Memorandum

To:	Steve Foster	**At:**	ESR
From:	Mark Irish	**At:**	SLR Consulting Australia Pty Ltd
Date:	12 February 2021	**Ref:**	610.19360-M04-v0.3 Additional DPIE RFI Response.docx
Subject:	Horsley Logistics Park Response to Additional DPIE RFI		

ESR is proposing to develop a new industrial estate, the Horsley Logistics Park (the development), that will be located at 327-335 Burley Road, Horsley Park, in New South Wales (NSW). SLR Consulting Australia Pty Ltd (SLR) has been engaged by ESR to prepare a Noise and Vibration Impact Assessment (NVIA) for the development to assess potential noise impacts associated with the construction and operation of the project. The report forms part of the State Significant Development Application (SSDA) for the development.

Following submission of the NVIA, the NSW Department of Planning, Industry and Environment (DPIE) has provided a Request for Additional Information by email on 19 January 2021, reproduced below. This memorandum includes SLR response to the DPIE RFI.

1.1 DPIE Issue 1: Operational noise modelling

Loading docks are anticipated to be utilised by 19 metre semi-trailers for reversing movements and super B-double for side-loading. However, there is no evidence that all heavy vehicle manoeuvres identified in the transport assessment have been taken into account in the operational noise assessment.

The NVIA must be revised to incorporate each distinct outdoor operation corresponding to side-loading as well as heavy vehicles idling, passing by, accelerating and reversing (including the contribution of energy-average noise emission associated with non-tonal reversing alarms). This would involve changes to modelled sound power levels for onsite vehicle movements and source path footprint. In addition, the representative duration of noise emission for each distinct operation also need to be amended accordingly. It should be noted that it is unlikely articulated trucks and B-doubles would be able to manoeuvre safely at 25 km/h when turning and reversing on site.

The Department requires all operational modelling assumptions be clearly identified and justified in the amended NVIA.

SLR Response to Issue 1:

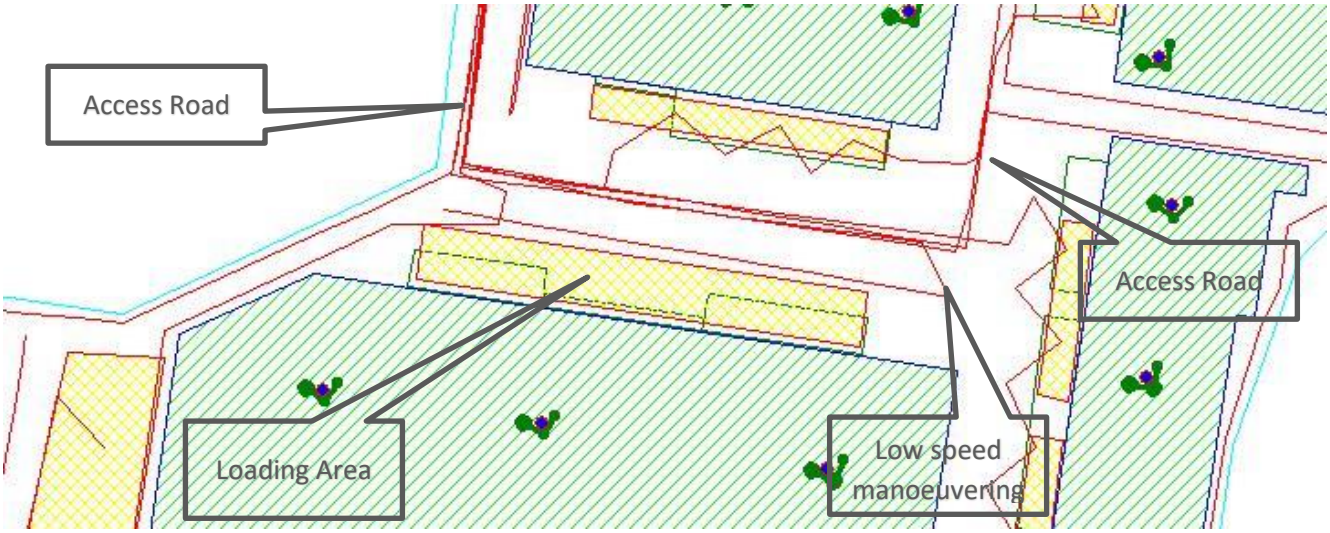
SLR has previously noted that the nominal 25 km/h speed used for heavy vehicle movements is considered representative of a broad range of low speed movements which are typical for an industrial estate. It is anticipated that 25 km/h or higher speed would be a suitable estimate for the majority of the access roads within the estate. It is recognised that in the vicinity of loading areas and hardstands associated with each Lot, lower vehicle speeds including reversing activity is likely to occur.

It is important to note that at this stage of the project the future tenants and precise details of the how the site would be used are not confirmed. The assessment therefore includes reasonable assumptions about the likely future sources of noise (as any SSDA would do), including the expected requirements for trucks accessing the site. 24-hour vehicle movement profiles and specific design information for each Lot will not be available until after approval.

A sensitivity analysis has been conducted to confirm whether the current modelling assumptions include sufficient allowance for the increased sound power levels associated with low speed activities in the loading and hardstand areas.

The relevant locations for the vehicle movement path (using Lot 201 as an example) are shown in **Figure 1** below.

Figure 1 Lot 201 Vehicle Source Locations – Access Road and Loading Area



The source SWLs in **Table 1** indicate the SWL associated with each of the vehicle manoeuvring and loading scenarios. Lot 201 night-time peak has been used as an example but the same principle would be applicable to each Lot within the estate.

The Lot 201 night-time peak scenario includes 10 two-way heavy vehicle movements, which has been modelled as five HV arrivals and five HV departures in a 15-minute period. In the event that the duration of individual low speed movements was extended due to additional manoeuvring (increasing SWL), this would also limit the number of vehicle movements that could reasonably be expected to occur in a 15-minute assessment period (decreasing SWL).

Table 1 Lot 201 Source Sound Power Levels – Noise source contributions

Noise Scenario	Noise Source	Night-time – 10 Heavy Vehicle two-way movements	
		SWL Contribution	Cumulative SWL
1. Existing model	Average 25 km/h entire route (with low speed activity allowance)	106	106
2. Reduced speed in loading area only	25 km/h access road only	103	105
	10 km/h within Lot	102	
3. As per 2 with increased speed on access road	40 km/h access road	101	104
	10 km/h within Lot	102	
4. As per 2 with reversing alarms, 30s duration	25 km/h access road	103	107
	10 km/h within Lot	102	
	Reversing alarm[1] – 5 one way movements, 30 second duration	102	
5. As per 2 with reversing alarms, 15s duration	25 km/h access road	103	106
	10 km/h within Lot	102	
	Reversing alarm[1] – 5 one way movements, 15 second duration	99	
6. As per 3 with reversing alarms, 30s duration	40 km/h access road	101	106
	10 km/h within Lot	102	
	Reversing alarm[1] – 5 one way movements, 30 second duration	102	

Note 1. Reversing alarm SWLs include 5 dB penalty for intermittency

The source contributions in **Table 1** indicate that the existing modelling assumption provides a reasonable estimate of the overall sound power level to account for a variety of different vehicle speeds and reversing alarm activity. The only scenario which anticipates a slightly higher SWL (a negligible 1 dB increase) is Scenario 4 with a 25 km/h speed limit on all access roads, together with reversing alarms operating for 30 seconds per vehicle on average.

This suggests that the overall modelling assumptions are a reasonable estimate of the realistic worst-case scenario activity without any detailed information regarding the operator requirements.

We consider the model to provide a conservative, worst-case assessment for the reasons as follows:

- Preliminary vehicle numbers are usually conservative and the peak night-time vehicle movements are often less than that proposed at DA stage without any operator information.

For example, the current model includes 10 two-way heavy vehicle movements for Lot 201 as discussed above. The prospective operator of Lot 201 (approximately 50% of Lot 201 floor area) has provided a peak night-time 1-hour 6 heavy vehicle two-way movements. This would translate to a maximum of 2 vehicle movements in a peak 15-minute scenario. Allowing a similar number for the remaining 50% floor area suggests that 4 vehicle movements would be a realistic number in a 15-minute scenario. This also conservatively assumes that all operators have peak vehicle movements occurring during the same assessment period.

- The peak scenario assumes that the peak activity would occur at all Lots simultaneously. It is quite possible that different shifts, working patterns and operational requirements of various operators may result in this being a less regular or likely occurrence.
- Weather enhancing conditions are assumed for the night-time scenario as they are a regular feature of the area in accordance with NPfI methodology. However, the assessment assumes that the wind direction under these conditions is always from the source to the receiver, which in practice would not always be the case, even when the wind speed is sufficient to require the assessment to be carried out under the enhanced conditions.

The initial modelling assumptions would be revisited during detailed design when vehicle routes, site layouts, peak vehicle movements and specific operator information becomes available. In the event that higher noise levels are predicted, additional feasible and reasonable noise mitigation options would be assessed.

1.2 DPIE Issue 2: Modifying correction for intermittent noise

The application of modifying corrections for annoying noise characteristics need to be revised in the NVIA in line with Fact Sheet C of the Noise Policy for Industry.

Given the NVIA reported exceedances of sleep disturbance screening criterion at all residential assessment locations and that the predicted temporal variation in noise is well above 5 dB within a 15-minute assessment period, the Department considers the application of a +5 dB modifying correction for intermittent noise to be warranted.

The Department's recommendation is supported by ISO1996-1:2016 on description, measurement and assessment of environmental noise which considers motor vehicle noise under conditions of small traffic volume to be intermittent. Furthermore, Guidelines for Community Noise from the World Health Organization (WHO) reiterated the need to account for the intermittent character of noise when setting night-time noise limits in terms of energy-average noise levels. The WHO notes that the intermittency of a time-varying sound can be determined by quantifying the number of noise events as well as examining the difference between the maximum sound level and background sound level.

SLR Response to Issue 2:

NPfI definition of Intermittency

The NPfI definition of the intermittent noise modifying factor and associated correction are provided in **Table 2**.

Table 2 NPfI Intermittent Noise Modifying Factor Definition and Associated Correction

NPfI Definition	Assessment/ measurement	When to apply	NPfI Correction	Application
Noise where the level suddenly drops/increases several times during the assessment period, with a noticeable change in source noise level of at least 5 dB(A); for example, equipment cycling on and off. The intermittency correction is not intended to be applied to changes in noise level due to meteorology	Subjectively assessed *but should be assisted with measurement to gauge the extent of change in noise level.*	The source noise *heard at the receiver* varies by more than 5 dB(A) *and the intermittent nature of the noise is clearly audible.*	5 dB	Adjustment to be applied for night-time only.

SLR interprets the NSW EPA's intentional use of the term 'sudden' as it relates to intermittent noise definitions in the NPfI as meaning the noise rapidly changes in a clearly abrupt manner over a short time period. Based on this interpretation, many of the principle sources of noise at the development (ie vehicle manoeuvring, forklift movements, mechanical plant, etc) are either relatively constant or have a gradual rise and fall over time, such as during a low speed vehicle passby or manoeuvring. These sources are not considered 'sudden' as they are unlikely to result an immediate change in noise level state.

Vehicle Movements

SLR agree with the Department's assertion that motor vehicle noise under conditions of low traffic volume could be considered intermittent, albeit under certain specific conditions (as referenced in ISO 1996-1:2016). In particular, to meet the NPfI definition the individual vehicle noise event must exhibit a 'sudden increase and decrease' and be sufficiently high enough above the prevailing ambient noise to result in the noise level at the receiver varying by more than 5 dB.

We would not consider multiple, simultaneous low speed vehicle movements and manoeuvring within the estate to exhibit this sudden time varying characteristic where the nearest receivers are offset from the source, such as the subject site. Repeated individual vehicles passing close to a receiver in an otherwise relatively quiet area would be an example where low traffic volumes could result in a sudden increase/decrease in noise level and therefore be considered intermittent.

Reversing Alarms – Peak Scenario Source Contribution

SLR agree that non-tonal reversing alarms could be considered intermittent, in the event that noise from this source is sufficiently dominant above the ambient noise level to result in a 5 dB change in level at the receiver.

To account for the fact that reversing alarms could be intermittent at the receiver in certain circumstances, a 5 dB adjustment has been added to each reversing alarm source SWL. This approach ensures that the 5 dB addition to the source level will be reflected in a similar increase at the receiver in the event that the reversing alarm source contribution is dominant.

To assess whether the reversing alarms are likely to be dominant in a peak scenario, the following source contributions are provided for one example receiver in each of NCA 01 (**Table 3**) and NCA 02 (**Table 4**). These are the most significant noise sources at this location which contribute to the overall ambient noise level. The predicted noise levels are for night-time, weather enhancing conditions as this is the controlling time period for the assessment.

Figure 2 NCA 01 Receiver Location

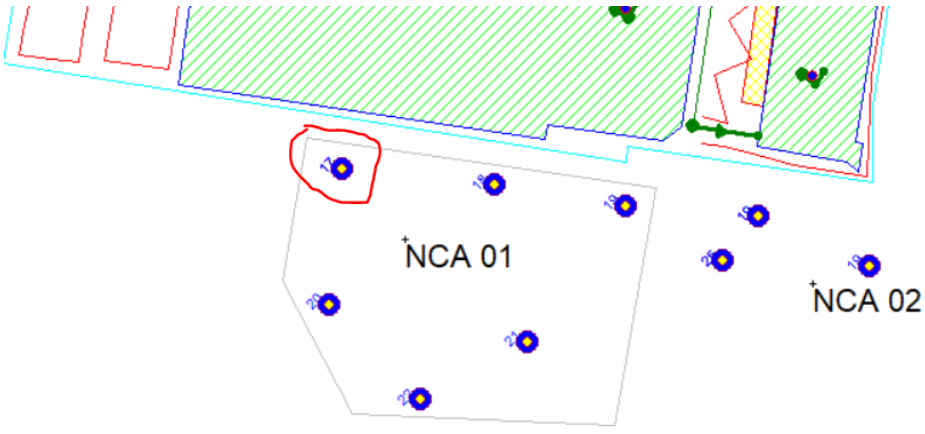


Table 3 NCA 01 Receiver – Noise source ranking and Reversing Alarm noise levels

Noise Source	Source Noise Level Contribution LAeq
Lot 201 Loading Area (includes reversing alarms)	27.6
Lot 201 Hardstand HV	26.9
201 HV	23.3
203 HV	21.2
202(B) HV	20.9
Lot 202-A Loading Area (includes reversing alarms)	20.6
204(A) HV	20.5
Lot 203 Loading Area (includes reversing alarms)	20.2
Lot 201 Hardstand reverse alarms	20.0
201 LV	19.4
Total Receiver Noise Level	**LAeq 34 dB**

Figure 3 NCA 02 Receiver Location

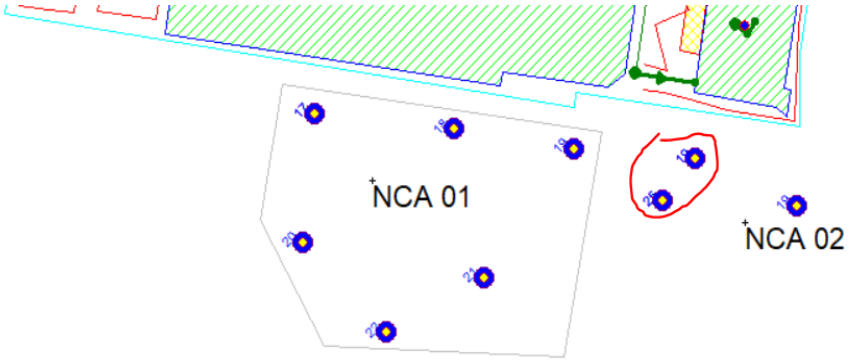


Table 4 NCA 02 Receiver – Noise source ranking and Reversing Alarm noise levels

Noise Source	Source Noise level contribution LAeq
Lot 204-B Loading Area (includes reversing alarms)	31.5
204(A) HV	28.9
Lot 204-A Loading Area (includes reversing alarms)	27.6
Lot 203 Loading Area (includes reversing alarms)	27.2
Lot 201 Loading Area (includes reversing alarms)	26.8
203 HV	26.6
202(B) HV	25.8
202(A) HV	22.5

Noise Source	Source Noise level contribution LAeq
201 HV	22.4
201 (2) Condenser	22.2
Total Receiver Noise Level	**LAeq 38 dB**

The results above indicate that the noise contribution from any individual reversing alarm is around 6 dB or more below the overall receiver noise level. Whilst reversing alarms are significant in terms of noise contributions, when considered in the context of other noise sources operating across the site and the overall L_{Aeq} receiver level they would not be considered individually dominant.

On that basis the noise level at the receiver during a night-time peak scenario would not be considered intermittent.

Reversing Alarms – Individual Source Contribution

To further test the potential for individual reversing alarms to be perceived as intermittent at the nearest receiver location, an analysis has been conducted by assessing a non-tonal reversing alarm (SWL 105 dB) at any point within each hardstand/loading area with no on-time or intermittency correction applied. This enables a prediction of the individual instantaneous reversing alarm noise level that would be measured at the receiver location which can then be compared to the overall ambient noise level due to other noise sources.

The following reversing alarm noise levels are provided for the same example receiver in each noise catchment NCA 01 (**Table 5**) and NCA 02 (**Table 7**). The predicted noise levels are for weather enhancing conditions.

Table 5 NCA 01 Receiver – Reversing Alarm noise levels

Individual Reversing Alarm Noise Source	Reversing Alarm Noise level at Receiver LAeq
Lot 201 Hardstand	38
Lot 201 Loading Area	33
Lot 202-A Loading Area	27
Lot 202-B Loading Area	28
Lot 203 Loading Area	30
Lot 204-A Loading Area	26
Lot 204-B Loading Area	29

Table 6 NCA 01 Receiver – Receiver noise levels with Lot 201 Hardstand Reversing Alarm

Scenario	Receiver Overall Noise level LAeq	Potential Short-term increase in Receiver Noise Level from Reversing Alarm LAeq	Perceived Intermittency Likely at Receiver?	Receiver Noise level with Intermittency Adjustment (if applicable) LAeq	Compliance with Project Criteria?
Night-time Peak	34	4	No	34	Yes

Scenario	Receiver Overall Noise level LAeq	Potential Short-term increase in Receiver Noise Level from Reversing Alarm LAeq	Perceived Intermittency Likely at Receiver?	Receiver Noise level with Intermittency Adjustment (if applicable) LAeq	Compliance with Project Criteria?
Lot 201 Hardstand & Loading, Lot 204 Loading & Rooftop Plant only	33	5	Yes	38	Yes

The results for individual reversing alarms suggest that a reversing alarm on Lot 201 hardstand might be expected to increase the short-term receiver noise level by up to 5 dB in a reduced scenario with only Lot 201 and Lot 204 operating. The alarm noise levels are lower for all other loading areas and therefore result in lower short term noise level increases.

In this scenario it is anticipated that a 5 dB intermittency correction could be applicable in reduced activity scenarios as indicated in **Table 6**. However, the overall receiver noise level in this scenario is still expected to comply with the project criteria due to the reduction in noise contribution from inactive noise sources during the assessment period.

Table 7 NCA 02 Receiver – Reversing Alarm noise levels

Individual Reversing Alarm Noise Source	Reversing Alarm Noise level at Receiver LAeq
Lot 201 Hardstand	22
Lot 201 Loading Area	32
Lot 202-A Loading Area	27
Lot 202-B Loading Area	35
Lot 203 Loading Area	33
Lot 204-A Loading Area	33
Lot 204-B Loading Area	41

Table 8 NCA 02 Receiver –Receiver noise levels with Lot 204-A (North) Loading Area Reversing Alarm

Scenario	Receiver Overall Noise level LAeq	Potential Short-term increase in Receiver Noise Level from Reversing Alarm LAeq	Perceived Intermittency Likely at Receiver?	Receiver Noise level with Intermittency Adjustment (if applicable) LAeq	Compliance with Project Criteria?
Night-time Peak	38	1	No	38	Yes
Lot 201 Hardstand & Loading, Lot 204 Loading & Rooftop Plant	37	1	No	37	Yes

Table 9 NCA 02 Receiver –Receiver noise levels with Lot 204-B (South) Loading Area Reversing Alarm

Scenario	Receiver Overall Noise level LAeq	Potential Short-term increase in Receiver Noise Level from Reversing Alarm LAeq	Perceived Intermittency Likely at Receiver?	Receiver Noise level with Intermittency Adjustment (if applicable) LAeq	Compliance with Project Criteria?
Night-time Peak	38	5	Yes	43	**No**
Lot 201 Hardstand & Loading, Lot 204 Loading & Rooftop Plant	37	5	Yes	42	**No**

The results for individual reversing alarms suggest that a reversing alarm on Lot 204-B (Southern) Loading Area might be expected to increase the short-term receiver noise level by 5 dB in both a peak and reduced scenario with only Lot 201 and 204 operating.

In this scenario it is anticipated that a 5 dB intermittency correction could be applicable as indicated in **Table 9**. This could result in the overall receiver noise level exceeding the project criteria during an individual reversing alarm operating on the southern Lot 204 loading area, in combination with other scenario noise sources.

The alarm noise levels are significantly lower for Lot 204-A (northern) loading areas and therefore result in lower short term noise level increases and no intermittency adjustment likely to be applicable.

Intermittency Assessment Summary

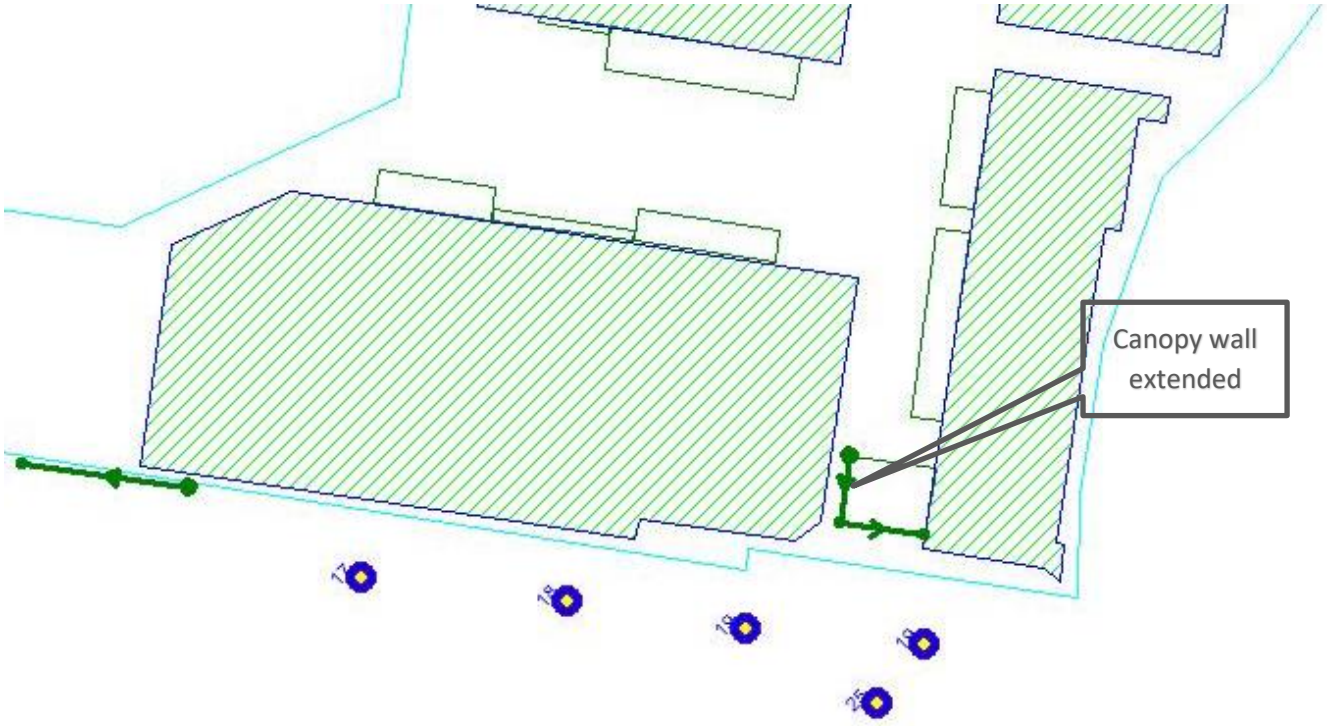
The above analysis concludes that for the majority of reversing alarm locations and activity scenarios, intermittency is considered unlikely to be applicable at the closest receivers due to offset distances, screening and the large number of noise sources operating concurrently.

However, a scenario has been identified where a reversing alarm operating on the southern Lot 204 loading area could be considered intermittent at the nearest receiver in NCA 02.

Lot 204 Loading Area – Additional Mitigation

Additional attenuation of a reversing alarm with the Lot 204 loading area has been investigated by means of an extension to the canopy wall (to eave height) as indicated in **Figure 4** below.

Figure 4 Lot 204 Loading Area – Extended Canopy Wall



Individual reversing alarms in Lot 204 were re-modelled with the results included in Table 10.

Table 10 NCA 02 Receiver – Reversing Alarm noise levels with Extended Canopy Wall

Individual Reversing Alarm Noise Source	Reversing Alarm Noise level at Receiver LAeq
	LAeq
Lot 204-A Loading Area	33
Lot 204-B Loading Area	38

Table 11 NCA 02 Receiver –Receiver noise levels with Lot 204-B (South) Loading Area Reversing Alarm

Scenario	Receiver Overall Noise level LAeq	Potential Short-term increase in Receiver Noise Level from Reversing Alarm LAeq	Perceived Intermittency Likely at Receiver?	Receiver Noise level with Intermittency Adjustment (if applicable) LAeq	Compliance with Project Criteria?
Night-time Peak	38	3	No	38	Yes
Lot 201 Hardstand & Loading, Lot 204 Loading & Rooftop Plant	37	2	No	37	Yes

In this mitigated scenario it is predicted that a 5 dB intermittency correction would no longer be applicable in the night-time peak or Lot 201 and 204 reduced activity scenario as indicated in **Table 11**.

Checked/
Authorised by: AW