Noise Management Plan

Crookwell 3 Wind Farm

Crookwell 3 Development Pty Ltd

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Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
1.2	19 July 2024	Benjamin French	Gustaf Reutersward	Arvind Deivasigamani
1.1	17 May 2024	Benjamin French	Gustaf Reutersward	Arvind Deivasigamani
1.0	12 April 2024	Benjamin French	Gustaf Reutersward	Arvind Deivasigamani

Basis of Report

This report has been prepared by SLR Consulting Australia (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Crookwell 3 Development Pty Ltd (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.

Table of Contents

Tables in Text

Figures in Text

Appendices

1.0 Introduction

Crookwell 3 Development Pty Ltd is planning to commence operation of the Crookwell 3 Wind Farm (CW3). The wind farm is located approximately 4 km east of Crookwell 2 Wind Farm (CW2) and approximately 17 km south east of the township of Crookwell.

The Conditions of Consent for Project Approval[1] for CW3 includes conditions which relate to the control of environmental noise associated with the wind farm.

The requirements of the Noise Management Plan (NMP) are outlined in Condition 14 of the Project Approval and is reproduced below:

Noise Management Plan

14. Prior to commissioning of the turbines, the Proponent must prepare a Noise Management Plan to manage noise emissions from the operation of the development, to the satisfaction of the Secretary. The Plan must include:
    (a) compliance monitoring within 3 months of operations, or the commencement of operation of a cluster of turbines if the development is to be staged, unless the Secretary agrees otherwise, in accordance with the Department's *Wind Energy: Noise Assessment Bulletin (2016)* (or its latest version) to determine whether the development is complying with the relevant conditions of this consent;
    (b) description of the parameters and meteorological conditions which trigger the use of noise management mode and sector management;
    (c) an auditable process that compliance can be independently confirmed for the use of noise management mode and sector management;
    (d) procedures and corrective actions to be undertaken if non-compliance is detected;
    (e) provision of a copy of the compliance monitoring results to the Secretary and the EPA.

    Following the Secretary's approval, the Applicant must implement the measures described in the Noise Management Plan.

This NMP has been developed in accordance with Condition 14 of the Project Approval.

The goal of the NMP is to define the methodology for how the operations of CW3 will demonstrate and maintain compliance with the operational noise criteria specified in the Project Approval.

Condition 12 of the Project Approval outlines how the noise limits are to be determined.

[1] The Project Approval refers to the Crookwell Developments Pty Ltd v Independent Planning Commission Conditions of Consent Issued 14 October 2020 relating to Development Application SSD 6695.

Operational Noise Criteria – Wind Turbines

12. The Applicant must ensure that the noise generated by the operation of wind turbines does not exceed the higher of 35 dB(A) or the existing background noise level (LA90 (10-minute)) plus 5 dB(A)) for each integer wind speed, measured at hub height, from cut-in to rated turbine generator power, at any non-associated residence.

Noise generated by the operation of the wind turbines is to be measured in accordance with the relevant requirements of the Department's *Wind Energy: Noise Assessment Bulletin* (2016) (or its latest version). The noise generated by the operation of the wind turbines must also be adjusted for tonality and low frequency noise in accordance with the Department's *Wind Energy: Noise Assessment Bulletin* (2016) (or its latest version).

However, these criteria do not apply if the Applicant has an agreement with the relevant owner/s of these residences to generate higher noise levels, and the Applicant has advised the Department in writing of the terms of this agreement.

1.1 Conditions of Approval

Table 1 lists the conditions of approval and summaries how and where they are addressed in this document.

Table 1 Summary of Condition Requirements

Condition Number	Condition Requirement [1]	NMP Section	How Addressed
Schedule 2			
8	The Applicant may replace or upgrade the wind turbines provided these upgrades remain within the approved development footprint of the site and would not result in any non-compliance with the conditions of this consent. Prior to carrying out any such upgrades, the Applicant must provide revised layout plans and project details of the development to the Secretary incorporating the proposed upgrades.	**6.1**	The project is committed to updating this NMP as required prior to upgrading of any WTGs.
Schedule 3			
12(1)	The Applicant must ensure that the noise generated by the operation of wind turbines does not exceed the higher or 35 dBA or the existing background noise level ($L_{A90, 10min}$) plus 5 dBA for each integer wind speed, measured at hub height, from cut in to rated turbine generator power, at any non-associated residence.	**2.1**	Project criteria are defined based on background monitoring.
12(2)	Noise measured by the operation of the wind turbines is to be measured in accordance with the relevant requirements of the Department's *Wind Energy: Noise Assessment Bulletin*	**2.0**	The noise assessment will be undertaken in accordance with the Bulletin as detailed in **Section 2.0**. This includes cumulative impacts from CW2 and adjustments for

Condition Number	Condition Requirement [1]	NMP Section	How Addressed
	(2016) (or its latest version). The noise generated by the operation of the wind turbines must also be adjusted for tonality and low frequency noise in accordance with Bulletin.		tonality and low frequency.
12(3)	However, these criteria do not apply if the Applicant has an agreement with the relevant owner/s of these residences to generate higher noise levels, and the Applicant has advised the Department in writing of the terms of agreement.	**2.1**	Residents that have entered into a noise agreement are to be evaluated at against the limits outlined in the agreement and shall not exceed the higher or 45 dBA or the existing background noise level plus 5 dBA. The applicant has advised the Department in writing of the terms of agreement.
14	Prior to commissioning of the turbines, the Proponent must prepare a Noise Management Plan to manage noise emissions from the operation of the development, to the satisfaction of the Secretary. The Plan must include:	**All**	This document is the Noise Management Plan.
14(a)	Compliance monitoring within 3 months of operations, or the commencement of operation of a cluster of turbines if the development is to be stages, unless the Secretary agrees otherwise, in accordance with the Department's *Wind Energy: Noise Assessment Bulletin* (2016) (or its latest version) to determine whether the development is complying with the relevant conditions of this consent;	**2.2**	Compliance monitoring will be undertaken within 3 months of commencement of operations, as defined in **Section 2.2**
14(b)	Description of the parameters and meteorological conditions which trigger the use of noise management mode and sector management		Sector management is currently implemented on CW2. CW3 is not anticipated to initially require noise management modes or sector management. However, it is anticipated that a combined CW2 and CW3 sector management with noise management modes will be modelled and investigated and implemented that more effectively manages cumulative wind farm noise from both projects. This will be actioned within the first 2 years of combined CW2 and CW3 operation. Any subsequent revised noise management protocols will be documented in an updated revision of this Noise Management

Condition Number	Condition Requirement [1]	NMP Section	How Addressed
			Plan.
14(c)	An auditable process that compliance can be independently confirmed for the use of noise management mode and sector management		As per above, should updated Noise Management Plan require noise management or sector management, then further details and examples of the auditable process will be provided. SCADA output will be made available upon request showing times under which Noise Management Modes are operating.
14(d)	Procedures and corrective actions to be undertaken if non-compliance is detected;	**3.0**	In the event of a detected non-compliance, a corrective action plan will be developed and submitted to the Secretary and EPA.
14(e)	Provision of a copy of the compliance monitoring results to the Secretary and the EPA	**5.0**	Development of a noise compliance report for submission to the Secretary and the EPA
14	Following the Secretary's approval, the Applicant must implement the measures described in the Noise Management Plan.	**All**	The project is committed to implementing the measures described in the Noise Management Plan.
Schedule 4			
2	Within 3 months of the submission of: (a) an incident report under condition 4 below; (b) an independent environmental audit report under condition 6 below; or (c) any modification to the conditions of this consent (unless the conditions require otherwise), the Applicant must review and, if necessary, revise the strategies, plans, and programs required under this consent to the satisfaction of the Secretary. Where this review leads to revisions in any such document, then within 4 weeks of the review the revised document must be submitted to the Secretary for approval.	**6.2**	The project is committed to updating this NMP as required.
9	The Department must be notified in writing via the Major Projects website portal immediately after the Applicant becomes aware of an incident. The notification must identify the development (including the development application number and the name of the development	**6.3**	The project is committed to notifying the Department of any significant incident, related to operational noise, as per the requirements of the condition.

Condition Number	Condition Requirement [1]	NMP Section	How Addressed
	if it has one), and set out the location and nature of the incident		
10	The Department must be notified via the Major Projects website portal within 7 days after the Applicant becomes aware of any non-compliance with the conditions of this consent. The notification must identify the development and the application number for it, set out the condition of consent that the development is noncompliant with, the way in which it does not comply and the reasons for the non- compliance (if known) and what actions have been done, or will be, undertaken to address the non-compliance	**6.4**	The project is committed to notifying the Department of any non-compliance, related to operational noise, as per the requirements of the condition.
11	Within 6 months of the commencement of construction, and every 3 years thereafter, unless the Secretary directs otherwise, the Applicant shall commission and pay the full cost of an Independent Environmental Audit of the development.. The audits must: (a) be prepared in accordance with the relevant Independent Audit Post Approval requirements (DPIE 2020); (b) be led and conducted by a suitably qualified, experienced and independent expert/s whose appointment has been endorsed by the Secretary; (c) be carried out in consultation with the relevant agencies; (d) assess whether the development complies with the relevant requirements in this consent, and any strategy, plan or program required under this consent; and (e) if directed by the Secretary, assess whether the performance of any noise mitigation measures implemented, including sector management and sound management mode, ensure compliance with the noise criteria in this consent; and (f) recommend appropriate measures or actions to improve the environmental performance of the development and any strategy, plan or program required under this consent.	**6.5**	The project is committed to the Independent Environmental Audit process, as related to operational noise, as per the requirements of the condition.
12	The Applicant must: (a) make the following information publicly available on its website as relevant to the		The project is committed to the providing all approved plans and summaries of monitoring results as related to operational noise, as

Condition Number	Condition Requirement [1]	NMP Section	How Addressed
	stage of the development: • the EIS; • the final layout plans for the development; • current statutory approvals for the development; • approved strategies, plans or programs required under the conditions of this consent; • the proposed staging plans for the development if the construction, operation and/or decommissioning of the development is to be staged; • a comprehensive summary of the monitoring results of the development, which have been reported in accordance with the various plans and programs approved under the conditions of this consent; • a complaints register, which is to be updated on a monthly basis; • minutes of CCC meetings; • the annual Statement of Compliance with the EPL; • any independent environmental audit, and the Applicant's response to the recommendations in any audit; and • any other matter required by the Secretary; and (b) keep this information up to date.		publicly available information on the website as per the requirements of the condition.

1. Conditions requirements come from Conditions of Consent Outcome Date: 14 Oct 2020 in relation to Development Application SSD 6695
2. Schedule 3, Condition 8, Condition 9, Condition 10, and Condition 11, relate to construction noise and blasting which is outside of the scope of this operational Noise Management Plan under condition 14. Construction Noise Management is captured in the EMS and CEMP, and regulated under POEO and the project Environmental Protection License (ref 21601).

1.2 Site Description

CW3 is comprised of 16 Vestas V126 wind turbines. All CW3 WTGs are fitted with serrated blade trailing edge technology which reduces their noise emission.

Due to the proximity of CW2, noise contributions from both wind farms will be considered and the cumulative noise of both projects assessed against the defined noise limits.

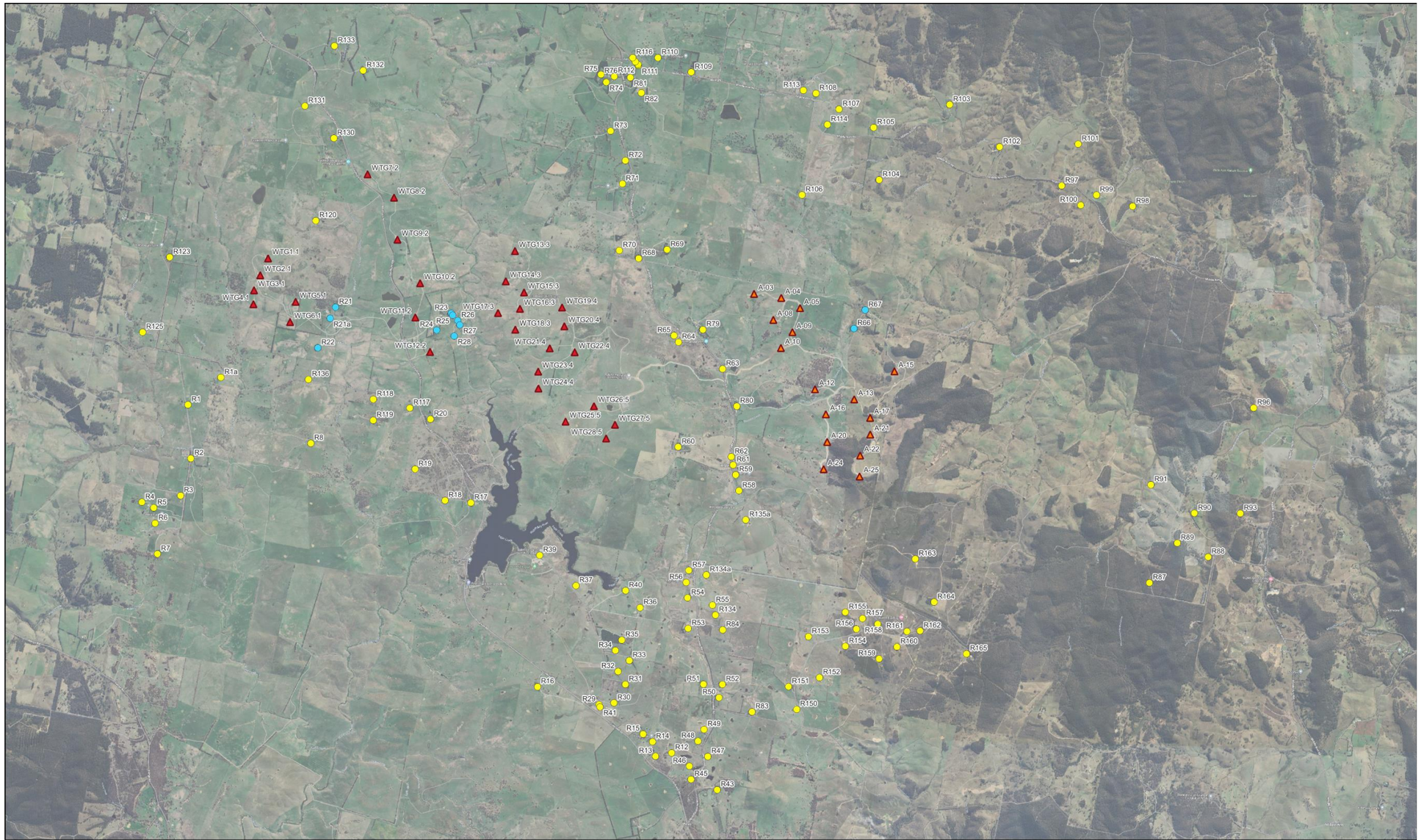
The coordinates of WTGs for CW2 and CW3 are provided in **Appendix A.** The coordinates of adjacent receptors are provided in **Appendix A**

Figure 1 shows the locations of all receptors (indicated as circles) in relation to wind turbine generators (WTGs) which are indicated as triangles, for both CW2 and CW3.

Receptors that are project involved or have a noise agreement with either CW2 or CW3 are indicated as blue circles and are assessable against an alternative noise limit (defined in **Section 2.1**).

Sector management is currently implemented on CW2. Noise modelling indicates that CW2 and CW3 can achieve compliance at the receptors located along Woodhouselee Road, between both wind farms, without further mitigation of CW3 for the two most critical wind directions assessed (60° and 240°). Future detailed noise modelling will be completed to better assess and optimise a combined CW2 and CW3 sector management control. Any subsequent revised noise management protocols will be documented in an updated revision of this Noise Management Plan.

Figure 1 Site Overview



2.0 Compliance Testing Requirements

This section details the compliance monitoring methodology and **Section 3.0** outlines procedures for corrective action if non-compliances are detected.

2.1 Project Criteria

Operational noise limits apply at non-project involved receptors, as specified in Condition 12.

The following are noted:

- The limits apply to the cumulative noise impacts due to the operation of CW2 and CW3 wind farms.

  CW2 operates under Sector Management control. Turbines are controlled individually and can enter low noise modes or be shut down for predefined local meteorological conditions. Noise Reduced Operation tables for all CW2 wind turbines were supplied to SLR and CW2's contributions have been factored into noise predictions for combined CW2 and CW3.

- Wind speeds are defined as hub height speeds from cut-in to rated generator power.
- Noise generated by the operation is to be adjusted for tonality and low frequency noise in accordance with the NSW WENA Bulletin.
- Project specific limits do not apply to receptors that have entered an agreement with the operator. These receptors will be assessed against the World Health Organisation (WHO) Guidelines (*Guidelines for Community Noise*).

Background noise measurements have undertaken over several long-term monitoring campaigns during 2004, 2010, 2015 and 2018 for the CW2 and CW3 Wind Farms. The SA EPA Guideline 2009 provides information on measuring background levels, locations, conditions for excluding invalid data and requirements for valid 10 min levels to adequately derive background noise equations. Background noise equations were determined by a third-order polynomial regression of from the measured $L_{A90,\ 10\ min}$ levels as a function of wind speed.

The background noise levels at integer values of hub height wind as well as the relevant regression equations are presented in **Table 2**.

These measurements form the basis for the noise limits in accordance with the South Australian EPA *Wind farms environmental noise guidelines, 2009* (SA EPA Guideline 2009) and Condition 12 of the Project Approval.

Noise generated by the operation of wind turbines, adjusted for tonality and low frequency noise is not to exceed the higher of 35 dBA or the existing background noise level (LA90 (10-minute)) by more than 5 dB(A), whichever is the greater, at all relevant receivers for wind speed from cut-in to rated power of the wind turbine generator and each integer wind speed in between, as measured at hub height.

Receptors with agreements with the proponent (i.e. project-involved residences) are assessed under the World Health Organisation (WHO) Guidelines. The WHO Guidelines state that external criteria of 45 dBA should be achieved at night time to minimise sleep disturbance and other health risks associated with noise.

Table 2 Background noise as determined from monitoring completed in 2010

Recept.	Background regression equation	Baseline noise level (dBA), referenced to Hub Height Wind Speed (m/s)									
		3	4	5	6	7	8	9	10	11	12
R62	y = -0.0135x3 + 0.4454x2 - 2.4834x + 29.187	25.4	25.5	26.2	27.4	29.0	30.9	33.1	35.4	37.8	40.2
R70	y = -0.0182x3 + 0.5772x2 - 3.0782x + 26.75	22.2	22.5	23.5	25.1	27.2	29.7	32.5	35.5	38.5	41.5
R79	y = 0.001x3 - 0.053x2 + 2.4941x + 19.177	26.2	28.4	30.4	32.4	34.4	36.2	38.1	39.8	41.5	43.2
R66	y = -0.0038x3 + 0.1588x2 + 0.201x + 17.442	19.4	20.5	21.9	23.5	25.3	27.3	29.3	31.5	33.8	36.2
R58	y = -0.0045x3 + 0.2194x2 - 1.5322x + 31.956	29.2	29.0	29.2	29.7	30.4	31.4	32.7	34.1	35.7	37.4
R60	y = -0.0108x3 + 0.4556x2 - 3.623x + 32.896	32.9	32.9	32.9	32.9	32.9	32.9	32.9	32.9	32.9	32.9
R64	y = -0.0032x3 + 0.0596x2 + 2.2844x + 12.521	19.8	22.4	25.0	27.7	30.3	33.0	35.6	38.1	40.6	43.0
R71	y = -0.0083x3 + 0.243x2 + 0.3267x + 18.194	21.1	22.9	24.9	27.1	29.5	32.1	34.8	37.5	40.1	42.8
R106	y = -0.0085x3 + 0.2644x2 - 0.8076x + 32.476	32.2	32.9	34.0	35.3	36.9	38.6	40.4	42.3	44.3	46.2
R8	y = -0.0201x3 + 0.7209x2 - 5.4402x + 35.805	25.4	24.3	24.1	24.8	26.2	28.1	30.6	33.4	36.4	39.6
R18	y = -0.0143x3 + 0.5536x2 - 4.7402x + 39.782	30.2	28.8	28.1	28.2	28.8	30.0	31.5	33.4	35.6	37.9
R20	y = -0.0124x3 + 0.4392x2 - 2.7661x + 29.349	24.7	24.5	24.9	25.9	27.3	29.0	31.0	33.2	35.6	38.0
R120	y = -0.0023x3 + 0.1114x2 - 0.2106x + 28.947	29.3	29.7	30.4	31.2	32.1	33.2	34.4	35.7	37.0	38.5

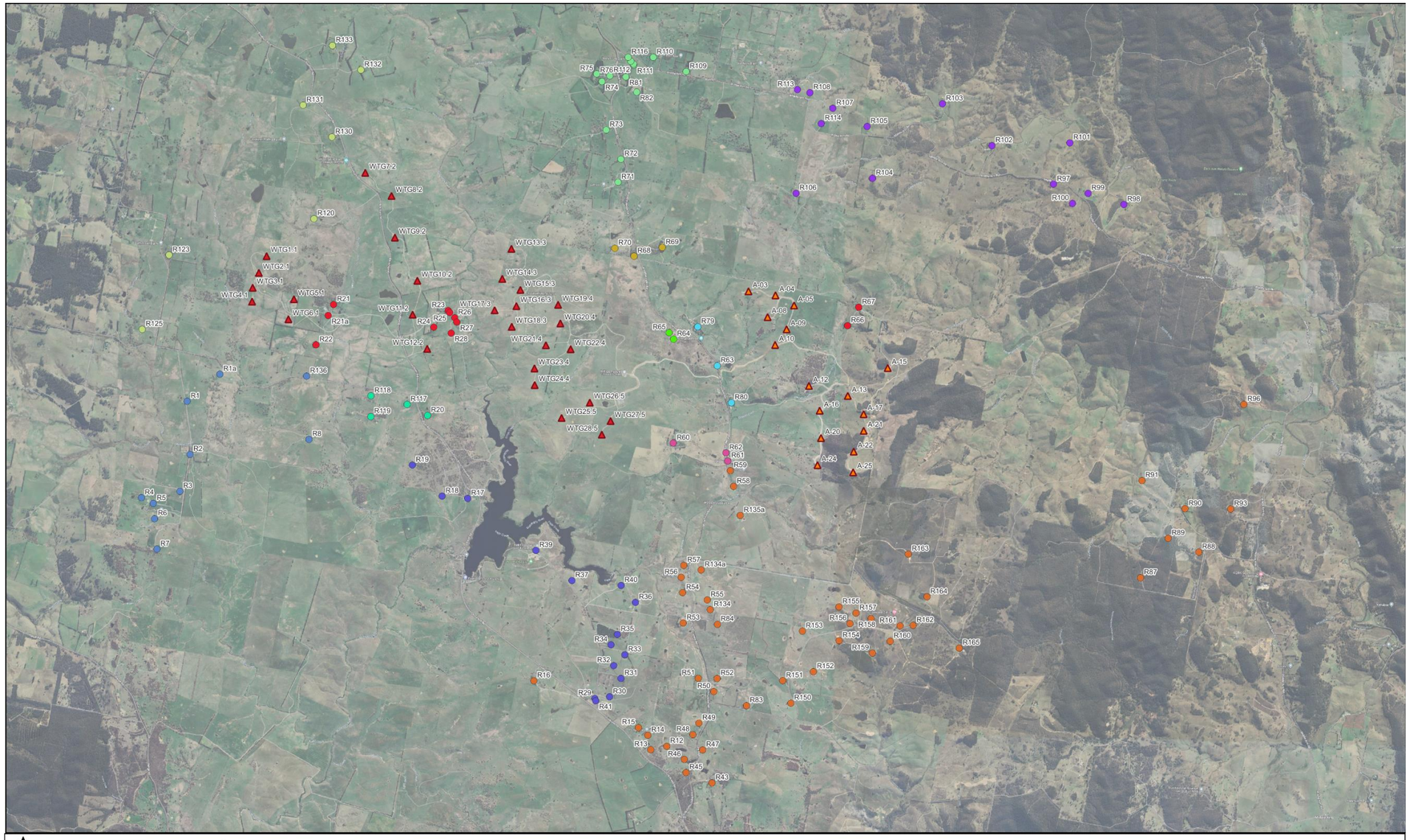
Receptors have been classified into background groups of similar ambient environments as shown in **Figure 2** and the derived noise criteria for these groups are shown in **Table 3,** noting that these are consistent with Condition 48 of the Crookwell 2 Wind Farm consent.

Table 3 Operational Noise Criteria

Background Group	Wind Farm noise level (dBA), referenced to Hub Height Wind Speed (m/s)									
	3 or less	4	5	6	7	8	9	10	11	12 or more
R61 [1]	35	35	35	35	35	36	38	40	43	45
R70 [1]	35	35	35	35	35	35	38	40	44	46
R79 [1]	35	35	35	37	39	41	43	45	47	48
R66 [2]	42	42	42	42	42	42	42	42	42	42
R58 [3]	35	35	35	35	35	36	38	39	41	42
R60 [3]	35	35	35	35	35	35	35	36	39	41
R64 [3]	35	35	35	35	35	38	41	43	46	48
R71 [4]	35	35	35	35	35	37	40	42	45	48
R106 [4]	37	38	39	40	42	44	45	47	49	51
R8 [5]	35	35	35	35	35	35	36	38	41	45
R18 [5]	35	35	35	35	35	35	37	38	41	43
R20 [6]	35	35	35	35	35	35	36	38	41	43
R120 [6]	35	35	35	36	37	38	39	41	42	44

Notes:
1 reference monitoring locations for CW3
2 noise agreement in place
3 receptor was monitored for CW2 compliance
4 receptor is outside of 35 dBA contour
5 receptor no longer relevant since CW3 west turbine cluster not built
6 receptors is only relevant to CW2

Figure 2 Background Noise Groups



2.2 Commencement of Operations

Compliance monitoring is required to start within three months of the commencement of operations, or the commencement of operation of a cluster of turbines if the development is staged.

During the construction of the wind farm individual WTGs may be operated as part of their respective commissioning phase to test their systems performance. Such commissioning phase operation is relatively short in duration and the noise contribution of individual WTGs is insufficient as to represent normal wind farm operation.

For the purposes of condition 14a of the permit, the commencement of operations of the wind farm shall be taken as time in which the wind farm has all WTGs simultaneously available for operation in an unrestricted manner (e.g. hold point testing has been completed).

If commissioning and full operations of the wind farm is to be completed in stages with clusters of WTGs to be available for operation in an unrestricted manner, then each stage is considered completed (commenced operations for stage) when a sufficient number of WTGs in that stage commence generating electricity such that the operating noise level from the stage is within 0.5 dB of the normal operating noise level from the fully completed wind farm at all receptors.

2.3 Unattended Monitoring

The unattended monitoring shall be conducted in accordance with the NSW WENA Bulletin, with sufficient noise monitoring undertaken to collect a minimum of 2,000 valid 10-minute sound pressure level, including a minimum of 500 from the worst case wind direction. The Bulletin acknowledges that it is sometimes impractical to obtain 500 valid data points from the worst-case conditions[2]. In this case, monitoring should continue for a minimum of six (6) weeks.

Other considerations include:

- All noise measurements shall be conducted using low noise floor (<20 dB) instrumentation that is certified to Class 1 standards (highest standard of instrumentation for field measurements) in accordance with AS/IEC 61672.1:2019 *Electroacoustics-Sound level meters-Part 1: Specifications*.
- The independent (laboratory) calibration date of the sound level measurement instrumentation must be within 2 years of the measurement period, as specified in Section 5.5 of Australian Standard AS 1055:2018 *Acoustics-Description and measurement of environmental noise*.
- Microphones shall be fitted with enhanced wind shield systems (enlarged primary wind shields or secondary wind shields) designed on the basis of the guidance contained in the UK Institute of Acoustics publication *A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise*, (the IOA GPG).
- $L_{C90,\ 10\ min}$ levels shall be collected in addition to $L_{A90,\ 10\ min}$ and $L_{Aeq,\ 10\ min}$.

[2] The worst case scenario is when the receiver is downwind of the nearest turbines, +/- 45 degrees.

- One third octave band $L_{A90\ 10\ min}$, $L_{Aeq,\ 10\ min}$ and $L_{C90,\ 10\ min}$ levels from 25 Hz to 10 kHz are to be collected.
- 100 ms L_p, dBA data to be collected to aid in amplitude modulation analysis, if required.
- Unattended measurements will be undertaken within the acoustic free field, between 5 m and 30 m of the receptor dwelling, and no closer than 5 m to any other significant vertical reflecting surface.
- The microphone will be located 1.5 m above ground.
- A local weather station will also be co-located with each unattended noise monitor.
- Subject to consent of the residents, 2 minutes of audio recordings shall be collected for every 10 minute measurement interval. The sample rate of recording shall be sufficient for narrow band tonality analysis, if required.

2.4 Reference Monitoring Locations

The Project Approval does not specify the specific locations for compliance monitoring.

An updated predicted noise contour map was produced based on the final as built layouts for CW2 and CW3 (CW2=28 WTGs, and CW3=16 WTGs), and a hub height windspeed of 12 m/s where all CW3 turbines are operating at full power (see **Figure 3**). The noise predictions were required to be updated as previous noise model predictions for the submission for *Crookwell 3 Wind Farm Amendment Noise Impact Assessment* (ref: 640.11047-R2 dated 26 September 2016) were for a CW3 23 turbine layout and CW2 33 turbine layout, and different turbine models.

As CW2 adopts a sector management, the prediction simulates the CW2 settings for a nominal wind direction of 60°, as most of the CW2 turbines are also operating at full power in accordance with the Crookwell 2 Noise Compliance Strategy [3].

Noise levels were calculated using the ISO9613 prediction algorithm which assumes downwind propagation from source to receiver under metrological conditions favourable to a moderate enhancement in all directions. The noise level contours presented in **Figure 3** are therefore potentially conservative.

Noise monitoring is to be undertaken at the most critical reference monitoring locations that correspond to Background Groups relevant for CW3 where noise levels are predicted to potentially exceed the minimum 35 dBA limit. The proposed reference monitoring locations are:

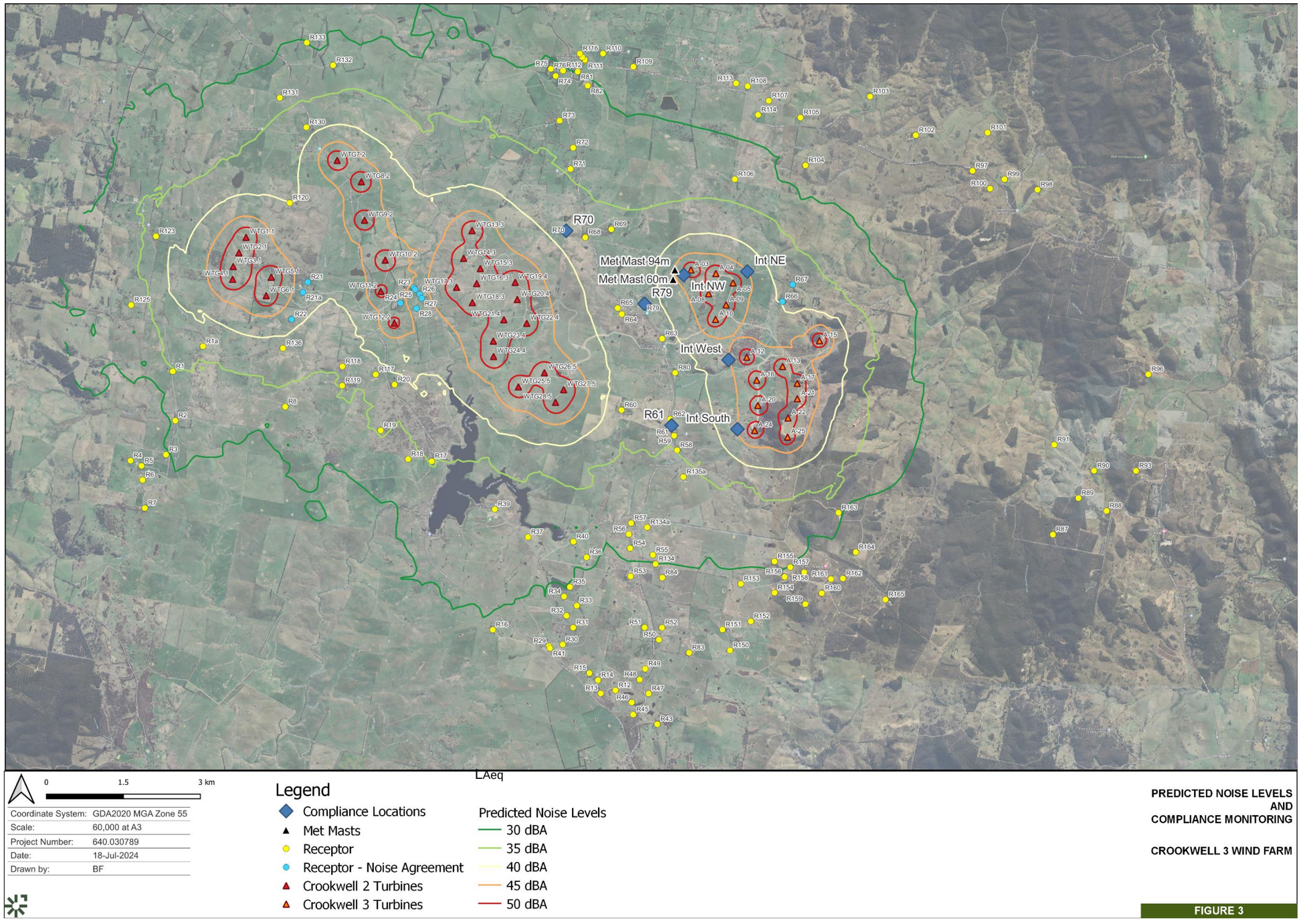
1. R61 Wallaroobie
2. R70 Snowgums
3. R79 Leeston

The noise monitoring equipment shall be set up as close as possible to that undertaken previously for background measurements.

[3] For this direction only WTG11.2 and WTG12.2 are in noise reduced mode. These turbines front Goulburn Rd and have negligible contributions to the critical receptors on Woodhouselee Rd.

In addition to the above, two alternative intermediate monitoring locations are proposed, as outlined in **Section 2.8.**

Figure 3 Predicted L_{Aeq} Noise Levels and Preferred Compliance Monitoring Locations



2.5 Attended Observations

During the noise monitoring surveys a number of subjective listening test assessments will be completed, to assist in determining if the wind farm noise contains any special noise characteristics.

For each of the reference monitoring locations a minimum of three (3) attended observations will be undertaken by a suitably qualified and experienced Acoustical Consultant, which shall be completed:

1. during monitor deployment,
2. during monitor retrieval, and
3. during a night time period.

These observations, in addition to the two-minute audio recordings will be used to assess the presence of any special noise characteristics at the receptor.

Due to the logistics of organising access to resident's properties and meteorological conditions it may be difficult to arrange for observations in ideal conditions, the attended observations (and therefore monitor deployment and retrieval) should be as far as practicable, scheduled for times when the windfarm is operating and the weather forecast is suitable for observations, i.e.:

- Wind speeds of 5 m/s to 10 m/s at hub height
- No rainfall
- Times when background noise is low (i.e. little traffic, bird song or insect noise)

A sound level meter (Class 1 that meets the international standards of IEC 61672-1:2002) will be used during each attended observation session to record audio samples and the same noise parameters recorded by the unattended monitors to support further analysis if required.

If the subjective assessment is able to identify any special noise characteristics, then the objective screening method and penalty scheme described in **Section 2.11** will be implemented.

2.6 Meteorological Data

Hub height wind speed data in 10-minute intervals shall be determined from data collected at the nearest meteorological mast or WTG, and adjusted to remove any significant wake effect of operating WTGs. Hub height wind speed data shall be used for the regression of valid noise level data collected.

Furthermore, meteorological data in 10-minute intervals will be collected by local weather stations collocated with each monitoring location at a nominal height of 1.5m. Meteorological parameters to be collected include:

- Local wind speed and direction,
- Atmospheric pressure,
- Temperature and
- Rainfall

Periods of rainfall or excessive local wind on microphone as determined by local weather station, are to be excluded from analysis data set. The threshold of local wind speed rejection shall depend upon the selection of wind sock but will typically be 5 m/s average or higher.

2.7 Extraneous Noise

The NSW *Wind Energy: Noise Assessment Bulletin (2016)* (WENA Bulletin) acknowledges that during typical operating conditions, wind turbine noise may be fully or partially masked, or substantially contaminated by wind or other extraneous noises.

The SA EPA Guideline 2021 requires that noise data should not be adversely affected by extraneous noise sources and that alternative compliance checking procedures are possible if traditional methods cannot be used, including that extraneous noise be excluded from the data analysis either during the data acquisition or post-acquisition data processing.

On the basis of the above, should extraneous noise (including domestic machinery such as pumps, fans, agricultural operations or elevated bird/insect/frog noise) be identified in the collected data, then the data shall be discarded as invalid, or its influence removed from the result.

2.8 Alternative / Intermediate Noise Monitoring Locations

In some cases, it may not be practical or possible to assess compliance at reference monitoring location. This may occur due to:

- Lack of accurate baseline background noise levels at the location, e.g. due to no previous background noise monitoring occurring at the location.
- Background noise environment at the location may have changed sufficiently for a compliance assessment at that location to no longer be practical, e.g. local vegetation has changed significantly since the baseline survey.
- Refusal of a property owner to grant access for noise monitoring.

The NSW WENA Bulletin acknowledges that NSW regulators may accept alternative techniques such as the use of alternative or intermediate locations between the wind farm and the relevant receptor. An intermediate monitoring location shall be selected such that:

- It is closer to the wind farm, and has a higher predicted wind farm noise level, than the nearby reference monitoring locations that the alternative intermediate monitoring location is intended to address. At such a location the signal-to-noise ratio (e.g. ratio of wind farm noise compared to background noise) is much higher, and for which there are well established theoretical and empirical relationships to the relevant receivers (e.g. noise model result difference for intermediate and reference location). Data from such sites may be used to supplement and support conclusions obtained at the receiver locations.
- The NSW WENA Bulletin recognises that ‘it is expected that intermediate locations will be chosen from predicted noise contour maps. Those intermediate locations would be expected to return Leq levels of around 45-50 dBA under down-wind conditions or be around 400 metres from the nearest turbines’.

On the basis of the above, four intermediate monitoring locations are proposed to supplement the monitoring being undertaken at the reference monitoring locations. The locations have been selected on the basis that they are:

- downwind of CW3 WTGs during prevailing wind directions from the ENE and W.
- will have negligible influence from CW2 WTGs.
- have predicted noise level of approximately 45 dBA or higher.

Intermediate North West is located to the western side of the northern CW3 cluster of WTGs (close to A03 etc). This is location is downwind from NE and E winds, approximately 170 metres from the nearest WTG.

Intermediate North East is located to the eastern side of the northern CW3 cluster of WTGs (A03, A04, A05 etc). This is location is downwind from prevailing W and WSW winds, approximately 360 metres from the nearest WTG.

Intermediate West is located to the western side of the CW3 WTGs (A12, A16 etc). This is location is downwind from E and SE winds, approximately 360 metres from the nearest WTG.

Intermediate South is located to the western side of the southern CW3 cluster of WTGs (A24, A25, A20 etc). This is location is downwind from E and NE winds, approximately 330 metres from the nearest WTG.

The exact positioning of the intermediate monitoring locations will be finalised on site.

In the event that noise monitoring and compliance assessment at the reference monitoring location is not practical or possible then the results and analysis of the data collected at the intermediate monitoring locations may be used in conjunction with noise model predictions to determine wind farm noise levels and compliance at other locations.

2.9 WTG Nearfield Noise Testing

In conjunction with the contractual Acoustic Performance Warranty obligations between Crookwell 3 Development Pty Ltd and the turbine manufacturer a series of nearfield acoustic testing under a range of wind speeds will be completed to determine the sound power level of the operational test turbines, including the evaluation of any audible tonality.

The testing of individual WTGs and data analysis will be in general accordance with IEC 61400-11.

The precise scope and detail of the testing will be covered separately in a Noise Test Plan to be prepared by the appointed Independent Consultant.

2.10 Turbine Operation Data

The turbine SCADA data contains power output which will be used to identify periods of shutdown.

Periods for which relevant turbines are not operating will be excluded from the analysis if the combined influence of non-operational turbines would result in a 0.5 dBA or greater difference to the overall wind farm noise levels at a receptor, based on modelling predictions.

2.11 Penalties for Special Noise Characteristics

Noise generated by the operation of the wind turbines must be penalty adjusted for tonality and low frequency noise in accordance with the NSW WENA Bulletin and the SA EPA Guideline.

A special noise characteristic is defined as a repeated and excessive characteristic if it occurs for more than 10 percent of an assessment period. A maximum penalty of 5 dBA is

applied to the measured levels where excessive levels of tonality, low frequency noise or a combination of both is identified.

2.11.1 Tonality

As referenced in the NSW WENA Bulletin:

- *'absence of tone in noise emissions measured at an intermediate location is sufficient proof the wind energy project noise is not tonal at a receiver location'.*
- *'If tonality is found to be a repeated characteristic of the wind turbine noise, 5 dB(A) should be added to measured noise levels from the wind energy project', and,*
- *'repeated and excessive characteristic if it occurs for more than 10 per cent of an assessment period', and*
- *'addition of 5 dB(A) to the measured noise level only where tonality is identified'.*
- tonality is to be assessed in accordance with ISO 1996-2: 2007 Annex D *Objective method for assessing the audibility of tones in noise – Simplified method*, analysing one third octave L_{A90} levels. It should be noted that ISO 1996-2:2007, was replaced by the revised edition ISO 1996-2:2017. The simplified method of the 2007 and 2017 standard are identical, however the narrow band method of the 2007 standard was replaced by an alternative method documented in ISO/TS 20065:2022 *Acoustics - Objective method for assessing the audibility of tones in noise – Engineering Method* (ISO/TS 20065:2022).

The evaluation of tonality shall be carried out as follows:

1. Complete tonality screening at intermediate locations. Use the simplified objective method of one-third octave L_{A90} levels of the data collected at the intermediate locations and determine the percentage of intervals (All-time and Night-time) that positive penalizable tone is identified, confirm from audio that the source of the tones is attributable to WTGs.
2. If the percentage of penalizable intervals (All-time and Night-time) at the intermediate locations, from step (1) above, exceeds 10% then the tonality assessment shall be extended to include narrow band screening at receptors in step (3). If the percentage of penalizable intervals (All-time and Night-time) from step (1) above is less than 10% of All-time and Night-time, then it can be concluded that tonality is not a repeated characteristic of CW3 noise at the receptors, and no further assessment or tonality penalty shall be applied.
3. If receptor based tonality assessment is required by Step (2), it shall be achieved by detailed narrow band assessment of recorded audio data (2 minutes of audio for each 10 minute interval) in accordance with ISO/TS 20065:2022.

   The tonal audibility index (ΔLta) that corresponds to a K penalty of +5 dB is equal to a value of 9 (e.g. at a ΔLta = 9, K = +5dB).

   If the percentage of intervals (All-time and Night-time) with a ΔLta greater than or equal to a value of 9, that are attributable to CW3, exceeds 10% then those intervals shall have a +5 dB penalty added to the noise level.

Tonality assessments will be carried out in conjunction with attended observations or recorded audio measurements where sources are clearly identifiable. This is to prevent misattributing and penalising the wind farm when many tonal sources exist naturally (e.g. aircraft, other machinery, wildlife etc).

2.11.2 Low Frequency Noise

Low frequency noise is assessed against a threshold criterion of 60 dBC ($L_{90,\ 10\ min}$). As with the tonality assessment, low frequency noise assessments should be carried out in conjunction with attended observations where sources are clearly identifiable. This may involve measurements at the intermediate locations closer to the turbines.

It should be noted that local wind on the microphone has a significant influence on C-weighted readings. Similarly road traffic and agricultural machinery are also common sources of low frequency noise.

2.11.3 Amplitude modulation

The NSW WENA Bulletin does not specifically address amplitude modulation.

The SA EPA Guideline *Wind farms environmental noise guidelines* 2021 (SA EPA Guideline 2021) includes an informative section that endorses the use of the UK Institute of Acoustics published method for rating amplitude modulation WTG noise. Whilst it does not provide a penalty scheme it states that 3–5dB peak to trough is typically observed for a standard WTG operation, and that if amplitude modulation depth higher than this is detected, the source of this increased depth should be investigated and rectified.

Amplitude modulation assessment will be carried out in conjunction with attended observations or recorded audio measurements where sources are clearly identifiable. Objective analysis of data will be undertaken UK Institute of Acoustics method, and a 5 dB penalty will be applied to intervals in which a modulation depth of 5 dB or more has been identified.

3.0 Non-Compliance Corrective Actions

In the event that non-compliance with the noise criteria specified in **Table 3** are detected, through the compliance monitoring or any subsequent monitoring/investigation, corrective actions will be developed and implemented in collaboration with the Secretary and the EPA.

The following section outlines corrective actions that may be implemented to reduce noise, if required:

Low noise modes. Strategic turbines may be set to low noise modes in order to achieve compliance. Low noise operation can reduce the sound power level of the turbine by up to 6 dBA.

Sector management may be employed to curtail or shutdown certain turbines in response to prevailing weather conditions.

Maintenance. Plant that is damaged or defective may create excessive noise. Regular maintenance of these items ensure noise emissions are minimised.

If the wind farm is found to be non-compliant with the Project Approval, a corrective action plan will be prepared and submitted to the Secretary and the EPA. The corrective action plan will include:

- A summary of the testing methodology and measurement results that confirmed the non-compliance, including the meteorological conditions under which the non-compliance was determined and the receivers where the non-compliance was detected.
- An investigation into the cause of the non-compliance.

- Details of the corrective measures to be implemented to achieve compliance with the Project Approval, including evidence that the corrective measures will be effective. This could be in the form of selecting low noise models for particular turbines and supporting predictive modelling.
- Time frames for implementing the corrective measures.
- A monitoring plan detailing additional monitoring to confirm the effectiveness of the corrective measures and reassessment of compliance.
- Time frames for additional compliance monitoring and reporting.

If the correction of non-compliance is expected to involve a long term solution, the corrective action plan shall detail intermediate mitigation strategies that will be implemented until the long term solution is developed. Intermediate mitigation strategies may also be implemented in cases where a non-compliance has been detected, however the precise source and/or magnitude requires further noise testing.

Intermediate mitigation strategies, if required will be documented in the corrective action plan.

4.0 Noise Complaints Management Procedure

A feedback hotline or other means of contact will be made available record complaints and other feedback relating to the wind farm.

Complaints relating to noise will be recorded in a complaints log. The log will record the following:

1 Time and date of the complaint.

2 Name and address of the complainant.

3 Time and date of the noise annoyance.

4 Description of the complaint, including:

   a) How long the noise been impacting the complainant's acoustic amenity.

   b) Any meteorological details at the time of the annoyance, including approximate wind direction, speed, and temperature.

5 Documentation of any follow-up or investigative actions that has been discussed with the complainant.

6 Any actions that will be taken to prevent similar complaints in the future, if appropriate.

Complaints Investigation

Noise complaints shall be provided to the wind farm owner and operations manager for initial evaluation and action.

The wind farm owner shall contact the complainant to identify the source of the complaint and determine if the complaint is a result of wind farm operations and if the wind farm was operating atypically at the time.

The wind farm operator may instigate noise monitoring to determine if the wind farm is non-compliant. The Secertary or EPA may also direct the wind farm operator to undertake compliance monitoring.

All actions to investigate the complaint and follow-up measures are to be recorded in the complaints log.

If the complaint is due to a non-compliance, the wind farm operator shall keep the complainant informed of the actions to rectify the non-compliance and time frames for these measures.

5.0 Noise Compliance Reporting

Operational noise compliance reporting shall meet the standards required by the NSW WENA Bulletin and will be made available to the Secretary and the EPA.

The noise compliance report will include the monitoring results from all assessment locations, including photographs and tables and charts clearly showing the excluded data due to rain, extraneous noise or the shutdown of influencing turbines, as well as other supporting analysis and documentation.

6.0 Project Approval Commitments

6.1 Schedule 2 – Condition 8 : Upgrading of Wind Turbines and Ancillary Infrastructure

> The Applicant may replace or upgrade the wind turbines provided these upgrades remain within the approved development footprint of the site and would not result in any non-compliance with the conditions of this consent. Prior to carrying out any such upgrades, the Applicant must provide revised layout plans and project details of the development to the Secretary incorporating the proposed upgrades.

The project is committed to updating this NMP as required prior to upgrading of any WTGs. Crookwell 3 Wind Farm utilises the ancillary infrastructure (substation) of Crookwell 2 Wind Farm under s separate consent.

6.2 Schedule 4 – Condition 2 : Revision of Strategies, Plans and Programs

> 2. Within 3 months of the submission of:
> (a) an incident report under condition 4 below;
> (b) an independent environmental audit report under condition 6 below; or
> (c) any modification to the conditions of this consent (unless the conditions require otherwise),
>
> the Applicant must review and, if necessary, revise the strategies, plans, and programs required under this consent to the satisfaction of the Secretary. Where this review leads to revisions in any such document, then within 4 weeks of the review the revised document must be submitted to the Secretary for approval.
>
> *Note: This is to ensure the strategies, plans and programs are updated on a regular basis, and incorporate any recommended measures to improve the environmental performance of the development.*

The Noise Management Plan will be reviewed to assess its effectiveness in evaluating and responding to complaints resulting from non-compliances with the noise criteria. This review will happen within 3 months of:

- Submission of a noise related incident report to the Department (The Department must be notified immediately after the Applicant becomes aware of an incident).
- An independent Environmental Audit Report - The next Independent Environmental Audit is scheduled for May 2026, as per the conditions of consent, and every three years thereafter unless the Secretary directs otherwise.
- any modification to the conditions of this consent (unless the conditions require otherwise)

The review will be undertaken by the Operations Health, Safety and Environment advisor, with input (as required) from the Community Engagement Representative, the Independent Environmental Auditor, and project Noise Consultants.

Procedure:

1. Gather and review the following documents:

- Noise Management Plan: Noise emission limits, monitoring procedures, and mitigation measures.
- Noise Monitoring Reports: Assess data to identify any deviations from expected noise levels.
- Complaints or Feedback Records: Review records of noise complaints or community feedback related to noise.

2. Analyse:

- Compare actual noise levels against predicted levels.
- Identify if any noise complaints are with merit.
- Identify any exceedances of noise limits and their causes.
- Determine the effectiveness of mitigation measures in reducing noise impacts.

3. Report:

- Summary of findings from the review process.
- Recommendations for improvements or adjustments to the noise management plan.
- Compliance status with noise criteria and permit conditions.
- Future actions to be taken based on the review outcomes, including timelines for implementation and performance monitoring of changes and actions.

6.3 Schedule 4 – Condition 9 : Incident Notification

> 9. The Department must be notified in writing via the Major Projects website portal immediately after the Applicant becomes aware of an incident. The notification must identify the development (including the development application number and the name of the development if it has one), and set out the location and nature of the incident.

The project is committed to notifying the Department of any significant incident, related to operational noise, as per the requirements of the condition.

On suspicion that an incident has occurred, the Operations Manager, with assistance as-needed from the Operations Health, Safety and Environment Advisor and/or the Independent Environmental Auditor, will assess the apparent conditions that indicate that an incident has occurred against the criteria and performance conditions within this Management Plan, as well as the Development Consent Conditions and environmental laws.

If any apparent condition causes or threatens to cause material harm to the environment; and/or breaches or exceeds the limits or performance measures/criteria in the development consent (and thereby this Management Plan) or environmental laws, the Operations Manager will notify the department of the incident, in writing via the Major Projects website portal, immediately after becoming aware of the incident. The notification will identify the development (including the development application number and the name of the development), and set out the location and nature of the incident.

6.4 Schedule 4 – Condition 10 : Non-Compliance Notification

> 10. The Department must be notified via the Major Projects website portal within 7 days after the Applicant becomes aware of any non-compliance with the conditions of this consent. The notification must identify the development and the application number for it, set out the condition of consent that the development is non-compliant with, the way in which it does not comply and the reasons for the non- compliance (if known) and what actions have been done, or will be, undertaken to address the non- compliance.

The project is committed to notifying the Department of any non-compliance as related to operational noise, as per the requirements of the condition.

On suspicion that a Non-Compliance has occurred, the Operations Manager, with assistance as-needed from the Operations Health, Safety and Environment Advisor and/or the Independent Environmental Auditor, will assess the apparent conditions that indicate that a non-compliance has occurred. If any apparent condition exists demonstrating that a Non-Compliance with the Development Consent Conditions has occurred, the Operations Manager will advise the Department via the Major Projects website portal within 7 days after the Applicant becomes aware of any non-compliance with the conditions of consent. The notification will identify the development and the application number for it, set out the condition of consent that the development is non-compliant with, the way in which it does not comply and the reasons for the non- compliance (if known) and what actions have been done, or will be, undertaken to address the non- compliance.

6.5 Schedule 4 – Condition 11 : Independent Environmental Audit

11. Within 6 months of the commencement of construction, and every 3 years thereafter, unless the Secretary directs otherwise, the Applicant shall commission and pay the full cost of an Independent Environmental Audit of the development.. The audits must:
    (a) be prepared in accordance with the relevant Independent Audit Post Approval requirements (DPIE 2020);
    (b) be led and conducted by a suitably qualified, experienced and independent expert/s whose appointment has been endorsed by the Secretary;
    (c) be carried out in consultation with the relevant agencies;
    (d) assess whether the development complies with the relevant requirements in this consent, and any strategy, plan or program required under this consent; and
    (e) if directed by the Secretary, assess whether the performance of any noise mitigation measures implemented, including sector management and sound management mode, ensure compliance with the noise criteria in this consent; and
    (f) recommend appropriate measures or actions to improve the environmental performance of the development and any strategy, plan or program required under this consent.

    Within 3 months of commencing an Independent Environmental Audit, or unless otherwise agreed by the Secretary, a copy of the audit report must be submitted to the Secretary, and any other NSW agency that requests it, together with a response to any recommendations contained in the audit report, and a timetable for the implementation of the recommendations.

    The recommendations of the Independent Environmental Audit must be implemented to the satisfaction of the Secretary.

The project is committed to the Independent Environmental Audit process as related to operational noise, as per the requirements of the condition.

As per condition 14(c), relevant SCADA output will be made available to the Independent Environmental Audit process upon request, showing times under which Noise Management Modes are operating.

6.6 Schedule 4 – Condition 12 : Access To Information

12. The Applicant must:
(a) make the following information publicly available on its website as relevant to the stage of the development:
- the EIS;
- the final layout plans for the development;
- current statutory approvals for the development;
- approved strategies, plans or programs required under the conditions of this consent;
- the proposed staging plans for the development if the construction, operation and/or decommissioning of the development is to be staged;
- a comprehensive summary of the monitoring results of the development, which have been reported in accordance with the various plans and programs approved under the conditions of this consent;
- a complaints register, which is to be updated on a monthly basis;
- minutes of CCC meetings;
- the annual Statement of Compliance with the EPL;
- any independent environmental audit, and the Applicant's response to the recommendations in any audit; and
- any other matter required by the Secretary; and

(b) keep this information up to date.

The project is committed to the providing all approved plans and summaries of monitoring results as related to operational noise, as publicly available information on the website as per the requirements of the condition.

Sincerely,

SLR Consulting Australia

Benjamin French
Senior Project Consultant, Acoustics & Vibration

Gustaf Reutersward
Technical Director, Acoustics & Vibration

Appendix A Coordinates of WTGs

Noise Management Plan

Crookwell 3 Wind Farm

Crookwell 3 Development Pty Ltd

SLR Project No.: 640.030789.00001

19 July 2024

Crookwell 2 WTG coordinates

WTG	X	Y
WTG1.1	733076	6175595
WTG2.1	732936	6175294
WTG3.1	732825	6175026
WTG4.1	732814	6174778
WTG5.1	733567	6174820
WTG6.1	733468	6174459
WTG10.2	735787	6175152
WTG11.2	735702	6174542
WTG12.2	735965	6173927
WTG13.3	737479	6175726
WTG14.3	737315	6175186
WTG15.3	737640	6174987
WTG16.3	737568	6174695
WTG17.3	737177	6174621
WTG18.3	737485	6174324
WTG19.4	738319	6174719
WTG20.4	738359	6174384
WTG21.4	738098	6173991
WTG22.4	738544	6173920
WTG23.4	737893	6173575
WTG24.4	737897	6173275
WTG25.5	738381	6172683
WTG26.5	738888	6172959
WTG27.5	739262	6172627
WTG28.5	739104	6172382

Crookwell 3 WTG coordinates

WTG	X	Y
A-03	741743	6174961
A-04	742228	6174889
A-05	742563	6174707
A-08	742087	6174497
A-09	742428	6174278
A-10	742222	6173996
A-12	742830	6173259
A-13	743529	6173079
A-15	744247	6173581
A-16	743024	6172813
A-17	743813	6172750
A-20	743047	6172320
A-21	743815	6172451
A-22	743635	6172077
A-24	742984	6171833
A-25	743625	6171704

Appendix B Coordinates of Receptors

Noise Management Plan

Crookwell 3 Wind Farm

Crookwell 3 Development Pty Ltd

SLR Project No.: 640.030789.00001

19 July 2024

Receptor coordinates

Receptor	X	Y
R1	731647	6172983
R2	731698	6172026
R3	731516	6171362
R4	730825	6171246
R5	731037	6171145
R6	731060	6170869
R7	731103	6170322
R8	733838	6172296
R12	740272	6166772
R13	739985	6166712
R14	739932	6166971
R15	739764	6167108
R16	737882	6167951
R17	736692	6171234
R18	736232	6171276
R19	735698	6171835
R20	735970	6172727
R21	734279	6174723
R22	733964	6173999
R23	736342	6174616
R24	736082	6174316
R25	736368	6174580
R26	736458	6174487
R27	736496	6174408
R28	736395	6174209
R29	738978	6167634
R30	739244	6167665
R31	739448	6167994
R32	739318	6168225
R33	739518	6168420
R34	739270	6168600
R35	739384	6168786
R36	739709	6169363
R37	738567	6169756
R39	737919	6170298
R40	739452	6169668
R41	738995	6167592
R43	741086	6166113
R45	740618	6166300

Receptor	X	Y
R46	740589	6166536
R47	740918	6166707
R48	740743	6166982
R49	740850	6167190
R50	741118	6167758
R51	740840	6167997
R52	741178	6167993
R53	740567	6168992
R54	740557	6169539
R55	741001	6169408
R56	740532	6169814
R57	740578	6170029
R58	741473	6171450
R59	741415	6171733
R60	740389	6172231
R61	741369	6171908
R62	741337	6172055
R63	741181	6173622
R64	740395	6174100
R65	740315	6174217
R66	743524	6174343
R67	743724	6174675
R68	739684	6175594
R69	740191	6175752
R70	739339	6175736
R71	739396	6176926
R72	739448	6177340
R73	739184	6177867
R74	739107	6178738
R75	739013	6178876
R76	739250	6178840
R77	738486	6180299
R79	740830	6174323
R80	741434	6172956
R81	739537	6178821
R82	739732	6178548
R83	741707	6167504
R84	741184	6168967
R87	748793	6169806
R88	749841	6170267

Receptor	X	Y
R89	749291	6170516
R90	749595	6171049
R91	748820	6171555
R93	750414	6171045
R96	750652	6172926
R97	747228	6176891
R98	748494	6176524
R99	747850	6176725
R100	747569	6176543
R101	747522	6177634
R102	746121	6177583
R103	745231	6178338
R104	743973	6176996
R105	743875	6177928
R106	742598	6176726
R107	743258	6178256
R108	742847	6178538
R109	740622	6178917
R110	740029	6179174
R111	739678	6179037
R112	739674	6179055
R113	742622	6178593
R114	743051	6177981
R115	739626	6179103
R116	739578	6179174
R117	735603	6172925
R118	734952	6173081
R119	734950	6172706
R120	733927	6176267
R123	731321	6175616
R125	730838	6174277
R130	734250	6177739
R131	733732	6178313
R132	734771	6178947
R133	734259	6179386
R21a	734183	6174526
R1a	732235	6173471
R134	741054	6169232
R134a	740891	6169947
R135a	741594	6170929

Receptor	X	Y
R136	733795	6173435
R150	742504	6167549
R151	742357	6167955
R153	742713	6168846
R154	743371	6168674
R157	743677	6169170
R160	744291	6168664
R152	742909	6168115
R156	743568	6168982
R158	743948	6169071
R161	744470	6168940
R162	744703	6168950
R165	745532	6168540
R155	743370	6169282
R159	743971	6168451
R164	744953	6169464
R163	744617	6170232

Appendix C Wind Roses

Noise Management Plan

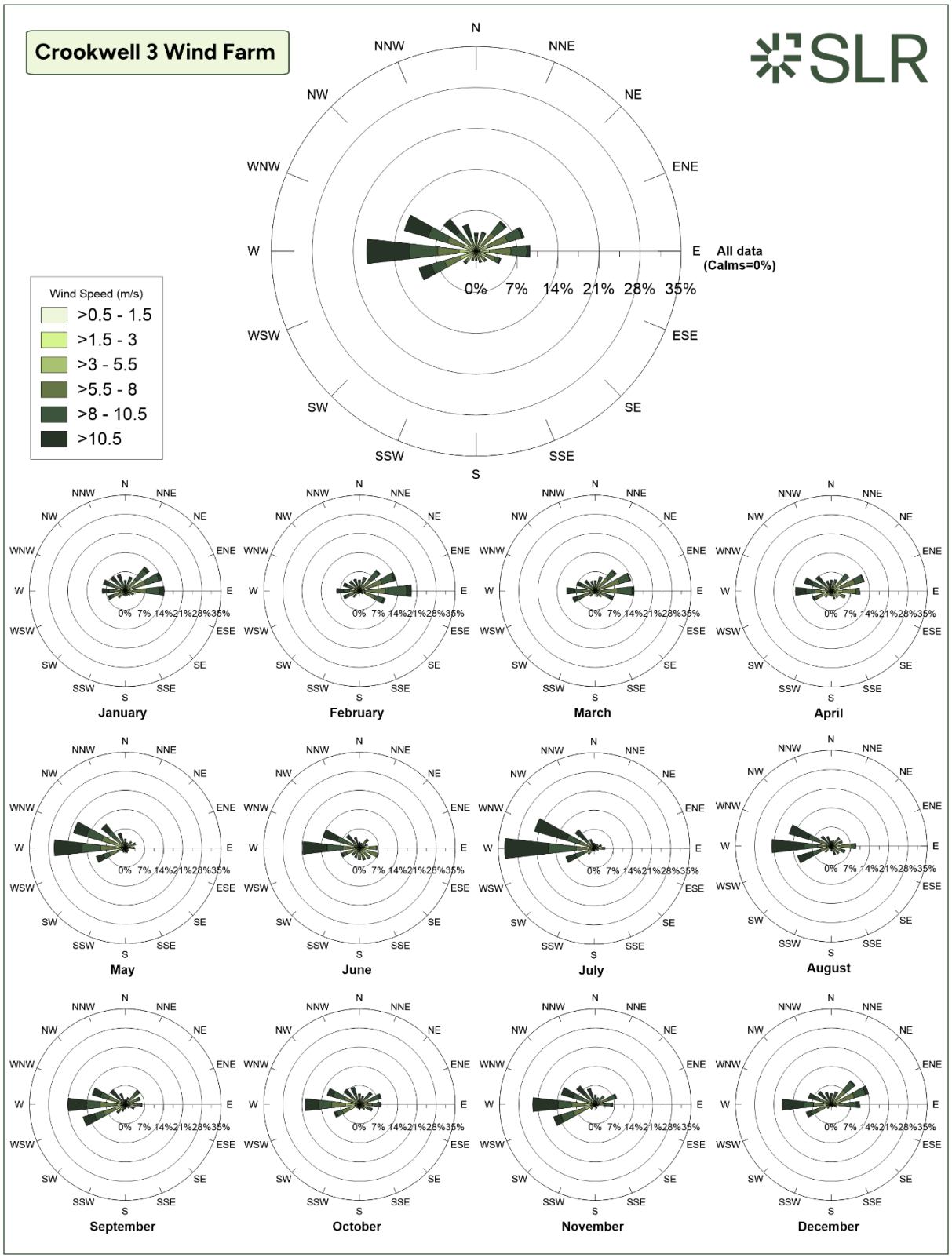
Crookwell 3 Wind Farm

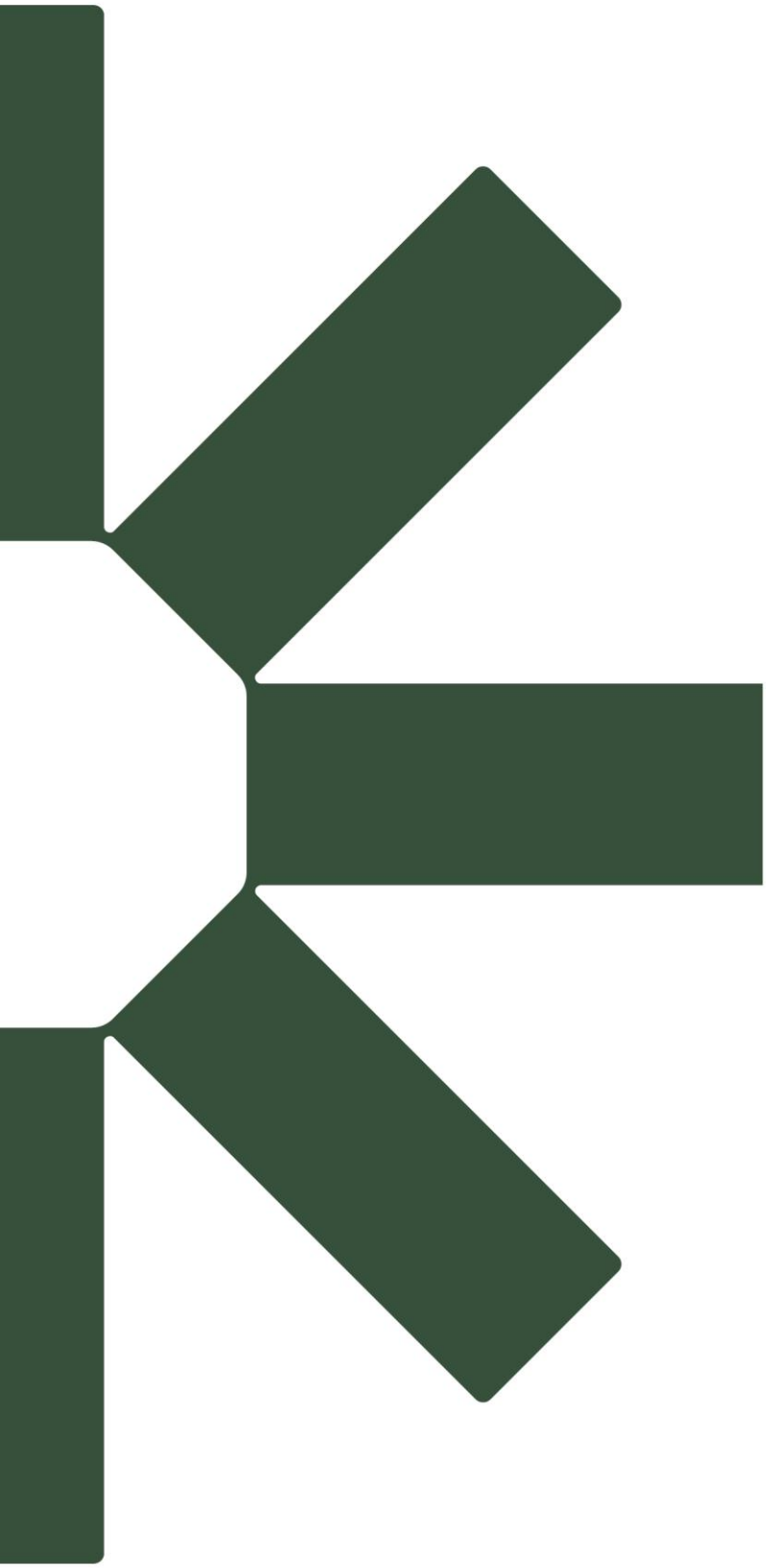
Crookwell 3 Development Pty Ltd

SLR Project No.: 640.030789.00001

19 July 2024

Figure 4 Hub height wind – prevailing conditions





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