

# ATTACHMENT-7-1-3-2- EMISSIONS IMPACT ASSESSMENT- NOISE

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# 1 NOISE IMPACT ASSESSMENT

## 1.1 INTRODUCTION

This Attachment assesses the predicted noise and vibration impacts of the proposed materials importation development on the surrounding environment. Additional details on the approach to the noise assessment are included in Chapter 8 of the Environmental Impact Assessment Report (EIAR).

This attachment includes details of the Receiving Environment Report as well as the Emissions Impact Assessment. It involves the assessment of noise and vibration impacts of both the transportation of material as well as deposition of material on the site as part of the proposed scheme.

### 1.1.1 Characteristics of the Development

The proposed development comprises the importation of inert soils material to fill quarry voids. Importation will be carried out in tandem with extraction at both the subject site as well as an adjacent quarry (Coppingerstown Quarry). It is proposed that HGV trips for haulage of soils material to the subject site will be balanced with extraction trips to remain within the permitted total trips for extraction at both sites, i.e. there will be no increase above permitted traffic levels in the volume of traffic generated from the proposed development, HGV numbers on the local road L3626 (Rocky Road) will not increase on the current permitted number. The operational hours will also remain the same, i.e. Monday to Friday 07.00 to 18.00, and 07.00 to 14.00 on Saturday. No operations shall take place on Sundays or Public Holidays.

Noise is regarded as a form of manmade pollution in the form of sound. Under the *Environmental Protection Agency Act, 1992* the definition of 'environmental pollution' includes (amongst other environmental pollutant sources):

*"noise which is a nuisance, or would endanger human health or damage property or harm the environment"*.

The DoEHLG Quarry Guidelines further describe the impacts noise can impart:

*"Noise can cause annoyance, nuisance, sleep disturbance and can also affect wildlife. Residential properties, schools, hospitals, nursing homes, churches, etc. are also noise-sensitive receptors."*

The following is stated in the same guidelines with reference to vibration:

*"vibration transmitted through the ground and pressure waves through the air ("air overpressure") can shake buildings and people and may cause nuisance."*

The potential to impact the noise and vibration environment is twofold: soil moving plant and machinery at the subject site and HGVs travelling on Rocky Road. This haul route directly passes 30 residences and the closest residences in each direction are located approximately 100m to the northwest, two properties 230m to the north and one property located 390m to the southeast.

There will be a cumulative impact for noise and vibration in the early years of the development when extraction will be ongoing in tandem with importation at different areas of the site.

## 1.2 METHODOLOGY

The methodology undertaken to assess the impact of noise and vibration from the proposed development on the receiving environment comprised the following steps:

1. Identify noise sensitive locations.
2. Undertake baseline noise monitoring.
3. Review Cork County Noise Action Plan and construction methodologies, location of haul route etc.
4. Assess impacts of noise from the proposed works.
5. Assess impacts of vibration from the proposed works.
6. Assess cumulative impacts.
7. Establish mitigation measures for noise and vibration.
8. Identify and assess residual impacts.

### 1.2.1 Noise Impact Assessment Methodology Guidance

The assessment has been carried out in accordance with the following guidelines:

- *Quarries and Ancillary Activities, Guidelines for Planning Authorities* (Department of Environment, Heritage and Local Government (DoEHLG), 2004).
- *Environmental Management Guidelines: Environmental Management in the Extractive Industry (Non-Scheduled Minerals)* (EPA, 2006).
- *Acoustics – Description, measurement and assessment of environmental noise – Part 1: Basic quantities and assessment procedures, Third Edition* (ISO 1996-1, 2016).
- *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)* (EPA, January 2016).
- *Guidelines on the information to be contained in Environmental Impact Statements* (EPA, 2002).
- *Draft Revised Guidelines on the information to be contained in Environmental Impact Assessment Reports* (EPA, 2017).
- *Advice Notes on Current Practice in the Preparation of Environmental Impact Statements* (EPA, 2003).
- *Draft Advice Notes for Preparing Environmental Impact Statements* (EPA, 2015).
- *Noise Action Plan 2013 – 2018* (Cork County Council, 2013).
- BS 6472-1:2008 *Guide to evaluation of human exposure to vibration in buildings. Vibration sources other than blasting.*
- BS 6472-2:2008 *Guide to evaluation of human exposure to vibration in buildings. Blast-induced vibration.*
- BS 7385-2:1993 *Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration.*

- ISO 1996-1:2003 *Acoustics - Description, measurement and assessment of environmental noise - Part 1: Basic quantities and assessment procedures.*
- ISO 1996-2:2007 *Acoustics - Description, measurement and assessment of environmental noise – Part 2: Determination of environmental noise level.*
- BS 5228-1:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites. Noise.*
- BS 5228-2:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites. Vibration.*
- Calculation of Road Traffic Noise (CRTN), Department of Transport Welsh Office, HMSO, 1988.

## 1.2.2 Construction Noise (Operational Phase) Criteria

The EPA Guidance document ‘*Environmental Management in the Extractive industry*’ has published Irish guidance relating to permissible noise levels that may be generated during scheduled activities (see Error! Reference source not found.). These limits, referred to as Emission Limit Values (ELVs) are considered to represent a reasonable compromise between the practical limitations in an extraction project, and the need to ensure an acceptable ambient noise level for nearby residents. While the proposed materials recovery facility is not an extractive activity, it is a comparable activity and accordingly the noise related guidance is relevant for the proposed development. Furthermore the materials recovery will also occur in tandem with extraction activities within the overall site.

**Table 1-1: Recommended Maximum Permissible Noise levels at the Façade of Dwellings During Construction**

Days and Times	L <sub>Aeq</sub> (1hr) dB
Daytime: 08:00 to 22:00 hours	55
Night-time 22:00 to 08:00 hours	45

(Source: Environmental Management Guidelines: Environmental Management in the Extractive Industry (Non-Scheduled Minerals) (EPA, 2006))

(Note: 95% of all noise levels shall comply with the specified limit value(s). No noise level shall exceed the limit value by more than 2 dBA.)

These same “appropriate Emission Limit Values (ELV’s)” for quarry developments are also set out in the 2nd Edition of the Irish Concrete Federation Environmental Code (ICF, 2005). As acknowledged in these guidelines “*the Code has gained national recognition and has now become a reference document in the Department of the Environment, Heritage and Local Government’s ‘Quarries and Ancillary Activities – Guidelines for Planning Authorities’ and in the EPA ‘Environmental Management in the Extractive Industry (Non-Scheduled Minerals) – Guidelines for Operators’*”.

These levels are also consistent with guidance issued by the Department of the Environment: “*Quarries and Ancillary Activities – Guidelines for Planning Authorities (2004) DOEHLG*”.

Subjectively, the significance that can be attached to changes in noise levels (perceptible to human beings) can be described as follows in **Table 1-2**.

**Table 1-2: Subjective Assessment of Changes in Noise Levels in Terms of Perceived Change in Loudness**

Change in Noise Level	Impact Rating	EPA Glossary of Impacts	Subjective Reaction
0 dB (A)	No change	n/a	n/a
<3 dB (A)	Not significant	Neutral, Imperceptible or Slight Impact	Barely perceptible
3 – 5 dB (A)	Minor	Significant Impact: Positive or Negative	Perceptible
6 – 10 dB (A)	Moderate		Up to a doubling of loudness
11 – 15 dB (A)	Major		Over a doubling of loudness
> 15 dB (A)	Severe	Profound Significant Impact: Negative only	-

The Cork County Council “Noise Action Plan 2013 – 2018” has also been taken in to consideration. The Noise Action Plan is required to identify ‘high priority areas’ using strategic noise mapping and provide recommendations for environmental noise control in these areas. A number of priority areas identified in the Noise Action Plan are located along the N25 and at the approach roads to the Lakeview Roundabout from the west, north and east. The Lakeview Roundabout is located to the north west of the site, and the closest specific high priority area to the subject site is referred to as N25-11, approximately 200m west of the junction between the L-3626 (Rocky Road) and the N25.

### 1.3 RECEIVING ENVIRONMENT

#### 1.3.1 Noise Sensitive Locations

The existing ambient noise levels in the proposed development area were measured at a number of chosen noise sensitive and receiver locations. A noise sensitive location (NSL) is defined in the EPA *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)* (EPA 2016) as

*“any dwelling, house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other facility or area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels”.*

The most sensitive NSLs identified for this assessment, based on the nature, extent and location of the proposed development, are residential dwellings close to the subject site as outlined earlier.

The main noise sources in the study area comprise quarrying and extraction activities, traffic noise from Rock Road and the N25, and agricultural practices.

There are no known facilities operating vibration sensitive equipment within 300m of the proposed road.

### 1.3.2 Baseline Noise Survey

The baseline noise survey was carried out in accordance with the EPA *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)* (EPA 2016) on 23<sup>rd</sup> and 24<sup>th</sup> May 2018. Four short-term measurement locations were identified along the extent of the scheme. Measurements were taken at these locations for a period of 30 minutes each.

The survey was conducted in general accordance with ISO 1996-1: 2003: 'Acoustics - Description, measurement and assessment of environmental noise - Part 1: Basic quantities and assessment procedures' sets out requirements for conducting a baseline survey to establish prevailing noise levels.

#### Procedure

The measurements were taken using a Type 1 Brüel and Kjaer Integrating Averaging Sound Level Meter with real time analysis. Measurements were made by placing the microphone at a height of 1.5m above ground level and positioned in the 'free field' at least 3m away from any reflecting surfaces.

All measurement equipment complies with the relevant Type 1 requirements of: IEC651 Specification for Sound Level Meters and IEC804 Specification for Integrating – Averaging Sound Level Meters, and were checked and calibrated before and after the survey using a Brüel and Kjaer 4231 Sound Level Calibrator (94dB at 1kHz) to an accuracy of +/- 0.3dB.

Weather conditions during the surveys were in line with the conditions described within Section 7.6 of NG4. The relative humidity, wind speed and temperature were measured using a Kestrel 2000 Wind Meter. The wind speed measured was 2 to 4m/s and the temperature was 18 - 23°C.

The measurement results were noted onto survey record sheets immediately following each measurement and also stored in the instrument's internal memory for subsequent analysis. Notes were taken in relation to the primary contributors to noise build-up at each location.

#### Measurement Parameters

The noise parameters recorded during the baseline noise assessment and presented in Table 1.4 included:

- L<sub>Aeq</sub>** is the A-weighted equivalent continuous steady sound level during the measurement period and effectively represents an average ambient noise value. This is the equivalent continuous sound level.
  
- L<sub>A10</sub>** refers to those A-weighted noise levels in the top 10 percentile of the sampling interval; it is the level which is exceeded for 10% of the measurement period. It is used to determine the intermittent high noise level features of locally generated noise and usually gives an indicator of the level of road traffic.

**L<sub>A90</sub>** refers to those A-weighted noise levels in the lower 90 percentile of the sampling interval; it is the level which is exceeded for 90% of the measurement period. It will therefore exclude the intermittent features of traffic and is used to describe a background level.

**Measurement Locations**

A description of the baseline noise monitoring locations is presented in **Table 1.3** and their locations are shown on **Figure 1.1**.

**Table 1-3: Noise Monitoring Locations Description**

Noise Monitoring Location	Description
N1	Residence and farmyard at Coppingerstown.
N2	Residences at Rocky Road
N3	Residences and farmyards cluster north of the site.
N4	Agricultural track NE of the site.

**Figure 1.1: Baseline Noise Monitoring Locations**





### 1.3.3 Baseline Noise Survey Results

The results of the baseline noise survey carried out are shown below on **Table 1.4**. All samples were 30 minutes in duration. All noise monitoring results are presented rounded to the nearest whole integer, with 0.5 being rounded up.

**Table 1-4: Baseline Noise Survey Results**

Location	Measurement Period	Measured Noise Levels (dB re. 2x10 <sup>-5</sup> Pa)			Notes
		L <sub>Aeq</sub>	L <sub>A90</sub>	L <sub>A10</sub>	
N1	11:29-11:59	48	41	51	Machinery and stone movement / rockbreaking from Coppingerstown Quarry. Trucks travelling on Rocky road and entering Midleton Quarry. Local traffic on Rocky Road and birdsong.
	08:59-09:29	57	32	47	
N1	12:06-12:36	40	31	42	
	<b>Arithmetic Average</b>	48	35	47	
Location	Measurement Period	L <sub>Aeq</sub>	L <sub>A90</sub>	L <sub>A10</sub>	Notes
N2	12:07-12:37	57	36	49	Noise from Midleton Quarry – rockbreaking and stones moving. Trucks and local traffic on Rocky Road. N25 audible in distance. Dogs barking, pedestrians on road talking. Domestic gardening e.g. strimmer / lawnmower.
	09:33-10:03	52	32	45	
	<b>Arithmetic Average</b>	55	34	47	
Location	Measurement Period	L <sub>Aeq</sub>	L <sub>A90</sub>	L <sub>A10</sub>	Notes
N3	13:43-14:13	46	37	45	Quarry rock breaking audible to south and N25 to north. Sheep bleating, and farmers talking, children and dogs. Tractors and trailer / agricultural activity.
	10:08-10:38	44	31	46	
	<b>Arithmetic Average</b>	45	34	46	
Location	Measurement Period	L <sub>Aeq</sub>	L <sub>A90</sub>	L <sub>A10</sub>	Notes
N4	14:53-15:23	40	35	42	Quarry audible to south east and N25 to north. Calves lowing.
	10:57-11:27	38	34	40	
	<b>Arithmetic Average</b>	39	35	41	

### 1.3.4 Historic Noise Surveys

As set out previously in this report, extraction is currently underway at the subject site as permitted under CCC Reg. Ref. 06/10088 and An Bord Pleanála Reference PL04.224250. Annual noise surveys were carried out at the site in compliance with one condition of the grant of permission for this development. The results of the most recent of these surveys are outlined below in **Table 1.5**. Please note, the locations referred to as N1 – N4 are different locations to where the baseline noise survey was undertaken. Please refer to **Figure 1.2** for details of locations.

**Table 1-5: Previous Noise Surveys**

Date	N1			N2			N3			N4		
	L <sub>Aeq</sub> (60 mins)	L <sub>A90</sub>	L <sub>A10</sub>	L <sub>Aeq</sub> (60 mins)	L <sub>A90</sub>	L <sub>A10</sub>	L <sub>Aeq</sub> (60 mins)	L <sub>A90</sub>	L <sub>A10</sub>	L <sub>Aeq</sub> (60 mins)	L <sub>A90</sub>	L <sub>A10</sub>
24 & 25/09/2014	47.3	34.0	40.7	67.9	46.3	69.8	48.9	38.4	52.0	42.3	38.8	43.5
22/04/2015	49.6	42.0	49.9	50	44.4	52.8	55.9	47.6	58.2	54.1	46.3	53.9
18/12/2015	50.7	43.7	52.4	45.0	42.5	46.4	48.3	44.5	50.7	50.1	42.1	54.1
02/06/2016	52.6	38.5	52.6	40.3	36.6	41.5	55.7	41.8	60.2	43.9	40.5	45.7
06/12/2016	49.7	37.8	49.0	47.7	35.2	41.7	43.1	34.7	45.2	44.6	36.9	46.9
23/03/2017	49.7	40.5	52.9	55.4	44.5	50.5	47.0	42.6	49.6	49.7	44.7	52.1
26/07/2017	52.1	42.4	55.6	48.2	43.7	50.1	42.7	39.1	44.4	48.1	43.8	50.8

**Figure 1.2: Previous Noise Survey Locations**



### 1.3.5 Baseline Vibration

It has not been considered necessary to undertake baseline vibration monitoring as there is no evidence to suggest that existing receptors are currently affected by appreciable environmental vibration.

## 1.4 POTENTIAL IMPACTS

This section of the report discusses the potential impact of the proposed works in relation to noise and vibration. The potential noise impacts on the surrounding environment must be considered for each of the two distinct stages: the short-term impact of the construction phase and the longer-term impact of the operational phase.

The potential noise and vibration impacts of the proposed works have been evaluated for the construction/operational stage to include construction of the Coppingerstown link track, installation of welfare facilities, weighbridge, wheelwash infrastructure etc., and finally importation and deposition of soils materials; and the post-restoration stage which comprises the agricultural use of the site following landscaping.

### 1.4.1 Construction / Operational Phase

#### 1.4.1.1 Construction / Operational Stage Noise Impacts

The works required during the operational stage include construction of the Coppingerstown link track, importation of materials and final restoration. Site set up will comprise installing hardstanding, a quarantine shed, site offices / facilities, a weighbridge and wheelwash. The busiest and longest phase of the development will be importation of the soils material which shall comprise the use of a variety of equipment including trucks, dozers to import to the site and deposit it in the relevant location depending on the phase of implementation at the time.

It is considered that most of the importation activities and subsequent required machinery is quite similar in nature to the current extraction facilities and therefore no major change in noise levels is predicted.

There will be vehicular movements to and from the site during all three phases primarily from HGVs importing the soils material. All of these activities have the potential to generate noise and vibration.

While cars and vans travelling to and from the site would be expected to peak in the morning and evening with the arrival and departure of site based staff and therefore constitute an occasional noise source, there will be a continuous source of noise from the site itself during a typical working day from the operation of plant machinery.

#### Daily Permitted Truck Movements for L-3626 Rocky Road

The delivery of soils materials by HGVs to the site would also produce a near constant source of noise emissions due to the predicted number of HGV trips expected on an hourly and daily basis. Filled trucks produce less noise due to the weight of material preventing little movement of the

trailer, empty trucks are recognised to be noisier as the trailers have a tendency to bounce on internal springs and produce intermittent and unpredictable loud bangs, and such bangs are echoed within the walls of typical stone and soils trailers when empty. The noise chapter has assumed that 60 truckloads will arrive a day with soil in conjunction with ongoing extraction works at Midleton and Coppingerstown Quarries.

For mobile items of plant that pass at intervals (such as earth-moving machinery passing along a haul road), it is possible to predict an equivalent continuous sound level using the method F.2.5. outlined in BS 5228 - 1: 2009.

The general expression for predicting the  $L_{Aeq}$  alongside a haul road used by single engine items of mobile plant is:

$$L_{Aeq} = L_{WA} - 33 + 10\log_{10}Q - 10\log_{10}V - 10\log_{10}d$$

where:

$L_{WA}$  is the sound power level of the plant, in decibels (dB);

$Q$  is the number of vehicles per hour;

$V$  is the average vehicle speed, in kilometres per hour (km/h);

$d$  is the distance of receiving position from the centre of haul road, in metres (m).

Using the traffic data providing which assumes that there will be 18 deliveries per hour (9 inbound and 9 outbound) with the item of plant being a Dozer (Ref C.5.13 of BS5228-1: 2009) with a sound power level of 82dB, travelling an average speed of 30 km/hr and at a distance of 10m from the nearest noise sensitive receptor. There is a correction of 3dB for reflections, however no correction for screening, as it is assumed that there is a direct line of sight. As such, the predicted noise level at a residential property 10m from the haul road will result in a noise level of 40dB.

The cumulative noise impacts are predicted to be 48 dB  $L_{Aeq}$  at N1, 55 dB  $L_{Aeq}$  at N2, 46 dB  $L_{Aeq}$  at N3 and 41 dB  $L_{Aeq}$  at N4. As such the increase in traffic noise levels along the proposed haul routes will not result in cumulative noise impact greater than 1 dB in all instances and confirms that this increase is negligible and the resultant impact is typically imperceptible.

## Infilling Works

Noise predictions were undertaken in accordance with BS 5228-1: 2009: *Code of Practice for Noise and Vibration Control on Construction and Open Sites: Noise to predict noise levels at nearby noise sensitive receptors*. Construction / operational phase noise levels will vary considerably depending on the nature of the activity required. **Table 1.6** provides an overview of the type of plant and machinery which will be required as part of the works.

**Table 1-6: Typical Construction Noise Levels**

Item & BS5228-1: 2009 Reference	No. Required	Predicted dB at 10m
Vibration roller (Ref C.5.26)	1	77
Dozer (Ref C.5.13)	1	82

Given the transient nature of the site and the proposed layout, activities will be at varying distances from the nearest sensitive receptors depending on the location of works.

For the majority of the time, plant and equipment will be a greater distance from the nearest noise sensitive locations than that used for the calculations and consequently will have lesser impact. The assessment is therefore representative of a “worst-case” scenario and the following assumptions have been made in predicting construction noise levels:

- the use of a dozer (or tracked excavator) which may be required to move and compact imported fill material within the quarry void.
- The nearest noise sensitive locations are located approximately 10m from proposed work areas; however there are no residences located within 10m of the subject site.
- All items listed in Table 1.7 are operating for a proportional period of 1 hour.
- All items are operating simultaneously for 80% of the time.

**Table 1.7** summarises the construction noise prediction calculations at varying distances from the proposed works area.

**Table 1-7: Predicted Noise Levels at Varying Distances**

Item & BS5228-1: 2009 Reference	No. Required	Sound Pressure Level $L_{Aeq}$ at 10m	Predicted Noise Levels at Varying Distances		
			10m	20m	40m
Vibration roller (Ref C.5.26)	1	77	49	43	37
Dozer (Ref C.5.13)	1	82	54	48	42
<b>Combined Level <math>L_{Aeq,1hour}</math></b>			55	49	43

Predictions are based on a  $L_{Aeq,1hour}$  value with all machinery operating for proportional periods of 1 hour. This may be considered a worst case scenario as this machinery will not all operate simultaneously and will be used at varying stages as the works progress.

The results of the assessment indicate that construction noise levels at varying distances from the proposed works areas are within the NRA guidelines for construction noise levels as outlined in **Table 1.7**.

There is a linear pattern of residential dwellings to the west of the site along the L3626, the closest of which is approximately 100m to the northwest of zone A with agricultural land comprising improved grassland in between. Therefore, it is evident that noise levels from the site itself will be much reduced at the facades of residences due to the relative distance involved and the intervening topography and screening.

Quiet working methods will be employed on the scheme insofar as possible within the parameters of the works proposed. This includes use of the most suitable plant, reasonable hours of working for noisy operations, taking economy and speed of operations into account. Working hours at the site during the operational phase will generally be limited to 07.00 to 18.00 Monday to Friday and 07.00 to 14.00 on Saturdays.

It is proposed to maintain the same quantum of HGVs on the local road as is currently permitted, and therefore there will be no increase to noise levels experienced as a result of traffic. It is recognised that empty HGVs are noisier than their fully loaded equivalent, in particular on uneven road surfaces as the flat bed of the truck has a tendency to move and bounce creating loud metallic bangs. There is a possibility therefore that there may be a reduction in noise levels if some HGVs are used for both importation and extraction and subsequently will not be travelling empty on Rocky Road as does the quarry related traffic at present.

#### 1.4.1.2 Construction / Operational Stage Vibration Impacts

There are internationally recognised criteria for vibration levels, for vibration which would be likely to lead to complaints, and vibration levels which would be likely to lead to structural damage (BS6472-1: 2008 *Guide to evaluation of human exposure to vibration in buildings, Vibration sources other than blasting*, BS6472-2: 2008 *Guide to evaluation of human exposure to vibration in buildings. Blast-induced vibration* and BS7385-2: 1993 *Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration*).

It is anticipated that the levels of vibration generated by the works associated with the proposed scheme and haulage of material to the site compounds and subsequent movement to construction sites/area of works would be below the criteria specified in aforementioned standards, as the level of vibration from these activities would not be significant.

#### 1.4.2 Post-Restoration Phase

The main source of noise following full restoration and landscaping of the site will arise from agricultural activities and therefore comprise occasional use of machinery such as tractors. The only ongoing activities shall be the use of the weighbridge and wheelwash as a result of possible ongoing extraction from the adjacent Coppingerstown Quarry and the associated main access point to Zone B.

#### 1.4.3 Cumulative Impact

As the proposed quantum of HGVs on Rocky Road is proposed to remain within the current permitted number arising from permitted extraction at both Midleton and Coppingerstown quarries, there will be no cumulative impact to residences on Rocky Road between the subject site and the N25 as a result of importation and extraction activities being progressed in tandem at Midleton and extraction at Coppingerstown also.

Extraction and importation works will however be progressed at the subject site and Coppingerstown at the same time which may have an impact on residential amenity for residences. However, the relative proximity of residences together with intervening topography will result in a negligible long-term negative impact.

## 1.5 MITIGATION MEASURES

Mitigation measures may be introduced in order to ameliorate or reduce negative impacts.

### 1.5.1 Construction / Operational Phase

The following mitigation measures are proposed in order to reduce noise levels from plant and machinery at the subject site, as well as from HGVs travelling on Rocky Road.

- During the initial phases where extraction and infilling are in operating in tandem, every effort should be made to double up on HGV trips in order to reduce the number of empty HGVs travelling to and from the site.
- HGVs will only be allowed to import material to the site during the proposed operational hours.
- All equipment will be regularly maintained to ensure that they are operating effectively and not producing additional noise emissions or potential tonal sources.
- Where practicable the number of machines in simultaneous operation will be minimised.
- All vehicle engines will be switched off when not in use.
- Plant and machinery used on-site will comply with the EC (Construction Plant and Equipment) Permissible, Noise Levels Regulations, 1988 (S.I. No. 320 of 1988).
- All contractors will employ the best practicable means to minimise noise emissions and will be obliged to comply with the general recommendations of BS 5228-1: 2009 and “*Environmental Good Practice Site Guide*” 2005 compiled by CIRIA and the UK Environmental Agency.

### 1.5.2 Post-Restoration Phase

No mitigation measures are required or recommended for the post-remediation phase.

## 1.6 PREDICTED RESIDUAL IMPACTS

There will be a net positive permanent residual impact on noise as a result of the proposed development as reverting the site to agricultural use will result in occasional machinery use, similar in nature to surrounding land uses. Heavy ground moving plant such as dozers and tracked excavators will no longer be in use at the site.

## 1.7 MONITORING MEASURES

It is proposed to undertake Noise Monitoring on an annual basis. The proposed locations (N1, N2 N3 and N4) are shown in Figure 1.2.