

Waddi Wind Farm

Condition 17 Noise Assessment

S4802C11A

December 2023

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1 INTRODUCTION

A noise assessment has been made of the proposed Waddi Wind Farm (the **Project**) to satisfy Condition 17 of the Determination on Application for Planning Approval for Waddi Wind Farm, as updated in 2019 (the **Planning Approval**). Condition 17 states the following:

Prior to the commencement of construction, the proponent shall commission third party noise modelling studies to demonstrate the final Wind Farm design complies with the noise limits outlined in this approval. The intended noise modelling methodology shall be discussed with the Department of Environment Regulation, at the appropriate time.

The noise assessment considers the following:

- Background noise testing conducted between 8 September 2023 and 23 November 2023
- 18 Wind Turbine Generators (**WTGs**) at the locations summarised in Appendix A
- Operation of a 135 MVA substation, located as in Appendix A
- Noise sensitive receptors (up to 10km) summarised in Appendix B, including the distance to the nearest WTG and the predicted noise level
- Local topographical contours, as provided by Tilt Renewables
- Noise level data for the selected WTG, the Vestas V162-6.0, with a hub height of 99m and a tip height of 180m
- The WTG being free of any excessive levels of tonality or any other special audible characteristics, when assessed at the noise sensitive receptors.

The project layout is shown in Figure 1.

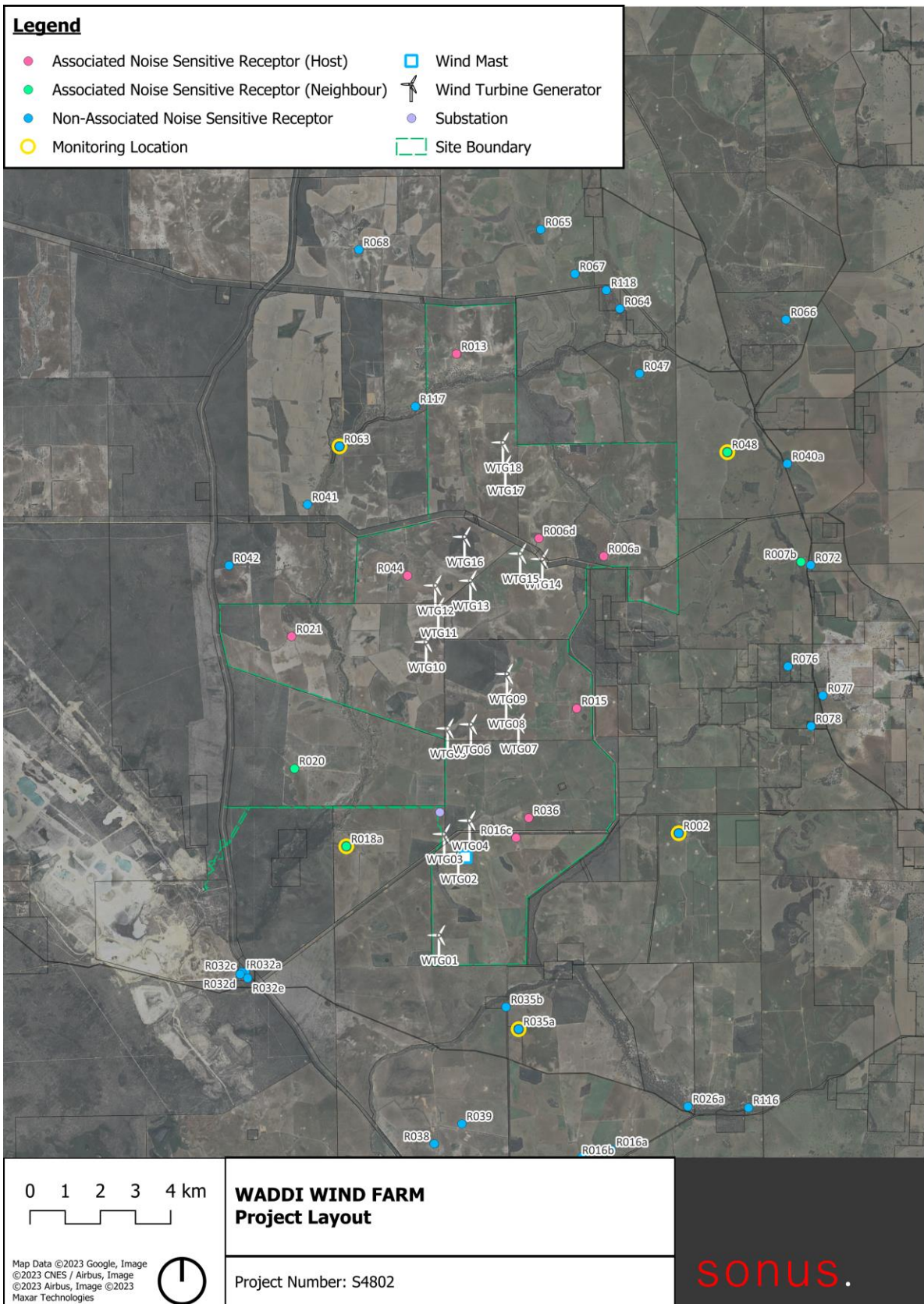


Figure 1: Project Layout

2 REGULATIONS AND GUIDELINES

Condition 12 of the Planning Approval sets the regulations and guidelines to be achieved by the Project, stating the following:

The Wind Farm shall comply, at all times, with the Western Australian Environmental Protection Authority Environmental Protection (Noise) Regulations 1997 revision dated November 2003 and the South Australian Environmental Protection Authority Environmental Noise Guidelines for Wind Farms dated February 2003

To satisfy Condition 12, the Western Australian EPA's *Environmental Protection (Noise) Regulations 1997* revision dated November 2003 (the **Regulations**) have been applied to the noise resulting from the Project, other than the noise from the operation of the WTGs.

For noise resulting from the WTGs, Condition 12 refers to the *South Australian Environmental Protection Authority Environmental Noise Guidelines for Wind Farms dated February 2003*, which has been superseded within South Australia. Reference is therefore made to the Department of Planning, Lands and Heritage *Position Statement: Renewable energy facilities March 2020* (the **Position Statement**). The Position Statement references the *South Australian Environmental Protection Authority Wind Farms Environmental Noise Guidelines 2009*.

To demonstrate compliance to Condition 12 the most contemporary edition of the South Australian EPA's *Wind farms environmental noise guidelines 2009*, updated November 2021, (the **Guidelines**) have been applied.

3 BACKGROUND NOISE MONITORING

3.1 Monitoring Procedure

The background noise levels were measured at five locations (R063, R048, R018a, R035a and R002) in the vicinity of the proposed wind farm between 8 September 2023 and 23 November 2023. The background noise monitoring was conducted in accordance with the Guidelines. Full details of the monitoring are available in Sonus report S4802C10A.

The noise monitoring equipment was located such that the measured background noise levels are representative of the background noise environment experienced at the dwellings, details are shown in Table 1. The location relative to the project area are shown in Figure 2.

Table 1: Background Noise Monitoring Locations

Receptor	Noise Logger Serial Number	Serial Number	Coordinates (GDA2020/ MGA Zone 50)		Monitoring Period
			Easting	Northing	
R002	Rion NL-52A Rion NL-42A	00331166 00923595	365758	6609578	8/9/23 – 28/9/23 25/10/23 – 23/11/23
R018a	Rion NL-52	00520898	356304	6609206	8/9/23 – 25/10/23
R035a	Rion NL-42A	01224054	361205	6604002	8/9/23 – 25/10/23
R048	Rion NL-52	00598175	367141	6620422	8/9/23 – 25/10/23
R063	Rion NL-52A	00331168	356111	6620587	8/9/23 – 25/10/23

3.2 Equipment

The background noise levels were measured using a combination of Rion NL-42 (Type 2) and Rion NL-52 (Type 1) sound level meters, all of which have a noise floor less than 20 dB(A). The sound level meters were field calibrated at the beginning and end of the measurement period with a Rion NC-74 Calibrator. All microphones were fitted with weatherproof windshields, with the microphone positioned approximately 1.5 m above ground level.

The wind speed at approximately the microphone height was logged at two representative locations. Rainfall data were obtained from the nearest Bureau of Meteorology (**BOM**) weather station, at Badgingarra Research Station. The rainfall and wind speed data were collected to determine the periods when weather on the microphone may have influenced the measured background noise levels in the vicinity. The locations are shown in Table 2.

Table 2: Local Weather Monitoring Locations

Measurement Location	Equipment Type	Coordinates (GDA 2020 / MGA Zone 50)		Measurement Period	
		Easting	Northing	Start	End
R048	Rainwise Wind	367099	6620496	8/9/2023	25/10/2023
R035a	Rainwise Wind	361169	6603988	8/9/2023	25/10/2023
R002	Rainwise Wind	365691	6609624	25/10/2023	23/11/23

3.3 Data Collection

The background noise level ($L_{A90,10}$) was measured continuously in 10 minute intervals at each monitoring location over the respective monitoring periods.

During the background noise monitoring regime, local wind speeds were measured at the site. The hub height wind speed was measured in concurrent 10 minute intervals with the background noise. The following table provides details of the wind mast.

Table 3: Wind Mast Locations

Measurement Location	Coordinates (GDA2020 / MGA Zone 50)	
	Easting	Northing
WAD02	359693	6608906

The Guidelines specify that the background noise should be correlated with wind speeds at the WTG hub height. The wind speeds at a hub height of 99m have used for the assessment.

3.4 Monitoring Results

Prior to the correlation and analysis, the following data were removed:

- data points corresponding to any periods of measured rainfall (including the 10 minute periods before and after the recorded period) and/or measured wind speed exceeding 5 m/s at the microphone height for more than 90% of the measurement period;
- data points corresponding to wind speeds below the cut-in (3 m/s) and above the rated power (13 m/s); and,
- data points clearly influenced by extraneous noise sources.

Following the data removal procedure, the following number of points remained for each of the monitoring locations.

Table 4 summarises the number of data points at each monitoring location before and after the removal of data points.

Table 4: Total Collected Data Points

Measurement Location	Data points	Data points after filtering	Downwind points	Downwind points after filtering
R002	7009	6084	2974	2610
R018a	5997	5397	1636	1462
R035a	5997	5392	2098	1992
R048	5794	5202	1251	1081
R063	5998	5357	1630	1416

The resultant background noise data for each monitoring location were correlated with the wind speed data measured at the closest wind mast. The correlated noise data were then split into wind speed bins as required by the Guidelines. Each wind speed bin is 1m/s wide and is centred on the integer wind speeds between cut in and rated power. The arithmetic average noise level for each wind speed bin was then determined to give the background noise level at each integer wind speed.

Based on the bin analysis, the background noise level ($L_{A90,10}$) corresponding to the integer wind speeds of 3m/s (cut in wind speed) to 13m/s (approximately rated power wind speed) are provided in Table 5.

Table 5: Background noise levels (dB(A))

Measurement Location	Background Noise Level for Hub Height (99m) Wind Speed Bins [dB(A)]										
	3m/s	4m/s	5m/s	6m/s	7m/s	8m/s	9m/s	10m/s	11m/s	12m/s	13m/s
R002	27	28	29	31	32	33	34	35	38	41	44
R018a	24	24	26	27	28	29	30	34	37	41	43
R035a	25	26	27	28	30	30	29	31	31	32	33
R048	23	24	26	28	29	30	30	32	35	37	38
R063	26	26	29	30	30	30	29	30	30	32	33

4 CRITERIA

4.1 Operation of WTGs

The noise criteria for the operation of the WTGs are set by Conditions 12, 13 and 14 of the Planning Approval.

As discussed in Section 2, to demonstrate compliance to Condition 12 the most contemporary edition of the South Australian EPA's *Wind farms environmental noise guidelines 2009*, updated November 2021, have been applied.

Condition 13 of the Planning Approval states *noise from the operational Wind Farm shall not exceed 45dB(A) or background +5dB whichever is the higher (using a 10 minutes L_{Aeq}), at surrounding noise sensitive premises within the wind farm boundary, unless otherwise agreed with the respective landowner.*

Condition 14 of the Planning Approval states *noise from the operational Wind Farm shall not exceed 5dB(A) above the background noise level or 35dB(A) (using a 10 minutes L_{Aeq}), whichever is the greater, at surrounding noise sensitive premises outside the wind farm boundary.*

Based upon the background noise monitoring, the assessment criteria for each integer windspeed at each residence are shown in Appendix C.

4.2 Operation of the Substation

The criteria for the operational noise from the substation are given by Condition 12, which references the Regulations. Table 6 gives a summary of the criteria.

Table 6: Summary of Criteria from the Regulations

Type of premises receiving noise	Time of day	Assigned level		
		L _{A10}	L _{A1}	L _{Amax}
Noise sensitive premises: highly sensitive area	0700 to 1900 hours Monday to Saturday	45 + influencing factor	55 + influencing factor	65 + influencing factor
	0900 to 1900 hours Sunday and public holidays	40 + influencing factor	50 + influencing factor	65 + influencing factor
	1900 to 2200 hours all days	40 + influencing factor	50 + influencing factor	55 + influencing factor
	2200 hours on any day to: 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays	35 + influencing factor	45 + influencing factor	55 + influencing factor
Noise sensitive premises: any area other than highly sensitive area	All hours	60	75	80
Commercial premises	All hours	60	75	80

The influencing factors provide additions to the assigned levels based upon the noise environment surrounding the noise sensitive premises. Achieving the assigned level without influencing factors shows compliance with the Regulations. Based upon 24 hour operation of the substation, and conservatively not considering any influencing factors, the substation must achieve an L_{A10} of 35 dB(A), an L_{A1} of 45 dB(A), and an L_{Amax} of 55 dB(A).

The Regulations also provide guidance on intrusive or dominant noise characteristics, such as impulsiveness, modulation and tonality, which are defined in Table 7.

Table 7: Intrusive or Dominant Noise Characteristics

Characteristic	Definition
Impulsiveness	A variation in the emission of noise where the difference between $L_{A\ peak}$ and $L_{A\ Slow\ max}$ is more than 15 dB when determined for a single representative event
Modulation	A variation in the emission of noise that is: <ul style="list-style-type: none"> (a) more than 3 dB $L_{A\ Fast}$ or is more than 3 dB $L_{A\ Fast}$ in any one-third octave band; and (b) present for at least 10% of the representative assessment period; and (c) regular, cyclic and audible;
Tonality	Noise emission of tonal characteristics where the difference between – <ul style="list-style-type: none"> (a) the A-weighted sound pressure level in any one-third octave band; and (b) the arithmetic average of the A-weighted sound pressure levels in the 2 adjacent one-third octave bands, is greater than 3 dB when the sound pressure levels are determined as $L_{Aeq,T}$ levels 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 $L_{A\ Slow}$ levels

Where these noise characteristics are present, the adjustments shown in Table 8 should be applied to a maximum of + 15 dB.

Table 8: Noise Characteristic Adjustments

Where tonality is present	Where modulation is present	Where impulsiveness is present
+ 5 dB	+ 5 dB	+ 10 dB

5 METHODOLOGY

5.1 Operation of WTGs

The predictions of environmental noise from the WTGs have been based on the noise propagation model described by ISO 9613-2:1996 “Acoustics — Attenuation of sound during propagation outdoors — Part 2: General method of calculation” (ISO 1996-2) and SoundPLAN noise modelling software. ISO 9613-2 is one of the recommended models under the Guidelines for the prediction of wind turbine noise. The noise propagation model considers the following:

- sound power levels and noise source locations
- separation distances between noise sources and residences
- topography of the area
- influence of the ground and air absorption
- meteorological conditions

ISO 9613-2 provides a methodology for predicting noise levels at sensitive land uses under meteorological conditions favourable to noise propagation. Specifically, the ISO 9613-2 model predicts noise based on the assumption of downwind noise propagation (resulting in higher noise levels) from all WTGs to all noise sensitive receptors simultaneously, therefore representing a conservative approach.

Inputs to the noise prediction model are in accordance with the Institute of Acoustics “A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise” (May 2013) (**IOA Guide**), which includes the following requirements:

- 10°C air temperature
- 70% relative humidity
- intermediate ground absorption
- barrier attenuation of no greater than 2 dB(A)
- noise sensitive receptor point located 4m above ground level at the residence (required by the IOA Guide, despite receptor points being at a lower level than this)
- application of a 3 dB(A) correction where a "concave" ground profile exists as defined by the IOA Guide

These inputs are in accordance with updated version of the Guidelines (November 2021), which specifically references the IOA Guide for suitable noise model inputs.

5.2 Operation of the Substation

To predict the noise from the substation, a noise model of the Project has been created using the SoundPLAN noise modelling software to predict the resultant noise levels at the noise sensitive receptors. Environmental noise predictions have been made using the CONCAWE¹ noise propagation model within the SoundPLAN noise modelling software. The sound propagation model considers the following influences:

- sound power levels and locations of noise sources (including height of sources)
- separation distances between noise sources and receivers
- shielding provided by the ground topography
- influence of the ground and air absorption
- meteorological conditions.

The CONCAWE system divides meteorological conditions into six separate “weather categories”, which are dependent on the wind speed, wind direction, time of day and level of cloud cover. Weather Category 1 provides the weather conditions associated with the “lowest” propagation of noise, while Weather Category 6 provides “worst-case” (i.e. highest noise level) conditions. Weather Category 4 provides “neutral” weather conditions for noise propagation (that is, conditions which do not account for the effects of temperature inversion or wind on propagation).

This assessment provides noise predictions for CONCAWE Weather Category 6 (worst-case) conditions.

¹ CONCAWE - The oil companies’ international study group for conservation of clean air and water – Europe, ‘The propagation of noise from petrochemical complexes to neighbouring communities’, May 1981.

6 ASSESSMENT

6.1 Operation of WTGs

The highest predicted noise levels (corresponding to hub height winds speeds of 10m/s and above) resulting from the assessment are:

- 35 dB(A) at a noise sensitive receptor that is associated or within the project boundary, and
- 24 dB(A) at a noise sensitive receptor that is non-associated or outside the project boundary.

Figure 2 shows the predicted 35 dB(A) to 50 dB(A) noise contours. The predictions at each noise sensitive receptor are presented in Appendix A.

Based upon the assessment, the base criteria are achieved at all noise sensitive receptors for the operation of the WTGs.

6.2 Operation of the Substation

The highest predicted noise level at any residence as a result of the operation of substation has been predicted to be less than 20 dB(A), due to the distances between the substation location and the noise sensitive receptors. Though it is unlikely the substation would produce intrusive or dominant noise characteristics to warrant an adjustment, it is noted that the predicted noise levels would also comply with any noise character adjustments applied.

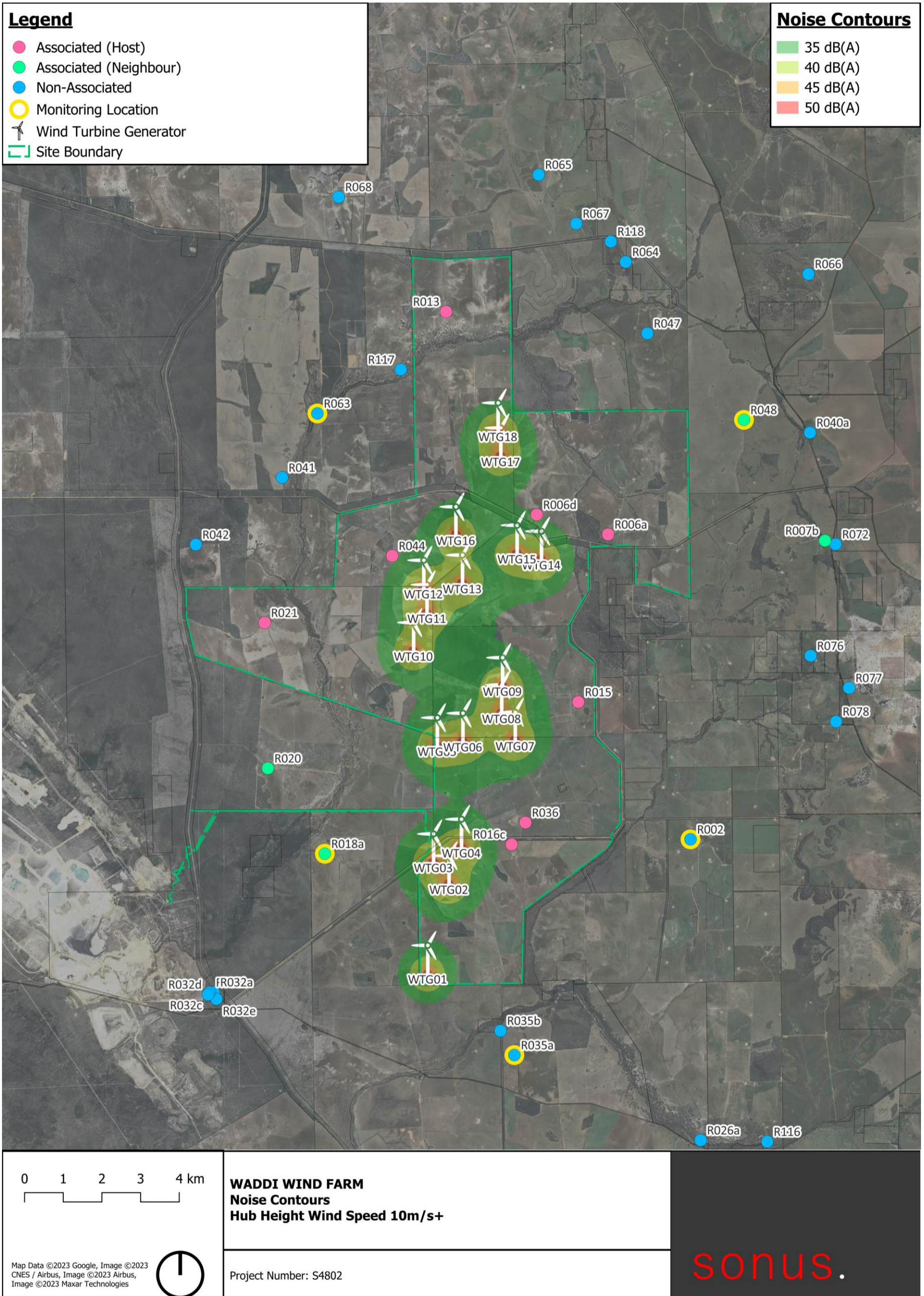


Figure 2: WTG Noise Contours

7 CONCLUSION

A noise assessment has been made of the proposed Waddi Wind Farm to satisfy Condition 17 of the Determination on Application for Planning Approval for Waddi Wind Farm, as updated in 2019.

Criteria have been determined for the operation of the wind turbine generators and the associated substation based upon Conditions 12, 13 and 14 of the Planning Approval and the:

- South Australian EPA's Wind farms environmental noise guidelines 2009, updated November 2021 for wind turbines
- Western Australian EPA's *Environmental Protection (Noise) Regulations 1997* revision dated November 2003 for the substation.

Noise modelling has been conducted to provide predicted noise levels at the surrounding noise sensitive residences. The predictions from the assessments show that the operation will comply with the requirements, thereby satisfying Condition 17 of the Determination on Application for Planning Approval for Waddi Wind Farm.

APPENDIX A: WIND TURBINE GENERATOR LOCATIONS

Table 9: Wind Turbine Generator Locations

ID	Coordinates (GDA 2020 / MGA Zone 50)	
	Easting	Northing
WTG 01	358956	6606094
WTG 02	359505	6608411
WTG 03	359105	6608975
WTG 04	359827	6609355
WTG 05	359204	6611979
WTG 06	359865	6612095
WTG 07	361217	6612120
WTG 08	360867	6612827
WTG 09	360889	6613531
WTG 10	358589	6614439
WTG 11	358936	6615417
WTG 12	358852	6616049
WTG 13	359853	6616183
WTG 14	361895	6616800
WTG 15	361265	6616954
WTG 16	359682	6617432
WTG 17	360844	6619470
WTG 18	360774	6620117

Table 10: Substation Location

ID	Coordinates (GDA 2020 / MGA Zone 50)	
	Easting	Northing
Substation	358966	6610174

APPENDIX B: NOISE SENSITIVE RECEPTOR LOCATIONS

ID Code	Receptor Status	Coordinates (GDA 2020 / MGA Zone 50)		Predicted Wind Turbine Noise Level [dB(A)]	Base Criterion [dB(A)]	Closest Turbine	Approximate Distance to Closest Turbine (m)	Approximate Angle to Closest Turbine (degrees)
		Easting	Northing					
R006a	Host - Associated	363626	6617461	29	45	WTG 14	1900	250
R006d	Host - Associated	361782	6617970	35	45	WTG 15	1100	205
R013	Host - Associated	359438	6623217	24	45	WTG 18	3400	155
R015	Host - Associated	362858	6613128	31	45	WTG 07	1900	240
R016c	Host - Associated	361132	6609447	33	45	WTG 04	1300	265
R021	Host - Associated	354748	6615178	26	45	WTG 10	3900	100
R036	Host - Associated	361493	6610013	32	45	WTG 04	1800	250
R044	Host - Associated	358048	6616908	34	45	WTG 12	1200	135
R007b	Neighbour - Associated	369256	6617399	< 20	45	WTG 14	7400	265
R018a	Neighbour - Associated	356304	6609206	26	45	WTG 03	2800	95
R020	Neighbour - Associated	354831	6611415	26	45	WTG 05	4400	85
R048	Neighbour - Associated	367141	6620422	< 20	45	WTG 17	6400	260
R002	Non-Associated	365758	6609578	21	35	WTG 07	5200	300
R016a	Non-Associated	363846	6600574	< 20	35	WTG 01	7400	320
R016b	Non-Associated	363008	6600365	< 20	35	WTG 01	7000	325
R026a	Non-Associated	366020	6601801	< 20	35	WTG 01	8300	300
R032a	Non-Associated	353433	6605629	< 20	35	WTG 01	5500	85
R032b	Non-Associated	353324	6605623	< 20	35	WTG 01	5700	85
R032c	Non-Associated	353292	6605597	< 20	35	WTG 01	5700	85
R032d	Non-Associated	353284	6605566	< 20	35	WTG 01	5700	85
R032e	Non-Associated	353501	6605451	< 20	35	WTG 01	5500	85
R035a	Non-Associated	361205	6604002	24	35	WTG 01	3100	315
R035b	Non-Associated	360847	6604630	24	35	WTG 01	2400	310
R037	Non-Associated	365933	6599884	< 20	35	WTG 01	9300	310
R038	Non-Associated	358805	6600740	< 20	35	WTG 01	5400	0
R039	Non-Associated	359593	6601306	< 20	35	WTG 01	4800	350
R040a	Non-Associated	368848	6620093	< 20	35	WTG 14	7700	245
R041	Non-Associated	355200	6618931	24	35	WTG 12	4700	130
R042	Non-Associated	352970	6617197	22	35	WTG 12	6000	100

ID Code	Receptor Status	Coordinates (GDA 2020 / MGA Zone 50)		Predicted Wind Turbine Noise Level [dB(A)]	Base Criterion [dB(A)]	Closest Turbine	Approximate Distance to Closest Turbine (m)	Approximate Angle to Closest Turbine (degrees)
		Easting	Northing					
R047	Non-Associated	364644	6622657	22	35	WTG 18	4600	235
R053a	Non-Associated	360947	6598311	< 20	35	WTG 01	8000	345
R063	Non-Associated	356111	6620587	22	35	WTG 18	4700	95
R064	Non-Associated	364083	6624504	< 20	35	WTG 18	5500	215
R065	Non-Associated	361832	6626758	< 20	35	WTG 18	6700	190
R066	Non-Associated	368807	6624191	< 20	35	WTG 18	9000	245
R067	Non-Associated	362806	6625495	< 20	35	WTG 18	5700	200
R068	Non-Associated	356661	6626184	< 20	35	WTG 18	7300	145
R072	Non-Associated	369557	6617214	< 20	35	WTG 14	7700	265
R076	Non-Associated	368864	6614324	< 20	35	WTG 14	7400	290
R077	Non-Associated	369858	6613494	< 20	35	WTG 14	8600	295
R078	Non-Associated	369522	6612622	< 20	35	WTG 07	8300	265
R116	Non-Associated	367744	6601763	< 20	35	WTG 01	9800	295
R117	Non-Associated	358270	6621722	24	35	WTG 18	3000	125
R118	Non-Associated	363698	6625031	< 20	35	WTG 18	5700	210
R120	Non-Associated	362029	6596869	< 20	35	WTG 01	9700	340

APPENDIX C: ASSESSMENT CRITERIA

ID Code	Receptor Status	Nearest Logging Location	Noise Criterion [dB(A)] at Integer Wind Speeds (m/s)										
			3	4	5	6	7	8	9	10	11	12	13
R006a	Host - Associated	R048	45	45	45	45	45	45	45	45	45	45	45
R006d	Host - Associated	R048	45	45	45	45	45	45	45	45	45	45	45
R013	Host - Associated	R063	45	45	45	45	45	45	45	45	45	45	45
R015	Host - Associated	R002	45	45	45	45	45	45	45	45	45	46	49
R016c	Host - Associated	R002	45	45	45	45	45	45	45	45	45	46	49
R021	Host - Associated	R063	45	45	45	45	45	45	45	45	45	45	45
R036	Host - Associated	R002	45	45	45	45	45	45	45	45	45	46	49
R044	Host - Associated	R063	45	45	45	45	45	45	45	45	45	45	45
R007b	Neighbour - Associated	R048	45	45	45	45	45	45	45	45	45	45	45
R018a	Neighbour - Associated	R018a	45	45	45	45	45	45	45	45	45	46	48
R020	Neighbour - Associated	R018a	45	45	45	45	45	45	45	45	45	46	48
R048	Neighbour - Associated	R048	45	45	45	45	45	45	45	45	45	45	45
R002	Non-Associated	R002	35	35	35	36	37	38	39	40	43	46	49
R016a	Non-Associated	R035a	35	35	35	35	35	35	35	36	36	37	38
R016b	Non-Associated	R035a	35	35	35	35	35	35	35	36	36	37	38
R026a	Non-Associated	R035a	35	35	35	35	35	35	35	36	36	37	38
R032a	Non-Associated	R018a	35	35	35	35	35	35	35	39	42	46	48
R032b	Non-Associated	R018a	35	35	35	35	35	35	35	39	42	46	48
R032c	Non-Associated	R018a	35	35	35	35	35	35	35	39	42	46	48
R032d	Non-Associated	R018a	35	35	35	35	35	35	35	39	42	46	48
R032e	Non-Associated	R018a	35	35	35	35	35	35	35	39	42	46	48
R035a	Non-Associated	R035a	35	35	35	35	35	35	35	36	36	37	38
R035b	Non-Associated	R035a	35	35	35	35	35	35	35	36	36	37	38
R037	Non-Associated	R035a	35	35	35	35	35	35	35	36	36	37	38
R038	Non-Associated	R035a	35	35	35	35	35	35	35	36	36	37	38
R039	Non-Associated	R035a	35	35	35	35	35	35	35	36	36	37	38

ID Code	Receptor Status	Nearest Logging Location	Noise Criterion [dB(A)] at Integer Wind Speeds (m/s)											
			3	4	5	6	7	8	9	10	11	12	13	
R040a	Non-Associated	R048	35	35	35	35	35	35	35	35	37	40	42	43
R041	Non-Associated	R063	35	35	35	35	35	35	35	35	35	35	37	38
R042	Non-Associated	R063	35	35	35	35	35	35	35	35	35	35	37	38
R047	Non-Associated	R048	35	35	35	35	35	35	35	35	37	40	42	43
R053a	Non-Associated	R035a	35	35	35	35	35	35	35	35	36	36	37	38
R063	Non-Associated	R063	35	35	35	35	35	35	35	35	35	35	37	38
R064	Non-Associated	R048	35	35	35	35	35	35	35	35	37	40	42	43
R065	Non-Associated	R048	35	35	35	35	35	35	35	35	37	40	42	43
R066	Non-Associated	R048	35	35	35	35	35	35	35	35	37	40	42	43
R067	Non-Associated	R048	35	35	35	35	35	35	35	35	37	40	42	43
R068	Non-Associated	R063	35	35	35	35	35	35	35	35	35	35	37	38
R072	Non-Associated	R048	35	35	35	35	35	35	35	35	37	40	42	43
R076	Non-Associated	R002	35	35	35	36	37	38	39	40	43	46	49	
R077	Non-Associated	R002	35	35	35	36	37	38	39	40	43	46	49	
R078	Non-Associated	R002	35	35	35	36	37	38	39	40	43	46	49	
R116	Non-Associated	R035a	35	35	35	35	35	35	35	36	36	37	38	
R117	Non-Associated	R063	35	35	35	35	35	35	35	35	35	37	38	
R118	Non-Associated	R048	35	35	35	35	35	35	35	37	40	42	43	
R120	Non-Associated	R035a	35	35	35	35	35	35	35	36	36	37	38	