

To: Paul Antony
From: John Sleeman
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Subject: Erskine Park Waste Transfer Station
Operational Noise Assessment
Modification with a Sort Line and Shredder

At: Cleanaway Pty Ltd
At: SLR Consulting Australia Pty Ltd
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1 INTRODUCTION

Cleanaway own and operate the Erskine Park Landfill which was opened in 1994 and involves rehabilitation of a former quarry through non-putrescible waste disposal. In October 2016 Cleanaway Pty Ltd (Cleanaway) obtained approval to use a portion of the site as a putrescible Waste Transfer Station to meet growing market demand. The Planning Assessment Commission (PAC), acting as delegate of the Minister for Planning, approved the application for the Erskine Park Waste and Resource Management Facility (WRMF) Staged Development Application (SSD 7075) on the 5 October 2016, comprising:

- A concept plan for a Waste and Resource Management Facility with a maximum processing capacity of 300,000 tpa. All waste received at the WRMF shall enter the Waste Transfer Station (Stage 1), up to 150,000 tpa of this waste may be recycled at the Resource Recovery Facility (RRF) (Stage 2)
- Construction and operation of the Stage 1 Waste Transfer Station with a maximum processing capacity of 300,000 tpa.

The WRMF will be developed in two stages, the first being a Waste Transfer Station (WTS) and the second being a Resource Recovery Facility (RRF). An Environmental Impact Statement (EIS) was prepared to support the application for the WRMF Concept Proposal and the Stage 1 WTS. A separate EIS for the Stage 2 RRF will be developed at a later date.

SLR Australia Pty Ltd (SLR) was engaged to provide a Construction and Operational Noise Assessment to accompany the EIS, and this was provided in SLR Report 610.14324-R1 'Erskine Park Resource Management Facility Staged SSD Stage 1 Waste Transfer Station Construction and Operation Noise Assessment' of October 2015 (SLR Report 610.14324-R1).

Cleanaway recently obtained a change in the Mod 1 DA to reflect changes to development staging, car and truck parking, office and so on. Cleanaway now have obtained SSD 7075 Mod 2 approved to reflect the revised site levels in response to ongoing design and constructability considerations. There was no other change from Mod 1 approval.

Cleanaway are proposing additional equipment to the approved SSD 7075, by way of installing a sort line and potential use of electric shredder. The operation of the sort line and the potential use of an electric shredder will occur only after completion of construction activities for the Waste Transfer Station (Stage 1). This Technical Memorandum provides an update to SLR Report 610.14324-R1, with the operational noise levels assessed against the EPA's Noise Policy for Industry (NPfI), which replaced the EPA's Industrial Noise Policy (INP) of 2000 in October 2017. Where required the results of SLR Report 610.14324-R1 are referred to in this Technical Memorandum to minimise the presentation of data. The use of Shredder is not intended to part of the Proposed Modification, being included to understand potential impact if considered.

2 INDUSTRIAL NOISE TRIGGER LEVELS

The NPfI's objectives are:

- To establish noise trigger levels that would protect the community from excessive noise;
- To preserve the amenity for specific land uses;
- To use the noise trigger levels for deriving project specific land uses; and
- To promote uniform methods to estimate and measure noise impacts including a procedure for evaluating meteorological effects.

Implementation is achieved by ensuring that:

- Noise from any single source does not intrude greatly above the prevailing background noise level. This is known as the intrusive noise criterion; and
- The background noise level does not exceed the level appropriate for the particular locality and land use. This is known as the amenity criterion.

In order to satisfy the above two requirements, an intrusive and an amenity noise criterion is determined of which the lower is usually adopted as the project specific noise level.

2.1 Assessing Intrusiveness

For assessing intrusiveness, the existing background noise generally needs to be measured. The intrusiveness trigger level essentially means that the equivalent continuous noise level (LAeq) of the source should not be more than 5 dBA above the measured (or default) Rating Background Level (RBL).

Furthermore the EPA's NPfI specifies minimum assumed RBLs, and for the daytime period a minimum RBL of 35 dBA, and associated minimum project intrusive noise of 40 dBA applies.

2.2 Assessing Amenity

The amenity assessment is based on amenity noise levels specific to the land use and associated activities. The project amenity noise levels are shown in **Table 1** and relate only to industrial-type noise and do not include road, rail or community noise.

The NPfl notes that the recommended amenity noise levels represent the objective for total industrial noise at a receiver location, whereas the project amenity noise level represents the objective for noise from a single industrial development at a receiver location. In the first instance the NPfl recommends the project amenity noise levels are 5 dB below the recommended amenity noise level. However where the resultant project amenity noise level is 10 dB or lower than the existing industrial noise levels, then in this case the project amenity noise levels can be set at 10 dB below existing noise levels if it can be demonstrated that existing industrial noise levels are unlikely to reduce over time.

Table 1 Recommended LAeq Noise Levels from Industrial Noise Sources

Receiver	Noise Amenity Area	Time of Day ¹	Recommended Amenity Noise Level LAeq(period)
Residence	Rural	Day	50 dBA
		Evening	45 dBA
		Night	40 dBA
	Suburban	Day	55 dBA
		Evening	45 dBA
		Night	40 dBA
	Urban	Day	60 dBA
		Evening	50 dBA
		Night	45 dBA
Hotels, motels, caretakers' quarters, holiday accommodation, permanent resident caravan parks	See column 4	See column 4	5 dB(A) above the recommended amenity noise level for a residence for the relevant noise amenity area and time of day
School classrooms - internal	All	Noisiest 1-hour period when in use	35 dBA
Hospital ward internal external	All	Noisiest 1-hour	35
			50
Area specifically for passive recreation	All	When in use	50 dBA
Active recreation area (e.g. School playground, golf course)	All	When in use	55 dBA
Commercial premises	All	When in use	65 dBA
Industrial premises	All	When in use	70 dBA
Industrial (applicable only to residential noise amenity areas)	All	All	Add 5 dB(A) to recommended noise amenity area

Notes 1: Time of day is defined as follows in accordance with NPI 2017:
Day – the period from 7 am to 6 pm Monday to Saturday or 8 am to 6 pm on Sundays and public holidays
Evening – the period from 6 pm to 10 pm
Night – the remaining periods.

2.3 Modifying Factors

Modifying factors are to be applied to the predicted noise levels if the source noise, at the receiver, is low frequency, tonal or intermittent in nature. No modifying factors need to be applied in the subject assessment.

2.4 NPfl Assessment of Prevailing Weather Conditions

Wind

Wind has the potential to increase noise at a receiver when it is light and stable and blows from the direction of the noise source. As the strength of the wind increases the noise produced by the wind will obscure noise from most industrial and transport sources.

When the source to receiver wind component is at speeds of up to 3 m/s for 30% or more of the time in any seasonal period (i.e. daytime, evening or night-time), then wind is considered to be a feature of the area and noise level predictions must be made under these conditions.

The NSW NPfl Fact Sheet D, noise enhancing weather conditions, states that:

“Significance is based on a threshold of occurrence of 30% determined in accordance with the provisions in this policy. Where noise-enhancing meteorological conditions occur for less than 30% of the time, standard meteorological conditions may be adopted for the assessment.”

Temperature Inversion

Temperature inversions, when they occur, have the ability to increase noise levels by focusing sound waves. Temperature inversions occur predominantly at night during the winter months.

The NSW NPfl Fact Sheet D, noise enhancing weather conditions, states, in relation to determining the significance of noise enhancing conditions, that:

“This involves assessing the significance of temperature inversions (F and G Class) stability categories for the night-time period Significance is based on a threshold of occurrence of 30% determined in accordance with the provisions in this policy. Where noise-enhancing meteorological conditions occur for less than 30% of the time, standard meteorological conditions may be adopted for the assessment.”

SLR Report 610.14324-R1 assessed the prevailing weather conditions, against the INP, which corresponds to criteria of the NPfl and concluded prevailing winds occurred, and temperature inversions as presented in **Table 2** and **Table 3**.

Table 2 Project Site Prevailing Wind Conditions in Accordance with the NPfl

Season	Winds $\pm 45^\circ \leq 3\text{m/s}$ with Frequency of Occurrence $\geq 30\%$		
	Daytime	Evening	Night-Time
Summer	Nil	Nil	Nil
Autumn	Nil	Nil	32.9% SW, 32.3% WSW
Winter	Nil	29.8% SW, 29.6% WSW	34.0% WSW, 31.6% W, 30.6% SW
Spring	Nil	Nil	Nil

Table 3 Prevailing Atmospheric Stability Frequency – Evening and Night-time – May 2012 to May 2015

Stability Class	Frequency of Occurrence				Estimated ELR °C/100 m	Qualitative Description
	Summer	Autumn	Winter	Spring		
A	0.0%	0.0%	0.0%	0.0%	<-1.9	Lapse
B	0.0%	0.0%	0.0%	0.0%	-1.9 to -1.7	Lapse
C	0.0%	0.0%	0.0%	0.0%	-1.7 to -1.5	Lapse
D	50.6%	42.4%	44.3%	45.5%	-1.5 to -0.5	Neutral
E	9.3%	11.5%	12.0%	9.5%	-0.5 to 1.5	Weak Inversion
F	8.7%	11.2%	14.2%	10.7%	1.5 to 4	Moderate Inversion
G	31.4%	34.9%	29.5%	34.4%	>4.0	Strong Inversion
F + G	40.1%	46.1%	43.7%	45.1%	>1.5	Moderate to Strong Inversion

Note 1: ELR (Environmental Lapse Rate).

In accordance with the NPfl, prevailing winds of speed less than (or equal to) 3 m/s with a frequency of occurrence greater than (or equal to) 30%, and considered to be a feature of the project site. The frequency of occurrence of moderate to strong (ie 1.5 to >4.0°C/100 m) winter temperature inversions are greater than 30% during the combined evening and night-time period, hence temperature inversion requires assessment.

2.5 Sleep Disturbance

The EPA's most recent policy considers sleep disturbance as the emergence of the LA1(1minute) level above the LA90(15minute) level at the time. Appropriate screening criteria for sleep disturbance are determined to be an LA1(1minute) level 15 dBA above the Rating Background Level (RBL) for the night-time period (10.00 pm to 7.00 am).

When the criterion is not met, a more detailed analysis may be required which should cover the maximum noise level or LA1(1minute), the extent that the maximum noise level exceeds the background level and the number of times this occurs during the night-time period. Some guidance on possible impacts is contained in the review of research results in Section 5.4 of the NSW Road Noise Policy (RNP).

- Other factors that may be important in assessing the extent of impacts on sleep include:
- How often high noise events will occur;
- Time of day (normally between 10.00 pm and 7.00 pm); and
- Whether there are times of the day when there is a clear change in the noise environment (such as during early morning shoulder periods).

It is noteworthy that there are no specific criteria for sleep disturbance nominated in the NPI, in the RNP, or in the ICNG. This is consistent with the statement in the RNP that *"Despite intensive research, the triggers for and effects of sleep disturbance have not yet been conclusively determined."*

Section 5.4 of the RNP contains a review of international sleep disturbance research, indicating that:

- Maximum internal noise levels below 50-55 dBA are unlikely to awaken people; and
- One or two noise events per night with maximum internal noise levels of 65-70 dBA, are not likely to affect health and wellbeing significantly.

3 EXISTING ACOUSTICAL ENVIRONMENT

Environmental noise monitoring was conducted in SLR Report 610.14324-R1 'Erskine Park Resource Management Facility Staged SSD Stage 1 Waste Transfer Station Construction and Operation Noise Assessment'. The noise monitoring was undertaken as part of the EIS stage, and the results are summarised in this Section. **Table 4** presents the Rating Background Levels (RBLs) or background (LA90) noise levels for the noise monitoring locations from the Report.

Table 4 Summary of Existing LA90(15minute) Rating Background Levels (RBLs) and Existing LAeq(period) Ambient Noise Levels - dBA re 20 µPa

Location	LA90(15minute) Rating Background Level (RBL)			LAeq(period) Existing Ambient Noise Level		
	Daytime 0700-1800 Hours	Evening 1800-2200 Hours	Night-time 2200-0700 Hours	Daytime 0700-1800 Hours	Evening 1800-2200 Hours	Night-time 2200-0700 Hours
	NM1 - Mandalong Close	44	45	39	54	54
NM2 - Catholic Village	35	38	36	49	43	44
NM3 - Lenore Drive	46	48	44	57	54	53
NM4 - Verdi Glenn	43	41	39	51	53	48

4 OPERATIONAL NOISE TRIGGER LEVELS

The Development operational noise emission trigger levels have been set with reference to the NPFI, as outlined in **Section 2**, and based on the results of **Section 3**.

The resulting operational intrusive and amenity noise emission trigger levels are given in **Table 5**

Table 5 NPFI Project Specific Noise Trigger Levels (dBA re 20 µPa)

Location	Project Specific Assessment Trigger Levels					
	Intrusive LAeq(15minute)			Amenity LAeq(Period)		
	Day	Evening	Night	Day	Evening	Night
RR1	49 ¹	50 ¹	44 ¹	55 ⁶	45 ⁶	43 ⁶
RR2	40 ²	43 ²	41 ²	55 ⁶	45 ⁶	40 ⁶
RR3	51 ³	53 ³	49 ³	55 ⁶	45 ⁶	43 ⁶

Location	Project Specific Assessment Trigger Levels					
	Intrusive LAeq(15minute)			Amenity LAeq(Period)		
	Day	Evening	Night	Day	Evening	Night
RR4	48 ⁴	46 ⁴	44 ⁴	55 ⁶	45 ⁶	40 ⁶
CC1 ⁵	60	-	-	-	-	-
IR1	-	-	-	65	65	65
IR2	-	-	-	65	65	65
IR3	-	-	-	65	65	65

Note 1: Based on measured background at NM1 - Mandalong Close

Note 2: Based on measured background at NM2 - Catholic Village

Note 3: Based on measured background at NM3 - Lenore Drive

Note 4: Based on measured background at NM3 - Verdi Glenn

Note 5: The NPfl and Australian Standard AS/NZS 2107:2000 'Acoustics - Recommended design sound levels and reverberation times for building interiors' do not provide guideline values for internal noise levels in childcare centres. The Association of Australian Acoustical Consultants has a Technical Guideline - Child Care Centre Noise Assessment and this recommends an internal level of 40 dBA for playing and sleeping areas. The intrusive trigger level is based on the 40 dBA internal noise level and an external to internal noise reduction (fixed non-openable windows) of 20 dBA).

Note 6: The amenity trigger levels are based on an Urban noise amenity area corrected to account for existing industrial levels. (As a conservative approach, it was assumed that the ambient LAeq measured were dominated by the Erskine Business Park activities).

5 OPERATIONAL NOISE ASSESSMENT

5.1 Prediction of Noise Emissions - General Discussion

In order to determine the acoustical impact of the Development during construction and operations on the surrounding community, a computer model was developed which incorporates the significant noise sources and the intervening terrain to the closest potentially affected receivers.

The computer model was prepared using the SoundPLAN V7.1 Industrial Module, a commercial software system developed by Braunstein and Berndt GmbH in Germany. The software allows the use of various internationally recognised noise prediction algorithms. The CONCAWE algorithm, suitable for the assessment of large industrial plants, has been selected for this assessment as it also enables meteorological influences to be assessed.

The noise modelling takes into account source sound level emissions and locations, screening effects, receiver locations, meteorological effects, ground topography and noise attenuation due to spherical spreading and atmospheric absorption.

Noise predictions were calculated at all sensitive receivers described in SLR Report SLR Report 610.14324-R1

5.2 Prediction of Noise Emissions - Operations

5.2.1 Meteorological Parameters

The noise modelling meteorological parameters presented in **Table 6** are based on the meteorological conditions presented in **Section 2.4**.

Table 6 Operational Noise Modelling Meteorological Parameters

Season	Period	Air Temp	Relative Humidity	Wind Velocity	Temperature Gradient
Non-adverse Annual	Daytime	20°C	58%	0m/s	0oC/100m
Non-Adverse Annual	Evening	17°C	68%	0m/s	0oC/100m
Adverse Winter SW Wind	Evening	12°C	70%	3m/s SW	0oC/100m
Adverse Winter WSW Wind	Evening	12°C	70%	3m/s WSW	0oC/100m
Non-Adverse Annual	Night-time	14°C	81%	0m/s	0oC/100m
Adverse Winter WSW Wind	Night-time	9°C	80%	3m/s WSW	0oC/100m
Adverse Winter W Wind	Night-time	9°C	80%	3m/s W	0oC/100m
Adverse Winter SW Wind	Night-time	9°C	80%	3m/s SW	0oC/100m
Adverse Winter Temperature Inversion	Night-time	9°C	80%	0m/s	3oC/100m1

Note 1: Using NPI default inversion parameter for non-arid areas

5.2.2 Hours of operation

The Development will be capable of operating 24 hours a day, seven days a week (subject to approval); however, the majority of truck movements to and from the site will be between 7.00 am and 5.00 pm and within approved operating hours.

5.2.3 Equipment Operating

The noise sources at the Erskine Park Transfer Station with the addition of the Sort Line and Shredder are as listed in **Table 7**.

Table 7 Operational Plant

Location	Equipment	Number of units
Transfer Station Building	Material Handler	2
Transfer Station Building	Wheel Loader	1
Transfer Station Building	Sort Line and Electric Shredder	1
Top of Transfer Station Building	Fan Outlet Model TS4S750A15M with Silencer	3

Notes: 1. Use of Shredder is not intended to part of the Proposed Modification, being included to understand the potential impact if considered.

On site transports trucks

In accordance with the NPI, trucks and cars travelling on the site access road are included in site noise emissions.

Trucks have been modelled travelling from the site entrance to the proposed Erskine Park Transfer Station site as well as light vehicles travelling to the car park.

5.2.4 Equipment Sound Power Levels

The sound power levels (SWLs) listed in **Table 8**, have been adopted for this study.

Table 8 Equipment Plant and Associated Sound Power Levels

Equipment	LAeq SWL (per unit)	LAmx SWL (per unit)
CAT972 Wheel Loader	112 dBA	120 dBA
CAT318D Material Handler	104 dBA	110 dBA
Fan Outlet Model TS4S750A15M	105 dBA	-
Fan Outlet Model TS4S750A15M with Silencer	94 dBA	-
Waste Shredder ¹	113 dBA	116 dBA
Sort Line	106 dBA	110 dBA
On Site Car	98 dBA	101 dBA
On Site Refuse Collection Truck	108 dBA	113 dBA
On Site Transfer Truck	111 dBA	116 dBA
Truck Reversing Alarm ²	110 dBA	110 dBA
Brakes	-	120 dBA

Notes: 1. Use of Shredder is not intended to part of the Proposed Modification, being included to understand the potential impact if considered.
2. Typical truck reversing alarm is 105 dBA - 115 dBA and for the purpose of this assessment is assumed to be 110 dBA. It has also been assumed that reversing alarms used on site will have a broadband spectrum and will not be tonal.

5.2.5 Operational Scenarios Modelled

Based on the traffic scenarios presented in Report 610.14324-R1 Table 2, the following worse case operational scenarios were modelled with reference to **Table 6**:

- Erskine Park Transfer Operations - Daytime - Non-Adverse Annual
- Erskine Park Transfer Operations - Night-time - Non-Adverse Annual
- Erskine Park Transfer Operations - Night-time - Adverse Winter SW Wind
- Erskine Park Transfer Operations - Night-time - Adverse Winter WSW Wind
- Erskine Park Transfer Operations - Night-time - Adverse Winter Temperature Inversion

The operational scenario modelled for this assessment comprised the concurrent operations presented in **Table 9**. The assessment against the intrusiveness trigger levels was based on the worst case traffic scenarios presented in Report 610.14324-R1 Table 2, .i.e. 12.00 pm - 1.00 pm period during the day and the 5.00 am - 6.00 am period at night. The assessment against the amenity trigger levels is based on the total number of truck movements over the day and night time periods as presented in Report 610.14324-R1 Table 2.

Table 9 Operational Scenarios and Equipment Operating

Trigger Levels	Operational Scenarios	Period of Day/Weather	Equipment operating	On Site traffic
Intrusive ¹	1	Daytime Non-Adverse Annual	Transfer station building with loader, material handler, shredder and sort line operating inside, 3x fans fitted with silencer	Up to 33 refuse collection trucks entering and leaving site / 1 hour corresponding to up to 8 refuse collection trucks entering and leaving site / 15 minutes ² Up to 2 transfer truck entering and leaving site / 1 hour corresponding to up to 1 transfer truck entering and leaving site / 15 minutes ²
	2	Night-time Non-Adverse Annual	Transfer station building with loader and material handler operating inside, 3x fans fitted with silencer	Up to 21 refuse collection trucks entering and leaving site / 1 hour corresponding to up to 5 refuse collection trucks entering and leaving site / 15 minutes ³
	3	Night-time Adverse Summer SSW Wind		Up to 1 transfer truck entering and leaving site / 1 hour corresponding to up to 1 transfer truck entering and leaving site / 15 minutes ³
	4	Night-time Adverse Winter WSW Wind		
	5	Night-time Adverse Winter Temperature Inversion		
Amenity ¹	6	Daytime Non-Adverse Annual	Transfer station building with loader, material handler, shredder and sort line operating inside, 3x fans fitted with silencer	Up to 161 refuse collection trucks entering and leaving site / 11 hour ⁴ Up to 20 transfer truck entering and leaving site / 11 hour ⁴ Up to 10 cars entering and leaving site / 11 hour
	7	Night-time Non-Adverse Annual	Transfer station building with loader and material handler operating inside, 3x fans fitted with silencer	Up to 39 refuse collection trucks entering and leaving site / 9 hour ⁴
	8	Night-time Adverse Summer SSW Wind		Up to 9 transfer truck entering and leaving site / 9 hour ⁴
	9	Night-time Adverse Winter WSW Wind		Up to 10 cars entering and leaving site / 9 hour ⁴
	10	Night-time Adverse Winter Temperature Inversion		

Note 1: The intrusive trigger level is applicable over any 15 minute period whereas the amenity level is applicable over the whole daytime, evening or night-time period, as appropriate.

Note 2: Based on Daily number of Trucks – Report 610.14324-R1 Table 2 - Hours ending at 1.00 pm.

Note 3: Based on Daily number of Trucks – Report 610.14324-R1 Table 2 - Hours ending at 6.00 am.

Note 4: Based on Daily number of Trucks – Report 610.14324-R1 Table 2.

Within the noise model, operations consisted of all plant items operating concurrently in order to simulate the overall maximum potential noise emission.

5.2.6 Noise Impact Assessment - Operations

Predicted noise level contributions from the 'worst case' proposed operations of the Erskine Park Transfer Station together with the respective trigger levels at the assessment locations are presented in **Table 10** and **Table 11**. Predicted $LA_{1(1\text{minute})}$ noise level contributions to assess sleep disturbance are presented in **Table 12** together with the respective trigger levels at the residential locations.

Table 10 Predicted INTRUSIVE Erskine Park Transfer Station Operations LAeq(15minute) Noise Levels - dBA re 20 µPa

Receivers	Predicted INTRUSIVE LAeq(15minute) Noise Level					INTRUSIVE LAeq(15minute) Noise Trigger Levels	
	Sc 1 Daytime Non-Adverse Annual	Sc 2 Night-time Non-Adverse Annual	Sc 3 Night-time Adverse Winter SW Wind	Sc 4 Night-time Adverse Winter WSW Wind	Sc 5 Night-time Adverse Winter Temp. Inversion	Daytime	Night-time
NM1	35	34	28	28	38	49	44
NM2	30	29	26	31	34	40	41
NM3	30	28	33	33	33	51	49
NM4	38	36	41	40	40	48	44
CC1 ¹	35	34	29	28	38	60	NA
IR1 ¹	62	60	61	60	61	NA	NA
IR2 ¹	55	53	51	51	55	NA	NA
IR3 ¹	54	52	51	52	53	NA	NA

Table 11 Predicted AMENITY Erskine Park Transfer Station Operations LAeq(period) Noise Levels- dBA re 20 µPa

Receivers	Predicted AMENITY LAeq(15minute) Noise Level					AMENITY LAeq(Period) Noise Trigger Levels	
	Sc 1 Daytime Non-Adverse Annual	Sc 2 Night-time Non-Adverse Annual	Sc 3 Night-time Adverse Winter SW Wind	Sc 4 Night-time Adverse Winter WSW Wind	Sc 5 Night-time Adverse Winter Temp. Inversion	Daytime (11 Hours)	Night-time (9 Hours)
NM1	33	31	26	25	34	55	43
NM2	29	26	24	28	31	55	40
NM3	28	26	31	31	30	55	43

Receivers	Predicted AMENITY LAeq(15minute) Noise Level					AMENITY LAeq(Period) Noise Trigger Levels	
	Sc 1 Daytime Non- Adverse Annual	Sc 2 Night- time Non- Adverse Annual	Sc 3 Night- time Adverse Winter SW Wind	Sc 4 Night- time Adverse Winter WSW Wind	Sc 5 Night-time Adverse Winter Temp. Inversion	Daytime (11 Hours)	Night-time (9 Hours)
NM4	36	33	38	37	37	55	40
CC1 ¹	33	31	26	26	35	NA	NA
IR1 ¹	60	57	57	57	58	65	65
IR2 ¹	54	51	49	49	52	65	65
IR3 ¹	52	50	50	50	51	65	65

Table 12 Predicted Erskine Park Transfer Station Operations LA1(1minute) - Sleep Disturbance - dBA re 20 µPa

Receivers	Predicted LA1(1minute) Noise Level				LA1(1minute) Sleep Disturbance Criteria
	Night-time Non-Adverse Annual	Night-time Adverse Summer SSW Wind	Night-time Adverse Winter WSW Wind	Night-time Adverse Winter Temperature Inversion	Night-time
NM1	42	36	35	46	54
NM2	38	31	35	43	51
NM3	32	37	37	36	59
NM4	42	47	46	46	54
CC1 ¹	N/A	N/A	N/A	N/A	N/A
IR1 ¹	N/A	N/A	N/A	N/A	N/A
IR2 ¹	N/A	N/A	N/A	N/A	N/A
IR3 ¹	N/A	N/A	N/A	N/A	N/A

Note 1: N/A - Sleep disturbance apply to residences only.

Discussion and Conclusion

Review of **Table 10** and **Table 11** indicates that the operational noise emissions from the proposed Erskine Park Transfer Station are predicted to be below or to meet the intrusive and amenity noise trigger levels at all of the noise assessment locations. Compliance is predicted for daytime, evening and night-time. $L_{Aeq(15\text{minute})}$ noise contour diagrams for the daytime scenario and night-time worst case scenario (Adverse Winter Temperature Inversion) are presented in **Appendix A1** and **Appendix A2** respectively.

In relation to the potential for sleep disturbance, the EPA, as presented in **Section 2.5**, suggest that the $L_{A1(1\text{minute})}$ noise level from any specific noise (ideally) should not exceed the L_{A90} background noise level by more than 15 dBA.

A review of noise events from the proposed Erskine Park Transfer Station operations (**Table 12**) shows that the $L_{A1(1\text{minute})}$ noise levels comply with the EPA's sleep disturbance screening criterion.

It is noted whilst the sleep disturbance screening criteria are clearly met the reversing alarms might be audible. In the event that reversing alarm noise is considered to be a source of disturbance, the alarm noise level should be checked against the appropriate regulatory and health and safety requirements and the necessary mitigating action taken to achieve an acceptable noise reduction without compromising safety standards.

In conclusion the addition of the Sort Line and Shredder to the Waste Transfer Station enables the operation to be within the compliance levels determined in accordance with EPA's NPfl.

Checked/YL Authorised by: JS

APPENDIX A1 NOISE CONTOURS – OPERATIONAL INTRUSIVE SCENARIO – DAYTIME – NON ADVERSE



APPENDIX A2 NOISE CONTOURS – OPERATIONAL INTRUSIVE SCENARIO – NIGHT-TIME ADVERSE (WINTER TEMPERATURE INVERSION)

