Regional Rail Revival
North-East & Shepparton

PREPARED FOR RAIL PROJECTS VICTORIA

NES-AJM-PWD-SHP-REP-XAV-SHP-0000557 SHEPPARTON STABLING PRELIMINARY NOISE ASSESSMENT

DATE 8 NOVEMBER 2019

REVISION B

CONFIDENTIAL

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Document Control Record

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DOCUMENT CONTROL						
Document title		Shepparton Stabling Preliminary Noise Assessment				
Document ID		NES-AJM-PWD-SHP-REP-XAV-SHP-0000557		**Contract No.**	CMS332569	
File path		https://geodocs.ajmjv.com/sites/RRR/WIPLibrary/NES-AJM-PWD-SHP-REP-XAV-SHP-0000557.docx				
Client		Rail Projects Victoria		**Client contact**	Rob Hammer	
Rev	**Date**	**Revision details/status**	**Prepared by**	**Author**	**Verifier**	**Approver**
A	31/10/2019	Issued to RPV	David Larner	Lissa Othman	Sarah Alper	Emma Connell
B	08/11/2019	Issued to RPV	David Larner	Lissa Othman	Sharon Stewart	Emma Connell
Current revision		B				

APPROVAL			
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Contents

1 Executive Summary

The Shepparton Line Upgrade Stage 2 (the Project) includes corridor works such as level crossing upgrades, platform extensions, a crossing loop extension at Murchison East and stabling at Shepparton. Two sites are currently being considered for stabling within an existing industrial precinct located east of Shepparton, near Grahamvale. A preliminary assessment of stabling noise emissions from these two sites has been undertaken.

This assessment includes:

- Identification of the noise requirements applicable to the Project's stabling facility (*Noise from Industry in Regional Victoria*)
- Measurement of the existing noise environment around the potential sites
- Identification of nearby Noise Sensitive Areas (NSAs) including the new Shepparton North-East Precinct Structure Plan (PSP) consisting of approximately 1,500 dwellings (NSAs) which do not currently exist but could be built in the future
- Determination of the Recommended Maximum Noise Levels (RMNLs) at Noise Sensitive Areas (NSAs) surrounding the stabling sites
- Prediction of the stabling noise emissions at NSAs, and comparison with the applicable RMNLs
- Provision of feasible mitigation options, if applicable.

Two scenarios were modelled at each of the potential stabling yard sites, as defined below:

- Scenario A: Start-up operations
- Scenario B: Refueling and dewatering operations.

At the Option A site, no exceedances were predicted for either scenario and no mitigation is required.

At the Option B site, exceedances may occur for start-up operations only at two existing NSAs; both located on Grahamvale Road, Grahamvale and also at the new Shepparton North-East PSP.

Standard mitigation measures, including limited extents of noise walls, or off-reservation treatments (ORT) will manage exceedances for the existing NSAs.

It is a requirement of the planning controls under the Greater Shepparton Planning Scheme that subdivision of the PSP can only occur following consideration of acoustic measures to manage impacts from the industrial area. No further mitigation for the Option B stabling site is likely to be required, pending discussion and approval from the EPA.

2 Approach

An assessment of operational stabling noise for the potential sites has been undertaken to inform stabling site selection and future planning approvals. The following approach has been used for the assessment of noise from stabling activities:

- Identification of the noise requirements applicable to the Project's stabling facility (*Noise from Industry in Regional Victoria*)
- Measurement of the existing noise environment around the potential sites
- Determination of the Recommended Maximum Noise Levels (RMNLs) at Noise Sensitive Areas (NSAs) (including the PSP areas) surrounding the stabling sites
- Prediction of the stabling noise emissions at NSAs (including the PSP area), and comparison with the applicable RMNLs
- Provision of feasible mitigation options, if applicable.

Noise from fixed infrastructure associated with the Project has been assessed in compliance with the Noise from Industry in Regional Victoria Publication 1411 October 2011 (NIRV). NIRV is a non-statutory guideline for assessment of the cumulative industrial noise in a rural environment. Under NIRV, "Commercial, industrial or trade premises" means any premises except a tram, light rail or railway line not being a siding, marshalling yard or maintenance depot of any tram, light rail or railway line; therefore, both proposed stabling facilities have been assessed under NIRV.

The time periods applicable to NIRV are presented in Table 2-1.

TABLE 2-1: TIME PERIODS DEFINED UNDER NIRV

TIME PERIOD	TIME (HHMM)
Day	0700 – 1800, Weekdays 0700 – 1300, Saturdays
Evening	1800 – 2200, Weekdays 1300 – 2200, Saturdays 0700 – 2200, Sunday/Public Holidays
Night	2200 – 0700, All days

Shepparton has a population of greater than 7000 and is therefore defined in NIRV as a Major Urban Area. As the two stabling sites are located in the Urban Centre Boundary (as defined by the Australian Bureau of Statistics – see Figure 2-1), the methodology from the State Environmental Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1 (SEPP N-1) was used to determine the RMNLs at NSAs[1].

[1] "Where either the noise emitter or the noise receiver are within a major urban area, the major urban area approach applies" – *Noise from Industry in Regional Victoria*, Publication 1411, extract.

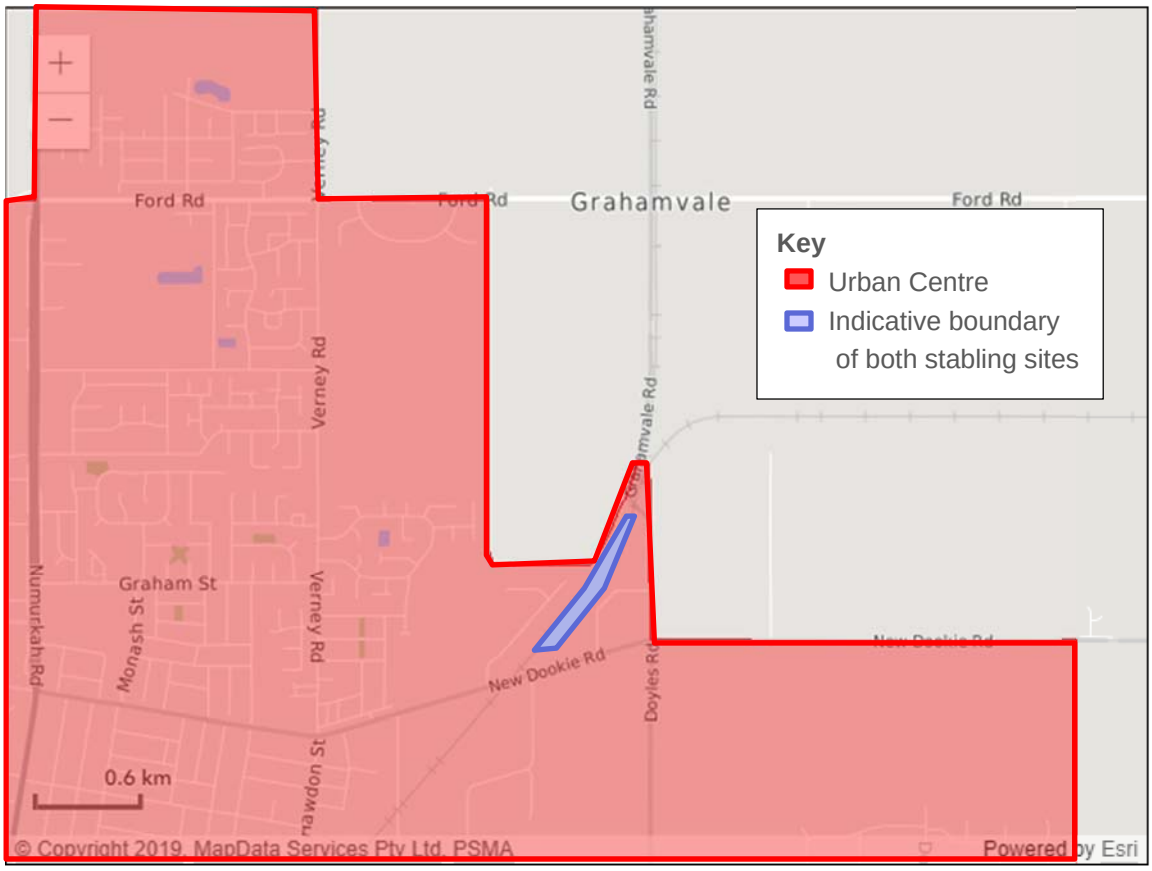

FIGURE 2-1 URBAN CENTRE BOUNDARY (SOURCE: AUSTRALIAN BUREAU OF STATISTICS MAPS)

SEPP N-1 states "The Noise Limits (*in this case, the RMNLs*) shall not be less than the values below", which are presented in Table 2-2. These noise levels are considered the Base Noise Levels for the assessment.

TABLE 2-2: BASE NOISE LEVELS FOR NIRV USING SEPP N-1 METHODOLOGY

TIME PERIOD	BASE NOISE LEVEL $DBL_{AEQ,30MINS}$
Day	45
Evening	40
Night	35

2.1 Precinct Structure Plan

2.1.1 SHEPPARTON NORTH EAST PRECINCT STRUCTURE PLAN

The Shepparton North East Precinct Structure Plan (PSP) is the development of a new neighbourhood within proximity of the project. Potentially, 1,500 new residences may be built within the Precinct.

The PSP applies to approximately 177 hectares of land located to the north east of Shepparton CBD and is generally bound by Ford Road to the north, Grahamvale Road to the east, a drainage reserve to the south and Verney road to the west.

Amendment C118 to the Greater Shepparton Planning Scheme implemented the Shepparton North East PSP and Development Contributions Plan (DCP). The Amendment was approved by the Minister for Planning in August 2019 and gazetted in October 2019.[2]

As part of the PSP preparation, a noise assessment was commissioned of existing land uses in the vicinity of the proposed Shepparton North East PSP area in accordance with the relevant Victoria EPA legislation, guidelines and accepted industry practice. This assessment recognised the proximity of the PSP to the existing industrial precinct and recommended acoustic treatment for any future residential development. The approved planning controls require proponents to consider noise impacts from the nearby industrial uses on the amenity of future residents and undertake any required mitigation as part of future development.

For the purposes of the SEPP N-1 methodology the PSP area has been assessed as General Residential Zone (the applied zone under the Urban Growth Zone 1 (UGZ1)). At this stage, specific locations for new residences have not been provided. In our assessment of stabling yard noise, we have assumed that there will be properties along the boundary of the PSP area which is bounded by the drainage reserve, facing the two proposed stabling sites.

[2] Victorian Planning Authority website: https://vpa.vic.gov.au/project/shepparton-north-east/ (accessed: October 2018)

3 Noise Sensitive Areas and Recommended Maximum Noise Levels

The RMNLs have been determined using the SEPP N-1 methodology as follows:

- Measurement of existing noise levels near the proposed stabling sites
- Determination of the NIRV RMNLs at NSAs based on planning use zones and background noise levels.

3.1 Existing Noise Environment

Noise measurements were conducted on the early mornings (during the night period) of the 31/01/19 and 01/02/19, and evening of the 18/09/2019, at locations shown in Figure 3-1. These measurement locations were taken as they were considered representative locations of NSAs in the vicinity of both stabling yards.

Noise measurements were typically conducted during neutral conditions, however, some measurements occurred when local wind speeds were > 5 m/s. As a result, any wind-affected noise measurements were removed from analysis.

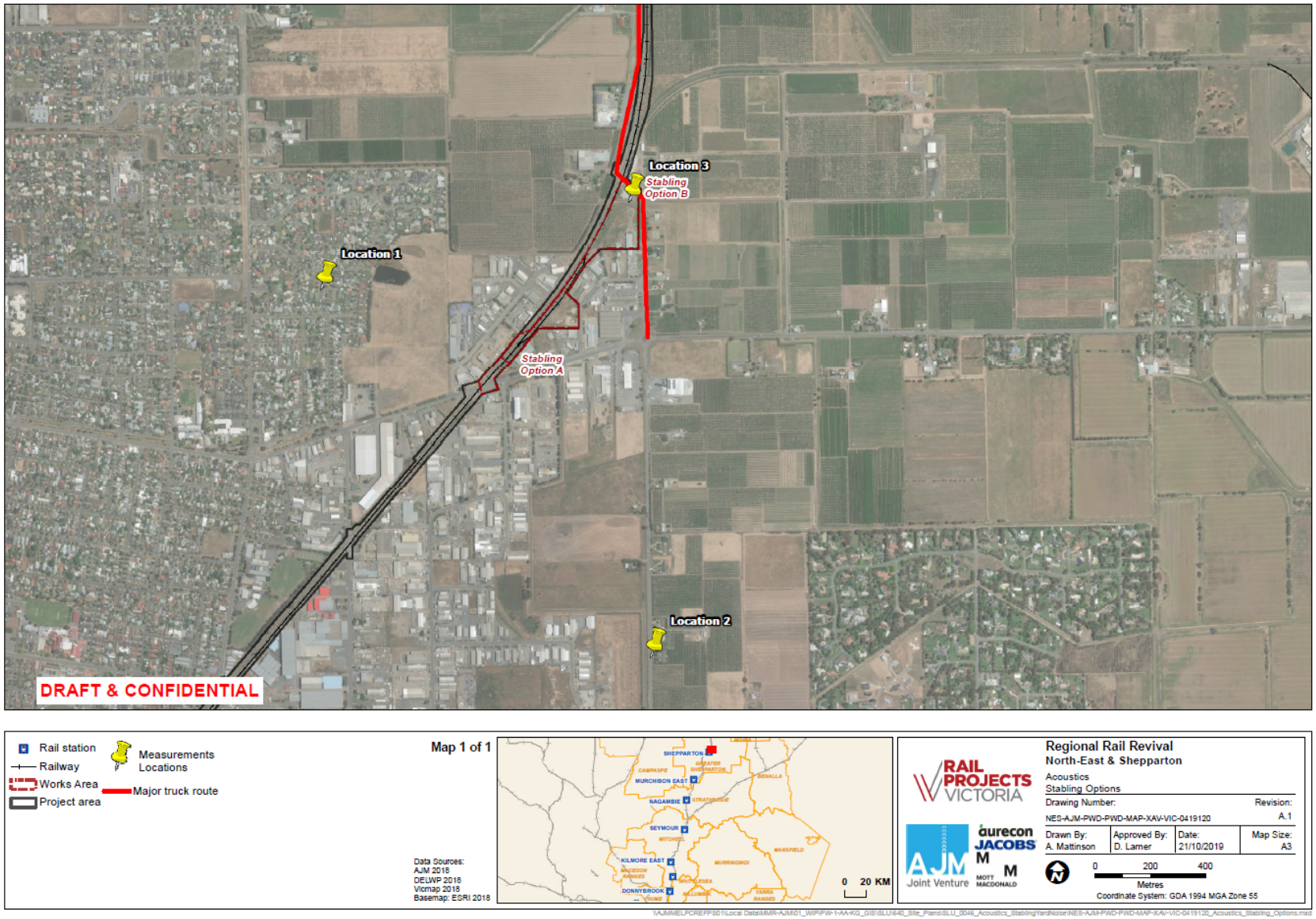

FIGURE 3-1: NOISE MEASUREMENTS CONDUCTED AROUND PROPOSED STABLING SITES

The results of the noise measurements are provided in Table 3-1. At the time of measurements, the local noise environment was controlled by constant truck noise on Grahamvale Road (as shown in Figure 3-1). This appeared to be a main trucking route in Eastern Shepparton.

TABLE 3-1: MEASURED NOISE LEVELS - SHEPPARTON

MEASUREMENT LOCATION	MEASUREMENT START TIME / DATE	$L_{AEQ,10MINS}$ (DB)	$L_{A90,10MINS}$ (DB)	AVERAGE $L_{A90,10MINS}$ (DB)
Evening Period				
Location 1	18:15 / 18/09/19	51	40	40
	21:19 / 18/09/19	43 Note	40 Note	
Location 2	19:22 / 18/09/19	68	43	43
	20:24 / 18/09/19	68	43	
Location 3	19:40 / 18/09/19	64	44	44
	20:40 / 18/09/19	61	45	
Night Period				
Location 1	01:09 / 31/01/19	39	38	39
	03:41 / 31/01/19	41	40	
Location 2	03:11 / 01/02/19	64	38	38
	03:31 / 01/02/19	58	38	
Location 3	03:58 / 31/01/19	64	35	36
	04:32 / 31/01/19	65	38	

Note: Construction works started in the distance at the end of the 10-minute measurement. Because of this, the construction noise was removed from the measurement, and the measurement period was limited to 8 minutes. Construction continued for the rest of the evening period.

3.2 Determination of RMNLs

The RMNLs were determined using the SEPP N-1 methodology, which incorporates planning use zones local to the noise receiver, and representative background noise measurements (dBL_{A90}). The nearby planning use zones in the vicinity of the proposed stabling yard (as shown in Figure 3-2).

- Farming Zone (FZ) [3]
- Industry Zone Category 1 (IN1Z)
- Neighbourhood Residential Zone (NRZ)
- General Residential Zone (GRZ)
- Road Zone Category 1 (RDZ1)
- Public Use Zone Category 1 (PUZ1 – Service and Utility)
- Public Use Zone Category 4 (PUZ4 – Transport).

[3] For the purposes of SEPP N-1 assessment methodology, AJM has assumed that this land is considered a *Type 1* NSA, as this zone is not defined in the EPA Victoria document *Designation of types of zones and reservations in the metropolitan region planning schemes for the purposes of State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1*, dated Feb 2000. This is considered a conservative approach. The draft *Noise Protocol* document states Farming Zones as Type 2, but as this document is yet to come into effect, a conservative approach was taken.

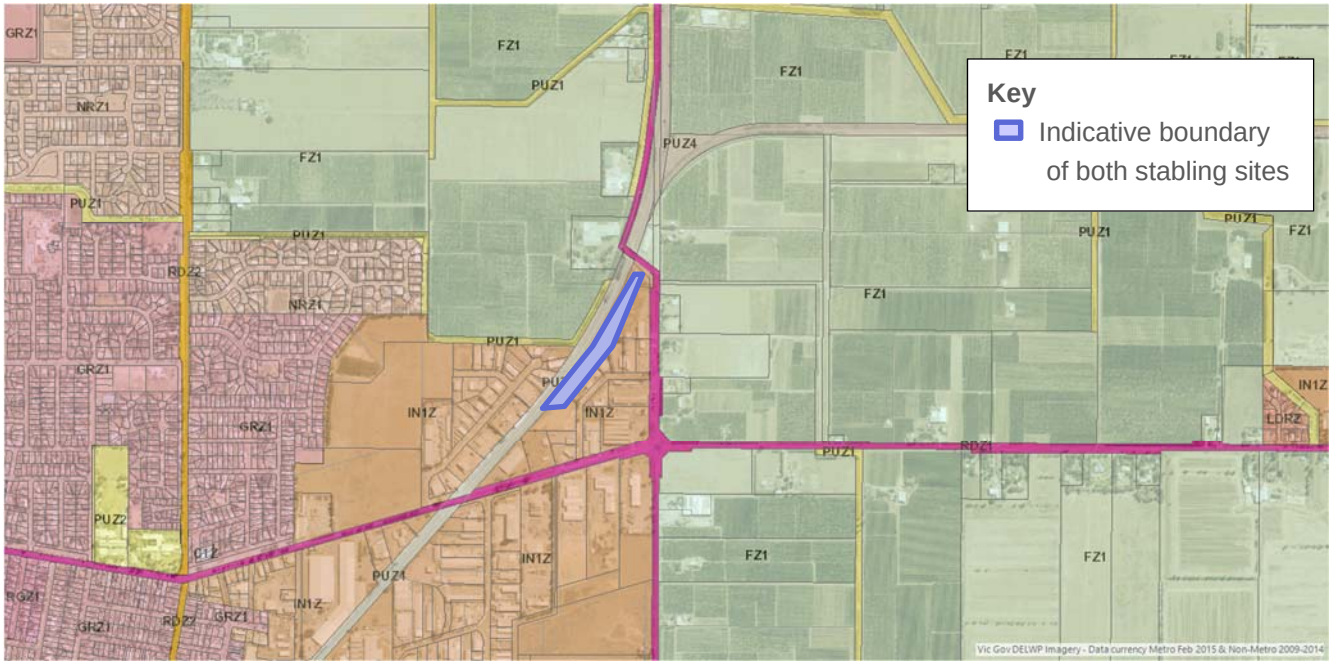

FIGURE 3-2: PLANNING USE ZONES – SHEPPARTON AND GRAHAMVALE (SOURCE: VICPLAN)

For this assessment the stabling area(s) are assumed to remain as IN1Z and not be rezoned to PUZ4.

The night period RMNLs applicable to the two stabling sites are presented in Table 3-2, and the location of their applicability is shown in Figure 3-3.

TABLE 3-2: APPLICABLE RMNLS TO THE PROJECT STABLING SITES

REPRESENTATIVE RMNL LOCATION	APPLICABLE BACKGROUND MEASUREMENT LOCATION	REPRESTNATIVE BACKGROUND NOISE LEVEL $DBL_{A90,10MINS}$	RMNL $DBL_{AEQ,30MINS}$
Evening Period			
Area 1	Location 1	40	47
Area 2	Location 2	43	53
Area 3	Location 3	44	49
Night Period			
Area 1	Location 1	39	42
Area 2	Location 2	38	46
Area 3	Location 3	36	44

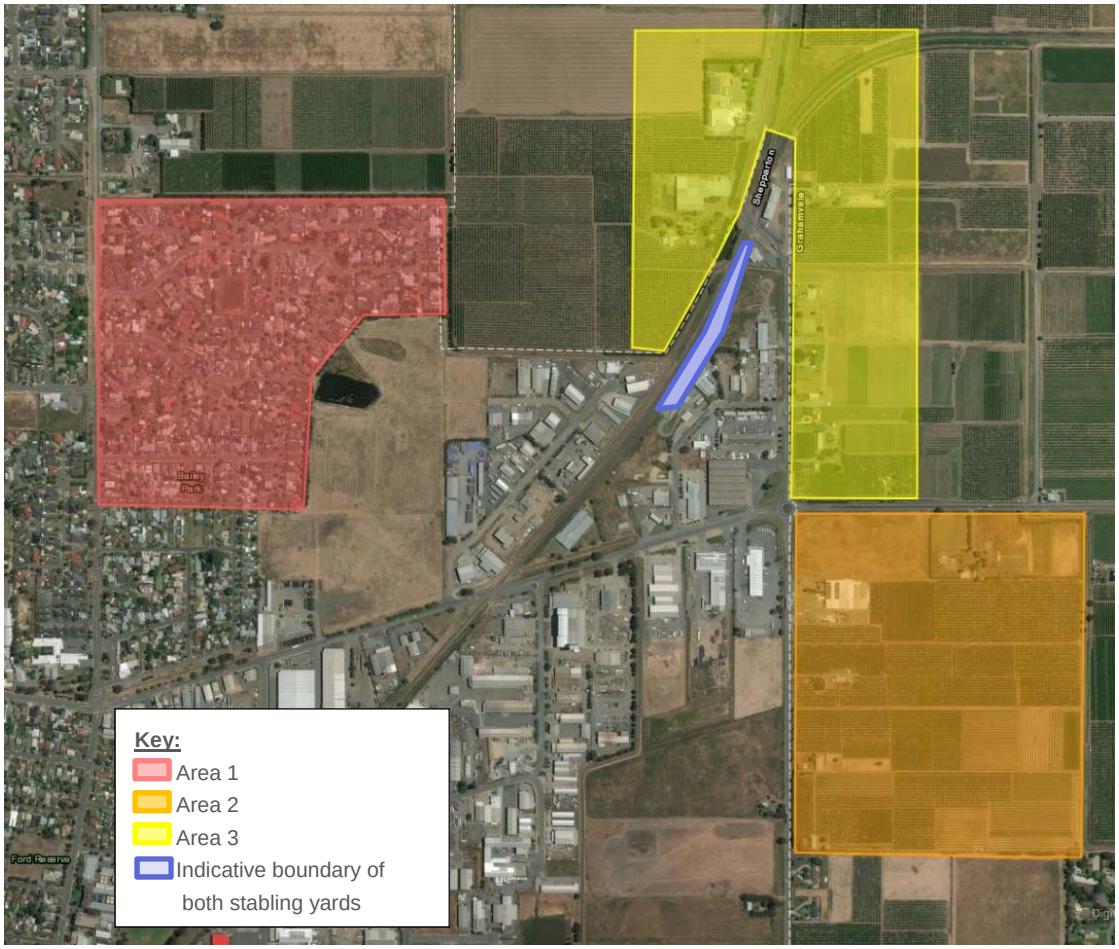

FIGURE 3-3: RMNL AREAS

4 Noise Modelling and Results

4.1 Methodology

A 3D computational noise model of the existing and proposed sites has been created in SoundPLAN 8.0. This model includes the following inputs:

- Sound power levels of noise sources
- Atmospheric conditions
- Ground conditions
- Topographical data (VicMap 10m)[4]
- Shielding from buildings

4.2 Scenarios

Two sites (Option A and Option B) were modelled, with two sub-scenarios:

- Option A
  - » Scenario 1A: Start-up procedures of a single 6-car VLocity
  - » Scenario 1B: Refuelling and dewatering operations of a single 6-car VLocity
- Option B
  - » Scenario 2A: Start-up procedures of a single 6-car VLocity
  - » Scenario 2B: Refuelling and dewatering operations of a single 6-car VLocity

RPV advised that refuelling and dewatering would occur between 6 pm – 10 pm, and start-up operations would occur prior to 7 am. As a result, all start-up operations will be assessed against the Night period RMNLs, and the refuelling and dewatering operations will be assessed against the Evening period RMNLs.

4.3 Source Noise Levels

All source noise levels used in the modelling are presented below in Table 4-1.

The source noise levels of a VLocity train and dewatering pump were calculated based upon sound pressure level measurements undertaken at the Ararat stabling facility and Traralgon sidings by AJM. The VLocity HVAC system and refuelling pump is based on empirical data and literature review.

[4] LiDAR data was not available for the project area. As a check, it was found that a slope of <1:11000 metres covered the assessment area, and is thus very flat. As a result, the VicMap 10m increment contours were used for this assessment.

TABLE 4-1 : SOURCE SOUND POWER LEVELS OF STABLING OPERATIONS

SOURCE	TIME IN USE IN HALF HOUR PERIOD NOTE 1 (%)	OCTAVE BAND CENTRE FREQUENCY, HZ SOUND POWER LEVELS, DB								TOTAL SOUND POWER LEVEL, DBA
		63	125	250	500	1K	2K	4K	8K	
VLocity Start-up Note 2 – Scenario A										
Front – Undercarriage	100	96	100	92	90	90	88	80	75	94
Front – Side Exhaust Note 3	100	84	83	77	79	79	74	69	64	83
Middle – Undercarriage	100	95	96	90	87	90	87	82	77	94
Middle – Side Exhaust	100	91	87	83	85	87	82	77	69	90
Rear – Undercarriage	100	92	93	91	88	92	88	83	81	95
Rear – Side Exhaust	100	84	83	77	79	79	74	69	64	83
HVAC Note 4	100	80	80	79	78	77	75	72	72	82
VLocity idling Note 5 – Scenario B										
Front – Undercarriage	100	85	88	83	80	77	74	68	63	83
Front – Side Exhaust Note 3	100	86	86	77	81	67	62	55	47	79
Middle – Undercarriage	100	87	88	82	81	75	75	67	62	83
Middle – Side Exhaust	100	85	86	78	85	68	63	58	48	83
Rear – Undercarriage	100	93	94	88	87	81	81	73	68	89
Rear – Side Exhaust	100	86	86	77	81	67	62	55	47	79
HVAC Note 4	100	80	80	79	78	77	75	72	72	82
Plant equipment – Scenario B										
Fuel Pump Note 6	100	81	82	84	84	87	84	80	74	91
Dewatering Pump – Dewatering Note 5	0.5	68	64	65	81	72	67	65	61	79
Dewatering Pump – Water Cycle Note 5	95.5	74	87	63	65	78	78	78	72	84

Notes:

1. Time-weightings apply for equipment not operating for the entire 30-minute period. Time-weightings have not been applied to the values in the table.
2. VLocity trains have been modelled based on measurements from an existing 3-car VLocity from a cold start at Ararat
3. The values provided are based on the opposite (rear) driver cabin (as VLocitys can travel in both directions)
4. SWL level is based on North West Rail Link noise report[5], octave band frequency spectrum derived based on axial fan
5. Idling VLocity train (3-cars in operations post-decoupling) and dewatering operations have been modelled based on measurements at Traralgon sidings
6. Pump sound power levels have been derived based on empirical equations[6] for a 22 kW pump operating at 2900 RPM, which is based on an indicative refuelling pump for the Waurn Ponds stabling facility

While measurements were of a 3-car VLocity, a 6-car VLocity is essentially 2x 3-car VLocitys coupled together, and therefore considered appropriate for modelling operational noise from these stabling sites.

[5] North West Rail Link – Noise and Vibration Technical Paper for Operations and Additional Construction Works – 17th October 2012. Rev. NWRL-10046-R-NO-00012-v1.0-EIS2 Operational NV.doc

[6] *Engineering Noise Control – Theory and Practice*, Bies, D. A. and Hansen, C. H., Fourth Edition, Spon Press 2009.

4.4 Results- Predicted Noise Levels

4.4.1 OPTION A

Of the 300 receptors assessed no exceedances were predicted to the start-up operations against the night period RMNLs. Noise levels from the refuelling and dewatering operations were also predicted at the 300 receptors. No exceedances were predicted to the evening RMNLs for this operation. No mitigation is required for the Option A site.

4.4.2 OPTION B

Of the 300 existing receptors assessed, exceedances were predicted for the start-up operations with respect to the night period RMNLs at two existing properties on Grahamvale Road and the south-eastern area of the PSP. For the purposes of this assessment, it is assumed that both of the Grahamvale Road properties are habitable.

Noise levels were predicted at the NSAs for de-watering and refuelling operations and compared to the evening period RMNLs. No exceedances were predicted with respect to the evening RMNLs for this operation.

5 Mitigation

Standard mitigation measures could be implemented to address the exceedances at the two Grahamvale Road NSAs. This may include noise walls adjacent to the stabling areas or off-reservation treatment (ORT) (such as acoustic glazing on habitable room windows of affected NSAs). For any future dwellings in the PSP area, the noise assessment conducted as part of the PSP recommended acoustic treatment for any future residential development. Given that proponents are required by the planning controls to consider noise impacts on the amenity of future residents, the onus to protect for noise impacts is on future proponents rather than nearby uses. Provided the recommended acoustic treatments were applied, no further mitigation for the PSP area would be required. This approach would need to be agreed with the EPA.

Operational restrictions were not considered, as refueling and dewatering must occur after service, and trains are required to start-up in the night period for the early service.

6 Conclusion

An assessment of the stabling noise emissions from two proposed sites, Option A and Option B, has been conducted, against the relevant noise requirements.

Two scenarios were modelled at each of the proposed stabling yards, as defined below:

- Scenario A: Start-up operations
- Scenario B: Refueling and dewatering operations

No exceedances were predicted to occur at the Option A site and consequently no mitigation is required.

At the Option B stabling site, exceedances were predicted at two potential existing NSAs on Grahamvale Road, Grahamvale and at the south-eastern area of the PSP. These exceedances could be adequately dealt with through standard mitigation measures.

With regard to the Shepparton North-East PSP site, proponents of any future subdivision are required by the recently approved planning controls to consider noise impacts on the amenity of future residents as a result of the nearby industrial uses.

Operational restrictions were not considered, as refueling and dewatering must occur after service, and trains are required to start-up in the night period for the early service.

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