sharp frost and low day time temperatures from late October through to April 2010. The unusually cold weather was brought about by dominance of northerly and north-easterly winds with dry sunshine weather in contrast to our usual South-westerly westerly oceanic mild damp winds. Snow arrived early in the winter, with night time temperatures between -3 to -15 experienced in the Donegal area. A late spring arrived in May 2010, followed by a damp summer. Winter commenced early in November 2011 and domestic demand for energy increased, with the reliance of fossil fuel increasing, due to oil heating, with consumption of coal and peat.

The present western carbon emission hungry society has to reduce its effect on the environment. The convention of biological diversity aims to halt the loss of species and habitats Plan. One of the main concerns is the climate change expected in the next few decades as a consequence of global warming.

Research is ongoing about the effect of global warming on wild life and the significance of ecological change. Since the industrial era, human activity has released increasing amount of CO2 and other greenhouse gases into the atmosphere The United Nations (UN) defines mitigation in the context of climate change, as a human intervention to reduce the sources or enhance the sinks of greenhouse gases. Examples include using fossil fuels more efficiently for industrial processes or electricity generation, switching to renewable energy (solar energy or wind power), improving the insulation of buildings, and expanding forests and other "sinks" to remove greater amounts of carbon dioxide from the atmosphere. Housing construction in Ireland is mostly concrete block build, and reliant on local quarries for sand, gravels and dimension stone.

6.6.1 Operational Phase

It is considered that there have been no effects on the local climate from the operation of the existing quarry.

Air quality values for clean air quality are set out in EU legislation on ambient air quality (Clean Air for Europe Directive (CAFE) 2008 and 4th Daughter Directive 2007). Air quality in Ireland is generally of a high standard across the country due to prevailing Atlantic airflows, relatively few large cities and the lack of widespread heavy industries. However, levels of particulate matter and nitrogen dioxide remain of concern.

Traffic is the main source of NOx. Domestic solid fuel use is the other main source of particulate matter in air in Ireland and particularly impacts air quality in areas where the sale of bituminous coal is permitted. The EPA REPORT as a result, levels of particulate matter in smaller towns are similar or worse than those in cities.

It is important to note the impact that the choice in domestic heating fuel can have on the environment and air quality.

Measured values of sulphur dioxide (SO2), carbon monoxide (CO), Ozone (O3), particulate matter (PM10 and PM2.5), heavy metals, benzene and polycyclic aromatic hydrocarbons (PAHs) were all below limit and target values set out in the CAFE Directive and 4th Daughter Directive. Monitoring stations are located across the country.

Significant reductions in SO2 have been observed in recent history, mainly due to fuel switching. The levels of SO2 in Ireland look set to remain low. However with increasing financial pressure in households as a result of the economic downturn, the use of bituminous coal for domestic heating may increase.

6.6.2 Potential Impacts of the Development

The proposed development does not include any elements that will produce significant greenhouse gases or odorous emissions. In the main , the potential impact results from excavation and quarrying machinery operating on diesel consumption.

Air Pollution Act 1987 section 26

Atmospheric pollution from smoke, dust, grit, noxious or offensive gases or rock particles shall be kept at such levels as not to be injurious to public health, livestock, vegetation or amenity.

The parameter set by EPA for dust Deposition will not exceed 350 mg/m2 per day measured at the quarry site boundaries and averaged over 30 days. A total of 2 static monitors to be maintained at locations agreed with Donegal County Council.

The effect from the proposed continuation of quarry operations is expected to be minimal due to the location of the site as the prevailing winds are from the Southwest which will direct all airborne particles away from the residential areas.

Three dust monitors are already installed at the quarry at location indicated on the site layout map. These will consist of Bergerhoff dust monitors with continuous samples collected over a 30 day period and reported to the Donegal County Council on a 6 monthly basis during the lifetime of the quarry.

If high dust levels are recorded corrective actions will be implemented to limit airborne dust by applying water spray on dry surfaces and any other mitigating measures to be agreed with the Local Authority.

6.6.3 Dust Monitoring

Dust monitoring was carried out at the quarry between 2004 until 2011 by BHP Consulting Engineers and dust deposition levels consistently remained within the permissible levels for quarry. The results of the monitoring are available in Appendix 6.2.

More recent dust monitoring as part of the EIA process was carried out by Catherine Storey CEnv MIEnvSc, The same three bergerhoff VDI 2119 monitor locations were used and dust deposition results for the quarry have remained compliant. The results of the most recent monitoring is set out in Table 1 below. Since that time no blasting has been carried out at the quarry and therefore no further monitoring has been carried out.

Dust Monitoring at Patton Brothers Quarry for the year 2014

By Catherine Storey Environmental Research

Dust sampling set up 22/01/2014. Using Bergerhoff/ VDI 2119 dust deposit gauges

Table 6.1 Dust Monitoring carried out in 2014

Sampled by	Date	Monitoring Station	Dust Deposition	Compliance
C Storey	21/02/2014	1	166	Yes
		2	53.4	Yes
		3	41.9	Yes
	27/03/2014	1	107	Yes
		2	60	Yes
		3	68	Yes
	24/04/2014	1	29	Yes
		2	30	Yes
		3	54	Yes
	26/05/2014	1	28	Yes
		2	31	Yes
		3	55	Yes
	25/06/2014	1	87	Yes
		2	87	Yes
		3	96	Yes
	23/07/2017	1	81	Yes
		2	60	Yes
		3	74	Yes
	Missed 08/2014			
	19/09/2014	1	150	Yes
	60 day	2	68	Yes
		3	60	Yes
	17/10/2014	1	57	Yes
		2	48	Yes
		3	56	Yes
	20/11/2014	1	87	Yes
		2	97	Yes
		3	110	Yes
	19/12/2014	1	162	Yes
		2	35	Yes
		3	86	Yes
	23/01/2015	Monitors lost in recent gales		

6.6.4 Mitigation measures for Air Quality

The impact of dust can be reduced at sources by limiting area of exposed earth and programming works in areas so that prevailing winds will blow dust away from sensitive areas.

- Atmospheric pollution from smoke, dust, grit, noxious or offensive gases or rock particles shall be kept at such levels as not to be injurious to public health, livestock, vegetation or amenity.
- Deposition of dust will not exceed 180 mg/m2 per day measured at the quarry site boundaries and averaged over 30 days. A total of 3 static monitors to be maintained at locations as agreed with Donegal County Council.
- Ensure that vehicles used for transport of materials from the quarry site are designed to prevent spillage and dust blow.
- To clean any spillage on the public roads as need arises or when requested by Donegal County Council. Barley straw is retained at the site in case of accidental spillage events
- Ensure road within the site at the Quarry are maintained in a dampened condition during dry weather in order to prevent dust arising from vehicles passing.
- Ensure water spraying systems are designed, installed and maintained on all processing and handling equipment in order to prevent dust blow during dry weather.
- Spray the roads in the area in order to prevent dust rising from passing traffic during dry weather. Road spraying shall take place at the beginning of each working day and at least once during the day, more frequent as conditions or if required.
- To use a water browser in areas of earth works on dry days to limit dust blow.

6.7 Water

6.7.1 Lwat 63 Trade Emission Results

The Trade emission License (Lwat 63) is in compliance with Section 261 for the discharge of trade emission waters after treatment, to be discharged via a small stream and tributary of the River Finn.

Bi Annual monitoring for the Discharge of Trade Emission (License No. LWat 63), in the Annual reports by the Donegal County Council Chemistry lab shows that the quarry has operated the treatment of trade discharge in compliance with parameters as set by the local authority - Donegal County Council. Confirmation of the results from the Chemistry Lab are contained in Appendix 6.3.

6.7.2. Extract from the NPWS on the conservation status of SAC IE 002301

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected

Code Description

3110 Oligotrophic waters containing very few minerals of sandy plains {Littorelletalia uniflorae)

4010 Northern Atlantic wet heaths with Erica tetra/ix

7130 Blanket bogs (* if active bog)

7140 Transition mires and quaking bogs

*Denotes a priority habitat

Code	Common Name	Scientific name
1106	Salmon	*Salmo solar*
1355	Otter	*Lutra Lutra*

The River Finn flows from Donegal uplands east ward on through Twin Towns of Ballybofey and Stranolar , the River from Glenfin becomes wider, deeper with steep embankments, with prime traditional pasture fields and areas of woodland on either bank. The River is the priority habitat for Salmon (Salmo salar) and Otter (Lutra lutra).

Plate 6.3 The river Finn

The River Finn has a reputation as one of the best salmon and sea trout rivers in Europe. As stocking densities are below EU minimum levels at present a Catch and Release Policy is in force.

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two Designations are collectively known as the Natura 2000 network.

Patton Bros Quarry Limited has been operating from this site since 2000, have registered under Section 261 of the Planning and Development Act 2000 (as amended), has been the subject to three grants of permission and has remained compliant within the Environmental regulation parameters as applied by Donegal County Council and set by EPA as part of Quarry Registration compliance Registration number EUQY31 and conditions of the grants of permission.

6.7.3 Water Framework directive (WFD)

River Basin Management Plans (RBMPs) have been published for all River Basin Districts in Ireland in accordance with the requirements of the Water Framework Directive. The plans provide focus for the management of water quality. The WFD report shows that the River Finn water quality is poor for this area.

6.7.4 Possible occurrence of cumulative impact.

Quarrying operations have the potential to significantly damage or destroy the freshwater habitat of Atlantic Salmon (salmo salar) and habitat of Otter (Lutra lutra) both of which are species listed in Annexe II of the European Habitats directive (council directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora). Significant impact could arise due to increased siltation from trade runoff entering the river environment. The fresh water habitat in the River Finn would not be untypical for these species.

6.7.5 Environmental Aspect of the proposed development.

The proposer Patton Bros. Quarry Limited, has operated with full planning permission from 2000-December 2014 and since that time Donegal County Council has agreed that all previously extracted stone could be removed from the site. The quarry applied for a Trade Emission Licence in 2002 which was granted. License Number LWat 63. The licence has granted permission for the Trade Emission waters from the quarry after treatment in settlement lagoons to de sludge the discharge waters to be discharged via local drainage channel then via an unnamed stream to the River Finn, in accordance with Local Government (Water Pollution) Act 1977

6.7.6 Local Government (Water Pollution) Amendment) Act 1990.

To date the Trade Emissions have been kept within the parameters as determined by the Local Authority (Donegal County Council). The parameters are set to prevent damage to the riparian environment of the River Finn, therefore has no cumulative effect.

6.7.7 Trade Emissions

Table 6.2 Trade Emission discharge results from 2010 to end of 2014

Results for Quarry Registration number LWat 63

For Patton Brothers Quarry Ltd, Gortletteragh,Stranolar, Co. Donegal

Licenced under Section 4 of the Water Pollution Act 1977/90

Received from Senior Executive Chemist Shirley McMenamin, and Senior Executive Chemist Dr. Joe Ferry et.al

The following is an extract of the Annual results provided by Donegal County Council, Water Pollution Laboratory, The Kube Building, Magherennan, Letterkenny, Co. Donegal.

Results of Analysis as per section 3.2, 3.3, 3.4 and 6.1 of the discharge License. And BHP Consultants of New rd. Limerick

station	Sample Lab code	Sample date	pH license limit 6.00 – 9.00	Suspended Solids license limit 20	compliance
Final discharge Point (FDP)	142501749	12/03/2014	7.38	<6	yes
FDP	132505243	07/10/2013	7.23	<6	yes
FDP	122503908	31/7/2012	7.8	1.5	yes
FDP	112504797	31/8/2011	7.01	3	yes
FDP	112503319	9/06/2011	7.17	1	yes
FDP	112501331	31/1/2011	8.49	4	yes
FDP	102502463	29/4/2010	7.23	<1	yes
FDP	102506204	25/11/2010	7.07	4	yes
Discharge water sampling	By BHP Consultants New road				

6.7.8 The effect of pH value and Suspended Solids on aquatic macro invertebrates and aquatic fauna

The pH values at the trade emission discharge point are basic, acidic < 6 would indicate that the water is too acidic and would be detrimental to aquatic wildlife. The Suspended solid levels have been found to be low, high suspended solids would create problems for aquatic wild life due to clogging of gills and lack of oxygen in the stream waters. It is important that these discharge parameters are maintained throughout the working life of the proposed quarry extension and retention works.

6.7.9 Compliance

The trade emission discharge water results to local drainage channel to un named stream to the River Finn have continued to be compliant throughout quarrying operations from 2010 to 2014 while the quarry has not operated since 2015 with the exception of removing existing strockpiles.

Therefore there is no adverse impact to the catchment stream or the River Finn during quarrying operation works.

Further analysis of macro-invertebrate fauna within the drainage channel close to the final settlement pond discharge point. A stream walk survey was carried out and sample location identified. The sample point area contains a diverse number of macro invertebrate, thereby revealing there is no adverse impact within the drain aquatic macro fauna community. Sampling was carried out using 3 minute kick sampling method, macro invertebrate were captured in pond dipping net, classified using x10 field magnifying lens then returned back to their habitat within the drain.

Macro invertebrates are good indicator species of stream water quality; pollution from any source has an immediate effect on macro invertebrate populations, some species are sensitive to pollutants, whilst others can tolerate pollution.

Example Mayfly and Stone fly are pollutant intolerant. Leeches and water lice are pollutant tolerant.

The amount of water pollution occurring at a site will be reflected in the diversity of stream invertebrates present. Macro invertebrates were identified using P.S. Croft (1986) Key to the major groups of British Freshwater Macro invertebrates. (AIDGAP) FSC, UK

6.7.10 Macro invertebrates in pond drain and stream channels

	Location Patton Bros Quarry Gortletteragh							
	Date of sampling: 29th April 2014							
	Ecologist: Catherine Storey CEnv MIEnvSc MCIEEM							
		Location 1	**Location 2 drain**	**Location 3**	**Total taxa**			**EPA Sensitivity Rating**
	Habitat Stream	**Riffle**	**Riffle**		**Setpond**			
	Family							
Mayfly								
	Heptagenidae	2		9			11	B
Mayfly	*Ephemera danica*	6		7	2		15	B
	Ephemerella	2		4			6	B
Damselfly	*Coenagridae*	5		7			12	B
	Lestidae			12			12	B
Stonefly	*Nemouridae*							C
	Isoperla	7		4	9		20	C
	Dinocras							
Caddisfly	*Polycentropidae*	8		7			15	B
	Odontoceridae	1		7	1		9	C
alderfly								
Oligochaeta	*tubifex*				2		2	E
	Lumbriculus	1					1	
Diptera	*Chironomidae*	17		7	19		43	C
	Tipulidae	5		16			21	C
Crustaceans	*Asellidae*	3			4		7	D
Total	Taxa	57		80	37			

Q5,4-5,4	unpoluted	Class A
Q3 -4	Slightly polluted	Class B
Q3,2-3	Moderately polluted	Class C
Q2, 1-2 1	Seriously polluted	Class D

6.7.11 Biotic taxa

The settlement pond was found to be lower in taxa than further downstream. The highest point for taxa was at the drain junction with the small unnamed stream.

Overall Q value for this site ranged from Q 3 to 4 at the settlement pond Class c to class B within the stream[1].

The quarry has been in operation for over 10 years without any pollution events. A review of existing Trade Emission reports by Donegal County Council and BHP Consultants reveals that pH and Suspended solids have remained within the define parameters and EPA guidelines as part of this quarry Environmental Management. The analysis of pond drainage channel and small stream also reveals that biotic health of the drain and stream, macro invertebrate indicate water discharge to be Q 3-4 class B to Class C, showing slight pollution at the pond, improving within the drainage channel Within the stream catchment the macroinvertebrate biota was found to be more diverse, showing that the water becomes much cleaner at the junction with the stream.

6.7.12 The quarry development within the context of the River Finn SAC IE 002301

The development is located c1.5 kilometre from the river Finn.

The assessment of the discharge trade emission water quality from the operational quarry site shows that there is and has been no adverse impact (moderate or minor) during the previous quarrying operations at this site.

6.7.13 Mitigation

- The existing settlement lagoons will be maintained and cleaned when required.
- A holding area for dimension stone, aggregate and fine gravels will be stored within QMA (Quarry management area).

The following measures are critical for preserving water quality and aquatic habitats[2].

- Fuels, oils, greases and hydraulic fluids must be stored in bunded compounds well away from the watercourse. Refuelling of machinery, etc., should be carried out in bunded areas.
- Stockpile areas for Stones be kept within QMA, with stockpiles kept to safe heights and stored well away from existing drainage channels and watercourses.
- Runoff from the above should only be routed to the designed and sited settlement lagoons.
- All Settlement lagoon should be inspected daily and maintained regularly.
- Bi annual trade effluent monitoring to be carried out and annual report of the results sent to the Donegal County Council, Chemistry Laboratory, Kube, Magherennan, Letterkenny.

[1] Q Value EPA method for analysing water quality standard

[2] Requirements for the Protection of fisheries Habitat during construction and Development works at River sites. (www.fisheriesireland.ie)

Appendix 6.1 Noise Monitoring Results from Patton Bros Quarry

Appendix 6.2 Dust Monitoring Results from Patton Bros Quarry

Appendix 6.3 Lwat 63 Trade Emission Results