APPENDIX 4

Noise Assessment

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DK/04/2745NL01

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Michael Watson
O'Callaghan Moran & Associates
Granary House
Rutland Street
Cork

Dear Michael,

RE: NOISE ASSESSMENT OF PROPOSED DEVELOPMENT AT FASSAROE

We are pleased to forward the following noise assessment in relation to the Greenstar Limited, Fassaroe site, Bray, Co. Wicklow.

1.0 INTRODUCTION

Greenstar is proposing to change the licensed waste activities at its site at Fassaroe, Bray Co. Wicklow. AWN Consulting has been commissioned to assess the potential noise impact of a proposed bio waste treatment facility and proposed increase in volumes of waste accepted by the site in light of relevant criteria.

2.0 NOISE CRITERIA

The details of Conditions 11.5.1 and 6.6 of the Fassaroe Greenstar (WL Reg No. 53 – 2) Licence as laid down by the Environmental Protection Agency (EPA) are as follows:

- Within four months of the date of grant of this licence, the licensee shall submit to the Agency an updated appropriately scaled drawing(s) showing all the monitoring locations that are stipulated in this licence, including any noise sensitive locations to be monitored.
- There shall be no clearly audible tonal component or impulsive component in the noise emissions from the activity at the noise sensitive locations.

Schedule C.1 details the following emission limits measured at any noise sensitive location:

- Daytime 55dB $L_{Aeq\ (30\ minutes)}$
- Night time 45dB $L_{Aeq\ (30\ minutes)}$

These noise limits will be adopted as part of this assessment.

2.0 PREPARATION OF THE NOISE MODEL

In order to assess the potential impact of the proposed development a site noise model has been developed. The following sections detail this process.

2.1 Noise Propagation Calculation

Brüel & Kjær *Predictor* Type 7810 is a proprietary noise calculation package for computing noise levels in the vicinity of industrial sites. Calculations are based on ISO9613-2:1996 *Acoustics – Attenuation of sound outdoors – Part 2: General method of calculation.* This method has the scope to take into account a range of factors affecting the attenuation 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, humidity (these have significant impact at distances greater than approximately 400m).

Calculations have been performed in octave bands from 63Hz to 8kHz as well as in overall dB(A) terms.

2.2 Brief Description of ISO9613-2: 1996

ISO9613-2:1996 calculates the noise level based on each of the factors discussed previously in Section 2.1. However, the effect of meteorological conditions is significantly simplified by calculating the average downwind sound pressure level, $L_{AT}(DW)$, for the following conditions:

- wind direction at an angle of ±45° to the direction connecting the centre of the dominant sound source and the centre of the specified receiver region with the wind blowing from source to receiver, and;

- wind speed between approximately 1ms^{-1} and 5ms^{-1}, measured at a height of 3m to 11m above the ground.

The equations and calculations also hold for average propagation under a well developed moderate ground based temperature inversion, such as commonly occurs on clear calm nights.

The basic formula for calculating $L_{AT}(DW)$ from any point source at any receiver location is given by:

$$L_{fT}(DW) = L_W + D_c - A \qquad \textit{Eqn. 2.2.1}$$

Where:

$L_{fT}(DW)$	is an octave band centre frequency component of $L_{AT}(DW)$ in dB relative to 20×10^{-5} Pa;
L_W	is the octave band sound power of the point source;
D_c	is the directivity correction for the point source;
A	is the octave band attenuation that occurs during propagation, namely attenuation due to geometric divergence, atmospheric absorption, ground effect, barriers and miscellaneous other effects.

The agreement between calculated and measured values of $L_{AT}(DW)$ support the estimated accuracy shown in Table 1 below:

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

* h is the mean height of the source and receiver.
† d is the mean distance between the source and receiver.

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

Table 1 Estimated accuracy for broadband noise of $L_{AT}(DW)$

2.3 Initial Configuration of the Noise Model

The input to the noise model was an overall site plan, a set of buildings, ground contours and noise sources.

The buildings in the model encompasses those on the Fassaroe site and nearby premises. These were input to the model using drawings supplied by O'Callaghan Moran & Associates as a background and superimposing the buildings.

Each noise source was input as sound power in octave bands. *Predictor* accepts sound power levels in octave bands from 63Hz to 4kHz.

Each source also has its own position, height and directivity.

2.4 Output of the Noise Model

Predicted noise levels are calculated for a grid of receiver points, and coloured iso-contours of the noise levels can be displayed, to give an overall picture of the spatial distribution of noise levels within the grid.

3.0 NOISE IMPACT ASSESSMENT

In order to assess the impact of the proposed bio waste treatment facility the following information was used in order to develop the noise model.

3.1 Building and Site Information

Building extents and elevations based on drawings supplied by O'Callaghan Moran and Associates.

3.2 Noise Sources

Table 2 details noise sources related to the proposed development that have been considered in the noise model.

Identification	Octave Band Centre Frequency (Hz)								dB(A)
	63	125	250	500	1k	2k	4k	8k	
ASP Blower	82	92	98	102	104	100	92	82	108
Front Loading Shovel	84	98	101	104	103	101	94	86	109
Screen	46	51	57	71	76	75	71	64	80
Blower (x 10 Motors)	72	82	88	92	94	90	82	72	98

Table 2 L_{wA} Levels utilised in the assessment

Sound data that was inputted into the expanded model was based upon the following documentation.

- Information supplied by O'Callaghan Moran & Associates.
- Bies and Hansen, Engineering Noise Control.

The minimum insertion loss assumed for the atmospheric side attenuator associated with blower plant items is detailed in Table 3.

Minimum Dynamic Insertion Loss	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
	4	7	14	26	30	37	31	20

Table 3 Minimum Attenuator Dynamic Insertion Loss

It is assumed that the front loading shovel and screen will not be in operation during night time periods.

3.3 Predicted Noise Levels

Table 4 details the noise level contribution of the proposed plant items at the critical noise sensitive locations in the vicinity of the site. Figure 1 details the approximate locations of the noise sensitive locations.

Assessment Location Ref.	Daytime Criterion dB(A)	Predicted Daytime Noise Level dB(A)	Night time Criterion dB(A)	Predicted Night time Noise Level dB(A)
NSL A	55	39	45	24
NSL B		41		23
NSL C		38		21

Table 4 Predicted Noise Levels at Sensitive Locations

Location NSL A

Predicted daytime noise levels are of the order of 39dB L_{Aeq}[1] at this location. This is some 6dB within the relevant daytime criterion of 55dB(A).

Predicted night time noise levels are of the order of 24dB L_{Aeq} at this location. This is some 11dB within the relevant night time criterion of 45dB(A).

Location NSL C

Predicted daytime noise levels are of the order of 41dB L_{Aeq} at this location. This is some 4dB within the relevant daytime criterion of 55dB(A).

Predicted night time noise levels are of the order of 23dB L_{Aeq} at this location. This is some 12dB within the relevant night time criterion of 45dB(A).

Location NSL C

Predicted daytime noise levels are of the order of 38dB L_{Aeq} at this location. This is some 7dB within the relevant daytime criterion of 55dB(A).

Predicted night time noise levels are of the order of 21dB L_{Aeq} at this location. This is some 24dB within the relevant night time criterion of 45dB(A).

3.4 Traffic Noise

In order to assist with interpretation of vehicle related noise, Table 5 offers guidance as to the likely impact associated with any particular change in traffic noise level.

Change in Traffic Noise Level (dB L_{A10})	Subjective Reaction	Impact
< 3	Imperceptible	Negligible
3 – 5	Perceptible	Slight/Marginal
6 – 10	Up to a doubling of loudness	Significant
11 – 15	Over a doubling of loudness	Substantial
> 15	-	Severe

Table 5 Likely impact associated with change in traffic noise level

[1] 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.

A report on traffic to and from the site has been prepared as part of this application. Information from this report has been used to determine the predicted change in site traffic noise levels.

It is stated that 77 vehicles enter and leave the site at present on a daily basis. This is projected to increase to 119 vehicles per day if development takes place. The associated increase in noise levels associated with this change in traffic is of the order of 2dB(A).

In summary, the predicted increase in the existing noise levels due to additional vehicular traffic associated with the proposed development is no greater than 3dB. Reference to Table 5 confirms that such an increase is borderline perceptible and the associated noise impact is negligible.

As the predicted site traffic increase is imperceptible with an associated negligible noise impact, mitigation measures are not proposed in relation to this issue.

If you have any questions in relation to this issue please do not hesitate to contact us.

Yours sincerely,

DAMIAN KELLY
Acoustic Consultant

TERRY DONNELLY
Senior Acoustic Consultant

FIGURE 1
NOISE SENSITIVE LOCATIONS