Acorn Composting Site, Littleton

Noise Assessment

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1. INTRODUCTION

URS has carried out noise modelling as part of an industrial noise assessment for the proposed Acorn Recycling Ltd (Acorn) composting facility at Littleton, Co. Tipperary, Ireland.

Acorn previously commissioned noise monitoring at boundary and noise sensitive locations (NSL's) as part of the planning application, Environmental Impact Statement for the proposed composting facility and EPA Waste Licence Application. The Planning Authority then requested Acorn:

"Please extend the noise analysis report to include predictions of the likely noise levels taking into account the proposed development rather than as submitted only assessing existing noise levels"

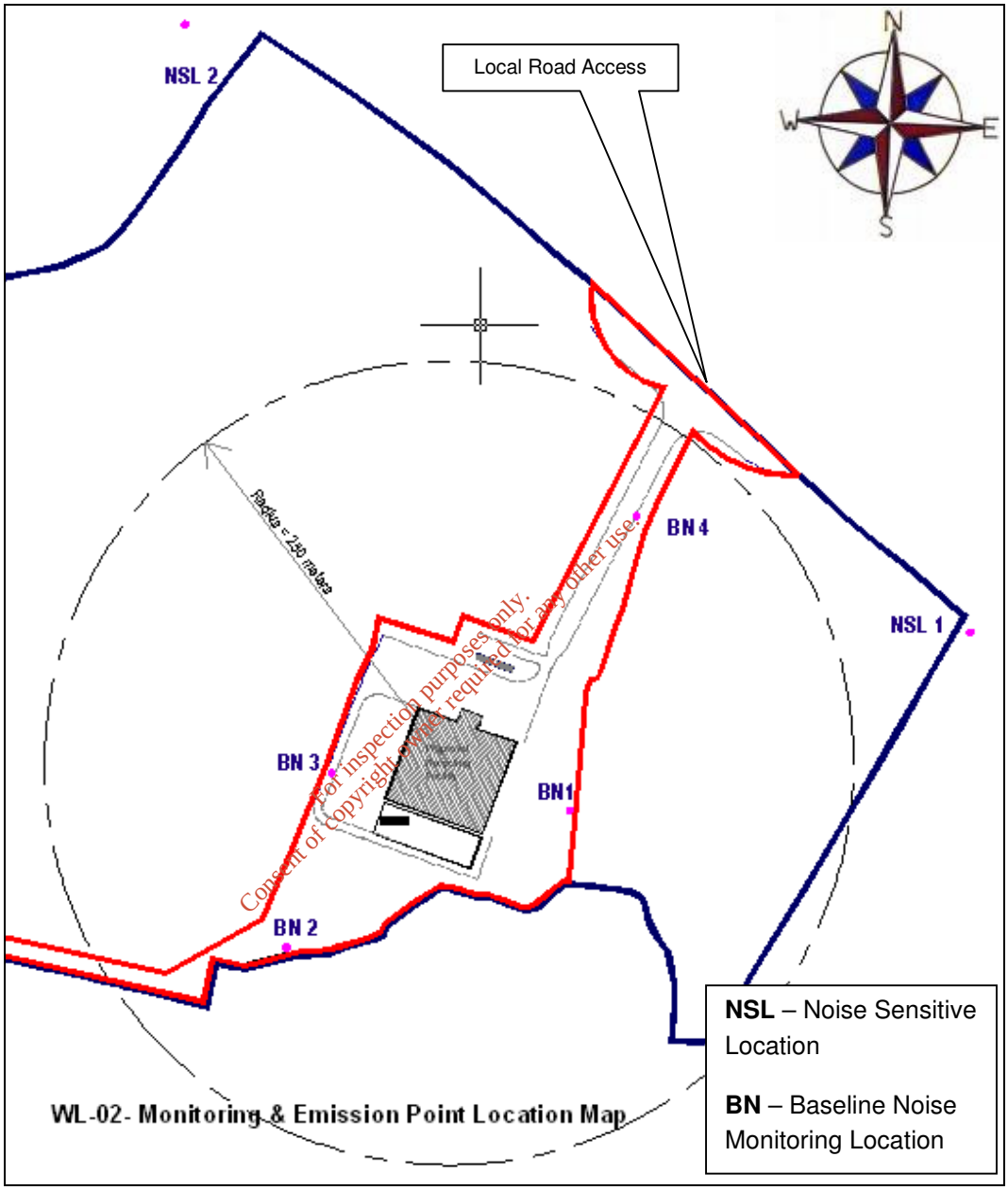
This modelling exercise is in response to the above request.

The proposed facility comprises two adjoining buildings, which house the sorting composting bays and a bio filter. The principal noise sources are likely to be extraction and aeration fans, and vehicles.

URS has modelled the noise from each of the sources, and constructed a noise prediction model using CadnaA® noise mapping software. Noise levels have been predicted at the boundary and at the two nearest residential noise sensitive receptors.

The site and the boundary/receptor locations are represented in Figure 1.

Figure 1 Proposed Development and Noise Assessment Locations



2. CRITERIA

A baseline environmental noise survey conducted by TMS Environment Ltd is documented in a report dated 11 August 2005. Section 5.1 of the TMS report states the following:

> *The World Health Organisation (WHO) recommends that outdoor daytime noise levels should be kept below LAeq,60min = 55 dBA for daytime measurements and LAeq,15min = 45 dBA at night-time in order to prevent any significant community annoyance. These noise limits are commonly adopted in Ireland by both the Environmental Protection Agency (EPA) and Local Authorities, in order to minimise the environmental noise impacts that existing or proposed industrial activities or developments sites may have on the receiving environment.*

Therefore the appropriate noise limits at the nearest noise sensitive receptors for this development are as follows;

- Daytime Free Field Average 55 dB(A); and
- Night Time Free Field Average 45 dB(A)

These noise limits are to be applied to continuously operating equipment within the proposed development.

3. MODELLING METHODOLOGY

Using the noise data and building data provided, URS determined the effective sound power levels and modelling scenarios for each of the sources. The methodology applied to each source is presented in Table 1.

Table 1 Summary of Noise Sources Modelling Scenarios

Source	Operation	Noise Data	Modelling
Delivery Vehicles	Approximately 40 vehicle movements along the local access road up to the site. NOTE: Daytime Only[1]	BS5228 provides typical sound power level of 98 dB(A)	The 40 vehicle events were modelled as a line source along the main drive, with a calculated daily average sound power per metre.
Vehicles Inside The Sorting Building	The following vehicles were included in the model. 2 x Volvo Dozers	Volvo Brochure gives a sound power level of 105 dB(A) for each dozer.	URS used typical diesel engine sound spectrum for model. Vehicle sound power levels

Source	Operation	Noise Data	Modelling
	1 x Delivery Vehicle (idling). These were modelled running continuously NOTE: Daytime Only	UK DEFRA[2] information gives a typical sound pressure level of 71 dB(A) at 10 metres for idling HGV	were used to calculate reverberant noise level in building.
Extraction Fans	3 x 30 kW fans, assumed running continuously at 100% Duty	Outlet and Inlet combined sound pressure of 89 dB(A) at 10m.	The Client has advised that the inlet manifold of the extraction fans provide substantial noise reduction. A –20dB correction has been assumed to account for this. The calculated sound power of fans within compost building has been used to calculate the reverberant noise level. URS applied typical fan spectrum.
			Derived outlet sound power of fans modelled as point sources on top of bio filter, with 20 dB(A) attenuation allowed for passage through bio filter material.
		Fan Case and Ductwork sound pressure level of 79 dB(A) at 10m.	Derived sound power modelled as point sources between compost building and bio filter.
Aeration Fans	12 x 5.5. kW Fans assumed running continuously at 100% duty	Open Running inlet sound pressure level of 88 db(A) at 10m Optional silenced version 68 dB(A) at 10m	Derived sound power modelled as point sources between compost building and bio filter. Silenced and un-silenced versions modelled
		Outlet assumed to be also 88 dB(A) at 10m.	Derived sound power assumed to be attenuated by 20 dB(A) due to passage of sound through compost.

Note 1: Daytime refers to the hours 7am to 7pm.
Note 2: DEFRA denotes Department for Environment, Food and Rural Affairs, UK

The main building and site parameters used in the modelling of internal reverberant sound levels, and the attenuation of sound through walls and roofs are indicated in Table 2. Acoustic absorption for soft ground and foliage between the facility and receiver locations has been taken into account.

Table 2 Summary of Main Building Parameters

Building Element	Detail	Data
Walls	First 2.4 m as 200mm thick concrete	Insulation Rw 45 dB
	Upper section of walls 'Kingspan' Cladding	Insulation Rw 25 dB
Roof	Steel Roof Assumed.	Insulation Rw 25 dB
Internal Sound Absorptions	Spray-on thermal insulation is not porous, so no sound absorption allowance. Compost sound absorption unknown.	Model used bare sound absorption values of concrete and steel
Building Seal	The building has been assumed to be essentially airtight, due to potential odour issues.	N/A
Site.	For modelling purposes, absorptive ground and screening due to foliage has been assumed.	N/A

4. SUMMARY OF RESULTS

The model was run for daytime and night time conditions (night time is without delivery vehicles and sorting shed contributions). The results at the various locations are presented in Table 3.

Table 3 Predicted Noise Levels

Period	Aeration Silencers	Noise levels dB(A)						Principal Source @ NSL1
		NSL1	NSL2	BN1	BN2	BN3	BN4	
Day	No	34	34	57	58	72	51	Composting Shed
	Yes	28	29	48	46	57	50	Composting Shed
Night	No	33	33	57	57	72	44	Composting Shed
	Yes	23	24	46	46	56	32	Composting Shed

Figure 2 illustrates a graphical representation of the noise model output (or noise map) which demonstrates the propagation of noise from the proposed development (daytime, with aeration fan silencers).

Figure 2 Noise Map – Daytime, silencers on aeration fans

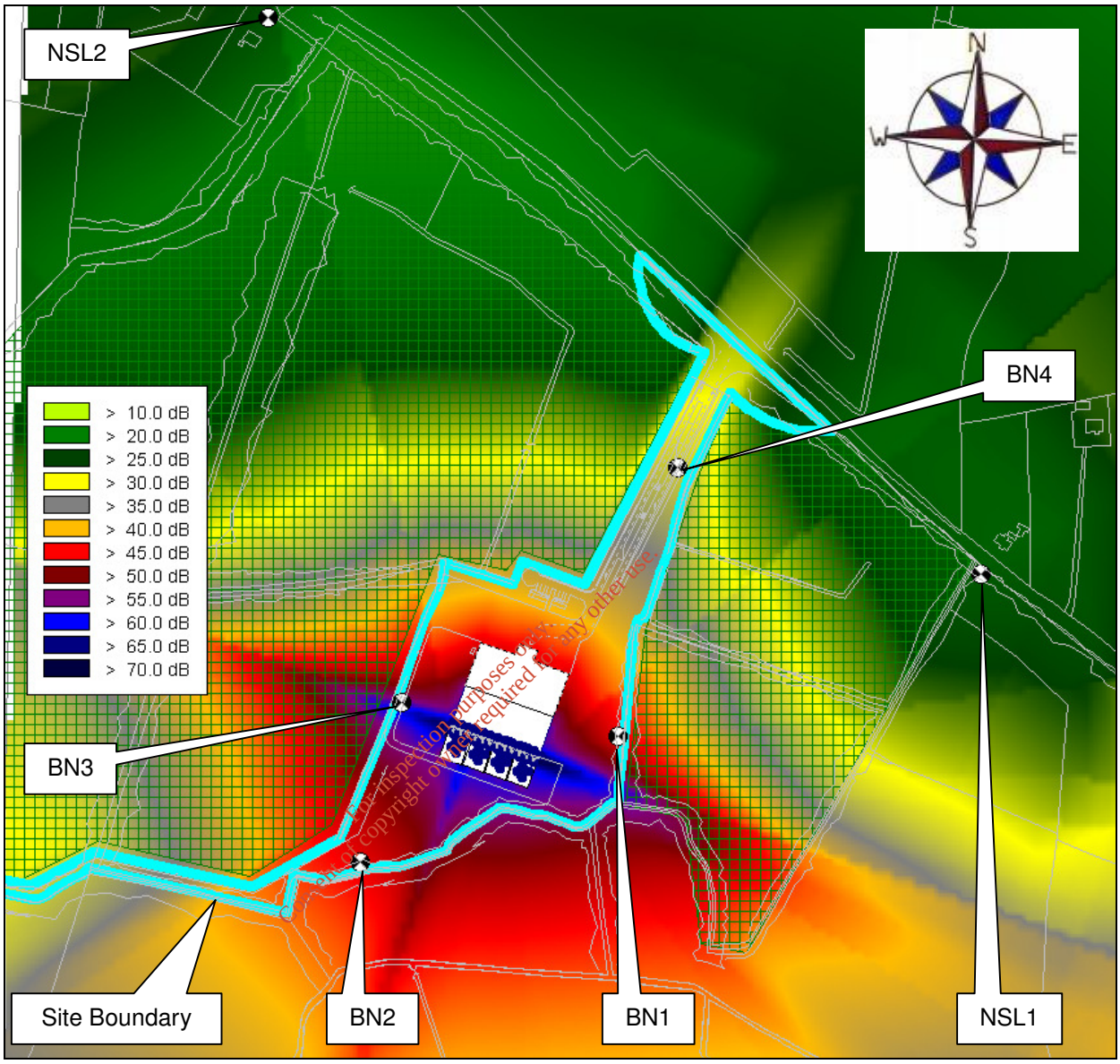
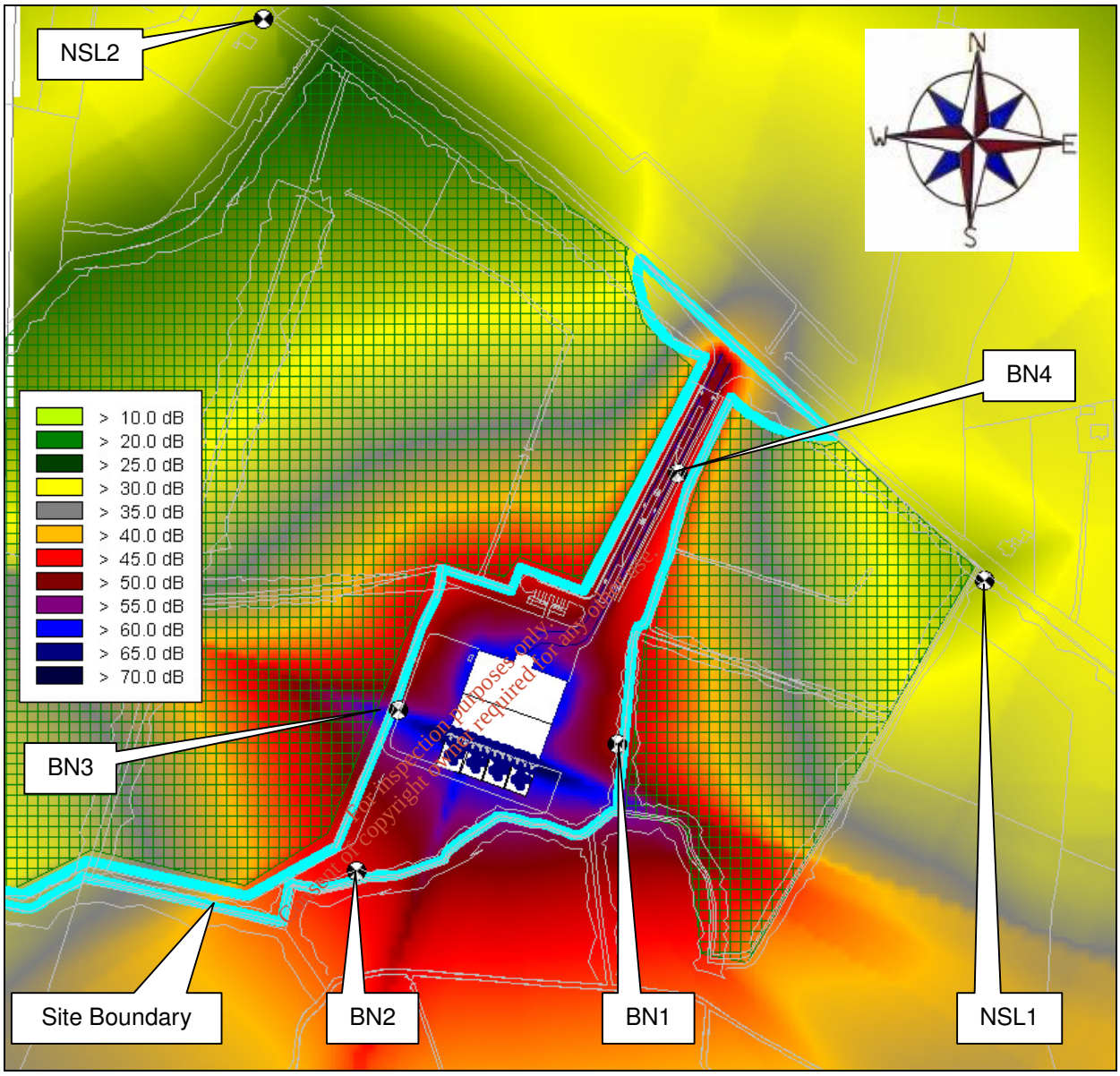


Figure 3 presents the noise map of the predicted daytime noise levels for the proposed development without aeration fan silencers.

Figure 3 Noise Map – Daytime, without silencers on aeration fans



5. DISCUSSION

5.1. Environmental Noise Levels

The model in general represents worst case conditions, with equipment running at 66% duty, minimal sound absorption within the building, soft ground and screening from foliage.

Willow Plantations have been planted around the Proposed Development. It is expected that the Willow Plantations will provide significant acoustic and visual shielding of the composting facility and be approximately 6m in height when construction commences in August 2008.

Table 3 shows that the predicted noise levels do not exceed the noise limits specified in Section 2 during either the day or night time period. Therefore the site is expected to achieve compliance with the WHO noise limits with and without aeration fan silencers.

The model indicates that the principal noise source is the composting shed. The extraction fans generate a high noise level within the shed; as the model currently assumes minimal sound absorption. In reality, however,, sound absorption due to the compost itself is likely to reduce internal noise levels within the shed, and therefore building-radiated noise levels and resulting noise levels at receptors should be less than predicted.

5.2. Comparison with Measured Ambient Noise Levels

Table 4 summarises the ambient noise measures documented in TMS Environment's report. The report states that road traffic noise is the dominant noise source at the Noise Sensitive Locations.

Table 4 Summary of Measured Ambient Noise Levels

	Daytime Noise Levels (dBA)			Night Time Noise Levels (dBA)		
Location	**LA10**	**LAeq**	**LA90**	**LA10**	**LAeq**	**LA90**
NSL1	70	70	39	37	34	28
NSL2	64	66	40	41	38	28
BN1	40	38	33	42	39	30
BN2	39	38	31	39	36	30
BN3	39	37	32	42	38	30
BN4	45	41	31	45	43	32

The predicted noise levels at NSL1 and NSL2 for the day and night time have been extracted from Table 3 and compared with the measured background (LA90) noise levels detailed in Table 4. This comparison is presented in Table 5.

Table 5 Summary of Predicted Noise Levels at Noise Sensitive Locations

Location	**Daytime Noise Levels (dBA)**			**Night Time Noise Levels (dBA)**		
	Predicted		**Measured LA90**	**Predicted**		**Measured LA90**
	Not Silenced	**Silenced**		**Not Silenced**	**Silenced**	
NSL1	34	28	39	33	23	28
NSL2	34	29	40	33	24	28

For the day time period, Table 5 shows that the predicted noise levels at both NSLs are less than the measured day time background, LA90, noise levels. During the night time, the 'not silenced' aeration fan scenario is predicted to exceed the measured background noise levels by 5 dBA. With silencers installed the predicted night time noise levels are less than the measured background noise levels.

BS4142 *Method for Rating industrial noise affecting mixed residential and industrial areas* states the following regarding the difference between industrial noise levels and background noise levels.

> *The greater this difference the greater the likelihood of complaints.*
>
> *A difference of around +10 dB or more indicates that complaints are likely.*
>
> *A difference of around + 5 dB is of marginal significance.*
>
> *If the rating level is more than 10 dB below the measured background noise level then this is a positive indication that complaints are unlikely.*

Therefore, to reduce the likelihood of complaints, it would be recommended to fit the aeration fans with silencers so that the noise levels due to the composting facility at the NSLs are below the background noise levels for both the day and night time periods.

6. CONCLUSIONS

URS has conducted a noise assessment of the proposed Acorn Composting Facility at Littleton, Tipperary. The client supplied input data was used to develop a noise model of the proposed facility.

A number of noise scenarios (daytime, night time, with and without aeration fan silencers) were modelled to determine if the proposed facility would achieve compliance with the WHO noise criteria at the identified noise sensitive locations. The scenarios represent typical conditions (66% duty, minimal sound absorption within buildings, soft ground and screening from foliage).

The predicted noise levels indicate that for typical conditions the WHO noise criteria will be met during the day and night time period.

A comparison of the predicted noise levels at the Noise Sensitive Locations due to the Proposed Development and the measured background noise levels was carried out. All scenarios (except for the night time unsilenced aeration fans) were predicted to generate noise levels less than the background noise levels at the NSLs. According to BS4142, it is recommended that to reduce the likelihood of complaints, the noise levels from the Proposed Development at the NSLs are less than the measured background noise levels. Therefore, it is recommended that silencers be fitted onto the aeration fans.