Chris Ritchie
Director - Industry Assessments
Department of Planning, Industry and Environment
4 Parramatta Square
12 Darcy Street
Parramatta NSW 2150

15 March 2021

Re: SSD 10436 - Response to Request for Additional Information (RFI)

Dear Chris

I refer to the following correspondence from the Department of Planning, Industry and Environment:

- RFI letter dated 17 November 2020;
- RFI letter dated 19 January 2021;
- RFI email dated 24 February 2021;

Both the letters and email requested additional information and updated modelling in relation to the Noise and Vibration Impact Assessment (NVIA) lodged with the SSD 10436.

These items have been updated and are reflected in the attached updated NVIA Addendum Report, dated 12 March 2021.

In relation to noise emissions resulting from traffic movements, ESR states the following:

> *ESR is committed to limit the number of vehicle movements if, during operational phase, the noise directly emitted from vehicle movements on the subject site are in excess of the agreed criteria outlined in NVIA Response to Submissions Report dated November 2020 and Addendum Report dated 12 March 2021. If other noise sources on the subject site require mitigation measures, ESR will implement the most appropriate and effective solution to minimise impact to surrounding sites.*

Should you have any questions regarding the response, please do not hesitate to contact me or Grace Macdonald, Senior Planner at grace.macdonald@esr.com/ 0411 599 155.

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Kind regards

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Attachment: Updated NVIA Addendum Report, dated 12 March 2021

Memorandum

To:	Steve Foster	**At:**	ESR
From:	Mark Irish	**At:**	SLR Consulting Australia Pty Ltd
Date:	12 March 2021	**Ref:**	610.19360-M06-v0.1 NVIA Addendum Collated.docx
Subject:	Horsley Logistics Park NVIA Addendum Report - Collated Response to DPIE RFIs		

ESR is proposing to develop a new industrial estate, the Horsley Logistics Park (the development), 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 proposal.

Following submission of the NVIA, the NSW Department of Planning, Industry and Environment (DPIE) has issued a number of requests for further information. These DPIE RFIs and SLR responses have been collated into a single addendum report included below.

1 NSW Department of Planning, Industry and Environment RFI Dated 17 November 2020

Following submission of the NVIA, the NSW Department of Planning, Industry and Environment (DPIE) has provided additional comments by email on **17 November 2020**, reproduced below. This section includes SLR response to the DPIE request, originally issued in report 610.19360-M02-v0.2 dated 21 December 2020.

DPIE Issue 1

The operational noise assessment reported predicted 15-minute energy-averaged noise levels would just comply with the night-time criterion of 38 dB(A) at residences in NCA01 and NCA02 to the south of the site whilst predicted noise levels are expected to exceed criterion by 6 dB at residences to the east in NCA03. This modelled scenario included a combination of source and path noise control measures such as:

- *orientation of heavy vehicle loading areas and access routes away from the southern and eastern site boundary as far as practicable, to take advantage of screening afforded by building envelope.*
- *a 3 m height x 80 m length masonry acoustic wall along the southern end of the western truck storage/hardstand area on Lot 201.*
- *a solid wall to the full length of the southern end of the Lot 204 canopy (hardstand to canopy height).*

- *rooftop plant screening and limiting the rooftop plant to an effective sound power level of 80 dB(A) per unit.*

The effectiveness of noise mitigation measures described in points 1, 2 and 3 is not clearly identified in the NVIA.

DPIE Issue 2

Predicted operational noise levels are said to reflect the site when all stages of the masterplan are fully operational. However, the Department notes the outcome of the assessment is dependent upon the accuracy/correctness of modelled operational activities. In addition to rooftop mechanical plant, Table 24 as presented below shows the other noise generating sources included in the noise model.

Table 24 Sound Power Levels for Onsite Vehicle Movements

Noise Source	Sound Power Level (SWL), per vehicle	Average Speed
Heavy Vehicles	103 dBA[1]	25 km/h
Light Vehicles	96 dBA	40 km/h
Gas-powered Forklifts[2]	93 dBA	n/a

Note 1: Based on SLR's noise measurement database, this sound power level is typical of trucks travelling at low speeds, such as within industrial estates.

Note 2: If electric forklifts are proposed for the development, noise emissions from forklifts would be considerably lower than gas-powered forklifts.

Comments on modelling assumptions are as follows:

- *Heavy vehicle sound power level is typical of trucks travelling at low speeds. This assumed source emission scenario does not appear to include noise from acceleration, reversing alarm and during idle.*
- *The NVIA assumed heavy vehicles would move at an average speed of 25 km/h. There is insufficient information in the EIS to verify this assumption. Source emission is sensitive to vehicle passage speed. For example, lowering heavy vehicle speed from 25 km/h to 10 km/h would increase the contribution of noise associated with heavy vehicles by around 4 dB.*
- *Forklift movements have been modelled in the at-grade dock areas of the hardstands. One forklift has been assumed for every two heavy vehicles onsite.*

DPIE Issue 3

In addition, there is no mention of corrections for annoying characteristics in the NVIA. Fact sheet C of EPA's Noise Policy for Industry (NPfI) specify penalty factors for noise heard/predicted/measured at a receiver location with annoying characteristics such as tonality, intermittency, or dominant low-frequency content. If the noise is likely to be intermittent and tonal, a correction of 10 decibels would need to be added to the predicted noise levels. Unless appropriately justified in the NVIA, the Applicant would need to implement best management practice and/or mitigation measures to minimise the prominence of intermittency and tonality of the sounds heard at noise affected residential receivers.

SLR Response to Issue 1, 2 and 3

The points raised in Issue 1, 2 and 3 have been addressed in the following sections of this response:

DPIE Issue	Relevant Section of Report
Issue 1: Effectiveness of noise mitigation measures described in points 1, 2 and 3	**Section 1.1**
Issue 2: Comments on modelling assumptions	**Section 1.2** **Note: Superseded by revised assessment in Section 3.1**
Issue 3: Corrections for annoying characteristics	**Section 1.3** **Note: Superseded by revised assessment in Section 3.2**

1.1 SLR Response to Issue 1

A number of iterative changes were carried out in collaboration with ESR during the design development stage to refine the layout and optimise the location, orientation and screening from buildings to assist in providing acoustic screening to the most affected receivers.

Additional noise walls were proposed in two locations (at Lot 201 and Lot 204), as described in the NVIA, to provide mitigation of noise level exceedances.

To illustrate the effectiveness of the proposed noise barriers, the following source contributions are provided for one example receiver in each noise catchment NCA01 and NCA02. These are the most significant noise sources at this location with and without the proposed indicative noise barriers. The predicted noise levels are for night-time, weather enhanced conditions as this is the controlling time period for the assessment.

Table 1 NCA01 Example Receiver – Noise source ranking

Noise Source	Unmitigated noise level contribution - no barriers		Mitigated noise level contribution - with barriers	
	LAeq	Highest LAmax	LAeq	Highest LAmax
HV hardstand Lot 201	31.2	60.4	25.0	51.8
201 LV	30.1		22.4	
201 HV	26.3		26.3	
204 HV	25.6		21.5	
Forklifts 201	24.6		24.6	
203 HV	24.1		23.7	
202(B) HV	22.9		22.9	
202(A) HV	21.6		21.6	
201 (2) Condenser	20.4		20.4	
201 (1) Condenser	20.4		20.4	

Table 2 NCA02 Example Receiver – Noise source ranking

Noise Source	Unmitigated noise level contribution - no barriers		Mitigated noise level contribution - with barriers	
	LAeq	Highest LAmax	LAeq	Highest LAmax
203 HV	37.3		26.9	
201 (2) Condenser	32.8		22.2	
204 HV	32.3		26.2	
204 (1) Condenser	31.6		21.6	
201 (3) Condenser	31		21.5	
Forklifts 204	30.7	55.4	26.2	53.9
201 (1) Condenser	30.3		20.5	
Forklifts 203	28.4		23.3	
202(B) HV	28.3		22.3	
Forklifts 204-B	27.3		21.6	

1.2 SLR Response to Issue 2

Heavy vehicle SWLs were modelled at 103 dB per vehicle as indicated in Table 24 of the report. This SWL has been used with reference to the paper 'Sound power levels of trucks at low speeds' (Granneman et al, Internoise 2009) and ongoing refinement of SLR source noise levels across many design and compliance assessment projects.

This noise level is considered representative for a broad range of heavy vehicle types travelling at a range of low speeds from 10 km/h to 30 km/h as indicated in the Internoise paper. This is considered a reasonable basis for this assessment, given the current level of detail available for the proposal does not include specific information regarding the type of vehicles associated with each Lot.

In order to assess the possibility of sleep disturbance from peak events, in addition to the above noise sources, heavy vehicle brake releases and reverse alarms (non-tonal) have been modelled at all points along the heavy vehicle routes and in the hardstand areas of the development with a L_{Amax} SWL of 117 dB, and light vehicles have been modelled with a L_{Amax} SWL of 100 dB.

As a conservative assessment, all forklift movements have been modelled as external to the building envelope for each Lot. Depending on the final configuration and operational considerations, some forklift movements may occur inside the building which would reduce the overall noise contribution from this activity. One forklift per two heavy vehicles is considered a reasonable assumption based on previous project experience as the operational requirements of each warehouse is not known at this stage.

1.3 SLR Response to Issue 3

With regard to modifying factors described in Fact Sheet C of the NPfI, SLR does not anticipate penalties associated with the factors to be applicable to this development for the following reasons.

1.3.1 Tonality

The most likely potential source of tonality would be reversing alarms, however, it is expected that non-tonal reversing alarms would be used as standard for any Lot operators so no such penalty is required.

Following selection of mechanical plant during detailed design, some plant items may exhibit tonal characteristics when considered individually. Any tonal characteristics of specific plant items are considered unlikely to be apparent in the overall site noise profile at a given receiver location. This should be assessed during detailed design once plant selections are made and any relevant engineering controls applied.

1.3.2 Dominant low frequency content

Under the definition included in Fact Sheet C of the NPfI, this is not considered relevant to the noise sources considered in this assessment (ie heavy and light vehicle movements, forklifts and external mechanical plant).

1.3.3 Intermittent noise

The NPfI definition of the intermittent noise modifying factor and associated correction are provided in **Table 3**.

Table 3 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.

Subjective definitions of noise characteristics are by definition subject to an individual's interpretation and experience. It is therefore difficult to clearly define what a typical person would subjectively characterise as intermittent noise in cases where the intermittency is not overwhelmingly obvious.

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, the principle sources of noise at the development (ie vehicle movements, mechanical plant, etc) are likely to be fairly constant sources or have a gradual rise and fall over time, such as during a vehicle passby. These sources are not considered 'sudden' as they are unlikely to result an immediate change in noise level state.

An example of a 'sudden' event would be a noise source similar to the dropping of a load, truck engine start, or other event that rapidly increases above the prevailing ambient noise level and then similarly decreases rapidly. Although such events could occur periodically throughout the industrial estate, SLR does not consider it likely that at a given receiver location, events significant enough to alter the ambient noise level by more than 5 dB would occur several times during the assessment period and meet the definition of intermittency in **Table 3**.

2 NSW Department of Planning, Industry and Environment RFI Dated 19 January 2021

Following submission of the NVIA, the NSW Department of Planning, Industry and Environment (DPIE) has provided a request for additional noise modelling on **19 January 2021**, reproduced below. This section includes SLR response to the DPIE request, originally issued in report 610.19360-M04-v0.3 dated 12 February 2021.

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.

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 1 and 2

The points raised in Issue 1 and 2 have been addressed in the following sections of this response:

DPIE Issue	Relevant Section of Report
Issue 1: Operational noise modelling	**Section 2.1** **Note: Superseded by revised assessment in Section 3.1**

DPIE Issue	Relevant Section of Report
Issue 2: Modifying correction for intermittent noise	**Section 2.2** **Note: Superseded by revised assessment in Section 3.2**

2.1 SLR Response to Issue 1

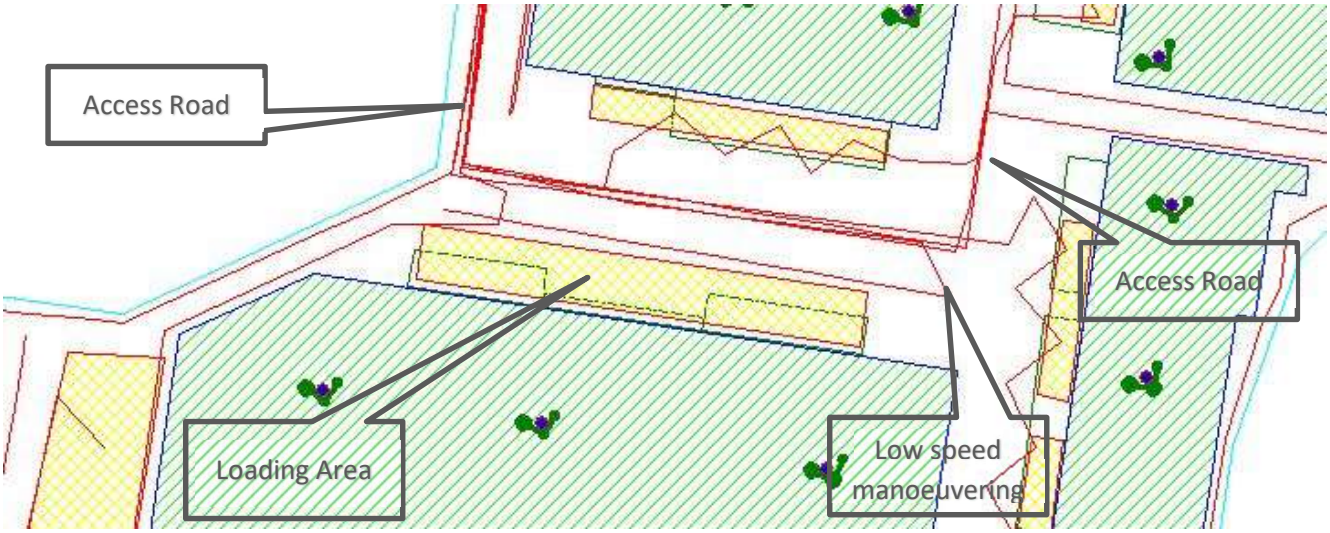
SLR has previously noted that the nominal 25 km/h speed used for heavy vehicle movements is considered representative of a broad range of low speed movements which are typical for an industrial estate. It is anticipated that 25 km/h or higher speed would be a suitable estimate for the majority of the 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 4** 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 4 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 4** 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.

2.2 SLR Response to Issue 2

2.2.1 NPfI definition of Intermittency

The NPfI definition of the intermittent noise modifying factor and associated correction are provided in **Table 5**.

Table 5 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.

2.2.2 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.

2.2.3 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 6**) and NCA 02 (**Table 7**). 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

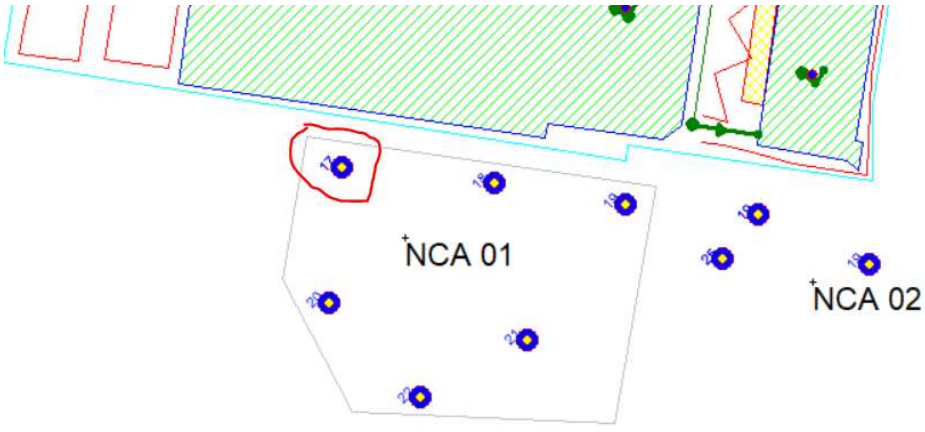


Table 6 NCA 01 Receiver – Noise source ranking and Reversing Alarm noise levels

Noise Source	Source Noise Level Contribution LAeq
Lot 201 Loading Area (includes reversing alarms)	27.6
Lot 201 Hardstand HV	26.9

Noise Source	Source Noise Level Contribution LAeq
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

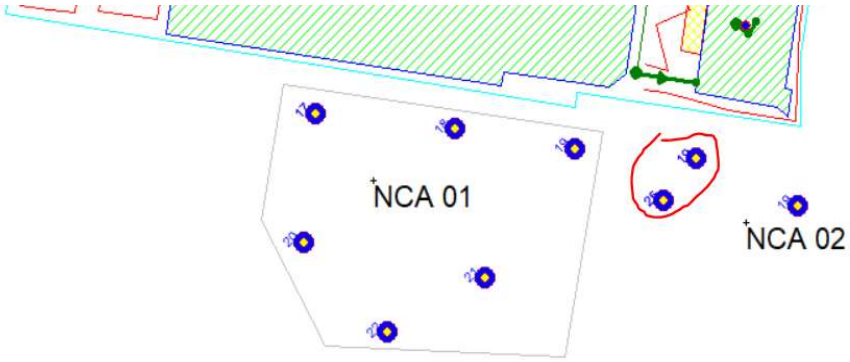


Table 7 NCA 02 Receiver – Noise source ranking and Reversing Alarm noise levels

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
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.

2.2.4 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 8**) and NCA 02 (**Table 10**). The predicted noise levels are for weather enhancing conditions.

Table 8 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 9 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
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 9**. 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 10 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 11 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 12 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 12**. 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.

2.2.5 Intermittency Assessment Summary

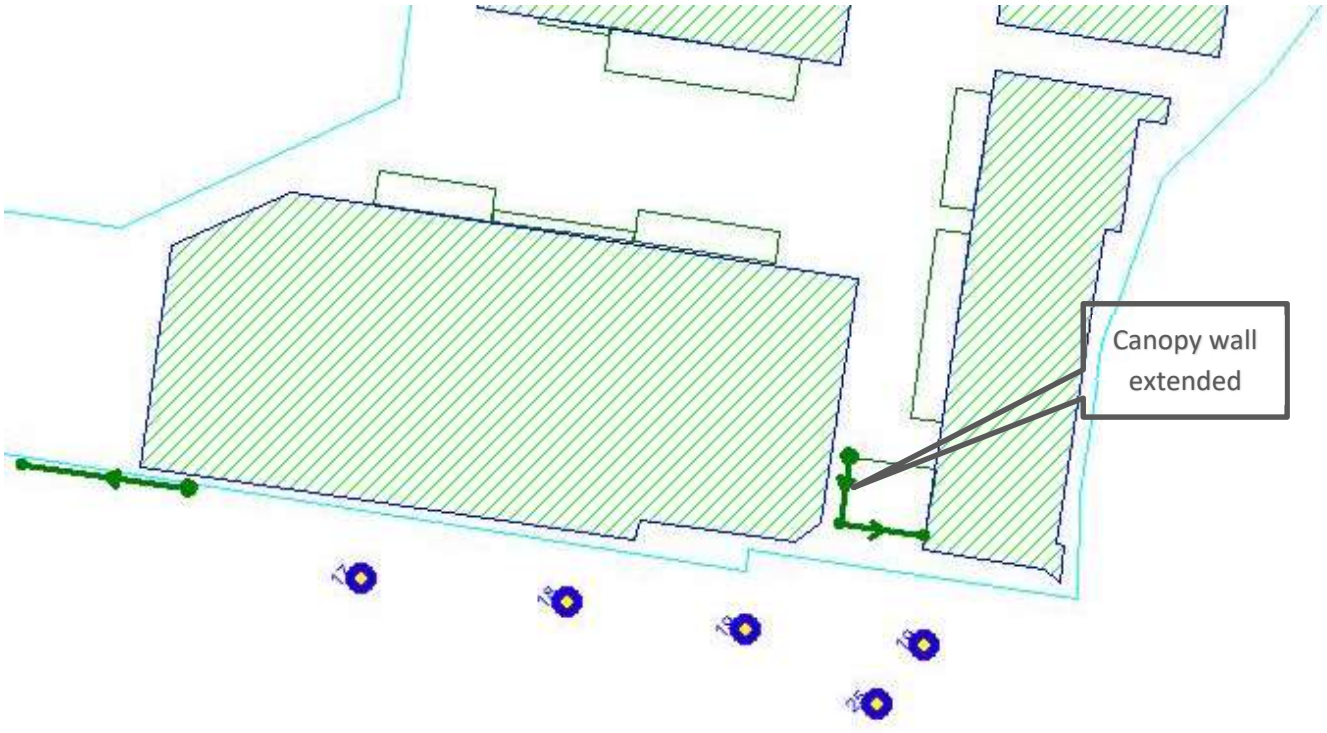
The above analysis concludes that for the majority of reversing alarm locations and activity scenarios, intermittency is considered unlikely to be applicable at the closest receivers due to offset distances, screening and the large number of noise sources operating concurrently.

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.

2.2.6 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 13**.

Table 13 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 14 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 14**.

3 NSW Department of Planning, Industry and Environment RFI Dated 24 February 2021

Following submission of the NVIA, the NSW Department of Planning, Industry and Environment (DPIE) has provided a request for additional noise modelling on **24 February 2021**, reproduced below. This section includes SLR response to the DPIE request, originally issued in report 610.19360-M05-v0.2 dated 5 March 2021.

DPIE Issue 1: Operational Noise Modelling

The Department would be amenable to operational noise predictions had the addendum NVIA (dated 12 February 2021) adopted the following noise emission assumptions:

- *heavy vehicle maximum sound power level of 105 dB(A) and a passage speed of 5 km/h for modelling heavy vehicle passing by within each lot for the calculation of L_{Aeq}*
- *heavy vehicle maximum sound power level of 111 dB(A) for accelerating driving condition for the calculation of L_{Aeq} (maximum sound power level for accelerating driving condition is independent of vehicle speed where tyre/road noise is negligible according to the US FHWA Traffic Noise Model, which means that L_{Aeq} reduces with increasing vehicle speed in the lower speed range)*
- *maximum sound power level of 118 dB(A) for air brake release (same as the submitted NIA)*
- *maximum sound power level of 110 dB(A) for BBS102 heavy duty reversing alarm or maximum sound power level of 115 dB(A) for BBS107 (https://www.ionnic.com/videoproduct/index/download/id/81/), assume up to 13 discrete events every 10 seconds and $L_{Aeq,10s}$ sound power level being 3 dB(A) lower than the maximum sound power level*
- *maximum sound power level of 105 dB(A) for gas-powered forklift reversing (up to 13 discrete events every 10 seconds) and $L_{Aeq,10s}$ sound power level of 102 dB(A)*

To ensure the addendum NVIA is clear, the broad types of trucks (rigid, semi-trailer, B-double and the like) need to be clearly stated in the amended report. Further, the amended report must clearly state whether impact noise such as metal-on-metal contact noise is likely to be generated by unloading/loading activities or any other operating activities. If operating activities are likely to generate impact noise, the assumed L_{Aeq} and L_{Amax} sound power levels and the corresponding duration of noise emission need to be reported and considered in the noise assessment. The amended report also need to clearly state whether condensers would be the only source of steady noise. If transport/trailer refrigeration units are expected to be left overnight, reasonable steps needs to be made to ensure all sources of noise are taken into account in the operational noise modelling of cumulative impact. All noise modelling assumptions need to be consolidated into one single section of the amended report.

DPIE Issue 2: Modifying Correction and Maximum Noise Level Event Assessment

Further to the above, the application of modifying corrections for annoying noise characteristics need to be evaluated and implemented in line with the guidance from the EPA and WHO. According to the Noise Policy for Industry, noise levels measured or predicted at a receiver attracts a +5 dB(A) penalty correction if the noise heard at the receiver varies by more than 5 dB(A) and the intermittent nature of the noise is clearly audible. 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 L_{Aeq} 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 noise level and background noise level.

L_{A90} background noise level by definition is the level exceeded for 90 percent of the measurement period and represents a level that is almost always there in between intermittent noise events. Only "201(2) condenser" from Table 4 of the addendum NIA has the potential to affect the background noise level as all other sources generates non-steady noise. However, a steady noise level of 22 dB(A) from noise source "201(2) condenser" at NCA 02 Receiver is unlikely to affect the measured rating background level. Thus, the Department maintains the position stated in the RFI dated 19 January 2021 that a +5 dB modifying correction for intermittent noise is warranted. This RFI requested the application of the intermittency correction on the basis that the NVIA reported exceedances of the sleep disturbance screening criterion at all residential assessment locations and that the predicted temporal variation in noise would therefore be well above 5 dB(A) within a 15-minute assessment period. A detailed maximum noise level event assessment is required to justify the exclusion of the intermittency correction for the mitigated scenario presented in Table 11 of the addendum NVIA. The Department would deem the exclusion of the intermittency correction appropriate at the EIS stage if the level exceeded for 10 percent of the assessment period of 15-minute is predicted to be less than 5 dB(A) above the rating background noise level. The detailed assessment should consider all feasible and reasonable noise mitigation measures with a goal of achieving the $L_{Aeq,15minute}$ and L_{Amax} trigger levels.

SLR Response to Issue 1 and 2

The points raised in Issue 1 and 2 have been addressed in the following sections of this response:

DPIE Issue 1	Relevant Section of Report
heavy vehicle maximum sound power level of 105 dB(A) and a passage speed of 5 km/h for modelling heavy vehicle passing by within each lot for the calculation of L_{Aeq}	**Section 3.1.1**
heavy vehicle maximum sound power level of 111 dB(A) for accelerating driving condition for the calculation of L_{Aeq} (maximum sound power level for accelerating driving condition is independent of vehicle speed where tyre/road noise is negligible according to the US FHWA Traffic Noise Model, which means that L_{Aeq} reduces with increasing vehicle speed in the lower speed range)	**Section 3.1.1**
maximum sound power level of 118 dB(A) for air brake release (same as the submitted NIA)	**Section 3.1.3**
maximum sound power level of 110 dB(A) for BBS102 heavy duty reversing alarm or maximum sound power level of 115 dB(A) for BBS107 (https://www.ionnic.com/videoproduct/index/download/id/81/), assume up to 13 discrete events every 10 seconds and $L_{Aeq,10s}$ sound power level being 3 dB(A) lower than the maximum sound power level	**Section 3.1.2** (LAeq) **Section 3.1.3** (LAmax)
maximum sound power level of 105 dB(A) for gas-powered forklift reversing (up to 13 discrete events every 10 seconds) and $L_{Aeq,10s}$ sound power level of 102 dB(A)	**Section 3.1.2** (LAeq) **Section 3.1.3** (LAmax)
The broad types of trucks (rigid, semi-trailer, B-double and the like)	Specific details of the types of trucks accessing the site are not available. Heavy vehicle sound power level modelling assumptions are included in **Table 15** in accordance with DPIE request

DPIE Issue 1	Relevant Section of Report
If impact noise such as metal-on-metal contact noise is likely to be generated by unloading/loading activities	**Section 3.1.3**. Metal on metal impact sound and similar events are not modelled for a speculative facility where the likelihood of these events is not known. Occasional events of this nature would not contribute significantly to the overall receiver LAeq or LAmax screening assessment.
whether condensers would be the only source of steady noise; *If transport/trailer refrigeration units are expected to be left overnight*	**Section 3.1.3**. Rooftop plant items are the only constant noise sources assumed at SSDA stage. Vehicle refrigeration units are not included for a speculative facility. These sources would be modelled during detailed design if required for a specific operator.
All noise modelling assumptions need to be consolidated into one single section of the amended report.	**Section 3.1.1** to **Section 3.1.3**
DPIE Issue 2	**Relevant Section of Report**
Modifying Correction and Maximum Noise Level Event Assessment	**Section 3.2**

3.1 SLR Response to Issue 1

It is important to note that at this stage of the project the future tenants and precise details of how the site would be used are not confirmed. The assessment therefore includes reasonable high level 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, details of the types of trucks accessing the site and specific design information for each Lot will not be available until after approval.

The source locations used in the noise model are shown in **Figure 5** below.

Figure 5 Noise Source Locations

The modelling inputs and resultant source Sound Power Levels (SWL) for each component of the vehicle access, manoeuvring and loading are included in **Table 15**, **Table 16** and **Table 17**.

3.1.1 Line Sources

Previous iterations of the line sources included a nominal 'low speed allowance' within the modelled SWL to accommodate later detailed design considerations such as loading area manoeuvring. The modelled line sources have now been subdivided into the following sections to accommodate DPIE request:

- Access road movements at 25 km/h, 20% accelerating driving condition
- Loading and hardstand areas within each Lot at 5 km/h, 20% accelerating driving condition

Table 15 Night-time Sound Power Levels – Line Sources

Source	Source SWL, dBA	Vehicle Speed, Km/h	Line Source Length, m	Duration of Vehicle on Route, s	Speed/ Duration Correction, dB	Number of Vehicles (two way)	Vehicle Number Correction, dB	Resultant SWL, dBA
201 HV hardstand Night	105 (80%) 111 (20%)	5	397	286	-5	3	5	107
201 HV hardstand Night Road	105 (80%) 111 (20%)	25	289	42	-13	3	5	98

Source	Source SWL, dBA	Vehicle Speed, Km/h	Line Source Length, m	Duration of Vehicle on Route, s	Speed/ Duration Correction, dB	Number of Vehicles (two way)	Vehicle Number Correction, dB	Resultant SWL, dBA
201 HV Night Loading	105 (80%) 111 (20%)	5	294	212	-6	10	10	111
201 HV Night Road	105 (80%) 111 (20%)	25	466	67	-11	10	10	106
202-A HV Night Loading	105 (80%) 111 (20%)	5	410	295	-5	4	6	108
202-B HV Night Loading	105 (80%) 111 (20%)	5	284	204	-6	4	6	107
202-B HV Night Road (arrive)	105 (80%) 111 (20%)	25	240	35	-14	4	6	99
202-B HV Night Road (depart)	105 (80%) 111 (20%)	25	355	51	-12	4	6	101
203 HV Night Loading	105 (80%) 111 (20%)	5	294	212	-6	5	7	108
203 HV Night Road	105 (80%) 111 (20%)	25	585	84	-10	5	7	104
204 (1) HV Night Loading	105 (80%) 111 (20%)	5	160	115	-9	2	3	101
204 (2) HV Night Loading	105 (80%) 111 (20%)	5	231	166	-7	2	3	103
204 HV Night Road	105 (80%) 111 (20%)	25	467	67	-11	4	6	102
201 LV Night Carpark	96	10	451	162	-7	10	10	99
201 LV Night Road	96	40	268	24	-16	10	10	90
202 LV Night Carpark	96	10	319	115	-9	8	9	96
202 LV Night Road	96	40	157	14	-18	8	9	87
203 LV Night Carpark	96	10	339	122	-9	5	7	94
203 LV Night Road	96	40	202	18	-17	5	7	86
204 LV Night Carpark	96	10	458	165	-7	6	8	96
204 LV Night Road	96	40	542	49	-13	6	8	91

3.1.2 Area Sources

Table 16 Night-time L_{Aeq} Sound Power Levels – Area Sources

Noise Source	Sound Power Level (dBA)	Duration of Use in Peak 15-minute Period (s)	Comment
Truck Reversing Alarm	107 [1]	60	Applicable to 50% of two way truck movements
Forklift Reversing Alarm	102 [1]	90	-
Gas Forklift	93	900	-

Note 1. LAeq sound power level 3 dBA lower than the maximum sound power level in accordance with DPIE request

3.1.3 Point Sources

Each nominal rooftop plant point source shown in **Figure 5** is modelled using SWL 90 dB, with a total SWL 95 dB per Lot.

Maximum noise level events are modelled to occur anywhere within the area sources shown in **Figure 5** with the SWLs included in **Table 17**.

Table 17 Night-time L_{Amax} Sound Power Levels – Hardstand, Loading Areas and Car Parks

Noise Source	Sound Power Level (dBA)	Comment
Air brake	118	-
Truck Reversing Alarm	110	Intermittency test applicable
Forklift Reversing Alarm	105	Intermittency test applicable
Car Peak Events	100	-

It is anticipated that the L_{Aeq} noise contribution from occasional impact sounds due to loading activities would not be significant compared to the dominant sources included in **Table 16**.

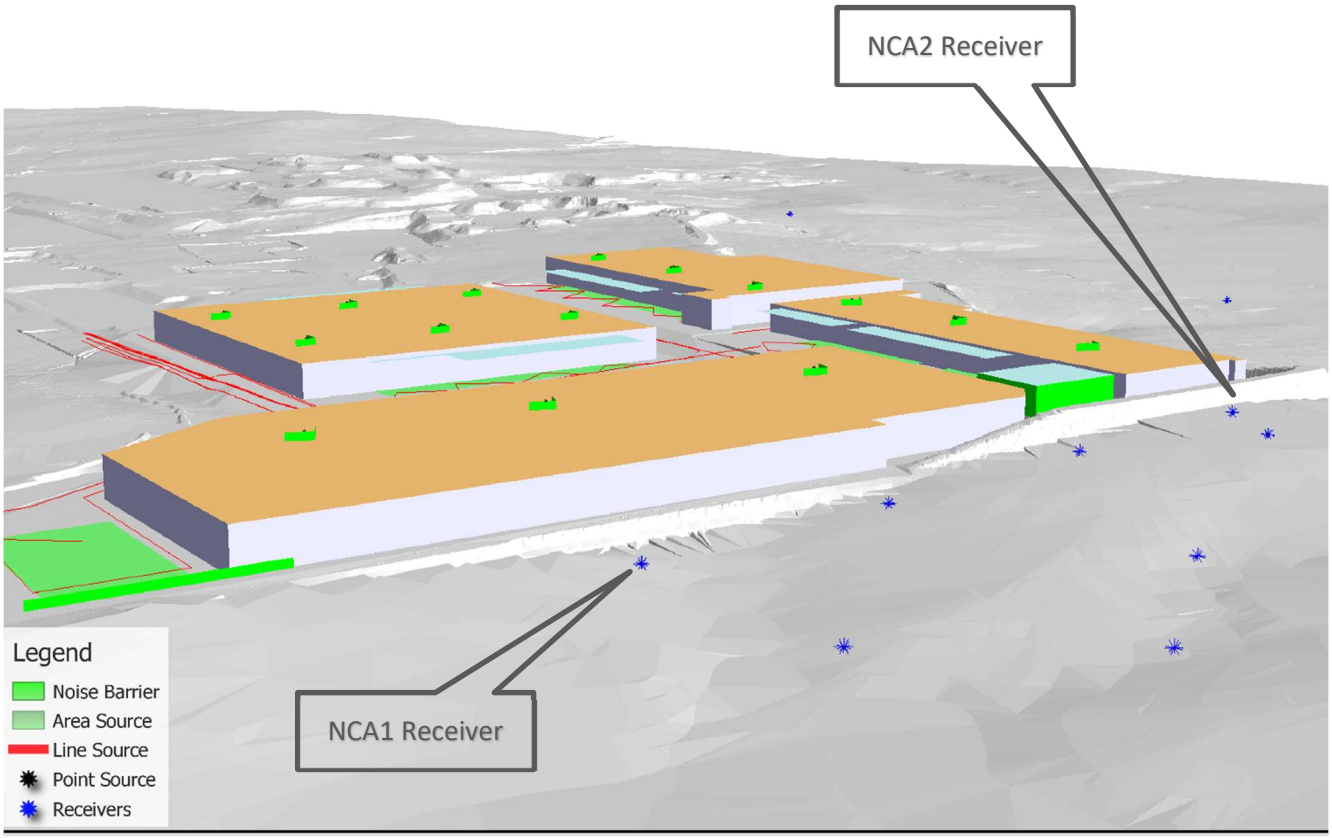
The maximum SWL of occasional impact sounds is also considered unlikely to exceed the air brake SWL 118 dB in **Table 17** for the sleep disturbance screening assessment.

3.1.4 Noise Mitigation Measures

The noise mitigation measures included in the model are shown in **Figure 6** and briefly summarised below:

- 3 m noise barrier to southern boundary of Lot 201 hardstand
- Infill noise wall to Southern and Western eave height of Lot 204 super canopy
- Rooftop plant screening to Southern and Eastern elevations.

Figure 6 Modelled Noise Mitigation Measures and Representative Receiver Locations



3.1.5 Predicted Noise Levels

The predicted noise levels and principal noise source contributions are shown in **Table 18** and **Table 19** for the most affected receivers in NCA1 and NCA2. Noise predictions are for night-time weather enhanced conditions.

Table 18 NCA1 Receiver – Principal Noise Source Contributions

Noise Source	Source Noise Level Contribution LAeq	Maximum Source Noise Level LAmax
201 HV hardstand Night Loading	27.8	-
201 LV Night Carpark	25.8	38.3 (car)
201 HV Night Loading	23.2	-
202-B HV Night Loading	19.4	-
201 HV Night Road	19.4	-
Loading 201 Maxima/AB Night	18.9	37 (air brake)
Lot 201 Hardstand Maxima/AB Night	18.7	48.7 (air brake) 40.7 (reversing alarm)
203 HV Night Road	17.1	-

Noise Source	Source Noise Level Contribution LAeq	Maximum Source Noise Level LAmax
204 (2) HV Night Loading	16.5	-
203 HV Night Loading	16.0	-
204 HV Night Road	16.0	-
Forklifts/Rev alm 201 Night	15.9	29 (reversing alarm)
202-A HV Night Loading	15.7	-
Loading 204 (B) Maxima/AB Night	15.4	36.3 (air brake)
202-B HV Night Road (depart)	14.3	-
201 (2) Condenser	13.6	-
201 (1) Condenser	13.5	-
Loading 202 (B) Maxima/AB Night	12.7	31.2 (air brake)
Loading 203 Maxima/AB Night	11.7	30.5 (air brake)
Loading 204 (A) Maxima/AB Night	11.4	30.3 (air brake)
Total Receiver Noise Level	**LAeq 33 dB**	**LAmax 49 dB**
Project Noise Trigger Level	**LAeq 38 dB**	**-**
Sleep Disturbance Screening Criterion	**-**	**LAmax 52 dB**

Table 19 NCA2 Receiver – Principal Noise Source Contributions

Noise Source	Source Noise Level Contribution LAeq	Maximum Source Noise Level LAmax
Loading 204 (A) Maxima/AB Night	27.8	47.4 (air brake)
204 (2) HV Night Loading	27.3	-
204 (1) HV Night Loading	26.8	-
Loading 204 (B) Maxima/AB Night	24.8	45.1 (air brake)
201 HV Night Loading	24.8	-
203 HV Night Loading	22.0	-
204 B(1) Condenser	21.4	-
201 (2) Condenser	21.3	-
201 LV Night Carpark	21.2	31.7 (car)
203 HV Night Road	21.1	-
Forklifts/Rev alm 204 (1) Night	20.8	39.4 (reversing alarm)
202-B HV Night Loading	20.4	-
201 HV hardstand Night Loading	20.4	-
201 (3) Condenser	20.4	-
204 LV Night Carpark	20.1	31.9 (car)
202-B HV Night Road (arrive)	19.8	-
Loading 201 Maxima/AB Night	19.1	37.3 (air brake)

Noise Source	Source Noise Level Contribution LAeq	Maximum Source Noise Level LAmax
201 (1) Condenser	18.5	-
Forklifts/Rev alm 204 (2) Night	17.8	37.1 (reversing alarm)
Total Receiver Noise Level	**LAeq 36 dB**	**LAmax 48 dB**
Project Noise Trigger Level	**LAeq 38 dB**	**-**
Sleep Disturbance Screening Criterion	**-**	**LAmax 52 dB**

The above noise predictions indicate that compliance with the night-time Project Noise Trigger Level is expected to be achieved at both receiver locations.

The above modelling assumptions would be revisited during detailed design when detailed information regarding 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 and considered.

3.2 SLR Response to Issue 2

SLR agrees 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.

The maximum noise levels from the most significant reversing alarm event locations are included in **Table 18** and **Table 19** for the most affected receiver in NCA1 and NCA2, respectively.

To assess the potential for individual reversing alarms to be perceived as intermittent at the nearest receivers in the absence of other significant activity occurring on site, an intermittency screening test has been conducted by comparing the maximum noise level of a non-tonal truck reversing alarm (SWL 110 dB) at any point within each hardstand/loading area to the established Rating Background Level (RBL) for the receiver. This enables a prediction of the emergence of an individual reversing alarm noise level that would be measured at the receiver location compared to the prevailing night-time background noise level.

The reversing alarm maximum noise level intermittency screening test is provided for the same example receiver in each noise catchment NCA1 (in **Table 20**) and NCA2 (in **Table 21**), with weather enhancing conditions. Rating Background Levels for each noise catchment are taken from the NVIA report (SLR report 610-19360-R02-v2.1 dated 2 November 2020).

Table 20 NCA1 Receiver – Reversing Alarm Intermittency Screening Test

Scenario	Receiver Maximum Noise level LAmax	Rating Background Level (RBL) dBA	Emergence above RBL dBA	Perceived Intermittency Likely at Receiver?
Lot 201 Hardstand	40.7	38	3	No
Lot 201 Loading	29.0	38	-9	No

Table 21 NCA2 Receiver – Reversing Alarm Intermittency Screening Test

Scenario	Receiver Maximum Noise level LAmax	Rating Background Level (RBL) dBA	Emergence above RBL dBA	Perceived Intermittency Likely at Receiver?
Lot 204 (1) Loading	39.4	35	4	No
Lot 204 (2) Loading	37.1	35	2	No

The screening test for the most affected receiver in each noise catchment indicates that the maximum reversing alarm noise level at the receivers would not be considered intermittent with the mitigation measures included in **Figure 6**.

Checked/
Authorised by: AW