

Lal Lal Wind Farms Nom Pty
Limited

Lal Lal Wind Farm - Elaine
Verification of Post-construction
Noise Assessment

270849-00

Issue | 28 June 2022

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 270849-00







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Document verification

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Appendices

Appendix A

New Zealand Standard Acoustics Wind farm noise NZS 6808:2010 Checklist

Distribution

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

22 June 2022

Copies	Recipient
1 PDF	Pedro Vozone Technical Manager Lal Lal Wind Farms Co Pty Limited c/- RES Australia Pty Ltd Suite 6.01 Level 6 165 Walker Street North Sydney NSW 2055
1 PDF	Manager Environmental Audit Environmental Audit Unit EPA Victoria 200 Victoria Street Carlton Vic 3053
1 PDF	Arup Project File

Auditor Verification Statement

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

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

1. Been requested by Lal Lal Wind Farms Nom Co Pty Limited c/- RES Australia Pty Ltd to undertake a verification process for the post-construction noise assessment for the Elaine component of the Lal Lal Wind Energy Facility (Elaine WEF), undertaken by SLR Consulting Australia Pty Ltd (SLR).
2. Specifically, I have been requested to independently verify whether or not the post-construction noise assessment as provided in the report entitled SLR Consulting Pty Ltd Lal Lal Wind Farm – Elaine, Compliance Noise Monitoring, Report No 640.11872-R04-v1.7, dated June 2022) (Post-construction Noise Assessment Report) complies with Regulation 131D (2) of the Environment Protection Amendment (Interim) Regulations 2021 (Regulations), in accordance with Regulation 164 (ca) (i).
3. Regulation 131D(2) requires that the Verification process must assess whether the Post-construction Noise Assessment has:
 - Been conducted in accordance with NZS 6808:2010 by a suitably qualified and experienced acoustician; and
 - Demonstrates whether or not the facility complies with the noise limits set out in accordance with NZS 6808:2010.
4. Having regard to, (amongst other things)
 - *Environment Protection Act 2017* as amended by the *Environment Protection Amendment Act 2018*
 - Environment Protection Amendment (Interim) Regulations 2021
 - Planning Approval PL-SP/05/0461/C under the Moorabool Planning Scheme (Amendment dated 27 September 2018)
 - New Zealand Standard Acoustics – Wind Farm Noise NZS 6808:2010 (NZS 6808:2010)

and the following relevant documents

- SLR Consulting Pty Ltd Lal Lal Wind Farm – Elaine, Compliance Noise Monitoring, Report No 640.11872-R04-v1.7, dated June 2022.
- Marshall Day Acoustics Lal Lal Noise Compliance Test Plan, Report No 003 R03 20170649, dated 23 January 2018.
- 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
- Background Monitoring Report: Marshall Day Acoustics Lal Lal Wind Farm Background Noise Monitoring Report No 001 R01 20170649, dated 01 March 2018.

- Pre-construction Predictive Modelling Assessment Report: Marshall Day Acoustics Lal Lal Wind Farm Pre-Development Noise Assessment Report No 002 20170649, dated 17 January 2018.
- Planning Approval PL-SP/05/0461/C under the Moorabool Planning Scheme (Amendment dated 27 September 2018).
- Lal Lal Wind Farm Compliance Baseline Noise Monitoring (SLR Reference: 640.11872-R01, Version No v1.1, dated February 2021)
- Wind Energy Facility Turbine Noise Regulation Guidelines (EPA Publication, March 2022)
- Wind Energy Facility Noise Auditor Guidelines (EPA Publication 1692, October 2018)
- Development of Wind Farm Facilities in Victoria – Policy and Planning Guidelines (Department of Environment, Land, Water and Planning, July 2021)
- 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)
- Victoria Planning Policy (Amendment VC124 – 2015) Clause 52-32-5

5. Hereby declare that I am of the opinion that:

- The post-construction noise assessment for the Elaine WEF (SLR Consulting Pty Ltd Lal Lal Wind Farm – Elaine, Compliance Noise Monitoring, Report No 640.11872-R04-v1.7, dated June 2022) has been conducted in compliance with the approved NCTP (Marshall Day Acoustics Lal Lal Noise Compliance Test Plan, Report No 003 R03 20170649, dated 23 January 2018). 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, except where the NCTP requires alternative methods.
- The post-construction noise assessment (SLR Consulting Pty Ltd Lal Lal Wind Farm – Elaine, Compliance Noise Monitoring, Report No 640.11872-R04-v1.7, dated June 2022) demonstrates that the Elaine WEF complies with the noise limits set out in accordance with NZS 6808:2010 and Condition 23 of Planning Permit No PL-SP/05/0461/C.

Dated: 28 June 2022

Signed



David W Spink

Environment 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
EPA	Environment Protection Authority Victoria
ERS	Environment Reference Standard
MDA	Marshall Day Acoustics Pty Ltd
NCTP	Noise Compliance Test Plan
NMP	Noise Management Plan
NZS 6808:2010	New Zealand Standard Acoustics – Wind Farm Noise NZS 6808:2010
Regulations	Environment Protection Amendment (Interim) Regulations 2021
SAC	Special Audible Characteristic
SLR	SLR Consulting Australia Pty Ltd
Standard	New Zealand Standard Acoustics – Wind Farm Noise NZS 6808:2010
WEF	Wind Energy Facility

1 Background to Verification

The Lal Lal Wind Farm 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), co-owned by Northleaf Capital Partners (40%), InfraRed Capital Partners (40%) and Macquarie Capital (20%), operated by RES Australia Pty Ltd, engaged Vestas Australian Wind Technology Pty Ltd to construct and operate the windfarm, using Vestas model V136-3.45MW turbines. Hereinafter the wind farm will be referred to as the Wind Energy Facility (WEF) which is consistent with Victorian Government terminology.

The WEF has two sections 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 at Elaine (Elaine WEF).

Lal Lal engaged SLR Consulting Australia Pty Ltd (SLR) to undertake a post-construction noise assessment of the WEF, in compliance with the Planning Permit No PL-SP/05/0461/C. The following quotation is provided in the SLR report Lal Lal Wind Farm – Elaine. Post-construction Noise Assessment (SLR Ref 640.11872-R04, Version No V1.7, dated June 2022) (Post-construction Noise Assessment Report):

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/C amended September 2018.

The wind farm is electrically and mechanically complete and has been released by the market operator to generate at full power however it has not reached practical completion. As a result for extended periods during the monitoring the Yendon portion of the wind farm not been able to operate at full capacity due to on-going maintenance and other extensive works on site which has reduced the turbine availability on site as well as grid outages.

The turbines of the Yendon and Elaine portions of the wind farm 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.

David Spink, an Environmental Auditor appointed under the *Environment Protection Act 2017*, has undertaken an independent verification (Verification) of the post-construction noise assessment of the Elaine WEF, in compliance with sub-regulation 131D(3)(b) of the Environment Protection Amendment (Interim) Regulations 2021- Specifically, to verify whether or not whether the post-construction noise assessment was conducted in accordance with the relevant noise standard, and whether or not the assessment demonstrates that the WEF complies with the applicable noise limits. The Environmental 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 report provides the Verification Statement and findings of the Verification process for the post-construction noise assessment of the Elaine WEF.

Note: 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.

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/C issued on 27 September 2018. This Planning Permit included conditions which specified requirements for the control of noise from the Lal la Wind Farm.

Key conditions and current status pertaining 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;*
- 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.

A Noise Compliance Test Plan (NCTP) was prepared by Marshall Day Acoustics Pty Ltd (MDA): Lal Lal Noise Compliance Test Plan (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: Lal Lal Wind Farm – Elaine, Compliance Noise Monitoring (Report No 640.11872-R04-v1.7, dated June 2022).

(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 requirement has been superseded by a requirement in the Regulations (Regulation 131D (3)(b)) to provide a Verification Statement and report by an Auditor appointed under the *Environment Protection Act 2017* (this report).

2.2 DELWP Requirements

The WEF must satisfy the requirements of DELWP, as specified in the publication - Development of Wind Farm Facilities in Victoria – Policy and Planning Guidelines (DELWP, July 2021) (DELWP Guideline). This publication replaces a March 2019 version and provides guidance on noise limits and assessment in Section 5.1.2, with reference to the Standard. The DELWP Guideline acknowledges 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.

2.3 EPA Requirements

The introduction of the Environment Protection Amendment (Interim) Regulations 2021 (Regulations) under the *Environment Protection Act 2017*, provides the current framework for post-construction noise assessment and the verification process. Specifically, Reg 131D of the Regulations provides requirements that 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 (March 2022), that provides some general guidance on the implementation of the Regulations pertaining to noise from WEFs (Reg 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 Guideline) to complement the DELWP Guideline, 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 Regulations, the scope of the Verification was generally consistent with the EPA Guideline.

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 Regulations.

The Wind Energy Facility Turbine Noise Regulation Guidelines (EPA, published March 2022) refers to the General Environmental Duty (GED) under the *Environment Protection Act 2017*. 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 *Environment Protection Act 2017* (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 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.

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 Elaine WEF was consistent with the relevant aspects of these EPA publications.

2.4 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 1055¹ and the previous EPA SEPP N-1²) are unsuitable. In addition, the Environment Reference Standard (ERS) does not provide specific guidance on noise from WEFs.

There are other standards and guidelines such as AS4959:2010³, the draft National Guidelines⁴, the UK ETSU-R-97⁵ and the Annual Report of the National Wind Farm Commissioner⁶ 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 Objectives of the Verification

The objectives of the Verification were to assess whether or not the Post-construction Noise Assessment, as provided in the SLR report entitled Lal Lal Wind Farm – Elaine. Post-construction Noise Assessment (SLR Ref 640.11872-R04, Version No V1.7, dated June 2022) (Post-construction Noise Assessment Report), demonstrates that the Elaine WEF complies with the requirements set out in Reg 131D(2) of the Regulations.

Reg 131D(2) states:

A Post-construction Noise Assessment must:

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

¹ AS 1055.1-1997 *Acoustics - Description and measurement of environmental noise - General procedures*, Standards Australia, 1997.

² *State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1*, Victoria Government Gazette No. S31, 1989.

³ AS4959:2010 *Acoustics – Measurement prediction and assessment of noise from wind turbine generators*.

⁴ *National Wind Farm Development Guidelines – Draft*, Environment Protection and Heritage Council, July 2010.

⁵ *The Assessment and Rating of Noise from Wind Farms*, UK Department of Trade and Industry, ETSU-R-97, September 1996.

⁶ *Annual Report to the Parliament of Australia*, Office of the National Wind Farm Commissioner, 31 March, 2017.

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

Reg 164(ca)(i) states that the Environmental Auditor must "... independently verify whether or not any noise assessment conducted for [the Elaine] wind energy facility was conducted in accordance with the relevant noise standard."

The relevant noise standard is NZS 6808:2010.

4 Applicable Noise Limits

The noise limits specified in NZS 6808:2010 are:

- Acceptable limit (40 dB $L_{A90(10min)}$, or background + 5 dB - whichever is higher (Section 5.2)
- High Amenity Areas (35 dB $L_{A90(10min)}$, or background + 5 dB - whichever is higher (Section 5.3)
- Special Audible Characteristics (tonal, impulsiveness, or amplitude modulation) receive a penalty between 1–6 dB added to the L_{90} noise level (Section 5.4.2).

These noise limits provided in the NZS 6808:2010 apply to all times of the day and night.

Condition 23 of Planning Permit No PL-SP/05/0461/C is consistent with these requirements of NZS 6808:2010. The Planning Permit also includes additional requirements (refer to Section 2.1 of this Report).

5 Approach to Verification Process

EPA Victoria has provided some general guidance for requirements under Reg 131D of the Regulations, of post-construction noise assessments in the publication Wind Energy Facility Turbine Noise Regulation Guidelines (EPA Publication, dated March 2022). 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 relatively consistent with Section 2.4.2 of Publication 1692, and included:

1. Inception meeting with Lal Lal management.
2. Inspection of the Elaine WEF site, particularly the locations of sensitive receivers and monitoring sites.
3. Review of background noise assessment.
4. Review of Noise Compliance Test Plan.
5. 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 NZS 6808:2010.
6. Review of compliance of the Elaine WEF against the noise limits set out in NZS 6808:2010, based on the assessment provided in the Post-construction Noise Assessment Report
7. Risk assessment, including a qualitative statement on the risk of non-compliance (and operational plans to manage potentially adverse impacts).
8. Preparation of the Verification Report.

6 Documents Reviewed for the Verification Process

6.1 Documents specific to the Lal Lal WEF

- SLR Consulting Pty Ltd Lal Lal Wind Farm – Elaine, Compliance Noise Monitoring, Report No 640.11872-R04-v1.7, dated June 2022.
- Marshall Day Acoustics Lal Lal Noise Compliance Test Plan, Report No 003 R03 20170649, dated 23 January 2018.
- 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
- Background Monitoring Report: Marshall Day Acoustics Lal Lal Wind Farm Background Noise Monitoring Report No 001 R01 20170649, dated 01 March 2018.
- Pre-construction Predictive Modelling Assessment Report: Marshall Day Acoustics Lal Lal Wind Farm Pre-Development Noise Assessment Report No 002 20170649, dated 17 January 2018. Planning Approval PL-SP/05/0461/C under the Moorabool Planning Scheme (Amendment dated 27 September 2018).
- Lal Lal Wind Farm Compliance Baseline Noise Monitoring (SLR Reference: 640.11872-R01, Version No v1.1, dated February 2021)

6.2 General references

- Environment Protection Amendment (Interim) Regulations 2021
- Wind Energy Facility Turbine Noise Regulation Guidelines (EPA Publication, March 2022)
- Wind Energy Facility Noise Auditor Guidelines (EPA Publication 1692, October 2018)
- Development of Wind Farm Facilities in Victoria – Policy and Planning Guidelines (Department of Environment, Land, Water and Planning, July 2021)
- 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)

- Victoria Planning Policy (Amendment VC124 – 2015) Clause 52-32-5
- 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 Lal Lal site, including the Elaine WEF, was undertaken by the Environmental 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:

- Background noise monitoring has been undertaken at 3 noise locations at the Elaine section of the WEF, identified as receivers H18aa, K15aa and L18aa.
- 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.
- It was identified that the two measurement locations adopted for K15aa may have been affected by extraneous noise sources, and subsequent measurements were undertaken by SLR to establish reasonable limits (Reference: Lal Lal Wind Farm Compliance Baseline Noise Monitoring (SLR Reference: 640.11872-R01, Version No v1.1, dated February 2021).

- 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 has been undertaken over approximately 5 weeks during August and September 2017. Additional measurements were undertaken by MDA at K15aa during October, November and December 2017.
- 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 the Standard.
- 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, notwithstanding the limitations identified at Location K15aa, the derived noise limits in the Background Noise Monitoring Report are reasonable.

Between July and November 2019 SLR undertook further background monitoring at Location K15aa with the objective of collecting representative pre-operational baseline conditions for this location where in the earlier MDA monitoring campaigns the data had been unduly influenced by extraneous noise sources. The updated baseline regressions curve for this receptor are documented in SLR report Lal Lal Wind Farm Compliance Baseline Noise Monitoring (ref: 640.11872-R01).

7.3 Review of Noise Compliance Test Plan

The NCTP for the WEF (MDA, Lal Lal Wind Farm, Noise Compliance Test Plan, 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.

- 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 (with the exception of location K15aa,

which have been established by subsequent baseline noise monitoring undertaken by 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 Permit (Permit No PL-SP/05/0461/C) was provided to the Environmental 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.
- 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.
- 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".

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 – Elaine, Compliance Noise Monitoring (SLR Report Ref. 640.11872-R04 v1.7 June2022) (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. By inference, compliance with the approved NCTP ensures compliance with NZS 6808:2010, except where the NCTP requires alternative methods.

- 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 Lal Lal WEF has not been practically able to reach a state of “full operation” to date. 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 Environmental Auditor accepts the justification provided by SLR for the assessment of Elaine WEF in isolation from the Yendon 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 Environmental Auditor has discussed this matter with EPA Victoria; however, to date no advice has been received on any changes to the current interpretation of the assessment process under NZS6808:2010. Until such advice is received, the Environmental 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 NZS 6808:2010. 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, except where the NCTP requires alternative methods.

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 Environmental 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 Elaine section of the wind farm has been undertaken at noise sensitive locations K15aa, H18aa and L18aa as identified in the NCTP.

- As noted above in Section 7.2, the initial background noise level measurements at location K15aa were considered to be influenced by ambient noise, and so noise limits for that location are based on additional background noise level monitoring undertaken by SLR between July and November 2019 at an alternative location near to the property, but less impacted by ambient noise sources at the residence.
- The post-construction (operational) wind farm noise was measured for approximately 8 weeks from March to May 2021 using appropriate measurement equipment that was calibrated and used an ‘enhanced’ windscreen.
- Site wind speed data was determined from anemometers located at hub-height (93 m AGL) on the wind farm site, and wake-corrected by a third-party wind engineer (Aurecon).
- Local ground level wind speed and precipitation were also measured by 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 5 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 < 3 m/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 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 both the NZS 6808:2010 and the Planning Permit. SLR provide a summary of the compliance issues in Section 9 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 (around 40–65% of the data is excluded), and allows for a much more reasonable number of data points. This alternative approach is reasonable, and the measured wind farm 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.
- 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’ is

presented in Appendices B and C respectively of the Post-construction Noise Assessment Report.

- In Appendix B, it is apparent that a significant number of noise level/wind speed data pairs have been excluded by the ‘*NCTP method*’ analysis. A much more representative number of data pairs are included in the alternative ‘*0.5 dB screening method*’ analysis shown in Appendix C.
- Nevertheless, in both cases, the analysis demonstrates that measured post-construction wind farm sound levels are compliant with the established noise limits at all measurable wind speeds. In each case there is a significant margin of compliance.

The Environmental Auditor agrees that the assessment in the Post-construction Assessment Report demonstrates that the Elaine WEF complies with the noise limits set out in accordance with NZS 6808:2010 and Condition 23 of Planning Permit No PL-SP/05/0461/C.

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 WEF, that there are no significant cumulative impacts due to the operation of the Yendon section of the WEF.

7.6 Risk Assessment

The Wind Energy Facility Turbine Noise Regulation Guidelines (EPA Publication, March 2022) identify a number of requirements in the Regulations, to monitor, report and respond to noise generated by a WEF, including:

- 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 *Environment Protection Act 2017* 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 predicted sound levels, it is expected that the risk to this beneficial use will be low due to compliance with NZS 6808:2010.

7.7 Compliance with NZS 6808:2010

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

8 Conclusion

David Spink, an Environmental Auditor appointed under the Environment Protection Act 2017, has completed an independent Verification of the Elaine WEF, part of the Lal Lal Wind Farm. The objectives of the Verification process were to assess whether or not the Post-construction Noise Assessment, as provided in the SLR report entitled Lal Lal Wind Farm – Elaine. Post-construction Noise Assessment (SLR Ref 640.11872-R04, Version No V1.7, dated June 2022) (Post-construction Noise Assessment Report), demonstrates that the Elaine WEF complies with the requirements set out in Reg 131D(2) of the Regulations.

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

- been conducted in compliance with the approved NCTP (Marshall Day Acoustics Lal Lal Noise Compliance Test Plan, Report No 003 R03 20170649, dated 23 January 2018). 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, except where the NCTP requires alternative methods.
- Demonstrates that the Elaine WEF complies with the noise limits set out in accordance with NZS 6808:2010 and Condition 23 of Planning Permit No PL-SP/05/0461/C.

Appendix A

**New Zealand Standard
Acoustics Wind farm noise NZS
6808:2010 Checklist**

A1 NZS 6808:2010 Checklist

Information Source:

Lal Lal Wind Farms Nom Co Pty Limited Report Ref 640.11872-R04 Version v1.3,
September 2021

NZS6808:2010 Section/Clause	NZS 6808:2010 Requirement	Reference from Information Source	Assessment	Compliance
5.2	Noise Limit	NCTP, S5 Post-construction compliance noise report	Noise limits based on measured background noise level analysis. Updated measurements for location K15aa.	Comply
5.4.3	Assessments for Special Audible Characteristics conducted in Accordance with Appendix B.	S8.3, Appendix D Post-construction compliance noise monitoring report	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 Post-construction compliance noise monitoring report	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	S8.3.2 Post-construction compliance noise monitoring report	ISO1996-2:2017 Appendix J and ISO/PAS 20065:2016 adopted for objective assessment of tonality.	Comply
Appendix B3	Amplitude Modulation:	S8.3 Post-construction noise compliance monitoring report	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-construction noise compliance monitoring report	Post-installation sound levels measured at same locations where background sound levels were determined	Comply
S7.5.2	Scatter plots of post installation sound levels against wind speed.	Appendix B and C, Post-construction noise compliance monitoring report	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, Post-construction noise compliance monitoring report	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, Post-construction noise compliance monitoring report	Subjective assessment has been undertaken. Objective measurement of tonality has been undertaken.	Comply

NZS6808:2010 Section/Clause	NZS 6808:2010 Requirement	Reference from Information Source	Assessment	Compliance
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, Post-construction noise compliance monitoring report	Regression curves shown in appendices include background sound curves and wind farm sound levels adjusted for SACs	Comply
S8.3	<p>Report of post-installation wind farm sound level measurements shall provide;</p> <p>a) Description of sound monitoring equipment including any ancillary equipment</p> <p>b) Statement confirming the use of A-frequency weighting</p> <p>c) The location of sound monitoring positions</p> <p>d) Description of the anemometry equipment including the height AGL of the anemometer</p> <p>e) Position of wind speed measurements</p> <p>f) Make and model of the wind turbines</p> <p>g) Number of operational wind turbines</p> <p>h) Time and duration of monitoring period</p> <p>i) Averaging period for both sound and wind speed measurements</p> <p>j) Atmospheric conditions: the wind speed and direction at the wind farm position and rainfall shall be recorded.</p> <p>k) Number of data pairs measured</p> <p>l) Description of the regression analysis</p> <p>m) Graphical plots showing the data scatter and the regression lines</p> <p>n) Graphical plots showing the data scatter and the regression lines for both the background and the wind farm in operation</p> <p>o) Assessment of special audible characteristics</p> <p>p) A statement that the wind farm complies with relevant limits – or not – as determined from the results of the measurements</p>	<p>Post-construction noise compliance monitoring report</p> <p>Table 2 and Table 3</p> <p>Table 2</p> <p>Appendix B</p> <p>Table 2</p> <p>Table 2</p> <p>Section 1</p> <p>Section 1</p> <p>Table 3</p> <p>Table 2</p> <p>Table 2</p> <p>Table 3</p> <p>Section 9</p> <p>Appendix B and C</p> <p>Appendix B and C</p> <p>Section 8 and Appendix D</p> <p>Section 11</p>		<p>Comply</p> <p>Comply</p> <p>Comply</p> <p>Comply</p> <p>Comply</p> <p>Comply</p> <p>Comply</p> <p>Comply</p> <p>Comply</p> <p>Comply</p> <p>Comply</p> <p>Comply</p> <p>Comply</p> <p>Comply</p> <p>Comply</p> <p>Comply</p> <p>Comply</p> <p>Comply</p> <p>Comply</p>