ARUP

Lal Lal Wind Farms Nom Pty Limited

Lal Lal Wind Farm - Yendon

Verification of Post-Construction Noise Assessment

Reference:

R01 | 7 December 2023

Job number 270849-00

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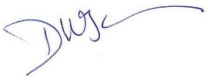
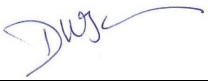
Document Verification

Project title	Lal Lal Wind Farm - Yendon
Document title	Verification of Post-Construction Noise Assessment
Job number	270849-00
Document ref	
File reference	

Revision	Date				
Draft	13 October 2023	**Description**	Draft Verification Report		
			Prepared by	**Checked by**	**Approved by**
		Name	David Spink Kym Burgemeister	David Spink	Kym Burgemeister
		Signature			
Issue	13 November 2023	**Filename**			
		Description	Verification Report		
			Prepared by	**Checked by**	**Approved by**
		Name	David Spink Kym Burgemeister	David Spink	Kym Burgemeister
		Signature			
R01	7 December 2023	**Filename**			
		Description	Verification Report, Revision 01		
			Prepared by	**Checked by**	**Approved by**
		Name	David Spink Kym Burgemeister	David Spink	Kym Burgemeister
		Signature			

Issue Document Verification with Document ☑

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Appendices

Distribution

Verification of Post-construction Noise Assessment Report, Lal Lal Wind Farm, Yendon, VIC 3352

07 December 2023

Copies	Recipient
1 PDF	Lal Lal Wind Farms Co Pty Limited c/- RES Australia Pty Limited Suite 6.01 Level 6 165 Walker Street North Sydney NSW 2055
1 PDF	Arup Project File

Auditor Verification Statement

Verification Statement of Post Construction Noise Assessment Report - Lal Lal Wind Energy Facility (Yendon)

I, David W Spink, an environmental auditor appointed pursuant to the *Environment Protection Act 2017*, having:

1. Been requested by Lal Lal Wind Farms Nom Co Pty Limited c/- RES Australia Pty Ltd to provide an auditor's opinion (verification) for the post-construction noise assessment for the Yendon component of the Lal Lal Wind Energy Facility (Yendon WEF), undertaken by SLR Consulting Australia Pty Ltd (SLR).
2. Specifically, I have been requested to independently provide an opinion on the methodology and results of the post-construction noise assessment provided in the report entitled Lal Lal Wind Farm – Yendon, Post-construction Noise Assessment (SLR Consulting Australia Pty Ltd, Report No 640.11872-R15-v1.7, dated October 2023) (Post-construction Noise Assessment Report), as required by Condition 25(d) of Planning Permit PL-SP/05/0461-2 (Planning Permit) – to confirm whether or not the assessment complies with the Noise Compliance Test Plan (NCTP) (Lal Lal Wind Farm, Noise Compliance Test Plan, Marshall Day Acoustics Pty Ltd, Report No. 003 R03 20170649, dated 23 January 2018) approved by the Minister for Planning on 17 May 2018, and the noise limits specified in Condition 23 of the Planning Permit.
3. Having regard to, (amongst other things)

    - Planning Approval PL-SP/05/0461-2 issued under the Moorabool Planning Scheme (Amendment dated 12 April 2022)
    - New Zealand Standard NZS 6808:2010 Acoustics – Wind Farm Noise (NZS 6808:2010)
    - *Environment Protection Act 2017* as amended by the *Environment Protection Amendment Act 2018*
    - Environment Protection Regulations 2021 as amended by the Environment Protection Amendment (Wind Turbine Noise) Regulations 2022

and the following relevant documents

- Lal Lal Wind Farm – Yendon, Post-construction Noise Assessment (SLR Consulting Australia Pty Ltd, Report No 640.11872-R15-v1.7, dated October 2023) (Post-construction Noise Assessment Report).
- Lal Lal Noise Compliance Test Plan (Marshall Day Acoustics Pty Ltd, Report No 003 R03 20170649, dated 23 January 2018) (NCTP).
- Environmental Auditor's Opinion (Phillip Bayne, Jacobs Group (Australia) Pty Ltd), memo entitled Proposed Lal Lal Wind Farm - Review of Lal Lal Wind Farm Noise Compliance, dated 24 January 2018
- Lal Lal Wind Farm Background Noise Monitoring (Marshall Day Acoustics Pty Ltd, Report No 001 R01 20170649, dated 01 March 2018).
- Lal Lal Wind Farm Pre-Development Noise Assessment (Marshall Day Acoustics Pty Ltd, Report No 002 20170649, dated 17 January 2018).
- Lal Lal Wind Farm Compliance Baseline Noise Monitoring (SLR Consulting Australia Pty Ltd, Report No. 640.11872-R01, Version No v1.1, dated February 2021)
- Wind Energy Facility Turbine Noise Regulation Guidelines (EPA Publication, November 2022)
- Wind Energy Facility Noise Auditor Guidelines (EPA Publication 1692, dated October 2018)

- Planning Guidelines for Development of Wind Energy Facilities (Department of Transport and Planning, September 2023)
- Guidelines for Conducting Environmental Audits (EPA Publication 2041, dated February 2022)
- Environmental Auditor Guidelines – Provision of statements and reports for environmental audits and preliminary risk screen assessments (EPA Publication 2022, dated August 2021)
- Environmental Auditor Guidelines for Appointment and Conduct (EPA Publication 865.13, dated March 2022)
- Victoria Planning Provisions Clause 52-32
- International Standard IEC61400-11:2012 Wind turbines – Part 11: Acoustic noise measurement techniques (IEC 61400-11:2012)
- International Standard ISO 1996-2:2007 Acoustics – Description, measurement and assessment of environmental noise – Part 2: Determination of environmental noise levels (ISO 1996-2:2007)
- Annual Report to the Parliament of Australia, Office of the National Wind Farm Commissioner, 31 March 2017.

4. Hereby declare that I am of the opinion that the post-construction noise assessment for the Yendon WEF as provided in the Post-construction Noise Assessment Report:

    a) Has been conducted in compliance with the approved NCTP

    b) Indicates that the measured post-construction wind farm sound levels are compliant with the established noise limits at all measurable wind speeds when analysing the data adopting the 0.1 dB 'NCTP method'. However, it is noted that, there is only a relative small margin of compliance at night-time at wind speeds around 10–11 m/s.

    c) An alternative '0.5 dB screening method' has also been adopted, for consistency with the assessment of the associated Elaine WEF. The '0.5 dB screening method' provides less screening of inoperable turbines, and therefore a greater number of measurement periods., This analysis indicates that the measured operational wind farm sound level marginally exceeds the established noise limits at wind speeds around 10 m/s at N31ab and K34aa.

    The marginal exceedance is attributed by SLR to seasonal extraneous noise from wildlife. Additional wind farm sound level measurements planned for Stage 2 of the compliance monitoring will be required to clarify the Yendon WEF sound levels at these locations and demonstrate compliance with the required noise limits in the Planning Permit.

Dated: 07 December 2023

Signed

David W Spink
Environmental Auditor (Industrial Facilities) – Appointed pursuant to the *Environment Protection Act 2017*

List of Acronyms

Acronym	Definition
AGL	Above Ground level
DELWP	Department of Environment, Land, Water, and Planning (Victoria)
DTP	Department of Transport and Planning Victoria
DTP Guidelines	Planning Guidelines for Development of Wind Energy Facilities (Department of Transport and Planning, dated September 2023)
EPA	Environment Protection Authority Victoria
EP Act	*Environment Protection Act 2017* as amended by the *Environment Protection Amendment Act 2018*
EPA Guidelines	Wind Energy Facility Noise Regulation Guidelines (EPA Publication, November 2022)
EP Regulations	Environment Protection Regulations 2021 as amended by the Environment Protection Amendment (Wind Turbine Noise) Regulations 2022
ERS	Environment Reference Standard
GED	General Environmental Duty (requirement under Section 25 of the EP Act)
ISO 1996.2	International Standards Organisation ISO 1996.2:2017 Acoustics – Description, measurement and assessment of environmental noise – Part 2: Determination of sound pressure levels
LA90(10 min)	A-weighted noise level exceeded for 90% of the measurement period, where the measurement period is 10 minutes
Lal Lal	Lal Lal Wind Farms Nom Co Pty Limited
LLWF	Lal Lal Wind Farm
MDA	Marshall Day Acoustics Pty Ltd
NCTP	Noise Compliance Test Plan
NMP	Noise Management Plan
NZS 6808:2010	New Zealand Standard NZS 6808:2010 Acoustics – Wind Farm Noise
SAC	Special Audible Characteristic
SLR	SLR Consulting Australia Pty Ltd
Standard	New Zealand Standard 6808:2010 Acoustics – Wind Farm Noise
Vestas	Vestas Australian Wind Technology Pty Ltd
WEF	Wind Energy Facility
WEF Operator	Lal Lal Wind Farms Nom Co Pty Limited
WTG	Wind Turbine Generator

1. Background to verification

The Lal Lal Wind Farm (LLWF) comprises of a total of 60 turbines, constructed across 2,100 Ha of land in the Moorabool Shire, approximately 17 km south-east of Ballarat. Lal Lal Wind Farms Nom Co Pty Limited (Lal Lal) is owned by global infrastructure investors Atmos Renewables (60%) and Northleaf Capital Partners (40%). LLWF was constructed by Vestas Australian Wind Technology Pty Ltd (Vestas) and Zenviron, using Vestas model V136-3.8MW turbines with serrated trailing edge technology. Construction was overseen by RES Australia Pty Ltd (RES), a global renewable energy company. RES continues to manage the project in the operational phase under an Asset Management Agreement.

The LLWF has two sections located about 9 kilometres apart. There are 38 turbines located east of Yendon and a further 22 turbines located north of Elaine. This report specifically concerns the turbines located at Yendon (Yendon Wind Energy Facility or Yendon WEF)

A planning permit was issued on 30 April 2009 under the Moorabool Planning Scheme (Permit No PL-SP/05/0461), with the current amendment (Permit No PL-SP/05/0461-2), dated 12 April 2022 (Planning Permit).

Key points noted:

1. The Planning Permit required a Noise Compliance Testing Plan (NCTP) to be prepared and approved by the Minister for Planning before development of the LLWF (Condition 24), and a post-construction noise compliance assessment to be conducted (Conditions 25). Marshall Day Acoustics Pty Ltd (MDA) prepared an NCTP entitled Lal Lal Wind Farm - Noise Compliance Test Plan (Marshall Day Acoustics Pty Ltd, Report No 003 R03 20170649, dated 23 January 2018) (NCTP).

2. Condition 25 of the Planning Permit also required that the NCTP must be accompanied by a report from an Environmental Auditor appointed under the *Environment Protection Act 1970* with their opinion on the methodology contained in the noise compliance testing plan. The NCTP was reviewed by an Environmental Auditor (Phillip Bayne, Jacobs Group (Australia) Pty Ltd, memo entitled Proposed Lal Lal Wind Farm - Review of Lal Lal Wind Farm Noise Compliance, dated 24 January 2018), and approved by the Minister for Planning on 17 May 2018.

3. Lal Lal engaged SLR Consulting Australia Pty Ltd (SLR) to undertake a post-construction noise assessment of the Yendon WEF. SLR subsequently issued a report of this assessment entitled Lal Lal Wind Farm – Yendon. Post-construction Noise Assessment (SLR Consulting Australia Pty Ltd, Report No 640.11872-R15, Version No V1.7, dated October 2023) (Post-construction Noise Assessment Report).

4. The NCTP (Section 4.3) stated that *the first stage of monitoring shall be commenced within 2 months following the commissioning of the last turbine of the Lal Lal Wind Farm. The second stage shall commence between 10 and 12 months following the commissioning of the last turbine of the Lal Lal Wind Farm*. It is understood that this requirement was not strictly achieved at LLWF, with the following comments provided in the Post-construction Noise Assessment Report (Section 1):

    a. *The objective of the noise assessment was to measure and assess the noise levels from the wind farm in accordance with the Noise Compliance Test Plan (NCTP) which forms endorsed conditions 24 and 25 of the Planning Permit ref: Planning Permit No. PL - SP/05/0461-2 amended 12 April 2022*

    b. *The wind farm is electrically and mechanically complete and has been released by the market operator to generate at full power and has now reached practical completion.*

    c. *The turbines of the Yendon and Elaine wind farms make up separate stages of the Lal Lal Wind Farm and the turbines are separated by over 10 km and there are no compliance critical receptors located in the intervening land which would be influenced by cumulative noise from both portions. Owing to a number of extended turbine outages in the Yendon portion, and to avoid further delay, it has been determined that a reasonable approach to the compliance assessment of Lal Lal Wind Farm would be to consider the Yendon and*

Elaine portions separately in this instance. This report covers the Stage 1 assessment of the Yendon portion of the wind farm only.

5. Condition 25(d) of the Planning Permit required that *the final compliance report must be accompanied by a report from an auditor accredited under the Environment Protection Act 1970 with the auditor's opinion on the methodology and results contained in the noise compliance testing plan.*

David Spink, an Environmental Auditor (auditor) appointed under the *Environment Protection Act 2017*[1], undertook an independent verification process for the post-construction noise assessment as provided in the Post-construction Noise Assessment Report, to provide an auditor's opinion[2] on the methodology and results against the NCTP[3] . The auditor was supported in the technical aspects of the verification process by Dr Kym Burgemeister (Arup Australia Pty Ltd) in his role as nominated expert support team member (Environmental Auditor Guidelines for Appointment and Conduct, EPA Publication 865.13, dated March 2022). This Verification Report provides the Auditor's Verification Statement and findings of the verification process for the post-construction noise assessment of the Yendon WEF, as required by the Planning Permit. It does not address any requirements for noise assessment under the Environment Protection Regulations 2021 as amended by the Environment Protection Amendment (Wind Turbine Noise) Regulations 2022.

Notes:

- The New Zealand Standard 6808:2010 Acoustics – Wind Farm Noise is referred to extensively in the report, and documents referenced for this Verification. It is referred to variously as NZS 6808:2010 or the Standard.
- A turbine may be referred to as a Wind Turbine Generator (WTG)

2. Regulatory requirements

2.1 Planning Permit requirements

The original Planning Permit under the Moorabool Planning Scheme was issued on 30 April 2009, with the current permit No PL-SP/05/0461-2 issued on 12 April 2022. This Planning Permit included conditions which specified requirements for the control of noise from the Lal Lal Wind Farm.

Key conditions with respect to the verification process include:

Operational Noise Limits (Condition 23)

Except as provided below in this condition, the operation of the wind energy facility must comply with New Zealand Standard 6808:2010 Acoustics – Wind Farm Noise (the Standard) at any noise sensitive location existing as at 20 March 2017, to the satisfaction of the Minister for Planning.

In determining compliance, the following requirements apply:

a. The operator must ensure that at any wind speed, wind farm sound levels, determined in accordance with the Standard at noise sensitive locations (as defined in the Standard) do not exceed a noise limit of 40 dB LA90, 10min, or background (LA90, 10 min) plus 5dB, whichever is greater;

[1] The *Environment Protection Act 1970* has now been replaced by the *Environment Protection Act 2017* as amended by the *Environment Protection Amendment Act 2018*) (EP Act)

[2] The term "auditor's opinion" has been replaced by the term "auditor's verification", consistent with the terminology currently used by the Department of Transport and Planning, and the Environment Protection Authority of Victoria

[3] The additional phrase in Condition 25(d) "contained in the noise compliance testing plan" is understood to mean that the assessment was against the approved NCTP.

b. *Compliance must be assessed separately for all-time and night-time. For the purpose of this requirement, night-time is defined as 10.00pm to 7.00am; and*

c. *Where special audible characteristics, including tonality, impulsive sound or excessive amplitude modulation occur, the measured noise level with the identified special audible characteristics will be modified by applying a penalty of up to +6dB L90 in accordance with section 5.4 of the Standard.*

The limits specified under this condition do not apply if an agreement has been entered into with the relevant landowner waiving the limits. Evidence of the agreement must be provided to the satisfaction of the Minister for Planning upon request, and be in a form that applies to the land for the life of the wind energy facility.

Noise Compliance Testing Plan (Conditions 24 and 25)

Condition 24 states:

Before the development starts, a noise compliance testing plan must be prepared by a suitably qualified acoustics expert to the satisfaction of the Minister for Planning.

MDA was engaged to develop a Noise Compliance Test Plan (NCTP), entitled Lal Lal Wind Farm, Noise Compliance Test Plan (MDA Report No 003 R03 20170649, dated 23 January 2018). The NCTP was subsequently submitted to the Department of Environment, Land, Water and Planning (DELWP), and approved on 06 April 2018 by the Minister for Planning.

Condition 25 states (in part):

The noise compliance testing plan must be accompanied by a report from an auditor accredited under the Environment Protection Act 1970 with the auditor's opinion on the methodology contained in the noise compliance testing plan.

Phillip Bayne (Jacobs Group (Australia) Pty Ltd), an Environmental Auditor appointed under the *Environment Protection Act 1970*, was engaged to provide an Auditor's Opinion of the NCTP. The Auditor's Opinion was provided in a memo entitled Proposed Lal Lal Wind Farm - Review of Lal Lal Wind Farm Noise Compliance (dated 24 January 2018).

Condition 25 states (in part)

(c) A final compliance report must be submitted to the Minister for Planning after a 12 month period following full operation of the facility.

SLR was engaged to undertake a post-construction noise assessment of the Yendon WEF. The outcome of this assessment has been provided in the report entitled Lal Lal Wind Farm – Yendon, Post-construction Noise Assessment (SLR Ref. 640.11872-R15-v1.7, dated October 2023) (Post-construction Noise Assessment Report).

(d) The final compliance report must be accompanied by a report from an auditor accredited under the Environment Protection Act 1970 with the auditor's opinion on the methodology and results contained in the noise compliance testing plan.

This Auditor's Verification Report is provided in compliance with this condition for the Yendon WEF.

Several points should be noted in respect of the Planning Permit conditions:

- The *Environment Protection Act 1970* has been replaced by the *Environment Protection Act 2017* as amended by the *Environment Protection Amendment Act 2018* (EP Act). The Environmental Auditor involved in the verification is now appointed under the (current) EP Act.
- The Environment Protection Regulations 2021 as amended by the Environment Protection Amendment (Wind Turbine Noise) Regulations 2022 (EP Regulations) are now in force. It is noted that, with the introduction of the EP Act and the EP Regulations (refer below), the requirement for an NCTP for new wind farms under a Planning Permit has been superseded by other requirements under the control of the Environment Protection Authority (EPA) (eg conduct of a post-construction noise assessment, and development of a Noise Management Plan, under Regulation 131). However, a requirement to comply with the conditions of an NCTP under an existing Planning Permit also

remains valid and must be complied with, unless the Planning Permit is subsequently amended to remove or modify this condition.

- The Department of Environment, Land, Water and Planning (DELWP) has previously issued guidance through the publication Development of Wind Farm Facilities in Victoria – Policy and Planning Guidelines (DELWP, November 2021). Following introduction of the EP Regulations, DTP has revised the publication to reflect these changes – the current document being Planning Guidelines for Development of Wind Energy Facilities (DTP, September 2023) (DTP Guidelines).
- As an interim measure, with the Planning Permit condition still in place for the Lal Lal WEF, the auditor has undertaken a verification of compliance with the NCTP (This Verification Report). A separate process will be required for noise assessment against the requirements of the EP Regulations.

The DTP Guidelines acknowledge that Amendment VC203 to the Victorian Planning provisions (VPP) and all planning schemes defer to the *Environment Protection Act 2017* for the regulation of operational wind turbine noise for a WEF. A further amendment (VC234, dated 04 July 2023) was made to VPP Clause 52.32, that clarified additional mandatory requirements to be included in the preconstruction (predictive) noise assessment report – no additional requirements were included for post-construction noise assessments.

2.2 EPA requirements

The EP Act includes the flowing specific requirements:

General Environmental Duty (GED) (EP Act Section 25)

> A person who is engaging in an activity that may give rise to risks of harm to human health or the environment from pollution or waste must minimise these risks, so far as is reasonably practicable (EP Act Section 25)

Unreasonable Noise (EP Act Section 166)

> A person must not, from a place or premises that are not residential premises -
>
> - Emit an unreasonable noise; or
> - Permit an unreasonable noise to be emitted

The Environment Protection Regulations 2021 came into effect in mid-2021 under the EP Act, focusing regulatory control of turbine noise from operational wind farms to the EPA under Regulation 131. The current amendment Environment Protection Amendment (Wind Turbine Noise) Regulations 2022 (EP Regulations) includes the requirements summarised in the following table;

Regulation	Requirement
131A	Wind turbine noise agreement
131B	Relevant noise standard
131BA	Noise limits
131BB & 131BC	Alternative monitoring point & Alternative monitoring point criterion
131 CA	Duty to ensure compliance with noise limit or alternative monitoring point criterion
131D	Post-construction noise assessment
131E	Noise management plan
131F	Annual statement

Regulation	Requirement
131G	Wind turbine noise monitoring
131H	Unreasonable noise
131I	Transitional provisions – noise limits
131J	Transitional provision – annual statements
164	Functions of environmental auditors

It is noted that the Planning Permit is the relevant Authorising Document under Regulation 131B. The Planning Permit specifies NZS 6808:2010 as the applicable noise standard, subject to the requirements specified in Condition 23.

The EP Regulations provides the current framework for post-construction noise assessment and the verification process. Specifically, Regulation 131D states in part:

(2) A post-construction noise assessment must-

a. *be conducted in accordance with NZS 6808:2010 by a suitably qualified and experienced acoustician; and*

b. *demonstrate whether or not the facility complies with the noise limits set out in accordance with NZS 6808:2010.*

(3) The operator must –

a. *ensure that a report of the post-construction noise assessment is prepared; and*

b. *engage an environmental auditor to prepare a report under regulation 164(ca)(i) in relation to the post-construction noise assessment.*

Regulation 164 (ca) (i) specifies that the auditor is to:

> *(i) … independently verify whether or not any noise assessment conducted for the wind energy facility was conducted in accordance with the relevant noise standard.*

EPA Victoria has issued Wind Energy Facility Noise Regulation Guidelines (November 2022) (EPA Guidelines), that provides some general guidance on the implementation of the EP Regulations pertaining to noise from WEFs (Regulation 131). It is understood that more detailed guidance will be provided at some time in the future.

EPA had previously issued Wind Energy Facility Noise Auditor Guidelines (Publication 1692, October 2018) (EPA 2018 Guidelines) to complement the DTP (DELWP) Guidelines, that set out the requirements for an audit of post-construction noise assessments (Section 2.4.2). In the current absence of any additional guidance from EPA in regard to the new EP Regulations, the scope of the verification was generally consistent with the EPA 2018 Guidelines.

The EPA Guidelines refers to the General Environmental Duty (GED) under the EP Act. Application of the GED requires engagement "in any activity that may give rise to risks of harm to human health or the environment from pollution or waste to minimise those risks, so far as reasonably possible". Specifically with respect to operation of WEFs: the EP Act (Section 166) imposes an obligation not to emit an unreasonable noise or permit an unreasonable noise to be emitted. To comply with the GED, the EP Regulations state that an operator of WEFs must ensure that wind turbine noise complies with the noise limits set out in the relevant noise standard. In this case, the standard referred to is NZS 6808:2010. It is noted that the Operator must also comply with a number of other requirements under Regulation 131, including the development of a Noise Management Plan (Regulation 131E) (including independent review by an Environmental Auditor appointed under Part 8.3 of the Environmental Protection Act 2017). Compliance with these requirements is not included in the scope of this verification. The Environmental

Reference Standard (ERS) provide noise indicators and objectives for various land use categories (Reference: Guide to the Environment Reference Standard, EPA Publication 1992, dated June 2021). However, assessment of turbine noise is directly addressed in the EP Regulations.

While this verification is strictly not an audit process, reference has also been made to the following EPA publications:

- Guidelines for Conducting Environmental Audits (EPA Publication 2041, dated February 2022)
- Environmental Auditor Guidelines for Appointment and Conduct (Publication 865.13, dated March 2022)

The verification process for the Yendon WEF was consistent with the relevant aspects of these EPA publications.

2.3 Auditor's additional comments

Specific guidelines such as NZS 6808:2010 have been developed to address the unique requirements for the prediction, measurement and assessment of sound from WEFs, because the usual measurement and assessment standards adopted in Victoria (such as AS 1055[4] and the previous EPA SEPP N-1[5]) and EPA Publication 1826[6] are unsuitable for WTG noise assessment. In addition, the Environment Reference Standard (ERS) does not provide specific guidance on noise from WEFs.

There are other standards and guidelines such as AS4959:2010[7], the draft National Guidelines[8], the UK ETSU-R-97[9] and the Annual Report of the National Wind Farm Commissioner[10] that can provide helpful background information and secondary guidance that can also assist with the assessment of projects where the Standard does not provide detailed or explicit guidance.

In particular, NZS 6808:2010 states that it does not set limits that provide absolute protection for residents from audible wind farm sound, but rather provides guidance on noise limits that are considered reasonable for protecting sleep and amenity from wind farm sound at noise sensitive locations.

3. Objective of the verification

The objective was to provide an auditor's opinion (verification) on the methodology and results for the post-construction noise assessment for the Yendon WEF, as provided in the report entitled Lal Lal Wind Farm – Yendon. Post-construction Noise Assessment (SLR Consulting Australia Pty Ltd, Report No 640.11872-R15, Version No V1.7, dated October 2023) (Post-construction Noise Assessment Report), as required by Condition 25(d) of the Planning Permit – and to confirm whether or not the assessment complies with the Noise Compliance Test Plan (NCTP) (Lal Lal Noise Compliance Test Plan, Marshall Day Report No. 003 R03 20170649, dated 23 January 2018), and the noise limits specified in Condition 23 of the Planning Permit.

The relevant noise standard is NZS 6808:2010, subject to the requirements of Condition 23 of the Planning Permit.

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[4] AS 1055.1-1997 *Acoustics - Description and measurement of environmental noise - General procedures*, Standards Australia, 1997.

[5] *State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1*, Victoria Government Gazette No. S31, 1989.

[6] Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues (EPA Publication 1826.4, dated May 2021)

[7] AS4959:2010 Acoustics – Measurement prediction and assessment of noise from wind turbine generators.

[8] *National Wind Farm Development Guidelines – Draft*, Environment Protection and Heritage Council, July 2010.

[9] *The Assessment and Rating of Noise from Wind Farms*, UK Department of Trade and Industry, ETSU-R-97, September 1996.

[10] *Annual Report to the Parliament of Australia*, Office of the National Wind Farm Commissioner, 31 March, 2017.

4. Applicable noise limits

Condition 23 of the Planning Permit states that the wind farm must comply with NZS 6808:2010, except for specific requirements provided in the condition.

In summary, these noise limits are consistent with NZS 6808:2010:

- Acceptable limit (40 dB LA90(10min), or background + 5 dB - whichever is higher
- Special Audible Characteristics (tonal, impulsiveness, or amplitude modulation) receive a penalty between 1–6 dB added to the L90 noise level, in accordance with Section 5.4 of NZS 6808:2010.

However, the following additional requirements are also included in Condition 23:

- Compliance must be assessed separately for all-time and night-time periods. These noise limits apply to all times of the day and night.
- The limits do not apply if an agreement has been entered into with any landowner waiving these limits.

5. Approach to verification process

The DTP Guidelines do not provide guidance on the verification process for a post-construction noise assessment.

The EPA has provided some general guidance for requirements under Regulation 131D of the EP Regulations, in the EPA Guidelines. However, guidance on the scope of a verification process is limited at this time, although it is understood that EPA will likely address this in the future.

Reference has therefore been made to the guidance provided in the previous EPA publication Wind Energy Facility Noise Auditor Guidelines (Publication 1692, October 2018). The verification process was generally consistent with Section 2.4.2 of Publication 1692, and included:

1. Inception meeting with LLWF management[11].
2. Review of background noise assessment.
3. Review of Noise Compliance Test Plan.
4. Technical verification of the Post-construction Noise Assessment Report, including:
    a. methodology applied to conduct the assessment
    b. noise monitoring equipment and parameters used
    c. sound modelling programs employed
    d. verification that assessment was conducted in line with the approved NCTP
5. Review of compliance of the Yendon WEF against the noise limits set out in Planning Permit Condition 23, based on the assessment provided in the Post-construction Noise Assessment Report
6. Risk assessment, including a qualitative statement on the risk of non-compliance (and operational plans to manage potentially adverse impacts).

[11] Inspection of the Yendon WEF site was not undertaken for this scope of work, since the auditor has previously inspected the general locations of sensitive receivers and monitoring sites.

7. Preparation of the Verification Statement and Report.

6. Documents reviewed for the verification process

6.1 Documents specific to the Yendon WEF

- Planning Approval PL-SP/05/0461-2 under the Moorabool Planning Scheme (Amendment dated 12 April 2022).
- Lal Lal Wind Farm – Yendon, Post-construction Noise Assessment (SLR Consulting Pty Ltd, Report No 640.11872-R15-v1.7, dated October 2023).
- Lal Lal Noise Compliance Test Plan (Marshall Day Acoustics Pty Ltd, Report No 003 R03 20170649, dated 23 January 2018).
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- Lal Lal Wind Farm Compliance Baseline Noise Monitoring (SLR Consulting Pty Ltd, Report No. 640.11872-R01, Version No v1.1, dated February 2021)

6.2 General references

- New Zealand Standard Acoustics -Wind Farm Noise NZS 6808:2010 (NZS 6808:2010)
- Planning Guidelines for Development of Wind Energy Facilities (Department of Transport and Planning, dated September 2023)
- Victoria Planning Provisions Clause 52-32
- *Environment Protection Act 2017* as amended by the *Environment Protection Amendment Act 2018*
- Environment Protection Regulations as amended by the Environment Protection Amendment (Wind Farm Noise) Regulations 2022
- Wind Energy Facility Turbine Noise Regulation Guidelines (EPA Publication, November 2022)
- Wind Energy Facility Noise Auditor Guidelines (EPA Publication 1692, October 2018)
- Guidelines for Conducting Environmental Audits (EPA Publication 2041, dated February 2022)
- Environmental Auditor Guidelines – Provision of statements and reports for environmental audits and preliminary risk screen assessments (EPA Publication 2022, August 2021)
- Environmental Auditor Guidelines for Appointment and Conduct (EPA Publication 865.13, dated March 2022)
- International Standard IEC61400-11:2012 Wind turbines – Part 11: Acoustic noise measurement techniques (IEC 61400-11:2012)
- International Standard ISO 1996-2:2007 Acoustics – Description, measurement and assessment of environmental noise – Part 2: Determination of environmental noise levels (ISO 1996-2:2007)

- Annual Report to the Parliament of Australia, Office of the National Wind Farm Commissioner, 31 March 2017.

7. Findings of verification process

The key findings of the verification process outlined in Section 5 are provided in this section, and address the objectives set out in Section 3.

7.1 Review of the WEF site

An inspection of the area surrounding the LLWF, including the Yendon WEF, was undertaken by the auditor on 28 October 2021. The intent of the site inspection was to ascertain the turbine placements in relation to the location of identified noise sensitive receiver locations, and the locations used for noise monitoring. The scope of the verification did not include confirming GPS locations of individual turbines as per the NCTP.

7.2 Review of background noise monitoring and determination of noise limits

While a detailed review of the background noise monitoring is not strictly required as part of this verification process, the measured background noise levels are used to set the noise limits at some wind speeds, for some of the noise sensitive locations. It is therefore helpful to review the background noise monitoring to confirm that the adopted noise limits have been determined appropriately.

The background noise monitoring was undertaken by Marshall Day Acoustics (MDA), and documented in the background noise monitoring report entitled Lal Lal Wind Farm, Background Noise Monitoring (MDA Report No. 001 R01 20170649, 1 March 2018) (Background Noise Monitoring Report).

The following key points were noted from a review of the Background Noise Monitoring Report:

7.2.1 Monitoring

- Background noise monitoring has been undertaken at 3 noise locations at the Yendon WEF, identified as receivers N31ab, M29aa and K34aa
- Detailed information regarding the microphone location at each monitoring location is provided, including individual aerial photographs showing specific measurement locations. This indicates that the measurement locations were located at appropriate positions relative to nearby sensitive receiver locations and the proposed locations of the wind turbines.
- The equipment adopted for the background noise level measurements, and wind shielding appears to be appropriate.
- The site wind-speed measurements have been undertaken using conventional anemometers located at various heights (up to 80 m) on two met-masts on the site. The hub-height (93 m AGL) wind speed has been calculated by Aurecon using the measured wind-shear coefficients. This method is appropriate.
- The background noise monitoring at N31ab and M29aa were undertaken over approximately 5 weeks during August and September 2017. K34aa was separately surveyed between 27 April and 01 June 2016.

7.2.2 Data analysis

- Over 4,000 noise level/wind speed 10-minute data pairs recorded at each location, with around 1,500 data points removed to exclude periods with extraneous noise or measured during rainfall. This exceeds the minimum requirement of 1,440 data pairs given in NZS 6808:2010.
- The regression analysis has been undertaken separately for all-time periods and the night-time periods in accordance with the Condition 23(b) of the Planning Approval. The data does not suggest that any further data sub-analysis is required, and appears to have been undertaken reasonably.

- A High Amenity noise limit is not indicated as being necessary (Farming Zone).
- The Auditor confirms that the derived noise limits in the Background Noise Monitoring Report are reasonable.

7.3 Review of Noise Compliance Test Plan

The NCTP (Lal Lal Wind Farm, Noise Compliance Test Plan (Marshall Day Acoustics Pty Ltd Report 003 R03 20170649, 23 January 2018) outlines the procedures to be undertaken to complete the operational (post-construction) noise compliance monitoring for the WEF. As discussed previously, the NCTP has been reviewed with an Independent Environmental Auditor's Opinion provided, and was subsequently endorsed by the Minister for Planning on 6 April 2018. It is therefore not the intent of this verification process to re-assess the efficacy of the already approved NCTP; however, it was reviewed to understand the relationship between NZS 6808:2010 and the intended approach to the post-construction noise assessment.

The key points were noted from a review of the NCTP, and discussion with SLR.

- The Planning Permit conditions listed in the NCTP Appendix F are understood to be those from Rev A (Permit No PL-SP/05/0461/A). The current Planning Permit (Permit No PL-SP/05/0461-2) was provided to the auditor. The wording of Condition 23 is slightly different; however, the intent of the condition has not changed.
- The noise measurement methodology developed in Section 4.2 of the NCTP is reasonable, and corresponds to the requirements of NZS 6808:2010.
- The noise limits have been determined in accordance with Condition 23 of the Planning Permit. These are consistent with NZS 6808:2010 except for the following:
    - NZS 6808:2010 provides operational noise limits for a 24 hour (all-time) period. Condition 23 of the Planning Permit also requires compliance based on an all-time period; however, it also requires compliance to be assessed separately for the night-time period (10pm – 7am)
    - NZS 6808:2010 does not differentiate between involved and non-involved receivers in regard to the noise limits. Condition 23 of the Planning Permit represents a modification in that the limits specified in this condition do not apply if an agreement has been entered into with the land owner waiving the limits.
- It has been identified by SLR that the all-time and night-time noise limits show in Tables 2 and 3 of the NCTP respectively included a transcription error, and did not match those established in the corresponding Tables 6 and 7 of the Background Noise Monitoring Report. The noise limits shown in the original Background Noise Monitoring Report are understood to be correct for those locations involved with the Yendon WEF.
- Additional procedures allow for the removal of measurement data that is adversely impacted by rainfall or extraneous noise. These procedures are well established, and are consistent with the requirements of NZS 6808:2010 and/or the NCTP.
- Screening for atypical wind farm operation is discussed in Section 5.3 of the NCTP, and adopts an approach of screening out periods where some turbines are not operational. This screening is undertaken on the basis that certain turbines are not considered relevant to the assessment where they are far enough from the particular sensitive receiver that their predicted noise contribution is less than or equal to 0.1 dB. This approach is understood to be consistent with the approach outlined in Explanatory Note C7.6.3 of NZS 6808:2010.
- Penalties for Special Audible Characteristics are to be determined in accordance with NZS 6808:2010.

The findings of the independent Environmental Auditor's Opinion of the approved NCTP (Phillip Bayne, Jacobs Group (Australia) Pty Ltd, memo entitled Proposed Lal Lal Wind Farm - Review of Lal Lal Wind Farm Noise Compliance, dated 24 January 2018) are noted, in regard to assessment of compliance with NZS 6808:2010. In particular, the Auditor's Opinion was that the NCTP does "formally recognise the

requirements of Planning Permit Condition 23 (in) that operational noise levels are to be measured and assessed in accordance with the Standard". It is also recognised that the Standard allows for "discretion / judgement in implementation of the NCTP, although not explicitly stated in the NCTP".

Based on this previous finding and that the NCTP has been approved, the auditor accepts that the methodology included in the NCTP is consistent with NZS 6808:2010, with allowance for the additional requirements of Condition 23 of the Planning Permit.

7.4 Technical verification of the post-construction noise assessment

Post construction compliance noise assessment has been undertaken by SLR and documented in their report Lal Lal Wind Farm – Yendon, Post-construction Noise Assessment (SLR Consulting Australia Pty Ltd, Report Ref. 640.11872-R15 v1.7, dated October 2023) (Post-construction Noise Assessment Report).

Key aspects of the verification of the Post-construction Noise Assessment Report are provided in the following sections.

7.4.1 General considerations

- The overall approach undertaken by SLR, as documented in the Post-construction Noise Assessment Report, is consistent with the methodology outlined in the approved NCTP.
- The Planning Permit requires compliance with NZS 6808:2010, except as allowed for under Condition 23. As noted in Section 7.4, the previous Auditor's Opinion was that the NCTP does "formally recognise the requirements of Planning Permit Condition 23 (in) that operational noise levels are to be measured and assessed in accordance with the Standard". The two additional considerations provided in Condition 23 are:
    - Compliance must be assessed separately for all-time and night-time periods. These noise limits apply to all times of the day and night.
    - The limits do not apply if an agreement has been entered into with any landowner waiving these limits.
- Condition 25 (c) of the Planning Permit requires a "final compliance report must be submitted to the Minister for Planning after a 12 month period following full operation of the facility". Due to grid and transmission constraints, the Yendon WEF could not strictly comply with this timeline. In addition, from a practical perspective, not all turbines will be available (eg regular maintenance), or online at "normal" operational capacity at any one time. The auditor accepts the justification provided by SLR for the assessment of Yendon WEF in isolation from the Elaine WEF (Refer to Section 1).
- To address this practical "full operation" requirement, the use of "relevant turbines" for individual sensitive receivers was provided in Section 5.3 of the NCTP. This approach is understood to be consistent with the approach outlined in Explanatory Note C7.6.3 of NZS 6808:2010.
- The assessment of the data is quite thorough and consistent with the general approach outlined in the approved NCTP, and indicates compliance with the relevant noise limits. However, the findings at the recent Supreme Court Hearing on the Bald Hills Wind Farm (Reference: Cited as Uren vs Bald Hills Wind Farm Pty Ltd, VSC145, 2022) has raised some issues on which data may be excluded from the noise assessment process. Whilst acknowledging that the Bald Hills case should be treated in isolation because of the specific circumstances of that case, it may have precedent for broader noise assessment of wind farm compliance. The auditor has discussed this matter with EPA; however, to date no written advice has been received on any changes to the current interpretation of the assessment process under NZS6808:2010. Until such advice is received, the Auditor accepts that compliance with the assessment methodology in the approved NCTP is consistent with compliance with NZS 6806:2010.

7.4.2 Noise assessment

The first objective of the verification process was to assess whether the post-construction noise compliance assessment, as provided in the Post-construction Noise Assessment Report, was conducted in accordance with Condition 23 of the Planning Permit. As stated above, compliance with the noise measurement and assessment methodology in the approved NCTP is considered to be consistent with compliance with the requirements of NZS 6808:2010, subject to the requirements of Condition 23 of the Planning Permit.

7.4.2.1 Monitoring program

Key observations/ findings in regard to the monitoring program are summarised as follows:

- The monitoring was undertaken by SLR, a suitably qualified and experienced specialist acoustics company. The level of technical information in the Post-construction Noise Assessment Report provided to the Auditor is appropriate for the verification process.
- The Monitoring Program was consistent with Sections 4.1 and 4.2 of the NCTP.
- Post-construction (operational) noise monitoring for the Yendon section of the wind farm has been undertaken at noise sensitive locations N31ab, M29aa, and K34aa as identified in the NCTP.
- The post-construction (operational) wind farm noise was measured for approximately 9 weeks between 26 May and 01 August 2022, using appropriate measurement equipment that was calibrated and used an 'enhanced' windscreen.
- Site wind speed data was generally determined from anemometers located at hub-height (93 m AGL) on the wind farm site. For some periods the met-mast anemometer was inoperable, and hub-height wind speeds were based on nacelle anemometers at turbines on the site. The wind speed data has been wake-corrected by a third-party wind engineer (Aurecon).
- Local ground level wind speed and precipitation were also measured by (Vaisala) weather stations situated at each sensitive receiver location.

7.4.2.2 Data Assessment

Key observations/ findings in regard to the screening of data used by SLR for screening of data (as presented in Section 7 of the Post-construction Noise Assessment Report):

- The raw data was screened by excluding data intervals as follows;

  a. Periods of rain

  b. Hub height wind speeds > 20 m/s and < 3m/s (turbine cut in)

  c. Periods potentially affected by extraneous noise

  This approach is consistent with the analysis outlined in Section 5.0 of the NCTP.
- The compliance assessment has been undertaken on data for 'all-time' (ie 24-hour) and 'night-time' (2200-0700hrs) periods separately, as required by the Planning Permit.
- A cubic polynomial has been used to determine the regression line for the noise level/wind speed data.
- Relevant Turbines

  When one or more wind turbines 'relevant' to the total noise level at each noise sensitive receiver were not operating, based on their predicted noise level contribution being < 0.1 dB at the sensitive receiver, this was deemed to be inconsequential to the assessment outcome (refer Section 5.3 of NCTP) (referred to as the *NCTP method*).

  The *NCTP method* of assessment requires consideration of all turbines based on a predicted individual "relevant" turbine noise contribution of < 0.1 dB at a sensitive receiver location. However, this method results in the exclusion of a very large proportion of the noise and wind-speed

measurement data.

SLR have therefore also evaluated compliance based on an alternative method adopting a noise level contribution from 'relevant' turbines of < 0.5 dB (rather than < 0.1 dB), which generally results in much less data exclusion. This alternative approach is reasonable, and the measured WEF sound levels determined using this approach are considered to be a suitably accurate measurement of the wind farm sound level at the noise sensitive receivers.

- Special Audible Characteristics

  SLR provide an assessment in Section 8 of the Post-construction Noise Assessment Report.

  a. SLR undertook subjective evaluation of Special Audible Characteristics (SACs), including tonality, impulsiveness and amplitude modulation (AM). The subjective assessment resulted in the identification of a potentially audible and discernible tonal noise at some locations.

     An objective assessment of the tonality was therefore undertaken in accordance with Annex J of ISO 1996-2:2017 Acoustics – Description, measurement and assessment of environmental noise – Part 2: Determination of sound pressure levels and ISO/PAS 20065:2016 Acoustics – Objective method for assessing the audibility of tones in noise – Engineering method, and appropriate penalties applied to the measurement data prior to the regression analysis. This approach is consistent with Section 5.8 of the NCTP and Appendix B of NZS 6806:2010.

  b. Objective assessment of impulsiveness and amplitude modulation is not indicated, and accordingly has not been undertaken.

     The Auditor considers that this approach is reasonable and is it consistent with the NCTP and NZS 6808:2010.

7.4.3 Compliance with Noise Limits

The second objective of the verification process was to assess whether the post-construction noise assessment confirmed compliance with the noise limits in Condition 23 of the Planning Permit. SLR provided a summary of the compliance issues in Sections 10 and 11 of the Post-construction Noise Assessment Report. Key observations/ findings are summarised as follows:

- The high sensitivity of the NCTP method for excluding data based on turbine operation coupled with regular turbine downtime due to ongoing commissioning and AEMO generation constraints placed on the wind farm operator has resulted in between 85–90% of the measurement data being excluded from the analysis. SLR have therefore also evaluated compliance based on an alternative method adopting a noise level contribution from 'relevant' turbines of 0.5 dB (rather than 0.1 dB), which results in far less data exclusion, and allows for a much more reasonable number of data points.
- The compliance assessment adopted both the 0.1 dB '*NCTP method'* for screening periods with inoperable turbines, and the alternative '*0.5 dB screening method*' which are presented in Appendices B and C respectively of the Post-construction Noise Assessment Report.
- The analysis of data adopting the 0.1 dB 'NCTP method' indicates that the measured post-construction wind farm sound levels are compliant with the established noise limits at all measurable wind speeds. However, there is only a relative small margin of compliance at night-time at wind speeds around 10-11 m/s.
- When the alternative '0.5 dB screening method' is adopted (which provides less screening of inoperable turbines, and therefore a greater number of measurement periods), the analysis indicates that the measured operational wind farm sound level marginally exceeds the established noise limits at wind speeds around 10 m/s at N31ab and K34aa.
- The marginal exceedance is attributed by SLR to seasonal extraneous noise from wildlife.

On this basis, the auditor does not believe that the assessment in the Post-construction Assessment Report currently demonstrates that the Yendon WEF complies with the noise limits for all noise sensitive receivers as set out in accordance Condition 23 of the Planning Permit.

Nevertheless, it is accepted that it is possible that the current measurements are affected by extraneous noise, and as such, there is currently insufficient data to be able to determine whether compliance has been achieved. Therefore, it is recommended that further noise measurements are undertaken at the receivers with a view to minimising the impact of extraneous noise sources. It is understood that these noise level measurements will be undertaken during Stage 2 compliance measurements required under by the Planning Permit.

7.5 Cumulative impacts

The Post-Construction Noise Assessment Report states that due to the 10 km separation of the Elaine and Yendon sections of the Lal Lal WEF, that there are no significant cumulative impacts due to the operation of the Elaine WEF.

7.6 Risk assessment

The EP Guidelines identify a number of requirements in the EP Regulations, to monitor, report and respond to noise generated by a WEF, including:

- Post-construction noise assessment (Regulation 131D)
- Noise Management Plan (NMP), verified by an EPA appointed Auditor (Reg 131E)
- Provision of an annual statement detailing the actions that have been taken to ensure compliance (Reg 131F)
- Noise monitoring every 5 years (Reg 131G)

The NMP is to include an evaluation of likelihood and consequence of risk, development of a risk matrix and risk management approach. It also needs to include consideration of control measures to address noise related hazards and determination of residual risks. It is understood that Lal Lal is currently preparing a NMP for consideration by an EPA appointed Environmental Auditor.

The implementation of an NMP that includes assessment and management of these elements of risk is considered appropriate.

The EP Act introduced a General Environmental Duty (GED) to take reasonable steps to minimise risks of harm to human health and the environment, as well as “unreasonable noise” provisions. A risk of noncompliance with NZS 6808:2010 is taken to be a risk to the beneficial use of the environment, specifically with respect to the amenity of residents in the noise sensitive locations. Based on the measured operational sound levels, there is a risk to this beneficial use because compliance with NZS 6808:2010 has not been adequately demonstrated.

7.7 Compliance with NZS 6808:2010

A full checklist addressing the specific requirements of NZS6808:2010 is attached in Appendix A.

As noted in Section 7.3, the noise limits have been determined in accordance with Condition 23 of the Planning Permit. These are consistent with NZS 6808:2010 except for the following:

- NZS 6808:2010 provides operational noise limits for a 24 hour (all-time) period. Condition 23 of the Planning Permit also requires compliance based on an all-time period; however, it also requires compliance to be assessed separately for the night-time period (10pm – 7am)
- NZS 6808:2010 does not differentiate between involved and non-involved receivers in regard to the noise limits. Condition 23 of the Planning Permit represents a modification in that the limits specified in this condition do not apply if an agreement has been entered into with the land owner waiving the limits.

8. Conclusion

David Spink, an Environmental Auditor appointed under the *Environment Protection Act 2017*, has completed an independent verification of the post-construction nose assessment of the Yendon WEF, part of the Lal Lal Wind Farm.

The objective was to provide an auditor's opinion (verification) on the methodology and results for the post-construction noise assessment for the Yendon WEF, as provided in the Post-construction Noise Assessment Report, as required by Condition 25(d) of the Planning Permit.

The verification process concluded that the post-construction noise assessment for the Yendon WEF, as provided in the Post-construction Noise Assessment Report:

- Has been conducted in compliance with the approved NCTP
- Indicates that the measured post-construction wind farm sound levels are compliant with the established noise limits at all measurable wind speeds when analysing the data adopting the 0.1 dB 'NCTP method'. However, it is noted that, there is only a relative small margin of compliance at night-time at wind speeds around 10–11 m/s.
- An alternative '0.5 dB screening method' has also been adopted, for consistency with the assessment of the Elaine WEF. The '0.5 dB screening method' provides less screening of inoperable turbines, and therefore a greater number of measurement periods., This analysis indicates that the measured operational wind farm sound level marginally exceeds the established noise limits at wind speeds around 10 m/s at N31ab and K34aa.
- The marginal exceedance is attributed by SLR to seasonal extraneous noise from wildlife. Additional wind farm sound level measurements planned for Stage 2 of the compliance monitoring will be required to clarify the Yendon WEF sound levels at these locations and demonstrate compliance with the required noise limits in the Planning Permit.

Appendix A

New Zealand Standard NZS 6808:2010 Acoustics Wind Farm Noise – Checklist

A.1 NZS 6808:2010 – Checklist

Information Source:

Lal Lal Wind Farm – Yendon. Post-construction Noise Assessment (SLR Consulting Australia Pty Ltd, Report Ref 640.11872-R15 Version v1.7, October 2023.

NZS6808:2010 Section/Clause	NZS 6808:2010 Requirement	Reference from Information Source	Assessment	Compliance
5.2	Noise Limit	Section 5	Noise limits based on measured background noise level analysis. The noise limits have been determined in accordance with Condition 23 of the Planning Permit. These are consistent with NZS 6808:2010 except for the following: ○ NZS 6808:2010 provides operational noise limits for a 24 hour (all-time) period. Condition 23 of the Planning Permit also requires compliance based on an all-time period; however, it also requires compliance to be assessed separately for the night-time period (10pm – 7am) ○ NZS 6808:2010 does not differentiate between involved and non-involved receivers in regard to the noise limits. Condition 23 of the Planning Permit represents a modification in that the limits specified in this condition do not apply if an agreement has been entered into with the land owner waiving the limits.	Comply
5.4.3	Assessments for Special Audible Characteristics conducted in Accordance with Appendix B.	Section 8.3 Appendix D	Subjective assessment indicated tonality. Objective analysis undertaken.	Comply
Appendix B1	Subjective assessment can be sufficient in some circumstances to assess special audible characteristics	Appendix D	Subjective assessment indicated no impulsiveness or AM	Comply
Appendix B2	Tonality: Reference test method shall be that prescribed as Annex C to ISO 1996-2:2007 or an equivalent method	Section 8.3.2	ISO1996-2:2017 Appendix J and ISO/PAS 20065:2016 adopted for objective assessment of tonality.	Comply
Appendix B3	Amplitude Modulation:	Section 8.3	No subjective identification of AM	Comply
S7.5.1	Post-installation sound level, shall, where practical, be measured at the same locations where the background sound levels were determined	Appendix B and C	Post-installation sound levels measured at same locations where background sound levels were determined	Comply

NZS6808:2010 Section/Clause	NZS 6808:2010 Requirement	Reference from Information Source	Assessment	Compliance
S7.5.2	Scatter plots of post installation sound levels against wind speed.	Appendix B and C	Scatter plots are shown	Comply
S7.5.3	Contribution of background sound removed from regression curve at each integer wind speed	Appendix B and C, Tables 13-24	Background sound has been subtracted from regression curve at each integer wind speed	Comply
S7.5.4	Assessment for SACS shall be undertaken covering range of operational wind speeds	Appendix D	Subjective assessment has been undertaken. Objective measurement of tonality has been undertaken.	Comply
S7.6.2	Conformance with limits by comparing best fit regression of background sound and wind farm sound levels adjusted for SACs	Appendix B and C	Regression curves shown in appendices include background sound curves and wind farm sound levels adjusted for SACs	Comply
S8.3	Report of post-installation wind farm sound level measurements shall provide;			
	(a) Description of sound monitoring equipment including any ancillary equipment	Table 2 and Table 3		Comply
	(b) Statement confirming the use of A-frequency weighting	Table 2		Comply
	(c) The location of sound monitoring positions	Appendix B		Comply
	(d) Description of the anemometry equipment including the height AGL of the anemometer	Table 2		Comply
	(e) Position of wind speed measurements	Table 2		Comply
	(f) Make and model of the wind turbines	Section 1		Comply
	(g) Number of operational wind turbines	Section 1		Comply
	(h) Time and duration of monitoring period	Table 3		Comply
	(i) Averaging period for both sound and wind speed measurements	Table 2		Comply

NZS6808:2010 Section/Clause	NZS 6808:2010 Requirement	Reference from Information Source	Assessment	Compliance
	(j) Atmospheric conditions: the wind speed and direction at the wind farm position and rainfall shall be recorded.	Table 2		Comply
	(k) Number of data pairs measured	Table 3		Comply
	(l) Description of the regression analysis	Section 9		Comply
	(m) Graphical plots showing the data scatter and the regression lines	Appendix B & C		Comply
	(n) Graphical plots showing the data scatter and the regression lines for both the background and the wind farm in operation	Appendix B & C		Comply
	(o) Assessment of special audible characteristics	Section 8 and Appendix D		Comply
	(p) A statement that the wind farm complies with relevant limits – or not – as determined from the results of the measurements	Section 11		Comply