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Department of Transport and Planning



Environmental Auditor Guidelines

Verification and review for wind energy facilities

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1. Definitions and Abbreviations

1.1 Abbreviations

EPA	Environment Protection Authority Victoria
DTP	Department of Transport and Planning
NMP	Noise Management Plan
NZS 6808:1998	New Zealand Standard 6808:1998 Acoustics – The Assessment and Measurement of Sound from Wind Turbine Generators
NZS 6808:2010	New Zealand Standard NZS6808:2010 Acoustics – Wind farm noise
SAC	Special Audible Characteristics
VPP	Victoria Planning Provisions
WEF	Wind Energy Facility

1.2 Definitions

Unless otherwise indicated, an expression or phrase that is used in this guideline has the same meaning as in the *Environment Protection Act 2017* (EP Act) (whether or not a particular meaning is assigned to it in the EP Act).

'Auditor review function' is a formal assessment by an environmental auditor of a noise management plan or of a wind turbine noise monitoring report, with the intention of recommending if any change to the plan or report is necessary.

'Auditor verification function' is described as a verification by an environmental auditor confirming that something has occurred, or complies to, a specified standard, plan or document. An auditor verification function may include the environmental auditor conducting any relevant tests and analysis to inform the verification process.

'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

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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 NZS6808:2010

- 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.

In some instances, holiday cabins and camping grounds might be considered as noise sensitive locations. Matters to consider include whether it is an established activity with existing rights.

'Site' is defined in the EP Act as specified land or a specified parcel of land.

'NZS6808:1998' is used in this document to refer to the New Zealand Standard NZS6808:1998 The Assessment and Measurement of Sound from Wind Turbine Generators.

'NZS6808:2010' is used in this document to refer to the New Zealand Standard NZS6808:2010 Acoustics – Wind farm noise.

A **'wind energy facility'**, is defined in clause 73.03 (Land use terms) of the Victoria Planning Provisions and all planning schemes as: Land used to generate electricity by wind force. It includes land used for:

a) any turbine, building, or other structure or thing used in or in connection with the generation, of electricity by wind force;

b) an anemometer.

This definition does not include turbines principally used to supply electricity for domestic or rural use of the land.

'The relevant noise standard' refers to the NZS 6808:2010 (for WEFs with an authorising document issued on or after 1 January 2011 or an authorising document amended to require compliance with NZS 6808:2010), the NZS 6808:1998 (for WEFs authorised before 1 January 2011 that have not had approvals amended to require compliance with NZS 6808:2010) or either NZS 6808:2010 or NZS 6808:1998 as modified or replaced by an authorising document which originally referred to either the NZS 6808:2010 or the NZS 6808:1998¹.

'Wind turbine noise agreement' refers to an agreement entered into between a WEF operator and a landowner, under Regulation 131A of the *Environment Protection Regulations 2021* (EP Regulations 2021).



¹ Where the authorising document does not refer to NZS 6808:1998 or NZS 6808:2010, or where it is amended or modified to remove any reference to the relevant standard, the relevant noise standard will be as set out in item 1 or 2 of the table in regulation 131B of the EP Regulations 2021.

2. Purpose of this guideline

2.1 Introduction

This guideline issued under section 203 of the *Environment Protection Act 2017* ('EP Act') is to assist environmental auditors in the category 'industrial facility' appointed under Division 1 of Part 8.3 of the EP Act ('environmental auditors') in conducting verifications and review in accordance with Division 1 (section 190) of Part 8.3 of the EP Act.

Part 6.1 – Environmental audit system, regulation 164 of the *Environment Protection Regulations 2021* (EP Regulations 2021) describes the prescribed functions of environmental auditors. In relation to wind energy facilities (WEF) the key functions are outlined in Regulation 164(ca) which states 'for the purposes of Division 5 of Part 5.3 –

- (i) To independently verify whether or not any post-construction noise assessment conducted for a wind energy facility was conducted in accordance with NZS 6808:2010; and
- (ii) To review any noise management plan prepared for a wind energy facility and any periodic monitoring undertaken under the Regulation 131G for the facility.'

These functions are reflected in the following provisions of the EP Regulations 2021:

- **Post-construction noise assessment** (Regulation 131D(3)(b)) WEF operators must engage an environmental auditor to prepare a report verifying that the post-construction noise assessment conducted for a WEF is conducted in accordance with the 2010 Standard.
- **Noise Management Plan** (Regulation 131E(3)) WEF operators must engage an environmental auditor to prepare a report of their review of a noise management plan prepared for the WEF.
- Wind turbine noise monitoring report (Regulation 131G(2)(c)) WEF operators must engage an environmental auditor to undertake a review of 5-yearly monitoring reports.

Environmental auditors also have functions under the planning system. Clause 52.32 of the Victoria Planning Provisions and all planning schemes provides that an application for a permit for a WEF must relevantly be accompanied by:

- A pre-construction (predictive) noise assessment report prepared by a suitably qualified and experienced acoustician that meets certain criteria, including most significantly an assessment of whether the proposed wind energy facility will comply with the noise limit for that facility under Division 5 Part 5.3 of the EP Regulations 2021 (assuming the applicable noise standard is NZS 6808:2010); and
- A report prepared by an environmental auditor that verifies whether or not the pre-construction (predictive) noise assessment was conducted in accordance with NZS 6808:2010.

The purpose of this requirement is to establish that, should a permit be granted for the WEF, it would be able to comply with the noise limit that would apply to the facility, once constructed, under the EP Regulations 2021.

2.2 Background

Operational wind farm noise was previously controlled through the planning system. Specifically, through planning conditions requiring compliance with NZS6808:2010 or its predecessor, NZS6808:1998, among other requirements. Consequently, environmental audits were completed under conditions of planning approvals for some projects.



In July 2021, to bring greater expertise and certainty to this area, the EPA became the primary regulator for operational wind farm noise. The regulatory framework was altered such that operational WEF noise became regulated under the EP Act and the detailed requirements under the EP Regulations 2021, and the environmental audit regime under permit conditions ceased.

As part of this suite of reforms the general environmental duty (GED) and unreasonable noise provisions of the EP Act came into effect. The EP Regulations 2021 were also updated to set out the requirements of environmental auditor verification for post construction noise assessment and review the noise management plans and five yearly wind turbine noise monitoring reports.

Since EPA became the lead regulator for operational WEF, planning permits and approvals no longer include operational noise conditions. Both the *Planning and Environment Act 1987* (administered by the DTP and councils) and the EP Regulations 2021 (administered by the EPA) require WEF operators to produce a variety of noise assessments that must be independently verified by an environmental auditor.

This guideline may be replaced, amended, or updated periodically. EPA may also provide site-specific guidance as it deems necessary. This may extend, clarify, or vary guidance provided in this guideline.

The most recent version of this guideline is available on the EPA website (www.epa.vic.gov.au) and DTP website (www.planning.vic.gov.au).

EPA will notify environmental auditors of any updates.

2.3 Intended audience

This guideline has been prepared by EPA for environmental auditors who are appointed in the category: Industrial Facility. This guideline with the support of the *Wind Energy Facility Turbine Noise Technical Guideline* aims to assist environmental auditors in completing verifications, review and reporting requirements for WEFs.

However, this guideline may also be useful for other parties involved in the process, such as:

- planning or responsible authorities and other statutory authorities
- WEF operators and their acoustic consultants
- Consultants/sub-contractors engaged to undertake maintenance and site inspections
- local communities

2.4 Legal status

The Victoria Planning Provisions (VPP) and the EP Regulations 2021 require wind turbine noise limits for WEFs to be determined and assessed in accordance with the relevant noise standard.

Following construction of the WEF, wind turbine noise is subject to specific regulations under Division 5 of Part 5.3 of the EP Regulations 2021, including specific requirements for assessing post-construction noise (regulation 131D), preparation of a Noise Management Plan (NMP) (regulation 131E), annual reporting (regulation 131F) and ongoing monitoring of wind turbine noise (regulation 131G).

Wind Energy Facility Turbine Noise Technical Guideline should be considered to assist environmental auditors to undertake verifications, reviews and reporting in relation to the technical assessment and measurement of wind turbine noise.



It is a requirement under section 190(2) of the EP Act that an environmental auditor have regard to this guideline and any other guidelines issued by EPA under section 203 of the EP Act, any relevant Environment Reference Standard (ERS), any relevant compliance code, and any prescribed matter when carrying out any function of an environmental auditor under the EP Act or any other legislation.

Failure to have regard to these guidelines may be considered by EPA in determining whether to reappoint a person as an environmental auditor, or in considering the revocation or suspension of an appointment. Refer to the **Environmental auditor guidelines for appointment and conduct (publication 865)** for further information.

2.5 Roles and Responsibilities

This section outlines the roles and responsibilities of various parties at the approval process, preconstruction permits, commencement, and operational stage of WEF.

2.5.1 WEF pre-construction roles and responsibilities in respect of noise

WEF Operator:

The operator of a WEF is responsible for engaging an environmental auditor to prepare a report that verifies the pre-construction (predictive) noise assessment of the WEF, as required in clause 52.32-4 of the VPP and all planning schemes.

Responsible authority:

The Minister for Planning is the responsible authority for planning permit applications for wind energy generation facilities under the *Planning and Environment Act 1987* and all planning schemes. The Department of Transport and Planning (DTP) administers the planning assessment and determination process for WEFs on the Minister's behalf. Preconstruction predictive noise assessments and affiliated reports are application requirements for the WEF planning permit application process.

The VPP and *Wind Energy Facility Turbine Noise Technical Guideline* provide guidance on the planning application process and key considerations when designing a WEF. Further information is provided on the DTP website: https://www.planning.vic.gov.au/guides-and-resources/guides/all-guides/renewable-energy-facilities/wind-energy-facilities



Pre-construction (predictive) noise assessment



Figure 1: Pre-construction (predictive) noise assessment roles and responsibilities for new wind energy facilities.

EPA appointed environmental auditors:

As part of the permit application the operator will engage an environmental auditor to undertake a verification of the pre-construction (predictive) noise assessment against the relevant noise standard.

Clause 52.32-4 of the VPP and all planning schemes requires an environmental auditor appointed under Part 8.3 of the EP Act to prepare a report that verifies if the acoustic assessment undertaken for the purpose of the pre-construction (predictive) noise assessment report has been conducted in accordance with the relevant noise standard.

The report issued by the environmental auditor verifies whether or not the noise assessments have been conducted in accordance with NZS 6808:2010.

This report should be thorough but concise. The report must have adequate detail including, a verification cover letter, an annexure listing all documents examined or relied upon to permit any reader to follow the deliberations that the environmental auditor undertook in forming their view (see Appendix A which outlines the minimum requirement pre-construction checklist).

Regulatory authority:

EPA is responsible for appointing and monitoring the conduct of environmental auditors appointed under Part 8.3 of the EP Act.



2.5.2 Post-construction and operational WEF roles and responsibilities



Post-construction noise assessment of an operating wind energy facility

Figure 2: Provides an overview of the stages involved for post-construction noise assessment, noise management plans and wind turbine noise monitoring for operating wind energy facilities.

WEF Operator:

The operator of a WEF is responsible for meeting the requirements in the EP Act and the EP Regulations 2021.

Operational WEF regulatory authority:

EPA is an independent statutory authority that operates under the EP Act. EPA's role is to protect human health and the environment by reducing the harmful effects of pollution and waste, including noise pollution. EPA regulates noise from ongoing operations once a WEF begins operating. It should be noted that noise during construction or commissioning is governed by the GED and the unreasonable noise provisions. EPA may also investigate complaints related to wind turbine noise and take enforcement actions.

EPA may review the environmental auditor verification report of post-construction noise assessments and the environmental auditor's review of the wind turbine noise monitoring and review and reporting of the noise management plans.

EPA is responsible for appointing and monitoring the conduct of environmental auditors appointed under the EP Act.



EPA appointed environmental auditors:

Assessing noise emissions from wind energy facilities is highly technical and complex. Part 5.3 Division 5 of the Environment Protection Regulations 2021 sets out requirements where WEF operators need to engage an environmental auditor. These requirements are:

- Regulation 131D(3)(b) requires an environmental auditor to undertake a verification report of a
 post-construction noise assessment. Under the EP Regulations 2021, the environmental auditor is
 required to 'independently verify whether or not any post-construction noise assessment
 conducted for a wind energy facility was conducted in accordance with NZS 6808:2010'
 (r.164(ca)(i))
- Regulation 131E(3) requires an environmental auditor to review a noise management plan (NMP) and prepare a report of the review.
- Regulation 131G(2)(c) requires an environmental auditor to undertake a report of the review of the 5 yearly noise monitoring report.

The expected conduct of an environmental auditor is set out in the **Environmental auditor guidelines for appointment and conduct (publication 865).** Among other things, an environmental auditor is expected in undertaking any prescribed environmental auditor function to:

- Apply assessment methods and approaches that are consistent with good practice.
- Behave in a professional manner upholding the independence and integrity of the environmental audit system.
- Exercise due care, diligence and professional judgement, to the standard which may be reasonably expected of a qualified and experienced environmental professional who is performing duties conferred upon him or her by the EP Act.
- Ensure that any reports which he/she provides are an accurate record of soundly based observations and logical deductions.

With regards to auditors performing verification functions in the WEF space, EPA expects environmental auditors to utilise their expertise, and the expertise of their support team if required, to determine if the post-construction noise assessment conducted for a WEF was completed in accordance with the relevant noise standard (see Appendix B for the post-construction checklist).

2.6 Overview of environmental auditor requirements

2.6.1 Pre commencement of WEF operation

Once engaged, an environmental auditor must prepare a report that verifies that the pre-construction (predictive) noise assessment undertaken by a suitably qualified and experienced acoustician is conducted in accordance with the NZS6808:2010 and provides an assessment of whether the proposed WEF will comply with the noise limit for the facility under the EP Regulations 2021. This verification report is submitted to DTP as part of the planning requirement by the WEF operator.

2.6.2 Commencement of WEF operation

For WEFs that commence operation on or after 1 November 2021, Regulation 131D of the EP Regulations 2021 requires a post-construction noise assessment to be conducted within 12 months of operations commencing by a suitably qualified and experienced acoustician and in accordance with the relevant noise standard. This assessment must demonstrate whether or not the WEF complies with the noise limit, and the report must be verified by an environmental auditor. The environmental auditor is required

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to prepare a report to verify that the post construction noise assessment was conducted in accordance with the NZS6808:2010. For staged commencement, the requirement must be complied with within 12 months of each stage being completed.

Regulation 131BB(1) excludes alternative monitoring points from being used in a post-construction noise assessment. If WEF operators are unable to access noise sensitive locations to undertake the measurements for the post-construction noise assessment, they should contact the EPA to discuss how to proceed.

Regulation 131E of the EP Regulations 2021 sets out the requirement for a WEF operator to prepare and implement a noise management plan (NMP) for their WEF. It also sets out what must be included in an NMP and that the operator must engage an environmental auditor to review the NMP and prepare a report of this review.

Regulation 131G of the EP Regulations 2021 states that from 1 January 2024 a WEF operator must engage a suitably qualified and experienced acoustician to conduct monitoring every five years from the start of operation to ensure that the wind turbine noise complies with the noise limits or the applicable alternative monitoring point criteria. The acoustician must prepare a report of the monitoring. The monitoring report must be reviewed by an environmental auditor. Both the monitoring report and auditor's review must be submitted to EPA.

2.7 Conflict of Interest

Environmental auditors are required to maintain professional independence and should avoid perceived or actual conflicts of interest.

A conflict of interest occurs when an entity or individual's personal interests come into conflict with the interests of a client, or the entity or individual's professional duties or responsibilities. By way of example, such a conflict can occur when a person has a personal vested interest in an outcome over which they have control —such as money, status, knowledge, relationships, or reputation—which conflicts with their professional responsibilities, which puts into question whether their actions, judgment, or decision-making can be unbiased.

It is a requirement that environmental auditors maintain a sufficient level of independence from the person who engages them and any third party whose assessment they are engaged to undertake a verification or review.

Figure 3 provides an example of the relationship between WEF operator, acoustic consultant, and environmental auditor for a pre-construction (predictive) noise assessment. A WEF operator will engage an acoustician to undertake an assessment and then engage an environmental auditor to verify the assessment has been undertaken in accordance with the relevant noise standard. The environmental auditor must maintain their independence to the WEF operator and acoustician consultant.





Figure 3 outlines the relationship between WEF operator, acoustician and environmental auditor for a pre-construction (predictive) noise assessment.

2.8 Expert support team

The environmental auditor can be assisted by an expert support team to undertake the verification and reviews. The expert support team should have the necessary technical expertise in acoustics in accordance with Appendix E of the *Environmental auditor guidelines for appointment and conduct* (EPA Publication 865.15, December 2024).

The expert support team supporting the environmental auditor should have expertise in the following:

- Understanding of the noise and vibration assessments for wind energy facilities in accordance with the NZS6808:2010 and NZS6808:1998
- Understanding of Division 5 of Part 5.3 of the Environment Protection Regulations 2021
- Understanding of Clause 52.32 of the Victorian Planning provisions
- Noise and vibration management plans preparation, review and implementation
- Understanding of the wind energy facility, pre-construction noise assessments (also known as predictive measurements), post-construction noise assessments and five yearly monitoring. a degree and or equivalent qualification relevant to acoustics and WEF.
- clearly demonstrated and detailed description of relevant project experience in acoustics, relevant to WEF.
- outline the number of years of experience in monitoring, assessing, analysing, and modelling noise.
- demonstrate membership of a professional association relevant to acousticians.
- be currently working in the field and up to date with current technologies.

To avoid entering a conflict of interest, the expert support team should not include any persons involved in undertaking an assessment or producing a report which that specific expert support team is assisting the environmental auditor to verify or review.



3 Pre-construction Verification

The proponent of a WEF is required to submit a pre-construction (predictive) noise assessment report to the Department of Transport and Planning, for the Minister for Planning when applying for planning approval. The pre-construction (predictive) noise assessment report must demonstrate that the proposal can comply with 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 2010 Standard.

Clause 52.32-4 of the VPP and all planning schemes requires an environmental auditor appointed under Part 8.3 of the Environment Protection Act 2017 to prepare a report that verifies whether or not the acoustic assessment undertaken for the purpose of the pre-construction (predictive) noise assessment report has been conducted in accordance with NZS 6808:2010.

The objectives of the pre-construction verification are to confirm that the WEF noise assessments have been carried out in accordance with the relevant noise standard. This is to ensure acoustical assessments carried out by the consultants on behalf of WEF project proponents are accurate and correct.

The verification report issued by the environmental auditor is a confirmation that the noise assessments have been conducted in accordance with the relevant noise standard. This report should be thorough but concise. The verification report must have adequate detail including an annexure listing all documents examined or relied upon to permit any reader to follow the deliberations that the environmental auditor undertook in forming their view.

3.1 Conducting the pre-construction verification

The verification of the pre-construction predictive noise assessment is to be conducted in a manner deemed appropriate by the environmental auditor and would typically include the following steps:

- 1. Familiarisation with the WEF development proposal and planned operation.
- 2. Inspection of the WEF project site and the surrounding environment.
- 3. Assessment of the rigour of the process used to identify surrounding noise sensitive locations.
- 4. Review of the pre-construction noise assessment considering the WEF development proposal and operations including:
 - turbine technical specifications and power ratings
 - tower locations
 - topography maps and aerial imagery, and
 - any other relevant factors.
- 5. Review of background noise assessments (where available).
- 6. Technical verification of the predictive noise assessment, including:
 - methodology applied to conduct the assessment
 - review manufacturer's or turbine technical reports on representative sound power and frequency spectrums produced by the turbines
 - noise monitoring equipment and parameters used
 - interrogated the rigor of the modelling selected parameters and processes







- sound modelling programs and input data employed
- relevance of a high amenity noise limits; and cumulative noise from other WEF considerations
- appropriate and reasonable accounting for uncertainty within the assessment
- compliance limits, including where there is a wind turbine noise agreement, specified in the noise assessment report, and
- verification that the assessment was conducted in line with the relevant noise standard.
- 7. 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.
- 8. Require clarification on mapped noise sensitive locations see section 3.3 for further details.
- 9. Risk assessment, including a qualitative statement on the risk of non-compliance.

3.2 Pre-construction methodology

Assessment methodology and compliance limits for WEFs in Victoria are set out in the EP Regulations 2021 and the relevant noise standard.

3.3 Noise sensitive locations

Noise sensitive locations are defined by the NZS6808:2010 as "the location of a noise sensitive activity, associated with a habitable space or education space in a building not on a wind farm site" (refer to the full definition in section 1 and in the NZS6808:2010). Noise sensitive locations need not be permanently occupied.

Noise sensitive location excludes buildings *on the wind farm site* (generally referred to as 'hosts'). For example, if the wind farm landowners' house(s) is on the same title as any of the wind turbines or ancillary equipment in the immediate vicinity, then those buildings are excluded from the assessment and are not protected by the NZS6808:2010, unless there is a specific wind turbine noise agreement under the EP Regulations 2021. Nevertheless, EPA considers it is good practice to set an upper limit of 45 dB L_{A90(10 min}) or background + 5 dB, whichever is greater at these host locations, which is consistent with noise limits for agreements under regulation 131BA(2)(b) - Noise agreements (subject to regulation 131A) may be established with individual landowners. Wind turbine noise agreements (subject to regulation 131A) may be established with individual landowners. Refer to *Wind Energy Facility Turbine Noise Technical Guideline* for further details on noise sensitive locations.

In assessing noise sensitive locations, the environmental auditor should confirm with the WEF operator that actual signed wind turbine noise agreements are in place for those properties that have been identified by the WEF operator as being locations with a wind turbine noise agreement. This can be undertaken by requesting the WEF operator provide written confirmation as to the properties that hold a noise agreement and that the 45 dB LA90 limit is applicable.

As the purpose of the verification is to prepare a report by an environmental auditor that verifies whether or not the pre-construction (predictive) noise assessment was conducted in accordance with the relevant noise standard, it is important to determine that the nominated locations of wind turbine noise agreements at the time of verification are in fact in place.



4 Cumulative impacts

4.1 Staged development of a WEF

Where a WEF is planned adjacent to an existing WEF or another planned WEF, verifications of predictive and compliance noise assessments also should ensure these assess the cumulative impacts of all surrounding WEFs upon identified noise sensitive locations in line with the NZ6808:2010.

4.2 Post Construction of a WEF

Where a WEF development occurs in stages or is subject to a subsequent expansion, verifications of predictive and five yearly or post-construction noise assessments should ensure these assess the cumulative impacts of the following stages or expansion inclusive of the original development.

5 Post-construction Verification

Following construction of the WEF, the proponent must conduct a post-construction noise assessment in accordance with regulation 131D, which applies post 1 November 2021. The assessment must be conducted in accordance with the NZS6808:2010 and demonstrate whether or not the WEF complies with the noise limits determined for the project. An environmental auditor is required to review the post construction noise assessment and prepare a verification report documenting the review.

5.1 Conducting the post-construction verification

The verification of the post-construction noise assessment is to be conducted in a manner deemed appropriate by the environmental auditor and would typically include the steps of:

- 1. Review of the constructed WEF design in comparison to the pre-construction permitted design for the WEF.
- 2. Inspection of the WEF project site.
- 3. Review of background noise assessments and determination of noise limits., including as specified in conditions of the planning approval.
- 4. Technical verification of the compliance noise assessment, including:
 - methodology applied to conduct the assessment
 - noise monitoring equipment and parameters used
 - monitoring locations
 - subjective and objective evaluation of Special Audible Characteristics, and penalties, where necessary
 - appropriate and reasonable accounting for noise emissions that are being measured, and
 - verification that the assessment has been conducted in line with the NZS6808:2010.
- 5. Verify of compliance noise assessment against noise management plan commitments.
- 6. Confirms the assessment meets the requirements of relevant noise standards and the noise limits will not be exceeded.

5.2 Methodology

Assessment methodology and compliance limits for WEFs in Victoria are set out in the EP Regulations 2021 and the relevant noise standard.



The verifications process should include:

- whether a high amenity noise limit is applicable, as assessed under Section 5.3 of the NZS6808:2010, following procedures outlined in clause 5.3.1 of the NZS6808:2010 and
- whether Special Audible Characteristics (SACs) Amplitude Modulation, Tonality and Impulsivity are present, as described in Section 5.4 of the 2010 Standard.

6 Review of the noise management plan

The WEF operator is required to prepare a Noise Management Plan (NMP) in accordance with regulation 131E. The function of the NMP is to demonstrate an understanding of the risks of noise-related harm associated with the operation of the WEF, and to document procedures to control those risks and rectify any non-compliance. An environmental auditor is required to review the NMP and prepare a report documenting the review.

The documented approach to WEF noise management should be practical, cost effective and proportionate to the risk of harm, and supported by verifiable evidence.

6.1 NMP procedures

The required content of a NMP is set out at regulation 131E(2). The required content includes (but is not confined to) procedures for:

- the identification, assessment, and control of risks of harm to human health and the environment from wind turbine noise.
- determining any alternative monitoring points and associated alternative monitoring point criteria.
- assessing compliance with the applicable noise limit (or alternative monitoring point criterion) for that facility,
- reducing wind turbine noise in the event of noncompliance with the noise limit for the facility or alternative monitoring point criterion determined for an alternative monitoring point,
- addressing any complaints about wind turbine noise received by the operator, including who will investigate the complaint and respond to the complainant.

6.2 Environmental auditor review

The environmental auditor review should present concise conclusions about the extent to which the NMP:

- demonstrates an understanding of the risks of noise-related harm associated with the operation of the WEF
- includes procedures:
 - that would be effective in controlling those risks and ensuring compliance with the noise limits
 - for noise remediation if non-compliance is identified
 - for complaint investigation and resolution.
- justifies the suitability of any alternative monitoring points and alternative monitoring point criteria.

Further information, including elements of good industry practice are provided in the *Wind Energy Facility Turbine Noise Regulation Guidelines*.



7 Wind turbine noise monitoring

Regulation 131G requires that wind turbine noise monitoring is required every five years. This is to ensure that wind turbine noise from the WEF complies with the noise limits or the applicable alternative monitoring point criteria.

The review of the wind turbine noise monitoring is to be conducted in a manner deemed appropriate by the environmental auditor and would typically include the steps of:

- 1. Review of the NMP.
- 2. Technical verification of the noise monitoring, including:
 - methodology applied to conduct the assessment
 - site inspection to support that there are no unusual WTG noise characteristics or altered noise sensitive location
 - noise monitoring equipment and parameters used
 - Subjective and objective evaluation of Special Audible Characteristics, and penalties, where necessary
 - appropriate and reasonable accounting for uncertainty within the assessment
 - verification that assessment conducted in line with NZS6808:2010.
- 3. Review of compliance noise assessment against noise management plan commitments.
- Review any changed circumstances that may influence noise compliance including altered background conditions, newly approved WEFs, new dwellings without, or a change in, landowner noise agreements.
- 5. Risk assessment that is proportionate to the risk of harm from noise emissions.
- 6. Preparation of a report under regulation 164(ca)(ii) in relation to the noise management plan.

7.1 Alternative monitoring points

Alternative monitoring points may be adopted in NMPs for complaint response purposes or during fiveyearly monitoring activities.

An alternative monitoring point may be used if a monitoring point for the WEF is not readily accessible, or where an alternative monitoring point is closer to the wind turbines being assessed and has less extraneous noise than the monitoring point at the noise sensitive area.

When alternative monitoring points are used, a well-established theoretical or empirical relationship between the noise levels at the alternative monitoring point and the noise sensitive area should be used and appropriately justified in the NMP or five-yearly wind turbine noise monitoring report. For example, concurrent noise level monitoring at the monitoring points determined in accordance with the relevant noise standard, and any alternative monitoring points, or the use of computer noise modelling, can help determine alternative monitoring point criteria.

Testing and modelling are not expected to be undertaken by the environmental auditor. The environmental auditor's role is to assess the rigour used in the process and confirm it is based on the NZS6808:2010 or approved EPA guidelines that support the NZS6808:2010.



8 Report content

Regulation 131E and 131G require a report of the reviews and verifications that are undertaken in accordance with Part 8.3 Division 3 of the EP Act, that should include:

- (a) a review of all relevant information
- (b) where relevant, identifying areas where the reviewed document may not comply with the 2010 Standard
- (c) whether any of those identified non-compliances likely would have a material impact on the noise assessment, and if so whether it likely under or overstates noise emission
- (d) the reasons for the findings and any recommendations in the review or verification report, and
- (e) any other prescribed matter.

The findings of a review or verification report should include a conclusion and recommendations if required. The process for arriving at these findings and any opinions stated should be well documented and referenced within the verification or review report.

An environmental auditor may use the title of 'Environmental Auditor (appointed pursuant to the Environment Protection Act 2017)' to sign documents prepared whilst carrying out functions pursuant to the Act or any other Acts.

References and Documents

In carrying out any function of an environmental auditor under the EP Act or any other Act, the environmental auditor must have regard to:

- a) any guidelines issued by the Authority under section 203 of the EP Act; and
- b) any relevant environment reference standard made under Part 5.2; and
- c) any relevant compliance code made under Part 5.3; and
- d) any prescribed matter.

Below is a list (not exhaustive) of published guidelines and standards relevant to WEF verifications and reviews that the environmental auditor should refer to. EPA expects environmental auditors to check EPA's webpage for updated information and guidelines.

Guidelines issued by the Authority under section 203 of the EP Act

Environmental auditor guidelines for appointment and conduct (publication 865)

Subordinate legislation

Environment Protection Regulations, 2021 (Regulations 2021)

Environment Protection Amendment (Wind Turbine Noise) Regulations 2022

Planning

Planning Guidelines for Development of Wind Energy Facilities ⁱ





Victoria Planning Provisions (clause 52.32)

Wind Energy Facilities (DTP landing page)

Standards

New Zealand Standard NZS 6808:1998 Acoustics - The Assessment and Measurement of Sound from Wind Turbine Generators

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

Other Published Guidelines

Wind Energy Facility Turbine Noise Technical Guidelines

Wind Energy Facility Turbine Noise Regulation Guidelines



Appendix A – Minimum requirements pre-construction Verification Checklist

NZS6808:2010 Section/Clause	NZS 6808:2010 Requirement	Reference from Information Source	Assessment/ Observations / Conclusions	Compliance
Definitions	Measurement time: 10min accuracy 1% i.e. 6 secs			
	Noise Limit: not to be exceeded			
	Notional Boundary: A line 20m from any side of a noise sensitive location			
	Post-installation sound level: A weighted L90 centile level			
	Cut in speed typical: 4 m per sec. Shut down 25 m per sec			
3.1	Metric for wind farm sound: A weighted L90 centile level i.e. dB L90 (10min)			
3.2	Determine location of 35 dB Contour			
	Determine wind farm noise limits			
	Refine predictions at each noise sensitive location			
4.1.1	Audibility			
4.2	Reverse Sensitivity			
	Nomination of a 40dB wind farm sound level contour and the 35dB contour.			
5.	Noise limits			
5.1.2	Upper limit at residential location of 40 dB L90			
5.1.4.	The use of a background +5dB limit means that the wind farm sound may be the dominant sound heard at a noise sensitive			





	location for a significant proportion of the time when the wind farm is operating.		
5.2	Wind farm sounds (as L90 10 min) should not exceed background by more than 5 dB or a level of 40 dB LA90 10min, whichever is the greater at the notional boundary of any noise- sensitive location.		
5.3	Background are commonly less than 25dB when predicted to exceed by 10dB or more		
	Higher degree of protection of amenity required		
5.3.2	Lowest stated level is 35dB or 5db above background if above 35db L90 10 min.		
5.6.1	Limits apply to cumulative levels of all wind farms.		
5.6.2	Staging of a wind farm is not to affect pre- wind farm background readings.		
5.6.3	Where a new wind farm will impact on the same noise sensitive locations as an existing wind farm, the assessment of background sound should exclude wind farm sound generated by all existing wind farms		
5.6.4	If predicted wind farm sound levels for a new wind farm are at least 10dB below an existing wind farm, then the cumulative effect shall not be taken into account.		
6	Predictions		
6.1.1	Predictions of sound levels from wind farms should be used to determine their environmental noise impact before installation takes place. This includes initial predictions to identify noise sensitive locations that ,might be exposed to a wind farm sound level greater than 35dB LA90(10min) at 95% rated power, and then predictions to establish the likely wind farm sound levels at each of these locations.		





	No other noise sensitive locations at risk to be within the 35 dB LA90(10min) contour when considering uncertainty of the predictions.		
6.2	Obtain from manufacturer obtained in accord with IEC 61400-11. Requires SPL to be measured against a wind speed of 10m AGL converted to Hub Height		
7.1	Locations		
7.1.2	(a) Has the operator chosen to adopt a noise limit of 40 dB for all wind speeds?(b) Has the operator agreed to conduct on/off testing if required.		
7.1.3	Have noise sensitive locations been clearly identified?		
7.1.4	Have background sound level measurements been appropriately established and representative of the noise sensitive locations: proximity and character. When and where were they taken. Were predictions at 95% rated power made in deriving 35 dB LA90 (10 min.) contour background locations If there are no noise sensitive locations within the 35dB LA90(10min) predicted wind farm sound level contour, then background sound level measurements are not required.		
7.1.5	If there are a group of noise-sensitive location, are the locations selected representative of the group in terms of proximity and character		
7.1.6	Selected on wind farm side of buildings. >3.5m from significant reflecting surfaces. Not near streams nor watercourses where possible (or substantiated if not)		
7.2	Sound data		







7.2.1	Made during a representative range of wind speeds and durations from cut-in to rated power. For dual speed turbines, include cut-in wind speed for the higher generating capacity		
C7.2.1	The background and operational wind turbine sound levels should be determined at all integer hub height wind speeds representative of the typical site exposure, including between cut-in of the turbines and the rated power of the turbines.		
7.2.2	Sound measured in accordance with NZS6801:2010. Measurement time intervals of 10 minutes.		
7.2.3	Instrument used shall meet requirements of Section 5 of NZS6801.		
7.2.3	Microphone protected from extraneous wind sound by wind shield in accordance with NZS 6801.2010. SLM with low noise floor as necessary		
7.2.4	Extraneous sounds caused by events, including precipitation, insects, fauna and so on, should, as far as is practical for an unattended monitoring exercise, be identified and removed from the data set		
7.3	Wind data		
7.3.1	Concurrent measurements of wind speed and direction taken from a known height preferably the wind turbine hub.		
7.3.2	If wind speeds are not taken from hub height predictions may be used from wind shear relationships: at least two heights		
7.3.3	Same location and height used for before and after installation where not impacted by turbines.		
7.3.3	If a high amenity noise limit is applied the wind farm wind speed threshold should be		





	determined at this same wind speed measurement position.		
7.4	Background measurements		
7.4.1	Background SLM to be plotted against the hub-height wind speeds to obtain a scatter plot		
7.4.1	Use separate scatter plots for different conditions including wind directions and times -of-day if there are markedly different groups in the scatter plot of all valid data		
7.4.2	Find the regression curve that gives the best correlation coefficient between the sound level and wind speed for each scatter plot and use it to describe the average background sound level at different wind speeds.		
C7.4.2	It may be appropriate to use bin analysis procedure where the fitted regression curve may be influenced by a limited number of data points.		
7.4.3	If there is a poor correlation between wind speed and sound level, further investigation of wind conditions should be undertaken e.g. wind flow modelling, local knowledge, site observations or local wind monitoring		
7.4.4	Where multiple regressions are indicated and several regression curves obtained, noise limits should be set on the basis of each regression curve derived. Where not practical, use the most stringent regression curve with lowest sound levels		
7.6	Compliance assessment		
7.6.1	The 35dB wind farm sound level contour shall be predicted and measurements made at noise sensitive locations within this contour.		
7.6.2	Compare the best-fit regression lines of the background sound levels and the regression curves of the wind farm sound levels adjusted for any special audible characteristics (at the wind speed at which		







	it is assessed) at each noise- sensitive location.		
7.6.3	If background sound levels were not measured prior to installation, it may be necessary to obtain background sound level measurements for limited periods at critical wind speeds. These may be for a limited range of wind speeds and directions while the wind turbines are not operating, i.e. on/off testing to get a representative number of measurements		
7.6.4	Establishing compliance at one point in time does not negate the need for further testing at a later date.		
7.7	ON/OFF testing		
8	Documentation		
8.1	 Predictions: Any report of wind farm sound level predictions in accordance with this Standard shall refer to this 2010 Standard and provide the following: (a) A map showing the topography (contour lines) in the vicinity of the wind farm, the position of the wind turbines, and noise-sensitive locations (b) Noise sensitive locations for which wind farm sound levels are calculated (c) Wind turbine sound power levels (d) The make and model of the wind turbines (e) The hub-height of the wind turbines (f) Distance of noise sensitive locations (g) Calculation procedure used (h) Meteorological conditions assumed (i) Air absorption parameters used 		
	(k) Topography/screening assumed, and (l) Predicted far-field wind farm sound		
	levels.		
8.2	Report of the background sound level measurements and compliance assessments to provide:		

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a) Description of the sound monitoring		
a, Decemption of the second memory		
equipment including anchidry		
equipment		
b) The location of sound monitoring		
positions		
c) Description of the anemometry		
equipment including the height AGL of		
the anemometer		
d) Position of wind speed measurements		
e) Time and duration of the monitoring		
period		
f) Averaging period for both sound and		
wind speed measurements		
g) Atmospheric conditions: the wind speed		
and direction at the wind farm position		
	 a) Description of the sound monitoring equipment including ancillary equipment b) The location of sound monitoring positions c) Description of the anemometry equipment including the height AGL of the anemometer d) Position of wind speed measurements e) Time and duration of the monitoring period c) Averaging period for both sound and wind speed measurements g) Atmospheric conditions: the wind speed and direction at the wind farm position 	 a) Description of the sound monitoring equipment including ancillary equipment b) The location of sound monitoring positions c) Description of the anemometry equipment including the height AGL of the anemometer d) Position of wind speed measurements e) Time and duration of the monitoring period b) Averaging period for both sound and wind speed measurements g) Atmospheric conditions: the wind speed and direction at the wind farm position



Appendix B – Minimum Requirement Post Construction Verification Checklist

NZ Standard 6808:2010 and Environment Protection Amendment (Wind Turbine Noise) Regulations 2022 Checklist, may include but limited to:

EP Regulations 2021	Requirement	Reference from Information Source	Assessment/ Observations / Conclusions	Compliance
131A	Wind turbine noise agreement			
131B	Relevant noise standard			
131BA	Noise limit			
131BB	Alternative monitoring point			
NZS6808:2010 Section/Clause	NZS6808:2010 Requirement	Reference from Information Source	Assessment/ Observations / Conclusions	Compliance
5.2	Noise Limit			
5.3	High amenity noise limit, as relevant to authorising document			
5.4.1	Considerations to be given to and special audible characteristics of the wind farm sound when comparing levels against noise limits.			
5.4.2	Adjust measured levels for Special Audible Characteristics			
5.4.3	Assessments for Special Audible Characteristics conducted in Accordance with Appendix B. Cumulative adjustments to not exceed +6 dB.			
5.7	Uncertainty of measurements			
Appendix B1	Subjective assessment can be sufficient in some circumstances to assess special audible characteristics			







Appendix B2	Tonality: Reference test method shall be that prescribed as Annex C to ISO 1996-2:2007 or an equivalent method		
Appendix B3	Amplitude Modulation		
7.2	Sound data		
7.2.1	Made during a representative range of wind speeds and durations from cut-in to rated power.		
	For dual speed turbines, include cut-in wind speed for the higher generating capacity		
C7.2.1	The background and operational wind turbine sound levels should be determined at all integer hub height wind speeds representative of the typical site exposure, including between cut-in of the turbines and the rated power of the turbines.		
7.2.2	Sound measured in accordance with NZS6801:2010. Measurement time intervals of 10 minutes.		
7.2.3	Instrument used shall meet requirements of Section 5 of NZS6801.		
7.2.3	Microphone protected from extraneous wind sound by wind shield in accordance with NZS 6801.2010. SLM with low noise floor as necessary		
7.2.4	Extraneous sounds caused by events, including precipitation, insects, fauna and so on, should, as far as is practical for an unattended monitoring exercise, be identified and removed from the data set		
7.3	Wind data		
7.3.1	Concurrent measurements of wind speed and direction taken from a		





	known height preferably the wind turbine hub.		
7.3.2	If wind speeds are not taken from hub height predictions may be used from wind shear relationships: at least two heights		
7.3.3	Same location and height used for before and after installation where not impacted by turbines.		
7.3.3	If a high amenity noise limit is applied the wind farm wind speed threshold should be determined at this same wind speed measurement position.		
7.6.3	If background sound levels were not measured prior to installation, it may be necessary to obtain background sound level measurements for limited periods at critical wind speeds. These may be for a limited range of wind speeds and directions while the wind turbines are not operating, i.e. on/off testing to get a representative number of measurements		
7.6.4	Establishing compliance at one point in time does not negate the need for further testing at a later date.		
7.7	ON/OFF testing		
8	Documentation		
S7.5.4	Assessment for SACS shall be undertaken covering range of operational wind speeds		
S7.6.2	Conformance with limits by comparing best fit regression of background sound and wind farm sound levels adjusted for SACs		
S8.2	 Background sound levels Report of the background sound level measurements and compliance assessments to provide: a) Description of the sound monitoring equipment including ancillary equipment 		





	 b) The location of sound monitoring positions c) Description of the anemometry equipment including the height AGL of the anemometer d) Position of wind speed measurements e) Time and duration of the monitoring period f) Averaging period for both sound and wind speed measurements g) Atmospheric conditions: the wind speed and direction at the wind farm position 		
S8.3	Report of post-installation WEF sound level measurements shall provide: a) Description of sound monitoring equipment including any ancillary equipment b) Statement confirming the use of A frequency weighting c) The location of sound monitoring positions d) Description of the anemometry equipment including the height AGL of the anemometer e) Position of wind speed measurements f) Make and model of the wind turbines g) Number of operational wind turbines h) Time and duration of monitoring period i) Averaging period for both sound and wind speed measurements j) Atmospheric conditions: the wind speed and direction at the wind farm position and rainfall shall be recorded. k) Number of data pairs measured l) Description of the regression analysis m) Graphical plots showing the data scatter and the regression lines n) Graphical plots showing the data scatter and the regression lines for both the background and the wind		







o) Assessment of special audible characteristics		
p) A statement that the wind farm complies with relevant limits – or not – as determined from the results of the measurements		



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