



INFORMATION REGARDING ENVIRONMENTAL AUDIT REPORTS

August 2007

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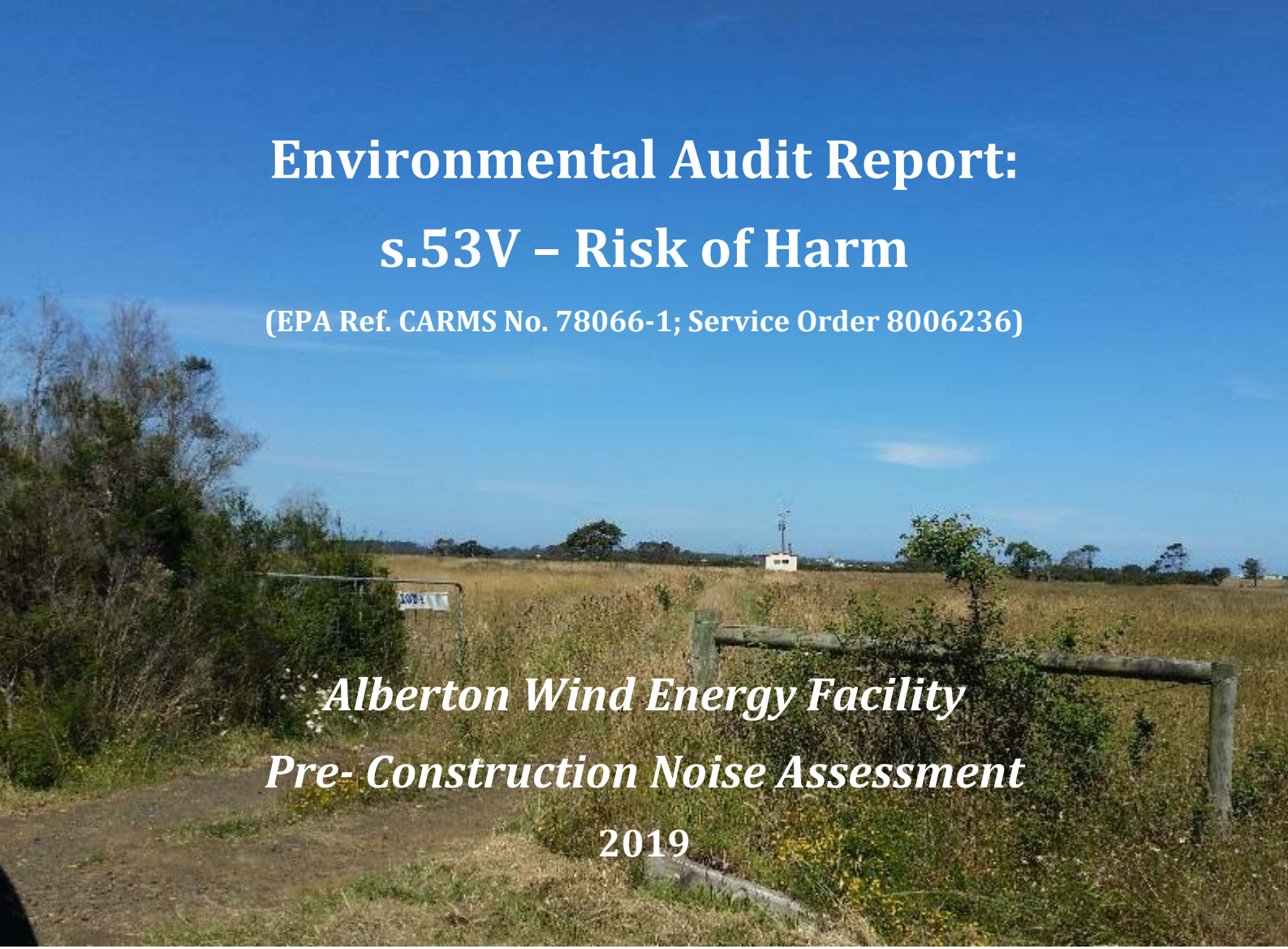
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APPROVALS - SUSTAINABILITY - COMPLIANCE

Environmental Audit Report: s.53V – Risk of Harm

(EPA Ref. CARMS No. 78066-1; Service Order 8006236)



*Alberton Wind Energy Facility
Pre- Construction Noise Assessment
2019*

for
Synergy Wind Pty Ltd

GENERAL INFORMATION

Report Descriptor:	Descriptor: r_Synergy_Alberton_PreConstruction_191025_R0
Title:	Environmental Audit Report: S.53V Risk of Harm Alberton Wind Energy Facility – Pre-construction Noise Assessment
Completed By:	
Name:	Stephen Jenkins BAppSci GradDipMgt. MAAS, FEIANZ
Company Details:	EnviroRisk Management Pty Ltd ABN 24 069 947 904 www.envirorisk.com.au
Appointments/ Certifications	Auditor appointed pursuant to the Environment Protection Act 1970 Certified Environmental Practitioner #32
Report subjected to audit	
Noise Compliance Assessment Report	Marshall Day Acoustics Pty Ltd Alberton Wind Farm Noise Assessment Rp 002 R02 2015590ML 19 April 2018
Report Distribution:	
Stephen Jenkins	EnviroRisk Management Pty Ltd (Master Copy)
Coralie Spitzner	Manager, Synergy Wind Pty Ltd

Revision	Summary of Amendments	Reviewed by	Issued by	Issue Date
0		L Nethercott	S Jenkins	30/10/19

AUDIT METHOD

The audit is based on a systematic examination of the pre-construction acoustic report titled Alberton Wind Farm Noise Assessment. It specifically reviews wind turbine noise and does not review site construction noise nor external to turbine sub-station generated noise.

The auditor has used an *'evidence based approach'* as provided for in AS/NZS ISO 19011:2018 Guidelines for Auditing Management Systems, predominantly via interrogation of information and data provided within the provided report, and from communications directly with the report's author.

Information presented within the Report relies on:

- the completeness and accuracy of records, information, plans, data and discussion contained within the report or made available to support review enquiries; and
- the accuracy and completeness of subsequent information provided during an interview with the report author(s);

The auditor has not conducted monitoring themselves nor performed any data analysis from simulation modelling. There was however interrogation of the technical content of the report, enquiries about quality assurance processes and interviews with personnel who prepared the acoustic report and who defined the noise sensitive locations.

The report should only be reproduced and distributed in full.

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ABBREVIATIONS

ABBREVIATION	WORD/PHRASE
AS/NZS	Australian and New Zealand Standard
CAR	Corrective Action Recommendation
EPA	Environment Protection Authority
DELWP	Department of Environment Land Water and Planning, Victoria
MDA	Marshall Day Acoustics Pty Ltd
m/sec	meters per second
NMP	Noise Management Plan
NSL	Noise Sensitive Locations
NZS	New Zealand Standard
SAC	Special Audible Characteristics
WEF	Wind Energy Facility

DEFINITIONS

Standard: - New Zealand Standard NZS 6808:2010 Acoustics – Wind farm noise

Noise Sensitive Location (source NZS 6808:2010):

- The location of a noise sensitive activity, associated with a habitable space or education space in a building not on the wind farm site. Noise sensitive locations include:

- (a) Any part of land zoned predominantly for residential use in a district plan;
- (b) Any point within the notional boundary of buildings containing spaces defined in (c) to (f)
- (c) Any habitable space in a residential building including rest homes or groups of buildings for the elderly or people with disabilities, papakainga and marae, excluding habitable spaces in buildings where the predominant activity is commercial or industrial. (Residential buildings designed for permanent habitation on land zoned for predominantly rural or rural-residential use are not classified as commercial or industrial for the purposes of this Standard);
- (d) Teaching areas and sleeping rooms in educational institutions, including public and private primary, intermediate, and secondary schools, universities, polytechnics, and other tertiary institutions;
- (e) Teaching areas and sleeping rooms in buildings used for licensed kindergartens, childcare, and day-care centres; and
- (f) Temporary accommodation including in hotels, motels, hostels, halls of residence, boarding houses, and guest houses.

Micro-siting:

- within 100m in any direction from the centre of the turbine at ground level as shown on the endorsed development plans.

EXECUTIVE SUMMARY

Table 1: Summary of Audit Information

EPA File reference no.	CARMS No. 78066-1
Auditor	Stephen Jenkins
Auditor account number	75700
Auditor appointment end date	1 May 2021
Audit type	Section 53V Risk of Harm
Date EPA notified	25/06/2019
Audit service order number	8006236
Name of person requesting audit	Ms Coralie Spitzner
Relationship to premises/location	Manager, Synergy Wind
Name of premises owner	n/a
Date of Auditor engagement	19/06/2019
Completion date of the audit	30/10/2019
Reason for Audit	Pre-construction wind farm noise compliance and risk of harm assessment.
Audit characterisation	Alberton Wind Energy Facility comprising 34x wind turbines (precise turbine candidate yet to be selected).
Environmental Segments	Noise
Current Land Use Zoning	Farming zone (FZ)
EPA Region	Gippsland
Municipality	Wellington Shire Council
Dominant – Lot on Plan	n/a
Additional - Lot on Plan(s)	n/a
Site / Premises name	
o Building/complex subunit no	n/a
o Street / Lot – Lower No.	n/a
o Street / Lot – Upper No.	n/a
o Street Name	n/a
o Street type (road, court, etc)	n/a
o Street suffix (North, Sth etc)	n/a
o Suburb	Alberton
o Postcode	3971
GIS Coordinate of Site centroid ¹	38.6442
o Latitude (GDA94)	
o Longitude (GDA94)	146.5261
Member & category of support team	Dave Dolly (Acoustics)
Further work or requirements	It is recommended that following planning approval, if micro-siting is being considered whereby a turbine is to be re-located closer to a noise sensitive location that presently is predicted to be marginally compliant (i.e. a dwelling close to the 40 dB L _{A90} (10 min) contour), that a

¹ Longitude and latitude (decimal degrees) co-ordinates in the 1994 Geocentric Datum of Australia (GDA94) is required to six decimal places. In the case of a WEF it is the point nominated by the proponent as representing the centroid point of the facility.

	<p>predictive noise assessment first verify compliance will be achieved prior to development.</p> <p>As the final turbine type has not been decided, it is recommended a turbine type from the nominated candidate list that achieves best practice noise control for low frequencies and during lower wind speeds is preferred for selection.</p>
Nature and extent of continuing risk	Nil (the wind energy facility is yet to be constructed).

1. Centroid not used but proposed Turbine T03 location adopted instead.

Outcome of the Audit

I have audited the pre-construction noise compliance assessment report (i.e. the noise assessment report) against the compliance criteria specified in NZS6808:2010 Acoustics Wind Farm Noise (the Standard) and with reference to State guidelines on wind energy facilities and relevant EPA advice.

The acoustic report has made predictions against a base standard noise amenity noise limit of 40dB LA90 given noise sensitive locations fall within a Farming Zone as defined within the local planning scheme. This approach is deemed appropriate considering EPA advice supports that a Farming Zone does not attract a high noise amenity limit.

I confirm the acoustic report has been prepared against the Standard and that compliance is predicted against a noise limit of 40dB LA90 under a range of turbine options and at the locations specified for turbine construction; albeit some indicate marginal compliance. A compliant outcome supports that noise will not present an unacceptable risk of harm. Given the marginal compliance predicted for some candidate turbines, should micro-siting result in turbine development closer to a noise sensitive location, a re-assessment by a qualified and competent acoustic consultant to confirm compliance at the nearest noise sensitive locations is recommended prior to construction.

It needs to be emphasised that the 40dB LA90 noise limit specified in the New Zealand Standard (and adopted under Victorian guidelines) means that wind turbine noise may, at times, be readily audible; particularly during relatively low wind speeds that align with low background noise conditions.

Table 2: Physical Site Information

Historic land use	Farming
Current land use	Farming and wind energy facility
Surrounding Land Use (N, S, E, W)	Farming, state forest and rural housing
Proposed land zoning (within 35dB contour)	Stay as is: FZ, PCRZ and small parcel of IN1Z
Nearest surface water - name	Albert River
Nearest surface water – direction	300m south east at nearest point
Groundwater Segment	Not relevant for wind energy facility audit

Signed



Stephen Jenkins
 ENVIRONMENTAL AUDITOR
 (APPOINTED PURSUANT TO THE ENVIRONMENT PROTECTION ACT 1970)

1.0 Introduction

This report describes the outcome of an environmental audit of the pre-construction noise compliance assessment report prepared by Marshall Day Acoustics (i.e. the noise assessment report) for the Alberton Wind Energy Facility (WEF).

The audit was commissioned by Synergy Wind Farm Pty Ltd to fulfil obligations under the Development of Wind Energy Facilities in Victoria Policy and Planning Guidelines, Department of Environment, Land, Water and Planning (DELWP), March 2019.

The specific item being audited is the noise assessment report prepared to demonstrate that the proposed wind energy facility can comply with the noise limits specified in the New Zealand Standard NZS6808:2010, Acoustics - Wind Farm Noise, including an assessment of whether a high amenity noise limit is applicable under Section 5.3 of the Standard.

This report has been prepared under Section 53V of the Environment Protection Act 1970 and discusses the potential for noise to represent a risk of harm at noise sensitive locations.

2.0 Audit Components

2.1 Objectives

The objectives of the audit are to assess the noise assessment report and verify the assessment:

1. has been conducted in accordance with the Standard;
2. meets the requirements of the DELWP guidelines (with respect to noise compliance); and
3. provides sufficient data to establish the adopting of best practices and an acceptable risk of harm from noise.

EPA Victoria publication 1692 provides the following definition:

'Risk of harm in relation to WEFs is defined herein as the potential for noise generated by WEFs to impact upon nearby noise sensitive locations.' Impact is taken to be noise that exceeds the compliance limits specified in the Standard.

2.2 Scope

The audit is to verify the compliance determination provided within the noise assessment report titled:

- Alberton Wind Farm. Noise Assessment, Rp 002 R02 2015590ML prepared by Marshall Day Acoustics dated 19 April 2018 (the 'noise assessment report').

A site inspection had previously been conducted by the auditor of the proposed locality of the WEF during 2017.

2.2.1 Activity

The activity is the Alberton wind energy facility (WEF) located approximately 5km west of Yarram, Victoria extending approximately from 3km south-west of Alberton to the west adjacent Gelliondale either side of the South Gippsland Highway towards Hedley.

2.2.2 Segment & Boundary

The segment being audited specifically relates to the noise being generated by the WEF with potential to impact on nearby noise sensitive locations.

The boundaries of the audit are the noise sensitive locations as identified in the acoustic assessment report within the 30 dB_{LA90} prediction contour. Locations beyond this contour are not considered to be at a risk of harm from noise.

Under best practice turbine design, operation and maintenance, the boundaries under audit generally lie within a 2km radius of the nearest wind turbine's centroid point to a noise sensitive location.

2.2.3 Element & Beneficial Uses

The element of the environment under consideration is the protection of human health and well-being as a result of noise annoyance and amenity loss.

The beneficial uses being protected are the normal domestic and recreational activities within a habitable space including sleep, or an education space in a building not on the WEF site.

2.2.4 Audit Period

The audit was conducted over the period: 26th June to 30th October 2019.

2.2.5 Criteria

The criteria used for the audit are specified in the New Zealand Standard, 6808:2010 Acoustics – Wind farm noise (NZS 6808:2010), which forms the 'Standard'.

Noise limits are defined in Table 2 of the Standard as:

Background sound level	Noise limit (L _{A90(10 min)})	High amenity noise limit (L _{A90(10 min)})
> 35 dB	background + 5 dB	background + 5 dB
30 – 35 dB	40 dB	
< 30 dB		

Notes:

- Where a high amenity noise limit is shown to be justified in accordance with 5.3.1, under wind conditions determined in accordance with 5.3.2, wind farm sound levels (L_{A90(10 min)}) during evening and night-time should not exceed the background sound level by more than 5 dB or a level of 35 dB L_{A90(10min)}, whichever is the greater. During daytime the noise limit in 5.2 should always apply. It is recommended that the wind farm noise limits should not be set lower than 35 dB L_{A90(10min)} at any time.

Reference has also been made to guidelines on windfarm noise including; EPA publication 1692, *Wind energy facility noise auditor guidelines, October 2018*; and DELWP Publication: *Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria, March 2019*.

Advice relating to the application/assessment of a High Amenity Area noise limit as applicable under the planning framework as issued by EPA, 25 October 2019 has also been considered.

Guidance was also obtained from EPA publications: 952.5 *Environmental Auditor Guidelines for the Preparation of Environmental Audit Reports on Risk to the Environment*, 953.2; *Environmental Auditor Guidelines for Conducting Environmental Audits*; and 1147.2 *Environmental Auditor Guidelines – Provision of Environmental Audit Reports, Certificates and Statement*.

Under the Development of Wind Energy Guidelines (DELWP, 2019) a 45 decibel limit is recommended for stakeholder dwellings. This is taken to mean a 45 dB_{LA90 (10min)} limit. However, the risk of harm to stakeholder dwellings is not considered within the scope of this audit as it falls outside the Auditor Guidelines (EPA Publication 1692).

Additional standards referenced during the audit were:

- ISO 1996-1:2016 Preview. Acoustics – Description, measurement and assessment of environmental noise.
- ISO 1996-2:2017 Acoustics – Description, measurement and assessment of environmental noise
- AS 1055.1:1997 Acoustics – Description and Measurement of Environmental Noise.

2.2.6 Exclusions

The audit includes operational wind turbine noise assessed against the requirements of NZS 6808:2010. As such, it does not include other noise sources such as off-turbine substations, transformers, construction and maintenance activities that are not integral with the wind turbine operation. These are better assessed against different standards and criteria (e.g. EPA's Noise from Industry in Regional Victoria guideline EPA Publication 1411; Noise Control Guidelines, EPA Publication 1254).

The audit is specific to the specifications contained in the noise assessment report. It relates to the configuration of wind turbines, the turbine types and the specifications detailed within the acoustic assessment report. It has, as reasonably practicable, interrogated the process to identify relevant non-stakeholder noise sensitive locations to ensure they are incorporated within the report locality and captured by modelling results figures.

2.3 Methodology

The following method was adopted for the review:

1. Communications with the client as to audit process;
2. Notification of audit to EPA;
3. Obtaining copies of report(s) subject to audit;
4. Detailed review of the acoustic assessment report's modelling methodology, source data, predictions and methods adopted against the Standard;

5. Data interrogation, review of the locality of noise sensitive locations within the 30dBA contour;
6. Communications with the proponent as to the identification and mapping of all relevant noise sensitive locations;
7. Meeting with EPA as to latest planning scheme guidance associated with the applicability, or otherwise, as to a high amenity noise limit;
8. Review of EPA advice in relation to application of planning based high amenity area and its associated noise limit;
9. Review of notes from previous site inspection;
10. Aerial photography check of potential receptors using NearMap™ and Google Earth;
11. Undertaking a qualitative risk of harm assessment;
12. Interview(s) with the proponent and their advisors to clarify report content and communications with respect to zoning, overlays and considerations relating to a standard noise amenity; and
13. Preparation and issue of the Audit Report.

2.4 Process

The audit was conducted in general accordance with auditing techniques specified within AS/NZS ISO19011:2014 *Guidelines for auditing management systems*.

The process undertaken included a review of the noise assessment report, an evaluation of all available material to assist with an evaluation of processes to determine a high amenity noise area (e.g. meeting with EPA; review of typical regional background noise levels, evaluation of written advice received from the EPA) and a risk of harm assessment. The process aimed to establish whether the noise assessment report provided sufficient detail to support a declaration of compliance against the Standard.

A determination of the risk of harm from noise has been formed from both:

- i. a direct conformance reference against the audit protocol 'criteria' contained in the tables provided within Appendix 1; and
- ii. a risk assessment (refer Section 5).

An audit protocol was prepared to assess conformance against the criteria, and this is provided in spreadsheets within Appendix 1 of this report. The appended spreadsheets list the audit criteria in the first two columns. The other columns list the auditor's findings in relation to being compliant with the requirement and observations and comments to substantiate (as needed) determinations of compliance or non-compliance against each criterion.

The protocol content should be read with reference to the relevant sections of the Standard (i.e. NZ6808:2010), EPA Guidelines, Advice and the DELWP Guidelines as relevant.

Compliance with the condition or requirement is rated Yes, No or other: whereby 'other' can include an item being 'Not Applicable (NA)' as it is not within the scope, 'Not Determined (ND)' based on information made available in the report and ambiguities

between the standards and guidelines, or 'Part Compliant (PC)' where the requirement has inherently several parts to it.

Where any particular qualification to a rating is required, it has been captured in the comments section of the tables. Where an issue has been identified in the noise assessment report, a *recommendation (i.e. Rec)* has been provided. An identified area for improvement, to further verify a compliant situation, has been referenced as an *opportunity for improvement (i.e. OFI)*.

Sections that are not in the scope of this review are identified as such. The rationale for exclusion from the scope is provided in the comments column where required.

The audit process has included communications with the EPA and client representatives, including the WEF acoustic and planning consultants.

3.0 Noise Limits

The noise assessment report has adopted a 40dB $L_{A90(10min)}$ base noise limit to be achieved. A determination as to whether a high amenity noise limit was applicable is made within Section 6.1 of the noise assessment report i.e.:

"The area surrounding the proposed wind farm is predominantly designated as Farming Zone in the planning map shown in Appendix C.

The Victoria Planning Provisions Practice Note prepared by the Department of Sustainability and Environment titled Applying the rural zones and dated March 2007 states the following: The Farming Zone is designed to encourage diverse farming practices, some of which can have significant off-site impacts. For this reason, the level of amenity that can be expected in this zone will usually not be compatible with sensitive uses, particularly housing.

Based on the above, the high amenity noise limit in NZS 6808:2010 is not considered applicable to residential receivers within a Farming Zone.

On this basis and following guidance from VCAT determination for the Cherry Tree Wind Farm, as required by the Victorian Guidelines, the high amenity noise limit detailed in NZS 6808:2010 is therefore not deemed to be applicable for residential receivers in the vicinity of the Alberton Wind Farm."

3.1 Consideration of a High Amenity Noise Limit

The EPA guidelines (Pub. 1692, 2018) state:

'The audit should include review of the assessment as it relates to:

- whether a high amenity noise limit is applicable, as assessed under Section 5.3 of the Standard following procedures outlined in clause C5.3.1 of the Standard. Where the Standard refers to a District Plan (or Plan) this shall be taken to mean a Scheme as defined within the VPPs.'

The following discusses the outcome of the Auditor's review of whether a high amenity noise limit is applicable.

Section 5.1.2 *Amenity of the surrounding area* within the Guidelines (DELWP, 2019), references Section 5.3 of the Standard to determine whether a *'high amenity noise limit' of 35 decibels may be justified in special circumstances*. This section further states *'All wind energy facility applications must be assessed using Section 5.3 of the Standard to determine whether a high amenity noise limit is justified for special locations, following procedures outlined in 5.3.1 of the Standard'*.

The terms 'special circumstances' and 'special locations' are not defined either within the DELWP guidelines (DELWP, 2019), the EPA noise auditor guidelines (EPA, 2018), nor the Standard (NZS 2010).

Furthermore, these guidelines reference a Tribunal report in that *'Guidance can be found on this issue in the VCAT determination for the Cherry Tree Wind Farm'*.

Taking wording directly from this report:

"The Mitchell Planning Scheme does not anywhere expressly or by implication "promote a higher degree of protection of amenity related to the sound environment of a particular area". Approaching the matter by a process of elimination it can be seen with certainty that the controls contained within the Farming zone, which includes most of the locality, do not answer this description. The purpose of the Farming zone is to encourage agricultural use, which is not an inherently quiet land use. In fact reference to the zone purposes confirms that agricultural use is to be preferred to residential use if there is potential conflict between the two.

Accordingly, the Tribunal concludes that the subject land and its locality is not capable of designation as a high amenity area because it does not possess the necessary characteristics of such an area as specified in the NZ standard.²

Under this outcome, land within a Farming Zone would appear to not fall within a 'high amenity area'.

The Auditors opinion as to the relevance of a high amenity area is provided against each relevant element of the Standard below:

(Note: Clauses taken directly from Section 5.3 of the Standard: High Amenity Areas)

"5.3.1

The wind farm noise limit of 40 dB LA90(10 min) in 5.2 is appropriate for protection of sleep, health, and amenity of residents at most noise sensitive locations. In special circumstances at some noise sensitive locations a more stringent noise limit may be justified to afford a greater degree of protection of amenity during evening and night- time.'

High amenity protection is therefore only relevant in 'special circumstance' during the evening and night period.

"A high amenity noise limit should be considered where a plan promotes a higher degree of protection of amenity related to the sound environment of a particular

² Cherry Tree Wind Farm Pty Ltd v Mitchell SC & Ors (Includes Summary) (Red Dot) [2013] VCAT 521. [108 - 109].

area, for example where evening and night-time noise limits in the plan for general sound sources are more stringent than 40 dB LAeq(15 min) or 40 dBA L10.”

The plan being referenced refers to the New Zealand planning schemes under the NZ Resource Management Act (as the Standard is taken from New Zealand). To interpret Australian planning schemes promotion of high amenity, the auditor sought and received advice from the EPA. EPA ‘Advice and Supplementary Advice’ dated 25 October, 2019 was provided on how Auditors are to interpret the Victorian planning schemes, namely:

“For proposed wind energy facilities:

When auditing an acoustic consultant’s determination as to whether a high amenity limit ought to or not apply to an area, the following steps should be taken:

- 1. First determine whether there are zones associated with an expectation of acoustical amenity (i.e. used predominately for residential purposes), including Township Zone, present within the 35 dB LA90 (10 min).*
- 2. Secondly, where the above zones are present, as per guidance in Section 5.3 of the NZS, confirm that background noise levels of the area are not affected by other specific sources, such as traffic noise. Additionally, check there are no agreements in place between stakeholders and WEF proponent in which case the HAL would not apply.”*

The relevant zone in this case is a Farming Zone, which is not ‘predominantly used for residential purposes.’ As such, the noise sensitive locations within the predicted 35 dB LA90 contour are not within a high amenity area and therefore no high amenity noise limit under the planning scheme warrants consideration.

The Auditor concurs with the determination within the noise report that a standard noise limit applies, and this limit has been assessed against for compliance purposes.

4.0 Evidence

The evidence used to form conclusions are summarised within the completed audit compliance protocol provided in Appendix 1.

Specific comments against conditions of the guidelines is discussed below:

4.1 Assessment against EPA Guidelines

4.1.1 Familiarisation with the WEF development proposal and planned operation

Details of the development proposal including candidate turbines was specified within the noise assessment report including limitations on the data provided by manufacturers and the absence of any tonal specifications for most of the turbines.

A review of the proposed development locality was made using ground surveillance, Google Earth and Google Maps, NearMap™ imaging and from communications with the WEF planning and acoustic consultants.

4.1.2 Inspection of the WEF project site and the surrounding environment

A site visit was made by the auditor during a peer review process in 2017 to familiarise himself as to the project site and surrounds, including NSL's to the west, south-east and north.

4.1.3 Assessment of the rigour of the process used to identify surrounding noise sensitive locations

The WEF covers a large area with many non-stakeholder properties falling within the 30dB LA90 predicted noise contour. Enquiries suggest the noise assessment report was based on information provided by the proponent's planners and that no site visit had been conducted prior to the modelling being undertaken. The Auditor sought confirmation from the planning consultant as to the rigor of the process to confirm all applicable noise sensitive locations were nominated within the noise assessment report. Discussions reveal an intensive process to identify dwellings has been completed including community consultation, Council meetings, aerial checks and legal interpretation. The process therefore appears rigorous as is summarised in the protocol discussion (refer Appendix 1).

Given the challenges in ground truthing identification of NSL's, the Auditor requested and received a statement from the planning consultant that the noise assessment report has appropriately captured all relevant NSL's. This communication is provided in Appendix 2.

4.1.4 Review of the pre-construction noise assessment considering the WEF development proposal and operations

The guidelines specify the following items warrant consideration:

- turbine technical specifications and power ratings;
- tower locations;
- topography;
- transformer stations³;
- any other relevant factors.

A range of turbine options are presented in the acoustic assessment report. It is noted the noisiest turbines (i.e. Vestas V136-3.45 and Gemesa G132-3.465) present marginal compliance predictions at the nearest noise sensitive locations presented in the report (i.e. <0.5dB). Quieter alternatives should be pursued by the WEF proponent as a best practice management approach to noise control.

The contour maps provided as Appendices within the noise assessment report are considered a realistic representation of noise levels predicted to surround the wind energy facility with respect to topography and turbine type. The locality is relatively flat with valley effects presenting no significant influence on noise propagation and attenuation.

³ Transformer stations are not specified in the acoustic assessment report. Discussions with the proponent representative reveal the transformer will be positioned post approval well away from a non-stakeholder noise sensitive location (NSL). With careful positioning the transformer can therefore be positioned over 2km from a nearest NSL if required. Compliance with noise limits, including high amenity noise limits, should be achieved.

Assumptions, such as ground attenuation and the absence of tonality, appear reasonable. Via phone interview, clarification was sought and confirmed on some aspects of the modelling process, including assumptions and the process to capture and verify noise sensitive locations. The methodology and model used to predict noise levels likely to be experienced at locations surrounding the wind farm is deemed to be appropriate. Details of the review against the model are provided within the compliance protocol in Appendix 1.

4.1.5 Review of background noise assessments (if available).

No background noise monitoring has been conducted. The noise assessment report specified it to be unnecessary as noise sensitive locations within a Farming Zone did not afford a high amenity noise limit, and therefore a base limit of 40dB LA90 was specified under all wind speeds as the compliance objective. As EPA advice supports a standard noise amenity within a Farming Zone this approach is reasonable and accepted.

4.1.6 Technical verification of the predictive noise assessment

The following items were evaluated by the auditor:

- methodology applied to conduct the assessment;
- noise monitoring equipment and parameters used;
- sound modelling programs employed; and
- verification that the assessment was conducted in line with the Standard.

A line item review of technical considerations against items specified within the Standard is provided within Appendix 1.

The EPA guidelines [EPA, 2018] specify an additional item that warrants review, namely:

- Review of identified potential noise impacts and any operational plans to manage the impacts (e.g. select turbines operating in reduced power modes during certain wind conditions) that are proposed as part of the WEF permit application.

No operation plans are presented within the noise assessment report. A contractual requirement is suggested in the noise assessment report to avert any tonal characteristics and attain compliance. Experience suggests best practice designed turbines can operate in the absence of any tonal characteristics.

5.0 Risk Assessment

The risk of impact to amenity was assessed qualitatively by direct reference to compliance with limits specified in the Standard. It is acknowledged that personal attitudes to noise can vary between individuals. However, the guidance provided in NZS6808:2010 has been adopted to assess whether the risk of harm from noise is unacceptable, namely:

Section 5.1.2. To provide a satisfactory level of protection against sleep disturbance, this Standard recommends a limit of wind turbine sound levels outdoors at noise sensitive locations of 40 dB LA90(10 min).

Section 5.1.3. The wind farm noise limit of 40 dB LA90(10 min) outdoors recommended for protection of sleep is also appropriate for protecting the health and amenity of residents for most noise sensitive activities.

Accordingly, noise levels that comply with the Standard are considered to protect both human health and the amenity of a noise sensitive location.

The risk that predictive modelling outcomes were inaccurate was gauged against:

- the internal QA process reported by the acoustic specialists;
- experience of noise prediction modelling on other wind energy facilities; and
- experience with noise levels surrounding operational wind energy facilities elsewhere.

Noise levels predicted were consistent with expectations given the relatively flat to undulating terrain. It is noted that the 40dB LA90 (10 min) is the derived noise limit at all noise sensitive locations.

Although background monitoring has not been conducted, the likelihood of low background noise at times means that whilst wind turbine noise may be compliant with the 40dB LA90 limit, it will be audible at times.

Best practice designed wind energy turbines can operate in the absence of special audible characteristics, including the absence of tones. Data within the noise assessment report was not able to confirm the absence of wind turbine tonality for all candidate turbines, as the final turbine has not been selected. To mitigate risk, consideration should be given to selecting a turbine that is warranted not to produce a tone, as defined by NZS 6808:2010, at any non-stakeholder noise sensitive location.

In the absence of special audible characteristics, turbines can comply with the 40dB LA90 noise limit and therefore present an acceptably low risk of harm from noise.

It is recognised that under some turbine candidates, compliance against the noise limit is marginal. Under the Guidelines, micro-siting (i.e. relatively small spatial changes in the precise location of the turbine) is permissible. Given that a micro-siting change has potential to present a non-compliant noise situation, acoustic predictive monitoring is recommended prior to site changes that may increase noise exposure above 40 dB LA90 (10 min) at relevant noise sensitive locations.

6.0 Results & Conclusions

The auditor has formed the opinion that the noise assessment report processes are based on sound methodology and have been undertaken by skilled and experienced personnel in accordance with the Standard.

The following conclusions are drawn based on the noise assessment report:

- I have found the process employed by the proponent designed to identify the relevant non-stakeholder properties with potential to be impacted by noise to have been rigorous.

- I have found the pre-construction noise report on the predicted maximum noise levels from the operating wind energy facility to be accurate and correct when based on the technical information provided concerning turbine type and siting.
- Compliance with the specified noise limits is therefore predicted at all non-stakeholder noise sensitive locations, and consequently the risk of harm is deemed acceptable.

This determination is relevant for the turbines and the siting plan used in the predictive modelling and the absence of special audible characteristics, including tones.

It needs to be emphasised that the 40dB L_{A90} noise limit specified in the New Zealand Standard (and adopted under DELWP guidelines) means that wind turbine noise may, at times, be readily identifiable; particularly when low wind speeds align with low background noise conditions.

7.0 Recommendations

19-1) It is recommended that following planning approval, if micro-siting is being considered whereby a turbine is to be re-located closer to noise sensitive location that presently is predicted to be marginally compliant (i.e. a dwelling close to the 40 dB L_{A90} (10 min) contour), that a predictive noise assessment first verify compliance will be achieved.

19-2) As the final turbine type has not been decided, it is recommended a turbine type that achieves best practice noise control for low frequencies and during lower wind speeds is preferable for selection.

8.0 References

1. New Zealand Standard NZS 6808:2010 '*Acoustics – Wind Farm Noise*'
2. Policy and Planning Guidelines for the Development of Wind Energy Facilities in Victoria, DELWP, March 2019
3. EPA Publication 1692 Wind energy facility noise auditor guidelines. Conducting environmental audits of noise from wind facilities
4. EPA Publication 865 Environmental Auditor Guidelines for Appointment and Conduct
5. EPA Publication 952 *Environmental Auditor Guidelines for the Preparation of Environmental Audit Reports on Risk to the Environment*
6. EPA Publication 953 *Environmental Auditor Guidelines for Conducting Environmental Audits*
7. EPA Publication 1147.2 *Environmental Auditor Guidelines – Provision of Environmental Audit Reports, Certificates and Statements*
8. AS/NZS ISO19011:2018 *Guidelines for auditing management systems*
9. ISO 1996-2:2017 *Acoustics – Description, measurement and assessment of environmental noise – Part 1: Basic quantities and assessment procedures*
10. NZS 6801:2008 *Acoustics- Measurements of environmental sound.*
11. *Cherry Tree Wind Farm Pty Ltd v Mitchell SC & Ors (Includes Summary) (Red Dot) [2013] VCAT 521.*
12. EPA, Victoria, Email Advice to Auditors '*Wind Energy Facilities – Applying/Assessing High Amenity*' 25 October 2019.

APPENDICES

APPENDIX 1: PROTOCOL