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## INTRODUCTION

### Background

- 10.1 This Chapter of the Environmental Impact Assessment Report (EIAR), prepared by SLR Consulting Ireland, addresses the potential noise related impacts associated with soil and stone waste recovery activities on the western side of the South Quarry void at Huntstown Quarry Complex, North Road, Finglas, Dublin 11. These activities will facilitate backfilling of the quarry to original (pre-extraction) ground level and the ultimate restoration of the quarry to grassland.
- 10.2 The existing parent permission for the Huntstown Quarry Complex (Planning Ref. FW12A/0022 and An Bord Pleanála Ref. No. 06F.241693) was granted in August 2014 and provides for continuation of quarrying activity for 20 years up to 2034. That permission also includes provision for the restoration of all quarry voids within the Huntstown Quarry complex, including the South Quarry, by backfilling to former (original) ground level by placement and recovery of naturally occurring soil and stone waste generated by construction and development activity across the Greater Dublin Area.
- 10.3 In order to facilitate the transfer and re-location of soil waste recovery activities from the North Quarry (where they are currently ongoing) to the South Quarry, a waste licence review application is to be submitted to the EPA to provide for the following :
- importation of soil and stone waste to the western side of Huntstown South Quarry at a maximum rate of 750,000 tonnes per annum (as permitted by Planning Ref. FW12A/0012);
  - extension of the licensed site boundary to incorporate the proposed waste recovery area on the western side of the South Quarry and the haul roads leading to / from it;
  - an increase in the total permitted (lifetime) soil and stone waste intake to the (extended) waste facility to 18.76 million tonnes;
  - continued use of pre-existing site infrastructure to support recovery activities; and
  - re-routing of traffic flows via existing internal haul roads (i.e. within the quarry complex) to access the backfilling / recovery area at the South Quarry.
- 10.4 No new infrastructure is required to facilitate transfer and re-location of established soil waste recovery operations from Huntstown North Quarry across to the western side of the South Quarry or the extension of the waste licence boundary to include this area.
- 10.5 It is currently envisaged that backfilling of the South Quarry will commence in early 2023, at which time it is expected that the ongoing backfilling of the North Quarry to surrounding ground level will be largely complete and the importation, backfilling and recovery of soil and stone waste at that location will cease.
- 10.6 The licensed site to which this waste licence review application relates is located entirely within the townlands of Coldwinters, Kilshane, Huntstown, Johnstown, Cappogue and Grange, Co. Dublin, approximately 2.5km north-west of the Dublin suburb of Finglas, 1km west of the interchange between the N2 Dual Carriageway and the M50 Motorway and immediately east of the Cappagh Road, as shown on Figure 10-1.
- 10.7 The planned extension to the waste licence area covers an area of 22.5 hectares. It comprises the western side of Huntstown South Quarry and pre-existing internal haul roads leading to it within the wider quarry complex. Further details on the proposed backfilling and recovery activities at the South Quarry (site infrastructure, operations, environmental management systems, and controls, etc.) are provided in Chapter 2 of this EIAR.

- 10.8 The noise impact assessment presented herein describes and assesses the existing noise baseline characteristics of the area surrounding the existing licenced area (and proposed extension thereto). The anticipated effects of future backfilling and recovery activities at the South Quarry are then applied to these baseline conditions and the resulting noise impacts assessed. Mitigation measures are identified where necessary to eliminate or minimise adverse impacts, insofar as practical.
- 10.9 An operational vibration assessment has not been undertaken as previous SLR experience, and that of the Applicant, in undertaking similar backfilling and soil recovery activities at Huntstown North Quarry and at other quarry locations, indicates that little or no vibration arises from such activities.
- 10.10 In order to assist the understanding of acoustic terminology and the relative change in noise, a glossary of terms and phrases, which specifically relate to this Chapter of the EIAR, is provided in Appendix 10-A.

## Scope of Work

- 10.11 The following sections of this Chapter describe the potential noise impacts associated with the proposed development. The following topics are addressed separately within this Chapter:
- legislative / planning framework;
  - methodology used to assess potential noise impacts from activities at properties (dwellings and farms) and sensitive ecological receptors;
  - baseline conditions pertaining to existing background and ambient noise levels around the licence extension area and local road network leading thereto;
  - noise impact evaluation criteria;
  - prediction of the noise levels and identification of potential impacts;
  - assessment of severity of impacts, with reference to the evaluation criteria;
  - description of mitigation measures that will be incorporated into the design and operation of the scheme to eliminate or minimise the potential for noise impact;
  - a summary of any residual impacts; and
  - a summary of proposed monitoring.

## Consultations / Consultees

- 10.12 Following a review of the proposed activities, existing consents and site mapping / surveys, it was considered that there was no requirement for formal external consultations to be carried out in respect of noise impact for the purposes of this assessment. There was however some consultation with other specialist contributors.

## Contributors / Author(s)

- 10.13 The noise impact assessment presented in this Chapter was prepared by SLR Consulting Ireland. The lead consultant for the study was Aldona Binchy (MSc. Eng PIEMA Environmental Engineering).

## Limitations / Difficulties Encountered

- 10.14 This assessment was compiled on the basis of published guidance documents, and site-specific field surveys. No difficulties were encountered in compiling the required information.

## REGULATORY BACKGROUND

10.15 Currently, there is no national or regional legislation which specifically addresses environmental management or control of soil waste recovery activities. There are, however, a number of guidance documents that are relevant in the context of noise action planning.

### Planning Policy and Development Control

10.16 The National Planning Framework (NPF) 2040 (published in February 2018) is a national planning framework for Ireland. The framework provides the policies for all regional and local plans. In the framework, the extractive industries are recognised as important for the supply of aggregates and construction materials to a variety of sectors.

10.17 The NPF makes reference to noise in general terms under Section 9.4, *Creating a Clean Environment for a Healthy Society*. It acknowledges that noise is unwanted sound but is an inevitable consequence of everyday life, and it becomes a problem when it occurs in the incorrect place or at the incorrect time or on a frequent or recurring basis. The NPF aims to support the following measures:

- **Noise Management and Action Planning**  
Measures to avoid, mitigate, and minimise or promote the pro-active management of noise, where it is likely to have significant adverse impacts on health and quality of life, through strategic noise mapping, noise action plans and suitable planning conditions.
- **Noise, Amenity and Privacy**  
This includes, but is not limited to, good acoustic design in new developments, in particular residential development, through a variety of measures such as setbacks and separation between noise sources and receptors, good acoustic design of buildings, building orientation, layout, building materials, noise barriers and buffer zones between various uses and thoroughfares.
- **Quiet Areas**  
The further enjoyment of natural resources, such as our green spaces and sea frontage, through the preservation of low sound levels or a reduction in undesirably high sound levels, is particularly important for providing respite from high levels of urban noise. As part of noise action plans, an extra value placed on these areas, in terms of environmental quality and the consequential positive impact on quality of life and health, due to low sound levels and the absence of noise, can assist in achieving this.

10.18 NPF Objective 65 on noise seeks to :

*“Promote the pro-active management of noise where it is likely to have significant adverse impacts on health and quality of life and support the aims of the Environmental Noise Regulations through national planning guidance and Noise Action Plans.”*

10.19 There are no specific policies relating to noise emissions in the NPF for the extractive industry, inert landfill and/or C&D waste recovery facility activities. The general objective is to facilitate the development while at the same time protect the environment.

### Local Planning Policy – Fingal County Development Plan

10.20 In the current Fingal County Development Plan, objectives and policies around control of noise focus primarily on ensuring appropriate land-use and development within in the vicinity of Dublin Airport and beneath established flight paths. The plan aims to strike a balance between property development within defined aircraft noise zones, avoiding in particular, the potential negative impacts of aircraft noise, whilst not placing unreasonable restrictions on future airport development.

- 10.21 The recovery area at Huntstown South Quarry is located immediately beyond the Outer Airport Noise Zone and flight paths in and out of the airport. The future backfilling and recovery activities are not however sensitive to aircraft noise and as such, are not subject to any development control provisions set out in the County Development Plan.
- 10.22 Although there are no specific noise policy and objectives set out for backfilling and soil recovery activities in the current Fingal County Development Plan 2017-2023, it is the general policy of the Council to balance the environment with sustainable and appropriate development and to protect and conserve the natural environment.

## EPA Noise Guidance for Scheduled Activities (NG4)

- 10.23 The Environmental Protection Agency's (EPA) 2016 'Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)' sets out scope, content, and methodology for scheduled / licensed industrial and waste activities in Ireland.
- 10.24 In accordance with the NG4 guidance, it is necessary to designate the noise environment at each sensitive receptor location as a 'Quiet Area', a 'Low Background Noise Area' or 'Not an Area of Low Background Noise'. To be categorised as a 'Quiet Area' the following criteria must be met:
- at least 3km from urban areas with a population > 1,000 people;
  - at least 10km from any urban areas with a population > 5,000 people;
  - at least 15km from any urban areas with a population > 10,000 people;
  - at least 3km from any local industry;
  - at least 10km from any major industry centre;
  - at least 5km from any National Primary Route; and
  - at least 7.5km from any motorway or dual carriageway.
- 10.25 If any of the above criteria are not met, then it is necessary to undertake a baseline noise survey of the existing daytime, evening, and night-time noise environments in order to establish whether the receptor is located in a 'Low Background Noise Area' or 'Not an Area of Low Background Noise'.
- 10.26 The noise criteria for these designations are shown in Table 10-1 below. For an area to be designated as an area of low background noise ( $L_{AF 90}$ ), the daytime, evening, and night-time noise limits must all be met.

**Table 10-1**  
**NG4 Noise Criteria for Area Designation**

Designation	Day $L_{AF 90}$ dB	Evening $L_{AF 90}$ dB	Night $L_{AF 90}$ dB
Low Background Noise Area	≤ 40	≤ 35	≤ 30
Not an Area of Low Background Noise	≥ 41	≥ 35	≥ 31

- 10.27 The procedure outlined in the NG4 Guidance document then sets out a methodology to determine an acceptable noise limit at a receptor location. This noise limit is termed the **noise rating level** (or  $L_{A,T}$ ) and includes, if necessary, a plus 5dB tonal penalty, or a plus 5dB impulsive penalty. If a noise source is both tonal and impulsive however, only one adjustment should be made.

- 10.28 In order to determine whether or not a 5dB tonal penalty should be applied, it is necessary to obtain third octave frequency data of the noise source in question. The NG4 guidance states that:  
*‘... the time average sound pressure level in the one-third-octave band of interest should exceed the time-average sound pressure levels of both adjacent one-third-octave bands by some constant level difference’. ‘The appropriate level differences vary with frequency. They should be greater than or equal to the following values in both adjacent one-third-octave bands:*
- *15dB in low-frequency one-third-octave bands (25Hz to 125Hz);*
  - *8dB in middle-frequency bands (160Hz to 400Hz); and*
  - *5dB in high-frequency bands (500Hz to 10,000Hz).’*
- 10.29 In order to determine whether or not a 5dB impulsive penalty should be applied to a noise source, it is necessary to establish whether or not the noise in question may be ‘described as something with a thumping, banging, or impact noise that is clearly audible above everything else.’
- 10.30 The permitted rating noise level in each designated area is shown in Table 10-2.

**Table 10-2**  
**NG4 Permitted Rating Noise Levels**

Designation	Daytime Noise Criterion, dB L <sub>ar,T</sub>	Evening Noise Criterion, dB L <sub>ar,T</sub>	Night-Time Noise Criterion, dB L <sub>ar,T</sub>
Quiet Area	Noise from the licensed site to be at least 10dB below the average daytime background noise level measured during the baseline noise survey	Noise from the licensed site to be at least 10dB below the average evening background noise level measured during the baseline noise survey	Noise from the licensed site to be at least 10dB below the average night-time background noise level measured during the baseline noise survey
Areas of Low Background Noise	45.0	40.0	35.0
All Other Areas	55.0	50.0	45.0

## British Standard 5228: 2009+A1:2014

- 10.31 British Standard 5228-1:2009+A:2014 *Noise and Vibration Control on Construction and Open Sites, Part 1: Noise* (BS5228) sets out a methodology for predicting noise levels arising from a wide variety of construction and related activities. It can be used to predict noise levels arising from the operations of extraction sites and associated backfilling / soil recovery activities. BS 5228 also sets out tables of sound power levels generated by a wide variety of mobile equipment.
- 10.32 Noise levels generated by site operations and experienced at local receptors will depend upon a number of variables, the most significant of which are:
- the amount of noise generated by plant and equipment being used at the subject site, generally expressed as a sound power level;
  - the periods of operation of the plant at the subject site, known as the “on-time”;
  - the distance between the noise source and the receptor, known as the “stand-off”;
  - the attenuation due to ground absorption or barrier screening effects; and
  - any reflections of noise due to the presence of hard vertical faces (i.e. walls).

**Guidelines for Noise Impact Assessment (IEMA)**

- 10.33 The *Guidelines for Noise Impact Assessment* produced by the Institute of Environmental Management and Assessment (IEMA, 2014) are generally recognised as established good practice standards for scope, content, and methodology of noise impact assessment.
- 10.34 These guidelines address the key principles of noise impact assessment and are applicable to all development proposals where noise effects are likely to occur. These guidelines state that for any assessment, the noise level threshold and significance should be determined by the assessor, based upon the specific evidence and likely subjective response to noise. An example impact scale offered by the IEMA guidelines is shown in Table 10-3.

**Table 10-3  
Example Impact Scale from the Change in Sound Levels (IEMA, 2014)**

Long-Term Impact Classification	Short-Term Impact Classification	Sound Level Change dB L <sub>pAeqT</sub> ( +ive or -ive) T = either 16hr day or 8hr night
Negligible	Negligible	≥ 0 dB and < 1 dB
	Minor	≥ 1 dB and < 3 dB
Minor	Moderate	≥ 3.0 dB and < 5 dB
Moderate	Major	≥ 5.0 dB and < 10 dB
Major		≥ 10.0

- 10.35 The criteria above reflect the key benchmarks that relate to human perception of sound. A change of 3dB is generally considered to be the smallest change in environmental noise that is perceptible to the human ear under most normal conditions. A 10dB change in noise represents a doubling or halving of the noise level. The difference between the minimum perceptible change and the doubling or halving of the noise level is split to provide greater definition to the assessment of changes in noise level.



10.36 To determine the overall noise impact, the magnitude and sensitivity Noise Effects Descriptors are presented in Table 10-4.



**Table 10-4**  
**Noise Effects Descriptors (IEMA, 2014)**

<b>Very Substantial</b>	Greater than 10 dB $L_{Aeq}$ change in sound level perceived at a highly sensitive noise receptor
<b>Substantial</b>	Greater than 5 dB $L_{Aeq}$ change in sound level at a noise-sensitive receptor, or a 5 to 9.9 dB $L_{Aeq}$ change in sound level at a highly sensitive noise receptor
<b>Moderate</b>	A 3 to 4.9 dB $L_{Aeq}$ change in a sound level at a sensitive or highly sensitive noise receptor, or a greater than 5 dB $L_{Aeq}$ change in sound level at a receptor of some sensitivity
<b>Slight</b>	A 3 to 4.9 dB $L_{Aeq}$ change in a sound level at a receptor of some sensitivity
<b>None / Not Significant</b>	Less than 2.9 dB $L_{Aeq}$ change in sound level and/or all receptors of negligible sensitivity to noise or marginal to the zone of the influence of the proposed development

10.37 As recognised in the IEMA guidance, there are however many factors which affect people's perception and their responses to noise. Guidance on assessment of the magnitude of noise impact and the significance of the effects are presented in Table 10-5 overleaf.

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**Table 10-5**  
**Relationship between Noise Impact, Effect and Significance (IEMA)**

Magnitude (Nature of Impact)	Description of Effect (on a Specific Sensitive Receptor) (i.e. Magnitude x Sensitivity)		Effect Significance
Substantial	Beneficial	<b>Receptor Perception = Marked Change</b> Causes a material change in behaviour and/ or attitude, e.g. individuals begin to engage in activities previously avoided due to preceding environmental noise conditions. Quality of life enhanced due to change in character of the area.	More Likely to be Significant (Greater justification needed- based on impact magnitude and receptor sensitivities- to justify a non-significant effect)
Moderate		<b>Receptor Perception = Noticeable Improvement</b> Improved noise climate resulting in small change in behaviour and/or attitude, e.g. turning down volume of television; speaking more quietly; opening windows. Affects the character of the area such that there is a perceived change in the quality of life.	
Slight		<b>Receptor Perception = Just Noticeable Improvement</b> Noise impact can be heard, but does not result in any change in behaviour or attitude. Can slightly affect character of the area but not such that there is a perceived change in quality of life.	
Negligible	N/A = no discernible effect on receptor		Not Significant
Slight	Adverse	<b>Receptor Perception = Non-intrusive</b> Noise impact can be heard, but does not cause change in behaviour or attitude, e.g. turning up volume of television, speaking more loudly; closing windows. Can slightly affect the character of the area but not such that there is a perceived change in the quality of life.	Less Likely to be Significant Greater justification needed- based on impact magnitude and receptor sensitivities- to justify a significant effect)
Moderate		<b>Receptor Perception = Intrusive</b> Noise impact can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; closing windows. Potential for non-waking sleep disturbance. Affects the character of area such that there is a perceived change in the quality of life.	
Substantial		<b>Receptor perception = Disruptive</b> Causes material change in behaviour and /or attitude, e.g. avoiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in getting to sleep, premature awakening, and difficulty in getting back to sleep. Quality of life diminished due to change in character of area.	
Severe		<b>Receptor Perception = Physically Harmful</b> Significant Changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or psychological effects, e.g. regular sleep deprivation / awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Significant

**Design Manual for Roads and Bridges**

- 10.38 The Design Manual for Roads and Bridges (DMRB, 2020) (LA 111) considers the following criterion to understand the need for further assessment for traffic generated noise impacts:
- is the project likely to cause change in the baseline noise levels of 1dB  $L_{A10,18hr}$  in the do-minimum year compared to the do- something opening year;
  - is the project likely to cause change in the baseline noise levels of 3 dB  $L_{A10,18hr}$  in the do-something future year compared to the do- minimum opening year;
  - does the project involve construction of new road links within 600m of noise sensitive receptors; and
  - would there be a reasonable stakeholder’s expectation that an assessment is undertaken.

**AQTAG09 - Guidance on Effects of Industrial Noise on Wildlife**

- 10.39 AQTAG09 (Air Quality Technical Advisory Group 09) guidance, published by the UK Environment Agency in 2005, provides guidance to planning and/or licensing officials handling pollution prevention and control applications for industrial installations on relevant noise emissions and relates these to requirements of Habitats Regulations.
- 10.40 The Habitats Directive (92/43/EEC) specifies that where specific noise from industry, measured at the habitat / nest site, is below the levels in Table 10-6, it is considered unlikely that it will have an adverse impact on designated species. Where noise levels are exceeded, a more detailed noise assessment will be required.

**Table 10-6**  
**Specific Noise Levels at Habitat / Nest Site**

Parameter	Noise Level, dB
$L_{Amax,F}$	80
$L_{Aeq,1hr}$	55

**NOISE AND HUMAN HEALTH**

- 10.41 Environmental noise exposure response relationships and thresholds for health endpoints for industry are not available at European or Irish level in legislation or guidelines.

**WHO Environmental Noise Guidelines**

- 10.42 World Health Organisation (WHO) Europe have produced the WHO Environmental Noise Guidelines 2018 for the European Region as a regional update to the WHO Community Noise Guidelines. The Guidelines include a review of evidence on the health effects of environmental noise to incorporate significant research carried out in recent years. The guidelines provide recommendations for protecting human health from exposure to environmental noise from various sources and provide assessments of several such sources including aircraft, rail, road, wind turbines and leisure noise.
- 10.43 The 2002 EU Directive introduced annual average indicators of noise exposure ( $L_{den}$  and  $L_{night}$ ) as long-term exposure indicators, which differ from those used in the earlier WHO Guidelines for Community Noise (1999).

## RECEIVING ENVIRONMENT

### Study Area

- 10.44 The proposed waste licence extension area under assessment for the purposes of this EIAR comprises the proposed backfilling and soil waste recovery area on the western side of the existing South Quarry, the lands immediately surrounding it and the haul routes leading to it within the Huntstown Quarry Complex.
- 10.45 The Central Quarry and construction materials production facilities extend across lands immediately to the north of the proposed licence extension area. The lands immediately to the south remain in use as agricultural grassland, as do the lands to the east of the South Quarry, beyond the eastern quarry (by-product) backfill area.
- 10.46 The lands to the west and north-west (beyond the proposed backfill and recovery area) comprise light industry and science and technology parks along the Cappagh Road (including Stadium Business Park, Huntstown Business Park and Millennium Business Park).
- 10.47 The study area for the purposes of this noise impact assessment is taken to be the proposed licence extension area and everything within 500m thereof. For completeness, a number of more distant properties located along (or accessed off) the R135 Regional Road which are impacted by HGV traffic movements generated by ongoing (and future) backfilling and recovery activities have also been included for noise impact assessment purposes.
- 10.48 There are 21 existing residences located in reasonable proximity to the future backfill and recovery operations at the South Quarry or trafficked roads along the local road network, refer to Figure 10-1. Eight of these properties are located along the R135 Regional Road, one is located beyond the eastern boundary of the recovery area (and eastern quarry boundary) and 12 to the south and south-west, along the Cappagh Road (L3080).
- 10.49 The proposed licence extension area is not subject to any statutory or non-statutory nature conservation designations and there are no such sites within a 2km radius.

### Baseline Study Methodology

- 10.50 Environmental noise surveys were carried out to capture typical background noise levels at the noise-sensitive receptors closest to the proposed soil recovery facility at Huntstown. The methodology of the surveys and the results are set out below. The weather conditions during the survey periods were acceptable for noise monitoring, being generally dry, with little or no wind.
- 10.51 The baseline noise measurements were taken using a Larson Davis 831 Type 1 sound level meter. The sound level meter was calibrated before the measurements, and its calibration checked after, using a Larson Davis Cal200 field calibrator. No calibration drifts were found to have occurred during surveys. All noise equipment had been calibrated to a traceable standard by UKAS (United Kingdom Accreditation Service) accredited laboratories within 24 months preceding the surveys.
- 10.52 At the measurement positions, the following noise level indices were recorded:
- $L_{Aeq,T}$  is the A-weighted equivalent continuous noise level over the measurement period (T), and effectively represents an “average” value.
  - $L_{A90,T}$  is the A-weighted noise level exceeded for 90% of the measurement period (T). This parameter is often used to describe the background noise.
  - $L_{A10,T}$  is the A-weighted noise level exceeded for 10% of the measurement period (T). This parameter is often used to describe traffic noise.

- 10.53 All noise levels are recorded in 'A-weighted' decibels, dB(A). 'A-weighting' is the process by which noise levels are corrected to account for the non-linear frequency response of the human ear. All noise levels are quoted in dB(A) relative to a sound pressure of 20µPa.
- 10.54 Environmental noise surveys were undertaken by SLR Consulting Ireland staff at the noise sensitive receptors in the vicinity of the licence extension area on the 30<sup>th</sup> and 31<sup>st</sup> of March 2021. Noise measurements were undertaken over three, non-consecutive, 30-minute periods during the daytime period (07:00 to 19:00). The monitoring periods chosen are considered to give representative daytime noise levels at nearby noise sensitive locations.
- 10.55 It should be noted that the baseline noise survey was undertaken at a time when there were public health restrictions in place around movement and travel due to the Covid 19 pandemic and, as a result, reported average ambient noise levels and background noise levels are likely to understate what they would otherwise be in normal circumstances.
- 10.56 During the surveys, the sound level meter was located in free-field conditions (i.e. at least 3.5m from the nearest vertical reflecting surface, with the microphone approximately 1.5m above ground level), with the meter set to 'Fast'-time weighting.

## Sources of Information

- 10.57 A desk study was carried out to examine all relevant information relating to noise conditions around the backfilling and recovery area at the South Quarry including:
- the NWPS website in relation to sites that are charged with the conservation of a range of habitats and species in study area; and
  - Ordnance Survey maps and aerial photography.
- 10.58 Knowledge of recent development was also considered when site-specific noise baseline surveys were being planned for the purposes of this EIA.

## Existing Noise Conditions

- 10.59 The noise monitoring locations which form the basis of this baseline noise study, shown in plan in Figure 10-1, comprise the following:
- BN1 to the east of the backfill / recovery area, south of the quarry entrance;
  - BN2 to the north-east of the backfill / recovery area, north of the quarry entrance;
  - BN3 to the west of the backfill / recovery area;
  - BN4 to the south of the backfill / recovery area;
  - BN5 to the south-west of the backfill / recovery area.
- 10.60 The baseline noise monitoring locations listed above are considered representative of the nearest noise sensitive locations (receptors) likely to be most impacted by the backfill and recovery activities at the South Quarry. These are described below<sup>1</sup>:
- Location BN1 is considered representative of residential properties located to the east of the recovery / backfill area, along the R135 Regional Road (also known as the North Road);
  - Location BN2 is considered representative of residential properties located north of the entrance to the quarry complex and to the north-east of the recovery / backfill area;
  - Location BN3 is considered representative of the commercial properties located to the west of the recovery / backfill area;

<sup>1</sup> Note that noise levels were not taken at the exact locations of the noise sensitive properties as no access was made onto privately owned land. Monitoring was carried out adjacent to / in close proximity of these properties.

- Location BN4 is considered representative of the residential properties (at Cappagh Cottages), located to the south of the recovery / backfill area;
- Location BN5 is considered representative of the residential properties located to the south-west of the recovery / backfill area.

10.61 Baseline noise measurements for the residential property located within an agricultural landholding immediately east of the South Quarry and set back some distance from the R135 Regional Road (i.e. property R9 shown on Figure 10-1) were provided separately by Roadstone. Noise monitoring data obtained at nearby monitoring location N2, located at the eastern quarry / property boundary, for the quarry / waste facility compliance monitoring programme in September 2020 are taken to be representative of baseline noise levels for this specific property.

10.62 Noise monitoring results for the baseline survey are provided in Table 10-7 below; logarithmic average  $L_{Aeq}$  values are provided in Table 10-8 overleaf.

**Table 10-7**  
**Summary of Measured Noise Levels, Free Field dB**

Location	Receptors	Period	Date	Time	$L_{Aeq,T}$	$L_{A10}$	$L_{A90}$
BN1	R5 to R8	Daytime	30/03/21	13:12	65	65	59
			30/03/21	14:34	60	62	57
			30/03/21	15:51	60	61	57
BN2	R1 to R4	Daytime	30/03/21	13:56	73	77	58
			30/03/21	15:14	71	75	55
			30/03/21	16:29	68	71	56
BN3	Millennium Business PK	Daytime	31/03/21	9:22	64	67	55
			31/03/21	11:29	64	68	54
			31/03/21	14:49	64	67	56
BN4	R10 Group R11	Daytime	31/03/21	10:02	62	67	47
			31/03/21	12:08	62	68	47
			31/03/21	13:30	65	67	49
BN5	R12	Daytime	31/03/21	10:45	74	78	49
			31/03/21	12:47	75	79	50
			31/03/21	14:10	74	78	55
N2 (Roadstone)	R9	Daytime	10/09/20	14.10	51	54	47
			10/09/20	14.40	53	55	48
			10/09/20	15.10	54	49	47

**Table 10-8**  
**Summary of Measured Noise Levels, Free Field dB (Average Values)**

Location	Receptors	Period	L <sub>AeqAVG</sub>
BN1	R5 to R8	Daytime	62
BN2	R1 to R4	Daytime	71
BN3	Millennium Business PK	Daytime	64
BN4	R10, Group R11	Daytime	63
BN5	R12	Daytime	74
N2	R9	Daytime	53

- 10.63 In the course of the baseline noise monitoring undertaken around Huntstown, the key observation in respect of the surrounding noise environment was that the recorded noise levels were dominated by road traffic noise on the adjoining local roads and M50. There was also limited noise contribution from aircraft movements in/out of Dublin Airport. It should be noted that aircraft movement were considerably reduced at the time of the baseline / reference surveys due to the impact of Covid-19 restrictions on international air travel.
- 10.64 On the basis of the data presented in Table 10-7 and Table 10-8 above, it is concluded that all the noise monitoring locations may be designated as 'all other areas' in accordance with standards set out in the EPA's NG4 Guidance (refer to Table 10-2).

## Sensitive Receptors

### Human Receptors

- 10.65 Sensitive locations are those where people may be exposed to noise from the existing or planned activities. The closest residential receptors to the backfilling and recovery area at the South Quarry (12 No.) have been identified on the basis of their distance from the extended licence boundary.
- 10.66 A total of 13 receptors have been identified for the purposes of this noise impact assessment. This includes two residential properties and a cluster of 10 cottages along Cappagh Road. A number of more distant properties located along (or accessed off) the R135 Regional Road (9 No.) have also been included in this assessment for completeness, as has the nearest commercial receptor at Millennium Business Park.
- 10.67 Details of the receptors under assessment in each direction and their proximity to the extended licence boundary (and nearest noise generating source associated with backfilling and recovery activities at the South Quarry) are presented in Table 10-9 below. Receptor locations are shown in Figure 10-1.

Table 10-9  
Noise Sensitive Receptors

Receptor Reference	Receptor	Sensitivity	Distance (m) / Direction from Site Boundary (Approx.)
R1	Residential/ Farm	Medium	540 NE
R2	Residential	Medium	634 NE
R3	Residential	Medium	657 NE
R4	Residential/ Farm	Medium	752 NE
R5	Residential	Medium	908 E
R6	Residential/ Farm	Medium	944 E
R7	Residential	Medium	938 E
R8	Residential	Medium	972 E
R9	Residential	Medium	625 E
R10	Residential	Medium	508 S
Group R11	Residential	Medium	195 S
R12	Residential	Medium	50 SW
Millennium Business Park	Commercial	Medium	50 W

### Ecological Receptors

- 10.68 Based on the nature, size and scale of the future backfilling and recovery activities at the South Quarry, it is considered that the maximum distance for which the project should be evaluated in terms of Natura 2000 and /or designated sites is up to a maximum radius of 2km from the licence extension area unless there are any potential source-pathway-receptor links between the recovery activities at the South Quarry and any designated site(s) beyond this distance.

## IMPACT ASSESSMENT

### Evaluation Methodology

- 10.69 To determine the noise impact arising from backfilling and soil recovery activities at the South Quarry, SLR Consulting Ireland carried out a noise prediction assessment, whereby resultant noise levels were calculated for nearby clusters of noise sensitive receptors identified on Figure 10-1.
- 10.70 Operational  $L_{Ar, 1hr}$  noise predictions at each receptor location are based on BS5228: Part 1 (2009)+ A1:2014 “Code of Practice for Noise and Vibration Control on Construction and Open Sites”
- 10.71 For the purposes of this assessment, it is assumed the following plant will be used continuously for backfilling and soil recovery activities on site at Huntstown South Quarry (over and above that present at the time of the baseline / reference noise survey):



- Bulldozer
  - Excavator
  - 2 No. HGVs (assuming 10-minute turnaround).
- 10.72 For the purposes of this assessment, it is assumed that all of the above listed noise sources are active and arise continuously and simultaneously during assessment hours, and that the attenuation distance to the selected closest receptors is calculated from the extended licence boundary (as indicated in Figure 10-1) **rather than from the noise source**.
- 10.73 Noise generated by soil intake and handling at the quarry will for the most part, be screened by surrounding landforms, and by the existing quarry faces in particular. For the purposes of this impact assessment, a reduction of -10 dB(A) has been assumed for partial noise screening by existing quarry faces and screening berms along the Roadstone property boundary. This reduction is likely to be conservative and to understate the degree of attenuation provided by the quarry faces and screening berms.
- 10.74 On the basis of the methodology outlined above, it is considered that the noise impact assessment presented herein is sufficiently robust and conservative and represents a worst-case scenario. Detailed noise assessment calculations are provided in Appendix 10-B.

## Operational Activities

- 10.75 As set out in Annex D of the updated Environmental Noise Standard, ISO 1996-2:2017 (*Acoustics — Description, measurement and assessment of environmental noise — Part 2: Determination of environmental noise levels*) a prominent, discrete tonal component may be detected in one-third octave spectra if the level of a one-third octave band exceeds the level of the adjacent bands by some constant level difference.
- 10.76 The appropriate level differences vary with frequency. They should be greater than or equal to the following values in both adjacent one-third octave bands:
- 15dB in low-frequency one-third octave bands (25Hz to 125Hz);
  - 8dB in middle-frequency bands (160Hz to 400Hz), and;
  - 5dB in high-frequency bands (500Hz to 10,000Hz).
- 10.77 The noise characteristics of the plant to be used for the proposed backfilling and soil waste recovery activities at the South Quarry and considered in this noise assessment are shown in Table 10-10. Notwithstanding the fact that a mechanical excavator may only be used occasionally for short intermittent periods at the facility, it is included in this noise assessment to ensure it is robust and sufficiently conservative. There will be no tonal components within the frequency range.

**Table 10-10**  
**Octave Band Noise Spectra : Backfilling Plant / HGVs**

Plant	Octave Band Sound Pressure Levels @ 10m, Hz								L <sub>Aeq</sub> @10m
	63	125	250	500	1,000	2,000	4,000	8,000	
Excavator	75	76	72	68	65	63	57	49	71
Dozer	79	77	76	74	68	67	60	59	75
HGV Truck	91	79	77	74	71	69	64	61	77

- 10.78 The plant and equipment used at the soil recovery facility will not generate impulsive or tonal noise. As such, no penalty has been added to the predicted operational  $L_{Ar, 1hr}$  noise level for presence of tonal or impulsive noise.
- 10.79 The operational  $L_{Ar, 1hr}$  noise prediction for each receptor location under assessment is presented in Table 10-11 below. Table 10-12 also shows the comparison between the predicted operational  $L_{Ar, 1hr}$  noise level and the prescribed noise limit (from the EPA’s NG4 Guidance) for ‘all other areas’ at each receptor.

**Table 10-11**  
**Operational Noise : Soil Recovery Activity at Huntstown South Quarry**

Receptor	Period	Noise Limit $L_{Aeq, 1hr}$ dB (A)	Operational* $L_{Aeq, 1hr}$ dB(A)	Difference
R1	Daytime	55	40	15
R2	Daytime	55	39	16
R3	Daytime	55	38	17
R4	Daytime	55	37	18
R5	Daytime	55	35	20
R6	Daytime	55	35	20
R7	Daytime	55	35	20
R8	Daytime	55	35	20
R9	Daytime	55	39	16
R10	Daytime	55	40	15
Group R11	Daytime	55	49	6
R12	Daytime	55	61	-6
Millennium Business Park	Daytime	55	55	0

\*Operational Noise Level = Predicted Noise Level without a 5 dB penalty

- 10.80 As can be seen from the above figures, the noise levels generated solely by the continuous backfilling and recovery activities at Huntstown, even in a worst-case scenario, are comfortably below prescribed EPA NG4 Daytime Noise criterion limits at all nearby noise sensitive locations apart from the Millennium Business Park and residential receptor R12.
- 10.81 It is emphasised that the assessment is very much a worst-case scenario, with separation distance between all noise sources and receptor taken to be a minimum, equivalent to the distance to the extended licence boundary. In reality however, the separation distance will be greater, providing scope for greater noise attenuation and reducing resultant noise to below threshold levels.
- 10.82 To identify the potential impact of continuous backfilling and soil waste recovery activity at the extended facility, predicted specific  $L_{Aeq, 1hr}$  dB(A) noise levels have been logarithmically added to existing ambient noise levels. The cumulative levels have been compared to the existing ambient noise levels at each of the noise sensitive locations for each time-period. The cumulative assessment is presented in Table 10-12 below.

**Table 10-12**  
**Cumulative Operational Noise : Soil Recovery Activity at Huntstown South Quarry**

Location	Receptor	Existing Baseline L <sub>Aeq,T</sub> dB(A)	Operational L <sub>Ar, 1hr</sub> dB(A)*	Cumulative L <sub>Aeq, T</sub> dB(A)	Difference	Short Term Impact	Long Term Impact
BN2	R1	71	40	71	0	Negligible	Negligible
BN2	R2	71	39	71	0	Negligible	Negligible
BN2	R3	71	38	71	0	Negligible	Negligible
BN2	R4	71	37	71	0	Negligible	Negligible
BN1	R5	62	35	62	0	Negligible	Negligible
BN1	R6	62	35	62	0	Negligible	Negligible
BN1	R7	62	35	62	0	Negligible	Negligible
BN1	R8	62	35	62	0	Negligible	Negligible
N2	R9	53	39	53	0	Negligible	Negligible
BN4	R10	63	40	63	0	Negligible	Negligible
BN4	Group R11	63	49	63	0	Negligible	Negligible
BN5	R12	74	61	74	0	Negligible	Negligible
BN3	Millennium Business Pk	64	55	65	1	Minor	Negligible

\*Operational Noise Level = Predicted Noise Level without the 5 dB penalty for tonal or impulsive noise

- 10.83 With reference to the *Guidelines for Noise Impact Assessment* produced by the Institute of Environmental Management and Assessment (IEMA, 2014), the long-term cumulative noise impact from the proposed backfilling and recovery operations at all residential receptors is determined to be **negligible** under a worst-case scenario.
- 10.84 However, when backfilling and recovery activities take place close to the original ground level along the western and south-western boundaries, the worst case short-term (temporary) noise impacts at the adjoining Millennium Business Park is assessed as **minor**.

**Traffic Noise**

- 10.85 The backfilling and recovery activities at the South Quarry as proposed will generate an average of 12 movements to and 12 movements from the quarry every hour of every working day (and a total of 24 movements per hour).
- 10.86 This compares with the current average rate of 23 movements per hour in each direction (or a total of 46 movements per hour) which is currently permitted for the ongoing (licensed) backfilling and recovery operations at the North Quarry.

10.87 Given the existing high level of HGV traffic around Huntstown quarry and the high level of ambient / traffic noise captured in the baseline / reference noise surveys, together with the future reduction in HGV traffic levels associated with the proposed backfilling of the South Quarry, it is considered that the potential noise impact of the traffic movements will not meet any of the assessment criteria set out in LA 111 (DMRB, 2020) and that the impact of the traffic can be screened out and deemed to be 'negligible' in terms of noise and no further assessment is considered necessary.

## Unplanned Events (i.e. Accidents)

10.88 Accidents, malfunctions and unplanned events refer to events or upset conditions that are not part of any activity or normal operations planned by Roadstone. Even with the best planning and the implementation of preventative measures, the potential exists for accidents, malfunctions or unplanned events to occur during the proposed backfilling and recovery activities at the South Quarry.

10.89 Many accidents, malfunctions and unplanned events are, however, preventable and can be readily addressed or prevented by good planning, design, emergency response planning, and mitigation. The unplanned events which are most likely to arise in this instance are:

- equipment malfunction; and
- vehicle collision.

10.90 In relation to noise, the impacts of any unplanned events are considered to be negligible and have no potential to increase noise levels at sensitive receptors.

## Cumulative / Synergistic Impacts

10.91 In essence, cumulative impacts are those which result from incremental changes caused by other past, present or reasonably foreseeable actions, together with those generated by planned recovery activities. Therefore, the potential impacts of the proposed activities at the South Quarry cannot be considered in isolation but must be considered in addition to impacts already arising from existing or planned future development.

10.92 Although there are a number of other waste related developments approved and/or in planning around the Huntstown quarry complex (including the Roadstone C&D facility, Rathdrinagh Land research facility and Irish Water Regional Biosolids Storage facility), these largely provide for waste activities and processes to be undertaken within enclosed structures rather than outdoors, and as a result any noise emissions are unlikely to be significant relative to existing high ambient baseline levels.

10.93 This noise impact assessment has determined that the backfilling and soil recovery activities at Huntstown South Quarry will not contribute to increased noise levels above the already high ambient baseline levels. In view of the separation distance between the planned recovery area and other development locations and the nature of those developments, no potential for significant cumulative noise impact has been identified. The cumulative impact of the future recovery activities at the South Quarry is therefore classified as insignificant.

## Interaction with Other Impacts

10.94 The potential impact of noise generated by the proposed backfilling and soil recovery activities on sensitive receptors, including sensitive ecological receptors and people living in the surrounding area has been assessed in this Chapter of the EIA. The impact of the proposed backfilling and recovery activities on these receptors is further considered in Chapter 4 'Population and Human Health' and Chapter 5 'Biodiversity'.

## 'Do-nothing' Scenario

- 10.95 At present the noise environment within the study area is dominated by traffic noise emanating from local road traffic, overhead aircraft, established quarrying activities and other local businesses. Over time, it is anticipated that the volume of road traffic and commercial / industrial development in the area could increase as economic activity and development increases. This in turn is likely to lead to a gradual, likely measurable increase in ambient and background noise levels.
- 10.96 If the proposed waste licence review application is not approved, alternative strategies would have to be developed to progress the restoration of the South Quarry to agricultural land use in line with the conditions attached to the current extractive permission, most likely using materials classified as non-waste by-product under Article 27 of the European Communities (Waste Directive) Regulations (S.I. No. 126 of 2011, as amended).
- 10.97 Although the end result would be the same as that provided for in the licence review application, it could ultimately take longer to complete given the limited number of decisions made by the Agency confirming by-product status for soil and stone to date.

## MITIGATION MEASURES

- 10.98 Where necessary, the three established strategies for impact mitigation are avoidance, reduction and remedy. Where it is not possible or practical to mitigate all impacts, then the residual impacts must be clearly described in accordance with the system for impact description set out in the EPA Guidelines (NG4). The adoption of Best Practicable Means is generally considered to be the most effective means of controlling noise emissions.
- 10.99 Notwithstanding the findings of the impact assessment presented above, which determined that any future soil recovery activity at Huntstown South Quarry will have a negligible long-term noise impact on residential amenity, and in line with established practice at other sites, the following best practice measures will be implemented wherever practicable to minimise the potential noise impact of backfilling and recovery activities:

### *Screening*

- existing screening banks and screening / planting around the facility will be retained to act as acoustic barriers. Existing / temporary berms will be inspected on a regular basis and maintained / strengthened / reinforced with planting as necessary.

### *Plant*

- all mobile plant used for recovery activities should have noise emission levels that comply with the limiting levels defined in EC Directive 2000/14/EC and any subsequent amendments thereof (transposed into Irish law under S.I. No. 632 of 2000, as amended);
- all plant items should be properly maintained and operated according to the manufacturers' recommendations, in such a manner as to avoid causing excessive noise (i.e. all moving parts are kept well lubricated, all cutting edges are kept sharpened, the integrity of silencers and acoustic hoods are maintained); and
- all plant should be fitted with effective exhaust silencers which are maintained in good working order to meet manufacturers' noise rating levels. Any defective silencers should be replaced immediately.

### *Traffic*

- all soil intake will be programmed to arrive during working hours only. Care should be taken when unloading vehicles to reduce or minimise potential disturbance to local residents;

- traffic speed within the facility will be limited / controlled;
- access / internal haul roads will be kept clean and maintained in a good state of repair (i.e. any potholes will be filled, and large bumps removed, to avoid unwanted rattle and “body-slap” from heavy goods vehicles); and
- delivery vehicles waiting within the facility will be prohibited from leaving their engines running and there should be no unnecessary revving of engines.

10.100 Experience from other waste recovery facilities has shown that by implementing these measures, typical noise levels from construction works and/or recovery operations can bring about a reduction of up to 5dB(A) in ambient noise levels.

## RESIDUAL IMPACT ASSESSMENT

10.101 The worst-case noise assessment has shown that in accordance with the scale in the *Guidelines for Noise Impact Assessment* (IEMA, 2014) the long-term cumulative noise impact from plant associated with backfilling and recovery activity at all receptor locations is **negligible**.

10.102 Table 10-13 summarises the impacts, mitigation measures and residual impact for operational plant noise at each of the noise sensitive receptors considered by this assessment.

**Table 10-13**  
**Operational Noise Summary Table**

Receptors	Increase in Operational Noise L <sub>Aeq,1hr</sub> dB(A)	Impact Without Mitigation Measures		Mitigation	Reduction in Noise from Mitigation L <sub>Aeq,1hr</sub> dB(A)	Increase in Operational Noise L <sub>Aeq,1hr</sub> dB(A)	Residual Short-Term Impact	Residual Long-Term Impact
		Short Term	Long Term					
R1	0	Negligible	Negligible	Not Required	-5	0	Negligible	Negligible
R2	0	Negligible	Negligible	Not Required	-5	0	Negligible	Negligible
R3	0	Negligible	Negligible	Not Required	-5	0	Negligible	Negligible
R4	0	Negligible	Negligible	Not Required	-5	0	Negligible	Negligible
R5	0	Negligible	Negligible	Not Required	-5	0	Negligible	Negligible
R6	0	Negligible	Negligible	Not Required	-5	0	Negligible	Negligible
R7	0	Negligible	Negligible	Not Required	-5	0	Negligible	Negligible

Receptors	Increase in Operational Noise $L_{Aeq,1hr}$ dB(A)	Impact Without Mitigation Measures		Mitigation	Reduction in Noise from Mitigation $L_{Aeq,1hr}$ dB(A)	Increase in Operational Noise $L_{Aeq,1hr}$ dB(A)	Residual Short-Term Impact	Residual Long-Term Impact
		Short Term	Long Term					
R8	0	Negligible	Negligible	Not Required	-5	0	Negligible	Negligible
R9	0	Negligible	Negligible	Not Required	-5	0	Negligible	Negligible
R10	0	Negligible	Negligible	Not Required	-5	0	Negligible	Negligible
Group R11	0	Negligible	Negligible	Not Required	-5	0	Negligible	Negligible
R12	0	Negligible	Negligible	Not Required	-5	0	Negligible	Negligible
Millennium Business Pk	1	Minor	Negligible	Short-term Required	-5	0	Negligible	Negligible

## MONITORING

10.103 Noise monitoring will continue to be undertaken at and around the extended licensed site. Noise monitoring locations shall be reviewed and revised where and as/when necessary. The results of the noise monitoring shall be submitted to the Fingal County Council and the Environmental Protection Agency as required on a regular basis for review and record purposes.

## REFERENCES

- Air Quality Technical Advisory Group (2005)** *AQTAG 09 Guidance on the Effects of Industrial Noise on Wildlife*
- British Standards Institution (2014)** *BS 5228-1:2009+A:2014 Noise and Vibration Control on Construction and Open Sites, Part 1: Noise (BS5228)*
- Department of Housing, Planning and Local Government (2018)** *National Planning Framework 2040*
- Environmental Protection Agency, 2016** *'Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)'*
- Fingal County Council (2017)** *Fingal County Development Plan 2017-2023*
- Highways England (2020)** *LA 111 Noise and Vibration, Design Manual for Roads and Bridges (DMRB)*
- Institute of Environmental Management and Assessment (2014)** *Guidelines for Noise Impact Assessment*
- World Health Organisation (2018)** *Environmental Noise Guidelines for the European Region*

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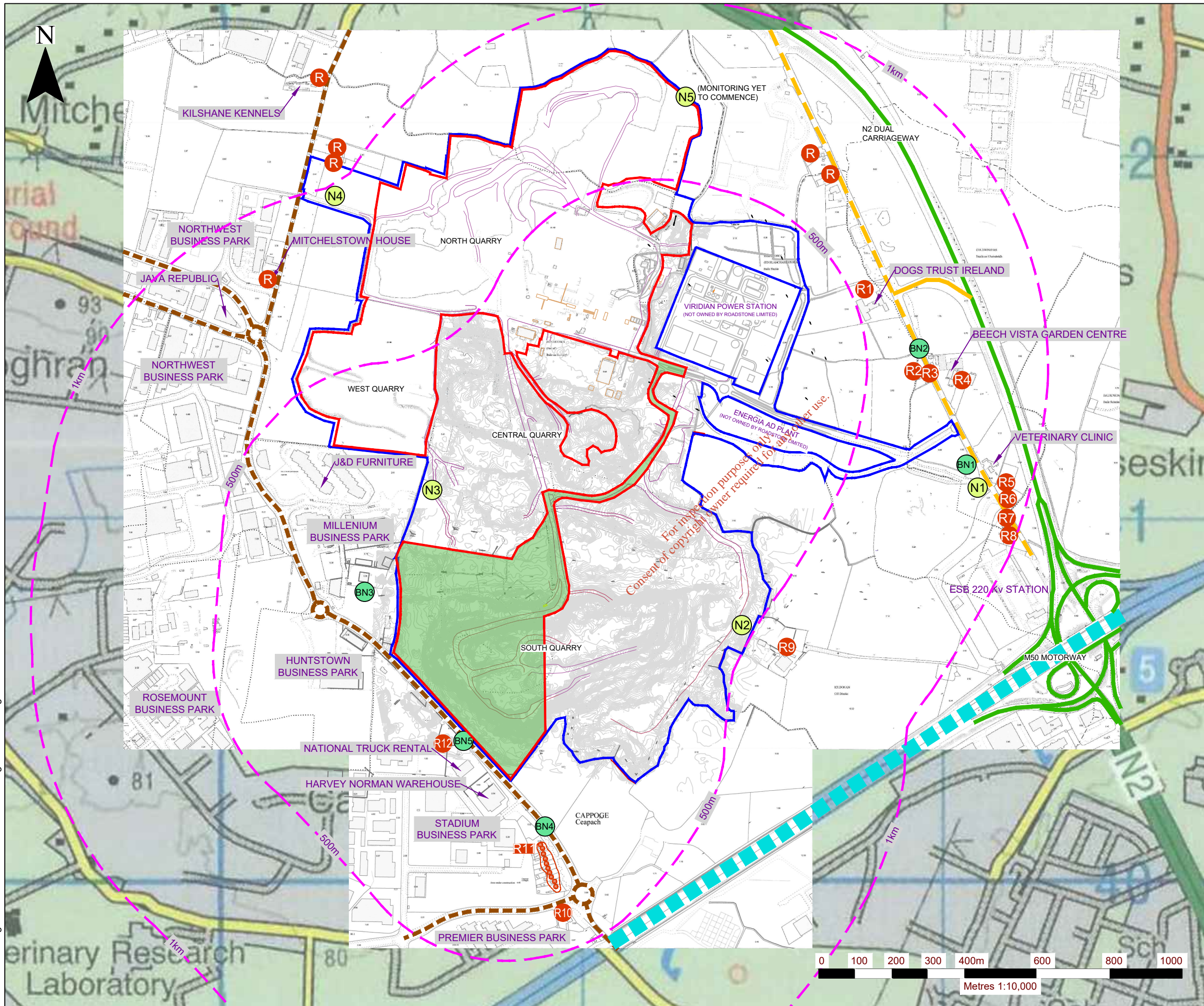


## FIGURES

### Figure 10-1 Noise Monitoring Receptor Locations

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0180.00313.0:Fig 10-1,REV A,WLR,Noise Monitoring Locations.dwg



**NOTES**

1. EXTRACT FROM 1:2,500 ORDNANCE SURVEY DIGITAL SHEET NO'S. 3062-A, 3062-B, 3062-C, 3062-D, 3063-A, 3063-C, 3130-A & 3130-B.
2. CYAL50167032 (C) ORDNANCE SURVEY IRELAND / GOVERNMENT OF IRELAND

**LEGEND**

	ROADSTONE LIMITED LAND INTEREST (C. 171.8 HA)
	AMENDED WASTE LICENCE AREA (COMPRISING EXISTING LICENCE AREA AND PROPOSED EXTENSION) (C. 77.5 HA)
	PROPOSED EXTENSION TO CURRENT WASTE LICENCE AREA
	WASTE LICENCE NOISE MONITORING LOCATIONS
	BASELINE NOISE SURVEY MONITORING LOCATIONS
	RECEPTOR LOCATIONS
	500M and 1KM OFFSET FROM APPLICATION AREA

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**ROADSTONE LTD.**  
 ENVIRONMENTAL IMPACT ASSESSMENT REPORT  
 HUNTSTOWN WASTE RECOVERY FACILITY  
 NORTH ROAD, FINGLAS, DUBLIN 11  
**NOISE MONITORING LOCATIONS**

**FIGURE 10-1**

Scale: 1:10,000 @ A3  
 Date: NOVEMBER 2021

## APPENDICES

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## APPENDIX 10-A

### GLOSSARY OF TERMINOLOGY

In order to assist the understanding of acoustic terminology and the relative change in noise, the following background information is provided.

The human ear can detect a very wide range of pressure fluctuations, which are perceived as sound. In order to express these fluctuations in a manageable way, a logarithmic scale called the decibel, or dB scale, is used. The decibel scale typically ranges from 0dB (the threshold of hearing) to over 120dB. An indication of the range of sound levels commonly found in the environment is given in the table below.

**Table 10A**  
**Noise Levels Commonly Found in the Environment**

SOUND LEVEL	LOCATION
0dB(A)	Threshold of hearing
20 to 30dB(A)	Quiet bedroom at night
30 to 40dB(A)	Living room during the day
40 to 50dB(A)	Typical office
50 to 60dB(A)	Inside a car
60 to 70dB(A)	Typical high street
70 to 90dB(A)	Inside factory
100 to 110dB(A)	Burglar alarm at one metre away
110 to 130dB(A)	Jet aircraft on take off
140dB(A)	Threshold of Pain

#### Acoustic Terminology

**dB (decibel)** The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure of 20µPa (2x10<sup>-5</sup> Pa).

**dB(A)** A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e., 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.

**L<sub>Aeq</sub>** L<sub>Aeq</sub> is defined as the notional steady ('equivalent continuous') sound level which, over a stated period of time, would contain the same amount of acoustical energy as the A-weighted fluctuating sound measured over that period. It is effectively an averaging of fluctuating noise levels over a sample monitoring period.

**L<sub>10</sub> & L<sub>90</sub>** If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L<sub>n</sub> indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence, L<sub>10</sub> is the level exceeded for 10% of the time and as such can be regarded as the 'average maximum level'. Similarly, L<sub>90</sub> is the 'average minimum level' and is often used to describe the background noise. It is common practice to use the L<sub>10</sub> index to describe traffic noise.

$L_{AF10}$ ,  $L_{AF90}$  Noise levels as above measured using the 'fast' time-weighting. 'Fast' time-weighting entails immediate and responsive measurement of changes in noise level over a very short time interval (rather than slower, dampened measurement, recorded and averaged over a slightly extended time interval).

$L_{Amax}$  is the maximum A-weighted sound pressure level recorded over the period stated.  $L_{Amax}$  is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall  $L_{Aeq}$  noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.

$L_{Amax,F}$ , The maximum A-weighted sound pressure level occurring within a specified time period. Measured using the "Fast" time weighting.

$L_{Ar, T}$  The Rated Noise Level, equal to the  $L_{Aeq}$  during a specified time interval (T), plus specified adjustments for tonal character and/or impulsiveness of the sound.

$L_{den}$  The 24-hour noise rating level determined by the averaging of the  $L_{day}$  with the  $L_{evening}$  plus a 5 dB penalty and the  $L_{night}$  plus a 10 dB penalty.  $L_{den}$  is calculated using the following formula:

$$L_{den} = 10 \log \left( \frac{1}{24} \right) \left( 12 * \left( 10^{\frac{L_{day}}{10}} \right) + 4 * \left( 10^{\frac{L_{evening}+5}{10}} \right) + 8 * \left( 10^{\frac{L_{night}+10}{10}} \right) \right)$$

Where: -

$L_{day}$  is the A-weighted long-term average sound level as defined in ISO 1996-2, determined over all the day periods of a year;

$L_{evening}$  is the A-weighted long-term average sound level as defined in ISO 1996-2, determined over all the evening periods of a year; and

$L_{night}$  is the A-weighted long-term average sound level as defined in ISO 1996-2, determined over all the night periods of a year.

$L_{pAeqT}$  A measure of the overall level of sound across the audible frequency range (20Hz – 20kHz) with A-frequency weighting (i.e. 'A-weighting') to compensate for the varying sensitivity of the human ear to sound at different frequencies.

**Impulsive:** A noise of short duration (typically less than 1 second), the sound pressure level of which is significantly higher than background.

**Tonal:** Sounds which cover a range of only a few Hertz which contains a clearly audible tone (i.e. distinguishable, discrete or continuous noise such as a whine, hiss, screech or hum, etc.).

**Time weighting:** One of the averaging times (Fast, Slow, Impulse) used for the measurement of root mean square sound pressure level in sound level meters.

## APPENDIX 10-B NOISE ASSESSMENT

Activity	Receptor	Activity L <sub>Aeq</sub> (dB) at 10m Distance				Reflection dB(A)	Screening dB(A)	Activity Distance (m)				Noise Attenuated with Distance dB(A)				Activity L <sub>Aeq</sub> (dB)				Operational Noise Levels dB(A)
		Dozer	HGV	HGV	Excavator			Dozer	HGV	HGV	Excavator	Dozer	HGV	HGV	Excavator	Dozer	HGV	HGV	Excavator	
PROPOSED INCREASE IN SOIL INTAKE AND RECOVERY RATE	R1	75	77	77	71	3	-10	540	540	540	540	-35	-35	-35	-35	33	35	35	29	40
	R2	75	77	77	71	3	-10	634	634	634	634	-36	-36	-36	-36	32	34	34	28	39
	R3	75	77	77	71	3	-10	657	657	657	657	-36	-36	-36	-36	32	34	34	28	38
	R4	75	77	77	71	3	-10	752	752	752	752	-38	-38	-38	-38	30	32	32	26	37
	R5	75	77	77	71	3	-10	908	908	908	908	-39	-39	-39	-39	29	31	31	25	35
	R6	75	77	77	71	3	-10	944	944	944	944	-39	-39	-39	-39	29	31	31	25	35
	R7	75	77	77	71	3	-10	938	938	938	938	-39	-39	-39	-39	29	31	31	25	35
	R8	75	77	77	71	3	-10	972	972	972	972	-40	-40	-40	-40	28	30	30	24	35
	R9	75	77	77	71	3	-10	625	625	625	625	-36	-36	-36	-36	32	34	34	28	39
	R10	75	77	77	71	3	-10	508	508	508	508	-34	-34	-34	-34	34	36	36	30	40
	Group R11	75	77	77	71	3	-10	195	195	195	195	-26	-26	-26	-26	42	44	44	38	49
	R12	75	77	77	71	3	-10	50	50	50	50	-14	-14	-14	-14	54	56	56	50	61
Millenium Business PK	75	77	77	71	3	-10	95	95	95	95	-20	-20	-20	-20	48	50	50	44	55	