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# Central Victorian Livestock Exchange, Miners Rest

## Expert Witness Statement - Noise Impact Assessment

## Amendment C185 Ballarat Planning Scheme and EPA Works Approval Application

Report Number 640.11095-R1

12 June 2015

RLX Investment Company Pty Ltd
co- Harwood Andrews

Version: Revision 0

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# Expert Witness Statement - Noise Impact Assessment

# Amendment C185 Ballarat Planning Scheme and

# EPA Works Approval Application

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**APPENDICES**

## WITNESS STATEMENT

1. My name is Jim Antonopoulos and I am a Principal grade acoustical consultant employed by SLR Consulting Australia Pty Ltd at Suite 6, 131 Bulleen Road, Balwyn North, Victoria. I have previously worked as an acoustical consultant for Graeme E. Harding & Associates (1996 to 2003) and Heggies Pty Ltd (2003 to 2010). SLR Consulting Australia Pty Ltd acquired Heggies Pty Ltd in 2010.

2. My academic qualifications include a Bachelor of Applied Science (Applied Physics) and I am a Member of the Australian Acoustical Society (M.A.A.S). A short CV is provided in **Appendix A**.

3. I have worked as an acoustical consultant in Melbourne since 1996. My areas of expertise include building and environmental acoustics. I have been involved in numerous assessments of industrial and commercial noise in accordance with the relevant EPA noise policies and guidelines, and in planning related matters associated with commercial development adjacent to residential uses. I have also acted as a regular expert peer reviewer (and VCAT representation) for the last three years on acoustical matters relating to planning on behalf of one of the main municipal Councils in Melbourne, City of Yarra.

4. With regard to the subject application for the proposed relocation of the Central Victorian Livestock Exchange, I have:

   (a) Conducted a site inspection of the proposed site in Miners Rest on 24 May 2015.

   (b) Conducted site inspections and noise testing of both the existing Ballarat saleyard facility during a prime cattle sale (24/25 May 2015), and the existing Barnawartha / Wodonga facility during a store cattle sale (3/4 June 2015) event.

   (c) From the collected noise data, calculated noise impacts from the proposed facility to the nearest residential areas to the proposed Miners Rest site.

   (d) Reviewed the provided documents and information as supplied by Harwood Andrews in relation to the proposed facility.

## INSTRUCTIONS, SUPPLIED INFORMATION AND INFORMATION RELIED UPON

5. My instructions were provided by Harwood Andrews lawyers in email correspondence dated 6 May 2015.

6. My instructions included the review of the previously prepared acoustical planning report (prepared by Marshall Day Acoustics, dated 28 August 2014). I was also requested to undertake any additional testing and investigations such that I can prepare my own independent assessment and acoustical report in relation to the proposal for the new saleyard facility.

7. A list of documents I have received is included in **Appendix B**. In addition I have received:

   - Revised Conceptual Site Layout, prepared by Geolyse, dated 03/06/15
   - Building elevation drawings prepared by MKM Constructions, dated 24 March 2015 drawing A:03 and A:04
   - Email dated 9 June 2015 from Regional Infrastructure Pty Limited confirming times of truck movements associated with the facility.
   - Cattle and sheep sale throughput figures for the existing Ballarat saleyards for the period 2010 to 2015 (provided in spreadsheet format ref. *CVLX Sale Throughput Statistics 2010 to 2015.xlsx*).

- Traffixgroup data titled *Existing BLSC Sales & Truck Breakdown Data by Day*, dated 12/06/2015

8. I have referred to the following additional technical documents relating to my field of expertise:

- State Environment Protection Policy (Control of noise from commerce, industry and trade) No. N-1' (SEPP N-1).
- Noise from Industry in Regional Victoria – EPA Publication 1411' (NIRV).
- Noise from Industry in Regional Victoria - Application Guideline 1413, 2011

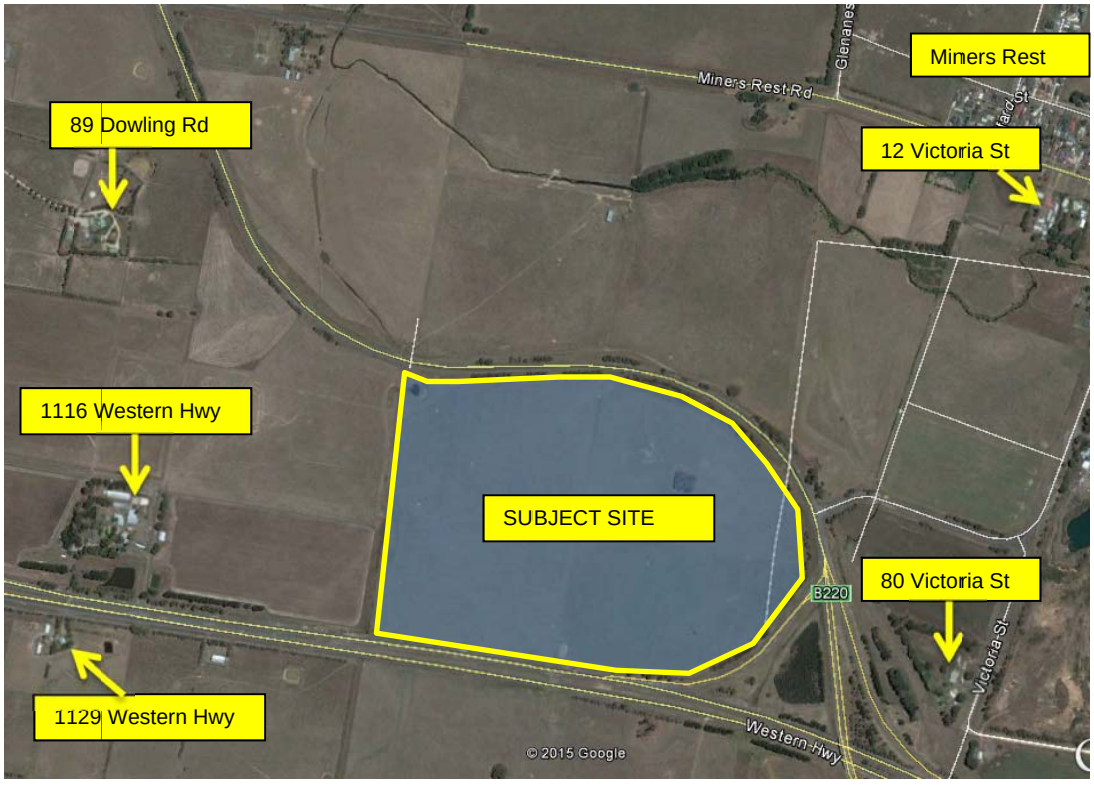
9. I conducted all site inspections, testing, analysis, calculations and computer modelling presented in this statement with the exception of testing during the sheep sale in Ballarat on 25 / 26 May 2015, which I was not able to attend. The testing during the sheep sale was undertaken by Dianne Williams of our office. Dianne Williams is an Associate grade acoustical consultant with over 15 years' experience and has appropriate qualifications and expertise to undertake this work. Dianne also peer reviewed this statement.

## PROPOSAL

10. From review of the provided information and from my site inspection, I provide the following summary of the proposed new facility.

11. The subject site is located at the intersection of the Sunraysia Highway and the Western Highway, Miners Rest. The aerial image below shows the subject site and nearest residential receptors.

**Figure 1 Site aerial (Source: Google Maps)**

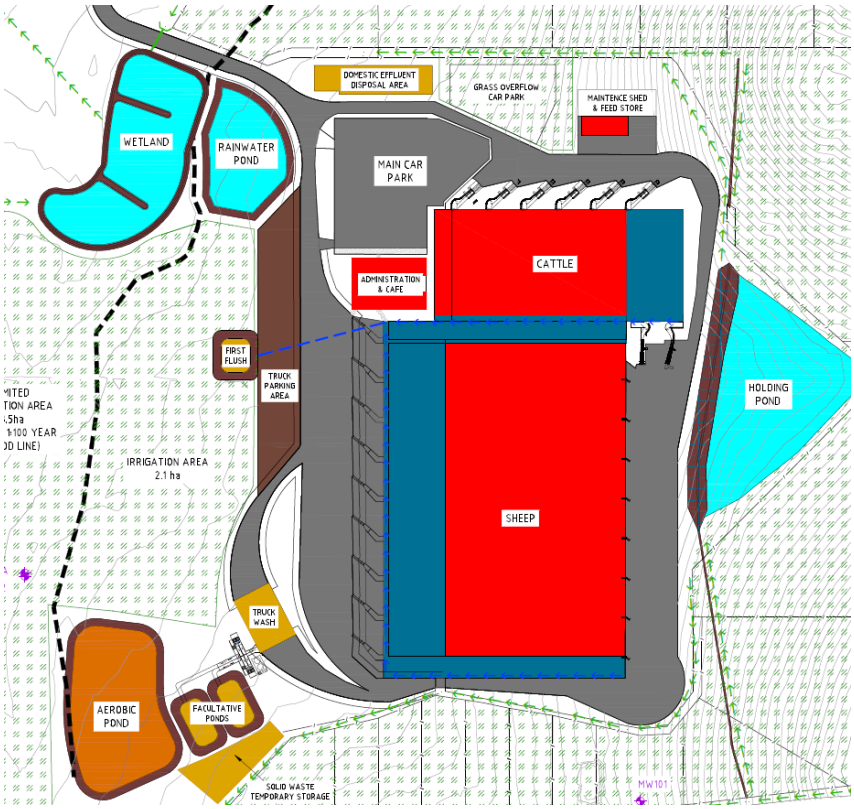


12. The two nearest residential receivers to the site are 1116 Western Highway, located approximately 500 m west of the site boundary, and 80 Victoria Street, located approximately 350 m east of the subject site boundary. A further receiver is located to the south-west of the site at 1129 Western Highway (approximately 650 m from the site boundary). The next nearest receiver locations are more than 700 m from the site boundary.

13. The facility layout, as provided in the drawing titled *'Revised Conceptual Site Layout'*, prepared by Geolyse, dated 03/06/15, shows the large sheep and cattle sheds located centrally on the site, with access provided from the Sunraysia Highway (north-west of site). An administration building is located directly to the west of the cattle shed, and a truck wash to the south west area of the sheep shed. An excerpt from the drawing is provided in **Figure 2.**

14. Given the site layout, the distances between the nearest two residential receivers and potential noise generating sources is in the order of 750 to 800 m.

**Figure 2 Site layout**




15. It is understood that the application is subject to a rezoning of the site from existing Farming Zone (FZ) to Special Use Zone (SUZ).

***Proposed Operations***

16. My understanding of the proposed operations of the new facility from review of the relevant documents (and particularly the Planning Assessment report prepared by Spire, dated August 2014) is summarised as follows:

- The proposed facility will include approximately 1.1 ha cattle yards and 3.4 ha of sheep yards, with both areas predominantly under a roof structure.

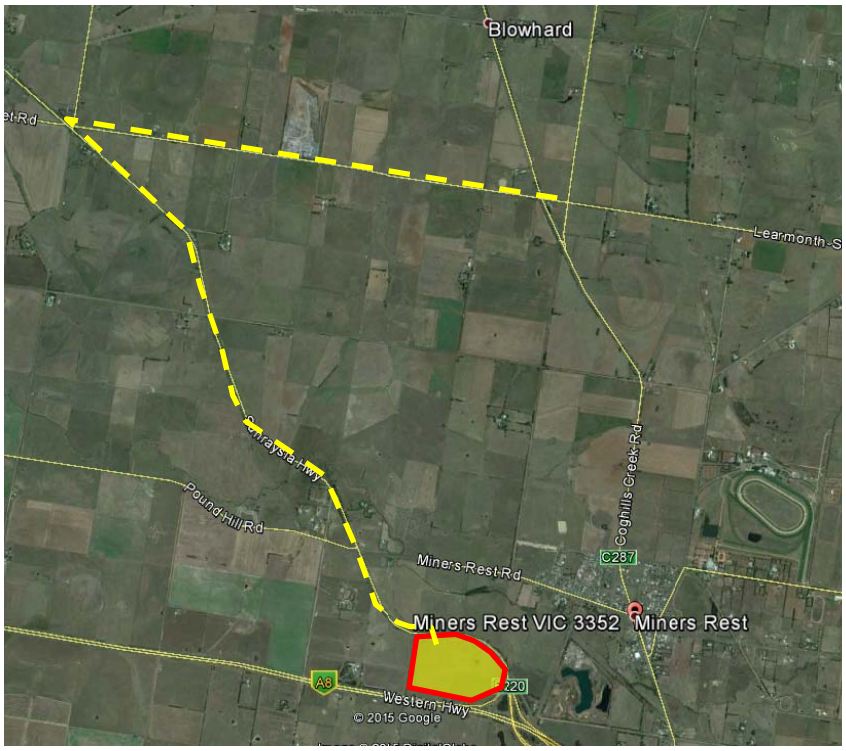
- The facility will include:
    - Truck loading and parking areas
    - Truck wash bay
    - Administration building
    - Car parking
    - Water storage dam and water treatment ponds
    - Maintenance and hay shed
- The operation of the facility is as a saleyard. The primary operation involves unloading cattle and sheep, holding overnight and weighing in the case of cattle, sales in the morning and the subsequent collection of the livestock the following day.
- The facility has designated days for sheep and cattle sales and proposed operations. The approximate anticipated livestock numbers (rounded to nearest 100) and other details are provided below, based on past yearly sales figures.

**Table 1 Summary of Sales Events (rounded estimates)**

| | **Prime Cattle Sales** | **Sheep and Lamb Sales** | **Store Cattle Sales** |
|---|---|---|---|
| **Occurrence** | 1 per week - Monday | 1 per week - Tuesday | 1 per month - Friday |
| **Throughput** | 400 average, 1200 maximum (note 95$^{th}$ percentile under 800) | 27,000 average 59,000 maximum | 3,000 average, 5,000 maximum |
| **Other details** | Unload Sunday generally 2-6 pm, weighing 11 pm to 6 am. Delivery / collection 10 am to 2 pm Monday | Unload Monday from 3 pm, drafting / weighing 3 pm to 7 am. Delivery / collection 10 am to 6 pm Monday | Unload Thursday generally 2-7 pm, penning during the night, weighing 6.30 am. Delivery / collection after sale |

- The facility operation is based on trucks bringing livestock in and out of the site. It is understood that the truck access to the site will be from the Sunraysia Highway, and the proposal is for the trucks to bypass the town of Miners Rest using Learmonth Sulky Road to the north. Refer to image below.

**Figure 3 Site Aerial (Google Earth) – proposed truck access route**




- In relation to truck movements, I have been provided with the traffic engineers' latest analysis of the total truck movements for the existing Ballarat (Delacombe) saleyard site (Traffixgroup data titled *Existing BLSC Sales & Truck Breakdown Data by Day*, dated 12/06/2015). The report provides a breakdown of 85th percentile and 'maximum' truck volumes that can occur at the site, for prime and store cattle sales, and for sheep sales. I have reviewed this data and provide the following summary of the heavy truck movements associated with the site (this excludes smaller 4x4 and utilities):
    - 136 trucks (85th percentile) and 215 trucks (maximum) during sheep sale unload days.
    - 96 trucks (85th percentile) and 122 trucks (maximum) during store cattle unload days.
    - 22 trucks (85th percentile) and 37 trucks (maximum) prime cattle unload days.
    - 143 trucks (85th percentile) and 227 (maximum) combined Monday volumes (cattle collection and sheep unload).
- The traffic report also indicates that very few truck movements would occur during the night (ie 10 pm to 7 am). I have sought further clarification on this from the proponent and they have advised me as follows (based on current Ballarat saleyard):
    - Prime Cattle Sales – no truck movements between 10pm Sunday and 7am Monday
    - Store Cattle Sales – no truck movements between 10pm Thursday and 7am Friday
    - Sheep Sales – normally no truck movements between 10pm Monday and 7am Tuesday. There is a peak season sale period typically in November or December where 10% of trucks may come in between 10pm and 1am. This represents approximately 4 to 5 sales for the year.
    - I understand that there is some chance of later truck arrivals than indicated above due to unforeseen events. My understanding is that this would be an uncommon event.

## SITE INSPECTIONS AND OBSERVATIONS

17. I undertook an inspection and acoustic testing at both the existing Ballarat and the Barnawartha saleyards on 24-25 May 2015, and 3-4 June 2015 respectively. Both inspections were conducted during a busy cattle sale event, and observations and testing conducted during livestock delivery, overnight activity and morning activities the following day. My colleague, Dianne Williams, undertook additional observations and testing on the 25-26 May 2015 during sheep sales.

18. The observations and testing conducted at the Barnawartha facility were during a store cattle sale which had a throughput of approximately 4300 cattle on the day with approximately 3600 of those being weaners. With reference to the sale throughput figures provided to me by the proponent, this event would represent the 90$^{th}$ percentile of sale events – ie 9 out of 10 sales would have less cattle. The data indicates that there have only been 6 sales from 2010 to 2015 that exceeded 4300 cattle. I would consider this sale and the number of cattle on site to be an appropriate representation of a peak store cattle sale event.

19. The observations at Ballarat were during a prime cattle sale which had a throughput of approximately 800 cattle on the day with approximately 270 weaners. With reference to the throughput figures provided to me by the proponent, this sale would represent the 95$^{th}$ percentile of sale events. I would consider this sale and the number of cattle on site to be an appropriate representation of a peak prime cattle sale event.

20. A throughput of 26,000 sheep was recorded for the 25-26 May 2015 sheep sale, which represents approximately the average of sheep throughput for a typical sheep sale in Ballarat.

21. I understand that the Barnawartha facility is very similar to that proposed in Miners Rest, incorporating metal roofing over the majority of the holding yards, and a large truck wash bay.

22. From my observations at both sites, it was apparent that the main sources of noise were:

    - Truck operations, including ingress and exit from the site, reversing and manoeuvring into the loading bays etc. The trucks did this at low speeds.
    - Noise from metal gates being operated and impacted, and from livestock being unloaded (impact sounds).
    - Noise from cattle lowing. This noise continued throughout the night at both sites, and was the only source of noise that extended into the night period.
    - Noise from the truck wash bay. This source of noise was observed to operate for an extended period at the Barnawartha facility, with up to 4 trucks being washed at the same time. The noise was predominantly mid and high frequency noise due to high pressure water impacting the truck trays and walls.
    - At the Ballarat site, noise from barking dogs was also noted during the sheep sales (by my colleague Dianne Williams).

23. Noise from sheep in the holding yards, as observed by my colleague, was minimal during the 26,000 sheep sale event in Ballarat, and insignificant when compared to the sound of all other sources on site.

24. Noise from pumps, compressors, pond areas and the like was inaudible over the noise of the other sources in the area.

## NOISE REQUIREMENTS

25. Within the Melbourne Metropolitan Area, noise from all commercial and industrial premises is required to comply with the *State Environment Protection Policy (Control of noise from commerce, industry and trade) No. N-1'* (SEPP N-1).

26. For country and rural areas, SEPP N-1 does not strictly apply. The EPA have provided a guideline document titled *Noise from Industry in Regional Victoria – EPA Publication 1411'* (NIRV) for the purposes of assessment in these areas. Note that this document does not have the same status as a SEPP, but provides assessment guidance for country and rural Victoria.

27. The subject site is outside the Melbourne Metropolitan Area and the NIRV is the appropriate assessment tool. The NIRV methodology is dependent on the specific location of the subject site and residential receivers. When the subject site or the receiver is located within the defined 'Major Urban Area' (representing towns with populations greater than 7000 or fringe growth areas) the NIRV reverts to the procedure as defined in SEPP N-1 for the purposes of setting noise criteria. When the subject site and receivers are outside the Major Urban Area, the NIRV provides its own methodology for determining the assessment criteria.

28. For the subject site, we have a complicated scenario. The site is located just outside the Ballarat Major Urban Area, and there are receivers to the west also outside the Major Urban Area. As such, the NIRV procedure for determining the 'Recommended Maximum Noise Levels' applies. However, to the east of the site, the residential receivers are within the Major Urban Area. As such, the assessment criteria for these receivers are determined using the SEPP N-1 methodology.

29. NIRV provides 'Recommended Maximum Noise Levels' based primarily on land use zonings. The methodology for determining the Recommended Maximum Noise Levels also includes a number of adjustments for high existing background noise, multiple industries and distance from the industry zone. Measurement procedures in NIRV are as per those in SEPP N-1.

30. There are separate recommended noise levels for the day, evening and night periods defined as follows. Note that all day Sunday and Saturdays after 1300 h are defined as 'evening' for the purpose of NIRV or SEPP N-1 noise assessments (this provides additional amenity consideration for these periods).

**Table 2 NIRV / SEPP N-1 defined day, evening and night periods**

| | |
|---|---|
| **Day** | Monday - Friday 0700h to 1800h<br>Saturday 0700h to 1300h |
| **Evening** | Monday - Friday 1800h to 2200h<br>Saturday 1300h to 2200h<br>Sunday 0700h to 2200h |
| **Night** | Monday – Sunday 2200h to 0700h |

31. It should be noted that NIRV applies to commercial noise sources such as mechanical plant and commercial vehicles while they are on or within the boundaries of the subject commercial site. Livestock noise is specifically excluded from assessment under NIRV and SEPP N-1. However, for the purposes of quantifying potential amenity impacts, the noise from cattle has been included in my assessment.

### *Background Noise Measurements*

32. Background noise measurements are normally conducted to determine noise assessment criteria. This is particularly the case under SEPP N-1. NIRV generally allows determination of conservative assessment criteria in the absence of any background noise data.

33. I have not undertaken background noise measurements of my own at any nearby residential receivers in the Miners Rest area. Appropriate long term background noise monitoring was undertaken by Marshall Day Acoustics in June and July 2014, and I do not see any reason to repeat this testing. I have used the results of the MDA background testing to assist in my determination of the noise limits.

### *NIRV Noise Criteria Determination*

34. **Appendix C** of this report includes an NIRV criteria calculation sheet for the two nearest receivers to the west and north-west of the proposed facility. The sheet includes all the necessary adjustments as defined in the NIRV. The final determined noise criteria are provided below:

**Table 3 NIRV Recommended Maximum Noise Levels, dBA**

| Period | 1116 Western Highway | 80 Dowling Road |
|---|---|---|
| **Day** | 48 | 46 |
| **Evening (including weekends)** | 41 | 41 |
| **Night** | 36 | 36 |

35. The above calculation of Recommended Maximum Noise Levels is based on the current Farming Zoning (FZ) of both the subject site and adjacent receivers. Given that the application includes rezoning of the subject site to SUZ, this could ultimately change the NIRV assessment criteria. I consider it appropriate to assess the potential noise impacts to the current zoning based criteria, which is in line with existing use and expectations in the area. My understanding of the NIRV is that this approach is implied but not explicit; i.e. it would not be reasonable to reduce the level of amenity currently experienced by residents in the area due to a rezoning of a site to a more industrial type use. The following excerpts from NIRV and the application guideline for NIRV provide some guidance on this issue:

From Page 8 of NIRV:

> These classifications should be varied if it is justifiable to do so, considering the uses allowed and the zone purposes. For example, where the purpose of an SUZ is for agriculture, the zone could be assigned the Table 1 noise emitter values of the Farming Zone (FZ).

From the NIRV Application Guideline 1413, 2011, Section 6:

> - Rezoning land from a rural or sensitive zone to a Special Use Zone or industrial zone (to facilitate future industrial activity) will increase the noise levels permitted in that area. The environmental change enabled from the rezoning should be considered as part of the rezoning decision.

### *SEPP N-1 Noise Criteria Determination*

36. The background noise level results are used in combination with the land use zoning under SEPP N-1 in order to determine the appropriate noise limits. **Appendix C** of this report shows the

zoning circles used as per SEPP N-1 procedure in order to determine the SEPP N-1 based noise limits. The following table provides the determined noise criteria at 80 Victoria Street.

**Table 4 SEPP N-1 based Recommended Maximum Noise Levels, dBA – 80 Victoria Street**

| Period | SEPP N-1 Zoning Level, dB | Measured Background Levels[1], dBA, L90 and definition (high, neutral, low) | SEPP N-1 Noise Limit, dB |
|---|---|---|---|
| **Day** | 53 | 35 (low) | 49 |
| **Evening (including weekends)** | 47 | 33 (low) | 43 |
| **Night** | 42 | 22 (low) | 35 |

NOTE: 1. Background monitoring data obtained from Marshall Day Acoustics Report

37. For residential receivers in the Miners Rest township (or on the fringe of the township), assuming similar low background levels to those obtained at 80 Victoria Street, the following noise limits are determined.

**Table 5 SEPP N-1 based Recommended Maximum Noise Levels, dBA – 12 Victoria St / Miners Rest Locations**

| Period | SEPP N-1 Zoning Level, dB | Measured Background Levels[1], dBA, L90 and definition (high, neutral, low) | SEPP N-1 Noise Limit, dB |
|---|---|---|---|
| **Day** | 50 | 35 (low) | 47 |
| **Evening (including weekends)** | 44 | 33 (low) | 42 |
| **Night** | 39 | 22 (low) | 34 |

NOTE: 1. Background monitoring data obtained from Marshall Day Acoustics Report

38. Both the NIRV and SEPP N-1 criteria are assessable external to the actual dwellings. The measurement is an 'Leq' over a half hour period, adjusted for audible characteristics (such as tonality, impulsiveness, duration, intermittency etc.).

## SITE NOISE TESTING

39. I undertook acoustic testing of all identified major noise sources at both the Ballarat and Barnawartha facility during my site visits (with the exception of the sheep sale which was undertaken by Dianne Williams of our office). The testing allowed me to quantify the sound power level of all major noise sources for the purposes of undertaking predictions of noise from the proposed facility to the nearest residential receivers.

40. The collected noise data, in combination with distances from source and measurement location (and in some cases the dimensions of the radiating source) was used to determine the sound power level. The following fundamental acoustical equation was generally used to obtain the sound power level.

*Lw = Lp + 10 Log A*

*Where:*

*A = 2$\pi$ r² when measured over hard ground, and 4 $\pi$ r² when measured over soft ground*

*r = distance in metres from the acoustic centre of the source to the measurement location,*

*Lw = Sound Power Level, in dB,*

*Lp = Sound Pressure Level, in dB*

41. Note that in order to determine the sound power level of the cattle lowing, a number of measurement locations were used around the shed, ranging from 85 to 140 m away, as well as close-in measurements at the face of the shed. All the collected data was analysed in order to determine the total sound power output of the cattle, and allocated to the different facades of the shed building. This was a more complicated process than that using the above equation, and utilised area source calculations within the computer modelling software.

42. A summary of the main noise sources and their determined overall A-weighted sound power level is provided below. **Appendix D** includes full 1/3 octave measurement data for most measurements undertaken as well as details of instrumentation used and prevailing weather conditions during my testing.

**Table 6 Determine Sound Power Level (re. 1pW) from Significant Noise Sources**

| Item | Source | Determined Sound Power Level, Leq |
|---|---|---|
| 1 | Cattle lowing under metal deck covered roof– Approximately 4300 Cattle (3600 weaner) as per Barnawartha store cattle sale | Total Sound Power Level = 106 dBA<br>Distributed to each side of shed as follows:<br>101 dBA to north and south sides<br>98 dBA east and west sides (smaller area) |
| 2 | Cattle lowing under metal deck covered roof– Approximately 800 to 1200 Cattle<br>Based on Ballarat measurement data and consideration of conservative adjustment from 4300 cattle | Total Sound Power Level = 103 dBA<br>Distributed to each 'side' of shed as follows:<br>99 dBA to north and south sides<br>95 dBA east and west sides (smaller area) |
| 3 | Fully loaded semi-trailer moving along access road to site | 104 dBA |
| 4 | Truck manoeuvring / reversing on site, including reversing beeper | 101 dBA |
| 5 | Cattle unloading, including clunks / bangs<br>Barnawartha data | 101 dBA |
| 6 | Sheep unloading, including bangs, some dogs barking, whistles and shouting, and truck movement (i.e. combined sound power of all activities)<br>Ballarat data | 104 dBA |
| 7 | Truck Wash Facility, based on typical worst case observed levels<br>Barnawartha | 104 dBA |

## CALCULATION AND ASSESSMENT OF NOISE TO RESIDENTIAL RECEIVERS

43. Using the collected sound data, calculations of noise to the surrounding residential uses can be undertaken and assessed to the determined NIRV or SEPP N-1 based criteria.

44. Given the numerous receivers and distribution of noise sources, I have conducted my calculations in the SoundPLAN 7.1 noise modelling software, which is one of the most widely used noise modelling packages in Australia and internationally. The computer model

incorporates all the site geometry, buildings, specific locations of sources and ground terrain. The following documents were used as inputs to the model:

- Revised Conceptual Site Layout, prepared by Geolyse, dated 03/06/15
- 3D ground terrain data provided by City of Ballarat on 10 June 2015.
- Building elevation drawings prepared by MKM Constructions, dated 24 March 2015 drawing A:03 and A:04.

The following additional assumptions and settings were used in the model:

- Ground was set to hard directly under and around the saleyard facility (in line with the provided site layout drawing where concrete or asphalt is proposed). Ground was set to soft outside this zone where grass / farmland was located
- All residential receivers were set to 1.7 m above ground.
- The site sheds were assumed approximately 6 m high based on the provided concept drawings.
- Truck activities and loading operations were set to 2 m above ground, and the truck wash activities were set at 3 m above ground.

45. The CONCAWE algorithms incorporated in the SoundPLAN noise modelling software were used in my calculations as these allow for calculation of noise propagation under specific meteorological conditions. I have undertaken calculations under two types of meteorological conditions being 'neutral' and 'worst case enhanced'. Neutral assumes no significant component of wind from source to receiver and no temperature inversion. 'Worst case enhanced' is a worst case scenario which could occur with specific wind conditions favouring sound propagation from source to receiver, or during severe temperature inversion conditions which 'bend' sound rays back towards ground. These are defined as 'Category 4' and 'Category 6' respectively in the CONCAWE algorithms.

46. I have prepared predictions for four operational scenarios as follows, with the specified noise sources as listed below and sound power levels as defined in **Table 6**. I believe these scenarios represent the critical operational scenarios for the proposed site.

**Table 7 Noise Prediction Scenarios**

| Scenario | Description | Sources Included in Modelling Scenario |
|---|---|---|
| 1 | Cattle unloading<br>(day / evening only operation) | 4300 cattle in yards lowing<br>Truck wash operating with typical worst case operations<br>1 large truck on site entry road, 2 to 3 trucks in loading area (either manoeuvring or being unloaded). Including voices, impact sounds from gates etc. |
| 2 | Sheep unloading<br>(day / evening only operation normally, possibly up to 1 am during peak season i.e. 4-5 sales per year) | Truck wash operating with typical worst case operations<br>1 large truck on site entry road, 2-3 trucks in loading area (either manoeuvring or being unloaded). Including voices, dogs barking and impact sounds from gates etc. |
| 3 | 4300 prime cattle lowing – night period | 4300 cattle in yards |
| 4 | 800-1200 store cattle lowing – night period | 800 -1200 cattle in yards |

47. As previously discussed, my site testing for both the prime and store cattle sales were undertaken during what could be considered equivalent to typical peak livestock throughput. Noise emissions from most prime and store cattle sales can be expected to be less than shown in my calculations.

48. The results of my calculations are summarised in **Table 8** to **Table 11**. The tables include assessment to the four nearest residential receiver areas under both CONCAWE category 4 and Category 6 (neutral and worst case enhanced) meteorological conditions. The assessment also includes any necessary penalties due to the characteristics of the noise. From my observations on site, the sources of noise exhibited both tonal and impulsive characteristics at times. The main tonal sources were the cattle lowing, and the impulsive sources were the gates and fencing being impacted during cattle loading and movement. I judged that a +2 dB penalty for each characteristic is appropriate, providing a total of up to +4 dB for some scenarios.

**Table 8 Results and Assessment – SCENARIO 1 Cattle unloading and associated activities**

| Period | 1116 Western Hwy (west of site) | | 89 Dowling Rd (north-west of site) | | 80 Victoria St (east of site) | | 12 Victoria St / or Miners Rest township indicative receiver | |
|---|---|---|---|---|---|---|---|---|
| **CONCAWE Cat:** | Cat 4 | Cat 6 | Cat 4 | Cat 6 | Cat 4 | Cat 6 | Cat 4 | Cat 6 |
| **Predicted Noise Level, dBA, Leq** | 34 | 38 | 31 | 35 | 32 | 37 | 29 | 34 |
| **Penalties / Adjustments** | + 4 | + 4 | + 4 | + 4 | + 4 | + 4 | + 4 | + 4 |
| **Effective Noise Level, dBA, Leq** | 38 | 42 | 35 | 39 | 36 | 41 | 34 | 38 |
| **NIRV / SEPP Criteria (Evening)** | **41** | **41** | **41** | **41** | **43** | **43** | **42** | **42** |
| **Excess (+) / Margin** | - | **+1** | - | - | - | - | - | - |

**Table 9 Results and Assessment – SCENARIO 2 Sheep unloading and associated activities**

| Period | 1116 Western Hwy (west of site) | | 89 Dowling Rd (north-west of site) | | 80 Victoria St (east of site) | | 12 Victoria St / or Miners Rest township indicative receiver | |
|---|---|---|---|---|---|---|---|---|
| **CONCAWE Cat:** | Cat 4 | Cat 6 | Cat 4 | Cat 6 | Cat 4 | Cat 6 | Cat 4 | Cat 6 |
| **Predicted Noise Level, dBA, Leq** | 33 | 38 | 29 | 33 | 29 | 34 | 26 | 31 |
| **Penalties / Adjustments** | + 2 | + 2 | + 2 | + 2 | + 2 | + 2 | + 2 | + 2 |
| **Effective Noise Level, dBA, Leq** | 35 | 40 | 31 | 35 | 31 | 36 | 28 | 33 |
| **NIRV / SEPP Criteria (Evening)** | **41** | **41** | **41** | **41** | **43** | **43** | **42** | **42** |
| **Excess (+) / Margin** | - | - | - | - | - | - | - | - |

**Table 10 Results and Assessment – SCENARIO 3 4300 Store Cattle Lowing**

| Period | 1116 Western Hwy (west of site) | | 89 Dowling Rd (north-west of site) | | 80 Victoria St (east of site) | | 12 Victoria St / or Miners Rest township indicative receiver | |
|---|---|---|---|---|---|---|---|---|
| **CONCAWE Cat:** | Cat 4 | Cat 6 | Cat 4 | Cat 6 | Cat 4 | Cat 6 | Cat 4 | Cat 6 |
| **Predicted Noise Level, dBA, Leq** | 29 | 34 | 26 | 31 | 29 | 34 | 25 | 30 |
| **Penalties / Adjustments** | + 2 | + 2 | + 2 | + 2 | + 2 | + 2 | + 2 | + 2 |
| **Effective Noise Level, dBA, Leq** | 31 | 36 | 28 | 33 | 31 | 36 | 27 | 32 |
| **NIRV / SEPP Criteria (Night)** | **36** | **36** | **36** | **36** | **35** | **35** | **34** | **34** |
| **Excess (+) / Margin** | - | - | - | - | - | **+1** | - | - |

**Table 11 Results and Assessment – SCENARIO 4 800-1200 Prime Cattle Lowing**

| Period | 1116 Western Hwy (west of site) | | 89 Dowling Rd (north-west of site) | | 80 Victoria St (east of site) | | 12 Victoria St / or Miners Rest township indicative receiver | |
|---|---|---|---|---|---|---|---|---|
| **CONCAWE Cat:** | Cat 4 | Cat 6 | Cat 4 | Cat 6 | Cat 4 | Cat 6 | Cat 4 | Cat 6 |
| **Predicted Noise Level, dBA, Leq** | 26 | 31 | 23 | 28 | 26 | 31 | 22 | 27 |
| **Penalties / Adjustments** | + 2 | + 2 | + 2 | + 2 | + 2 | + 2 | + 2 | + 2 |
| **Effective Noise Level, dBA, Leq** | 28 | 33 | 25 | 30 | 28 | 33 | 24 | 29 |
| **NIRV / SEPP Criteria (Night)** | **36** | **36** | **36** | **36** | **35** | **35** | **34** | **34** |
| **Excess (+) / Margin** | - | - | - | - | - | - | - | - |

49. The calculations results are provided at the four locations judged to be the most critical. Note that an assessment to 1129 Western Highway has not been provided. Noise emissions to this property would be 2 to 3 dBA lower than those predicted at 1116 Western Highway.

50. The above results and assessment can be summarised as follows:

- During 'neutral' meteorological conditions, for all scenarios, noise emissions to all residential receivers are predicted to comply with either the NIRV or SEPP N-1 based criteria.
- A 1 dBA excess from the criteria occurs under worst case enhanced meteorological conditions during typical peak store cattle sale predictions. It should be considered that this is a once a month event, and that 9 out of 10 such events would have less cattle than has been used in the modelling. I consider this 1 dBA excess to be insignificant given the circumstances and conditions required for this to occur, and the low number of such events in a year.

51. I note one further aspect in relation to the potential for Scenario 2 to occur after 10 pm during peak sheep season sales (4-5 sales per year). I would expect that if this scenario did extend beyond 10 pm it would have reduced noise emissions from what has been shown as there would be less trucks and activity on site than the modelling has incorporated (modelling based on busiest operations with truck wash, and numerous trucks on site). I would expect in the order of a 3 dBA noise reduction under this condition for Scenario 2. As such, the activity would be compliant or marginally (1dBA) above the night period criteria under worst case enhanced meteorological conditions.

52. Similarly, I understand that unforeseen events could result in trucks coming to site outside normal times. This scenario would normally represent a single truck on site after 10 pm. The overall emission level from a single truck and its movement and operations would be in the order of 5 dBA lower than that of the combined trucks on site as modelled in Scenarios 1 and 2. As such, this event is likely to be compliant or marginally above the assessment criteria under worst case enhanced meteorological conditions. I would considered this an acceptable outcome given this is a rare operational event.

## OTHER POTENTIAL NOISE IMPACTS – TRUCKS ON PUBLIC ROADS

53. Truck movements associated with the operation of the facility have the potential to cause noise impact to residents located along the truck route. I provide below a qualitative assessment of potential impacts from this source.

54. I note that truck movements associated with the facility will be primarily on existing major arterials and highways during the day and evening. The site will be directly accessed via the Sunraysia Highway, being a major arterial that, according to the traffic engineers report, carries in the order of 1500 vehicles per day, with approximately 25% of those (376) being heavy vehicles. The addition of trucks on this road due to the saleyard operations will not represent a significant change in amenity to nearby residents who are already exposed to truck and traffic noise from the highway.

55. The only location where the trucks could provide a potential noise impact is the proposed Learmonth Sulky Road route section, which appears to be a lower use road. I drove along this road during my site inspection and noted minimal traffic flow along it, but I did observe that there was a quarry along this road which would likely generate some truck movements.

56. For public roads such as this, my only concern would be potential sleep disturbance from truck movements at night. Given the provided information relating to truck movements, it would appear that there would be negligible truck movements during the night due to the proposed saleyards. The exception is during peak season sheep sale periods where I have been advised that there may be truck movements between 10 pm and 1 am (less than 10% of trucks for the day during this period). This type of event would typically occur on 4 or 5 occasions in November and December.

57. Sleep disturbance for single events such as truck pass-bys are normally assessed internally (i.e. at the ear of the occupant) using the 'Lmax' or 'LAmax' measurement parameter, being the instantaneous maximum A-weighted noise level of the pass-by event.

58. Commonly used assessment criteria for sleep disturbance include the NSW Road Noise Policy (*March 2011, NSW Government Office of Environment and Heritage*), the World Health Organisation (WHO) Guidelines for Community Noise (1999), and the criteria determined by Professor Barbara Griefahn (*Noise Control During the Night – Proposal for Continuous and Intermittent Noise, Acoustics Australia Volume 20 No.2*). Based on all of these documents, I would recommend that internal maximum levels in the order of 50 to 55 dBA would be reasonable on the basis of the potential number of events during the night. If more events were envisaged, I would suggest a design level of 45 to 50 dBA.

59. The internal design level of 50 to 55 dBA equates to an external design level of 60 to 65 dBA with windows open.

60. With reference to aerial photograph (google earth) I note that a single residential dwelling, 85 Learmonth Sulky Road, appears to be located approximately 45 m from centreline of Learmonth Sulky Road. Another three dwellings appear to be located in the order of 150 to 350 m from the road. Based on these offset distances, for a large cattle truck at 80 km / h with a sound power level of 110 dBA, noise levels as follows can be expected:

    - 66 dBA at 45 m
    - 55 dBA at 150 m
    - Less than 53 dBA beyond 200 m

61. Based on the above, only the single property which is within 50 m of the road could be exposed to levels with the potential to exceed sleep disturbance criteria. Note that this assumes the bedroom of the dwelling faces Learmonth Sulky Road and that the window is slightly open.

## SUMMARY AND CONCLUSION

62. I have been provided with the current concept plan, operational information and site details relating to the proposed Ballarat saleyard in Miners Rest.

63. I have conducted detailed site testing and inspections at both the existing Ballarat and Barnawartha saleyards. The collected noise data was representative of peak prime and store cattle sale events.

64. The collected data was used as the basis of calculations to predict noise to the nearest residential areas surrounding the proposed subject site. Assessment of these sources to the NIRV was undertaken. The calculations and assessment included noise from cattle lowing which is strictly not assessable under the guidelines, but included for the purposes of quantifying potential amenity impacts.

65. Noise impacts for the vast majority of proposed site operations, under all meteorological conditions, will comply with the NIRV criteria at all nearby residential receivers.

66. There are some infrequent events that could potentially result in small exceedances from the EPA guideline criteria under worst case enhanced meteorological conditions. There is no clear guidance in either SEPP N-1 or NIRV in relation to how to account for infrequent events, although SEPP N-1 does provide the following statement in Schedule A1, Item 6:

> *"When the effective noise level may be significantly affected by atmospheric effects, a derived point may be used located near the industry. Where it is inappropriate to use a derived point because of the size of the industry or the unavailability of an alternative measurement point, three measurements shall be taken within a 30 day period at the noise sensitive receiver. The effective noise level shall be the arithmetic average of the three measurements"*

67. The situation relating to the proposed saleyard falls into the above category where noise levels are significantly affected by atmospheric effects, and the area of the noise source is very large (so a derived point is not a practical approach). The implication of the statement is that a worst case event, which only occurs once a month (e.g. a store cattle sale), would technically need to be averaged with two other operation measurements (e.g prime cattle or sheep sale etc.) to obtain the final effective noise level. As such the averaging over different days and under different meteorological conditions is likely to result in NIRV compliant levels.

68. I do not consider the potential impacts from trucks on truck routes to access the site as significant. The facility will generate minimal night period truck movements.

69. Based on the above, there is no reason from a noise impact perspective why the proposal should not proceed. Given my findings, it is not necessary to provide any noise controls to the site, however, should the operator elect to provide noise control I provide the following options which would provide a useful reduction in noise.

    - Provision of rubber or similar impact isolating pads on gates and fences within the facility. The characteristic clunking and banging of these sources was notable and a penalty was applied in my assessment to account for these.

    - Provision of a screen along the west side of the truck wash bay to cut line of sight to the nearest western receptor.

    - Provision of a bund or screen along the east side of the cattle shed to shield the nearest eastern receptor from the cattle holding area.

70. I have made all the enquiries that I believe are desirable and appropriate and no matters of significance which I regard as relevant have to my knowledge been withheld from the Panel.

Prepared by:

Jim Antonopoulos BAppSc MAAS
Principal – Acoustics

# APPENDIX A

## JIM ANTONOPOULOS

Principal Project Consultant - Acoustics

**Curriculum Vitae**

### QUALIFICATIONS

Bachelor of Applied Science (BAppSc), Applied Physics

### MEMBERSHIP

Member of Australian Acoustical Society (MAAS)

### BACKGROUND

Jim Antonopoulos graduated from the Royal Melbourne Institute of Technology (RMIT) with a Bachelor of Applied Science in Applied Physics in 1996. Jim undertook his final year specialising in acoustics and developing a low frequency Helmholtz resonator.

### CONSULTING EXPERIENCE

Jim has been working as an acoustical consultant in Melbourne since 1996. Prior to working for SLR Consulting, Jim worked at Graeme E Harding & Associates Pty Ltd for 7 years and gained much experience in building and architectural acoustics, environmental noise assessment, industrial noise control and vibration assessment.

At SLR, Jim has expanded his areas of expertise to include large scale traffic and industrial noise computer modelling.

### SPECIAL EXPERTISE

- Architectural and Building Acoustics
- Environmental Noise Assessment
- Industrial Noise Control and Occupational Noise Assessment
- Mechanical Services Noise Control Design
- Sound power measurement, sound and impact insulation testing, FFT analysis
- Expert Testimony at VCAT
- Noise Modelling (SoundPLAN)
- Vibration measurement and assessment
- Supervision and site inspection of contractor works during construction
- Preparation of tender specification documents

### SELECTED INDUSTRIAL, COMMERCIAL AND MINING ASSESSMENT PROJECT EXPERIENCE

**Donald Mineral Sands Mining Project** – Project Management of Noise Impact Assessment for EIS

**Lao PDR Copper Expansion Project (Oz Minerals)** – Project Management of Noise Impact Assessment for EIS. Copper and Gold refinery plant and mining expansion.

**Blackshaws Road South Kingsville** – Hobsons Bay Planning Scheme Amendment C82, Noise and Vibration Impact assessment

**SPI Powernet Terminal Stations (Richmond, Geelong, Redcliffs)** – Numerous environmental noise measurements and assessments

**Cranbourne Terminal Station** – Environmental Noise Assessment including transformer noise control design (silencers, enclosures etc.)

**Peerless Laverton and Braybrook Plants** – Annual occupational noise assessments and design of noise and vibration control for milling machines, fans and other plant (enclosures, silencers etc.)

**South Pacific Tyres (Campbellfield)** – Occupational and environmental noise assessments and design of noise control for various items of plant

**Yallourn Power Station** – Environmental Noise Assessment and measurement of various plant and equipment noise levels

**Stramit facility relocation study (Dandenong)** Environmental noise assessment of proposed plant, noise control design for building

**Moorabool Water Treatment Plant** – Environmental Noise Assessment

**Black Rock Biosolids Treatment Facility** – Full Environmental Noise Impact Assessment of proposed facility, including conceptual noise control requirements and equipment specification

**Burgess Furniture** (**Preston)** – Full noise control (silencer) design for large cyclone

LIST OF SUPPLIED INFORMATION

**INDEX**

**Amendment C185**



*Planning Scheme Documents*

1. Schedule 15 to SUZ.
2. Application for amendment.
3. Zoning maps 5 & 6.
4. Notice letter to Minister Guy, 13 August 2014.
5. Strategic Assessment Guidelines Checklist.
6. Incorporated document.
7. Officer report.
8. Explanatory report.
9. Instruction sheet.
10. Clause 52.03.
11. Schedule to clause 81.01.

*Supporting documents*

12. CHMP, 14 December 2014, Ecology & Heritage Partners
13. Water Cycle Management Report, December 2014, Geolyse.
14. Flora & Fauna assessment, 29 January 2014, Biosis.
15. On-site Effluent Disposal Assessment, 21 August 2014, Douglas Partners.
16. Noise Assessment, August 2014, Marshall Day.
17. Odour Assessment, August 2014, The Odour Unit.
18. Planning Assessment, August 2014, Spiire.
19. Infrastructure Servicing Assessment, August 2014, Spiire.
20. Stormwater Investigation, August 2014, Spiire.
21. Traffic assessment, Traffix Group, August 2014.
22. Cover letter from Spiire to Ballarat City Council, 28 August 2014.

CVLX Works Approval Application

*Supporting documents*

23. Community Communication Plan, June 2014.
24. Draft Environmental Improvement Plan, August 2014, Spiire.

*Works Approval*

25. Works Approval Application, January 2015, Spiire.
26. Cover letter from Spiire, 12 January 2015.
27. EPA comments.
28. Initial summary response to Development Plan requirements of exhibited version SUZ15 – tracked version + clean copy Rev.B, January 2015.

*Other*

29. Referral Responses:

    - Goulburn Murray Water - 3 March 2015.
    - CFA - 11 March 2015.
    - GHCMA - 19 December 2014 and 18 March 2015.
    - VicRoads - 19 December 2014 and 18 March 2015.
    - Central Highlands Water - 5 January 2015, 19 January 2015 and 20 March 2015.
    - Department of Economic Development, Jobs, Transport and Resources – 5 January 2015 and 23 March 2015.
    - Department of Environment – 23 December 2014.
    - Powercor – 3 December 2014.
    - Downer/Tenix – 16 December 2014.
    - Southern Rural Water – 5 January 2015.
    - Internal responses – Traffic and Transport (Gary Smith), Environmental Health (Ned Beslagic) and Land Development (Subdivisions) Engineer (Derylle Hastings).

30. Title particulars.
31. Memorandum of Understanding between DTPLI and EPA "*Joint Processing of a Planning Scheme Amendment under the Planning and Environment Act 1987 and an Application for a Works Approval under Section 198B of the Environment Protection Act 1970*".

**INDEX**



**1. Ordinary Council Meeting 22 April 2015**

- Agenda
- Summary of Submissions Table
- Applicant Response to Submissions
- Submitters Location Map
- Saleyards Newsletter 1 – August 2014
- Saleyards Newsletter 2 – December 2014
- Saleyards Newsletter 3 – February 2015
- Saleyards Newsletter 4 – March 2015

**2. Objections / Submissions**

# Noise in Regional Victoria (NIRV) Recommended Maximum Noise Level Calculation

**Project Name:** Ballarat Saleyards

**Project No.:** 640.11095

**Location:** 1116 Western Hwy

**Date:** 2015-06-08

**Generating Zone:** FZ

**Receiving Zone:** FZ

| | Zone Limits (dBA) |
|---|---|
| **Day** | 46 |
| **Evening** | 41 |
| **Night** | 36 |

| | Measured Background L90 (dBA) |
|---|---|
| **Day** | 40 |
| **Evening** | 34 |
| **Night** | 29 |

**Earth Resources Industry?** No

**Distance Adjustment Needed?** No
(A distance adjustment is needed if the generator and receiver are NOT in the same zoned area of land)
**Receiver Distance(m):** 0
**Adjustment (dB)** 0

**Background Relevant Area?** No
eg. Within 300m of an undivided road OR within 600m of a divided road OR 1000m of a freeway

**High Traffic area?** No
Measured Traffic LAeq

**Multiple Noise Contributors?** No
-3 dB for if multiple industries are contributing to the noise

| | Day | Evening | Night | |
|---|---|---|---|---|
| Zone Limits | 46 | 41 | 36 | Step 1 |
| Adjust for Distance (if needed) | 46 | 41 | 36 | Step 2 |
| Adjust for Minimum Limits (45,37,32) | 46 | 41 | 36 | Step 3 |
| Background + (8,5,5) | 48 | 39 | 34 | Step 4 |
| Limit After Step 4 (Background level) | 46 | 41 | 36 | |
| Limit After Step 5 (High Traffic Noise) | 46 | 41 | 36 | Step 5 |
| **NIRV Recommended Maximum Noise** | **46** | **41** | **36** | |

# Noise in Regional Victoria (NIRV) Recommended Maximum Noise Level Calculation

**Project Name:** Ballarat Saleyards

**Project No.:** 640.11095

**Location:** 89 Dowling Road

**Date:** 2015-06-08

**Generating Zone:** FZ

**Receiving Zone:** FZ

| | Zone Limits (dBA) |
|---|---|
| **Day** | 46 |
| **Evening** | 41 |
| **Night** | 36 |

| | Measured Background L90 (dBA) |
|---|---|
| **Day** | |
| **Evening** | |
| **Night** | |

**Earth Resources Industry?** No

**Distance Adjustment Needed?** No
(A distance adjustment is needed if the generator and receiver are NOT in the same zoned area of land)
**Receiver Distance(m):** 0
**Adjustment (dB)** 0

**Background Relevant Area?** No
eg. Within 300m of an undivided road OR within 600m of a divided road OR 1000m of a freeway

**High Traffic area?** No
Measured Traffic LAeq

**Multiple Noise Contributors?** No
-3 dB for if multiple industries are contributing to the noise

| | Day | Evening | Night | |
|---|---|---|---|---|
| Zone Limits | 46 | 41 | 36 | Step 1 |
| Adjust for Distance (if needed) | 46 | 41 | 36 | Step 2 |
| Adjust for Minimum Limits (45,37,32) | 46 | 41 | 36 | Step 3 |
| Background + (8,5,5) | | | | Step 4 |
| Limit After Step 4 (Background level) | 46 | 41 | 36 | |
| Limit After Step 5 (High Traffic Noise) | 46 | 41 | 36 | Step 5 |
| **NIRV Recommended Maximum Noise** | **46** | **41** | **36** | |

# SEPP N-1 Noise Limit Calculation

**Project Name:** Ballarat Saleyard **Project No.:** 640.11095

**Location:** 80 Victoria Street (east rec.) **Date:** 2015-06-03

**140 m Diameter Circle**

| Type 2 Area | Type 3 Area |
|---|---|
| 0 | 0 |
| 0% | 0% |

**400 m Diameter Circle**

| Type 2 Area | Type 3 Area |
|---|---|
| 0 | 43982 |
| 0% | 35% |

| | |
|---|---|
| Partial Influencing factor (140m) | 0.0000 |
| Partial Influencing factor (400m) | 0.1750 |
| Total Influencing factor | 0.1750 |

| Time of Day | Range of LA90 levels to achieve neutral condition | | | | Time of Day | Zoning Level |
|---|---|---|---|---|---|---|
| *Day* | 41 | dB(A) to | 47 | dB(A) | *Day* | 53 |
| *Evening* | 38 | dB(A) to | 44 | dB(A) | *Evening* | 47 |
| *Night* | 33 | dB(A) to | 39 | dB(A) | *Night* | 42 |

| Measured Background Level LA90 dBA | | |
|---|---|---|
| *Day* | *Evening* | *Night* |
| 35 | 33 | 22 |

**Resultant Noise Limits,**

| Time of Day | Background Condition | Background Level Description | Noise Limit |
|---|---|---|---|
| *Day* | High, If (Background Level + 6dB) > Zoning Level<br>Low, If Zoning Level >(Background Level +13dB)<br>Neutral, If otherwise | Low | 49 |
| *Evening* | High, If (Background Level + 3dB) > Zoning Level<br>Low, If Zoning Level >(Background Level +10dB)<br>Neutral, If otherwise | Low | 43 |
| *Night* | High, If (Background Level + 3dB) > Zoning Level<br>Low, If Zoning Level >(Background Level +10dB)<br>Neutral, If otherwise | Low | 35 |

# SEPP N-1 Noise Limit Calculation

| | | | |
|---|---|---|---|
| **Project Name:** | Ballarat Saleyard | **Project No.:** | 640.11095 |
| **Location:** | 12 Victoria St / Miners Rest indicative | **Date:** | 2015-06-03 |

**140 m Diameter Circle**

| Type 2 Area | Type 3 Area |
|---|---|
| 0 | 0 |
| 0% | 0% |

**400 m Diameter Circle**

| Type 2 Area | Type 3 Area |
|---|---|
| 0 | 0 |
| 0% | 0% |

| | |
|---|---|
| Partial Influencing factor (140m) | 0.0000 |
| Partial Influencing factor (400m) | 0.0000 |
| Total Influencing factor | 0.0000 |

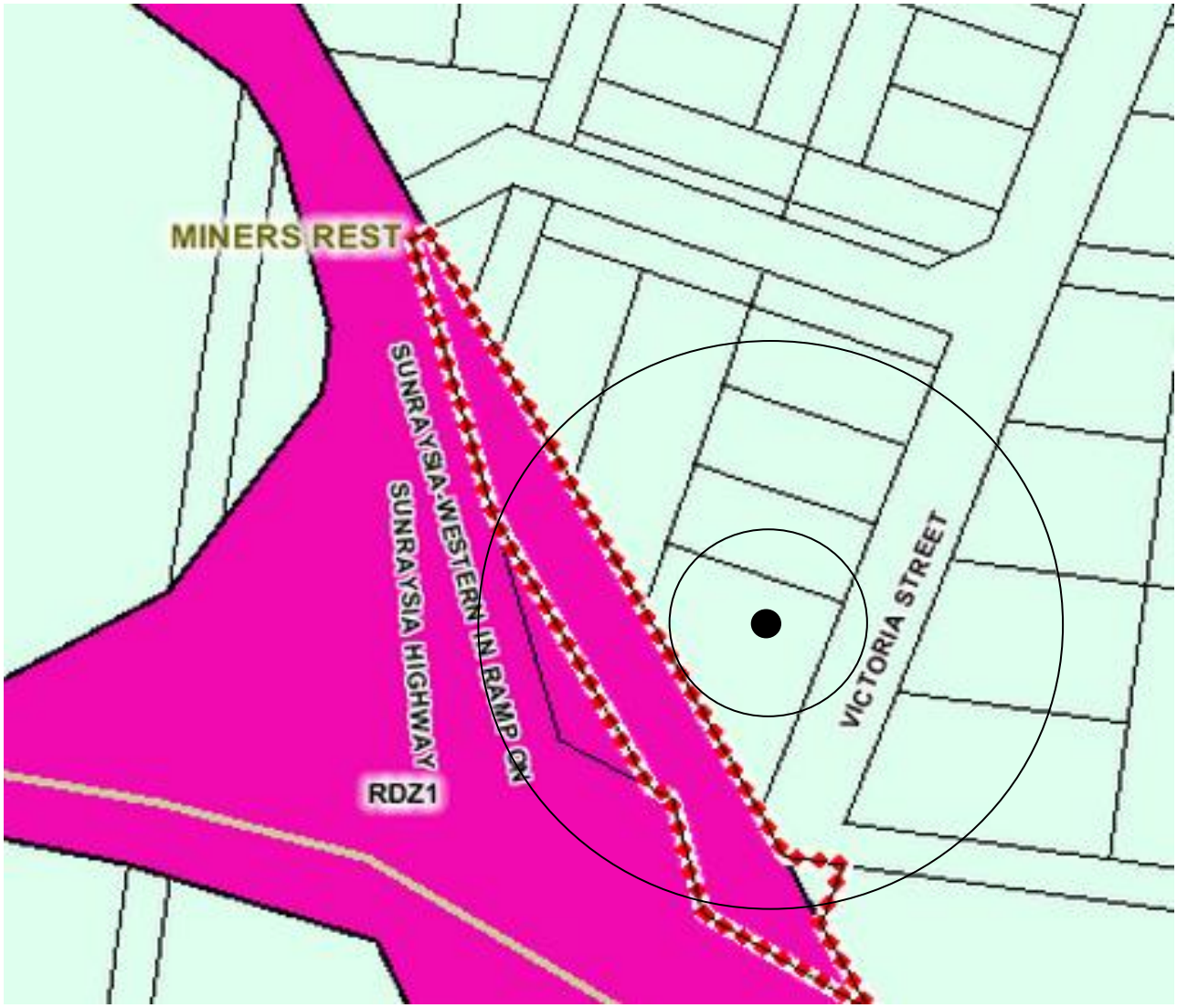
| Time of Day | Range of LA90 levels to achieve neutral condition | | | | Time of Day | Zoning Level |
|---|---|---|---|---|---|---|
| ***Day*** | **38** | **dB(A) to** | **44** | **dB(A)** | ***Day*** | **50** |
| ***Evening*** | **35** | **dB(A) to** | **41** | **dB(A)** | ***Evening*** | **44** |
| ***Night*** | **30** | **dB(A) to** | **36** | **dB(A)** | ***Night*** | **39** |

| Measured Background Level LA90 dBA | | |
|---|---|---|
| *Day* | *Evening* | *Night* |
| **35** | **33** | **22** |

Assume as per 80 Victoria

**Resultant Noise Limits,**

| Time of Day | Background Condition | Background Level Description | Noise Limit |
|---|---|---|---|
| ***Day*** | High, If (Background Level + 6dB) > Zoning Level<br>Low, If Zoning Level >(Background Level +13dB)<br>Neutral, If otherwise | **Low** | **47** |
| ***Evening*** | High, If (Background Level + 3dB) > Zoning Level<br>Low, If Zoning Level >(Background Level +10dB)<br>Neutral, If otherwise | **Low** | **42** |
| ***Night*** | High, If (Background Level + 3dB) > Zoning Level<br>Low, If Zoning Level >(Background Level +10dB)<br>Neutral, If otherwise | **Low** | **34** |




**SEPP N-1 Zone Type**

| | | |
|---|---|---|
| R1Z = Type 1 | RCZ1 = Type 1 | IN1Z = Type 3 |
| PUZ2 = Type 1 | B1Z = Type 2 | IN2Z = Type 3 |
| PCRZ = Type 1 | B2Z = Type 2 | IN3Z = Type 2 |
| RDZ1 = Type 3 | PUZ1 = Type 1 | GWAZ1 = Type 1 |
| RDZ2 = Type 2 | PUZ2 = Type 1 | MUZ = Type 2 |
| PPRZ = Type 1 | PUZ3 = Type 1 | B3Z = Type 3 |

| Period | Zoning Level dB(A) | Background Noise Level dB(A) | Noise Limit dB(A) |
|---|---|---|---|
| Day weekday (0700h-1800h) | 53 | 35 | 49 |
| Day Saturday (0700h-1300h) | 53 | 35 | 49 |
| Saturday (1300h-1800h) | 47 | 33 | 43 |
| Sunday (0700h-1800h) | 47 | 33 | 43 |
| Evening (1800h-2200h) | 47 | 33 | 43 |
| Night (2200h-0700h) | 42 | 22 | 35 |

N

SLR Consulting Pty Ltd

A.B.N. 29 001 584 612
Suite 6, 131 Bulleen Road Telephone: (03) 9249 9400
Balwyn North, Victoria 3104 Facsimile: (03) 9249 9499

TITLE Ballarat Saleyards
SEPP N-1 Zoning Circles for 80 Victoria Street

APPENDIX C

| DRAWN | DATE | SCALE | FILE | JOB No. | DRG. No. | REVISION |
|---|---|---|---|---|---|---|
| JA | 2015-06-05 | NTS | 640.11095 SEPP N-1 ZONING CIRCLE MAP3 BASIC VERSION | 640.11095 | 1 | 0 |

**Measured Leq noise levels (unweighted)**

| One Third Octave Band Centre Frequency | Lin | dBA | 50Hz | 63Hz | 80Hz | 100Hz | 125Hz | 160Hz | 200Hz | 250Hz | 315Hz | 400Hz | 500Hz | 630Hz | 800Hz | 1kHz | 1.25kHz | 1.6kHz | 2kHz | 2.5kHz | 3.15kHz | 4kHz | 5kHz | 6.3kHz | 8kHz | 10kHz |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Ballarat Sheep Sale** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| large truck ariving full @30m | 82 | 65 | 69 | 67 | 70 | 69 | 67 | 62 | 60 | 59 | 57 | 58 | 57 | 55 | 56 | 57 | 54 | 52 | 52 | 50 | 49 | 47 | 46 | 43 | 40 | 38 |
| small empty fixed truck departing @30m | 76 | 66 | 68 | 66 | 70 | 64 | 62 | 60 | 59 | 58 | 54 | 55 | 58 | 57 | 55 | 55 | 57 | 56 | 53 | 53 | 49 | 46 | 47 | 44 | 42 | 36 |
| truck + 2 trailers driving past and reversing into bay (3 times) 15m closest, 30m furtherst | 75 | 68 | 66 | 68 | 62 | 62 | 62 | 61 | 60 | 57 | 55 | 60 | 63 | 60 | 59 | 61 | 57 | 57 | 54 | 53 | 50 | 47 | 45 | 43 | 40 | 37 |
| truck reversing into bay, including dogs @38m | 74 | 65 | 67 | 65 | 61 | 62 | 61 | 58 | 56 | 55 | 54 | 54 | 56 | 56 | 60 | 57 | 54 | 53 | 49 | 49 | 51 | 47 | 55 | 49 | 46 | 44 |
| dogs (3 to 4), 2 trucks depart (similar distances), some cattle noise, gates on truck, sheep unloading @47m | 70 | 63 | 58 | 59 | 60 | 61 | 60 | 56 | 57 | 54 | 51 | 53 | 56 | 58 | 52 | 55 | 52 | 50 | 49 | 47 | 45 | 42 | 40 | 37 | 35 | 30 |
| sheep getting off truck, voice, dogs, whistle @ 45m | 71 | 63 | 57 | 60 | 62 | 61 | 61 | 61 | 56 | 54 | 53 | 54 | 57 | 55 | 52 | 54 | 50 | 52 | 51 | 47 | 45 | 44 | 45 | 41 | 38 | 31 |
| crash (tailgate), departure, and reversing 25-38 m | 73 | 66 | 62 | 62 | 61 | 61 | 60 | 61 | 60 | 57 | 57 | 60 | 60 | 59 | 56 | 57 | 55 | 54 | 54 | 53 | 51 | 49 | 48 | 46 | 42 | 38 |
| dogs, voice, sheep unloading, truck idling, crashes @30m | 70 | 64 | 58 | 62 | 59 | 59 | 60 | 58 | 57 | 55 | 54 | 56 | 55 | 58 | 52 | 56 | 54 | 52 | 51 | 47 | 45 | 43 | 42 | 39 | 37 | 31 |
| truck wash @ 20m | 65 | 61 | 59 | 48 | 49 | 50 | 51 | 52 | 50 | 47 | 49 | 49 | 48 | 49 | 47 | 51 | 50 | 49 | 50 | 50 | 50 | 49 | 48 | 47 | 45 | 42 |
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Ballarat Prime Cattle Sale** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| truck departing @30m | 79 | 66 | 65 | 63 | 62 | 63 | 65 | 62 | 61 | 59 | 56 | 58 | 59 | 59 | 57 | 57 | 55 | 55 | 55 | 54 | 52 | 50 | 48 | 46 | 44 | 41 |
| cattle stomping in truck @7m | 81 | 75 | 64 | 64 | 70 | 73 | 73 | 72 | 70 | 63 | 66 | 69 | 70 | 67 | 67 | 64 | 63 | 62 | 63 | 61 | 61 | 60 | 58 | 56 | 55 | 52 |
| cattle lowing at 100m + some other activities on site | 70 | 54 | 53 | 55 | 55 | 53 | 51 | 51 | 52 | 50 | 51 | 48 | 48 | 45 | 44 | 44 | 42 | 40 | 37 | 34 | 33 | 34 | 29 | 26 | 23 | 22 |
| cattle and truck leaving @ 100m | 71 | 57 | 64 | 60 | 60 | 58 | 56 | 58 | 58 | 53 | 52 | 51 | 51 | 51 | 48 | 46 | 43 | 42 | 40 | 37 | 38 | 34 | 30 | 25 | 21 | 18 |
| cattle lowing at 10m | 80 | 78 | 52 | 53 | 57 | 58 | 58 | 63 | 71 | 68 | 69 | 71 | 66 | 69 | 71 | 70 | 70 | 68 | 65 | 63 | 59 | 54 | 48 | 46 | 44 | 42 |
| cattle lowinga t 65m | 70 | 58 | 53 | 55 | 54 | 51 | 49 | 52 | 61 | 59 | 53 | 53 | 51 | 48 | 48 | 45 | 43 | 43 | 40 | 36 | 31 | 26 | 22 | 19 | 19 | 16 |
| cattle lowing at 100m | 73 | 52 | 50 | 51 | 52 | 50 | 49 | 50 | 50 | 47 | 54 | 48 | 43 | 40 | 40 | 39 | 37 | 37 | 34 | 30 | 25 | 20 | 16 | 15 | 14 | 14 |
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Barnawartha Store Cattle Sale** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 trucks being washed at 10-15m | 74 | 70 | 59 | 60 | 59 | 58 | 59 | 61 | 59 | 60 | 58 | 59 | 61 | 57 | 61 | 59 | 59 | 60 | 58 | 55 | 55 | 56 | 57 | 57 | 55 | 54 |
| truck being washed at 30m | 74 | 67 | 55 | 60 | 58 | 60 | 58 | 59 | 59 | 58 | 55 | 55 | 57 | 57 | 57 | 58 | 57 | 57 | 56 | 56 | 56 | 54 | 52 | 50 | 48 | 44 |

**Measured Leq noise levels (unweighted)**

| One Third Octave Band Centre Frequency | Lin | dBA | 50Hz | 63Hz | 80Hz | 100Hz | 125Hz | 160Hz | 200Hz | 250Hz | 315Hz | 400Hz | 500Hz | 630Hz | 800Hz | 1kHz | 1.25kHz | 1.6kHz | 2kHz | 2.5kHz | 3.15kHz | 4kHz | 5kHz | 6.3kHz | 8kHz | 10kHz |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| truck being washed at 30m | 73 | 67 | 56 | 57 | 55 | 56 | 57 | 60 | 59 | 56 | 51 | 52 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 56 | 55 | 55 | 54 | 53 | 51 | 48 |
| 3 trucks being washed at 30m | 75 | 66 | 66 | 66 | 60 | 59 | 57 | 58 | 59 | 58 | 52 | 53 | 53 | 55 | 57 | 56 | 54 | 54 | 53 | 54 | 54 | 53 | 53 | 52 | 50 | 46 |
| truck being washed at 30m | 74 | 66 | 59 | 63 | 67 | 62 | 60 | 64 | 60 | 55 | 54 | 55 | 55 | 53 | 52 | 54 | 53 | 53 | 54 | 55 | 55 | 55 | 56 | 55 | 54 | 52 |
| NWW reference location, 104m from nearest roof structure post, lots of activity, truck loading, bangs, 3-4 trucks moving 100-140m away, 2 being unloaded 130-150m away, cows lowing | 69 | 57 | 58 | 63 | 61 | 56 | 55 | 55 | 54 | 52 | 50 | 51 | 52 | 49 | 49 | 48 | 45 | 42 | 39 | 37 | 35 | 31 | 29 | 25 | 21 | 19 |
| NWW reference location, 104m from nearest roof structure post, lots of activity, truck loading, bangs, 3-4 trucks moving 100-140m away, 2 being unloaded 130-150m away, cows lowing | 71 | 57 | 55 | 57 | 56 | 55 | 56 | 54 | 54 | 53 | 51 | 52 | 52 | 51 | 50 | 48 | 44 | 42 | 40 | 38 | 36 | 34 | 32 | 28 | 23 | 20 |
| 139m NNE logger loc. Lots of sources: cattle, gates, loud voices light NE breeze | 70 | 50 | 48 | 47 | 49 | 49 | 45 | 45 | 45 | 47 | 50 | 43 | 41 | 43 | 43 | 40 | 37 | 36 | 36 | 34 | 31 | 27 | 24 | 21 | 16 | 14 |
| 139m NNE logger loc. Lots of sources: cattle, gates, loud voices light NE breeze | 69 | 50 | 50 | 49 | 53 | 49 | 47 | 46 | 44 | 46 | 48 | 41 | 41 | 42 | 42 | 40 | 37 | 37 | 37 | 34 | 32 | 30 | 27 | 25 | 17 | 15 |
| 139m NNE logger loc. Lots of sources: cattle, gates, loud voices light NE breeze | 67 | 52 | 49 | 49 | 55 | 52 | 47 | 46 | 44 | 47 | 52 | 46 | 43 | 43 | 44 | 41 | 39 | 38 | 36 | 33 | 31 | 28 | 25 | 22 | 16 | 13 |
| 139m NNE logger loc. Lots of sources: cattle, gates, loud voices light NE breeze | 69 | 50 | 50 | 51 | 51 | 51 | 47 | 47 | 44 | 46 | 48 | 44 | 41 | 43 | 42 | 40 | 38 | 36 | 35 | 33 | 31 | 28 | 26 | 23 | 16 | 14 |
| 139m NNE logger loc. Lots of sources: cattle, gates, loud voices light NE breeze | 68 | 51 | 49 | 51 | 54 | 49 | 46 | 46 | 45 | 47 | 50 | 47 | 41 | 43 | 43 | 41 | 38 | 37 | 35 | 32 | 33 | 33 | 25 | 25 | 17 | 14 |
| 36m from semi trailer unloading, idling, clunks / bangs from cattle | 70 | 62 | 57 | 55 | 59 | 60 | 61 | 62 | 55 | 56 | 55 | 54 | 56 | 57 | 53 | 51 | 51 | 48 | 48 | 49 | 47 | 44 | 44 | 40 | 36 | 32 |

**Measured Leq noise levels (unweighted)**

| One Third Octave Band Centre Frequency | Lin | dBA | 50Hz | 63Hz | 80Hz | 100Hz | 125Hz | 160Hz | 200Hz | 250Hz | 315Hz | 400Hz | 500Hz | 630Hz | 800Hz | 1kHz | 1.25kHz | 1.6kHz | 2kHz | 2.5kHz | 3.15kHz | 4kHz | 5kHz | 6.3kHz | 8kHz | 10kHz |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| semi trailer @70m manouvering into pos to unload | 71 | 56 | 58 | 62 | 59 | 57 | 53 | 50 | 50 | 46 | 45 | 48 | 49 | 45 | 48 | 49 | 45 | 45 | 43 | 44 | 41 | 35 | 32 | 29 | 24 | 20 |
| Single tray large truck fully loaded slow moving at @15-20m | 78 | 71 | 62 | 70 | 67 | 64 | 67 | 66 | 63 | 66 | 63 | 62 | 63 | 64 | 63 | 61 | 60 | 60 | 59 | 55 | 55 | 53 | 51 | 47 | 42 | 39 |
| @ north opening of cattle shed space ave, cattle noise, some clunks and bangs | 73 | 69 | 51 | 58 | 49 | 49 | 51 | 50 | 54 | 62 | 66 | 67 | 56 | 59 | 62 | 61 | 59 | 58 | 56 | 52 | 49 | 45 | 42 | 40 | 37 | 31 |

Instrumentation used:
Rion NA-28 S/N 30642027
Rion NA-27 S/N 0-1191098
Rion Type NC74 Calibrator S/N 34546617
All measurements were calibration checked before and after measurements. All instrumentation is within current NATA calibration
Weather:
Ballarat Testing: Cool, calm to light northerly wind conditions at times.
Barnawartha Testing: Cool and calm weahter conditions throughout all testing. Some light NE winds noted at times