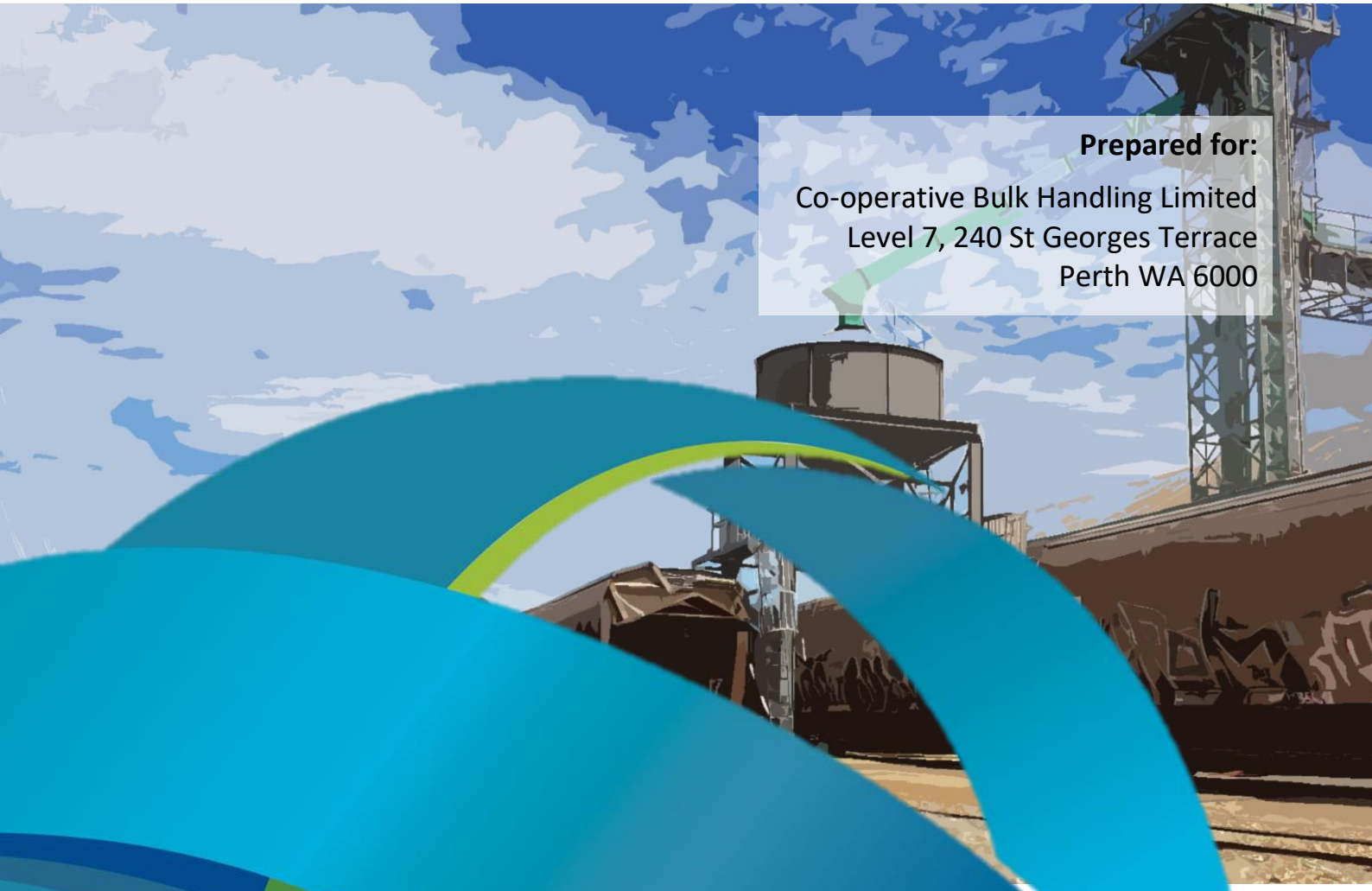
NOISE IMPACT ASSESSMENT REPORT

Rail Loading Facility - Konnongorring



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BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Co-operative Bulk Handling Limited (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

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DOCUMENT CONTROL

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EXECUTIVE SUMMARY

The CBH Group (CBH) is a grain growers' cooperative that handles, markets and processes grain from the wheatbelt of Western Australia (WA). CBH owns a rail fleet and dedicated infrastructure for the efficient transfer of grain from country receival points to its four port terminals.

The existing CBH rail loading facilities at Konnongorring provides storage and transport of grain from the local grain agriculture industry in the wheatbelt region. To support the local growers, CBH is proposing to implement new and upgraded infrastructure at the facility to provide rail load out capacity for the handling and transport of grain.

To support the upgrade of the rail loading facilities, this report, prepared by SLR Consulting Australia Pty Ltd (SLR), details an assessment of noise for the proposed operation of the site.

Criteria have been developed in accordance with Western Australian Planning Commission State Planning Policy 5.4 Road and Rail Noise ("SPP5.4"), and the *Environmental Protection (Noise) Regulations 1997* ("the Regulations").

An assessment of the rail siding upgrade was prepared to facilitate forward works. A copy of this assessment is attached, and following submission the rail siding upgrade was approved by Council on the 15th November 2023. This report focuses on the assessment of noise emissions under the *Environmental Protection (Noise) Regulations 1997*, namely proposed Overhead Rail Bins and site operations. The rail siding addition does not contribute to the noise emissions assessed under the *Environmental Protection (Noise) Regulations 1997*, therefore each assessment is independent of the other.

The assessment of noise and vibration for the proposed upgrade and enhancement of the Konnongorring rail loading facility has determined that:

- The predicted noise levels with the proposed operations are higher than the predicted noise levels for current operations as the demolition of former buildings removes an acoustic barrier and the proposed Overhead Rail Bin (ORB) increases operational noise emissions during operation.
- In conjunction with the landowner and PTA, it is proposed to construct a solid fence on PTA land close to the residential receptor R1, to mitigate noise emissions to comply with acoustic criteria. This barrier options will also reduce rail noise (exempt under the regulations) to the residential receptor, potentially improving the overall acoustic amenity.
- The proposed rail load out facility will reduce the requirement to use road transport to move grain from the Konnongorring CBH site to other CBH sites for transportation to port. There should be a net reduction in general road traffic noise as a result of this measure.
- Regardless of the above, noise from proposed operation of the loadout facility may be perceptible at the nearest sensitive receivers given the relatively quiet noise environment at Konnongorring and forecast levels, particularly the nearest sensitive receivers to the rail siding and loadout.

The assessment outcome is contingent on aspects such as the adopted source noise emissions, loadout operations being typically four hours in duration.

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1 Introduction

The CBH Group (CBH) is a grain growers' cooperative that handles, markets and processes grain from the wheatbelt of Western Australia (WA). CBH owns a rail fleet and dedicated infrastructure for the efficient transfer of grain from country receival points to its port terminals.

The existing CBH rail loading facility at Konnongorring provides storage and transport of grain from the local grain agriculture industry in the wheatbelt region.

To support the local growers, CBH is proposing to construct new rail out loading siding infrastructure to increase the amount of train transported to port by rail. It is expected that current daily truck traffic on the local Northam-Pithara Road will reduce significantly as grain from Konnongorring should no longer need to be transported by truck to Avon for rail transportation to port.

An assessment of the rail siding upgrade was prepared to facilitate forward works. A copy of this assessment is attached, and following submission the rail siding upgrade was approved by Council on the 15th November 2023. This report focuses on the assessment of noise emissions under the *Environmental Protection (Noise) Regulations 1997*, namely proposed Overhead Rail Bins and site operations. The rail siding addition does not contribute to the noise emissions assessed under the *Environmental Protection (Noise) Regulations 1997*, therefore each assessment is independent of the other.

1.1 Locality

Figure 1 presents an aerial image of the Konnongorring facility. It is predominately surrounded by scrub bushland and individual residences on larger land holdings.

Figure 1 Overview of CBH Konnongorring facility

1.2 Background to the proposal

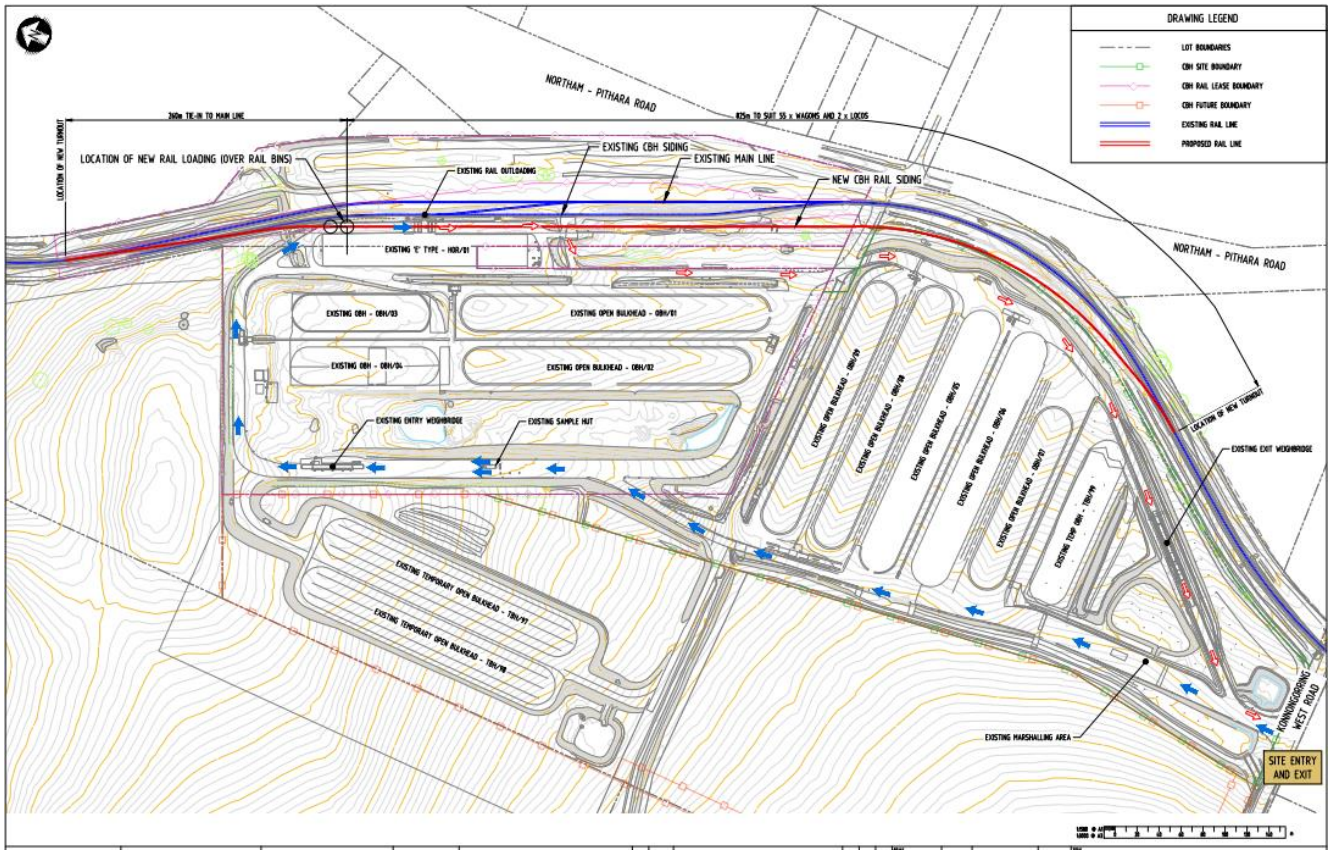
Currently, trucks currently deliver grain to and from the CBH Konnongorring site. Augers / elevators, conveyors and stackers are used to unload the grain from trucks. Front end loaders and stackers load the trucks.

It is proposed to upgrade the existing railway line at the CBH Konnongorring site as well as upgrade the plant to allow for rail out-loading at the Konnongorring site. The proposed upgrade of the facility includes:

- Implementation of new loadout infrastructure for train loading including two new grain storage silos.
- Installation of approximately 1km of new rail siding track to support the grain rail loading and manoeuvring of the locomotive and wagon rollingstock, with a turnout at each end. The rail siding part of the project was assessed separately and approval from Council granted on the 15th November 2023.

An overview of the main siding and rail loading upgrades for the Konnongorring facility are illustrated in **Figure 2.** The proposed additional siding alignment is shown in red, with turnouts to main line at each end. The rail loading facility (two overhead bins) is at the northern end of the existing CBH storage building.

Figure 2 Proposed Konnongorring rail loading facility (supplied)



Future operations will include rail out-loading at the existing site. This will include new train loading infrastructure and modifications which will reduce the need for out loading of grain via trucks and instead allow all out loading to occur via rail. This will reduce the number of truck movements on the Northam-Pithara Road.

1.3 Aim and purpose

The site is located in an area where future environmental noise emissions as a result of the proposal may have the potential to impact nearby sensitive areas.

To support the upgrade of the Konnongorring facility, this report details an assessment of noise emissions for the proposed operation of the site. The report compares potential noise levels from site operations against environmental noise criteria developed from a review of applicable WA state noise regulations and planning policy.

2 Criteria

The grain transfer and processing operations of the rail loading facility include potential sources of noise associated with on site mobile equipment, fixed plant and machinery. The regulatory framework in WA requires the potential noise emissions, and noise related impacts, associated with the site operations to be managed under the *Western Australia Environmental Protection (Noise) Regulations 1997* (the Regulations).

Site noise emissions are covered by state noise regulations in the form of the Regulations. Generally, to achieve compliance with the Regulations, noise levels at nearby residential areas are not to exceed defined limits i.e. Assigned Noise Levels. A summary of the applicable noise limits is provided in **Table 1**.

Table 1 Assigned noise level summary

Part of premises receiver noise	Time of day	Assigned Noise Level, dB		
		L_{A10}	L_{A1}	L_{Amax}
Noise Sensitive premises at locations within 15 m of a building directly associated with a noise sensitive use	7.00 am to 7.00 pm Monday to Saturday ('Day')	45 + IF	55 + IF	65 + IF
	9.00 am to 7.00 pm Sunday and public holidays ('Sundays')	40 + IF	50 + IF	65 + IF
	7.00 pm to 10.00 pm all days ('Evening')	40 + IF	50 + IF	55 + IF
	10.00 pm on any day to 7.00 am Monday to Saturday and 9.00 am Sunday and public holidays ('Night')	35 + IF	45 + IF	55 + IF
Noise Sensitive premises at location further than 15 m from a building directly associated with a noise sensitive use	All hours	60	75	80
Commercial premises	All hours	65	75	80
Industrial and utility premises	All hours	65	80	90

The Regulations adopt three noise metrics to quantify the noise limits. The 'L_{A10}' assigned noise level (level exceeded more than 10% of the time) has been adopted for this assessment as it provides the representative quantification of noise for the continuous operation during rail loading activities.

The assigned levels are determined with consideration of prevailing background noise levels and 'influencing factors' (IFs) which take into account land-use zoning and road traffic around the nearest sensitive receiver of interest, within a 100 m and 450 m radius. The assigned levels are as detailed in **Table 3** of **Section 3.1** and are the most stringent noise assessment criteria adopted by the Regulations.

Under the Regulations, if noise emitted from any premises when received at any other premises cannot reasonably be free of intrusive characteristics of tonality, modulation and impulsiveness, a series of adjustments are added to the emitted levels (measured or calculated) and the adjusted level must comply with the assigned level. The adjustments are detailed in **Table 2** and are further defined in Regulation 9(1) w of the Regulations.

Table 2 Definition of noise characteristics

Noise characteristic	Definition	Adjustment if present (Note[1])
Tones	Where the difference between the A weighted sound pressure level in any one third octave ban and the arithmetic average of the A weighted sound pressure levels in the two adjacent one third octave bands is greater than 3 dB in terms of $L_{Aeq,T}$ where the time period T is greater than 10% of the representative assessment period, or greater than 8 dB at any time when the sound pressure levels are determined as L_{ASlow} levels.	+5 dB
Modulation	A variation in the emission of noise that – Is more than 3 dB LAFast or is more than 3 dB LAFast in any one third octave band; Is present for at least 10% of the representative assessment period; and, Is regular, cyclic and audible.	+5 dB
Impulsiveness	Present where the difference between the L_{APeak} and L_{Amax} is more than 15 dB when determined for single representative event.	+10 dB

Note 1 where noise emission is not music, these adjustments are cumulative to a maximum of 15 dB.

3 Methodology

The study applied the following approaches to assess the potential impacts of the proposed rail loading facilities.

3.1 Receptor assigned levels

The assigned noise levels determined for sensitive receivers adjacent to the site are detailed in **Figure 3** and **Table 3**.

Figure 3 Aerial image annotated to show existing Konnongorring sensitive receivers

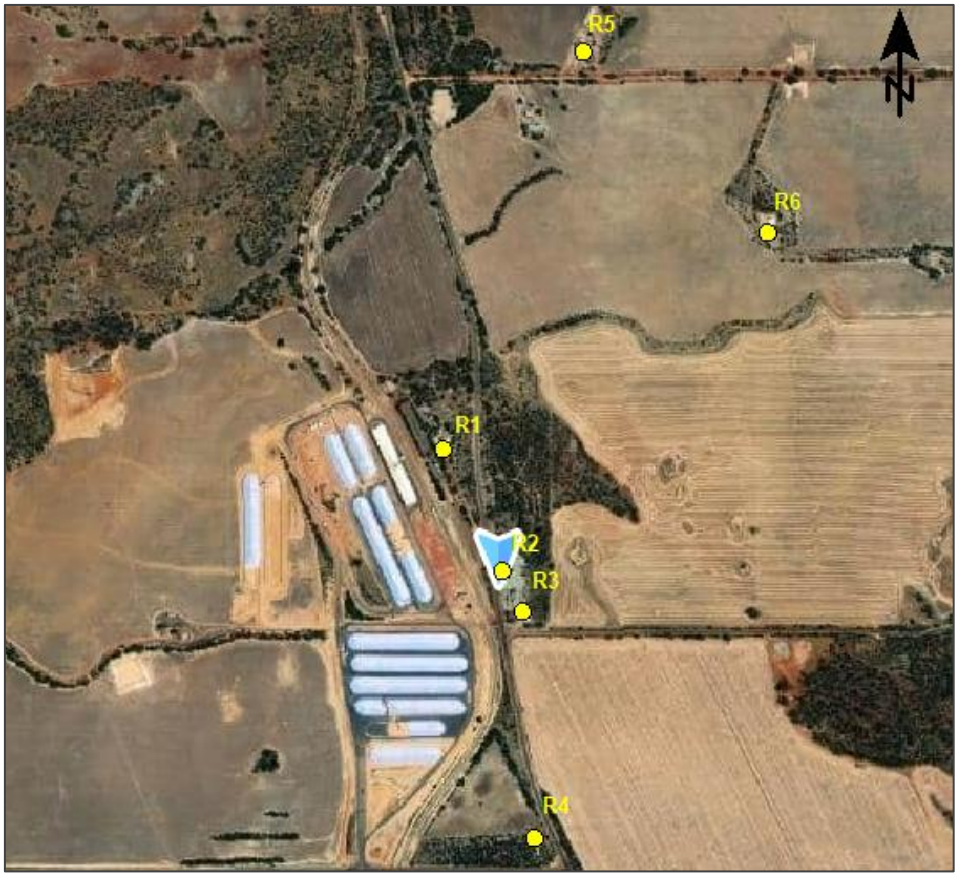


Table 3 Assigned Levels – Key Receptors

Sensitive receivers	Notes	Influencing Factor, dB	Assigned Levels, L_{A10} dBA		
			Day	Evening	Night
R1	Residence	9	54	49	44
R2	Community Hall	Not applicable	60	60	60
R3	Church	6	51	46	41
R4	Church	2	47	42	37
R5	Rural Residence	0	45	40	35
R6	Rural Residence	0	45	40	35

The assigned levels include the influencing factor (IF) derived based on the proximity of the receivers to industrial zoned areas. These areas have been identified from the City of Goomalling Local Planning Scheme, map 'LPSC-Map-08_Goomalling_Konnongorring-Townsite' and where applicable the actual and use. Identified 'Type A' classified' areas include:

- the CBH site; and
- the communications tower next to receptor R1.

Type B (Commercial) classified areas include the Konnongorring hall.

The night-time assigned levels has been adopted as the most stringent assessment criteria for night operations. The Evening assigned level are applicable for Day operations, as CBH may operate on Sundays and Public Holidays.

3.2 Assessment scenarios

The primary noise emission sources which formed the basis of the noise assessment for the current and proposed future rail loading operations at the Konnongorring facility are detailed in **Table 4**.

These operational scenarios consider the noisiest 15-minute period that can be reasonably expected on any day when the seasonal grain industry would be requiring the CBH site to store and transport grain.

The significant change between existing and proposed scenarios is the demolition of the 'E-shed', which removes an effective acoustic barrier for some existing yard operations to the nearest residential receptor, R1.

It is noted that scenario C activities on site are similar to scenario B, and similarly scenario F has similar activities to scenario E. Although not occurring during all trainloading, there may be times when refill of the overhead rail bins is required, so this is modelled for all the proposed operations. Compliance of scenarios C and F ensure compliance of scenarios B and E.

Table 4 Noise assessment scenarios – Konnongorring

	Scenarios	Truck movement on site	Fixed plant, front end loaders and stackers
A	Existing operations Day	During harvest, a maximum of 44 truck movements on the internal haul road within a one hour period during any time period. Trucks pass on the north side of the CBH storage building.	Stackers and one front end loader in constant operation during any time period. Operation of the storage shed north side grate and elevator.
B	Proposed operations – excluding train loading Day	(as per A, with removal of E-shed). Upgrade of receptor R1 fence.	(as per A, with removal of E-shed). Upgrade of receptor R1 fence.
C	Proposed operations – Train loading Day	As per B	As per B
D	Existing operations Night	A maximum of eight (8) truck movements on the internal haul road within a one hour period during any time period.	Stackers and one front end loader in constant operation during any time period. Truck moving grain to the storage shed northern loading area, grate and elevator in operation.
E	Future operations – excluding train loading Night	A maximum of six truck movements on the internal haul road within a one hour period during any time period. Upgrade of receptor R1 fence.	Stackers and one front end loader in constant operation during any time period. Upgrade of receptor R1 fence.
F	Future operations Train loading Night	As per E	As per E

3.3 Noise from fixed plant and vehicles on site

- The location of the site was reviewed to identify the nearest noise sensitive receivers from aerial imagery and land-use information. The adopted noise sensitive receivers are detailed in the location map detailed in **Figure 3**.
- The primary sources of noise were identified from a noise emission survey of current operations at the Konnongorring and Brookton facilities. The measured noise levels and the adopted source noise emission levels are detailed in **Appendix A**.
- Noise prediction models for each site were developed utilising the SoundPLAN noise prediction software (version 8.2). The noise models applied geospatial datasets for existing terrain, buildings and structures and design drawings for the existing and proposed infrastructure at the rail loading facilities.
- Meteorological conditions in line with DWER guidelines, were modelled for downwind propagation of noise. CONCAWE methods for calculating other noise attenuation effects were otherwise applied.
- Given the typical terrain covering and to align with local measurements / calibrations, ground was conservatively modelled as 60% hard reflective.
- Environmental noise levels for the existing operations and future operations with the new and upgraded infrastructure were predicted at the identified sensitive receivers.
- The predicted noise levels were assessed against the noise assessment criteria detailed in **Section 1.3**.
- Commentary has been provided on the potential for noise impacts associated future changes in noise from site operations and subjective aspects such as annoyance or disturbance.

Equipment sound power used in modelling the site operations have been derived from measurements undertaken at other sites with similar equipment, including Kellerberrin and Brookton. A list of the sound power levels used in the modelling is provided in **Table 5**.

Table 5 Source sound power levels, dB

Source	Noise emission level, L_{10}									Overall
	31 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	L_{A10}
OH Grain Elevator	110	106	100	92	91	91	86	79	77	95
Loader	110	110	110	99	101	97	95	94	86	104
Auger Loading Truck	115	111	104	96	96	97	93	94	93	102
New Loadout Fan 1 (1 of 2)	90	89	88	84	74	64	54	47	44	78
Grain conveyor/m	77	86	82	80	75	70	65	61	58	77 / m
Grain truck at 20 km/hr	72	85	93	96	93	92	95	93	80	102

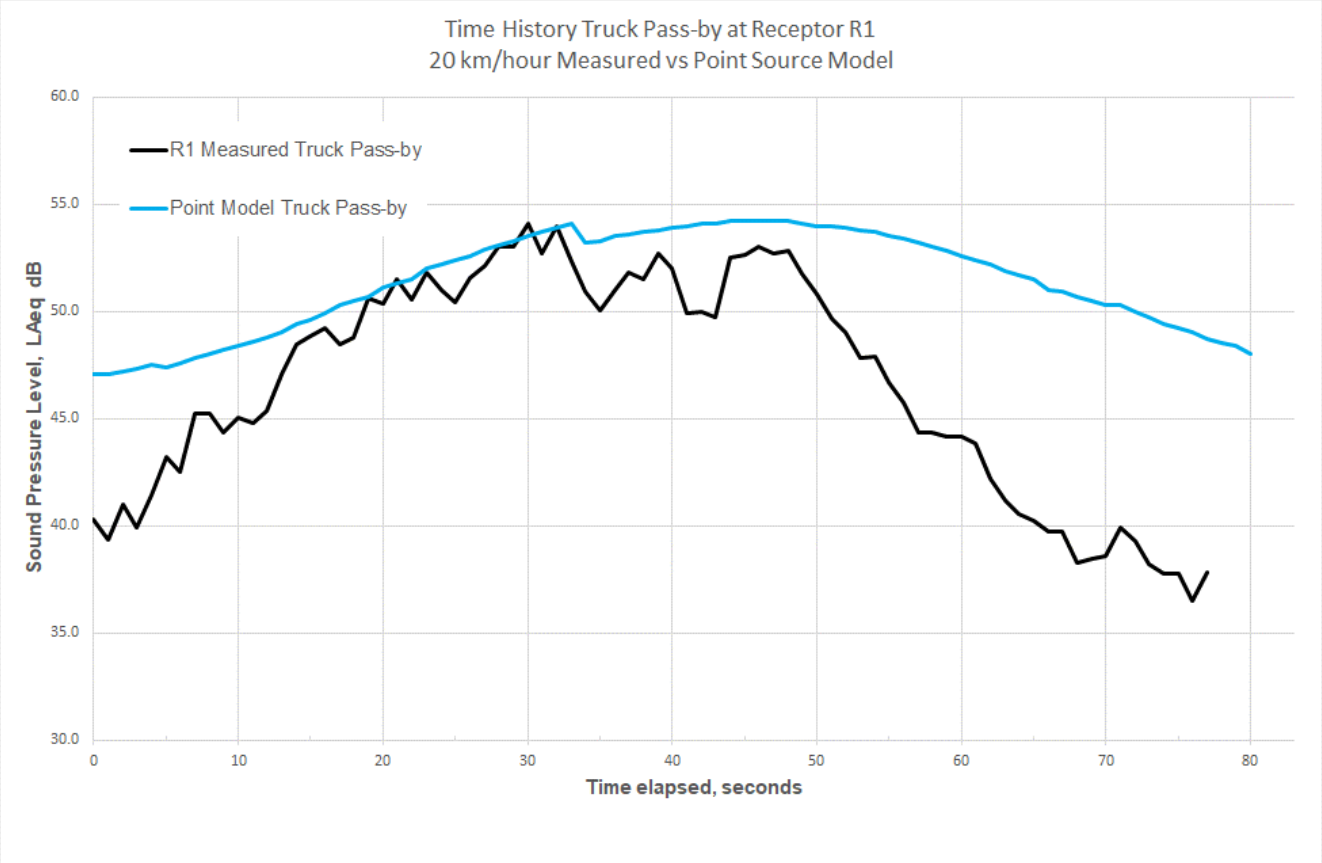
3.4 Truck pass-by assessment of statistical emissions

Measured time history noise emissions near receptor R1 for trucks and mobile equipment travelling on the one way road system at CBH Konnongorring show that noise levels are at a maximum when the truck pass-by is nearest, and are progressively reduced in level prior to and following the pass-by. It is the statistical L_{A10} noise level that should be considered for noise sources exhibiting variation from within site, predominantly associated with truck movements.

A small number of truck movements per hour will emit noise for less than 10% of the time period, the L_{A1} parameter would be used to assess these. As truck pass-by rate is increased, the emitted L_{A10} noise level will increase, and for almost continuous single pass-by events, tend towards the maximum pass-by noise emission level. It is not convenient (as modelling software packages to not have statistical assessment capability), but it is possible to determine the emitted L_{A10} noise for different pass-by rates. Due to the significance of noise emissions to receptor R1, this higher level of assessment has been undertaken for receptor R1.

A comparison of predicted noise emission at R1 compared to measured noise emission is shown in **Figure 4**. The predicted emissions use spaced individual truck 'point' noise sources at the measured normal maximum pass-by level for a truck at the site speed limit of 20 km/hour. Collating the individual predicted noise levels and sorting from high to low allows for calculation of statistical noise emission at the receptor. The measured time history noise level at R1 is also shown for a typical truck pass-by. Comparison shows that the modelling method overpredicts the noise emission prior to and following the pass-by of maximum level.

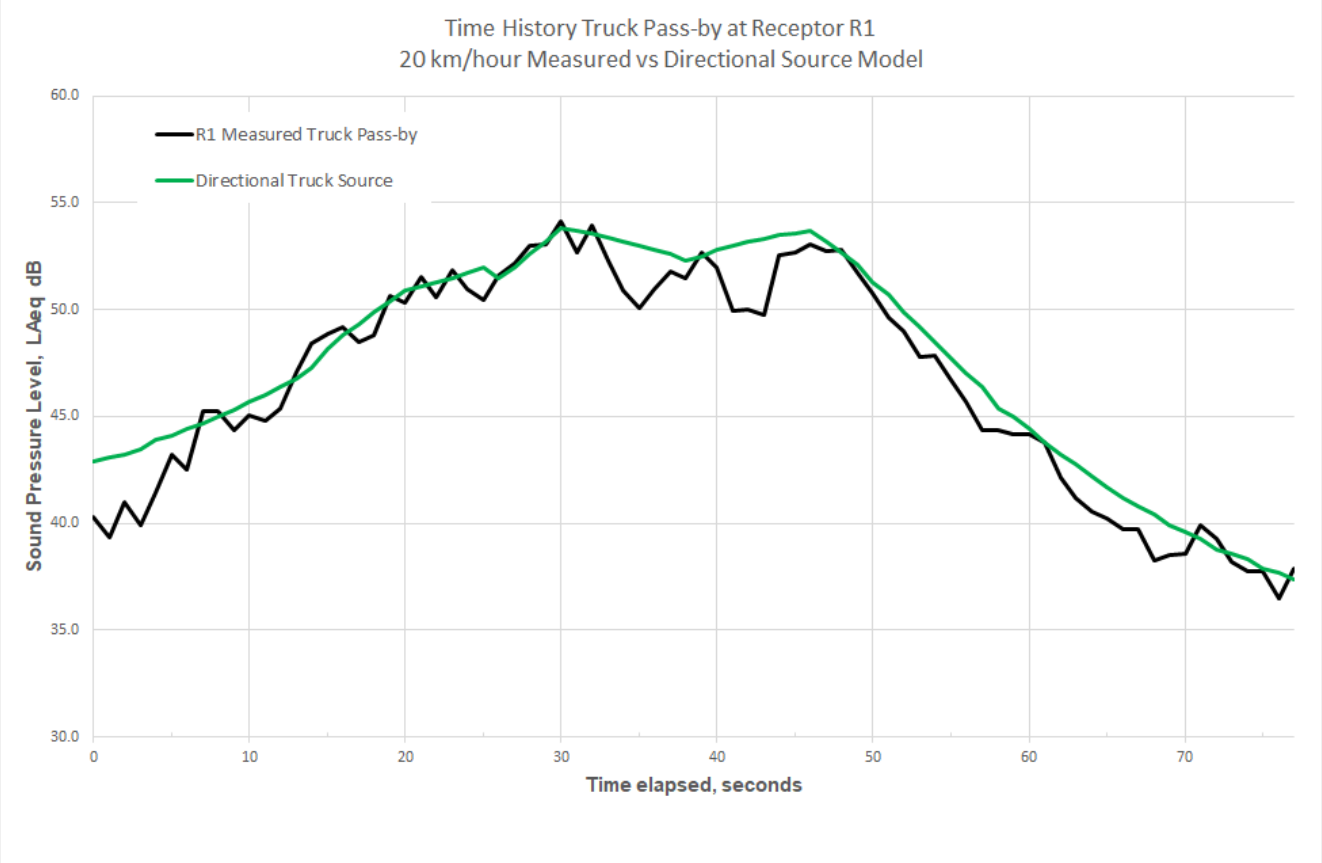
Figure 4 Traditional point source time history compared to measured time history for truck pass-by at R1



The finding is consistent with observation, in that when a truck has passed by an observer, the trailers act as an acoustic barrier to the prime mover.

A revised acoustic model of the truck has been developed, utilising the 'directivity' attribute. The predicted noise emission and measured time history using the directivity method shows good agreement, as per **Figure 5**.

Figure 5 Directional point source time history compared to measured time history for truck pass-by at R1



The truck modelling on site has been modelled using the Directional Truck noise source methodology.

The time histogram representing 1 second directional point sources (5.5m apart for a truck travelling at 20 km/hr) is sorted from highest to lowest, the relevant percentile for a defined number of truck movements per hour calculated and the equivalent sound power representing the L_{A10} for the receptor used to generate the truck L_{A10} noise emission contour.

The truck L_{A10} noise emission contour is added (energetically) to the noise emitted from steady state equipment such as OBH elevator and onsite loading operations to determine the one hour cumulative L_{A10} noise emission.

The equivalent truck source sound power to represent the 1 hour statistical L_{A10} noise emission from the moving trucks, when modelled as the maximum noise emission from a series of noise sources is provided in Table 6.

Table 6 Point representation truck noise source sound power for statistical L_{A10} emission

Truck movements per hour	Sound Power Level, L_{A10} dB
6 trucks / hour	90.3
8 trucks / hour	94.1
44 trucks / hour	101.6

4 Background noise environment

Existing noise levels were measured with SVAN statistical monitors at two locations representative of key receptors near the CBH Konnongorring facility.

The monitoring locations are shown in **Figure 6**.

Figure 6 Statistical Noise Monitor Locations

The daytime, evening and night-time noise levels at the monitoring locations are summarised in **Table 7** with graphs of the noise levels following the table. The graphs show a train pass event just before midnight.

Table 7 Summary of monitored noise levels – Wednesday 15th June Noon – Thursday 16th June 7am

Date	Daytime (from noon)			Evening			Night-time		
	LA90	LAeq	LA10	LA90	LAeq	LA10	LA90	LAeq	LA10
K1	28	51	56	20	44	47	20	47	34
K2	31	59	59	28	49	50	27	46	33

Figure 7 K1 Statistical Noise Levels

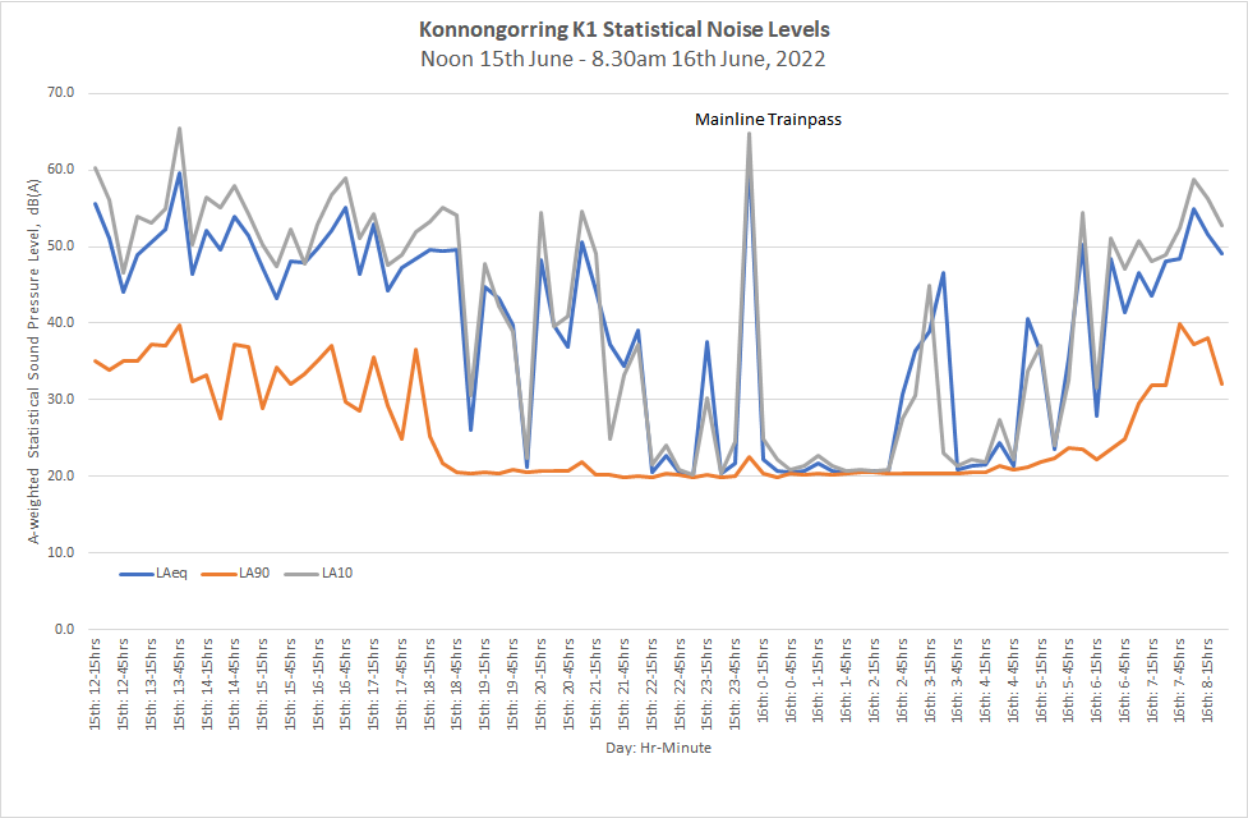
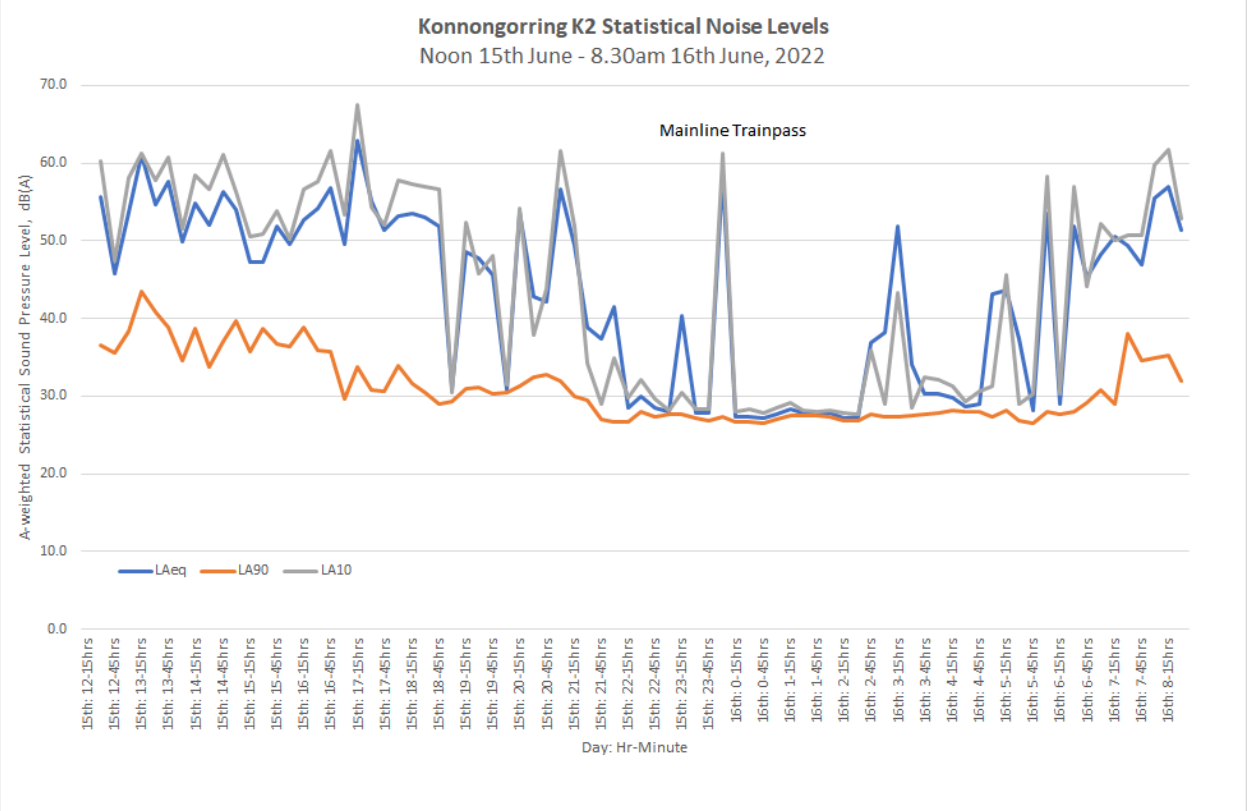


Figure 8 K2 Statistical Noise Levels



5 Impact assessment

5.1 Noise from fixed and mobile plant

The predicted noise levels from fixed plant and internal road transport operations at Konnongorring are detailed in **Table 8.** The noise levels are presented for the existing operations and the future operations with the proposal. **Appendix A** presents colour contour maps of the typical distribution in future noise levels within the study area. Note that as rail operations are exempt under the regulations and being assessed under State Planning Policy 5.4, noise from the train at the siding is not included in the calculation of noise emissions from 'fixed and mobile' plant.

Table 8 Predicted noise levels – Fixed plant and on-site road transport at Konnongorring

	Existing noise level $L_{A10,T}$, dB		Noise level with proposal 3.6m wall on PTA side of R1 residence $L_{A10,T}$, dB	
	Day / Evening Sunday / Holiday	Night	Day / Evening Sunday / Holiday	Night
R1	46	44	47	41
R2	51	47	51	41
R3	51	46	51	41
R4	44	41	42	35
R5	23	25	24	21
R6	29	27	31	25

Note: brackets ( ) designate the noise emission with adjustment of + 5 dBA for tonal characteristic under the regulations.

The corresponding Assigned Level assessment criterion (L_{A10} noise level) for each time period is included in the **Table 9**. As the predicted emissions are almost identical for the proposed scenarios, being dominated by general operational noise emissions, only the proposed train loading scenario is shown in **Table 9**.The predicted noise levels for existing operations are not subject to assessment and are presented to inform a review of potential changes in noise emission levels with the proposal.

Table 9 Assessment of Predicted noise levels – Fixed plant and on-site road transport at Konnongorring

ID	Existing noise level $L_{A10,T}$, dB		Noise level with proposal 3.6m fence on PTA land $L_{A10,T}$, dB		Assigned level $L_{A10,T}$, dB day/ even/ night	Assessment – proposed operation	
	Day / Evening Sunday / Holiday	Night	Day / Evening Sunday / Holiday	Night		Day	Night
R1	46	44	47	41	54/49/44	Complies	Complies
R2	51	47	51	41	60	Complies	Complies
R3	51	46	51	41	51/46/41	+5 (Church)	Complies
R4	42	41	42	35	47/42/37	Complies	Complies
R5	23	25	24	21	45/40/35	Complies	Complies
R6	29	27	31	25	45/40/35	Complies	Complies

Monitoring of CBH noise emissions undertaken in June 2023 demonstrated that the truck noise emission was 'tonal' in characteristic, although not strongly tonal. The monitoring location nearby to receptor R1 was 105m from the CBH Konnongorring exit truck route with line of sight. The construction of an acoustic barrier fence or wall will assist in reducing the noise level and the noise characteristic at receptor R1.

All other receptors are at a greater distance from the CBH operations. As distance increases, noise characteristics become less distinct (tonal alarms excepted) and are masked by general background noise. The CBH noise emissions at the other receptors are unlikely to exhibit noise characteristics that require adjustment under the regulations.

The demolition of the old E-type shed removes a partial barrier between truck and equipment operations and receptor R1. In order to ensure ongoing compliance with the criteria, consideration should be given to constructing a new solid 3.6m high barrier fence on the PTA land (near the common fence to R1). This acoustic barrier will reduce noise from the proposal to the receptor, and will also assist in reducing noise intrusion from existing and planned rail activity. It is understood that CBH are holding discussions with the landowner and PTA.

Figure 9 Receptor R1 showing proposed acoustic barrier fence on PTA land

Alternatives to a solid wall would include construction of a suitably high berm or combination of berm and wall on top.

The noise emissions at receptor R3 are predicted to marginally exceed Holiday and Sunday 'assigned levels' during periods of maximum truck movements on the CBH site. The receptor is a church which is not in constant use, but is understood to have congregations and special events on a semi-regular basis. Noise emissions are mainly associated with truck movements on site. From a practical aspect, many of these same trucks and other road traffic pass by the church via public roads with higher noise emissions.

However traffic noise is assessed under the requirements of State Planning Policy 5.4, and for this church the traffic noise meets requirements. The impact of truck activity on CBH site (excluding the truck movements on the gazetted roads) will not in itself significantly impact the amenity of church activities, when they occur.

There is no real change in truck activity affecting the church compared to existing operations. However, the operation of a rail siding at CBH Konnongorring will reduce the need to transport grain to other CBH facilities by truck, with a net reduction in truck activity associated with this grain transport. It is noted that for the existing Konnongorring CBH site, every truck of grain delivered to site would later be transported by truck to another site (Avon or other CBH sites), effectively doubling the truck movements.

Where noise emissions are of concern, management of what equipment is operated during the night period could reduce the noise emission to comply with the regulation 'assigned level'. Management may include:

- locating equipment behind existing stockpiles,
- selective noise mitigation of equipment, or
- limiting certain noisy operations during the night period.

5.2 Noise from public roads

The proposed rail loading facility at Konnongorring is intended to facilitate rail transport of grain from the CBH facility, thereby reducing road transport currently used to move grain from Konnongorring to other CBH sites with rail loading access.

Noise emissions from the Northam – Pithara road may marginally decrease due to the reduction of CBH truck movements on sections of this road.

6 Conclusion

The proposed load out facility is predicted to marginally reduce road transport noise emissions from the Konnongorring CBH site, with a reduction in road traffic associated with the movement of grain via rail rather than road transport. Truck movements associated with transfer of grain to other CBH facilities will significantly reduce.

Site noise emissions are predicted to increase from existing for nearby receptor R1, partly due to the demolition of an 'E-shed' which previously provided an acoustic barrier to the nearest receptors. A proposal to provide an effective acoustic barrier fence for receptor R1 is shown to reduce noise emissions to acceptable levels. An acoustic barrier will also reduce noise from the existing rail line and the proposed siding.

Commensurate of the rural setting of the sites and local communities, there remains potential for noise to be audible at sensitive receivers during the proposed operations even when the assessment criteria are met. Whilst specific noise mitigation measures were not identified to be required for predicted noise levels to meet the criteria, the assessment has recommended noise management measures for inclusion in the future development of the proposals and the environmental management for each site.

7 Recommendations

The following measures are recommended to be included as part of the environmental management systems for the Konnongorring loadout facility:

- Review activities which can be undertaken during daytime hours to avoid, where feasible, noise generating operations during the evening and night-time periods when the noise environment is more sensitive.
- Undertake community consultation to advise local residents of the proposal and the potential noise levels associated with the future operations, particularly during the peak harvest period.

Management of equipment is operated during the night period could reduce the noise emission to comply with the regulation 'assigned level'. Management may include:

- locating equipment behind existing stockpiles,
- selective noise mitigation of equipment, and/or
- limiting certain noisy operations during the night period.

APPENDIX A

Contour Noise Maps
Site operations

Figure 10 CBH Konnongorring 2022 Operational Noise Emissions - Day

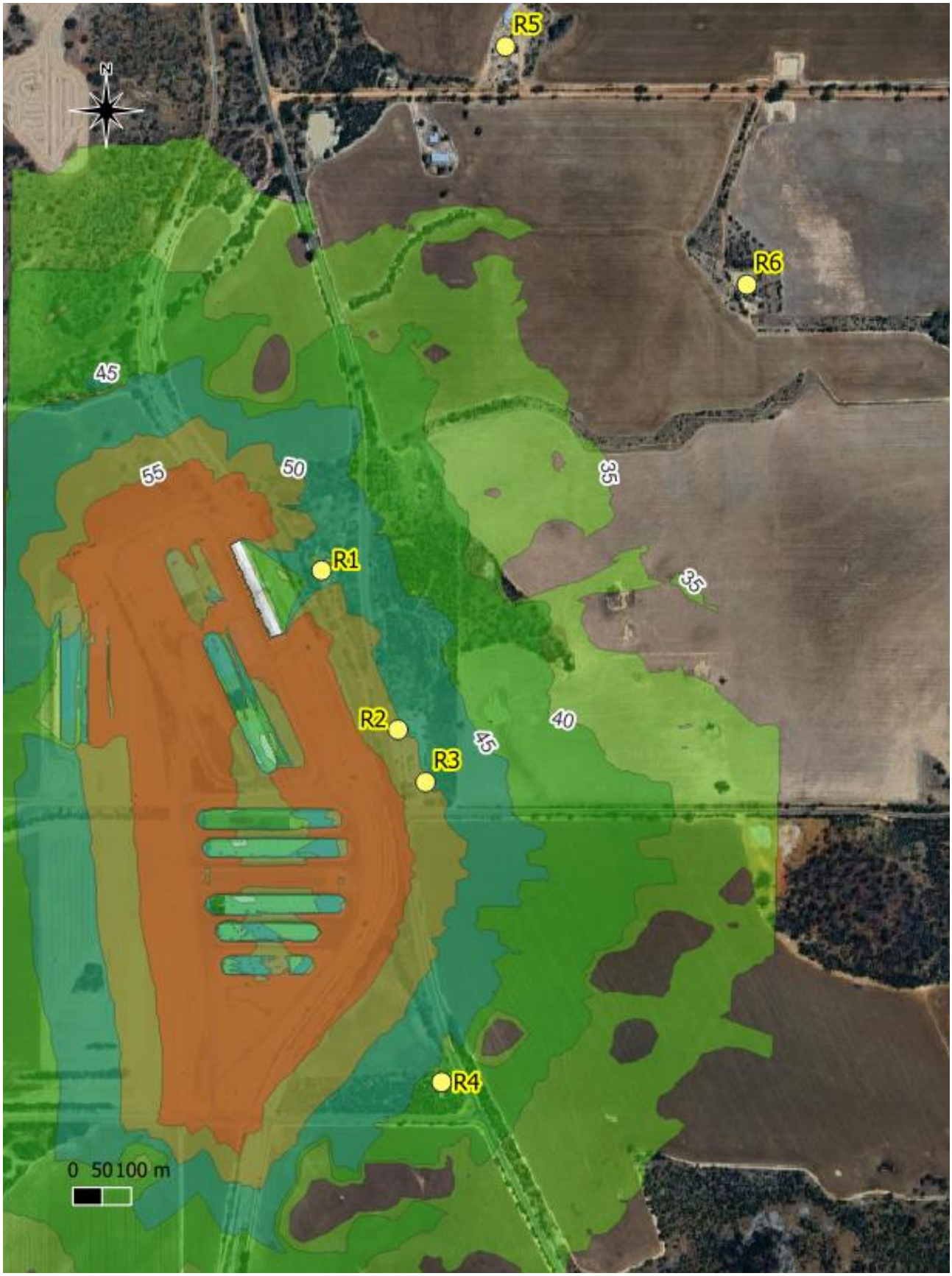


Figure 11 CBH Konnongorring Proposed Operational Noise Emissions - Day

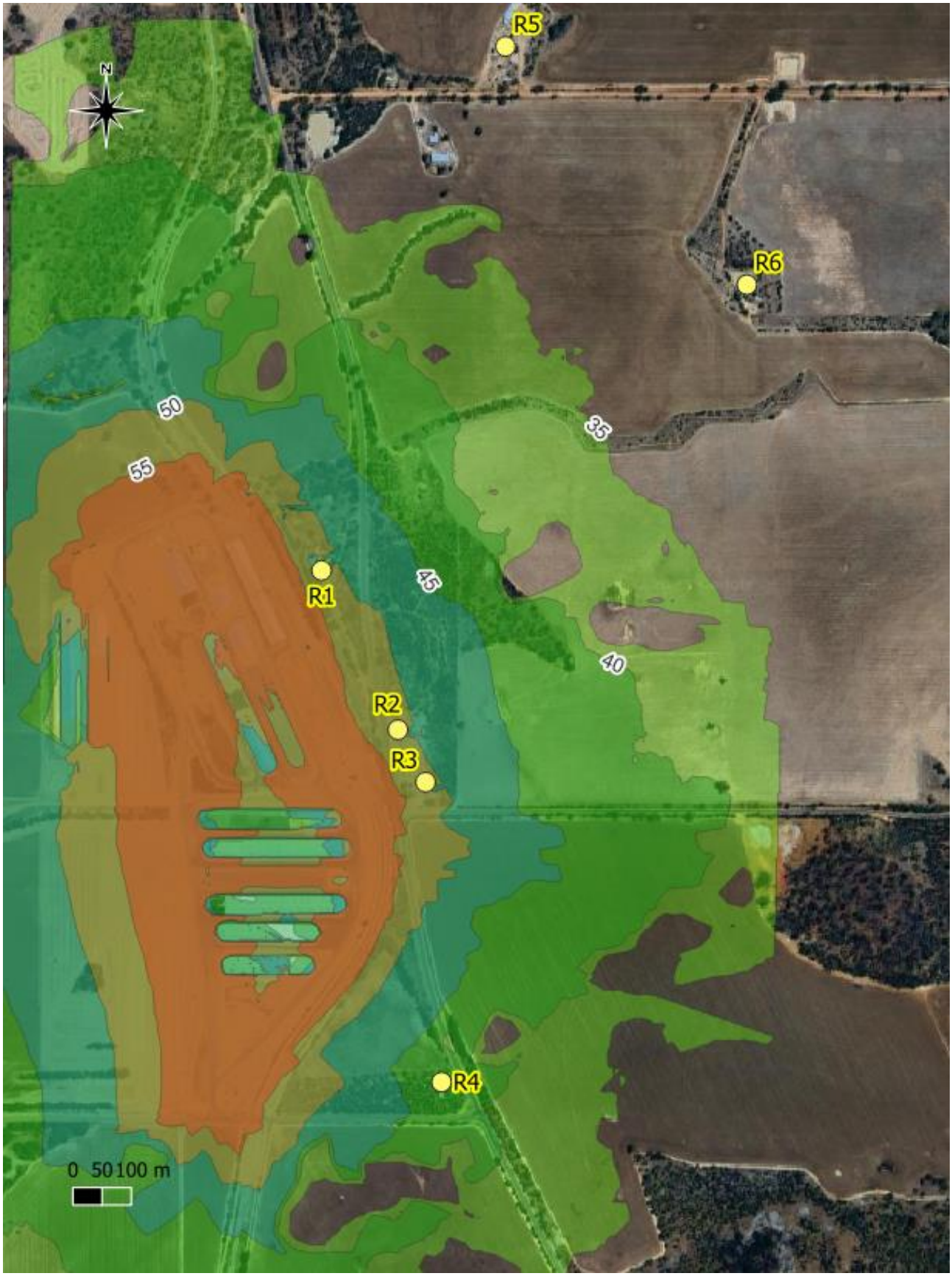


Figure 12 CBH Konnongorring 2022 Operational Noise Emissions - Night

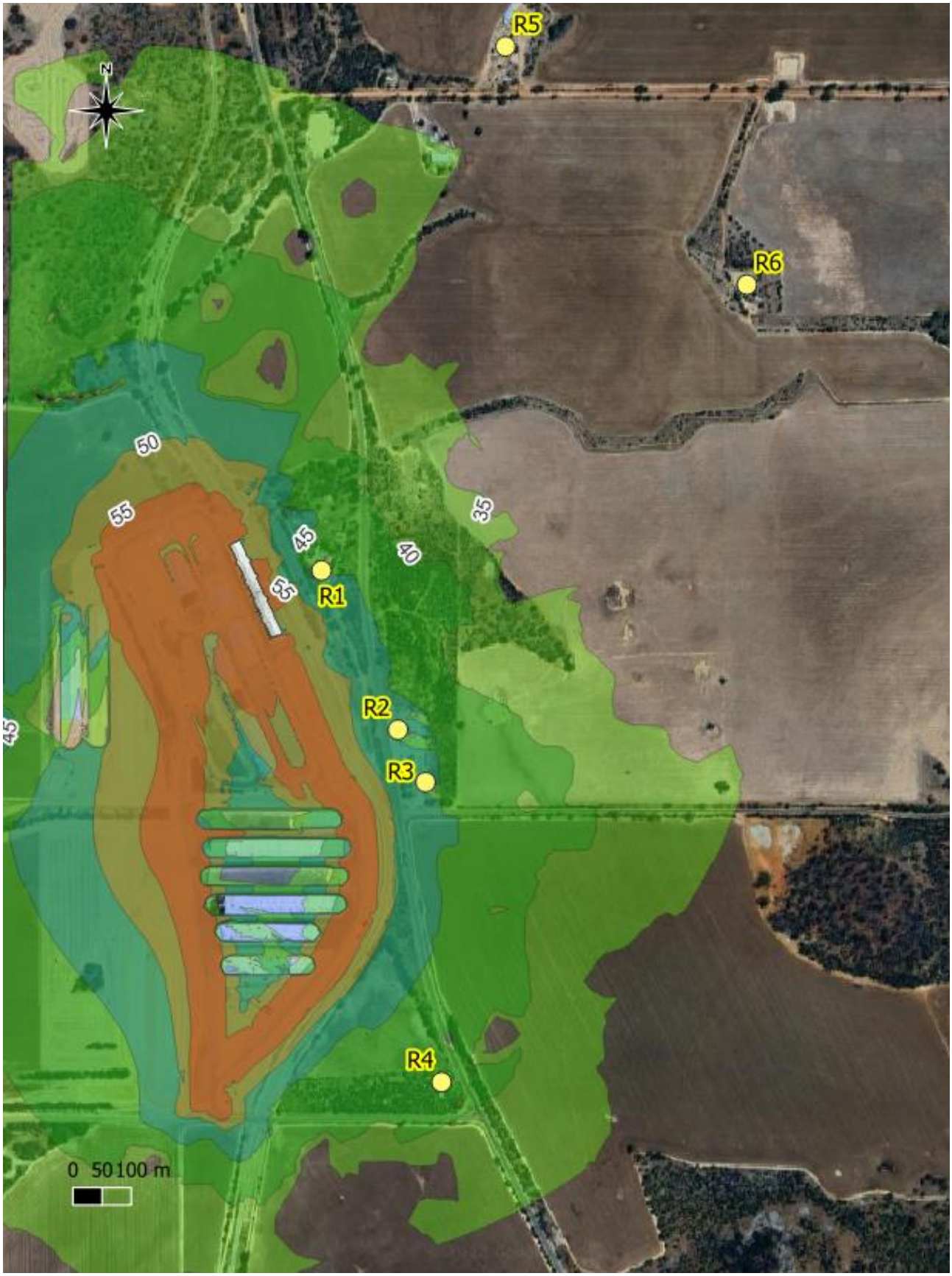


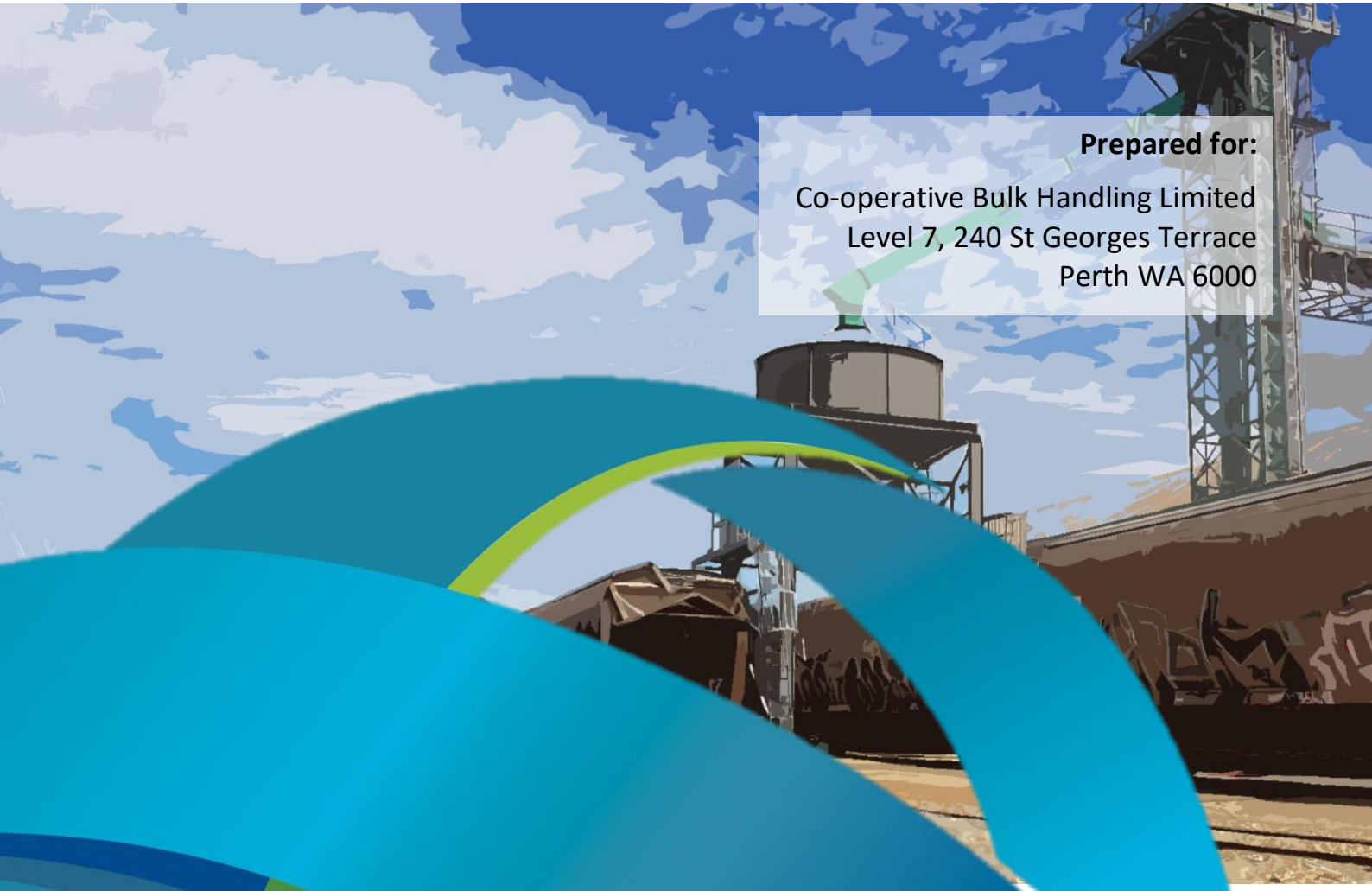
Figure 13 CBH Konnongorring Proposed Operational Noise Emissions - Night

APPENDIX B

Rail Siding Acoustic Assessment
State Planning Policy 5.4

RAIL NOISE IMPACT ASSESSMENT REPORT

Rail Loading Facility - Konnongorring



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BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Co-operative Bulk Handling Limited (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

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

DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
675.30116.0010.00100-R01-v1.3	23 October 2023	Paul Drew	Luke Zoontjens	Paul Drew

EXECUTIVE SUMMARY

The CBH Group (CBH) is a grain growers' cooperative that handles, markets and processes grain from the wheatbelt of Western Australia (WA). CBH owns a rail fleet and dedicated infrastructure for the efficient transfer of grain from country receival points to its four port terminals.

The existing CBH rail loading facilities at Konnongorring provides storage and transport of grain from the local grain agriculture industry in the wheatbelt region. To support the local growers, CBH is proposing to implement new and upgraded infrastructure at the facility to provide rail load out capacity for the handling and transport of grain. This report addresses the rail siding element of out loading proposal. The rail out loading facility will be subject to a separate Development Application.

To support the rail siding proposal, this report, prepared by SLR Consulting Australia Pty Ltd (SLR), details an assessment of rail noise emissions.

Criteria have been developed in accordance with Western Australian Planning Commission State Planning Policy 5.4 Road and Rail Noise ("SPP5.4"). Although noise from rail is not assessable under the *Environmental Protection (Noise) Regulations 1997* ("the Regulations"), SPP5.4 is considered a reasonable benchmark.

The assessment of railway noise and vibration for the proposed upgrade and enhancement of the Konnongorring rail loading facility has determined that noise from proposed operation of the rail siding

- complies with relevant SPP5.4 requirements, and
- may be perceptible at the nearest sensitive receivers given the relatively quiet noise environment at Konnongorring and forecast levels, particularly the nearest sensitive receivers to the rail siding.

The assessment outcome is contingent on aspects such as the adopted source noise emissions.

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DOCUMENT REFERENCES

TABLES

FIGURES

APPENDICES

1 Introduction

The CBH Group (CBH) is a grain growers' cooperative that handles, markets and processes grain from the wheatbelt of Western Australia (WA). CBH owns a rail fleet and dedicated infrastructure for the efficient transfer of grain from country receival points to its port terminals.

The existing CBH rail loading facility at Konnongorring provides storage and transport of grain from the local grain agriculture industry in the wheatbelt region.

To support the local growers, CBH is proposing to construct new rail siding infrastructure to increase the amount of grain transported to port by rail. It is expected that current daily truck traffic on the local Northam-Pithara Road will reduce significantly as grain from Konnongorring should no longer need to be transported by truck to Avon for rail transportation to port once the outloading facility is constructed. This application only considers the construction of the rail siding

This acoustic assessment considered the rail noise impact of the proposal, which is assessed under the requirements of State Planning Policy 5.4 (SPP5.4).

1.1 Locality

Figure 1 presents an aerial image of the Konnongorring facility.

Figure 1 Overview of CBH Konnongorring facility

1.2 Background to the proposal

Currently, trucks deliver grain to and from the CBH Konnongorring site. Augers / elevators, conveyors and stackers are used to unload the grain from trucks. Front end loaders and stackers load the trucks.

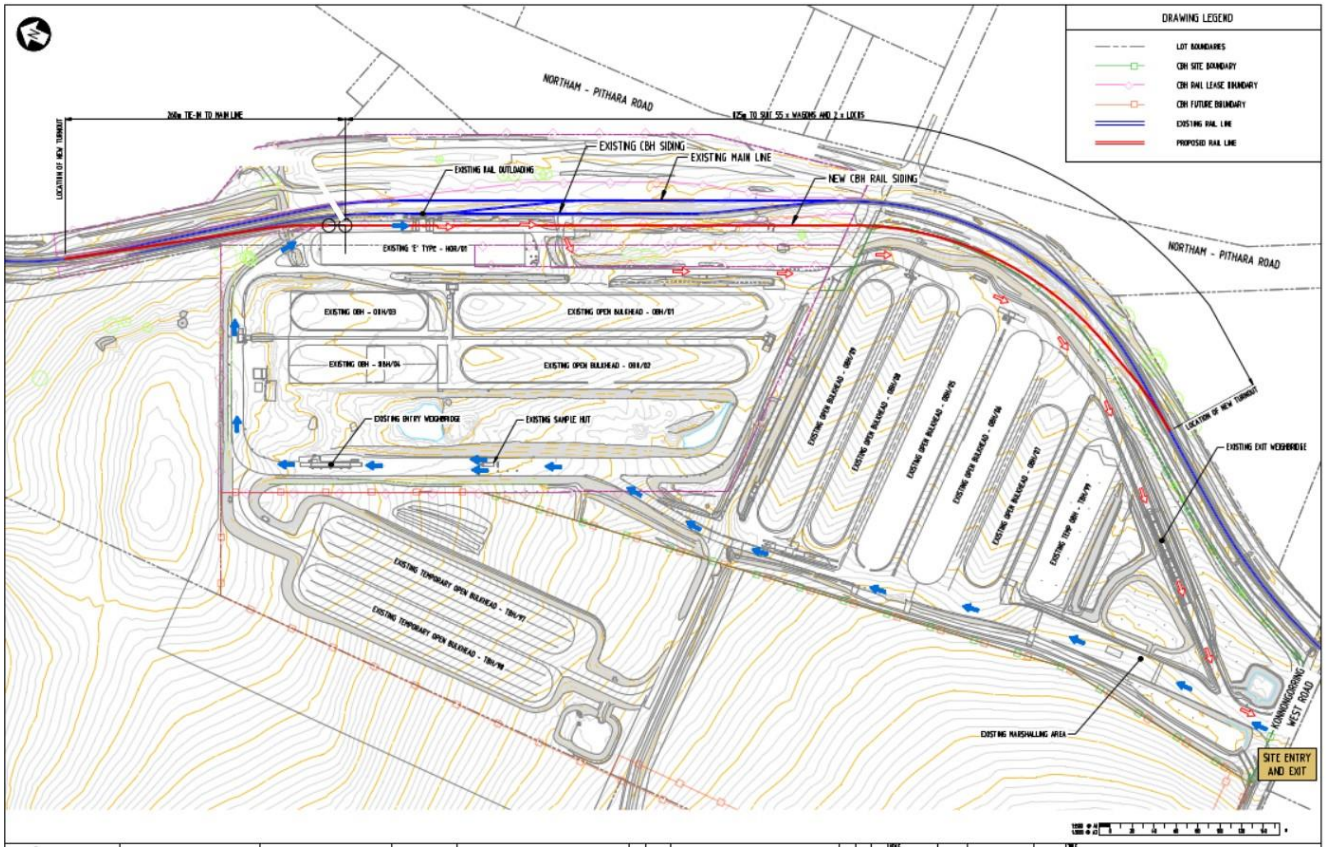
Although there is a nearby freight rail line, the existing facility does not outload via rail.

It is proposed to upgrade the existing railway line at the CBH Konnongorring site. The proposed upgrade of the facility includes installation of approximately 1km of new rail siding track to support the grain rail loading and manoeuvring of the locomotive and wagon rollingstock, with a turnout at each end.

- Installation of approximately 1km of new rail siding track to support manoeuvring of the locomotive and wagon rollingstock, with a turnout at each end.

An overview of the main siding upgrades for the Konnongorring facility are illustrated in **Figure 2.** The proposed additional siding alignment is shown in red, with turnouts to main line at each end.

Figure 2 Proposed Konnongorring rail loading facility (supplied)



1.3 Aim and purpose

The rail siding is located in an area where environmental noise emissions as a result of the proposal may have the potential to impact nearby sensitive areas. One aim of the proposal is to ensure the facility complies with relevant and applicable environmental noise emission standards.

To support the rail siding proposal, the purpose of this report is to detail an assessment of railway noise and vibration emissions from the proposed operation of the rail siding. The report compares potential noise levels from site operations against environmental noise criteria developed from a review of applicable WA state planning policy.

2 Criteria

The airborne noise from freight rail operations is addressed under the *Western Australian Planning Commission* (WAPC) *State Planning Policy 5.4 Road and Rail Noise* (SPP5.4).

The noise assessment criteria adopted in accordance with this framework are detailed in the following sections.

2.1 Noise from rail transport

The adopted noise assessment criteria from SPP5.4 are detailed in **Table 1** and are based on the following noise parameters:

- Day and night period average levels ($L_{Aeq,day}$ and $L_{Aeq,night}$) as defined in SPP5.4, and
- maximum event levels (L_{Amax}), which although not described within SPP5.4 or similar WA noise policies, are a valuable indicator of relative annoyance and sleep disturbance caused by rail operations and referenced in the management of noise from railway infrastructure projects in Australia.

Table 1 Adopted railway noise assessment targets

Asset	Type of development	Day period average (6.00 am – 10.00 pm)	Night period average (10.00 pm – 6.00 am)	Maximum passby level
Railway operations within the rail loading facility	Railway upgrade	$L_{Aeq,day}$ 60 dB	$L_{Aeq,night}$ 55 dB	LAmax 85 dB

These noise objectives are relevant to the emission of railway noise as received at a sensitive land use such as residential dwellings. The objectives are applicable at one metre from the most exposed habitable façade of the building receiving the noise.

2.2 Vibration from rail movements

Railway vibration is generated by dynamic forces at the wheel-rail interface and will occur to some degree, even with continuously welded rail and smooth wheel and rail surfaces (due to the moving loads, finite roughness of the surfaces and elastic deformation). Significantly higher vibration levels can occur due to rail and wheel surface irregularities, including some irregularities that do not cause significant levels of airborne noise.

This vibration propagates via the sleepers or rail mounts into the ground or track support structure. It then propagates through the ground or structure, and may sometimes be felt as tactile vibration by the occupants of buildings. Given typical buffer distances and airborne noise emissions, the vibration design objectives adopted for this project are in terms of human comfort considerations (not cosmetic building damage risk or regenerated noise).

For human comfort considerations, there are several sources from which vibration design objectives may be drawn, including:

- British Standard BS 6472-2008 – Evaluation of Human Exposure Vibration in Buildings (1 Hz to 80 Hz)
- Forrestfield-Airport Link – Noise and Vibration Management – Construction and Operation – Environmental Impact Report, SLR Report Number 675.10594.00400 dated August 7, 2015.
- Australian Standard AS 2670.2 1990 – Evaluation of Human Exposure to Whole Body Vibration - Part 2: Continuous and Shock Induced Vibration in Buildings (1 Hz to 80 Hz)
- The NSW DEC document Assessing Vibration: A Technical Guideline.

The following discussion expresses vibration velocity levels in terms of decibels (L_v dB re 10^{-9} m/s). A level of L_v 100 dB corresponds to 0.1 mm/s (RMS) and a level of 120 dB corresponds to 1 mm/s (RMS). AS 2670.2:1990 (based on ISO 2631) provides recommended objective vibration levels as follows:

- Night period continuous or intermittent vibration – Curve 1.4 (approximately L_{vSmax} 103 dB);
- Daytime continuous or intermittent vibration – Curve 2 to Curve 4 (approximately L_{vSmax} 106 to 112 dB);
- Night period transient vibration with several occurrences per day – Curve 1.4 to Curve 20 (approximately L_{vSmax} 103 to 126 dB); and
- Daytime transient vibration with several occurrences per day – Curve 30 to 90 (approximately L_{vSmax} 130 to 139 dB).

BS 6472:2008 includes a vibration dose relationship for intermittent events such as trains, which for a "low probability of adverse comment" would permit 1 second vibration RMS levels of up to approximately $L_{v,RMS,1s}$ 110 dB (0.32 mm/s) during daytime and $L_{v,RMS,1s}$ 107 dB (0.23 mm/s) during night-time on the basis of likely volumes.

The NSW DEC's *Assessing Vibration: A Technical Guideline* is based on the guidelines contained in BS 6472. For vibration associated with train passbys, the guideline indicates that vibration levels should be assessed on the basis of the vibration dose value. This would correspond to a maximum level of approximately $L_{v,RMS,1s}$ 107 dB for each train passby as discussed above for BS 6472.

For design purposes, the trains are conservatively considered 'intermittent' rather than 'transient', and assessed on the basis of a maximum 1 second RMS vibration level not to be exceeded for 95% of rail passby events. Vibration levels of less than 100 dB may not be imperceptible within habitable rooms of sensitive receivers, nonetheless the levels represent a low risk of potential vibration impact.

The adopted criteria for occupied buildings are detailed in **Table 2**.

Table 2 Adopted Rail Vibration Targets for Occupied Buildings

Sensitive receivers	Vibration criteria for buildings while occupied, Peak Particle Velocity, dB
Night Period	103
Day Period	107

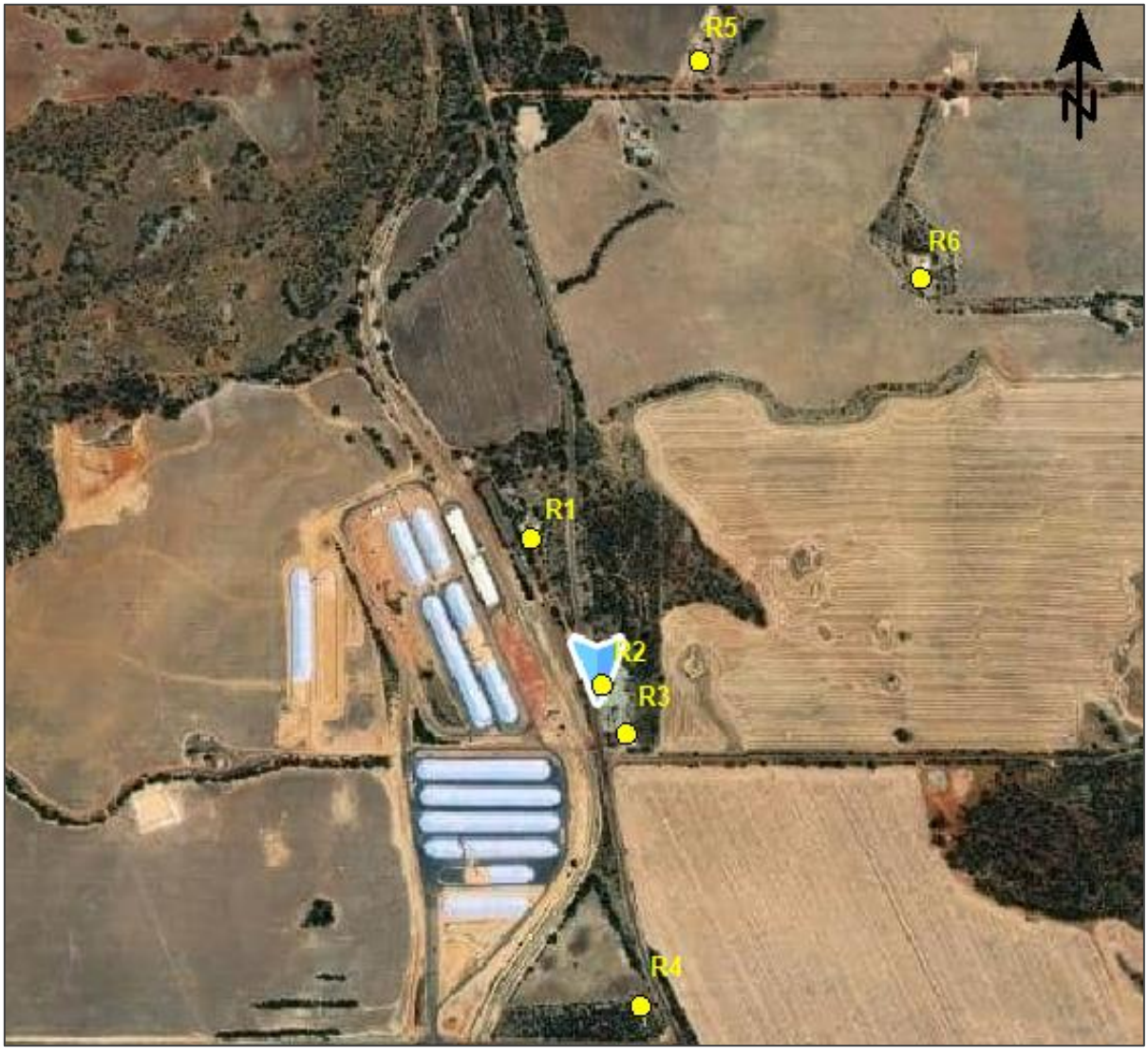
3 Methodology

The study applied the following approaches to assess the potential impacts of the proposed rail loading facilities.

3.1 Receptors

The identified sensitive receivers adjacent to the site are detailed in **Figure 3**.

Figure 3 Aerial image annotated to show existing Konnongorring sensitive receptors



Receptors R1, R4, R5 and R6 are existing residences. Receptor R2 is a community hall and receptor R3 is a church.

3.2 Assessment scenarios

The primary noise emission sources which formed the basis of the noise assessment for the current and proposed future rail loading operations at the Konnongorring facility are detailed in **Table 3**.

The significant change between existing and proposed scenarios is the construction of an extended siding rail section.

Table 3 Noise assessment scenarios – Konnongorring

	Scenarios	Freight train source
A	Existing operations Day	One mainline train passby per day.
B	Proposed operations –Train on siding Day	Loco moving on siding, 4 hours. One mainline train passby per day.
C	Existing operations Night	One mainline train passby.
D	Future operations Train on siding Night	Locomotive moving on siding, 4 hours. One mainline train passby.

3.3 Site model development

- The location of the site was reviewed to identify the nearest noise sensitive receivers from aerial imagery and land-use information. The adopted noise sensitive receivers are detailed in the location map detailed in **Figure 3**.
- The primary sources of noise were identified from a noise emission survey of current rail operations at the Konnongorring, Kellerberrin and Brookton facilities.
- Noise prediction models for each site were developed utilising the SoundPLAN noise prediction software (version 8.2). The noise models applied geospatial datasets for existing terrain, buildings and structures and design drawings for the existing and proposed infrastructure at the rail loading facilities.
- Given the typical terrain covering and to align with local measurements / calibrations, ground was conservatively modelled as 60% hard reflective.
- Rail noise levels for the existing operations and future operations with the new and upgraded infrastructure were predicted at the identified sensitive receivers.
- The predicted noise levels were assessed against the noise assessment criteria detailed in **Section 2**.

3.4 Noise from rail movements

The Brookton CBH site currently uses a bin over rail system similar to the proposed design at Konnongorring. As part of a previous noise study, noise measurements were completed at Brookton for three train loading events over three separate nights at M1-M3 as shown in **Table 4**. The measurement results are shown below:

Table 4 Measured train loading noise levels, dB

Brookton Train Loading Measurement Number	L_{AE}, dB (20m from track)
One (M1)	108
Two (M2)	103
Three (M3)	101
Median	**103**

These noise measurements taken during existing train loading activities were used to predict the feasibility of the noise levels being below the criteria at the surrounding nearby residences from the rail loading operations once the upgrades are complete.

Signal and design limit speeds on the network are generally in excess of 110 km/hr. However within the study area based on observations at similar sites, speeds are considered to be substantially less near the township and are conservatively estimated to be 80 km/hr or less.

Noise measurements were also completed at two locations (Figure 4, section 4 of this report) at the CBH Konnongorring site to determine the existing noise levels of a one train passing through Konnongorring. The measured L_{AE} for the two locations at different distances from the rail line were used to calibrate the acoustic model, consistent with the State Planning Policy 5.4. This site does not have a high rate of train pass events per day, the limited data set is not able to define potential variation in noise emissions. The measurement results are shown below:

Table 5 Measured train passby noise levels, dB

K1 Train passby, L_{AE}, dB (55m from track)	K2 Train passby, L_{AE}, dB (88m from track)
92	88

The L_{AE} is a measure of the noise emission exposure for a single train event: it is the cumulative acoustic energy at the measurement location for that train even for the period of the event. Through use of an acoustic model, the L_{AE} can be used to predict the Day or Night L_{Aeq} level for any number of train events over that period for any location near the site of interest.

3.5 Vibration from rail movements

A review of potential ground-borne vibration emissions was undertaken to identify where nearest sensitive receivers may experience potential impacts associated with perceptible vibration. A screening level assessment was undertaken based on historical ground-borne vibration levels measured by SLR near the existing Perth freight rail network, and adjusted where appropriate to account for differences in speed and track condition.

4 Background noise environment

Existing noise levels were measured with SVAN statistical monitors at two locations representative of key receptors near the CBH Konnongorring facility.

The monitoring locations are shown in **Figure 4**.

Figure 4 Statistical Noise Monitor Locations

The daytime, evening and night-time noise levels at the monitoring locations are summarised in **Table 6** with graphs of the noise levels following the table. The graphs show a train pass event just before midnight.

Table 6 Summary of monitored noise levels – Wednesday 15th June Noon – Thursday 16th June 7am

Location	Daytime (from noon)			Evening			Night-time		
	LA90	LAeq	LA10	LA90	LAeq	LA10	LA90	LAeq	LA10
K1	28	51	56	20	44	47	20	47	34
K2	31	59	59	28	49	50	27	46	33

Figure 5 K1 Statistical Noise Levels

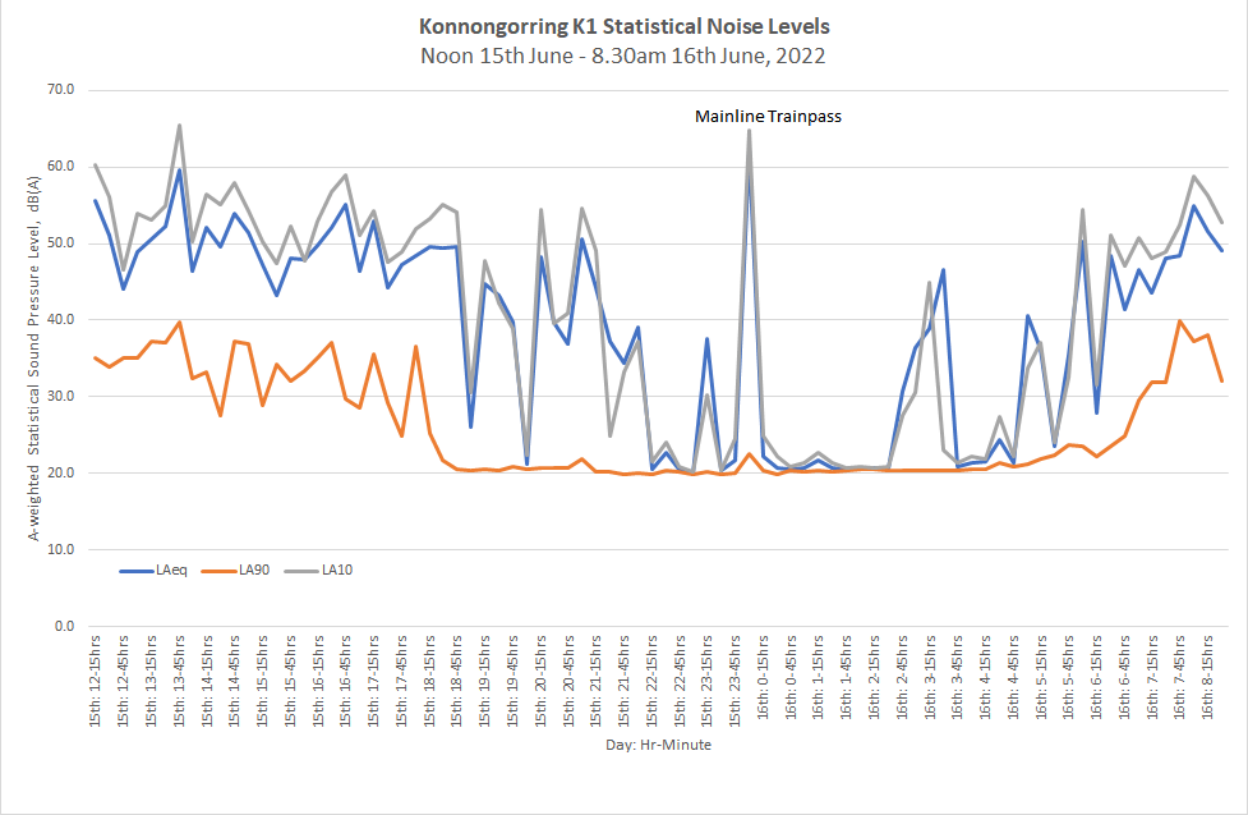
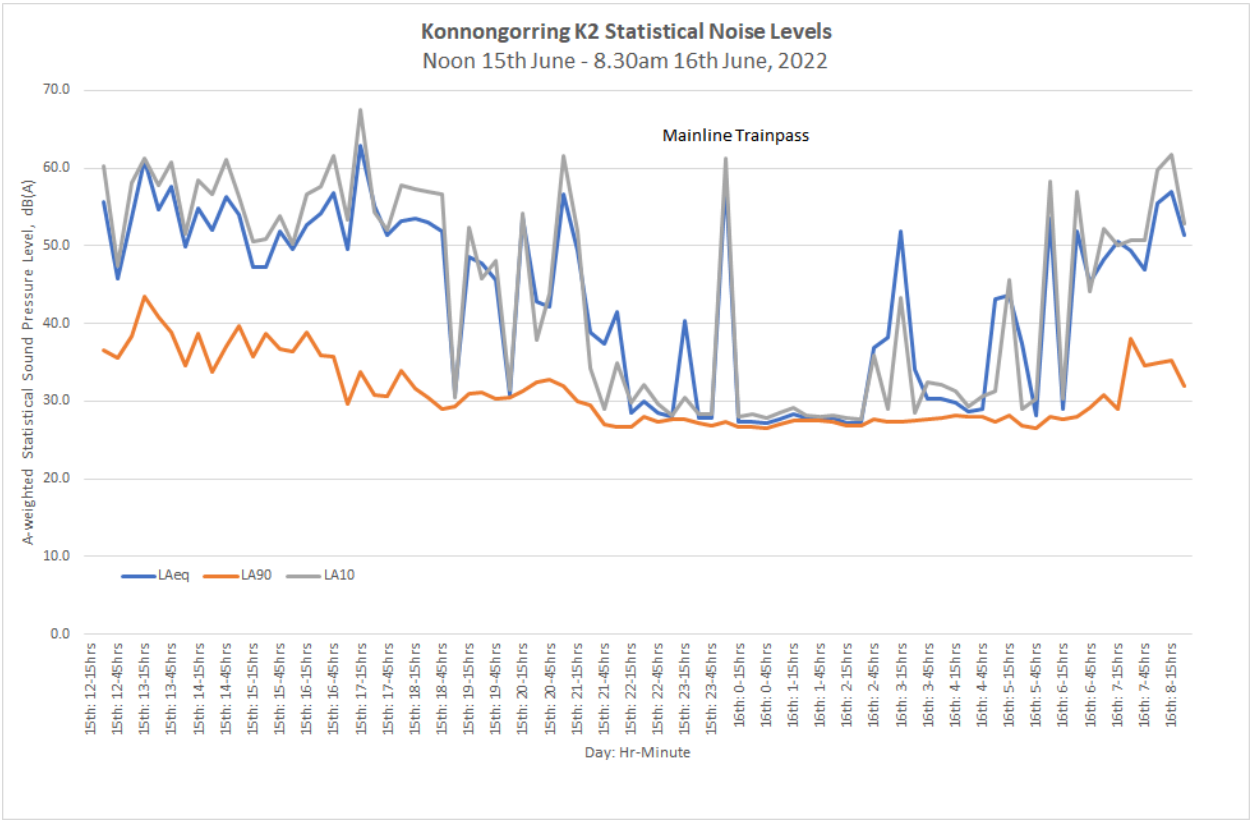


Figure 6 K2 Statistical Noise Levels



5 Impact assessment

5.1 Noise from rail movements

The predicted daytime and night-time railway noise levels for the movement of the grain freight train within the site are detailed in **Table 7**. For the proposed rail loading operations, the SPP5.4 noise assessment criteria (L_{Aeq} noise levels) and the guideline L_{Amax} 85 dB maximum noise level guideline are met at all of the assessed sensitive receivers.

Appendix B presents colour contour maps of the typical distribution in future period average rail noise levels within the study area. For Night period plots the extent of the calculated $L_{Aeq,night}$ affected area exceeding 55 dBA is shown shaded blue. For Day period plots the extent of the calculated $L_{Aeq,day}$ affected area exceeding 60 dBA is shown shaded orange. These are the respective zones outside which compliance with the requirements of State Planning Policy 5.4 is achieved.

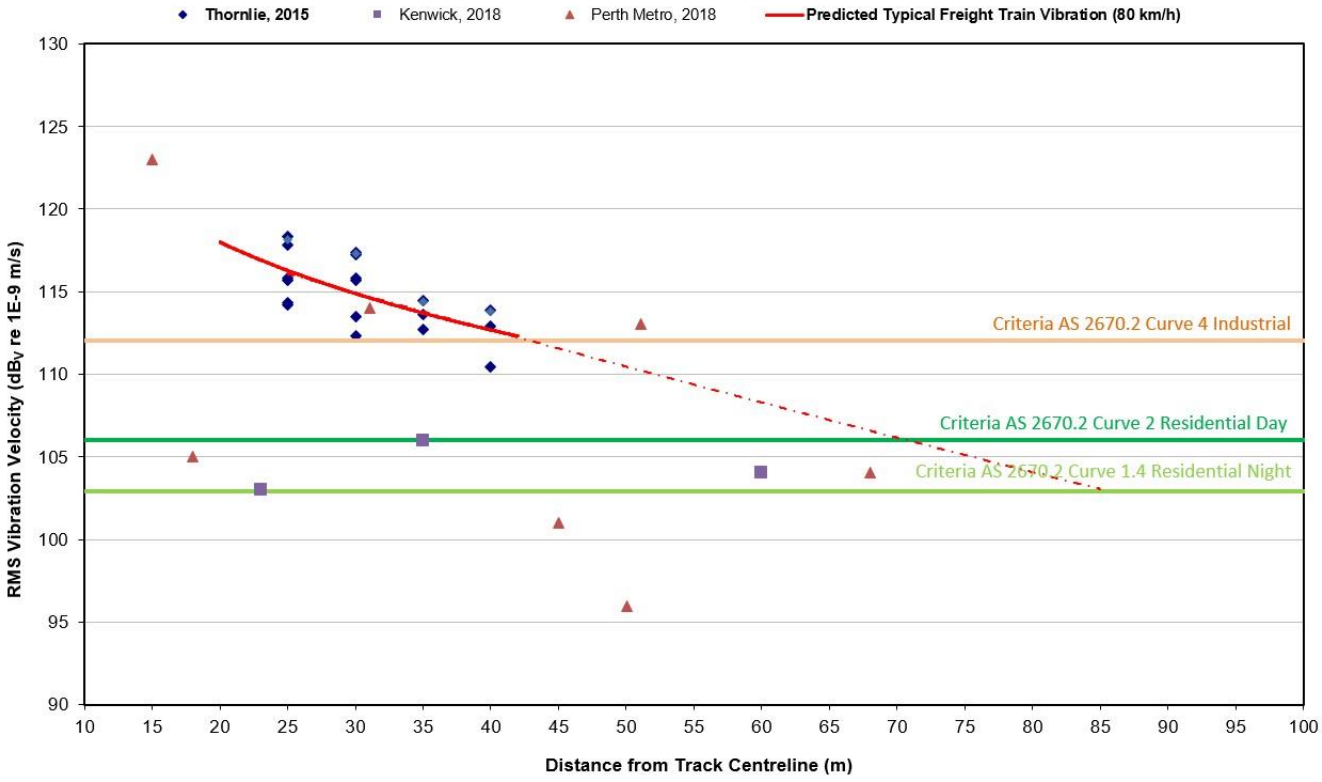
Table 7 Predicted noise levels – Rail operations at Konnongorring

ID	Existing railway noise, dB		Railway noise level with proposal, dB		SPP5.4 criterion $L_{Aeq,day}$/ $L_{Aeq,night}$ / L_{Amax}	Assessment – proposed operation
	Day $L_{Aeq,day}$ / L_{Amax}	Night $L_{Aeq,night}$/L_{Amax}	Day $L_{Aeq,day}$// L_{Amax}	Night $L_{Aeq,night}$/ L_{Amax}		
R1	45 / 77	45 / 77	49 / 81	52 / 81	60/55/85	Complies
R2	43 / 74	43 / 74	45 / 77	48 / 77	60/55/85	Complies
R3	42 / 74	42 / 74	45 / 77	48 / 77	60/55/85	Complies
R4	34 / 66	34 / 66	38 / 71	41 / 71	60/55/85	Complies
R5	33 / 64	33 / 64	36 / 68	39 / 68	60/55/85	Complies
R6	26 / 57	26 / 57	30 / 62	33 / 62	60/55/85	Complies

5.2 Vibration from rail movements

The rail extension is not predicted to create an increase in vibration at the sensitive receivers due to the freight trains. To inform the assessment of the existing potential vibration impacts, **Figure 7** presents historical results previously measured near existing Perth freight railways.

Figure 7 Measured historical vibration levels near Perth freight rail lines



Note that these levels are not corrected for speed, which ranges from 15 to 80 km/h depending on each site. The dotted red line in **Figure 7** indicates the expected level versus distance, at a speed of 80 km/h.

- The nearest sensitive receivers to the rail facilities are located approximately 70 m from the sources of vibration. At this distance, the dotted red line in **Figure 7** indicates ground-borne vibration levels at sensitive receivers to be approximately 106 dB for a train travelling at 80 km/h on track in average condition. The rail speed limit for the track passing through Konnongorring is 50 km/hr.
- Given that changes in vibration emissions with speed may be roughly approximated using a '20 log' relationship, vibration levels are expected to be less than set criteria at the nearest residential properties for train speeds less than 50 km/h, at a calculated vibration level of L_v 102 dB. This applies to mainline rail operations.

The speed of the freight train with the current and existing infrastructure is expected to be below 30 km/h while on the rail siding and shunting. On this basis, it is feasible for the freight trains to comply with the relevant vibration criteria during on the rail siding and shunting.

6 Conclusion

Rail noise and vibration emissions from the proposed operation of the rail siding are predicted to comply with the requirements of State Planning Policy 5.4.

Commensurate of the rural setting of the sites and local communities, there remains potential for noise to be audible at sensitive receivers during the proposed operations even when the assessment criteria are met. Whilst specific noise mitigation measures were not identified to be required for predicted noise levels to meet the criteria, the assessment has recommended noise management measures for inclusion in the future development of the proposals and the environmental management for each site.

7 Recommendations

The following measures are recommended to be included as part of the environmental management systems for the Konnongorring loadout facility:

- Undertake community consultation to advise local residents of the proposal and the potential noise levels associated with the future operations.
- Within the initial three months of operations with the proposed upgrade, if there are any sustained complaints received, conduct a short-term noise monitoring survey to review and confirm operational noise levels at nearby receivers.

APPENDIX A

Noise Contour Plots
Rail Emissions, L_{Aeq} dB

Figure 8 Existing Rail Noise Emissions – Night Period, SPP5.4 $L_{Aeq,night}$ (Outside the blue area is compliant)

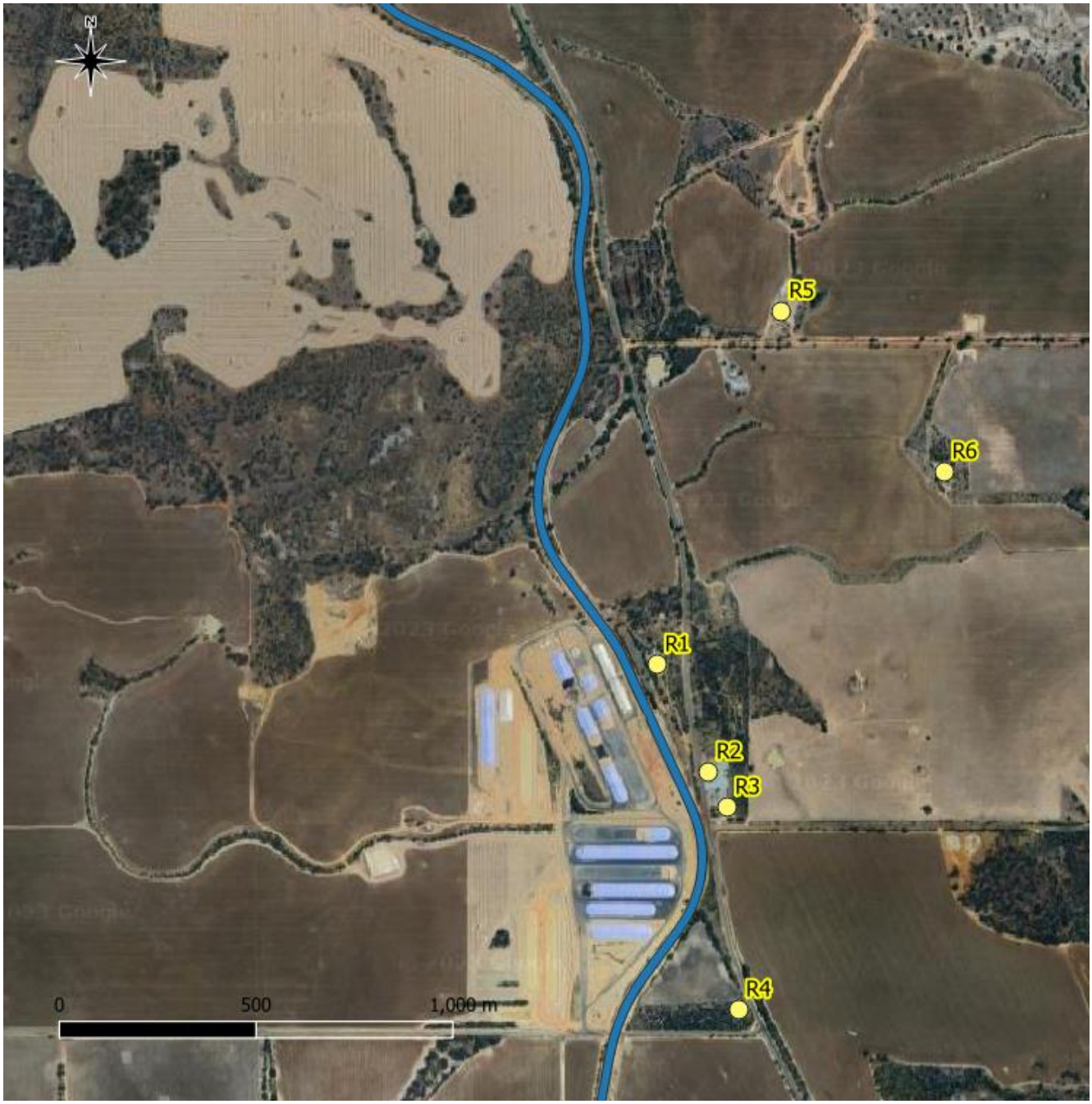


Figure 9 Proposed Rail Noise Emissions – Night Period, SPP5.4 $L_{Aeq,night}$ (Outside the blue area is compliant)

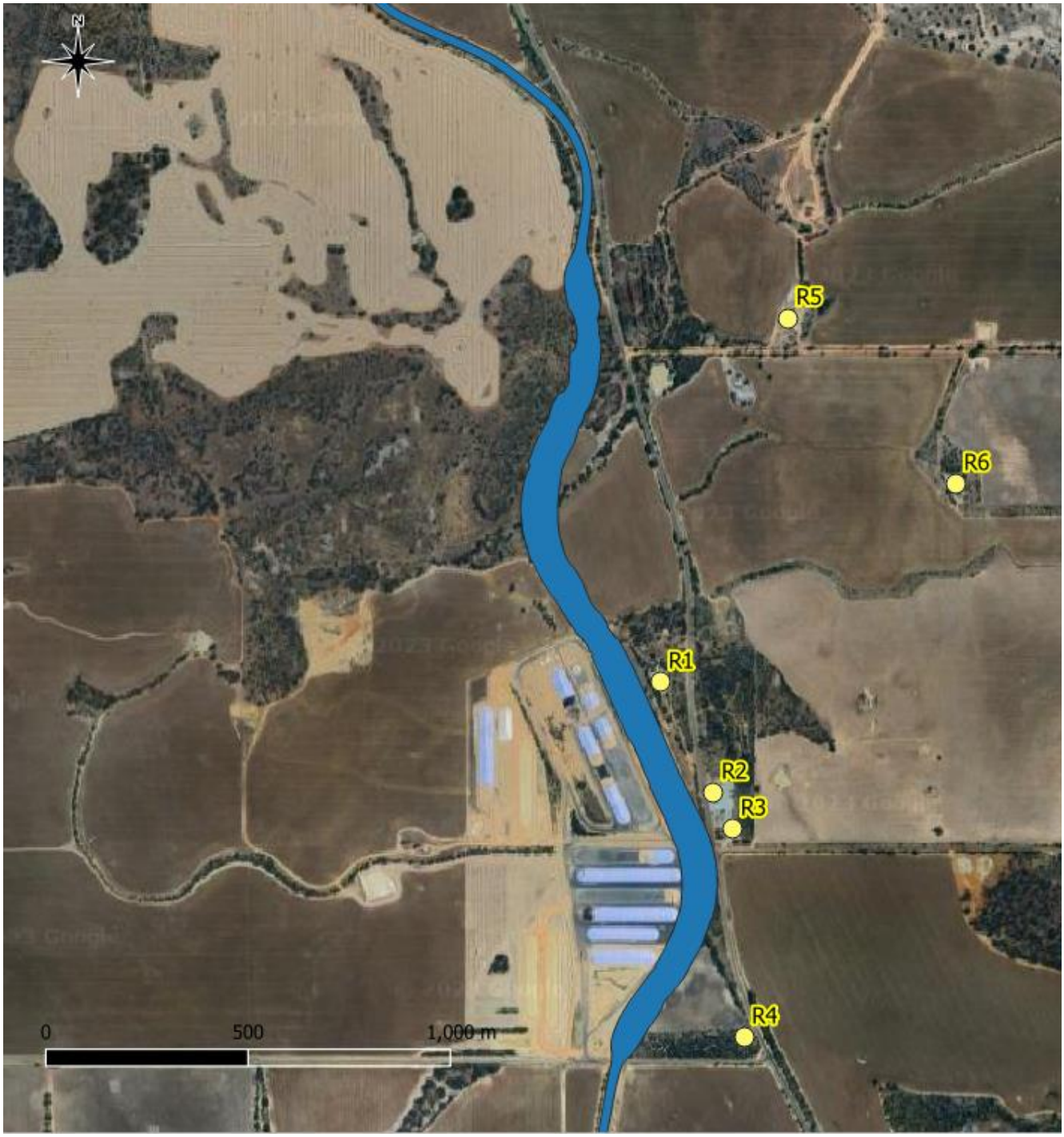
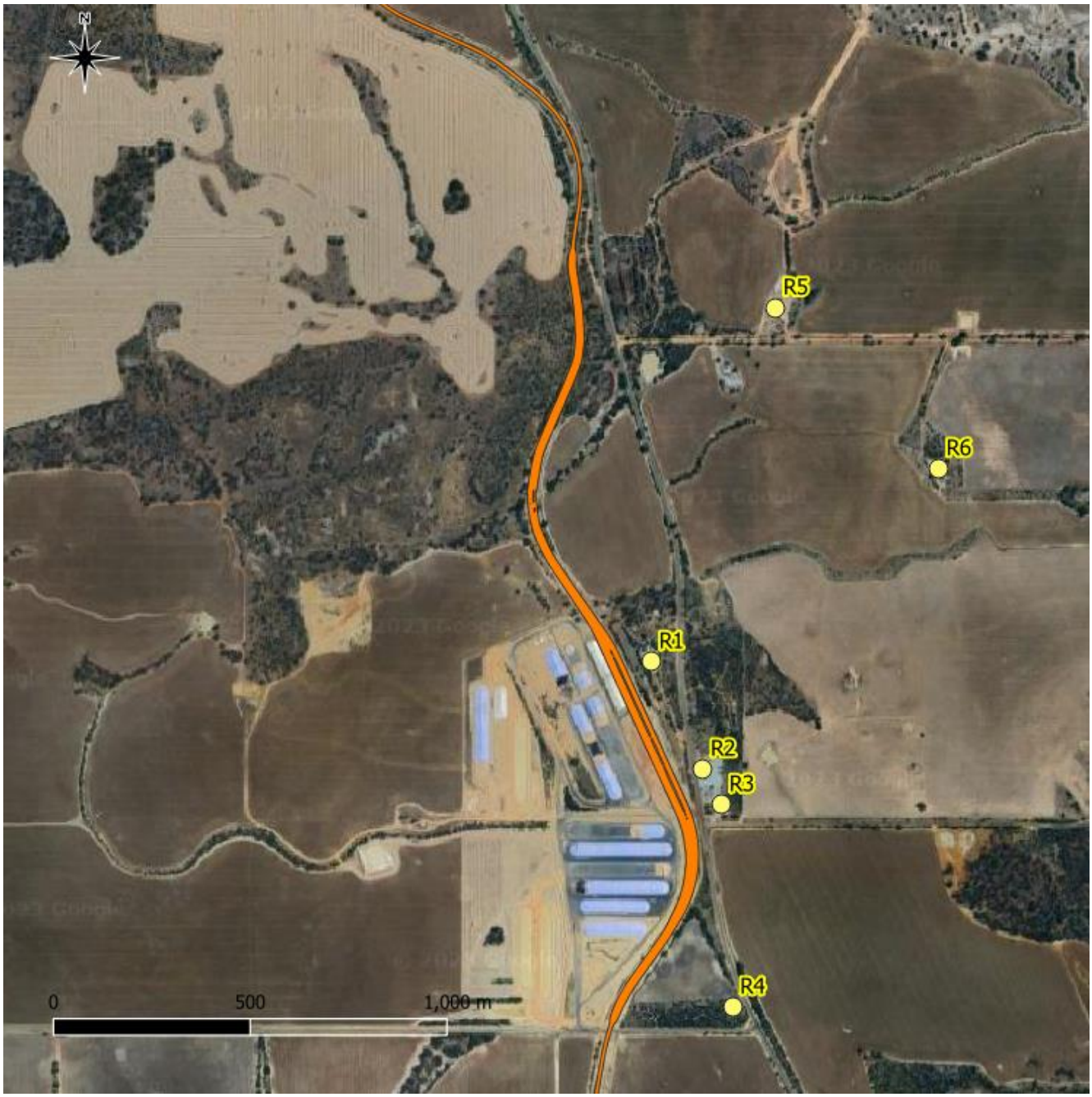


Figure 10 Existing Rail Noise Emissions – Day Period, SPP5.4 $L_{Aeq,day}$ (Outside the orange area is compliant)

Figure 11 Proposed Rail Noise Emissions – Day Period, SPP5.4 $L_{Aeq,day}$ (Outside the orange area is compliant)



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