Burrendong Wind Farm Amendment Report

APPENDIX E.2

Noise and Vibration Memorandum

MEMO

MARSHALL DAY Acoustics

Project:	Burrendong Wind Farm	**Document No.:**	Mm 001 R03		
To:	Burrendong Wind Farm Pty Ltd	**Date:**	5 March 2026		
Attention:	Jane Ewers	**Cross Reference:**	Rp 002 r02 20200219		
Delivery:	Email	**Project No.:**	20251010		
From:	Harsh Vardhan Sah	**No. Pages:**	21	**Attachments:**	No
Subject:	Response to RFI by DPHI				

Marshall Day Acoustics Pty Ltd (MDA) has previously provided extensive acoustic services for Burrendong Wind Farm (project), including an EIS Noise Assessment that was submitted to the NSW Department of Planning, Housing and Infrastructure (DPHI) as part of the State significant development application (SSDA).[1]

Burrendong Wind Farm Pty Ltd (Ark Energy) received an RFI from DPHI in December 2024 and requested MDA to provide a response to the noise related items, reproduced below for reference:

- *Provide a list of non-associated receivers predicted to exceed the construction noise affected management level, and the predicted noise levels at each of these receivers;*
- *Provide an assessment of vibration impacts or confirm that minimum setback distances required to achieve compliance with vibration criteria can be met for all non-associated receivers;*
- *Identify locations where blasting may be required and provide an assessment of blasting impacts;*
- *Confirm what mitigation measures would be implemented for non-associated dwellings predicted to experience sleep disturbance (noting that the measures listed in the NIA have not been committed to by Ark and may not be feasible, e.*g. alternative routes for OSOM)

Ark Energy have advised MDA that following the submission of the Response to Submissions in September 2025, DPHI have requested additional receivers be assessed prior to acceptance of the associated reports for the project.

Ark Energy has requested that MDA provide a memo that summarises updated assessment results and outcomes reflecting the finalised receiver dataset.

[1] Rp 002 r02 20200219 *Burrendong Wind Farm - EIS Noise Assessment* (EIS Noise Assessment), dated 15 September 2023

Revised table of receiver coordinates

Table 1 supersedes Table 29 in Appendix E of the EIS Noise Assessment, as per data supplied by Ark Energy on 23 February 2026.

Table 1: Receivers within 3 km of the proposed WTGs – GDA94/MGA Zone 55

Receiver	Easting, m	Northing, m	Terrain elevation, m	Distance to the nearest WTG, m	Nearest WTG
Non-associated receiver					
O17-1	714,157	6,377,163	428	1,427	39
R8-1	717,203	6,386,186	420	2,617	49
T8-1	718,998	6,386,243	397	2,919	49
U10-1	720,158	6,383,862	410	1,428	53
U11-1	720,468	6,382,956	397	1,071	53
U8-2	720,004	6,385,439	387	2,869	53
U9-1	719,970	6,384,513	395	1,961	53
U9-3	719,842	6,384,954	392	2,365	53
V11-2	721,480	6,383,289	418	2,130	53
V11-3	721,301	6,382,968	404	1,878	53
V13-1	721,599	6,380,843	763	1,630	57
W10-1	722,032	6,383,574	407	2,744	53
W10-2	722,193	6,383,739	421	2,954	53
W11-1	722,234	6,383,351	414	2,870	53
XW12-1	722,082	6,383,453	408	2,752	53
Associated receiver					
K11-1	710,652	6,382,554	639	1,042	27
L6-1	711,530	6,388,112	385	2,537	21
Q13-1	716,474	6,381,259	629	1,588	51
R14-1	716,862	6,380,138	620	1,616	62
S11-1	718,297	6,382,726	701	536	50
S12-1	718,499	6,382,037	707	650	51

Revised construction noise assessment

Table 2 and Table 3 supersede Table 20 and Table 21 in Section 9.3 of the EIS Noise Assessment. Predictions have been conducted following the same method set out by the EIS Noise Assessment.

Table 2: Indicative range of construction noise predictions at non-associated receivers, dB L_{Aeq}

Construction task	Nearest receiver	Predicted level range	Noise affected management level	Exceedance	Highly noise affected management level	Exceedance
WTG foundations	U11-1	45-50	45	0-5	75	-
WTG assembly	U11-1	40-45	45	-	75	-
Construction of hardstands	U11-1	45-50	45	0-5	75	-
Access road construction	U11-1	35-40	45	-	75	-
Substation construction	O17-1	30-35	45	-	75	-
Connection switchyard construction	A22-1	35-40	45	-	75	-
O&M and site (temporary and permanent) compounds construction	P5-1	30-35	45	-	75	-
Construction of overhead transmission lines	S13-1	40-45	45	-	75	-
Permanent meteorological masts of footing construction	U10-1	45-50	45	0-5	75	-
Underground transmission lines (cable trench digging)	U11-1	45-50	45	0-5	75	-
Concrete batching plant	P5-1	25-30	45	-	75	-
Temporary laydown areas & construction compounds	U11-1	35-40	45	-	75	-
Temporary and permanent meteorological masts footing	O17-1	35-40	45	-	75	-

Table 3: Indicative range of construction noise predictions at associated receivers, dB L_{Aeq}

Construction task	Nearest receiver	Predicted level range	Noise affected management level	Exceedance	Highly noise affected management level	Exceedance
WTG foundations	S11-1	50-55	45	5-10	75	-
WTG assembly	S11-1	45-50	45	0-5	75	-
Construction of hardstands	S11-1	50-55	45	5-10	75	-
Access road construction	S11-1	50-55	45	5-10	75	-
Substation construction	K11-1	30-35	45	-	75	-
Connection switchyard construction	K11-1	10-15	45	-	75	-
O&M and site (temporary and permanent) compounds construction	L6-1	40-45	45	-	75	-
Construction of overhead transmission lines	R14-1	30-35	45	-	75	-
Permanent meteorological masts of footing construction	S11-1	45-50	45	0-5	75	-
Underground transmission lines (cable trench digging)	S11-1	60-65	45	15-20	75	-
Concrete batching plant	L6-1	35-40	45	-	75	-
Temporary laydown areas & construction compounds	S12-1	55-60	45	10-15	75	-
Temporary and permanent meteorological masts footing	K11-1	30-35	45	-	75	-

The receivers Q13-1 and R14-1, which were identified as closest non-associated receivers to the construction tasks in the EIS Noise Assessment, are now associated with the project. The new receiver dataset received from Ark Energy identifies more receivers near the project than the previous set used for assessment. Thus, the closest receivers to the construction tasks have changed from those described in the EIS Noise Assessment, to the ones described in Table 2 and Table 3 above.

Predicted construction noise levels are indicated to be above the noise affected management level at the closest non-associated receivers during the following construction tasks:

- WTG foundations
- Construction of hardstands
- Permanent meteorological masts of footing construction
- Underground transmission lines (cable trench digging).

The assessment is based on highly conservative assumptions for construction i.e. all equipment nominated for a stage is assumed to be operating continuously and concurrently at the shortest distance between work area and receiver. This will not occur in practice. Noise levels during construction will typically be lower than predicted herein.

To provide further context, Table 4 presents predicted construction noise levels at each non-associated receiver where predicted noise levels are indicated to be above the noise affected management level, including discrete predicted noise levels (rather than the range in Table 2).

Table 4: Indicative construction noise predictions at non-associated receivers where predicted noise levels are indicated to be above the noise affected management level, dB L_{Aeq}

Construction task	Affected receiver	Predicted level
WTG foundations	U11-1	46
Construction of hardstands	U11-1	46
Permanent meteorological masts of footing construction	U10-1	46
	U11-1	46
Underground transmission lines (Cable trench digging)	U11-1	46

Notwithstanding the conservative assessment assumptions that have been adopted, construction noise can be comfortably managed by adopting standard work methods and noise management practices as previously set out in the EIS Noise Assessment.

Revised construction vibration assessment

Per Table 2, the nearest non-associated receivers to each construction task are A22-1, O17-1, P5-1, S13-1, U10-1 and U11-1.

These receivers are all 890 m or more away from the respective construction area. This is significantly greater than the recommended minimum working distances for human response limits for vibration intensive plant set out in Table 22 of the EIS Noise Assessment.

On this basis no construction vibration impacts are indicated at any non-associated receiver.

Blasting assessment

The specific requirement or otherwise for blasting will be determined once a main contractor is appointed and project-specific construction plans and methods are established. However, it is not uncommon for blasting to be necessary at wind turbine foundations during the construction phase of the wind farm.

Theoretical modelling of airblast and ground vibration is complex and subject to considerable uncertainty. The blasting process is highly non-linear, and the variability of ground and rock conditions limits the accuracy of predictions.

In the absence of the specific information required to conduct predictions in accordance with the ANZEC 1990 Report, as referred to in Section 3.5.3 of the EIS Noise Assessment, it is not possible to provide site specific airblast overpressure and ground vibration levels.

Notwithstanding the above, to provide an indication of the potential effects of blasting, airblast overpressure and ground vibration levels have been estimated using the method detailed in AS 2187-2, based on a range of generic assumptions.[2] It is not feasible to establish whether these assumptions are suitable for the project until such time as a blasting plan is established, and necessary site characteristics have been evaluated.

The method accounts for the separating distance, the mass of the charge detonated in any given instant (referred to as the maximum instantaneous charge), the configuration of the charge (unconfined versus confined blastholes), and site characteristics that can be evaluated from measurements of test shots.

Airblast overpressure

Estimated airblast overpressure levels are presented in Figure 1 for a range of separating distances and maximum instantaneous charge weights. The estimated levels are based on confined blasthole charges and assumed site characteristics. [3]

The criteria specified in the ANZEC 1990 Report, set out in Section 3.5.3 of the EIS Noise Assessment, are also shown in Figure 1.

Ground vibration

Estimated ground vibration levels are presented in Figure 2 for a range of separating distances and maximum instantaneous charge weights. The estimated levels are based on assumed site characteristics. [4]

The criteria specified in the ANZEC 1990 Report, set out in Section 3.5.3 of the EIS Noise Assessment, are also shown in Figure 2.

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[2] AS 2187-2:2006 *Explosives—Storage, transport and use, Part 2: Use of explosives*

[3] Site-specific characteristics are defined in terms of a site exponent and site constant.
AS 2187-2 refers to a site exponent of -1.45 for estimating overpressure, with corresponding site constants commonly ranging from 10 to 100. In lieu of site-specific data, a site exponent of -1.45 and a mid-value site constant of 50 has been assumed for estimating overpressure.

[4] In lieu of site-specific data, a site exponent of 1.6 and a site constant of 1140 as provided in the example calculation in AS 2187-2 has been assumed for estimating ground vibration.

Figure 1: Estimated airblast overpressure levels for K_a = 50 and a = -1.45

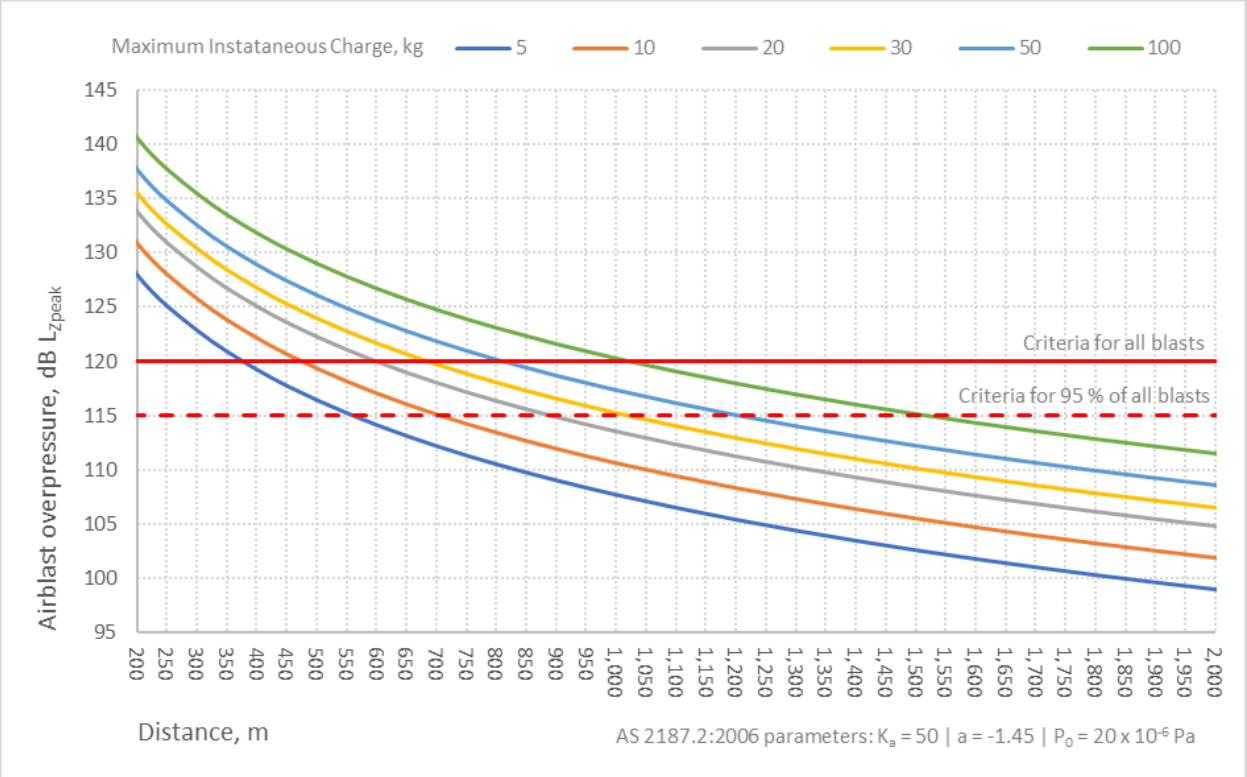
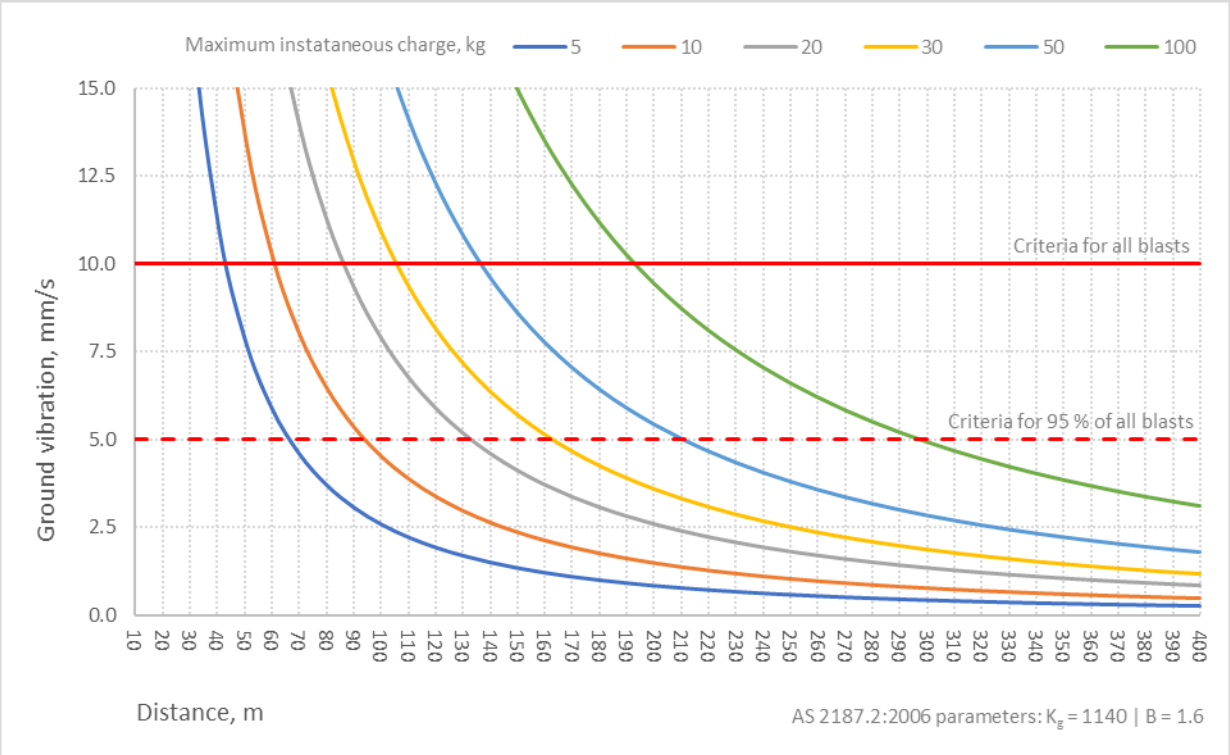


Figure 2: Estimated ground vibration levels for K_g = 1140 and B = 1.6



The minimum distances between all non-associated receivers up to 3 km of the potential blasting locations i.e. wind turbine foundations, are summarised in Table 5.

Table 5: Closest receivers to potential blasting locations, up to 3 km

Receiver	Nearest wind turbine	Approximate distance, m
Non-associated receivers		
U11-1	53	1,060
O17-1	39	1,420
U10-1	53	1,420
V13-1	57	1,623
V11-3	53	1,872
U9-1	53	1,955
V11-2	53	2,125
U9-3	53	2,360
R8-1	49	2,613
W10-1	53	2,740
XW12-1	53	2,748
U8-2	53	2,865
W11-1	53	2,866
T8-1	49	2,915
W10-2	53	2,950

Based on these distances and the estimated airblast overpressure and ground vibration levels shown in Figure 1 and Figure 2, the following is established:

- Estimated airblast overpressure levels at the nearest non-associated receivers are below the criteria set for all blasts.
- Estimated ground vibration levels at the nearest non-associated receivers are below the criteria set for all blasts.

Revised wind turbine noise assessment

Non-associated receivers

Table 6 supersedes Table 10 in Section 6.4 of the EIS Noise Assessment.

Table 6: Highest predicted noise level at non-associated receivers located within 3 km of WTGs, dB L_{Aeq}

Receiver	Predicted noise level
O17-1	32.0
R8-1	26.8
T8-1	25.8
U10-1	32.0
U11-1	34.9
U8-2	27.8
U9-1	29.8
U9-3	28.5
V11-2	32.0
V11-3	33.1
V13-1	34.2
W10-1	29.5
W10-2	28.8
W11-1	29.4
XW12-1	29.7

It can be seen from Table 6 that the predicted WTG noise levels are below the NSW Noise Assessment Bulletin base (minimum) criterion of 35 dB L_{Aeq} at all non-associated receivers by at least 0.1 dB.

Associated receivers

Table 7 supersedes Table 11 in Section 6.4 of the EIS Noise Assessment.

Table 7: Highest predicted noise level at associated receivers located within 3 km of WTGs, dB L_{Aeq}

Receiver	Predicted noise level
K11-1	37.2
L6-1	31.2
Q13-1	35.0
R14-1	36.0
S11-1	40.9
S12-1	40.6

It can be seen from Table 7 that the predicted WTG noise levels from the proposed project are below the reference level of 45 dB L_{Aeq} for all associated receivers by at least 4.1 dB.

Revised curtailment

The EIS Noise Assessment previously documented curtailment strategy necessary to manage noise levels at R14-1. The status of this receiver has since changed to associated.

This status change as well as noise levels at all other non-associated receivers being below the base noise criteria mean that a curtailment strategy is no longer needed to manage noise levels.

Wind speed dependent predicted noise levels

Table 8 and Table 9 supersede Table 35 and Table 36 in Appendix K of the EIS Noise Assessment.

Table 8: Predicted noise levels at non-associated receivers located within 3 km of WTGs, dB L_{Aeq}

Receiver	Hub-height wind speed, m/s								
	4	5	6	7	8	9	10	11	≥12
O17-1	21.3	21.5	23.4	26.4	29.2	31.5	32.0	32.0	32.0
R8-1	16.1	16.3	18.2	21.2	24.0	26.3	26.8	26.8	26.8
T8-1	15.1	15.3	17.2	20.2	23.0	25.3	25.8	25.8	25.8
U10-1	21.3	21.5	23.4	26.4	29.2	31.5	32.0	32.0	32.0
U11-1	24.2	24.4	26.3	29.3	32.1	34.4	34.9	34.9	34.9
U8-2	17.1	17.3	19.2	22.2	25.0	27.3	27.8	27.8	27.8
U9-1	19.1	19.3	21.2	24.2	27.0	29.3	29.8	29.8	29.8
U9-3	17.8	18.0	19.9	22.9	25.7	28.0	28.5	28.5	28.5
V11-2	21.3	21.5	23.4	26.4	29.2	31.5	32.0	32.0	32.0
V11-3	22.4	22.6	24.5	27.5	30.3	32.6	33.1	33.1	33.1
V13-1	23.5	23.7	25.6	28.6	31.4	33.7	34.2	34.2	34.2
W10-1	18.8	19.0	20.9	23.9	26.7	29.0	29.5	29.5	29.5
W10-2	18.1	18.3	20.2	23.2	26.0	28.3	28.8	28.8	28.8
W11-1	18.7	18.9	20.8	23.8	26.6	28.9	29.4	29.4	29.4
XW12-1	19.0	19.2	21.1	24.1	26.9	29.2	29.7	29.7	29.7

Table 9: Predicted noise levels at associated receivers located within 3 km of WTGs, dB L_{Aeq}

Receiver	Hub-height wind speed, m/s								
	4	5	6	7	8	9	10	11	≥12
K11-1	26.5	26.7	28.6	31.6	34.4	36.7	37.2	37.2	37.2
L6-1	20.5	20.7	22.6	25.6	28.4	30.7	31.2	31.2	31.2
Q13-1	24.3	24.5	26.4	29.4	32.2	34.5	35.0	35.0	35.0
R14-1	25.3	25.5	27.4	30.4	33.2	35.5	36.0	36.0	36.0
S11-1	30.2	30.4	32.3	35.3	38.1	40.4	40.9	40.9	40.9
S12-1	29.9	30.1	32.0	35.0	37.8	40.1	40.6	40.6	40.6

C-weighting assessment

Table 10 supersedes Table 34 in Appendix I of the EIS Noise Assessment.

Table 10: Predicted C-weighted noise levels for receivers within 3 km of WTGs, dB L_{Ceq}

Receiver	Predicted noise level
Non-associated receiver	
O17-1	53.5
R8-1	50.5
T8-1	49.7
U10-1	53.2
U11-1	55.0
U8-2	50.7
U9-1	51.9
U9-3	51.2
V11-2	52.7
V11-3	53.4
V13-1	55.1
W10-1	51.3
W10-2	50.9
W11-1	51.3
XW12-1	51.4
Associated receiver	
K11-1	57.7
L6-1	53.2
Q13-1	56.0
R14-1	56.5
S11-1	59.5
S12-1	59.5

The results in Table 10 show that preliminary C-weighted noise levels are predicted to be below the 60 dB L_{Ceq} screening criterion at all assessed non-associated receivers by a margin of at least 4.9 dB.

Construction traffic noise assessment – sleep disturbance

The majority of construction traffic movements are expected to occur during the day period only. However, some oversize and/or overmass (OSOM) deliveries may occur at night-time during approximately seven months of the construction program.

Limited noise control options are available for mitigation of OSOM events. Any mitigation measures will be management based, e.g. limiting the number of OSOM movements per night, limiting the hours during which night-time deliveries can occur on certain roads, and/or avoiding OSOM deliveries on multiple consecutive nights.

Construction noise assessment – public road upgrades

The EIS Noise Assessment does not include an assessment of potential construction noise impacts related to construction works on public roads. Ark Energy has requested that MDA provide a high-level assessment of potential construction noise impacts associated with public road upgrades on Twelve Mile Road, Yarrabin Road and Burrendong Dam Road, including Goolma Road and Twelve Mile Road intersection.

At this stage of the project, definitive construction processes and associated plant and equipment items are not known. The construction assumptions set out in Table 11 have been adopted for public road upgrade works. The table sets out plant/equipment likely to be used, the number of each plant/equipment likely to be operating concurrently in a worst case 15-minute period, and the percentage of time the plant/equipment is likely to be operating within a worst case 15-minute period.

Table 11: Public road upgrade construction assumptions

Plant/equipment	Count	'On' time in 15-minute period
Bulldozer	1	50%
Dump truck	1	10%
Excavator	1	50%
Grader	1	50%

Based on source noise data set out in Appendix M of the EIS Noise Assessment, a combined sound power level in the order of 110 dB L_{WA} has been developed for the scenario set out in Table 11.

The prediction method set out in Section 4.2 of the EIS Noise Assessment has been adopted from which a setback distance of approximately 400 m has been established.

Receivers located within 400 m of Twelve Mile Road, Yarrabin Road and Burrendong Dam Road would therefore be at risk of construction noise levels being above the noise affected management level (45 dB L_{Aeq}, refer Section 9 of the EIS Noise Assessment).

The closest receiver to the proposed Goolma Road and Twelve Mile Road intersection works, QY-2, is located over 460 m away from the start of the works area. Therefore, no receivers are expected to be within the noise affected management level for the intersection upgrade works. An indicative location for the intersection upgrade works has been provided by Ark Energy and shown in Figure 3.

Ark Energy has provided additional GIS data on 21 January 2026 that determines receivers within the 400 m setback distance described above. These are detailed in Table 12 and shown graphically in Figure 3.

Table 12: Non-associated receivers within construction noise setback distance for public roads works

Receiver ID	Approximate distance to road, m	Receiver ID	Approximate distance to road, m
HY-18	20	FY-7	210
FY-22	40	PY-3	220
FY-13	70	HY-25	240
QY-2	70	R1-1	250
HY-9	70	FY-20	260
S4-1	70	P5-1	270
R3-1	90	R2-1	270
HY-2	90	S6-4	280
S6-5	100	S3-1	310
S6-1	110	GY-16	310
HY-6	130	EY-14	330
S6-3	150	IY-4	330
IY-17	150	FY-12	340
S5-2	150	KY-4	350
S5-1	170	GY-10	380
IY-14	200		

Noise levels above the noise affected management levels are not unique to this project and are characteristic of most construction noise assessments due to the typically high source noise associated with construction plant and equipment. In particular, works on public roads will commonly give rise to instances where noise affected management levels are exceeded due to the location of dwellings immediately adjacent transport routes.

Revised assessment should be carried out once a construction contractor is appointed and refined details are available for work processes, plant, and equipment specific to the public road upgrades. Where predicted noise levels are above the noise affected management levels then specific noise management requirements designed to mitigate the impact of public upgrade works should be determined. The detailed assessment and associated noise management requirements should be detailed in the construction noise and vibration management plan (CNVMP) described in Section 9.6 of the EIS Noise Assessment.

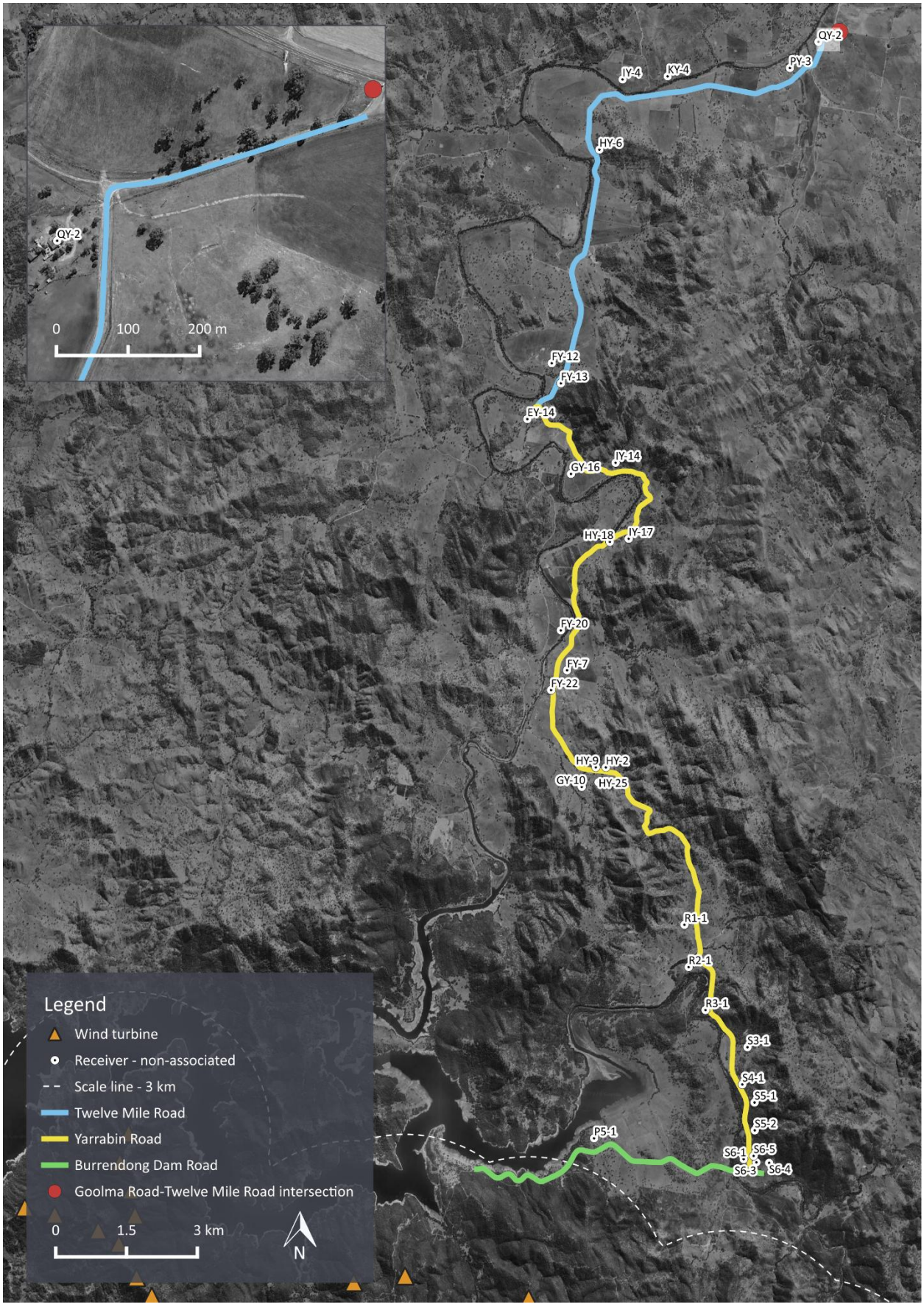
The ICNG provides extensive details and guidance with respect to noise mitigation including: [5]

- Universal work practices
- Consultation and notification
- Plant and equipment
- On-site controls
- Work scheduling
- Transmission path and at-receiver considerations.

All of the above items should be considered as part of the future CNVMP.

[5] The former Department of Environment and Climate Change, now the Department of Planning Housing and Infrastructure - NSW DECC publication *Interim Construction Noise Guideline* (ICNG), dated 2009

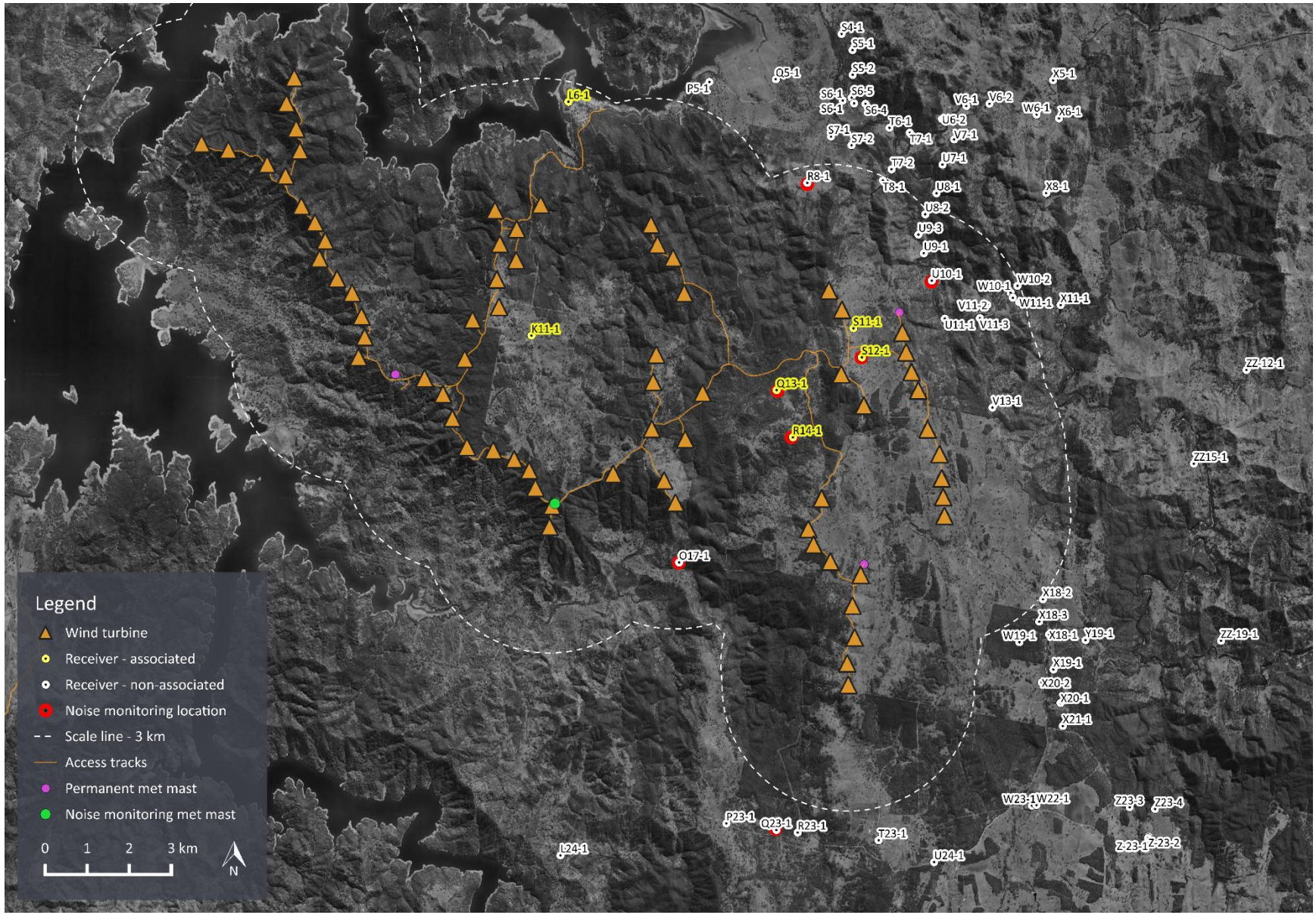
Figure 3: Non-associated receivers within 400 m of the proposed public road upgrades



Updated site layout

Figure 4 supersedes Figure 1 in Section 2.0 of the EIS Noise Assessment.

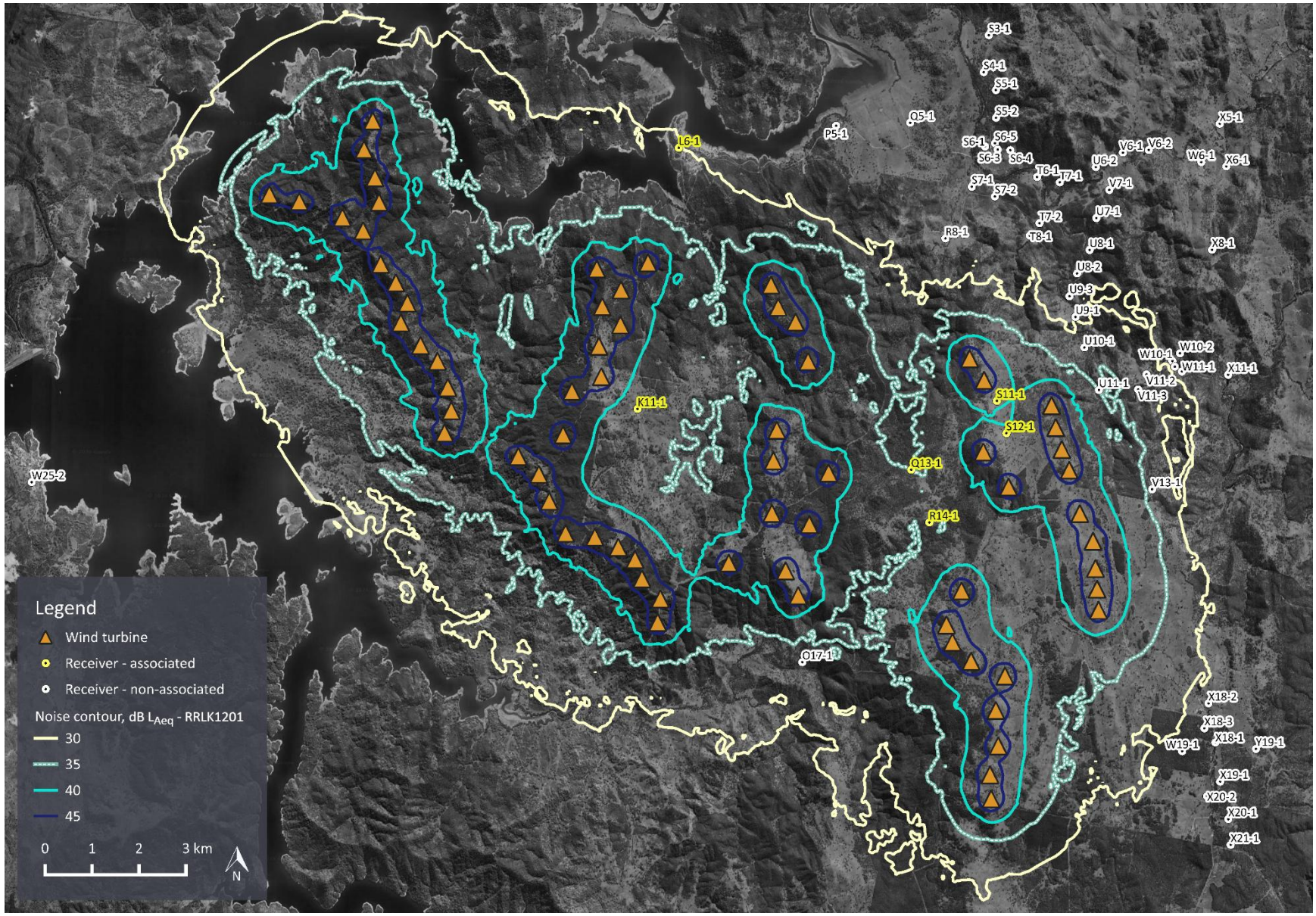
Figure 4: Site layout



Updated predicted noise contours

Figure 5 supersedes Figure 2 in Section 6.4 of the EIS Noise Assessment.

Figure 5: Highest predicted noise level contours



Updated construction layout

Figure 6 supersedes the figure in Appendix L of the EIS Noise Assessment.

This incorporates the updated transmission line and transmission line pole layouts from Mm 002 20250075 *Temporary Workforce Accommodation Facility (TWAF)* dated 27 May 2025.

Figure 6: Construction layout plan