8 Noise and Vibration

8.1 Introduction

AWN Consulting Limited were commissioned to conduct an assessment into the likely noise impact associated with the proposed Ringaskiddy waste management facility.

8.2 Receiving Environment

8.2.1 Environmental Noise Survey

An environmental noise survey was conducted in order to quantify the existing noise environment. The survey was conducted generally in accordance with ISO 1996: 1982: *Acoustics – Description and Measurement of Environmental Noise*. Specific details are set out below.

8.2.2 Choice of Measurement Locations

Three measurement locations were selected. Refer to Figure 8.1 for their approximate positions. Each is discussed in turn below.

Location 1 Is located to the north east of the proposed site. The position was located at a car park at the end of the local road that links with the N28.

Location 2 Is at the front gate of a noise sensitive location to the west of the proposed site. This residence is located off the local road that connects with the nearby N28. This location provides a measure of the noise climate at the nearest residential dwelling to the west of the site.

Location 3 Is in a recently developed housing estate to the west of the proposed development. The majority of residential houses in the immediate vicinity of the proposed development are in this general direction.

8.2.3 Survey Periods

Measurements were conducted over the course of four survey periods as follows:

- 00:00hrs to 02:00hrs on 26/06/01;
- 10:45hrs to 14:10hrs on 26/06/01;
- 14:45hrs to 17:25hrs on 26/06/01;
- 22:10hrs to 23:40hrs on 26/06/01.

The Waste to Energy facility of the proposed development will operate continuously (i.e. 24 hours per day, seven days a week). The remaining sections of the development, the waste transfer station and community recycling park, will operate Monday to Friday and half day on a Saturday.

The measurement periods therefore cover typical peak and off-peak periods. These measurement periods were selected in order to provide a typical snapshot of the noise climate, with the primary purpose being to ensure that the proposed development noise criteria are commensurate with the prevailing environment.

The weather throughout both the daytime and the night-time periods was mostly dry with occasional showers and a slight south westerly breeze.

8.2.4 Instrumentation

The measurements were performed using a Brüel & Kjær Type 2260 Sound Level Meter. Before and after the survey the measurement apparatus was check calibrated using a Brüel & Kjær Type 4231 Sound Level Calibrator.

8.2.5 Procedure

Measurements were conducted at the three locations on a cyclical basis. Sample periods were 15 minutes. An average of 9 measurements were conducted at each monitoring location. The results were noted onto a Survey Record Sheet immediately following each sample, and were also saved to the instrument memory for later analysis where appropriate. Survey personnel noted all primary noise sources contributing to noise build-up.

8.2.6 Measurement Parameters

The survey results are presented in terms of the following five parameters:

L_{Aeq} is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period.

L_{Amax} is the instantaneous maximum sound level measured during the sample period.

L_{Amin} is the instantaneous minimum sound level measured during the sample period.

L_{A10} is the sound level that is exceeded for 10% of the sample period. It is typically used as a descriptor for traffic noise.

L_{A90} is the sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.

The "A" suffix denotes the fact that the sound levels have been "A-weighted" in order to account for the non-linear nature of human hearing. All sound levels in this report are expressed in terms of decibels (dB) relative to $2x10^{-5}$ Pa.

8.2.7 Results and Discussion

Location 1

The results for Location 1 are summarised in Table 8.1 below.

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Files Located : J:/jobs/796/graphics/EIS figures

Ordnance Map :

Figure Title : Noise Monitoring Locations

Figure No : 8.1

Table 8.1 Summary of Results for Location 1

Time	Period	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)				
		L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}
00:03 – 00:18	Night	57	84	33	42	36
01:06 – 01:21	Night	38	39	31	40	34
11:23 – 11:38	Day	58	85	45	59	46
12:21 – 12:36	Day	63	86	45	63	47
13:17 – 13:32	Day	60	78	33	62	37
14:46 – 15:01	Day	57	79	38	56	40
15:40 – 15:55	Day	61	80	40	63	44
16:33 – 16:48	Day	64	87	35	65	39
22:47 – 23:02	Night	55	80	31	42	33

The daytime noise environment in this location was dominated by traffic movements on local roads and a generator running at a nearby caravan. Plant and process noise from nearby industrial facilities was clearly audible at this location during survey periods. Noise levels during daytime periods were in the range 57 to 64dB L_{Aeq} and 37 to 47dB L_{A90}. These levels would be considered typical for an environment close to a busy road.

Night time noise levels in the vicinity of this monitoring location were dominated by occasional traffic movements in the early hours. During periods when traffic movements were not noted as the dominant source of noise, waves crashing on the nearby rocks and birdsong were noted to contribute to levels. Noise levels during this period were in the range 38 to 57dB L_{Aeq} and 33 to 36 L_{A90}. These noise levels are typical of what would be expected in the type of environment under consideration.

No significant sources of vibration were observed.

Location 2

The results for Location 2 are summarised in Table 8.2.

Table 8.2 Summary of Results for Location 2

Time	Period	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)				
		L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}
00:25 – 00:40	Night	52	76	37	46	38
01:26 – 01:41	Night	51	78	35	41	36
11:43 – 11:58	Day	64	84	42	64	47
12:40 – 12:55	Day	62	84	41	64	43
13:35 – 13:50	Day	61	82	40	61	42
15:03 – 15:18	Day	61	82	44	62	46
15:57 – 16:12	Day	66	87	42	69	45
16:53 – 17:08	Day	60	81	39	59	42
22:09 – 22:24	Night	54	78	38	49	41
23:05 – 23:20	Night	40	64	34	41	37

Traffic movements dominated daytime noise measurements at this location. During lulls in traffic noise, activities from the nearby port were noted as dominant noise sources. Noise levels during daytime periods were in the range 60 to 66dB L_{Aeq} and 42 to 47dB L_{A90}. These levels would be considered typical for an environment close to a busy road.

Night time noise levels at this location were influenced by plant and process noise from sites both in the vicinity of and at a distance from the proposed site. Noise levels were in the range of 40 to 54dB L_{Aeq} and 36 to 41dB L_{A90}. These noise levels are typical of what would be expected in the type of environment under consideration.

No significant sources of vibration were observed.

Location 3

The results for Location 3 are summarised in Table 8.3 below.

Table 8.3 Summary of Results for Location 3

Time	Period	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)				
		L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}
00:45 – 01:00	Night	44	62	32	42	34
12:02 – 12:17	Day	55	73	41	59	45
12:58 – 13:13	Day	57	74	43	66	47
13:54 – 14:09	Day	55	77	40	59	43
15:21 – 15:36	Day	57	78	43	59	47
16:15 – 16:30	Day	62	82	45	64	51
17:10 – 17:25	Day	56	78	42	60	46
22:27 – 22:42	Night	49	63	41	52	44
23:24 – 23:39	Night	48	75	40	47	42

Daytime noise levels at this location were dominated by local and distant traffic movements, port activities and a dog barking on the estate. Noise levels were in the range of 55 to 62dB L_{Aeq} and 43 to 51dB L_{A90}, which would be considered typical for an environment close to a busy road.

Night time noise levels were influenced by distant traffic noise. No other dominant sources of noise were noted at this location during this survey period. Noise levels were in the range of 44 to 49dB L_{Aeq} and 34 to 44dB L_{A90}. These noise levels are typical of what would be expected in the type of environment under consideration.

No significant sources of vibration were observed.

8.3 Characteristics of the Proposed Development

When considering a development of this nature, the potential noise and vibration impact on the surroundings must be considered for each of two distinct stages: the short term impact of the construction phases and the longer term impact of the operational phase.

The first construction phase will involve clearing the site and erecting new buildings.

There are four primary sources of noise in the operational context as follows:

- Process and building services plant;
- Car parking on site;
- Vehicle movements on site;
- Vehicles on public roads.

8.4 Predicted Impact of the Proposal

8.4.1 Noise Criteria

Due consideration must be given to the nature of the primary noise sources when setting criteria. In this instance, there are four primary sources of noise associated with the development once operational as outlined above. Criteria for noise from process and building services plant, car parking and vehicle movements on site will be set in terms of $L_{Aeq,T}$, the equivalent continuous sound level. However, given that vehicle movements on public roads are assessed using a different parameter (i.e. L_{A10}), it is appropriate to consider the degree by which the noise level due to the additional traffic exceeds the existing traffic noise level in the area.

Given the nature of the development under consideration, appropriate guidance may be taken from the EPA publication "Guidance Note for Noise in Relation to Scheduled Activities" as follows.

... the noise level at sensitive locations should be kept below an L_{ArT} value of 55dB(A) by daytime. At night, to avoid disturbance, the noise level at noise sensitive locations should not exceed an L_{AeqT} value of 45dB(A).

Note that L_{ArT} is defined as being the value for L_{Aeq} over time interval T, plus specified adjustments for tonal character and impulsiveness of the sound.

A shorter assessment time period (T) is adopted for night-time in order to reflect the increased potential for disturbance. Appropriate periods are 1 hour for daytime (08:00hrs to 22:00hrs) and 15 minutes for night-time (22:00hrs to 08:00hrs).

In summary, the following criteria apply at the façades of those residential properties closest to the development:

Daytime (08:00hrs to 22:00hrs)	55dB $L_{Aeq,1hr}$
Night-time (22:00hrs to 08:00hrs)	45dB $L_{Aeq,15min}$

These criteria relate to noise from process and building services plant, car parking and vehicle movements on site.

In order to assist with interpretation of traffic noise, Table 8.4 offers guidance as to the likely impact associated with any particular change in traffic noise level.

Table 8.4 Likely Impact Associated with Change in Traffic Noise Level

Change in Sound Level, dB(A)	Significance Level	EPA Glossary of Impacts	Subjective Reaction
< 3	Not Significant	Neutral, Imperceptible or Slight Impact	Barely perceptible
3 - 5	Minor	Significant Impact: Positive or Negative	Perceptible
6 - 10	Moderate		Up to a doubling of loudness
11 - 15	Major		Over a doubling of loudness
> 15	Severe	Profound Significant Impact: Negative only	-

8.4.2 Vibration Guidelines

Vibration standards come in two varieties: those dealing with human comfort and those dealing with cosmetic or structural damage to buildings. In both instances, it is appropriate to consider the magnitude of vibration in terms of Peak Particle Velocity (PPV).

It is acknowledged that humans are particularly sensitive to vibration stimuli and that any perception of vibration may lead to concern. In the case of traffic, vibration is perceptible at around 0.5mm/s and may become disturbing or annoying at higher magnitudes. However, higher levels of vibration are typically tolerated for single events or events of short duration. For example, blasting and rock breaking, two of the primary sources of vibration during construction, are typically tolerated at vibration levels up to 12mm/s and 2.5mm/s respectively. This guidance is applicable to the daytime only; it is unreasonable to expect people to be tolerant of such activities during the night-time.

Guidance relevant to acceptable vibration at the foundation of buildings is contained within:

- Building Research Establishment (BRE) Digest 353 (July 1990): *Damage to structures from ground-borne vibration*, and;
- British Standard BS 7385 (1993): *Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from groundborne vibration.*

The BRE digest refers to the German Standard DIN 4150, which provides limits below which there is very unlikely to be any cosmetic damage to buildings. For structures that are of great intrinsic value and are particularly sensitivity to vibration, transient vibration should not exceed 3mm/s at low frequencies. Allowable levels increase to 8mm/s at 50Hz and 10mm/s at 100Hz and above.

BS 7385 states that there should typically be no cosmetic damage if transient vibration does not exceed 15mm/s at low frequencies rising to 20mm/s at 15Hz and 50mm/s at 40Hz and above. These guidelines relate to relatively modern buildings and should be reduced to 50% or less for more critical buildings.

8.4.3 Forecasting Methods

Prediction calculations for process buildings have been performed using *Predictor* in accordance with ISO 9613: *Acoustics – Attenuation of sound outdoors, Part 2: General method of calculation*, 1996.

Prediction calculations for building services plant, car parking and vehicle movements on site have been conducted generally in accordance with ISO 9613: *Acoustics – Attenuation of sound outdoors, Part 2: General method of calculation*, 1996.

Prediction calculations for vehicles on public roads have been conducted in accordance with *Calculation of Road Traffic Noise*, Department of Transport Welsh Office, HMSO, 1988.

8.4.4 Construction Phase

A variety of items of plant will be in use, such as excavators, lifting equipment, dumper trucks, compressors and generators. There will be vehicular movements to and from the site that will make use of existing roads.

Due to the nature of the activities undertaken on a large construction site, there is potential for generation of significant levels of noise.

The potential for vibration at neighbouring buildings and residential dwellings is typically limited to excavation works, piling operations and lorry movements on uneven road surfaces. The most significant of these is the vibration associated with excavation and piling operations; the method of which will be selected and controlled to ensure that there is no likelihood of cosmetic or structural damage to existing neighbouring buildings and dwellings. All site roads will be kept even so as to mitigate the potential for vibration from lorries.

Due to the fact that the construction programme has been established in outline form only, it is not possible to calculate the actual magnitude of noise emissions to the local environment. However, the impact due to construction activities will be transient in nature.

8.4.5 Operational Phase

There are four primary sources of noise in the operational context.

- process and building services plant
- car parking on site
- vehicle movements on site
- vehicles on public roads.

Each of these primary noise sources is addressed in turn below.

Process and Building Services Plant

In relation to process and building services plant noise, only the waste to energy facility was modelled. It was considered that noise emissions arising from the other areas (the waste transfer station and community recycling park) were not significant.

Preparation of the Noise Model

Proprietary noise calculation software was used for the purposes of this impact assessment. The selected software, Brüel & Kjær Type 7810 *Predictor*, calculates noise levels in accordance with ISO9613: *Acoustics – Attenuation of sound outdoors, Part 2: General method of calculation*, 1996.

Brüel & Kjær Type 7810 Predictor

Brüel & Kjær Type 7810 *Predictor* is a proprietary noise calculation package for computing noise levels in the vicinity of noise sources. *Predictor* predicts noise levels in different ways depending on the selected prediction standard. In general, however, the resultant noise level is calculated taking into account a range of factors affecting the propagation of sound, including:

- the magnitude of the noise source in terms of sound power
- the distance between the source and receiver
- the presence of obstacles such as screens or barriers in the propagation path
- the presence of reflecting surfaces
- the hardness of the ground between the source and receiver
- attenuation due to atmospheric absorption
- meteorological effects such as wind gradient, temperature gradient and humidity (these have significant impact at distances greater than approximately 400m).

Prediction Calculations

Prediction calculations have been performed using *Predictor* in accordance with ISO9613, assuming 10°C and 60% humidity. The degree of accuracy associated with this prediction method is shown in the table below.

Table 8.5 Estimated Accuracy for Broadband Noise of L_{AT}(DW)

Height, h	Distance, d	
	0 < d < 100m	100m < d < 1,000m
0<h<5m	±3dB	±3dB
5m<h<30m	±1dB	±3dB

Where: h is the mean height of the source and receiver;
d is the mean distance between the source and receiver.

Note: These estimates have been made from situations where there are no effects due to reflections or attenuation due to screening.

Input Data

Sound power data for each item of plant considered in the noise model is given in Table 8.6. This data is typical of noise levels measured for similar items of plant at an Indaver facility in, Flanders, Belgium. These items are representative of the equipment which will be used in the Ringaskiddy facility.

Table 8.6 L_w Levels Utilised in Noise Model

Description.	Octave Band Centre Frequency (Hz)									dB(A)
	31	63	125	250	500	1k	2k	4k	8k	
Fan Turbine Building	71.1	72.1	77.5	87.6	86.7	81.6	75.7	71.6	64.4	91.2
Turbine Cooling	58.3	64.1	68.6	71.9	82.8	79.5	77	72.3	63.5	85.7
Air Condensers	69.5	82.4	87.3	88.2	88.3	93.3	90.7	83.3	79.9	97.5
Air Condensers	69.5	82.4	87.3	88.2	88.3	93.3	90.7	83.3	79.9	97.5
Air Condensers	69.5	82.4	87.3	88.2	88.3	93.3	90.7	83.3	79.9	97.5
Air Condensers	69.5	82.4	87.3	88.2	88.3	93.3	90.7	83.3	79.9	97.5
Vent	72.8	72	74.9	72.6	71.6	69.4	68.3	54.1	47	80.6
Chimney Go12	-	82	89	92.3	78.6	74.8	69.2	69.8	70	94.4
Fan Turbine	71.1	72.1	77.5	87.6	86.7	81.6	75.7	71.6	64.4	91.2
Fan Turbine	71.1	72.1	77.5	87.6	86.7	81.6	75.7	71.6	64.4	91.2
Grid Compressor	-	74.2	73.2	77.5	81.8	76	70.4	65	64.2	84.9
Grid Compressor	-	74.2	73.2	77.5	81.8	76	70.4	65	64.2	84.9
Grid Compressor	-	74.2	73.2	77.5	81.8	76	70.4	65	64.2	84.9
Chimney Go12	-	82	89	92.3	78.6	74.8	69.2	69.8	70	94.4

Building layouts and heights were taken from drawings supplied by Arup Consulting Engineers.

Ground topography, geographical features and location data for noise-sensitive locations were taken from survey drawings supplied by Arup Consulting Engineers and Ordnance Survey maps.

Output Data

Predictor calculates noise levels for a set of receiver locations specified by the user. The results include an overall level in dB(A) and a frequency spectrum for each of the noise sources contributing to noise build-up at the receiver point. The items in the list can be ranked in order of their contribution, and thus the noisiest items can be readily identified.

For the purposes of this assessment, we have predicted noise levels at the façade of the nearest noise-sensitive locations and at a variety of other locations along proposed boundaries.

8.4.6 Results of the Noise Model

Noise levels have been predicted at a total of 10 locations as summarised in the following table. Locations of receiver positions are shown in Figure 8.2.

Table 8.7 Details of Receiver Locations

Receiver Location Reference	Description of Receiver Locations
R01	Is located to the north east of the proposed site. The position was located at a small car park overlooking the West Channel at the end of the third class road that links with the N28. This receiver location is equivalent to survey location 1.
R02	Located at the Martello Tower to the west of the proposed site.
R03	Located at in a field at the boundary of the proposed development.
R04	At the façade of the nearest private residence, Ringaskiddy House, some 100m west of the boundary of the public recycling centre. This location is in close proximity to the noise survey location 2.
R05	At the façade of Rock Cottage to the west of the proposed waste treatment site.
R06	At the façade of a private residence in Ringaskiddy Village. The N28 joins the existing third class route that currently serves the proposed site in the vicinity of this proposed location.
R07	Is located in a recently developed housing estate to the west of the proposed site. Survey location 3 is equivalent to this noise model receiver.
R08	Is located in the vicinity of an industrial unit approximately 100m north of the proposed development site.
R09	Is located on the south east boundary of the proposed site.
R10	At the façade of a private residence located some 500m to the south east of the proposed development.

Table 8.8 details the predicted noise levels at the receiver locations outlined in Table 8.7.

Table 8.8 Model Predicted Noise Levels

Identification	Octave Band Centre Frequency (Hz)									dB(A)
	31	63	125	250	500	1k	2k	4k	8k	
R01	25.9	34.6	40.1	38.2	28.3	29.3	26.4	18.7	8.2	44
R02	9.5	21	26.4	29.6	31.1	34	28.7	7.1	–	38
R03	13.1	22	24.7	23.8	15.1	15.3	7.5	–	–	29
R04	12.6	20.6	22.6	22.4	15	13.9	5.4	–	–	27
R05	9.6	21.6	23.8	23.7	15.8	15.9	6.1	–	–	29
R06	5.9	19.9	22	23.7	17.3	17.4	8.4	–	–	28
R07	1.6	15.3	16.5	15	12.6	14.2	3.6	–	–	22
R08	12	25.6	30.3	28.5	20	20.8	13.8	1.4	–	34
R09	29.9	36.1	41.6	46	46.5	44	38.6	32.5	20.7	51
R10	7.5	20.9	25.4	26.7	24.5	21.2	11.4	–	–	31

Predicted noise levels at the receiver locations are in the range of 22 to 51dB L_{Aeq}.

Predicted levels at all locations are within the adopted daytime criterion of 55dB $L_{Aeq,1hr}$.

Predicted levels at all locations, with the exception of location R09, are within the adopted night time criterion of 45dB $L_{Aeq,15min}$.

Location R09 exhibits a predicted noise level due to process and building services plant of the order of 51dB L_{Aeq}. This location is along the boundary of the proposed site and therefore the night time criterion of 45dB $L_{Aeq,\ 15min}$, which is applicable to noise sensitive locations, is not applicable. There are no noise sensitive receptors located to the east of this location.

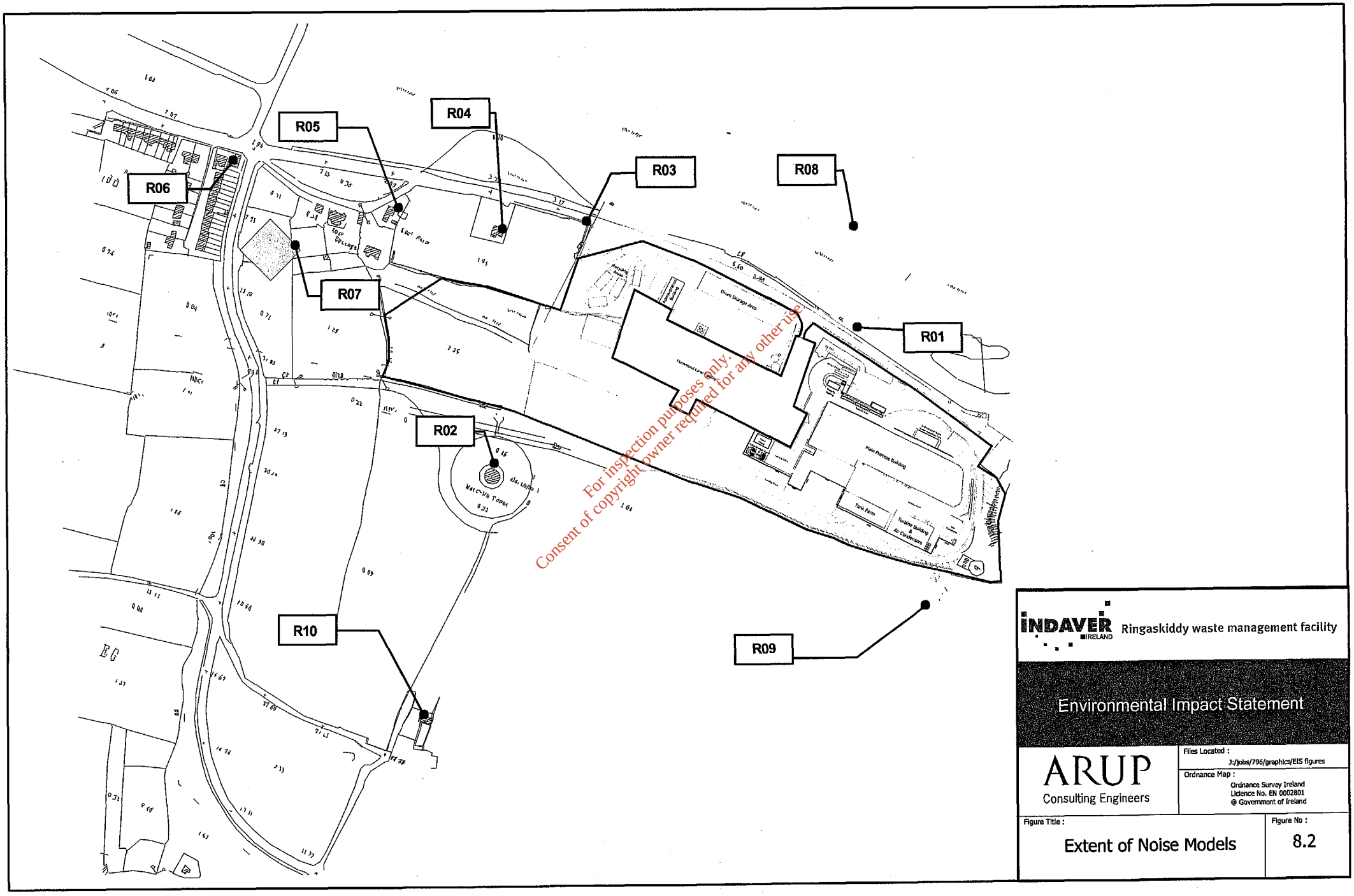

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Figure Title :
Extent of Noise Models

Figure No :
8.2

The nearest noise sensitive location to the south west of this location is R10, the predicted noise level at this location is 31dB L_{Aeq}, which is in compliance with the adopted night time criterion of 45dB $L_{Aeq, 15min}$.

Car Parking on Site

Car parking facilities will be provided by means of surface car parking. Car parking areas will be located at the administration block at the transfer station and at the waste to energy facility.

Noise level measurements have been conducted in the vicinity of car parks in support of previous planning applications. The worst case noise level associated with surface car parking activities during peak periods of operation has been found, by measurement, to be typically of the order of 48dB$L_{Aeq,1hr}$ at a distance of 10m beyond the boundary of the car park.

The closest noise-sensitive location to one of the surface car parks is Ringaskiddy House which is some 130m west of the community recycling park car parking area. Taking into account distance attenuation the predicted noise level at this location is 26dB $L_{Aeq,1hr}$. This is within the daytime of 55dB $L_{Aeq,1hr}$. This portion of the facility will not be operational during night time hours. However the predicted level of 26dB(A) is also within the night time criterion of 45dB $L_{Aeq,15min}$.

Vehicle Movements on Site

Considering a worse case scenario (both phases of the waste management facility operational), it is envisaged that there will be something of the order of 148 HGV movements to and from the site during the course of a typical working day.

The noise level associated with an event of short duration, such as a vehicle drive-by, may be expressed in terms of its Sound Exposure Level (SEL), defined as being the "A-weighted" equivalent continuous sound level which, when maintained for one second, contains the same quantity of sound energy as the actual time varying level of one event. The SEL can be used to calculate the contribution of an event or series of events to the overall noise level in a given period. The appropriate formula is given below.

$$L_{Aeq,T} = SEL + 10\log_{10}(N) - 10\log_{10}(T) + 20\log_{10}(r_1/r_2) \text{ dB}$$

where: $L_{Aeq,T}$ is the equivalent continuous sound level over the time period T (s);
SEL is the "A-weighted" Sound Exposure Level of the event under consideration (dB);
N is the number of events over the course of time period **T**;
r_1 is the distance at which SEL is expressed;
r_2 is the distance to the assessment location.

The mean value of Sound Exposure Level for a heavy truck movement, at low to moderate speeds, is of the order of 78dB(A) at a distance of 5m from the edge of the road. These figures are based on a series of measurements conducted under controlled conditions.

A "worst-case" projected figure for HGVs is 18 movements in any one hour period was assumed.

The time period of interest is one hour, equivalent to 3,600 seconds.

In order to derive the projected noise level post-development, it is necessary to predict the impact at the nearest noise sensitive locations. In this instance the nearest noise sensitive location,

which is beyond the western boundary, is some 200m from the entrance to the waste transfer station and the community-recycling park.

The "worst-case" noise level due to additional vehicle movements along the site access road may therefore be calculated as follows:

$$L_{Aeq,1hr} = 78 + 10\log_{10}(18) - 10\log_{10}(3600) + 20\log_{10}(5/200) \quad dB$$
$$= 23dB$$

The resultant noise level at the assessment location is 23dB $L_{Aeq,1hr}$. This is within the daytime criterion of 55dB $L_{Aeq,1hr}$.

Vehicles on Public Roads

A detailed assessment of the impact of the development on roads and traffic has been prepared by Arup Consulting Engineers. Information from this assessment has been used to determine the change in noise levels in the vicinity of a number of roads and junctions in the area surrounding the development. For the purposes of assessing potential noise impact, it is appropriate to consider traffic movements with and without the development. Table 8.9 presents the change in noise level brought about by the development when compared to the predicted noise level in the absence of development.

Table 8.9 Assessment of Change in Traffic Noise Level Due to Vehicles on Public Roads

Street/Junction Reference	Base (2005)	Base + Development (2005)	Change in Noise Level (dB L_{A10}) resulting from development traffic
N28 (North)	31,650[1]	31980	0.0
R611 (South)	24,070	24200	0.0
N28 (East of Shannon Park)	17,350	17800	0.1
R610 (North)	6,670	6740	0.0
N28 (East of Raffeen Bridge)	13,890	14410	0.2
Raffeen Village	1,320	1360	0.1
Shanbally Village	3,090	3090	0.0
N28 (East of Shanbally)	12,690	13240	0.2
R613 (West of Coolmore)	5,160	5310	0.1
R613 (East of Coolmore)	6,010	6160	0.1
N28 (Ringaskiddy Village)	7,950	8650	0.4
N28 (East of Ferry Port)	4,430	5050	0.6

1 Traffic figures used for assessment purposes were "Annual Average Daily Traffic" (AADT) figures.

The Annual Average Daily Traffic AADT values were derived from the peak hour traffic flows based on the RT201 : Expansion Factors for Short Period Traffic Counts (produced by An Foras Forbartha Teoranta). The existing AADT values were calculated from the 18-hour traffic count data and the relationship between the peak hour counts (AM peak, Development peak and PM peak) and the AADT values were derived. These factors were then applied to the future projected peak hour traffic flow figures for both the 'with' and 'without' scenarios. The application of these factors to the proposed development's peak hour traffic produces higher all-day traffic flows compared against the profile detailed in the traffic section. The reason for this is that the development generates less off-peak traffic than the traffic profiles used in RT 201 to calculate

the AADT values. Therefore the projected AADT traffic flows used in this assessment are more conservative than the daily traffic profiles recorded in the traffic section.
The maximum predicted increase in traffic noise in the vicinity of the proposed site in the opening year 2005 is less than 1dB at all locations assessed. Reference to Table 8.4 confirms that such an increase is imperceptible and the associated noise impact is negligible.

As a vehicle travels along a road, vibration can be generated in the road and subsequently propagate towards nearby buildings. Such vibration is generated by the interaction of a vehicle's wheels and the road surface and by direct transmission through the air of energy waves. Some of these waves arise as a function of the size, shape and speed of the vehicle, and others from pressure fluctuations due to engine, exhaust and other noises generated by the vehicle.

It has been found that ground vibrations produced by road traffic are unlikely to cause perceptible structural vibration in properties located near to well-maintained and smooth road surfaces. Problems attributable to road traffic vibration can therefore be largely avoided by maintenance of the road surface.

Ground vibration from additional traffic due to the development under consideration would be expected to be orders of magnitude less than that required to cause cosmetic or structural damage to buildings or lead to disturbance of occupiers.

8.5 Mitigation Measures

In order to sufficiently ameliorate the likely noise impacts set out above, a schedule of noise control measures has been formulated for both construction and operational phases.

8.5.1 Construction Phase

With regard to construction activities, reference will be made to BS5228: *Noise control on construction and open sites*, which offers detailed guidance on the control of noise from demolition and construction activities. In particular, it is proposed that various practices be adopted during construction, including:

- limiting the hours during which noisy site activities are permitted
- establishing channels of communication between the contractor/developer, Local Authority and residents
- appointing a site representative responsible for matters relating to noise
- monitoring typical levels of noise during critical periods and at sensitive locations.

Furthermore, it is envisaged that a variety of practicable noise control measures will be employed. These may include:

- selection of plant with low inherent potential for generation of noise
- all site roads will be kept even so as to mitigate the potential for vibration from lorries
- erection of barriers as necessary around items such as generators or high duty compressors
- siting of noisy plant as far away from sensitive properties as permitted by site constraints.

8.5.2 Operational Phase

Process and Building Services Plant

Practicable noise control measures will be employed to ensure that noise from process and building services plant complies with the daytime and night-time criteria of 55dB $L_{Aeq,1hr}$ and 45dB $L_{Aeq,15min}$ respectively.

With regard to process and building services plant it is envisaged that the following will be employed:

- plant will be sited as far away from noise-sensitive locations as is practicable
- acoustic enclosures as necessary

Further to this Indaver policy states the following:

- specific noise at 1m distance from any equipment will not exceed 82dB(A). The sum of emission relevant noise power levels will not exceed 100dB(A). The sound pressure level of an item of equipment installed outside of a building will not exceed 65dB(A) measured at a distance of 5m
- at any place in the building at a distance of 1m from an item of equipment the overall sound pressure level, with all equipment in operation, may not exceed 85dB(A).

Car Parking on Site

The noise impact assessment outlined above has demonstrated that additional mitigation measures are not required.

Vehicle Movements on the Site

The noise impact assessment outlined above has demonstrated that additional mitigation measures are not required.

Vehicles on Public Roads

The noise impact assessment outlined above has demonstrated that additional mitigation measures are not required.

8.6 Predicted Impact of the Proposal

This section summarises the likely noise impact associated with the proposed development, taking into account the mitigation measures.

8.6.1 Construction Phases

During the construction phases of the project there will be some small impact on nearby residential properties due to noise emissions from site traffic and other activities. However, due to the proximity of existing industrial sites in the vicinity of the proposed development, it is considered that the various noise sources will not be excessively intrusive. Furthermore the implementation of appropriate noise control measures, will ensure that noise impact is kept to a minimum.

8.6.2 Operational Phase

A commissioning noise survey will be conducted once the development is complete.

Building Services and Process Plant

Practicable noise control measures will be employed to ensure that noise from process and building services plant complies with the daytime and night-time criteria of 55dB and 45dB $L_{Aeq,T}$ respectively. The resultant noise impact is within acceptable limits.

Car Parking on Site

The predicted level of noise emissions from car parking on site is within the daytime and night-time criteria of 55dB and 45dB $L_{Aeq,T}$ respectively. The resultant noise impact is within acceptable limits.

Vehicle Movements on the Site

The predicted level of noise emissions from vehicle movements on site is within the daytime and night-time criteria of 55dB and 45dB $L_{Aeq,T}$ respectively. The resultant noise impact is within acceptable limits.

Vehicles on Public Roads

The predicted increase in traffic noise level post-development is imperceptible and the associated impact is negligible.

8.7 References

Environmental Protection Agency (1995) "*Draft Guidelines on the Information to be Contained in Environmental Impact Statements*"

BS4142: 1997: *Rating industrial noise affecting mixed residential and industrial areas*

WHO Environmental Health Criteria 12: Noise and Planning Policy Guidance 24 "*Planning and Noise*".

ISO 9613: *Acoustics – Attenuation of Sound Outdoors, Part 2: General Method of Calculation*, 1996.