Perisher Valley Waste Transfer Station

Noise Impact Assessment

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NSW National Parks and Wildlife Service
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1 INTRODUCTION

The NSW National Parks and Wildlife Service (NPWS) propose to build a new Waste Transfer Station (WTS), a new workshop facility and office building in the Perisher Services Precinct in Perisher Valley, NSW.

Heggies Pty Ltd (Heggies) has been engaged by NGH Environmental on behalf of the NPWS to prepare an assessment of the potential noise impacts associated with the project. This report presents the results of this assessment and forms part of the Review of Environmental Factors submission.

The office building has not been assessed as part of this report.

2 SITE LOCATION

The proposal site is located within the ski resort village of Perisher Valley. The site is located opposite the central car parking facility and the proposed precinct development would augment existing facilities in the precinct which currently include a fire station, an ambulance building, Telstra exchange, a helipad and a church.

The WTS would be located at the south eastern extent of the Perisher Services Precinct, at the back of the precinct as viewed from Kosciuszko Road as shown in **Figure 1**.

Figure 1 Site Location

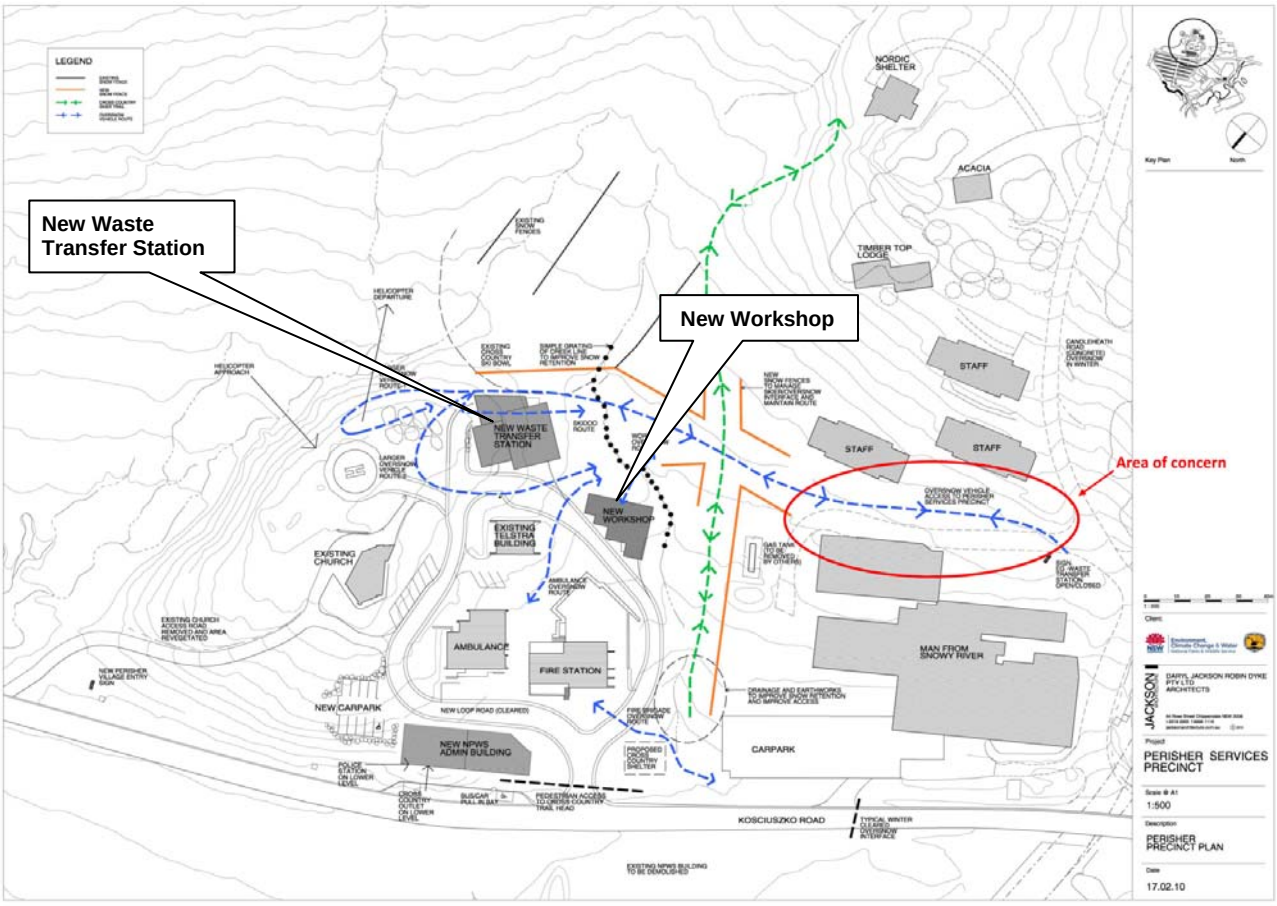


Image courtesy of NGH Environmental

3 PROJECT DESCRIPTION

3.1 Proposed Development

The purpose of the proposed Waste Transfer Station (WTS) is to improve waste management in the Perisher Range Resort (PRR) area to allow for expected growth in overnight and day visitations and associated increases in waste and recyclables. The new workshop will be primarily used for storing and maintaining vehicles and equipment.

The Waste Transfer Station would operate year round with peak operations expected during the 16 week ski season from June to October. The WTS would be accessible by both conventional wheeled vehicles and oversnow vehicles (snowmobiles and snow cats) to enable delivery, transfer and off - site transportation of waste and recyclables.

The WTS would have a footprint of approximately 450 m^2. It would be approximately 25 metres in length, 25 metres wide and 8 metres tall at its highest point. The facility would be fully enclosed to allow operation during the extreme weather conditions experienced in winter.

External facades would be of stone and various metal wall cladding that would conform with relevant development guidelines and controls for Perisher Valley. Two roller doors would provide truck and snowmobile access on the north east façade of the building. A roller door on the south west façade allows for snowmobile exit. The northwest façade of the building would abut the services precinct loop road and would include a stairway with handrail for pedestrian accessing and four roller doors, three of which would allow access to hoppers and compactors to remove different waste streams. The fourth roller door would allow trucks to exit the WTS.

The proposed workshop will generally only be used for routine servicing of vehicles and equipment. No significant fabrication work or heavy engineering will be completed in the workshop. The workshop will be of a similar construction to the WTS with roller door access.

3.2 Vehicle Movements

Transport of waste from the WTS will be through road based trucks that will collect containers of compacted garbage from the WTS several times per week, with access being achieved through the cleared loop road. These limited numbers of transport movements will be during day time hours only and the vehicular route does not generally pass close to any residential receptors and is not considered to be a significant impact risk.

Transport of waste to the WTS during the busier winter months will be primarily using oversnow vehicles, namely snow cat vehicles or snowmobiles. These are either contracted collection services (e.g. Hans Oversnow) or lodge and business operators. Eventually a full collection service will be put in place in which only snow cats will be used.

The volume of oversnow traffic will be highly seasonal, with peak mid winter volumes as follows.

Current oversnow traffic & prior to full collection service in place;

- 72 snow cat movements to & from the WTS over a 7 day period or 10 per day on average
- 556 snowmobile movements to & from the WTS over a 7 day period or 79 per day on average

Full collection service in place;

- 142 snow cat movements to & from the WTS over a 7 day period or 20 per day on average

Opening hours of the waste transfer station shall be limited to only the day time hours documented in **Table 1** and it is expected that the oversnow routes would only be used during these times for WTS operations. NPWS and Ambulance oversnow vehicles will use this route during and outside of these hours.

Table 1 Proposed WTS daily opening hours 2012 to 2017

Opening hours	Delivery type
7am - 8am	Perisher Blue deliveries (incl Mid-Station) via Loop Road, not oversnow
8am - 10am	Closed to all deliveries
10am - 12 noon	Open to all deliveries except oversnow vehicles with trailer bins
12 noon – 3pm	Oversnow vehicles with trailer bins and Charlotte Pass Village
3pm – 7pm	Open to all deliveries except oversnow vehicles with trailer bins

Beyond 2017 it is anticipated that a full collection service will be in place with the waste transfer station acess limited to the hours documented in **Table 2** and it is expected that the oversnow routes should only be used during these times.

Table 2 Proposed WTS daily opening hours 2012 to 2017

Opening hours	Delivery type
7am - 8am	Perisher Blue deliveries (incl Mid-Station) via Loop Road, not oversnow
8am - 10am	Closed to all deliveries
10am - 3pm	Collection service vehicle deliveries

An exit platform for oversnow vehicles would be provided on the southern corner of the WTS, allowing oversnow vehicles to rejoin the oversnow access route over an unnamed creekline to the west of the proposal site. The oversnow routes are indicated in **Figure 1** by dashed blue line with the majority of oversnow vehicles to be directed between Perisher Blue Staff Accommodation Blocks (PBSAB) and the rear of the Man From Snowy River Hotel (MFSRH) accommodation wing. This portion of the route has been highlighted as an area of concern with regards to potential for noise impacts on staff and guest accommodation areas.

The WTS and workshop will be manned by a small workforce of approximately 12 people and accordingly only a minimal number of vehicle movements are expected to be generated by staff.

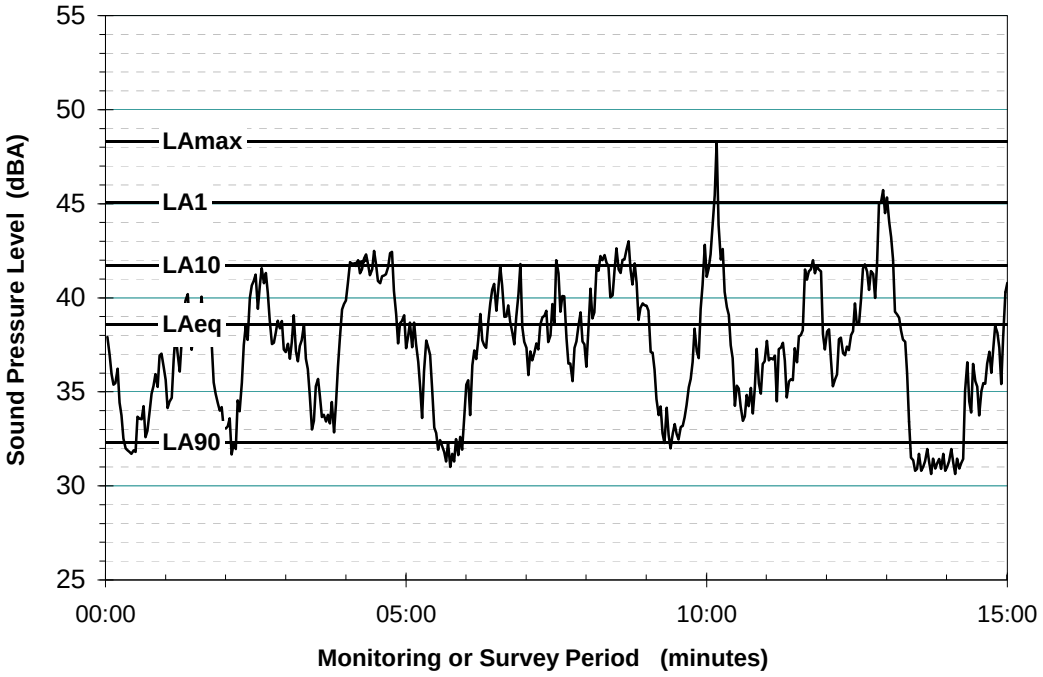
4 ACOUSTICAL TERMINOLOGY USED IN THE REPORT

4.1 Acoustical Descriptors and Typical Noise Levels

This report makes repeated reference to certain statistical noise level descriptors, in particular the L_{A10}, L_{Aeq}, L_{A90}, L_{A1} and L_{Amax} noise levels, depicted graphically in **Figure 2**.

- The L_{A10} noise level is the A-weighted sound pressure level exceeded 10% of a given measurement period and is utilised normally to characterise typical average maximum noise levels.
- The L_{Aeq} is essentially the average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound over the same measurement period.
- The L_{A90} noise level is the A-weighted sound pressure level exceeded 90% of a given measurement period and is representative of the average minimum background sound level (in the absence of the source under consideration), or simply the "background" level.
- The L_{A1} noise level is the A-weighted sound pressure level exceeded 1% of a given measurement period and is utilised normally to characterise typical maximum noise levels.
- The L_{Amax} noise level is the maximum A-weighted sound pressure level measured over the given measurement period.

Figure 2 Graphical Display of Statistical Noise Level Descriptors



A range of typical noise levels is shown in **Table 3**.

Table 3 Typical Noise Levels

Sound Pressure Level (dBA)	Typical Source	Subjective Evaluation
130	Threshold of pain	Intolerable
120	Heavy rock concert	
110	Grinding on steel	Extremely noisy
100	Loud car horn at 3 m	
90	Construction site with pneumatic hammering	Very noisy
80	Kerb side of busy street	Loud
70	Loud radio or television	
60	Department store	Moderate to
50	General Office	Quiet
40	Inside private office	Quiet to
30	Inside bedroom	Very quiet
20	Unoccupied recording studio	Almost silent

4.2 A-Weighting or dBA Levels

The overall level of a sound is usually expressed in terms of dBA, as is the case in Australian Standards (AS) 1055 *Acoustics – Description and measurement of environmental noise*, which is measured using the "A-weighting" filter incorporated in sound level meters. These filters have a frequency response corresponding approximately to that of human hearing.

People's hearing is most sensitive to sounds at mid frequencies (500 Hz to 4000 Hz), and less sensitive at lower and higher frequencies. Thus, the level of a sound in dBA is a good measure of the loudness of that sound.

Different sources having the same dBA level generally sound about equally as loud, although the perceived loudness can also be affected by the character of the sound (eg the loudness of human speech and a distant motorbike may be perceived differently, although they are of the same dBA level).

4.3 Sensitivity to Noise Levels Changes

A change of less than 3 dBA in the level of a sound is difficult for most people to detect, whilst a 3 dBA to 5 dBA change corresponds to a small but noticeable change in loudness. A 10 dBA change corresponds to an approximate doubling or halving in loudness.

5 EXISTING NOISE ENVIRONMENT

In order to quantify the existing ambient noise environment of the area, noise monitoring was conducted on the north eastern façade of the Man From Snowy River Hotel (MFSRH). This location was selected as being representative of the potentially most affected residential receivers by the proposed development. The monitoring location was chosen after a detailed inspection of the area giving consideration to other noise sources which may influence the readings, the proximity of noise-sensitive receivers, security issues for the noise monitoring device and gaining permission for access from the landowners.

Figure 3 Noise logger in position.

Unattended environmental noise monitoring was conducted between Friday 13 August 2010 and Friday 20 August 2010.

Instrumentation for the survey comprised an Acoustic Research Laboratories (ARL) Ngara Environmental Noise Logger (Serial number 878053) fitted with microphone and windshield. Noise monitoring was configured to include both sound pressure level time history as well as WAV audio. Calibration of the logger was checked prior to and following measurements. Drift in calibration did not exceed ±0.5 dBA. All equipment carried appropriate and current NATA (or manufacturer) calibration certificates.

Whilst data was recorded for the entire monitoring period an as yet undiagnosed technical failure of the noise logger resulted in most of the files being corrupted. Fortunately the first six hours of the data were unaffected and the ambient noise environment in the period from 1 pm through until 7 pm was quantified. A graphical representation of the ambient noise levels analysed into 15 minute statistics and short term L_{eq} time trace is presented in **Figure 4**. This data is sufficient to quantify typical existing ambient noise levels in the vicinity of noise sensitive receptors during the time period when the WTS and oversnow routes are operational.

Noise monitoring conducted in Perisher Valley, at the Ski-tube Terminal in September 2002 by Heggies for a period of 2 weeks gave ambient background noise levels significantly higher in level, owing to the greater amount of activity that this area experiences. The background noise data collected in 2010 will therefore be used to establish criteria which would be more conservative.

The measured data was processed in general accordance with the NSW Department of Environment, Climate Change and Water's (DECCW) *Industrial Noise Policy* (INP) assessment time periods. **Table 4** details the RBL (background) and L_{Aeq} noise levels recorded during the daytime and evening time periods.

Table 4 Measured Ambient Noise Levels Corresponding to DECCW Industrial Noise Policy Assessment Time Periods

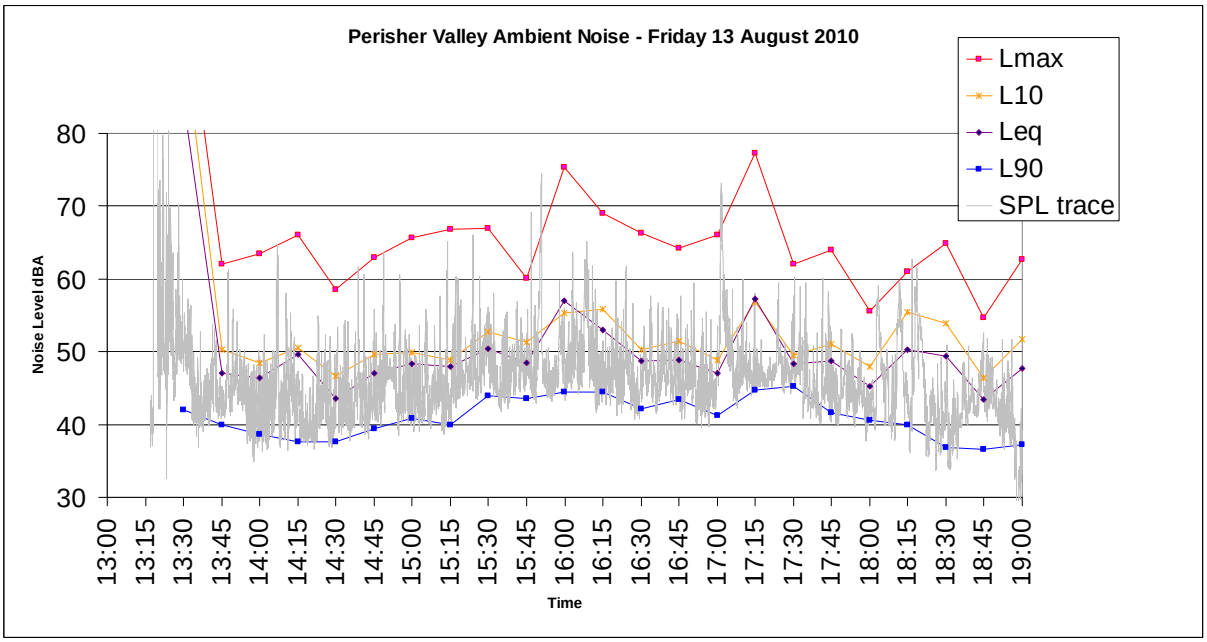
Logger Location	Noise Level – dBA re 20 µPa			
	Daytime		Evening	
	RBL [1]	LAeq [2]	RBL	LAeq
Perisher Valley	38.4	51.0	36.7	48.0

Note 1: The RBL noise level is representative of the average minimum background sound level (in the absence of the source under consideration), or simply the background level.

Note 2: The L_{Aeq} is essentially the average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound.

Note 3: The evening period was limited to only a single hour of available data.

Figure 4 Statistical Noise Level Data – 24 Hour Summary



5.1 Discussion of Results

The ambient noise survey results reflect a noise environment influenced by a wide variety of noise sources, from distant plant and equipment (exhaust fans, ski lift operation, mechanical plant), vehicle traffic (oversnow and road), recreational activity (people skiing and talking etc.) and natural sources (wind, birds etc.). The highest noise levels (the SPL trace peaks) were caused by oversnow vehicle movements (snow cats and skidoo movements) grooming activity (on the cross country trail) and groomer reverse alarms.

The measurements show background L_{A90} noise levels generally ranging between 38 dBA and 45 dBA during the daytime. The limited data in the evening gave background L_{A90} levels range between 36 dBA and 40 dBA.

6 OVERSNOW VEHICLE NOISE MEASUREMENTS

Detailed noise measurements were taken on Friday 13 August 2010 of numerous oversnow vehicles. Testing of 4 different NPWS snowmobiles and a single Snowcat (Hans Oversnow) was completed including simultaneous external (façade) measurements and internal (MFSRH and PBSAB) measurements with both window open and window closed conditions. Reference tests were also completed for free-field conditions to establish the sound power level of each vehicle, the results of which are included in **Table 12**.

Figure 5 Noise testing of oversnow vehicles

7 ASSESSMENT CRITERIA

7.1 INP 2000 Criteria for Operational Noise Emissions

Responsibility for the control of noise emissions in New South Wales is vested in Local Government and the Department of Environment, Climate Change and Water (DECCW). The DECCW oversee the *Industrial Noise Policy* (INP) which provides a framework and process for deriving noise criteria for consents and licences that will enable the DECCW and others to regulate premises that are scheduled under the Protection of the Environment Operations Act 1997.

The INP criteria for industrial noise sources have two components:

- Controlling the *intrusive* noise impacts for residents and other sensitive receivers in the short term; and
- Maintaining noise level *amenity* for particular land uses for residents and sensitive receivers in other land uses.

Intrusiveness Criterion

In setting an "Intrusive" noise goal, a statistically rigorous estimate of the ambient (background) L_{A90} noise level, termed the RBL, needs to be established at the nearest sensitive receivers. An "RBL plus 5 dBA" criterion is then applied to the 15-minute L_{Aeq} noise emissions of the noise source in question at the receivers of interest (normally at their property boundary).

Intrusive Design Goal: $L_{Aeq(15minute)} \leq$ RBL + 5 dBA

Section 3.1 of the INP recommends that, where the RBL is found to be below 30 dBA, it is set at 30 dBA. This requirement is not relevant to this situation.

Amenity Criterion

The amenity assessment is based on noise criteria specific to land use and associated activities. The criteria relate only to industrial-type noise and do not include road, rail or community noise. If present, the existing noise level from industry is generally measured. If it approaches the criterion value, then noise levels from new industries need to be designed so that the cumulative effect does not produce noise levels that would significantly exceed the criterion. For high-traffic areas there is a separate amenity criterion.

The cumulative effect of noise from industrial sources needs to be considered in assessing the impact. In order to determine the amenity noise goal, the maximum ambient L_{Aeq} noise levels within an area should not normally exceed the acceptable noise levels specified in **Table 5**. Where existing L_{Aeq} noise levels approach or exceed the acceptable noise levels given in **Table 5**, L_{Aeq} noise design goals are set below the existing L_{Aeq} levels in order to limit any further increase or "creep" in the ambient levels.

An extract from the NSW INP that relates to the amenity criteria recommended for the receiver types relevant to this assessment is given in **Table 5**.

Table 5 Amenity Criteria - Recommended External L_{Aeq} Noise Levels from Industrial Noise Sources

Type of Receiver	Indicative Noise Amenity Area	Time of Day	Recommended L_{Aeq}[1] Noise Level	
			Acceptable	Recommended Maximum
Residence	Suburban	Day	55 dBA	60 dBA
		Evening	45 dBA	50 dBA
		Night	40 dBA	45 dBA
Industrial premises	All	When in use	70 dBA	75 dBA

Notes:

1 The L_{Aeq} index corresponds to the level of noise equivalent to the energy average of noise levels occurring over a measurement period.

2 For Monday to Saturday, Daytime 7.00 am – 6.00 pm; Evening 6.00 pm – 10.00 pm; Night-time 10.00 pm – 7.00 am.

3 On Sundays and Public Holidays, Daytime 8.00 am – 6.00 pm; Evening 6.00 pm – 10.00 pm; Night-time 10.00 pm – 8.00 am.

7.2 Sleep Disturbance

Sleep disturbance is generally only considered during the night-time and as the hours of operation of the WTS and related oversnow routes is only to occur during the day then it would not typically be evaluated.

However, some concerns have been raised with respect to the PBSAB where a number of staff are night shift workers (snow making, groomers, hospitality staff etc.) and may be sleeping during the day-time. Furthermore, the accommodation areas of the hotel are sometimes occupied by families with young children that may sleep during the day.

In order to minimise the risk of sleep disturbance from industrial operations from the WTS and workshop, the DECCW's Environmental Noise Control Manual (ENCM) recommends that:

- The $L_{A1\ (60second)}$ noise level outside a bedroom window should not exceed the L_{A90} background noise level by more than 15 dBA during night-time period (10.00 pm to 7.00 am). The $L_{A1\ (60second)}$ noise level may conservatively be estimated by the typical maximum level of noise emission.

Based on the measured background noise levels during the day period the sleep disturbance criteria for the nearest and potentially most affected residential receivers are presented in **Table 6**.

Table 6 Night-time Sleep Disturbance Criteria

Sleep Disturbance Criteria	
Measured RBL	**Criteria $L_{A1(60second)}$**
38 dBA	53 dBA

The DECCW's Environmental Criteria for Road Traffic Noise (ECRTN) provides additional guidance as to the likelihood of sleep disturbance and points out the following:

> *"There is no universally accepted criterion governing the likelihood of sleep disturbance. In other words, at the current level of understanding, it is not possible to establish absolute noise level criteria that would correlate to an acceptable level of sleep disturbance (for all or even a majority of people)."*

In summary of the reviewed technical literature with regards to sleep disturbance the document concludes;

- Maximum internal noise levels below 50-55 dBA are unlikely to cause awakening reactions.
- One or two noise events per night of 65-70 dBA are not likely to affect health and wellbeing significantly.

The RTA *"Environmental Noise Management Manual"* (ENMM, January 2002), addresses sleep disturbance in a similar fashion. With respect to road traffic noise, it is required to assess the characteristics of so-called "maximum noise events" at nearest residential receivers, namely their occurrence throughout the night-time period (ie how many on an hourly basis) and their magnitudes. A "maximum noise event" is defined as any single event where the L_{Amax} level exceeds the $L_{Aeq(1hr)}$ level by more than 15 dBA.

7.3 Project Specific Noise Goals – Operational Noise

The project-specific goals for the continuous operational noise emissions including mechanical plant and equipment are given in **Table 7.**

Table 7 Assessment Criteria for Industrial Noise Emissions

Location	Area Classification	Period [1]	ANL [2] L_{Aeq} (period) dBA	Measured RBL [3] $L_{A90(15min)}$ dBA	Measured $L_{Aeq(period)}$ Noise Level dBA	Criteria for New Sources	
						Intrusive $L_{Aeq(15min)}$	Sleep Disturbance [4] L_{AMax}
MFSRH & PBSAB	Residential	Day	55	38	51	**43**	55
		Evening	45	37	48	**41**	55
		Night	40	NA	NA	**40**	55

Note 1: DECCW Governing Periods are Day: 7.00 am to 6.00 pm, Evening: 6.00 pm to 10.00 pm, Night: 10.00 pm to 7.00 am.
Note 2: Recommended - ANL Acceptable Noise Level
Note 3: RBL Rating Background Level
Note 4: Sleep disturbance is bedroom internal noise level

An intrusiveness criterion of **43 dBA** will be the determining limit for operational noise emissions for day operations of the WTS and Workshop and short term noise levels with up **to 55 dBA** L_{max} internal for sleep disturbance..

7.4 Road Traffic Noise (oversnow vehicles)

The DECCW's *Environmental Criteria for Road Traffic Noise* (ECRTN) presents the NSW Government's noise design goals for the assessment of road traffic noise and will form the basis of assessment for oversnow vehicle movements.

The ECRTN document contains recommended road traffic noise criteria for various types of road and land use developments. The relevant criteria relating to land use developments with the potential to generate additional traffic on 'collector' roads is summarised in **Table 8**.

Table 8 DECCW Guidelines for Road Traffic Noise at Residences

Type of Development	Criteria		
	Day (7.00 am to 10.00 pm)	**Night (10.00 pm to 7.00 am)**	**Where Criteria are Already Exceeded**
Land use developments with potential to create additional traffic on collector roads	$L_{Aeq(1hour)}$ 60 dBA	$L_{Aeq(1hour)}$ 55 dBA	Where feasible and reasonable, existing noise levels should be mitigated to meet the noise criteria via judicious design construction of the development. In all cases, traffic arising from the development should not lead to an increase in existing noise levels by more than 2 dB.

Definitions: Land use developments with potential to create additional traffic – addresses the acceptable level of traffic noise impact for existing residences.

In circumstances where ambient L_{Aeq} noise levels are *already* being exceeded, application of the ECRTN criteria would then be to ensure that, at a minimum, traffic arising from the proposed development should not lead to an increase in existing noise levels of more than 2 dB.

It is noted that the noise criteria presented within the ECRTN noise policy document are guidelines and non-mandatory.

Furthermore, with regards to sleep disturbance already addressed in **Section 6.2** the literature would suggest that;

- Maximum internal noise levels below 50-55 dBA are unlikely to cause awakening reactions.
- One or two noise events per night of 65-70 dBA are not likely to affect health and wellbeing significantly.

7.5 Construction Noise

The DECCW issued the "*Interim Construction Noise Guideline"* in July 2009. The main objectives of the guideline are stated in Section 1.3, a portion of which is presented below:

- promote a clear understanding of ways to identify and minimise noise from construction works.
- focus on applying all 'feasible' and 'reasonable' work practices to minimise construction noise impacts.
- encourage construction to be undertaken only during the recommended standard hours unless approval is given for works that cannot be undertaken during these hours.

The guideline sets out Noise Management Levels (NMLs) at residences, and how they are to be applied, as presented in **Table 9**. This approach intends to provide respite for residents exposed to excessive construction noise outside the recommended standard hours whilst allowing construction during the recommended standard hours without undue constraints.

Table 9 Noise at Residences Using Quantitative Assessment

Time of Day	Management Level $L_{Aeq(15minute)}$[1]	How to Apply
Recommended standard hours: Monday to Friday 7.00 am to 6.00 pm Saturday 8.00 am to 1.00 pm No work on Sundays or public holidays	Noise affected RBL + 10 dBA	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq(15minute)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to minimise noise. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details
	Highly noise affected 75 dBA	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the proponent should consider very carefully if there is any other feasible and reasonable way to reduce noise to below this level. If no quieter work method is feasible and reasonable, and the works proceed, the proponent should communicate with the impacted residents by clearly explaining the duration and noise level of the works, and by describing any respite periods that will be provided.
Outside recommended standard hours	Noise affected RBL + 5 dBA	A strong justification would typically be required for works outside the recommended standard hours. The proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5 dBA above the noise affected level, the proponent should negotiate with the community.

Note 1: Noise levels apply at the property boundary that is most exposed to construction noise. If the property boundary is more than 30 m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 m of the residence.

8 PREDICTED NOISE EMISSIONS

8.1 Proposed Operations

Calculations have been conducted to assess the impact of the following noise sources or operations associated with typical workshop and WTS facilities:

- Mechanical ventilation plant
- Vehicle movements within the WTS and emptying rubbish into bins, rubbish compaction equipment, workshop activities (hammer, compressor etc.)
- Vehicle operations in the hardstand area (e.g. forklifts, truck engines and reversing alarms);
- Oversnow movements external to the site.

8.2 Source Noise Levels

8.2.1 Indoor noise sources

Rubbish arriving from the resort will be taken into the WTS through roller door access and transferred from the oversnow vehicles and emptied into assorted bins for recycling. Emptying of glass bottles is expected to produce the highest short term noise levels. Rubbish compaction of some of the bins is expected to occur periodically within the WTS for short term events. The noise levels associated with emptying of glass into bins, the compaction and the loading and unloading of compaction bins are based upon measurements of similar equipment. Typical sound power levels for these activities are included in **Table 10**.

Table 10 Typical Short Term Noise Events - Indoors

Noise Source	Typical Sound Power Level L_{Max} L_W (dBA)
Emptying of glass into bin	120
Compaction	87
Loading of compaction bin onto truck	108

8.2.2 Outdoor noise sources

Outdoor noise sources from the WTS and workshop (excluding oversnow vehicles en-route) areas are assessable under the INP.

The WTS and workshop buildings will not be air-conditioned. Both buildings will have portions heated by an internal gas fired boiler and in-slab hydronics.

The WTS will have a reverse cycle air conditioning unit and a toilet exhaust fan on the north-eastern side of the building towards the helipad. The workshop will have a toilet exhaust fan on the south side of the building and a workshop exhaust fan to the south-west side.

Noise will be generated by activities associated with trucks arriving and leaving, including the operation of reversing alarms. Typical sound power levels for these activities are included in **Table 11**.

Table 11 Typical Noise Sources - Outdoors

Noise Source	Typical Sound Power Level L_{eq} L_w (dBA)
Workshop Ventilation Fan	85
Reversing Alarm	100 – 110
Truck Engine	100
Forklift	85
Roller Door	84
Raised Voices	83

8.2.3 Oversnow noise sources

The most significant traffic noise sources will be oversnow vehicles. Extensive passby noise testing of snowcat and snowmobile noise levels during typical operation gave the typical sound power levels included in **Table 12**.

Table 12 Typical Oversnow Traffic Noise Sources

Noise Source	Typical Sound Power Level L_{eq} L_w (dBA)
Snowcat (Hans Oversnow)	108
Snowcat – reverse alarm	110
Snowmobile Maroon – 52728C	101
Snowmobile Black – 71597C	103
Snowmobile Red – 52729C	102
Snowmobile Black – 527 41C	108

8.3 Predicted Noise Emissions

8.3.1 Operations Noise

Noise levels have been calculated in accordance to ISO9613:1998 algorithms to the nearest noise sensitive receptors, being the accommodation areas of the MFSRH and PBSAB. Calculated received noise levels for various outdoor activities are included in **Table 13**.

Table 13 Typical Noise Sources - Outdoors

Noise Source	Perisher Blue Staff Accommodation Block dBA			Man From Snowy River Hotel dBA		
	Outside	Inside Window Open	Inside Window Closed	Outside	Inside Window Open	Inside Window Closed
Ventilation fan running at Workshop	18	-	-	18	-	-
Garbage truck on hardstand area	29	17	4	29	17	4
Forklift on hardstand area	14	-	-	13	-	-
Roller door operation – closest side	35	23	10	34	22	9
Raised voices	14	-	-	13	-	-
Combined Total (Worst case)	***36***			***35***		

Calculated received noise levels for various short term indoor activities are included in **Table 14**

Table 14 Typical Noise Sources - Indoors

Noise Source	Perisher Blue Staff Accommodation Block dBA			Man From Snowy River Hotel dBA		
	Outside	Inside Window Open	Inside Window Closed	Outside	Inside Window Open	Inside Window Closed
Emptying of glass into bin	34	22	9	32	20	7
Compaction	7	-	-	5	-	-
Loading of compaction bin onto truck	22	10	-	20	8	-

8.3.2 Oversnow Traffic Noise

Based upon the projected number of oversnow vehicles using the WTS facility and the proposed hours of operation the noise levels at the noise sensitive accommodation areas has been predicted;

Table 15 Typical Noise Sources - Outdoors

Noise Source	**Perisher Blue Staff Accommodation Block & Man From Snowy River Hotel**			
	L_{eq} (1hour) Outside	**L_{max} Outside**	**L_{max} Inside Window Open**	**L_{max} Inside Window Closed**
Current oversnow traffic	57 dBA	75 – 80 dBA up to 90 events per day	64 – 69 dBA	53 – 58 dBA
Full collection service	55 dBA	77 – 82 dBA up to 20 events per day	62 – 67 dBA	49 – 54 dBA

8.4 Construction Noise

The site is cleared; therefore noise emissions during construction would be generated by typical construction activities involving limited earthworks, concrete foundation ours and hand held power tools and the like. Construction works will be conducted during the recommended standard hours and as such are not considered to be of acoustical significance at residential receivers.

9 ASSESSMENT OF NOISE EMISSIONS

9.1 Operational Noise

9.1.1 Mechanical Plant & Hardstand Operations

An $L_{Aeq(15\ min)}$ level of 29 dBA has been predicted at the nearest noise sensitive receptors during garbage truck operation on the WTS hardstand area. A worst case evaluation which includes garbage truck, forklift and raised voices on the hardstand area combined with ventilation fan and operation of the most exposed roller door would result in levels up to 36 dBA which achieves the 43 dBA limiting criterion for continuous noise emissions.

9.1.2 Breakout Noise

Noise breakout from within the WTS and workshop buildings during typical operations, including the short term high noise events such as emptying of glass into bins, will comply with INP and sleep disturbance criteria and will typically be inaudible above the prevailing background noise levels at residential receivers.

9.2 Oversnow Traffic Noise

The additional oversnow traffic generated as a result of the proposed WTS will result in an increase in existing levels of oversnow traffic noise on the thoroughfare between the MFSRH and the PBSAB. The predicted $L_{Aeq(1hr)}$ noise levels (55 to 57 dBA) generated by the projected hourly vehicle movements achieves the recommended daytime Environmental Criteria for Road Traffic Noise (ECRTN) criteria at residential receptors of 60 dBA. It is anticipated that oversnow noise levels will reduce once a full collection service is implemented, owing to the reduced number of vehicles required.

Maximum noise levels from oversnow vehicle pass-bys to both residential receptors have been measured and predicted for the purposes of assessing the potential for sleep disturbance on occupants who may be sleeping or resting during the day period. It should be noted that this approach is exceptional as typically sleep disturbance is only assessed during the night period.

With windows left open the maximum internal noise levels (62 to 69 dBA) and the number of events may be sufficiently high such that awakening reactions and disturbance could be experienced by some occupants. With windows closed the maximum internal noise levels (49 to 58 dBA) from oversnow pass by events is unlikely to cause awakening reactions. It should be noted that the response of individuals is quite varied and the awakening response of people sleeping during the day period could be different (more or less sensitive to awakening reaction) to those sleeping during the night. It should be noted that individuals that sleep during the day period are often exposed to higher noise levels than those sleeping at night owing to the greater activity and noise events taking place during the day. It is for this reason that it is not uncommon for shift workers who sleep during the day period to wear earplugs.

We note that the rooms of the MFSRH and PBSAB have windows that are able to be opened, however, we would expect that during the winter months it is more usual for windows to be left closed. During the period when the noise measurements were being conducted the weather conditions were unseasonably warm and sunny and we noted that even under such conditions almost all windows within the MFSRH and PBSAB remained shut.

9.3 Construction Noise

Construction works will be carried out within the recommended standard hours and as such, noise from general construction activities is unlikely to adversely impact upon the acoustical amenity of residential receivers.

10 CONCLUSIONS

Heggies has conducted an assessment of the noise impact associated with the proposed development of a workshop and a WTS with an associated oversnow collection. This assessment has been carried out in accordance with NSW regulatory requirements and this report is to form part of a Review of Environmental Factors for the proposed development.

The scope of the assessment involved a survey of the existing noise environment; derivation and establishment of assessment criteria for noise emissions; a noise impact assessment relative to appropriate criteria; and, where required, recommendations for noise control measures. The findings are as follows:

Industrial Noise Sources

Compliance with project specific Industrial Noise Policy (INP) noise goals will be achieved at the nearest potentially sensitive residential receiver locations under typical and worst case operational scenario conditions.

Oversnow Related Noise Sources

Oversnow traffic generated by the development will comply with the DECCW *Environmental Criteria for Road Traffic Noise* (ECRTN) guidelines during the daytime and will generally result in maximum indoor noise levels (windows closed) which comply with representative sleep disturbance limits. When windows are open during the day, the maximum indoor noise levels may be high enough to result in awakening reactions or disturbances to some occupants.

Existing levels of road traffic noise will not be significantly increased as a result of the proposal.

Construction Noise

Construction works will be carried out within the recommended daytime hours and as such, noise from general construction activities is unlikely to adversely impact upon the acoustical amenity of residential receivers.

11 CLOSURE

This report has been prepared by Heggies Pty Ltd with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

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Heggies disclaims any responsibility to the client and others in respect of any matters outside the agreed scope of the work.