greenstar
setting the standard

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Mr. Frank Clinton
Programme Manager,
Office of Climate Licensing and Resource Use
Environmental Protection Agency,
P.O. Box 3000,
Johnstown Caste Estate,
County Wexford.

13th August 2009

RE: Waste Acceptance and Operational Hours – Greenstar Limited - Waste Licence No. W0053-03

Dear Mr. Clinton,

Under the provisions of Section 42B of the Waste Management Acts, Greenstar hereby applies to the Environmental Protection Agency for a Technical Amendment for the above referenced site. If granted, the amendment would involve a limited change to a single licence condition (Condition 1.6.2) so that the licensee can, with the Agency's agreement, extend the processing hours applicable to dry mixed recyclables (DMR).

Background

Greenstar Limited was granted a revised Waste Licence for the above referenced facility at Fassaroe, Bray, County Wicklow, in June 2006.

The current waste licence allows for the acceptance of a maximum of 200,000 tonnes of waste annually. This comprises the following waste types and volumes, as specified in Schedule A of the Licence: -

- Household and Commercial (143,560 tonnes)
- Construction and Demolition (54,040 tonnes)
- Hazardous (2,400 tonnes)

A number of processes are carried out at the facility including the indoor processing of Dry Mixed Recyclable Waste (DMR). DMR is received from a variety of sources in either segregated or non segregated (mixed) form. On receipt, DMR is deposited onto the floor of the Phase 1 Transfer Building. Mixed DMR is separated, using a sorting line, into paper, cardboard, aluminium, steel, plastic bottles and plastic film fractions, which are then baled separately and stored pending removal for recycling. Source segregated DMR is baled directly and stored pending consignment.

Greenstar now seeks a technical amendment of Condition 1.6.2 relating to permitted hours of waste operations at the site with particular regard to the processing of DMR inside the Phase 1 (DMR processing) Building. The proposal was outlined at a recent meeting with OEE inspectors for the facility, Ms. Breege Rooney and Ms. Deirdre French, and Greenstar indicated our intention to submit this written request to the Office of Climate, Licensing and Resource Use.

Registered in Ireland No. 325120

Directors: G. Bailey, J. Dempsey, N. Parkinson, E. Bolger (Secretary).
Registered Office: Burton Court, Burton Hall Road, Sandyford, Dublin 18.

Affiliate Organisation, CIWM
Member of the IWMA
Corporate Affiliate of the EI

The background to this request is outlined below and I would be obliged if you could give the matter your attention. In essence, with the Agency's agreement, Greenstar seeks to amend an existing condition so that processing of DMR can proceed on a 24 hour, 7 day per week basis outside the restrictive hours specified in Condition 1.6.2. Greenstar is not proposing any extension to waste acceptance hours or to hours of operation relating to any other waste types.

Existing Conditions relating to Waste Acceptance Hours and Hours of Operation

Conditions 1.6.1, 1.6.2 and 1.6.3 of the Waste Licence set the following Waste Acceptance Hours and Hours of Operation: -

- **1.6.1** *With the exception of emergencies or as may be agreed with by the Agency, waste shall not be accepted at or despatched from the facility only between the hours of 7.30 to 19.00Monday to Saturday inclusive.*
- **1.6.2** *The facility shall be operated only during the hours of 7:30am to 21:00pm Monday to Saturday inclusive.*
- **1.6.3** *The facility shall not operate or accept/ despatch waste on Sundays or Bank Holidays without the agreement of the Agency.*

Requested Amendment

Greenstar now seek the agreement of the Agency to alter the wording of Condition 1.6.2 above so that consideration can be given to a limited amendment to the operating hours so that indoor processing of DMR can occur outside of the hours currently conditioned (7.30am to 21.00). Specifically, we would like the following noted with regard to this request:

1. Greenstar is not seeking acceptance of waste outside of the hours already licensed, changes to Condition 1.6.1 are not being sought. All feed material for the DMR processing will be taken from the stockpile that is already inside the Phase 1 building.

2. Greenstar seeks a limited amendment to the existing hours of operation. We seek this amendment only in relation to DMR waste. Greenstar does not propose to seek amendments relating to C&I or C&D waste.

3. All DMR processing activities take place inside the Phase 1 building, with transport trailer loading in the loading area immediately to the west of the Phase 1 building

4. There will be no truck movements into or out of the site associated with the proposed extension of operational hours. All trailers to be loaded between 21.00 and 07.30 Monday to Saturday, will be parked in the loading area within the building before 21.00pm.

5. Loading shovel will operate only within the Phase 1 building. This will be used to load the hopper of the processing line with feed material from the stockpile and to move recovered material from holding bays of the processing line into the baling machine.

6. Forklift trucks will empty holding bins of recovered material or residual material into the baling machine and to remove baled recovered material from the baling machine and load into container trailers in the loading area immediately to the west of the phase 2 building. There will be minimal shunting of trailers to the west of Phase 1 building. The reversing siren/buzzer on the shunting unit will be replaced with a white noise type reversing indicator.

7. The DMR line consists of a system of conveyors, manual picking stations, ballistic separator, over-band magnet and eddy current separator.

8. Material is baled using a Bollegraaf HBC 60 baling machine located within the Phase 1 building. This produces 0.5 tonne bales suitable for loading into 40ft ISO containers

Basis for Request

Greenstar is noting an increased demand for processing capacity of DMR. As currently conditioned, Greenstar operates at a commercial disadvantage when compared to some of its competitors within the Greater Dublin area, some of whom are permitted to operate for significantly longer daily periods than those conditioned in W0053-03. Greenstar wish to increase our capability to process recyclable material. At present, we notice that much of the DMR material that could be processed in Ireland is leaving the country with large volumes exported to the UK for processing. The amendment allows for the maximising of pre-treatment capacity at the facility and facilitates diversion of biodegradable (paper and cardboard) and other recyclable waste from the disposal stream.

Supporting Information

The facility is located in an area of north county Wicklow zoned to provide for industrial and related uses though at present, a mixture of agricultural, quarrying, commercial and residential land surrounds the facility. There are approximately 17 residences within 250m of the site. Greenstar has invested heavily in recent times to ensure that processing operations are now located indoors and the appearance of the site has altered in this regard during the past 2-3 years.

Due to the works carried out since the current Waste Licence was issued, Greenstar now enjoys an excellent relationship with our neighbours in the vicinity of the site and this is reflected in our complaints record at the site. Greenstar has received no complaints relating to noise during 2007, 2008 and thus far in 2009.

The proposal will not result in any new emission or changes to emission points and the only emission of potential environmental significance associated with the proposal is noise. Greenstar considers that the associated noise emissions will not result in an exceedance of the Emission Limit Values (ELV) set in the Licence and neither impair or interfere with amenities outside the facility boundary. To illustrate this, Greenstar commissioned a noise survey that is attached to this submission.

Greenstar implements a comprehensive environmental monitoring programme at the site to assess the significance of emissions from site activities. The programme includes surface water, wastewater, groundwater, noise and dust monitoring. To assess the specific impact that this proposed amendment would have, Greenstar commissioned a noise monitoring survey in June 2009.

Noise Survey (June 2009)

As acknowledged in the attached noise report, there are a variety of potential on-site noises associated with activities at the site. These include internal waste processing, external timber shredding and vehicle movements. The licence requires quarterly monitoring at monitoring locations including on-site and at the nearest noise sensitive locations. Four monitoring locations are located along the eastern boundary; N1, N2, N3 and N4. Two off-site noise sensitive locations are located close to residences along the eastern boundary, NSL1 and NSL2.

Monitoring carried out to date has established that the facility complies with the ELVs set in the Licence. The licence states that site operations shall not give rise to levels above 45dB during night-time hours (22.00-08.00) at the two noise sensitive locations specified.

In addition to quarterly monitoring at the facility, Greenstar commissioned a separate survey to assess the potential noise impact from processing DMR at night. The survey was undertaken on the evening of 10th June 2009 between 1900 and 2100 hours when only the DMR line was operating. Other site operations associated with the processing of C&I and C&D waste were suspended to replicate the conditions that will pertain during the proposed extended operational hours. From the period 19.00 to 21.00 hours, the processing of DMR indoors was accompanied by external use of a generator set and internal use of a front end loader and two forklift trucks. The forklift trucks occasionally accessed the open yard immediately west of the building.

A survey was also undertaken from 21.00 hours following shut down and staff departure from the site. This allowed a determination of the ambient noise monitoring environment. No noise emissions arose from the site during this period. It was noted that noise emissions arose from background sources, chiefly the traffic on the N11 national road.

The survey included one onsite station and the two offsite sensitive locations used during routine site monitoring.

Specific noise levels recorded during the survey indicate that night time processing of DMR will not exceed the limits specified in the licence (55dB prior to 2200 hours and 45dB after 2200). In particular, the proposed night-time operation will comply with noise emission levels specified in Schedule B.4 of the waste licence which prohibits noise levels greater than 45dB. The report further notes that no tones were noted in site emissions apart from reversing alarms faintly audible at N2 and NSL1. It is recommended that these alarms be replaced by flat spectrum (white noise) alarms. No impulses were detected.

Notwithstanding the reduced noise levels, based on the precaution principle, the report recommends that the following be implemented.

- Reversing alarms on mobile plant associated with the DMR operation should be replaced with white noise alarms
- Additional monitoring should be carried out following the commencement of night-time DMR
- Shut off the 3 fans on the façade of the DMR (Phase 1) Building after 2100 hours. These fans are not required to allow the processing of the DMR

The above recommendations will be implemented in full and Greenstar will engage further monitoring by specialists including assessment of noise environment after 00.00 hours.

Summary

With the Agency's agreement, Greenstar is proposing a modest change to the existing operations at the site to allow for night-time recovery of DMR at the facility. The proposal will not result in any new emission or changes to emission points and Greenstar provides evidence to show that noise associated with the proposed changes will not result in the exceeding of existing ELVs at the facility. The amendment will allow for increased recovery of dry recyclable material and is consistent with the principle of self-sufficiency and the proximity principle in this regard. The proposal promotes waste pre-treatment and encourages waste diversion from landfill through materials recycling. In this respect, the proposal will assist in maximising recycling and recovery rates and is consistent with obligations under the Landfill Directive.

I would be obliged if the Agency could amend Condition 1.6.2 to allow for flexibility in the processing of DMR and I trust that the attached information will allow the Agency to make an early determination on this matter.

Should you require any further clarification, please do not hesitate in contacting the undersigned. I am available to meet with you to discuss any aspect of this proposal.

Yours sincerely,

Malcolm Dowling

Malcolm Dowling
Group Compliance and Environment Manager
Greenstar

DixonBrosnan

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Project	
	Noise assessment at Greenstar Ltd., Fassaroe, Bray, Co. Wicklow – Waste licence W0053-03
Client	O'Callaghan Moran & Associates

Project no	No pages	Client reference	©DixonBrosnan 2009
06042	15	W0053-03	v280409

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Report no	Date	Status	Prepared by	Chkd
06042.15.1	17.06.09	Submitted to client	Damian Brosnan	CD
06042.15.2	17.06.09	Clarified details	Damian Brosnan	CD

Executive summary

DixonBrosnan Environmental Consultants were commissioned by O'Callaghan Moran & Associates, on behalf of their client Greenstar Ltd., to undertake an assessment of potential night-time noise emissions at the latter's integrated waste management facility at Fassaroe, Bray, Co. Wicklow (W0053-03). Operations at the site are currently undertaken during the period 0800-2100 hours. Greenstar Ltd. proposes to extend operations of an onsite dry recyclables line (DRL) over 24 hours. The DRL is located within the Phase 1 transfer building and is approximately 130 m from the nearest sensitive receptors (dwellings) to the east. The purpose of the noise assessment was to investigate potential impacts, if any, associated with this proposal in the context of limits currently in force at the site.

Waste licence W0053-03 issued by the Environmental Protection Agency in respect of the site includes several conditions relating to noise. The licence states that site operations shall not give rise to levels above 45 dB during night-time hours (2200-0800) at two noise sensitive locations (NSLs) specified in the licence.

A noise survey was undertaken on the evening of Wednesday 10.06.09. The DRL facility only was operating from 1900 to 2100 hours. The survey was concentrated at one onsite station and two offsite sensitive locations used during routine site monitoring. It was noted during the survey that road traffic noise not associated with the Greenstar operation is significant in the area.

Noise levels recorded, and calculations subsequently undertaken, indicate that night-time operations of the DRL facility will not exceed the 55 dB limit applicable prior to 2200 hours, and the 45 dB limit applicable from 2200 hours. However, based on the precautionary principle, several recommendations are made as follows:

- It is recommended that reversing alarms on mobile plant associated with the DRL operation be replaced with white noise alarms.
- It is recommended that, immediately following the commencement of night-time DRL operations, emissions are assessed directly by measurement, including after 0000 hours.
- It is recommended that shut off of three fans located on the DRL building façade after 2100 hours is implemented by policy onsite.

Contents

1 Introduction

1.1 DixonBrosnan Environmental Consultants were commissioned by O'Callaghan Moran & Associates, on behalf of their client Greenstar Ltd., to undertake an assessment of potential night-time noise emissions at the latter's integrated waste management facility at Fassaroe, Bray, Co. Wicklow (W0053-03). Operations at the site are currently undertaken during the period 0800-2100 hours. Greenstar Ltd. proposes to extend operations of an onsite dry recyclables line (DRL) over 24 hours. The DRL is located within the Phase 1 transfer building and is approximately 130 m from the nearest sensitive receptors (dwellings) to the east. The purpose of the noise assessment was to investigate potential impacts, if any, associated with this proposal in the context of limits currently in force at the site.

1.2 Waste licence W0053-03 issued by the Environmental Protection Agency in respect of the site includes several conditions relating to noise as summarised in **Appendix 2**. In summary, the licence states that site operations shall not give rise to levels above 55 dB during daytime hours (0800-2200) and 45 dB during night-time hours (2200-0800) at two noise sensitive locations (NSLs) specified in the licence. Both NSLs are shown in **Appendix 3**. Audible tones and impulses are prohibited at the NSLs at all times. The proposed continuation of DRL operations beyond 2100 hours will be subject to a limit of 55 dB at both NSLs during the period 2100-2200 hours, and 45 dB thereafter.

1.3 A noise survey was undertaken on the evening of Wednesday 10.06.09. The survey consisted of two phases as follows:

- Survey undertaken during the period 1900-2100 hours. During this period, the DRL line was in continuous operation as is currently permitted. Processing of Municipal Solid Waste (MSW) and Construction and Demolition (C&D) waste was suspended by site management. No members of the public accessed the civic amenity area during this period. The DRL operation was accompanied by external use of a generator set, and internal use of a front end loader and two forklift trucks. The forklift trucks occasionally accessed the open yard immediately west of the building. Three fans located in the upper façade of the Phase 1 building were switched off. The noise emissions arising from the site were identical to those which will arise from 2100 hours if the proposal is accepted.
- A survey was undertaken from 2100 hours following site shut down and staff departure to determine the existing ambient noise environment. No emissions arose from the site during this period. Noise emissions arose from background sources, chiefly road traffic on national route N11 which was dominant.

1.4 The survey was undertaken at the two routine noise sensitive stations NSL1 and NSL2, and the onsite monitoring station N2, as described in **Appendix 2**. Survey methodology, equipment specification and weather conditions are presented in **Appendix 4**. Noise data recorded are presented in **Appendix 5**. Frequency spectra

are shown in **Appendix 6**. Due to time constraints, shortened measurement intervals of 10 minutes were used. As the noise emissions under consideration (DRL emissions and road traffic noise) were steady, the shortened intervals are representative of longer reference periods.

2 Results & analysis

2.1 Noise emissions from the proposed operation arose from the DRL plant, including external generator set, and internal use of a front end loader and two forklift trucks. Emissions were steady and continuous, and therefore represented by the L_{AF90} parameter. $L_{AF90\ 10\ min}$ values recorded at N2, NSL1 and NSL2 are presented in Table 1.

2.2 Throughout the survey it was noted that traffic noise emissions from national route N11 were continuously audible, and dominant in the background. As traffic noise was continuously present, recorded L_{AF90} values were also influenced by same. Thus measured $L_{AF90\ 10\ min}$ values presented in Table 1 were influenced to varying degrees by site emissions and N11 traffic. Where both sources were audible, the contribution specifically arising from the DRL emissions may be estimated by comparison with levels measured following DRL shut down (see **Appendix 7** on this matter). At locations NSL1 and NSL2, the data suggest that L_{AF90} levels expected to arise from the facility will be at least 5 dB lower, and more likely to be 10 dB lower, than L_{AF90} levels measured. Table 1 presents a summary of the foregoing.

Table 1: Noise data summary & interpretation

Station	N2	N2	NSL1	NSL2
Approx time of measurement	1910	2045	2020	2030
Measured $L_{AF90\ 10\ min}$ while DRL on	46 dB	44 dB	41 dB	42 dB
$L_{AF90\ 10\ min}$ measured later while DRL off	38 dB	38 dB	40 dB	DRL not
Thus N11 noise at around 2130 hours considered to be	38 dB	38 dB	40 dB	audible,
Traffic noise correction factor (see **Appendix 7**)	+3 dB	+1 dB	+1 dB	thus L_{AF90} =
Estimated N11 traffic noise level present while DRL on	41 dB	39 dB	41 dB	N11 noise
Difference between total noise level & DRL contribution	46-41 dB	44-39 dB	41-41 dB	
Estimated contribution from DRL only	44 dB	42 dB	<36 dB	<37 dB

2.3 Specific DRL emissions calculated in Table 1 are in all cases lower than the 45 dB night-time limit which will apply to the proposed operation from 2200 hours.

2.4 No tones were noted in site emissions, apart from reversing alarms faintly audible at N2 and NSL1. It is recommended that these alarms be replaced with flat spectrum (white noise) alarms. No impulses were detected. Thus the proposed night-time operation will comply with Schedule B.4 of the site waste licence which prohibits tones and impulses at noise sensitive locations, subject to replacement of the existing reversing alarms.

3 Conclusions

3.1 Two different background noise environments apply in the vicinity of the Greenstar facility:

- N11 traffic noise is dominant in the evening, and is expected to remain dominant until around 2300-0000 hours. Noise levels measured during the survey of 10.06.09 are considered representative of these conditions. During the survey, it was noted that DRL emissions were audible at a low level at N2, slightly audible at NSL1, and inaudible at NSL2.
- In the absence of N11 traffic noise, background noise levels will decrease. These conditions are expected to apply from around midnight onwards. DRL noise emissions are calculated to be 42-44 dB at N2, less than 36 dB at NSL1, and less than 37 dB at NSL2.

3.2 Under both conditions, night-time operation of the DRL facility will not exceed the 55 dB limit applicable prior to 2200 hours, and the 45 dB applicable from 2200 hours. It should be noted that these limits apply only to the offsite stations NSL1 and NSL2. From 3.1 above, levels here are expected to be less than 36-37 dB during the night-time when traffic noise decreases.

3.3 Reversing alarms on the front end loader and forklift trucks were faintly audible at N2 and NSL1. It is recommended that these alarms be replaced with white noise alarms. Such alarms will not be audible offsite.

3.4 It is recommended that, immediately following the commencement of night-time DRL operations, emissions are assessed directly by measurement, including after 0000 hours.

3.5 Tests undertaken onsite during the survey of 10.06.09 indicate that three fans located on the upper facades of the DRL building contribute significantly to noise breakout. The measurements and calculations presented in this report assume that the fans will be off from 2100 hours. It is recommended that fan shut off after 2100 is implemented by policy onsite.

Appendix 1: Glossary

Ambient	The total noise environment at a location, including all sounds present.
A-weighting	The weighting or adjustment applied to sound level recordings to approximate the non-linear frequency response of the human ear. The A-weighting is denoted by the suffix A in the parameters listed below such as L_{Aeq}, L_{A10}, etc.
Background noise	The A-weighted sound pressure level of the residual noise in decibels exceeded for 90% of a given time interval. The L_{A90}.
Decibel (dB)	The units of the noise measurement scale. Based on logarithmic scale so cannot be simply added or subtracted. A 3 dB difference is the smallest change perceptible to the human ear. A 10 dB difference is perceived as a doubling or halving of the sound level. **Throughout this report noise levels are presented as decibels relative to 20 µPa**. Examples of decibel levels are as follows: 20 Very quiet room; 35 Rural environment at night; 65 Conversation; 80 Busy pub; 100 Nightclub; 120 Jet take-off
Free-field	Noise environment away from all surfaces other than the ground. Noise levels recorded near walls will be artificially increased due to reflections. Where there is more than one wall, noise levels will be further increased. Levels recorded within such 'near-field' conditions will be increased by up to 3 dB, and up to 6 dB near a corner. In practice, free-field conditions will be achieved by maintaining a separation distance of at least 3.5 m from walls.
Frequency	The number of cycles per second of a sound or vibration wave. An example of a low frequency noise is a hum, while a whine represents a higher frequency. The range of human hearing approaches 20-20,000 Hz.
Hertz (Hz)	The unit of frequency measurement.
Impulse	A noise which is of short duration, typically less than one second, the sound pressure level of which is significantly higher than the background.
Interval	The time period t over which noise monitoring is conducted. May be 5-60 minutes, depending on the standard applied. The interval is usually denoted by t as in $L_{Aeq\,t}$, $L_{A90\,t}$, etc.
L_{AE}	The sound exposure level is a measure of the noise level of an event, standardised to an interval of one second, and containing the same acoustical energy as the actual event.
$L_{Aeq\,t}$	The equivalent continuous sound level during a measurement interval, effectively representing the average A-weighted noise level.

L_{AF}	The A-weighted sound pressure level measured using a fast time weighting and averaged over one second. The L_{AF} value therefore changes each second.
L_{Aleq}	The A-weighted sound pressure level at a particular instant, measured using an impulse time weighting on the sound level meter. May be used in the assessment of impulse noise.
$L_{An\,t}$	The A-weighted sound level which is exceeded for n% of the measurement interval.
L_{Cpeak}	The peak C-weighted sound pressure level recorded during the measurement interval. The highest peak on the sound pressure wave before any time constant is applied. The C-weighting is used rather than the A-weighting as the latter screens out low frequency sources.
$L_{Req\,t}$	The rating noise level, derived from the $L_{Aeq\,t}$ plus specified adjustments for tonal and impulsive characteristics.
$L_{AF10\,t}$	The A-weighted sound level measured using a fast time weighting which is exceeded for 10% of the measurement interval, usually used to quantify traffic noise.
$L_{AF90\,t}$	The A-weighted sound level measured using a fast time weighting which is exceeded for 90% of the measurement interval, usually used to quantify background noise. May also be used to describe the noise level from a continuous steady or almost-steady source, particularly where the local noise environment fluctuates.
Near-field	Area where free field conditions do not apply.
Noise sensitive location	Any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other facility or area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels.
1/3 octave band analysis	Frequency analysis of sound such that the frequency spectrum is subdivided into bands of one third of an octave each. An octave is taken to be a frequency interval, the upper limit of which is twice the lower limit in Hertz.
Residual noise	The noise level remaining at a given position in a given situation when the specific noise source is absent or does not contribute to the noise level.
Specific noise	The noise source under investigation for assessing the likelihood of complaints.
Tone	A character of the noise caused by the dominance of one or more frequencies which may result in increased noise nuisance.
Z-weighting	Standard weighting applied by sound level meters to represent linear scale.

Appendix 2: EPA waste licence W0053-03

Condition 6.8.1 of licence W0053-03 specifies that a noise monitoring survey is to be undertaken at the study site annually. The survey is to be undertaken in accordance with the EPA manual *Environmental noise survey guidance document* (2003). Schedule C however specifies quarterly monitoring frequency. Greenstar proposes to complete quarterly monitoring of the facility in accordance with schedule C until otherwise instructed by the Agency.

Schedule C.5 of the licence specifies that the noise survey is to be carried out at six stations, designated N1, N2, N3, N4, NSL1 and NSL2. At each station, monitoring is to be undertaken in accordance with *International Standard ISO 1996 Acoustics: Description and measurement of environmental noise Parts 1-3 1982-1987*. The schedule lists the parameters which are to be monitored: L_{Aeq}, L_{A10} and L_{A90}, all over 30 minutes. One third octave band frequency analysis is also required.

Schedule B.4 of the licence specifies maximum noise levels not to be exceeded at noise sensitive locations (NSLs). The limits specified are 55 dB during daytime hours, and 45 dB at night-time, measured as $L_{Aeq\ 30mins}$. There are no noise limits specified with respect to boundary stations. Daytime and night-time periods are 0800-2200 and 2200-0800 respectively. Schedule B.4 also specifies that *there shall be no clearly audible tonal component or impulsive component in the noise emission from the activity at any noise sensitive location.*

Condition 4.4 additionally states that:

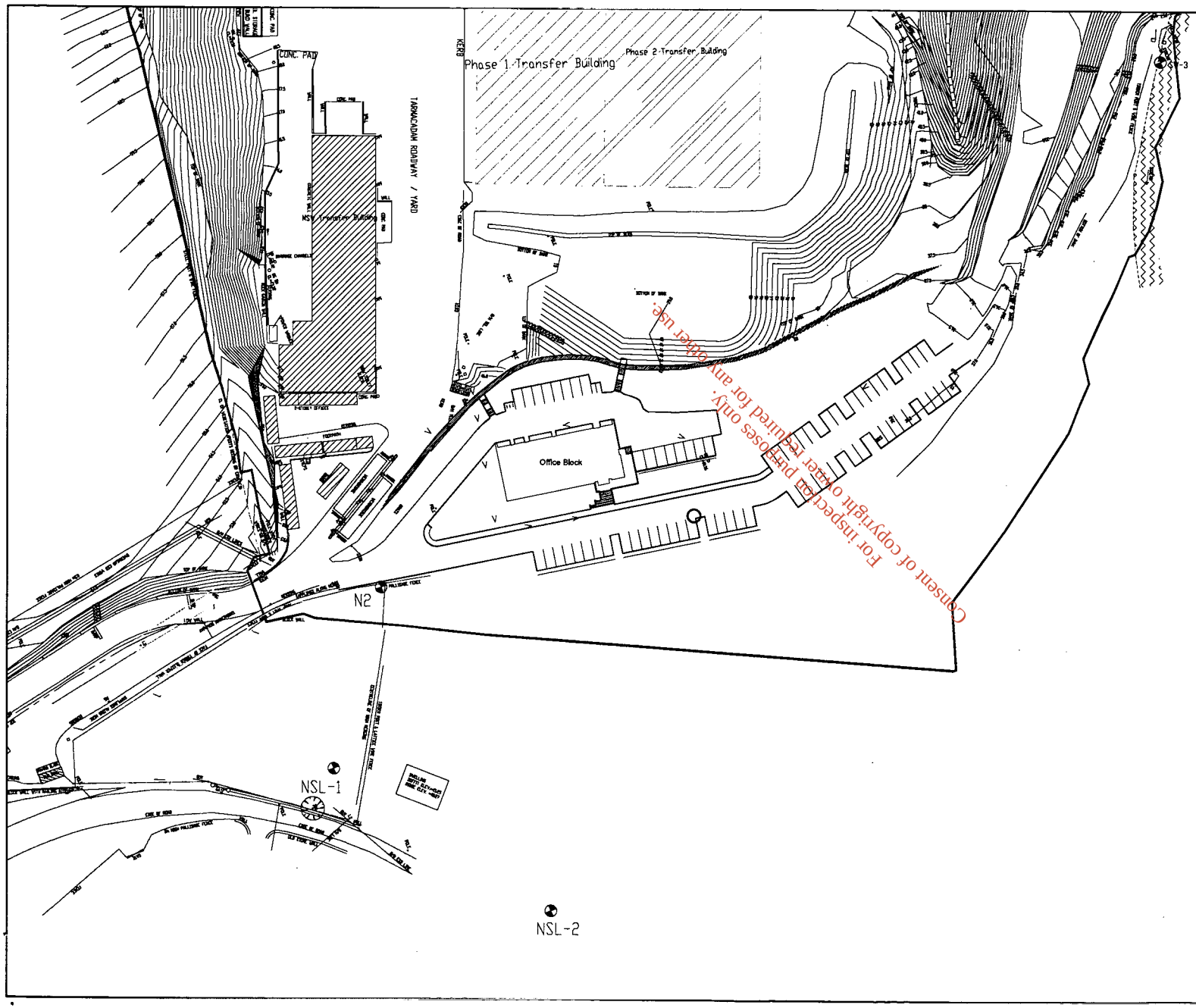
Noise from the facility shall not give rise to sound pressure levels (Leq, t) measured at any noise sensitive locations of the facility [sic] *which exceed the limit value(s).*

As noted above, noise monitoring is to be undertaken at six stations agreed with the EPA. The stations are summarised below and indicated in Appendix 3.

Noise monitoring stations.

Station	Location
N1	Near site entrance
N2	E of parking area
N3	NE corner of site
N4	N boundary
NSL1	Adjacent to dwelling near SE corner
NSL2	Near cluster of dwellings to E of parking area

Appendix 3: Noise monitoring stations



NOTES

REV	DATE	DESCRIPTION	DRN	CHKD	APP
A	04/08/09	ISSUE	MW	SM	==

O' Callaghan Moran & Associates.
Granary House, Rutland Street,
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Tel. (021) 4321521 Fax. (021) 4321522
email : ocm@indigo.ie

CLIENT
GREENSTAR LTD

TITLE
FASSAROE W0053-03
NIGHT TIME SURVEY
NOISE MONITORING LOCATIONS

SCALE	DRAWING No.	REV.
1:1000 A3	1	A

DOS Filename : ********

Appendix 4: Methodology

Survey	Project ref.	06042
	Purpose	Assessment re proposed 24 hour operations
	Locations	Concentrated at NSLs
	Comment	Proposed operation in progress until 2100
Event	Date	10.06.09
	Day	Wednesday
	Time	Evening
Operator	On behalf of DixonBrosnan	Damian Brosnan
Conditions	Cloud cover	50%
	Precipitation	0 mm, passing shower x1
	Temperature	15 ^{0}C
Wind	Speed	0-1 m/s
	Direction	NE
	Measurement	Anemo anemometer 2 m above ground level
Sound level meter	Instrument	Bruel & Kjaer Type 2250-L
	Instrument serial no.	2566801
	Microphone serial no.	2571655
	Application	BZ7130 Version 2.0
	Bandwidth	Broadband
	Max input level	142.66 dB
	Broadband weightings	Time: Fast Frequency: AC
	Peak weighting	Frequency: C
	Windscreen correction	UA-0237
	Sound Field correction	Free-field
	UKAS calibration	30.09.08
	UKAS calibration certificate	Available on request
Onsite calibration	Time	10/06/2009 17:57:18
	Calibration type	External
	Sensitivity	42.22 mV/Pa
	Post measurement check	93.9 dB
Onsite calibrator	Instrument	Bruel & Kjaer Type 4231
	Instrument serial no.	1723667
	UKAS calibration	14.08.08
	UKAS calibration certificate	Available on request
Monitoring methodology	International Standard ISO 1996	*Acoustics: Description and measurement of environmental noise Part 1 (2003) & Part 2 (2007)*
	Exceptions	-
	Intervals	5-10 min

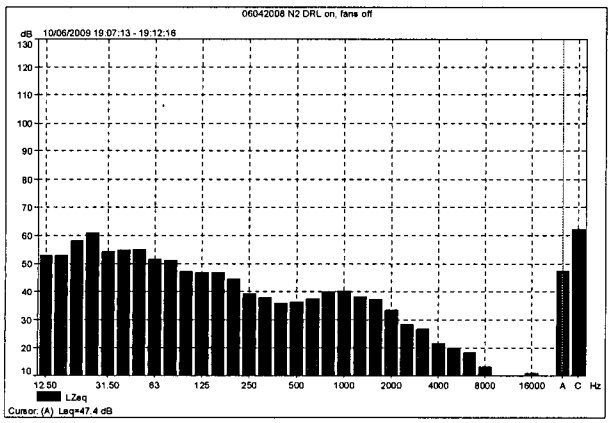
Appendix 5: Noise data

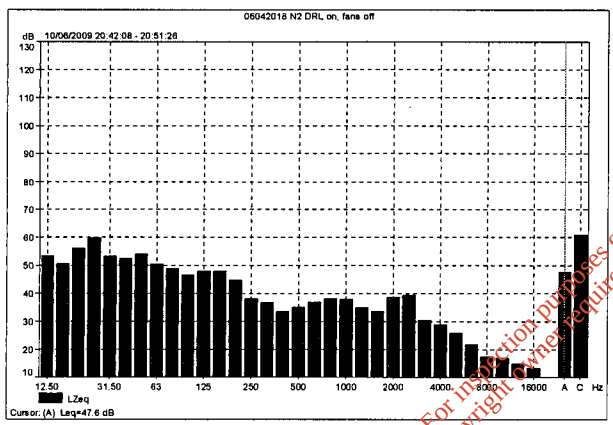
Recorded 10.06.09

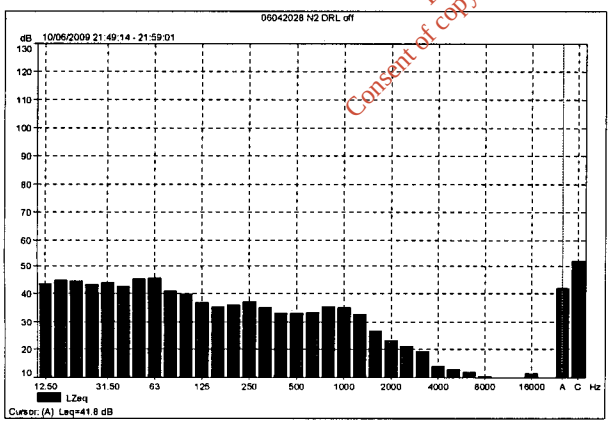
Location	Time	L_{Aeq} dB	L_{AF10} dB	L_{AF90} dB	Noise audible
N2	1907-1912	47	49	46	DRL plant audible continuously at low level. Reversing alarms faintly audible. N11 traffic also continuously audible, and in equal loudness with DRL noise. Birdsong and crows. Aircraft.
N2	2042-2051	48	49	44	DRL plant continuously audible, and in equal loudness with N11 traffic. Birdsong, crows and aircraft.
N2	2149-2159	42	44	38	No site emissions as DRL off. N11 traffic continuously audible and dominant. Sporadic local traffic audible. Birdsong dying down. Aircraft.
NSL1	2013-2023	45	46	41	DRL plant slightly audible continuously. Reversing alarms faintly audible. N11 traffic continuously audible and dominant in background. Birdsong and crows. Local traffic intermittent and significant. Excavator working at 200 m, not associated with Greenstar. Aircraft.
NSL1	2119-2129	43	44	40	DRL plant off. No site emissions. N11 traffic continuously dominant. Sporadic local traffic. Birdsong dying down. Aircraft.
NSL2	2027-2037	48	48	42	DRL plant not audible. Reversing alarms also not audible. N11 traffic continuously dominant from NE. Local traffic intermittent and dominant when present. Stream in valley continuously slightly audible. Crows, birdsong and aircraft.
NSL2	2106-2116	53	51	45	DRL plant off. No site emissions. N11 traffic continuously dominant. Sporadic local traffic. Stream noise slightly audible continuously. Birdsong.

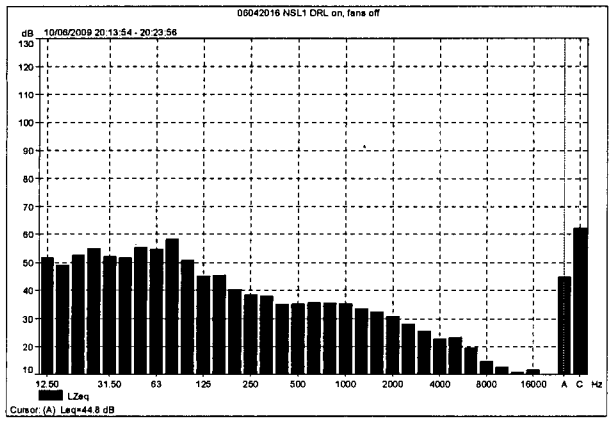
DRL: Dry recyclables line.

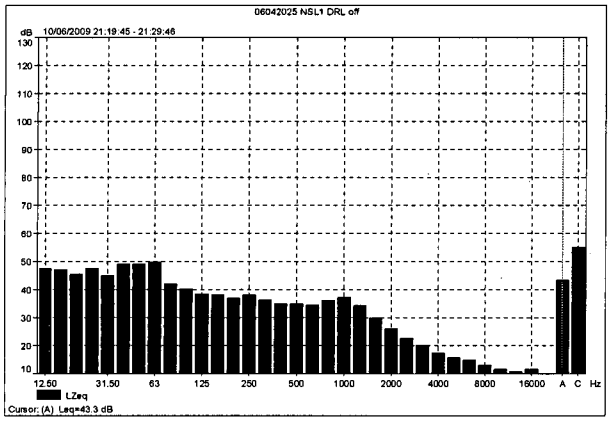
Appendix 6: Frequency spectra

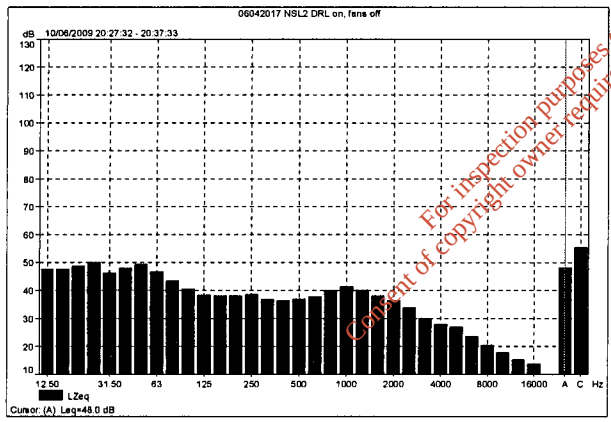


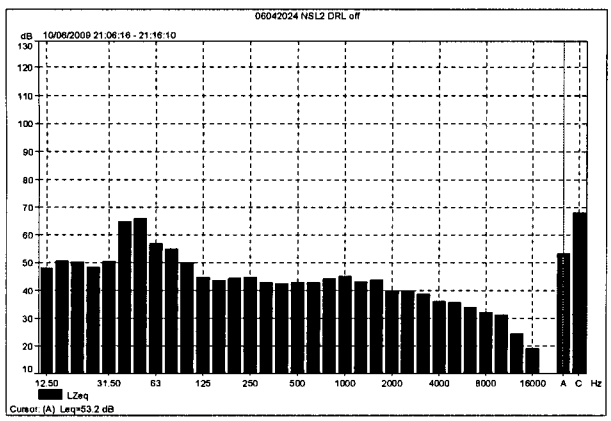












Appendix 7: Comment regarding background traffic noise

In the absence of DRL emissions, the L_{AF90} measured at NSL1, for instance, was considered to be entirely attributable to N11 traffic. This value, measured 2119-2129 hours, was 40 dB. It would ordinarily be reasonable to compare this value to the L_{AF90} level (41 dB) recorded during the period 2013-2023 hours when both traffic and DRL emissions were present. This comparison indicates that the contribution attributable to the DRL emissions in this case was 34 dB.

However, it is apparent that the measurements used in the above comparison were separated by an hour, during which time N11 traffic noise decreased. It follows that the background traffic noise level measured around 2120 hours, after DRL shut down, may not have been representative of traffic noise levels one hour earlier. Thus the above comparison may not be valid, and the traffic contribution may have been more significant.

In order to overcome this difficulty, N11 traffic noise was measured before and after the survey. The monitoring location used was close to the Greenstar facility boundary, but in the shadow of a berm where facility emissions were inaudible. This exercise indicated that N11 traffic noise levels decreased by 4 dB between 1830 and 2130 hours, equivalent to a reduction of 4760 Pascals per hour. Assuming that the decrease in traffic volume (and therefore traffic noise) was linear, the background noise level attributable to N11 traffic noise at 2030 hours was 1 dB higher than at 2130 hours. At around 1900, when a measurement was undertaken at N2, the traffic noise level is estimated at 3 dB higher than at 2130. These correction factors are applied in Table 1 on page 5. It is reasonable to assume that the correction factors are applicable to all measurement stations, regardless of base noise level.