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RYAN CORNER WIND FARM
NOISE MANAGEMENT PLAN

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Project: **RYAN CORNER WIND FARM**

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SUMMARY

This document was prepared on behalf of Ryan Corner Development Pty Ltd (RCD) to address the requirement under the *Environment Protection Regulations 2021*¹ (EP Regulations) to develop and implement a noise management plan (NMP) for the Ryan Corner Wind Farm.

The NMP is a living document which will be updated and amended if/when required in response to:

- external reviews of the NMP by an EPA accredited auditor
- regulator requirements
- periodic review of the NMP by GPG
- any changes in circumstances that alter the risk profile of the wind farm with respect to noise such as a change to the configuration of the wind farm, a change in the noise characteristics of the wind farm, or a change in the noise sensitive locations in the area around the wind farm).

The NMP will also be formally reviewed, and amended if required, as part of the noise monitoring completed every 5 years in accordance with the EP Regulations. The review will account for the results of the monitoring and any recommendations of the suitably qualified and experienced acoustic engineer responsible for conducting the monitoring.

The following subsections identify the location of relevant NMP content with respect to the requirements contained in the EP Regulations and the recommendations from EPA Publication 2061 *Wind Energy Facility Turbine Noise Regulation Guidelines*².

Environment Protection Regulations 2021

The requirements of the EP Regulations for an NMP are reproduced in the table below and are cross-referenced with the section of this NMP containing the relevant information.

EP Regulations – regulation 131E NMP requirements	Relevant section in this NMP
<i>(2) The noise management plan must include procedures for the following—</i>	
<i>(a) the identification, assessment and control of risks of harm to human health and the environment from wind turbine noise;</i>	Section 5.0
<i>(b) determining any alternative monitoring points and alternative monitoring point criteria for the wind energy facility;</i>	Section 8.0 and Section F1
<i>(c) assessing whether wind turbine noise from the facility complies with—</i>	
<i>(i) the noise limits for that facility; or</i>	Section 4.0
<i>(ii) if the wind turbine noise is assessed at an alternative monitoring point, the alternative monitoring point criterion for that alternative monitoring point;</i>	Section 8.2

¹ *Environment Protection Regulations 2021* version 10, in force as of 11 November 2023 and including amendments introduced by the *Environment Protection Amendment (Wind Turbine Noise) Regulations 2022*

² At the date of preparation of this NMP, EPA Publication 2061 is not available as a version controlled formal document. This NMP is based on the EPA Victoria webpage last updated on 26 January 2024

EP Regulations – regulation 131E NMP requirements	Relevant section in this NMP
(d) <i>reducing wind turbine noise from the facility in the event that non-compliance is detected with –</i> (i) <i>the noise limit for that facility; or</i> (ii) <i>if the wind turbine noise is assessed at an alternative monitoring point, the alternative monitoring point criterion for that alternative monitoring point;</i> (e) <i>addressing any complaints about wind turbine noise received by the operator, including who will investigate the complaint and respond to the complainant.</i>	Section 10.0 Section 11.0, Section 13.0 and Appendix I

EPA Publication 2061

EPA Publication 2061 defines elements of current good industry practice and notes that they may be useful to include when developing an NMP. These elements are reproduced in the table below and are cross-referenced with the section of this NMP containing the relevant information.

EPA Publication 2061 – NMP elements	Relevant section in this NMP
Organisational environmental strategy (regulation 131 E(2)(a))	
Definition of organisational and other responsibilities in relation to the measurement, assessment and management of noise emissions from the WEF.	Section 13.0
Requirements for reporting and record-keeping, including document control systems, incident reporting and tracking, and records to be retained.	Section 13.0
Regulatory standards (regulation 131 E(2)(a))	
Summary of legislative framework.	Section 3.0
Outline of site environmental noise objectives, including the relevant consent conditions.	Section 1.2, Section 3.4, Section 3.5 and Section 4.0
Noise sensitive areas and alternative monitoring points (regulation 131 E(2) (b), (c)(i) and (ii))	
Identification and justification of noise sensitive areas, alternative monitoring points, land use category and operational noise limits that apply at each of the locations.	Section 2.2, Section 4.0, Section 6.1, Section 8.1, Section 8.2 and Appendix D
Map of noise sensitive areas in relation to the WEF, and alternative monitoring points.	Section 2.2 and Section 8.1

EPA Publication 2061 – NMP elements	Relevant section in this NMP
Risk assessment and controls (regulation 131 E(2)(a))	
• Operational noise modelling, including method, input data and results.	Section 5.2.1
• Risk analysis and assessment, including identifying major noise sources and evaluating and assessing risks of harm to human health and the environment from wind turbine noise.	Section 5.2
• Evaluation of likelihood and consequence of risks, development of a risk matrix and risk management approach.	Section 5.2.5
• Consideration of control measures to address noise related hazards and determination of residual risks.	Section 5.2.4 and Section 5.2.5
Operational performance (regulation 131 E(2)(c))	
• Details of noise measurement procedures, including equipment requirements, timing and duration.	Section 8.0 and Appendix F
• Wind-speed measurement locations and analysis approach for wind-speed data.	Appendix F
• Noise level and wind-speed measurement data analysis approach, including for subjective and objective evaluation of Special Audible Characteristics (SACs), and procedures for data exclusion, where necessary.	Section 8.0 and Appendix F
• Approach for attended subjective observations.	Section 8.0 and Appendix F
• Summary of results of operational noise monitoring and compliance assessment, including at alternative monitoring points.	Section 5.2.2 (compliance assessments at receivers only to date, based on noise modelling)
• Summary of baseline meteorological conditions (consistent with the compliance documentation required under section 8.3 of [New Zealand Standard 6808:2010], including atmospheric conditions (wind-speed and direction, rainfall)).	Appendix H (wind speed and direction trends – rainfall is recorded and addressed during noise monitoring)
Site inspection and maintenance (regulation 131 E(2)(a))	
• Details of the maintenance plan and routine maintenance activities.	Section 5.2.4 and Section 13.0
• Requirements of ongoing condition monitoring and inspections that may influence noise emissions.	
• Procedures for unexpected (non-routine) maintenance activities.	
• Procedures for scheduled inspections and monitoring.	

EPA Publication 2061 – NMP elements	Relevant section in this NMP
Noise complaint management procedures (regulation 131 E(2)(e))	
<i>Reflecting good practices set out in AS/NZS 10002:2014 Guidelines for complaint management in organizations, complaint management procedures should include:</i>	
• details of how the community can lodge a complaint, including contact details • a complaint register to record information for each complaint received, which may include: ○ the name and address of the person making the complaint ○ procedures on how complainants' details will be maintained, including any relevant privacy policy ○ a receipt number for each complaint, which is to be communicated to the person making the report ○ any applicable property reference number (for example when connected to a background sound measurement location) ○ the time, prevailing conditions and a description of the concerns reported.	Section 11.0 and Appendix I Section 11.0 and Appendix I
• Investigation and response procedures, which may include: ○ a proforma noise investigation report ○ procedures for the analysis of complaint data against environmental conditions and WEF operational data ○ procedures for taking measurements to assess wind turbine noise levels in response to complaints ○ procedures for communication, consultation, and engagement with any relevant stakeholders.	Section 9.0 and Appendix I
<i>WEF operators should also consider a proactive program for contacting community in nearby noise sensitive areas to determine if there are unreported complaints.</i>	
Noise remediation procedures (regulation 131 E(2)(d))	
• For situations where a noncompliance has been detected (either as a result of investigating a complaint or through other routine monitoring procedures) the NMP must set out noise remediation procedures to address noncompliance and to reduce noise emissions.	Section 10.0
Training (regulation 131 E(2)(d))	
• Develop and implement a training program for employees engaged in the operation of the WEF, including the provision of information, instruction, supervision and training, particularly in regard to their duties under the EP Act.	Section 13.0
Review (regulation 131 E(5)(a))	
• Program for review, including the development of the annual statement, five-yearly turbine monitoring and NMP review cycle.	Section 7.0 (annual statement), Section 8.0 (five yearly monitoring), Section 12.0 (NMP review)

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1.0 INTRODUCTION

1.1 Overview

The Ryan Corner Wind Farm is a consented project located northwest of Port Fairy in western Victoria. The wind farm (also referred to as a wind energy facility or WEF) is being developed by Ryan Corner Development Pty Ltd (RCD), a wholly owned subsidiary of Global Power Generation Australia Pty Ltd (GPG).

The planning permit authorising the development of the wind farm was issued in 2008. Amendments to the permit, including changes to the number and height of turbines and turbine layout, were issued in 2017 and 2022. Construction of the wind farm commenced in May 2022 and the wind farm is not yet operational.

Prior to commencement of construction of the wind farm, a pre-construction noise assessment^{3, 4} was prepared in accordance with the standard specified in the planning permit, NZS 6808:2010⁵. Background noise monitoring^{6, 7} was also undertaken in accordance with NZS 6808:2010.

1.2 Objectives

Preparation of this noise management plan (NMP) was commissioned by GPG to address the requirement for an NMP established by regulation 131E of the *Environment Protection Regulations 2021* (EP Regulations).

The objectives of the NMP are to describe how the wind farm operator will fulfil the general environmental duty under the *Environment Protection Act 2017* (EP Act) with respect to wind turbine noise throughout the life of the project. This includes:

- Complying the noise performance requirements of the planning permit and EP Regulations, and documenting compliance with these requirements.
- Preventing unreasonable noise under the EP Act through:
 - maintenance of equipment to control noise
 - pre-emptive checks to identify changes in noise level of character
 - timely response to complaints and incidents.

The NMP forms part of the broader environmental management plan for the wind farm.

Open communication and pro-active community engagement are integral elements of the environmental management plan and are an essential component of effective noise management. GPG commits to applying best practices in information sharing, consultation and engagement with the local community, in accordance with the Community Engagement & Benefit Sharing Plan⁸ specifically designed for the wind farm. GPG will also apply the endorsed Complaint Investigation and Response Plan⁹ to proactively respond to any noise complaints.

³ Rp 003 R03 2018076 *Ryan Corner Wind Farm – Pre-construction noise assessment update*, dated 10 June 2021

⁴ Mm 003 R01 20180786 *Ryan Corner Wind Farm – Revised noise predictions*, dated 6 December 2023

⁵ New Zealand Standard NZS 6808:2010 *Acoustics – Wind farm noise*

⁶ Rp 002 R03 20180786 *Ryan Corner Wind Farm – Background Noise Assessment*, dated 10 June 2021

⁷ Rp 004 20180786 *Ryan Corner Wind Farm – Background noise assessment*, dated 22 September 2023

⁸ See project website here: <https://ryancornerwindfarm.globalpower-generation.com.au/sustainability/community/>

⁹ GPG document titled *Complaint Investigation and Response Plan* dated 5 May 2022 and endorsed 6 May 2022

1.3 NMP content

The NMP accounts for the following:

- The requirements of the EP Act.
- The guidance of EPA Publication 2061¹⁰.
- Contemporary noise measurement and assessment practices.

The NMP sets out the following:

- An overview of the Ryan Corner Wind Farm, including details of noise sensitive locations around the wind farm.
- The legislation applicable to wind turbine noise levels associated with the wind farm.
- The operational noise limits which apply to wind turbine noise.
- Procedures for the identification, assessment and control of risks of harm to human health and the environment from wind turbine noise.
- Procedures for assessing compliance with:
 - the noise limits set out in the relevant noise standard; and
 - alternative monitoring point criteria for the assessment of wind turbine noise at alternative monitoring points.
- Procedures for reducing wind turbine noise in the event of a non-compliance with the relevant noise standard.
- Procedures for addressing complaints about wind turbine noise received by the operator of the wind farm.
- An outline of the organisational environmental strategy for the wind farm.

In accordance with the EPA Publication 2061, this NMP addresses requirements for periodic reviews, including annual compliance statements, noise monitoring every 5 years, and review of the provisions of this plan.

Acoustic terminology used in this report is presented in Appendix A.

¹⁰ EPA Publication 2061 *Wind Energy Facility Turbine Noise Regulation Guidelines*

At the date of preparation of this NMP, EPA Publication 2061 is not available as a version controlled formal document. This NMP is based on the EPA Victoria webpage last updated on 26 January 2024

2.0 WIND FARM OVERVIEW

2.1 Wind turbines

The Ryan Corner Wind Farm comprises fifty-two (52) Vestas V136-4.2 MW wind turbines with a rotor diameter of 136 m and a hub height of 112 m, resulting in a total capacity of 218.4 MW.

The Vestas V136-4.2MW model is a variable speed wind turbine, with the speed of rotation and the amount of power generated by the turbines being regulated by control systems which vary the pitch of the turbine blades (the angular orientation of the blade relative to its axis).

The standard power optimised configuration of the turbine has been selected for the Ryan Corner Wind Farm, which incorporates serrated turbine blades and does not utilise sound management modes.

Details of the turbines currently being installed at the site are summarised in Table 1 below.

A site layout is provided subsequently in Figure 1 of Section 2.2 and the turbine coordinates provided in Appendix B.

Table 1: Wind turbine details

Item	Description
Manufacturer	Vestas
Model	V136
Rated power	4.2 MW
Rotor diameter	136 m
Hub height	112 m
Power control	Variable speed and blade pitch
Cut-in wind speed at hub height	3 m/s
Rated power wind speed at hub height	13.0 m/s
Cut-out wind speed at hub height	25.0 m/s

Details of noise levels and risk controls are provided subsequently in Section 5.0.

2.2 Noise sensitive locations

The wind farm is located in a rural area comprising mainly open farmland.

A total of one hundred and sixty-one (161) noise sensitive locations (receivers) have been identified within 5 km of the wind turbines as of 27 May 2021, located at distances ranging from approximately 893 m to 4,989 m from the turbines. These comprise:

- One hundred and fifty-five (155) pre-existing residential dwellings located outside the wind farm site boundary and are not subject to a noise agreement, collectively referred to as *non-stakeholder receivers* herein, consistent with Victorian planning guidance¹¹.
- Six (6) pre-existing residential dwellings located within the wind farm site boundary which are the subject of noise agreements between the landowner and proponent. These are collectively referred to as *stakeholder receivers* herein.

Noise agreements have been established with other landowners who live outside the site boundary. However, the noise agreements do not relate to the dwellings where these landowners reside. These landowner dwellings are therefore not classified as stakeholder receivers for noise assessment purposes.

Accordingly, all one hundred and fifty-five (155) non-stakeholder receivers are considered noise sensitive locations (receivers) for assessing wind turbine noise.

A site layout plan of the turbines and receivers is provided in Figure 1 of Section 2.2. The coordinates of the receivers are provided in Appendix C.

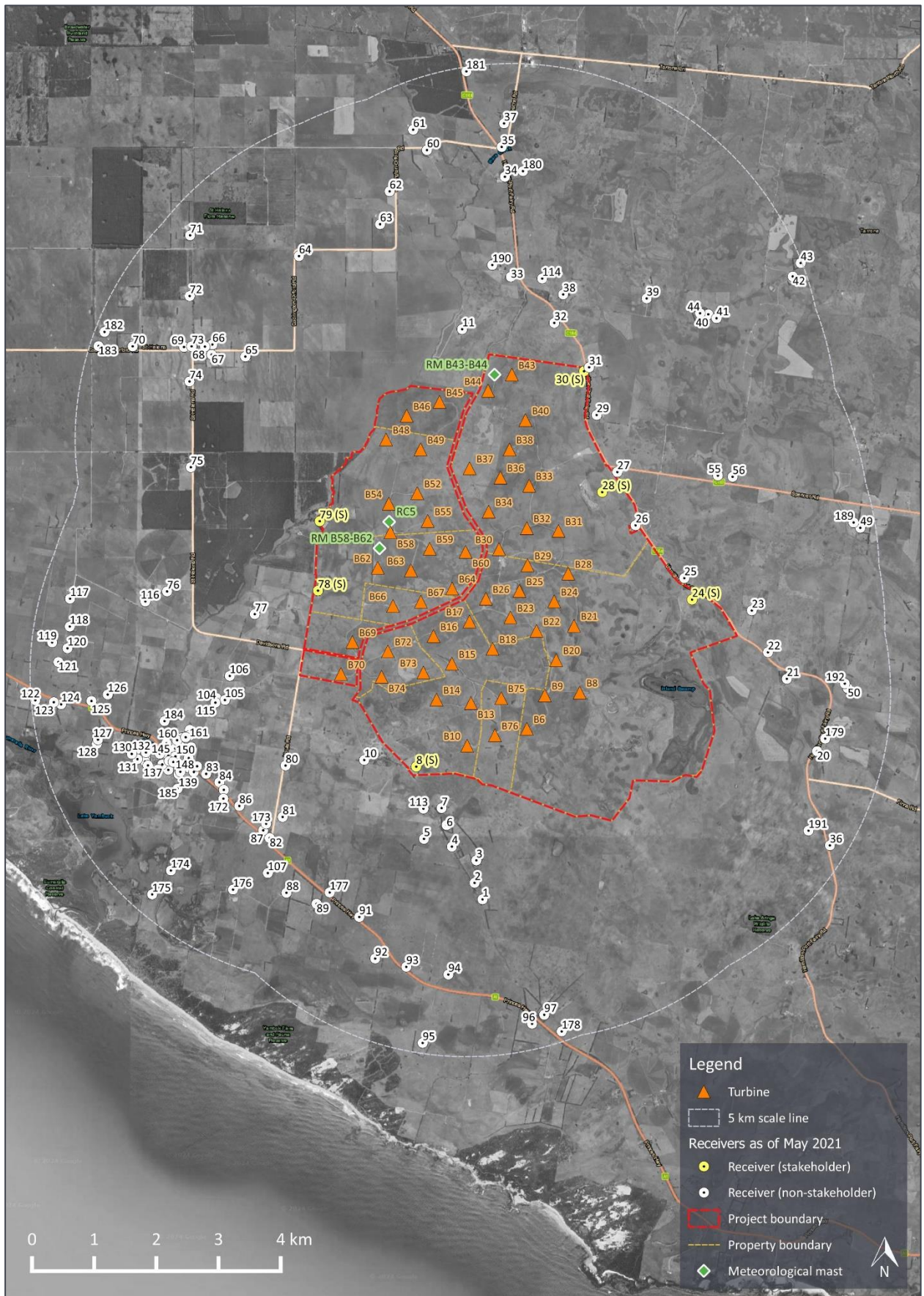
A site layout map indicating the land zoning of the area is also provided for reference purposes in Appendix D. The map indicates the site and immediate environs are designated as farming zones.

The profile of the wind farm site and the nearby surrounding area generally comprises undulating terrain. As an indication of the terrain profile, the following ground elevation ranges are noted:

- Turbine ground elevation: 24 m to 40 m; and
- Receiver ground elevation: 10 m to 60 m.

¹¹ Department of Transport and Planning publication *Planning Guidelines for Development of Wind Energy Facilities* dated September 2023

Figure 1: Site layout and noise sensitive locations

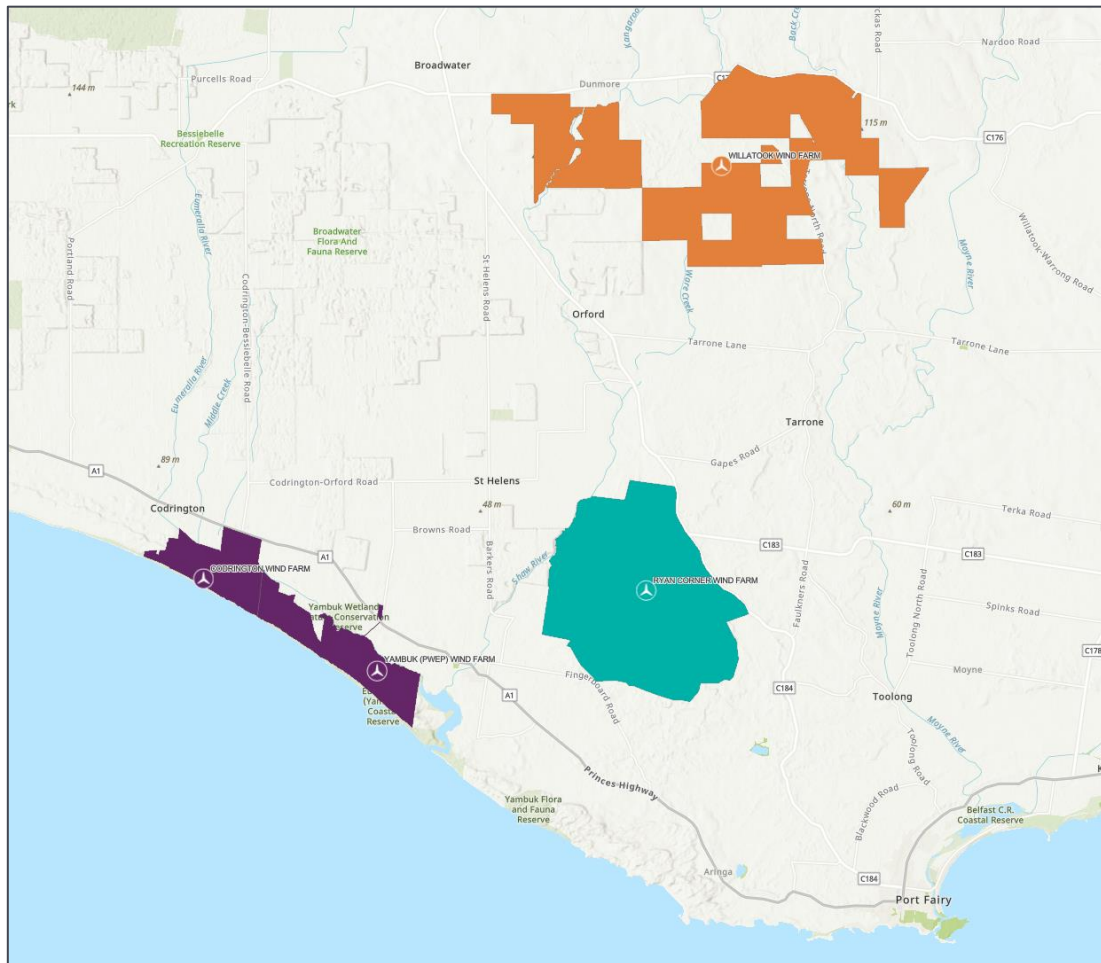


2.3 Other wind farm developments

The operating Yambuk Wind Farm and proposed Willatook Wind Farm are just within 10 km of the Ryan Corner Wind Farm. The Codrington Wind Farm is slightly more than 10 km from the Ryan Corner Wind Farm.

An extract of an online Victorian Government map¹² showing the project location along with other nearby operating, approved, proposed and under construction wind farms is presented in Figure 2.

Figure 2: Location of Ryan Corner Wind Farm and other nearby developments



The potential cumulative noise impact of the Yambuk Wind Farm was addressed at the environment effects inquiry for the Ryan Corner Wind Farm, with the inquiry report¹³ stating as follows:

The Inquiry believes that there will be no cumulative noise impacts with other nearby wind farms, as noise attenuates with distance and the nearest wind farm is Yambuk, 7km away.

As such, cumulative wind farm noise considerations are not applicable to the Ryan Corner Wind Farm and the other wind farms identified within the vicinity of the project.

¹² <https://mapshare.vic.gov.au/planningwebmaps/RenewablesSummary.html>, accessed 9 May 2024

¹³ Ryan Corner Wind Farm Environment Effects Inquiry Moyne Planning Scheme: Permit Application 20060222 Permit Application P107/067 – Inquiry Report, dated March 2008 ([weblink](#))

3.0 REGULATORY STANDARDS & GUIDELINES

The following publications and online references are relevant to wind turbine noise associated with the Ryan Corner Wind Farm:

- *Environment Protection Act 2017*
- *Environment Protection Regulations 2021*¹⁴
- EPA Publication 2061
- Planning permit No. 20060222-2 for the Ryan Corner Wind Farm.
- NZS 6808:2010

Details of the guidance and noise limits provided by these publications are provided below.

3.1 Environment Protection Act 2017

The *Environment Protection Act 2017* (EP Act) provides the overarching legislative framework for the protection of the environment in Victoria.

The EP Act establishes a general environmental duty (GED) to minimise the risks of harm to human health or the environment from pollution or waste, including noise related health effects and amenity impacts, so far as reasonably practicable.

The EP Act also prohibits the emission of unreasonable noise from commercial and industrial trade premises. Specifically, the EP Act states that:

A person must not, from a place or premises that are not residential premises—

(a) emit an unreasonable noise; or

(b) permit an unreasonable noise to be emitted.

Under the EP Act, unreasonable noise means noise that:

(a) is unreasonable having regard to the following—

(i) its volume, intensity or duration;

(ii) its character;

(iii) the time, place and other circumstances in which it is emitted;

(iv) how often it is emitted;

(v) any prescribed factors; or

(b) is prescribed to be unreasonable noise.

Further information about noises that are prescribed to be unreasonable are separately defined in regulations made under the EP Act (see next section).

¹⁴ *Environment Protection Regulations 2021* version 10, in force as of 11 November 2023 and including amendments introduced by the *Environment Protection Amendment (Wind Turbine Noise) Regulations 2022*

3.2 Environment Protection Regulations 2021

The *Environment Protection Regulations 2021* (EP Regulations) give effect to the EP Act by establishing prescriptive requirements for a range of environmental considerations, including noise.

Part 5.3 Division 5 *Wind turbine noise* establishes requirements that apply to the operational turbine noise of a wind farm. The relevant requirements are summarised in Table 2.

Table 2: EP Regulations – Part 5.3 Division 5 summary

Regulation	Provisions and requirements
131A	<i>Wind turbine noise agreement</i> Enables owners and operators of WEFs to enter into written agreements with landowners regarding the limits that wind turbine noise must comply with. Requires specification of the WEF and premises of the relevant landowner in any noise agreements made and allows modification of the noise limits of the WEF only at the premises of the relevant landowner specified in the agreement.
131B	<i>Relevant noise standard</i> Defines the relevant noise standard that a WEF must comply with, according to the date and content of the authorising document for the facility.
131BA	<i>Noise limit</i> Specifies that the noise limit for WEFs is to be determined in accordance with the relevant standard nominated in regulation 131B. Modified noise limits are defined for the premises of landowners who have entered into an agreement with the wind farm under regulation 131A, according to the date when the agreement was made.
131BB	<i>Alternative monitoring point</i> Establishes provisions for alternative monitoring points for the assessment of wind turbine noise, apart from post-construction noise assessment under regulation 131D.
131BC	<i>Alternative monitoring point criterion</i> Establishes the noise limit assessment methodology to be used when noise monitoring has been conducted at an alternative monitoring point.
131C	<i>Duty to manage and review wind turbine noise</i> Establishes the obligation for an operator of a WEF to take all applicable actions set out in Division 5 of the EP Regulations to manage and review wind turbine noise from the facility (see further discussion below).
131CA	<i>Duty to ensure compliance with noise limit or alternative monitoring point criterion</i> Establishes the obligation of the operator of a WEF to ensure that wind turbine noise complies with the noise limit for the facility or, where applicable, the alternative monitoring point criterion.
131D	<i>Post-construction noise assessment</i> Establishes requirements for post-construction noise measurements and compliance assessment reports when a new wind farm starts operating. This also includes the requirement to engage an environmental auditor in relation to the post-construction noise assessment.

Regulation	Provisions and requirements
131E	<i>Noise management plan</i> Establishes requirements for the development, review and implementation of a noise management plan. Includes provisions for using alternative monitoring points and alternative monitoring point criteria for assessing compliance with the noise limits that apply to the WEF.
131F	<i>Annual statements</i> Establishes a requirement for annual statements to be prepared within four (4) months of the end of the financial year. Requires a statement to demonstrate whether or not the wind turbine noise compliance with the noise limits that applied to the WEF. In the case of an assessment being conducted at an alternative monitoring point, includes provisions for using alternative monitoring point criteria to establish compliance.
131G	<i>Wind turbine noise monitoring</i> Establishes a requirement for noise monitoring and associated reporting to be completed within three (3) months of the fifth anniversary of the wind farm commencing operation, and every subsequent five (5) years.
131H	<i>Unreasonable noise</i> Wind turbine noise levels are prescribed as unreasonable for the purposes of the EP Act (specifically for the purposes of paragraph (b) of the definition of unreasonable noise in section 3(1) of the EP Act) if they exceed the noise limit of the relevant noise standard, or the alternative monitoring point criteria if the assessment of wind turbine noise is conducted at an alternative monitoring point.
131I	<i>Transitional provision – noise limits</i> Establishes that noise limits for WEFs determined before the commencement of the <i>Environment Protection Amendment (Wind Turbine Noise) Regulations 2022</i> are, from that commencement, the noise limits for that facility as if the noise limits were determined in regulation 131BA.

An important element of regulation 131C is the Act compliance note¹⁵, which provides clarity on how a wind energy facility operator can satisfy the GED under the EP Act. The Act compliance note means that demonstrating compliance with regulation 131C of the EP Regulations also demonstrates compliance with the GED under the EP Act.

To comply with regulation 131C, a wind farm operator must ensure that wind turbine noise levels comply with the noise limits (or the alternative monitoring point criteria if the wind turbine noise is assessed at alternative monitoring points), and must take all applicable actions under Division 5 of the EP Regulations.

¹⁵ Regulation 6 to the EP Regulations states that if a note at the foot of a provision of the regulations states 'Act compliance' followed by a reference to a section number, the regulation provision sets out the way in which a person's duty or obligation under that section of the EP Act is to be performed in relation to the matters and the extent set out in the regulation provision.

The applicable actions relate to the following:

- NMP (this document): development and implementation of an NMP in accordance with regulation 131E, including:
 - engaging an environmental auditor to prepare a report under regulation 164(ca)(ii) in relation to the NMP
 - submitting the NMP to the Authority on request
 - amending the NMP when required by the Authority.
- Annual statements (see Section 7.0): submission of annual statements in accordance with regulation 131F
- Wind turbine noise monitoring (see Section 8.0): engagement of a suitably qualified and experienced acoustician to determine procedures and conduct wind turbine noise monitoring every five (5) years in accordance with regulation 131G, including:
 - ensuring a noise monitoring report is prepared;
 - engaging an environmental auditor to undertake a review under regulation 164(ca)(ii) of the noise monitoring report; and
 - providing the noise monitoring report and auditor report to the Authority.

3.3 EPA Publication 2061

The EPA Publication 2061 provides an outline of the requirements that apply to wind turbines under the EP Regulations but it does not present statutory requirements or impose compliance obligations. It is intended as a general guide to assist wind farm operators and provides information on:

- noise management plans (NMPs)
- annual statements
- periodic monitoring.

In relation to NMPs, the EPA Publication 2061 defines elements of current good industry practice and note that they may be useful to include when developing an NMP. These elements are reproduced earlier in the summary section of this NMP.

In relation to annual statements, the EPA Publication 2061 reiterates the requirement of the EP Regulations for the annual statement to demonstrate whether wind turbine noise complied with the noise limits or applicable alternative monitoring point criteria. The guidance notes that wind farm operators should select methods of demonstrating compliance which are proportionate to the risk of harm from wind turbine noise associated with the site. Methods to demonstrate compliance, depending on the level of risk, may include a combination of:

- desktop review;
- report on the completion of scheduled maintenance procedures;
- review of Supervisory Control and Data Acquisition (SCADA) system operational data;
- measurements at a reference or alternative monitoring point;
- nearfield noise measurements;
- measurement at critical noise sensitive areas; and
- actions taken to address compliance issues if relevant, including curtailing noise emissions.

EPA Publication 2061 notes a range of factors for wind farm operators to consider when deciding on the extent and type of information to be included in the annual statement, including:

- the margin of noise limit compliance established through noise assessments
- noise sensitive locations
- separation distances
- predictive noise levels
- history of complaints
- exceedance of noise limits during the period.

In relation to periodic wind turbine noise monitoring, EPA Publication 2061 reiterates the requirement under the EP Regulations to conduct monitoring at five (5) year intervals from the from the fifth anniversary of the wind energy facility commencing operations, as of 1 January 2024. Similar to the approach described for annual statements, EPA Publication 2061 advocates the selection of procedures for wind turbine noise monitoring that are proportionate to the risk of harm from noise emissions.

3.4 Planning permit

The planning permit authorising the development of the wind farm was granted on 21 August 2008, and was last amended on 9 March 2022 (Permit No: 20060222-2). The planning permit specifies requirements for the control of operational wind turbine noise in conditions 31 to 34. A summary of these conditions is listed in Table 3.

Table 3: Summary of planning permit noise conditions.

Condition	Description
31	Specifies that operational wind turbine noise must comply with the noise criteria contained in NZS 6808:2010, subject to modifications relating to the location and time period of assessment, and penalties for any identified special audible characteristics. Further details of the modifications are discussed in Section 3.5.
32	Establishes a requirement for post-construction noise monitoring and reporting, including the timing of noise monitoring.
33	Specifies that a report documenting the results of post-construction noise monitoring must be forwarded to the Minister for Planning within 14 months after the commissioning of any turbine.
34	Establishes requirement for noise compliance reports to be accompanied by a report from an environmental auditor, or, if one cannot be engaged, an independent peer review by consent of the Minister for Planning.

The planning permit conditions relating to noise from the wind farm are reproduced in full in Appendix E.

3.5 Relevant standard – NZS 6808:2010

The EP Regulations specify that if an authorising document sets out conditions to modify or replace either NZS 6808:1998 or NZS 6808:2010 in relation to wind turbine noise, then the relevant standard for the purposes of the EP Regulations is NZS 6808:1998 or NZS 6808:2010, as modified by the authorising document.

The planning permit for the Ryan Corner Wind Farm is the relevant authorising document and specifies NZS 6808:2010 as the applicable noise assessment standard, subject to several modifications. Accordingly, NZS 6808:2010, as modified by the planning permit, is the relevant standard under the EP Regulations.

NZS 6808:2010 defines a methodology for assessing operational wind turbine noise levels, including procedures for:

- measuring background noise levels prior to construction of a wind farm
- deriving noise criteria from measured background noise levels
- conducting post-construction measurements of wind farm noise
- assessing the character of the noise produced by the wind farm noise
- assessing post-construction noise measurements to determine compliance with the standard.

The noise criteria defined by NZS 6808:2010 are a combination of a base (minimum) noise limit and noise limits which vary with wind speed and background noise levels. The base limit is a fixed value that is used for conditions when the background noise is low. The noise limit at each integer wind speed is then defined as the base limit or the background level plus 5 dB, whichever value is higher. The limits apply to wind turbine noise levels in the vicinity of noise sensitive locations. The noise limits specified in NZS 6808:2010 apply to noise sensitive locations outside the wind farm boundary.

The character of the wind farm sound is also assessed to determine whether penalties should be applied to account for sounds referred to by the standard as special audible characteristics (SACs). These SACs are defined as tonality, impulsiveness and amplitude modulation. The noise level of the wind farm, adjusted where necessary for the presence of SACs, is then compared with the noise limits at each wind speed to determine the wind farm's compliance.

Condition 31 of the planning permit states the following procedural modifications apply when determining compliance with NZS 6808:2010:

- The noise limits only apply to dwellings existing as of 1 December 2021.
- The noise limits do not apply at locations where a noise agreement has been established with the landowner.
- The minimum noise limit applicable to the wind farm is 40 dB L_{A90} .
- The noise limits apply, and sound levels should be measured, outdoors within 10 metres of a dwelling (i.e. rather than the 20 metre distance from a dwelling specified in NZS 6808:2010).
- Compliance must be separately assessed for the night period defined as 2200 to 0700 hours.

The modifications to NZS 6808:2010 detailed above also apply to the application of the standard for an assessment of compliance with the relevant standard in accordance with the EP Regulations.

4.0 OPERATIONAL NOISE LIMITS

4.1 Non-stakeholder receivers

In accordance with condition 31 of the planning permit, the NZS 6808:2010 noise limits were determined from pre-construction noise monitoring at the Ryan Corner Wind Farm.

The noise monitoring results and noise limits were detailed in MDA report Rp 002 R03 20180786 *Ryan Corner Wind Farm – Background Noise Assessment* (Rp 002), dated 10 June 2021.

Noise monitoring was repeated at receiver 26 due to the initial survey not measuring at a planning permit compliant location. The results and noise limits for this repeat survey were detailed in MDA report Rp 004 20180786 *Ryan Corner Wind Farm – Background noise assessment* (Rp 004), dated 22 September 2022. The analysis involved a review of the potential effect of extraneous noise, including bird or insect sounds.

Background noise monitoring was also completed at receiver 77 in April 2024 and results will be included in a subsequent amendment of the NMP.

Based on analysis of one-third octave band sound level data and comparison of the background noise levels with and without periods clearly affected by bird or insect noise, 10-minute intervals were identified and filtered from the analysis at all locations. Additional data filtering procedures were applied for receivers 7, 10, and 11 based on inspection of the time history to isolate noise source such as generators, quarries, workshops, and gardening activities.

At all other receivers where background noise level data is not available, compliance is assessed against the base (minimum) limit of 40 dB L_{A90} .

NZS 6808:2010 defines a procedure for setting noise limits which apply to the total noise level of all wind farms at a receiver. However, the planning permit specifies limits determined in accordance with NZS 6808:2010 which apply solely to the noise of the Ryan Corner Wind Farm. Irrespective, there are presently no other existing or approved wind farms that are close enough to the Ryan Corner Wind Farm to introduce cumulative noise considerations which could impact the compliance of Ryan Corner Wind Farm with the applicable noise limits. The nearest known projects are detailed in Section 2.3. Accordingly, the noise limits are to be used to assess noise levels solely related to the operation of the Ryan Corner Wind Farm.

All noise limits are referenced to wind speeds at a height of 112 m above ground level, corresponding to the hub height of the wind turbines installed at the site. The reference wind speed positions for the noise limits are detailed in Table 4, corresponding to the reference meteorological mast used for the background noise monitoring and the noise limits.

Table 4: Reference wind speed measurement location – MGA94 zone 54

Mast designation	Easting	Northing	Measurement height ^[1] / Reference height
RC5 ^[2]	596663	5762388	40 m / 112 m
RC2 ^[3]	598592	5763788	40 m / 112 m

1 As discussed in Rp 002, the analysis methodology adopted by the wind engineering service for the background noise survey calculated from a measurement height less than 60% of the hub-height of the turbines. This was indicated to likely be a slight overestimation of the wind speeds at 112 m, and therefore provide a conservative assessment for the background noise survey.

2 Mast used for the background noise survey detailed in Rp 002

3 Mast used for the background noise survey detailed in Rp 004

The operational noise limits from Rp 002 (for all monitored receivers except for receivers 26 and 77) are presented in Table 5 and Table 6 for the all-time and night-time periods respectively. As per Rp 002, background noise dependent limits for receivers 7 and 11 are presented for the night-time period only, on account of local sources of extraneous noise which were evident in the background noise data during the daytime.

Table 5: All-time (day and night combined) noise limits, dB L_{A90} – from Rp 002

Location	Hub height wind speed, m/s ^[1]												
	3	4	5	6	7	8	9	10	11	12	13	14	15
10 ^[2]	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.7	42.4	44.4	46.5	48.8	51.4
27	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	41.8	44.0	46.3	48.8	51.5
29	40.0	40.0	40.0	40.0	40.0	40.0	40.0	41.4	43.3	45.3	47.5	49.8	52.3
31	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	41.2	43.0	44.9	47.0	49.3

1 112 m above ground level at RC5 596663 E, 5762388 N (MGA94 zone 54)

2 Due to elevated noise levels likely attributable to the operation of a quarry to the north of the property, all background noise data for the period 0700 – 1700 hrs was removed from the analysis. Therefore, the all-time period for noise limits at receiver 10 is 1700 – 0700 hrs.

Table 6: Night-time (2200 – 0700 hrs) noise limits, dB L_{A90} – from Rp 002

Location	Hub height wind speed, m/s ^[1]												
	3	4	5	6	7	8	9	10	11	12	13	14	15
7	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	41.5	43.3	45.3	47.5
10	- ^[2]	- ^[2]	- ^[2]	40.0	40.0	40.0	40.0	40.0	41.0	43.1	45.4	48.1	51.2
11	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	41.8	44.7	47.8
27	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.5	43.5	46.7	50.2
29	-	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	41.4	44.2	47.4	50.8
31	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.9	43.1	45.5

1 112 m above ground level at RC5 596663 E, 5762388 N (MGA94 zone 54)

2 Outside valid range of the regression analysis

The noise survey at receiver 26 reported in Rp 004 required some data to be removed based on the operations and noise impact of a nearby quarry, resulting in adjusted all-time and night periods. The operational noise limits from Rp 004 (for receiver 26) are presented in Table 7 for the adjusted all-time period of 1800 – 0600 hrs and adjusted night-time period of 2200 – 0600 hrs.

Table 7: Receiver 26 noise limits, dB L_{A90} – from Rp 004

Time period	Hub height wind speed, m/s ^[1]												
	3	4	5	6	7	8	9	10	11	12	13	14	15
Adjusted all-time	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
Adjusted night-time	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0

1 112 m above ground level at RC2 598592 E, 5763788 N (MGA94 zone 54)

4.2 Stakeholder receivers

The NZS 6808:2010 definition of a noise sensitive location specifically excludes stakeholder dwellings located within a wind farm site boundary. Noise limits therefore do not apply to the six (6) stakeholder receivers located within the site boundary of the wind farm.

In accordance with the definition of the Victorian Wind Energy Guidelines, there are currently no stakeholder receivers located outside the wind farm site boundary (see discussion Section 2.2 – the noise agreements in place with landowners residing at dwellings located outside the site boundary only address noise levels at locations within the site boundary, not the landowner dwellings outside the site boundary).

If noise agreements are established in future to address noise levels at dwelling locations outside the site boundary, any additional stakeholder receivers would be subject to noise limits determined in accordance with regulation 131BA of the EP Regulations.

5.0 RISK ASSESSMENT & CONTROLS

5.1 Risk management procedures

5.1.1 Overview

In order to minimise the risk of noise related harm as far as reasonably practicable in accordance with the GED under the EP Act, a wind farm operator must fulfil the requirements of regulation 131C of the EP Regulations by:

- ensuring that the wind farm complies with the noise limit set out in the relevant noise standard
- taking all applicable actions set out in Division 5 of the EP Regulations.

The applicable actions under Division 5 of the EP regulations comprise the development and implementation of the NMP (this document), preparation of annual statements (see Section 7.0), and conducting wind turbine noise monitoring every five (5) years (Section 8.0).

Based on the above, ensuring compliance with the relevant standard is a key risk to address. Taking all of the applicable actions under Division 5 of the EP Regulations forms part of the overall process of managing this compliance risk, and informs the selection and implementation of appropriate risk controls to verify and maintain compliance.

In addition to fulfilling the GED to minimise the risk of harm from noise, complying with regulation 131C (in particular, complying with the relevant standard) demonstrates that wind turbine noise is not prescribed to be unreasonable under the EP Act. However, wind turbine noise must also not be unreasonable having regard to the listed factors comprising:

- its volume, intensity or duration
- its character
- the time, place and other circumstances in which it is emitted
- how often it is emitted
- any prescribed factors.

These listed factors, which are separate to an assessment of compliance with the relevant standard, must be accounted for in the maintenance and complaint handling protocols set out in the NMP.

5.1.2 Identification of risk

Wind turbine noise risk is identified via a range of methods which are used to determine the potential for unreasonable noise. These methods comprise:

- Wind turbine noise compliance assessments based on:
 - noise modelling (see Section 5.2.1)
 - noise monitoring (see Section 5.2.2 and Section 8.0).
- Operational noise reviews conducted as part of:
 - routine maintenance
 - planning any changes which could materially alter the noise emissions of the turbines
 - preparation of annual statements.

- Complaint evaluation and the identification of any trends in the complaints which could indicate:
 - the presence of a previously unidentified condition in which the risk is increased, or
 - a prevalence of complaints in an identified condition of increased risk.

5.1.3 Assessment of risk

Wind turbine noise risks are assessed by accounting for both their consequence and likelihood. The objective of the risk assessment is to determine the appropriate risk controls.

There are multiple factors which influence both the consequence and likelihood of wind turbine noise related risks, including the following:

- The type and extent of noise compliance assessment data that is available (i.e. modelling and/or monitoring data).
- The magnitude of the compliance margins established by modelling and, if available, measurement-based compliance assessments.
- The breadth of the range of wind speeds and directions when compliance margins are minimal (if applicable), and the regularity of occurrence of these conditions.
- The number of receivers where compliance margins are minimal (if applicable).
- The times when compliance margins are minimal (e.g. day or night, or both).
- The presence of SACs and, if applicable, whether there is more than one type of SAC present, the prevalence of their occurrence (i.e. whether constantly present when the turbines are operating or only under certain atmospheric conditions), and whether they are at a level which warrants the application of penalty adjustments to the wind turbine noise.
- The occurrence of noise related complaints and, if so, the extent and nature of the complaints.
- The level of knowledge of the noise implications of any proposed modification to the configuration or operation of the turbines (e.g. whether a change relates to an aspect of the turbines which is known to influence noise emissions and, if so, whether there is data available to quantify or estimate the change).
- The availability of options to reduce turbine noise emissions or mitigate identified SACs.
- The requirement for dedicated operational noise controls, such as turbine curtailments, to maintain compliance.
- The systems in place to implement, monitor, and review the noise controls.

EPA Publication 1695.1 *Assessing and controlling risk: A guide for business* provides an example general method for a combined assessment of risk likelihood and consequence, as depicted in Figure 3 and Figure 4.

Figure 3: Example risk matrix reproduced from EPA Publication 1695.1

Permanent or long-term serious environmental harm / life threatening or long-term harm to health and wellbeing.	Consequence	Severe	Medium	High	High	Extreme	Extreme
Serious environment harm / high-level harm to health and wellbeing.		Major	Medium	Medium	High	High	Extreme
Medium level of harm to health and wellbeing or the environment over an extended period of time.		Moderate	Low	Medium	Medium	High	High
Low environmental impact / low potential for health and wellbeing impacts.		Minor	Low	Low	Medium	Medium	High
No or minimal environmental impact, or no health and wellbeing impacts.		Low	Low	Low	Low	Medium	Medium
			Rare	Unlikely	Possible	Likely	Certain
			Likelihood				
			Could happen but probably never will	Not likely to happen in normal circumstances	May happen at some time	Expected to happen at some time	Expected to happen regularly under normal circumstances

Figure 4: Description of risk ratings reproduced from EPA Publication 1695.1

Risk level	Description
Extreme	Totally unacceptable level of risk. Stop work and/or take action immediately.
High	Unacceptable level of risk. Controls must be put in place to reduce to lower levels.
Medium	Can be acceptable if controls are in place. Attempt to reduce to low.
Low	Acceptable level or risk. Attempt to eliminate risk but higher risk levels take priority.

In order to apply the example framework set out above, potential wind turbine noise outcomes must be related to the range of consequence and likelihood ratings, accounting for the relevant standard under the EP Regulations.

The relevant standard for assessing wind turbine noise sets noise limits at values intended to protect amenity and well-being, while enabling the development of renewable sources of energy. Achieving compliance with the relevant standard therefore means that wind turbine noise will generally be audible at some locations during certain periods. Community attitudes to the noise will vary between individuals and will depend on a range of acoustic and non-acoustic factors (i.e. factors that are not related to sound level or character).

However, achieving compliance with the relevant noise standard provides for an acceptable outcome under the EP Act and EP Regulations with respect to the general environmental duty and noise that is prescribed to be unreasonable, provided that:

- all other applicable actions under Division 5 of the EP Regulations are taken, and
- the noise is not unreasonable having regard to the listed factors set out in the EP Act.

Accordingly, for wind turbine noise which complies with regulation 131C of the EP Regulations, the consequence rating is generally assigned as low to minor. A moderate or higher consequence rating is generally only applicable to wind turbine noise that does not comply with the relevant standard, or is otherwise found to be unreasonable according to the listed factors defined in the EP Act. However, a moderate rating may be applicable to wind turbine noise that complies with the relevant standard if there are multiple contributing factors which individually increase the consequence.

Defining quantitative thresholds to further separate consequence levels according to the wide range of factors outlined earlier is complex and subject to considerable uncertainty. Given these uncertainties, defining quantitative boundaries between each consequence level would involve the assignment of arbitrary thresholds which could be misleading and imply a greater level of assessment accuracy than is afforded by the current state of knowledge. To enable consequence levels to be practically assigned, it is therefore necessary for an element of the consequence ratings to be informed by qualitative assessment, accounting for the range of relevant factors.

A similar level of qualitative assessment is also required to determine the likelihood of the risk, accounting for the range of relevant factors.

5.1.4 Control of risk

The wind turbine noise risk of an operational wind farm is controlled by the following:

- Conducting noise monitoring when the wind farm begins operating to determine if the wind turbine complies with the relevant standard, accounting for normal full power operating conditions (i.e. full power for the normal operating configuration of the wind farm).
- Verifying the ongoing implementation of any noise controls which were in place when the wind farm was assessed to be compliant.
- Conducting routine inspections and maintenance works to verify the wind turbines are functioning within the operating envelope assessed to be compliant with the relevant standard.
- Defining and implementing modified or alternative noise controls when necessary as a result of:
 - identifying wind turbine noise levels above the noise limits defined by the relevant standard
 - planned changes to the operation of the wind farm which will change, or have the potential to change the noise risk
 - a change in circumstances which affects the noise limits the wind farm must adhere to.
- Verifying that wind turbine noise complies with the relevant standard following the implementation of any changes to the operation of the wind farm that are materially relevant to wind turbine noise levels (based on data to quantify the effect of the change).
- Periodic repeat verification that the wind farm continues to adhere to the relevant standard, in line with the requirements of regulations 131F and 131G of the EP Regulations for annual statements and repeat monitoring, using procedures that are proportionate to the risk profile of the wind farm.
- Developing, implementing and maintaining a community complaint and evaluation procedure.

The applicable risk controls listed above are documented in this NMP, which forms part of the broader environmental management strategy for the wind farm. The NMP must be periodically reviewed, and updated when necessary, to address any potential or identified changes to the risk profile of the wind farm (see Section 13.0).

5.2 Site risks

The following sections provide an assessment of the risk profile of the Ryan Corner Wind Farm at the date of this NMP, accounting for the procedures outlined in Section 5.1.

5.2.1 Noise modelling

Updated noise modelling was produced for this NMP on the basis of the latest sound power level data for the turbines at the site. The noise modelling inputs and results are summarised below.

Inputs

A digital model of the wind farm has been used to predict the distribution of noise levels around the wind farm. This distribution is illustrated by contour lines which indicate the predicted noise level when the wind turbines are generating their highest noise emissions.

Key details of the noise prediction method are summarised in Table 8.

Table 8: Noise modelling summary

Item	Description
Prediction method	ISO 9613-2 ¹⁶ as implemented in proprietary noise modelling software (SoundPLANnoise version 9.0). This method calculates the highest noise level in all directions for atmospheric conditions which increase the spread of noise from each turbine in every direction; a hypothetical worst-case scenario which does not occur in practice given that noise propagation from a wind farm is dependent on wind direction.
Noise emission data	Sound power levels sourced from manufacturer documentation – see below.
Source heights	Hub height for the distance and ground effect components of the calculation. Maximum tip height is used for the component of the calculation related to terrain screening.
Receiver heights	1.5 m
Ground characterisation	G = 0.5 (50 % hard ground and 50 % soft ground)
Atmospheric conditions	T = 10°C and Relative Humidity = 70%
Terrain profile	Ground elevation contours at 10 m height intervals
Terrain effects	Adjustments for the effects of terrain applied on the basis of the UK Institute of Acoustics guidance ¹⁷

¹⁶ ISO 9613-2:1996 *Acoustics – Attenuation of sound during propagation outdoors Part 2: General method of calculation*

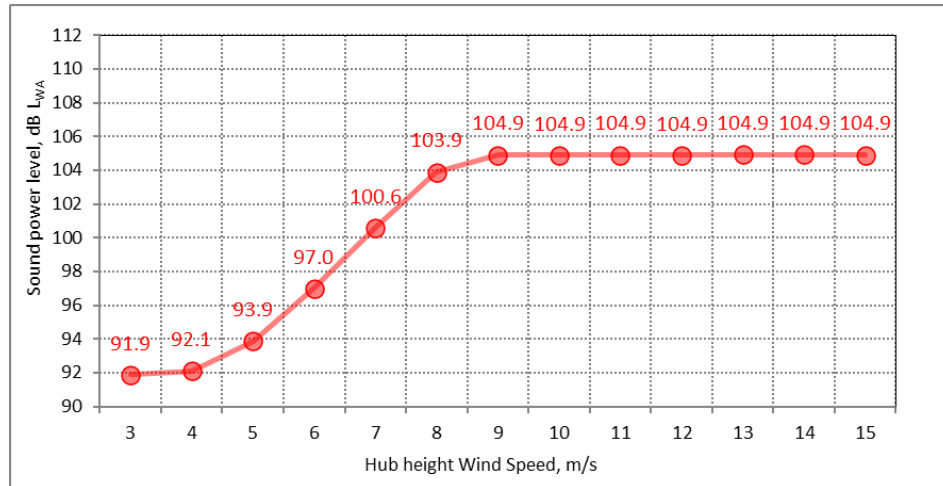
This standard has been revised in 2024, however, the 1996 version is retained for consistency with the pre-construction noise assessments.

¹⁷ UK Institute of Acoustics publication *A good practice guide to the application of ETSU-R-97 for the assessment and rating of wind turbine noise*

Noise emission (sound power) data for the Vestas V136–4.2MW turbines at the Ryan Corner Wind Farm was sourced from the document 0067-4732_V05 – V136-4_0&4_2MW Third Octaves, dated 1 June 2023.

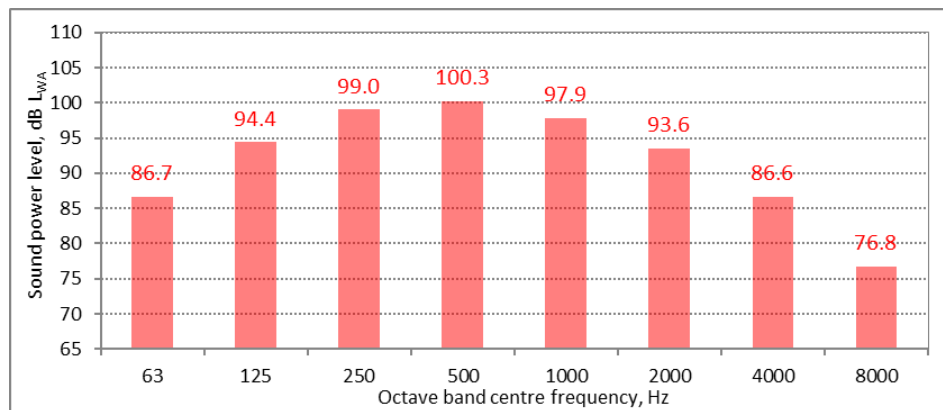
The sound power levels from these documents have been adjusted by the addition of relevant uncertainty margins (the margin being the test uncertainty at each wind speed for measurement-based data, and a nominal value of 1 dB for general specification data). The data, including the additions for uncertainty, are presented in Figure 5.

Figure 5: Vestas V136-4.2 MW – sound power level versus wind speed



The frequency spectrum corresponding to the highest overall A-weighted sound power level (104.9 dB L_{WA} at 10 m/s hub height wind speed) is presented in Figure 6.

Figure 6: Vestas V136-4.2 MW – sound power level spectrum



Results

The predicted noise contours are illustrated in 5 dB increments for the wind speeds when the turbine's noise emissions are highest. The highest predicted noise levels are summarised in Table 9 according to the number of receivers within different noise level bands above and below 40 dB L_{A90} ; the minimum wind turbine noise limit under the relevant standard (see Section 3.5).

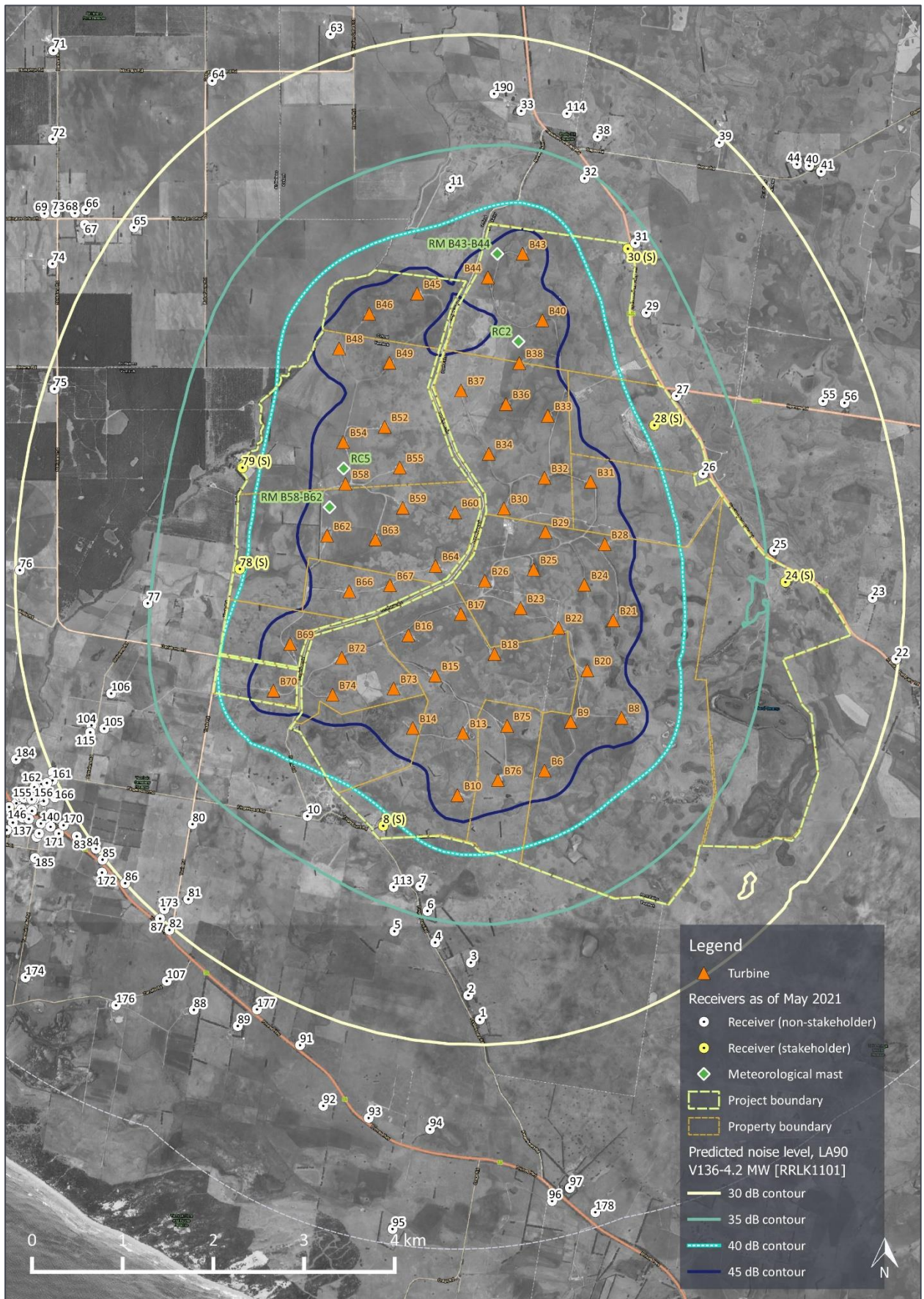
Table 9: Predicted noise level summary – count of identified receivers within 5 km of turbines

Predicted noise level range, dB L_{A90}	No. of stakeholder receivers	No. of non-stakeholder receivers
> 40	0	0
35 – 40	5	10
30 – 35	1	26
25 – 30	0	117
20 – 25	0	2

In terms of noise risks, the key factors to note from the modelling are:

- The predicted noise levels are below 40 dB L_{A90} at all receivers (the minimum wind turbine noise limit under the relevant standard (see Section 3.5).
- There are ten (10) non-stakeholder receivers with a predicted noise level between 35 and 40 dB, however, there is still a clear margin of compliance to the minimum wind turbine noise limit under the relevant standard at these locations (minimum compliance margin of 2,6 dB).
- There are twenty-six (26) non-stakeholder receivers with a predicted noise level between 30 and 35 dB, corresponding to a margin of compliance with the minimum noise limit of at least 5 dB.
- All other receivers have predicted noise levels below 30 dB, corresponding to a margin of compliance with the minimum noise limit of at least 10 dB.

Figure 7: Predicted noise level contours



5.2.2 Post-construction noise compliance monitoring

As the Ryan Corner Wind Farm is currently under construction, a post-construction noise assessment is yet to be commenced.

Once the post-construction noise assessment has been completed, the findings are to be used to inform an updated assessment of the risk profile of the wind farm. Their impact on the noise risk assessment should be considered in an update to this NMP. The NMP review cycle is documented in Section 12.0 and responsibilities for maintaining the NMP are discussed in Section 13.0.

5.2.3 Noise complaints

As the Ryan Corner Wind Farm is currently under construction, there is no indication of operational noise related complaints.

The occurrence of noise related complaints does not automatically infer a change in the risk profile of the wind farm. However, if complaints relating to the operational wind turbine noise occur, and indicate the potential for unreasonable noise under the EP Act (prescribed unreasonable noise or noise assessed to be unreasonable according to the listed factors defined by the EP Act), the risk profile and risk controls for the wind farm may require review. For example, if complaints occur as a result of atypical noises linked to the need for maintenance or remedial actions, any ongoing maintenance and management requirements would need to be reflected in the site's risk controls.

5.2.4 Risk controls

The wind turbine noise risk controls the Ryan Corner Wind Farm are defined in the following subsections for the different stages of the project.

Prior to commencement of operations

- Verification noise modelling for the micro-sited project layout and final turbine selection. The results of this modelling confirmed that compliance is predicted by a margin of at least 2.6 dB (see Section 5.2.1).
- Specification of noise guarantees in the turbine supply contract to limit the level and character of the turbine's noise emissions.

Commencement of operations

- Post-construction noise monitoring to commencing within 2 months of the first turbine being commissioned to verify that wind turbine noise levels assessed in accordance with NZS 6808:2010 are below the noise limits. In accordance with the planning permit for the wind farm, the noise monitoring will continue for a period of twelve (12) months after the whole site becomes fully operational (see Section 6.0).
- The results of the noise monitoring are to be reviewed an independent environmental auditor.

Ongoing operations

- Training of site supervisors and site inspection personnel to promote awareness of the general environmental duty under the EP Act and to enable identification and reporting of changes in noise emission characteristics which could impact the amenity of neighbouring receivers.
- Preventative and reactive maintenance activities to identify and rectify turbine faults or defects which could give rise to increased noise emissions. The site supervisors will undertake weekly observations as part of their site inspections to listen for any abnormal noise being produced by the turbines. The turbine supplier (Vestas) will also conduct similar listening checks as part of their service program for the turbines. A completed Vestas maintenance schedule will be provided to RCD no earlier than 2 months before operation, however the service program is noted to include the following key turbine component checks:

- Blades: after 3 months of operation and then annually
- Gearbox: after 3 months of operation and then annually
- Yaw system: after 3 months of operation and then annually
- Generator bearings: annually

Vestas will also implement and manage an on-line condition monitoring system able to provide feedback on turbine condition based on techniques including vibration analysis. Vestas will use the data to detect or anticipate faults while components are operational and to plan maintenance works.

- Implementation of the Endorsed Complaints Investigation and Response Plan to address community concerns in a timely manner and ensure data is collected and retained in a format to enable systematic reviews.
- Collection and recording of noise related comments received via general enquiry channels (e.g. an open invitation to the community to provide comments or questions is regularly published in project newsletters) or the Ryan Corner Community Engagement Committee.
- Annual review of maintenance, operation, communication and complaint records with respect to noise to inform the preparation of annual statements in accordance with the EP Regulations. A key objective of the review is to identify and assess if any changes have occurred which may have altered the level and/or character of wind turbine noise.
- Noise monitoring every five (5) years in accordance with the EP Regulations to verify that wind turbine noise levels remain below the noise limits.
- Formal review of the NMP by a suitably qualified and experienced acoustician every 5 years (after the first 5 yearly test) to evaluate the suitability of the risk control and identify if any additional risk controls are warranted.
- Additional noise monitoring when a requirement for a noise investigation report has been instigated as a result of complaints or identification of a potential non-compliance.

5.2.5 Assessment

This section presents an assessment of noise risk consequence, likelihood and level, based on the risk factors outlined in Section 5.1.3 and site information presented in Section 5.2.1 to Section 5.2.4.

Based on risk assessment procedures outlined in Section 5.1.3, the inherent risk consequences are classified as minor on the basis that the noise modelling of the wind farm indicates compliance with the base (minimum) applicable noise limits determined in accordance with the relevant standard.

In terms of risk likelihood, the predicted margins of compliance indicate that the wind farm is expected to comply with noise limits. However, compliance is yet to be verified by a post-construction noise assessment, and information about the noise characteristics of the wind farm will need to be reviewed after the wind farm has commenced operation. The inherent risk likelihood is therefore categorised as possible.

In accordance with EPA Publication 1695.1 (see Section 5.1.3), the inherent risk consequence and likelihood equates to a medium risk level which is defined as follows:

Can be acceptable if controls are in place. Attempt to reduce to low.

With the risk controls in place, the residual risk is reduced to low.

A risk matrix in accordance with EPA Publication 1695.1 is presented in Table 10 with a summary of the risk controls detailed previously in Section 5.2.4.

Table 10: Ryan Corner Wind Farm risk matrix

Hazard	Potential harm	Inherent risk assessment			Risk controls (see Section 5.2.4)	Residual risk assessment		
		Consequence	Likelihood	Risk Rating		Consequence	Likelihood	Risk Rating
Wind turbine noise levels above the noise limits as a result of elevated broad band noise emissions.	Prescribed unreasonable noise, resulting in unacceptable amenity impacts and increased risk of sleep disturbance	Minor	Possible	Medium	Prior to commencement of operations - Verification noise modelling - Contractual noise performance warranties in the turbine supply contract Following commencement of operations - Post-construction noise monitoring to verify compliance with NZS 6808:2010 - Review of post-construction report by an independent environmental auditor	Minor	Unlikely	Low
Wind turbine noise levels above the noise limits as a result of SACs.	Prescribed unreasonable noise, resulting in unacceptable amenity impact and increased risk of sleep disturbance.	Minor	Possible	Medium	Ongoing operations - Site inspection and maintenance program, including both proactive and reactive measures (site supervisor observations as part of weekly sites inspections and Vestas service program) - Implementation of the Endorsed Complaints Investigation and Response Plan - Collection and recording of noise related comments via general communication channels - Annual reviews as part of preparation of annual statements - Noise monitoring every 5 years as required by the EP Regulations - Additional noise monitoring when noise investigation reports are instigated - Formal review of the NMP every 5 years.	Minor	Unlikely	Low
Wind turbine noise below the noise limits, but characterised by audible atypical features e.g. as a result of turbine defects or maintenance issues.	Unreasonable noise according to the listed factors under the EP Act, resulting in unacceptable amenity impacts.	Minor	Possible	Medium	Ongoing operations - Site inspection and maintenance program, including both proactive and reactive measures. (site supervisor observations as part of weekly sites inspections and Vestas service program) - Implementation of the Endorsed Complaints Investigation and Response Plan - Collection and recording of noise related comments via general communication channels - Annual reviews as part of preparation of annual statements - Noise monitoring every 5 years as required by the EP Regulations - Additional noise monitoring when noise investigation reports are instigated - Formal review of the NMP every 5 years	Minor	Unlikely	Low

6.0 POST-CONSTRUCTION NOISE ASSESSMENT

In accordance with regulation 131D of the EP Regulation and the requirements of the planning permit, noise compliance monitoring must be undertaken when the wind turbines being operating. The noise monitoring must be documented in a post-construction noise assessment report for review by an independent environmental auditor.

The following sections provide an overview of the locations, timing, procedures and reporting requirements for the monitoring.

6.1 Noise monitoring locations

Noise measurements for the post-construction noise assessment are to be carried out at the eight (8) preferred noise compliance monitoring locations listed in Table 11, and shown in Figure 8, subject to permission being granted by the landowners.

Table 11: Preferred noise compliance monitoring locations (MGA94 Zone 54)

Receiver	Easting, m	Northing, m
7	597,507	5,757,787
10	596,263	5,758,560
11	597,837	5,765,483
26	600,625	5,762,317
27	600,332	5,763,187
29	599,999	5,764,104
31	599,879	5,764,871
77	594,503	5,760,903

In addition to noise monitoring at receivers to assess compliance with NZS 6808:2010, the EP Regulations introduced the possibility of using intermediate locations between the wind farm and the receivers to provide an alternative means of assessing compliance with NZS 6808:2010. The intermediate locations, referred to as alternative monitoring points in the EP Regulations, provide a means of addressing the practical challenges that often occur when attempting to measure wind farm noise levels at receivers amid comparable background noise levels. In particular, simultaneous noise measurements at intermediate locations and receivers can inform the definition of a relationship between the two sets of locations, in turn enabling the intermediate locations to be used as reference points where testing can be repeated, if required, for the purposes of re-assessing compliance in future.

Intermediate locations should generally be located:

- In the vicinity of the predicted 45 dB L_{A90} contour associated with the wind farm.
- At positions that are suitable for measuring conditions that are representative of downwind propagation from the wind farm to the receiver, accounting for all turbines that significantly contribute to the total wind farm noise levels at the receiver.

Subject to access to suitable locations, supplementary measurements shall therefore also be conducted at the six (6) alternative monitoring points listed in Table 12 and shown Figure 8.

Table 12: Alternative monitoring points

Alternative monitoring point	Nearest receivers represented	Direction from wind farm
7int	7	South
10int	10	South
11int	11	North
26/27int	26, 27	North-east
29/31int	29, 31	East
77int	77	West

The preferred noise compliance monitoring locations were generally selected to represent non-involved receivers that are within or near the predicted 35 dB L_{A90} noise contour of the Ryan Corner Wind Farm.

In the event that permission is not able to be obtained for carrying out compliance measurements at the preferred receiver monitoring locations, other monitoring locations shall be considered.

Subject to practical considerations and constraints, the receiver measurement systems shall be positioned in the vicinity of the dwelling at each of the preferred noise compliance monitoring locations as follows:

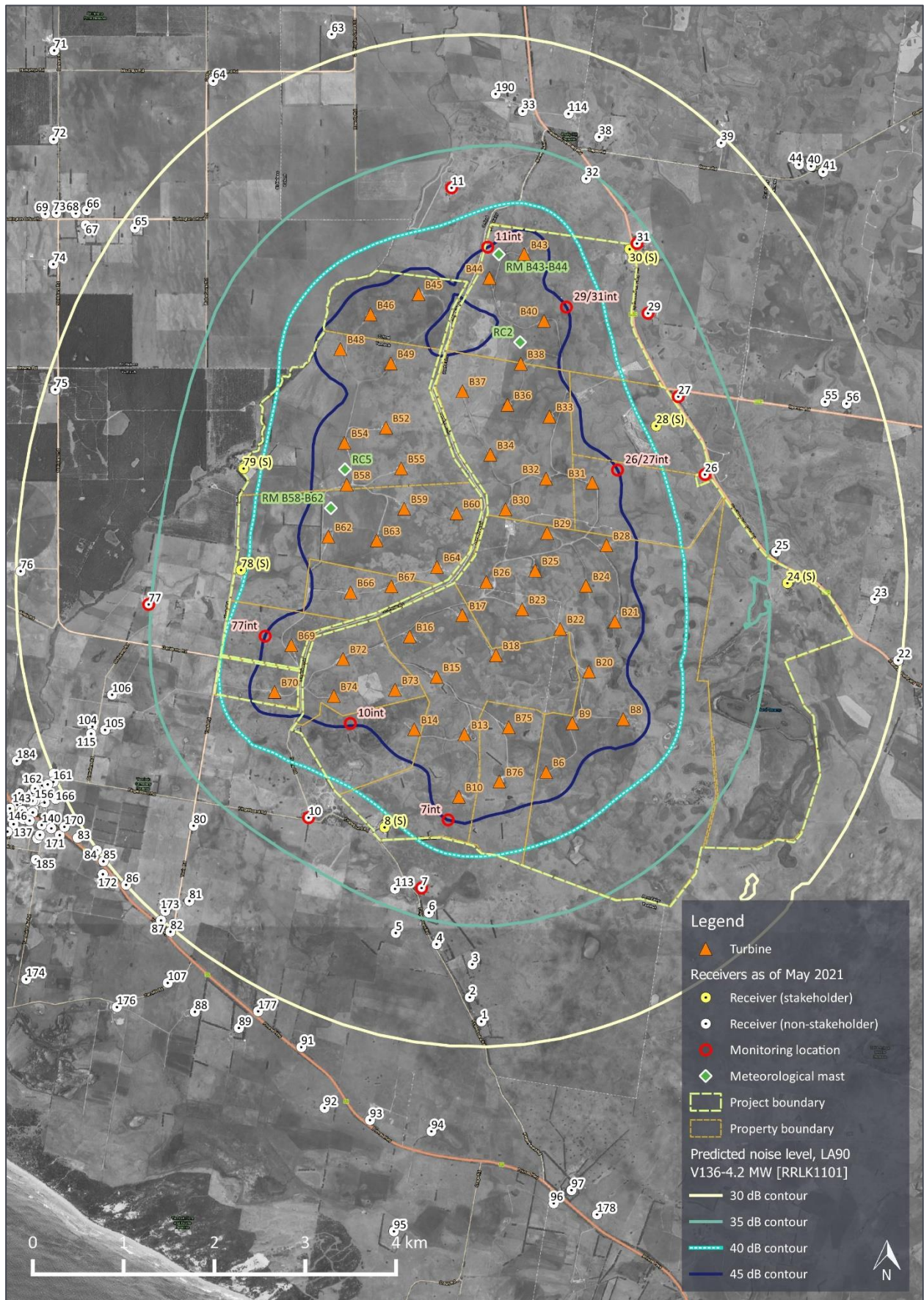
- The measurements shall not occur within 5 m of a vertical reflecting surface.
- The measurements shall occur within 10 m of the dwelling (per the modification introduced by the planning permit).
- The measurements shall occur as close as practically possible to the location of the background noise monitoring (where applicable, and subject to the overriding requirement of the planning permit to measure compliance within 10 m of the dwelling).

The intermediate locations, subject to practical access constraints, shall be positioned as follows:

- In the vicinity of the predicted 45 I L_{A90} contour associated with the wind farm.
- As far as practical from any localised sources of increased background noise such as livestock or dense/tall clusters of vegetation.
- At positions that are suitable for measuring conditions that are representative of downwind propagation from the wind farm to the corresponding receivers, accounting for all turbines that significantly contribute to the total wind farm noise levels at the noise sensitive location.

All noise monitoring locations shall be positioned as far as practically possible from streams, watercourses and vegetation which may result in localised increases in background noise levels.

Figure 8: Post-construction noise monitoring locations and predicted noise level contours



6.2 Timing

Post construction noise monitoring must adhere to the distinct timing requirements of the EP Regulations and the planning permit.

The EP Regulations specify that a post-construction noise assessment must be completed after a wind farm commences operation. The specific requirements stated in regulation 131D are:

- (1) An operator of a wind energy facility that commences operation on or after 1 November 2021 must ensure that a post-construction noise assessment for the facility is conducted—*
 - (a) within 12 months of the commencement of operation of the facility; or*
 - (b) in the case of a facility that commences operation in stages as set out in the authorising document for that facility, within 12 months of each stage being completed.*
- (2) A post-construction noise assessment must—*
 - (a) be conducted in accordance with NZS 6808:2010 by a suitably qualified and experienced acoustician; and*
 - (b) demonstrate whether or not the wind energy facility complies with the noise limit for that facility.*
- (3) The operator must—*
 - (a) ensure that a report of the post-construction noise assessment is prepared; and*
 - (b) engage an environmental auditor to prepare a report under regulation 164(ca)(i) in relation to the post-construction noise assessment.*
- (4) The operator must give a copy of each report referred to in subregulation (3) to the Authority within 10 business days of the completion of the auditor's report.*

However, to comply with the planning permit, operational noise monitoring must commence within two (2) months of commencement of operation the first turbine, and must extend for a period of twelve (12) months after the last turbine has begun operating.

The planning permit monitoring requirements are therefore significantly more onerous than those of the EP Regulations. Noise monitoring in accordance with the requirements of the planning permit will therefore satisfy the monitoring requirements of the EP Regulations.

6.3 Monitoring and analysis procedures

In accordance with the requirements of the EP Regulations, a suitably qualified and experienced acoustic engineer will need to be engaged to conduct a post-construction noise assessment of the wind farm based on noise monitoring at receivers around the wind farm.

Specific details of the noise monitoring and analysis to be conducted for the selected monitoring locations are detailed in Appendix F. However, in recognition of the extended noise monitoring period required to address the planning permit, the following general requirements are noted for the period of monitoring which informs the post-construction noise assessment under the EP Regulations:

- **Monitoring duration:** monitoring for the purposes of a post-construction report in accordance with the EP Regulations should be conducted for a period of at least six (6) weeks to enable a range of conditions to be captured. The period may need to be extended if atypical weather conditions occur during the survey (with respect to rainfall or wind speeds and directions) or disrupted wind farm operations preclude a meaningful assessment of compliance (e.g. as a result of turbine faults or restrictions on energy production).
- **Representative wind directions:** monitoring for the purposes of a post-construction report in accordance with the EP Regulations should extend for a sufficient period to include the times of year when downwind conditions occur more frequently (see site wind direction trends in Appendix H).
- **Representative operations:** wind farm operational data recorded by the Supervisory Control and Data Acquisition (SCADA) system shall be analysed to verify representative operations during the noise monitoring period. Any periods when wind turbine noise may have been materially reduced by the effects of disrupted operations or atypical curtailments shall be identified and excluded from the analysis. If insufficient data is available for a meaningful analysis (and the monitoring has already been extended or decommissioned), refined operational procedures may be implemented, but the uncertainty introduced into the assessment must be quantified and accounted for in the compliance assessment (see further specific details of these procedures in Appendix F).
- **Attended observations:** at least three (3) sets of attended observations for evaluating the presence of SACs are to be conducted during the monitoring period which informs the post-construction noise report. Attended observations must always be conducted in the vicinity of receivers and at times when both the wind farm is operating, and conditions are suitable for conducting observations (e.g. dry weather conditions). Preference should be given to conducting attended observations at times when the receivers are downwind from the wind farm where practical to do so. At least one (1) of the three (3) sets of attended observations should be conducted during the night period (2200-0700 hrs).

6.4 Noise compliance monitoring report

The post-construction noise report under the EP Regulations must be submitted to the authority no later than twelve (12) months after the completed wind farm begins operating, accompanied by a report from an independent environmental auditor.

Under the planning permit, a report is to be issued within fourteen (14) months of commissioning of any turbine.

To meet the requirements of both the EP Regulations and the planning permit, a post-construction noise monitoring report will need to be prepared prior to completion of the noise monitoring (i.e. on account of the noise monitoring continuing for a period of twelve (12) months after the last turbine begins operating).

The noise compliance monitoring report shall document the following:

- An assessment of the wind farm's compliance with the operational noise performance requirements of the relevant standard.
- Requirements for further noise investigations if the results of the noise compliance testing are not sufficient to conclude that the wind turbine noise is compliant with the relevant standard (see noise investigation reports in Section 9.0).
- A requirement to prepare a noise remediation plan if the results of the noise compliance testing demonstrate that the wind turbine noise is not compliant with the relevant standard.
- Any recommended modifications to the NMP in light of the findings of the post-construction noise assessment.

The noise compliance monitoring report shall adhere to the documentation requirements detailed in Section 8.3 of NZS 6808:2010, and the general requirements of AS 1055:2018 *Acoustics – Description and measurement of environmental noise*, and shall include the following:

- Supporting documentation for the site wind speed and direction data referenced in the assessment.
- Charts illustrating the noise measurement results clearly identifying all samples that have been filtered from the analysis due to rainfall or the identification of extraneous noise influences. The analysis shall be supplemented by a summary table for each noise monitoring location detailing the total number of measurements points, the number of points that have been removed, and the final number of data points that the analysis has been based on.

The noise compliance monitoring reports shall also include the following:

- Full details of all attended observations conducted for the purpose of identifying where SACs are potentially present in the wind turbine noise. If objective analysis is undertaken to investigate potential SACs, full details of the analysis and results shall be documented, including a description and justification for any procedures that have been used to screen results that are unlikely to be related to the operation of the wind farm.
- Full details of any supplementary procedures that have been adopted as part of conducting the compliance assessment.

7.0 ANNUAL STATEMENTS

The EP Regulations require the operator of a wind farm to provide a statement to the Authority within four (4) months of the end of each financial year. This requirement will begin after the Ryan Corner Wind Farm begins operation.

Regulation 131F (3) stipulates the information the annual statement must include for the previous financial year. The information to be provided for the Ryan Corner Wind Farm to address these requirements comprises the following:

- Details of any complaints concerning wind turbine noise received by the operator and how the complaints (if any) were addressed.

This shall comprise a summary of the data collated in accordance with the endorsed community complaint and evaluation procedure. Summary information shall also be provided in relation to the times, dates and location of complaints, and the wind farm operating conditions at the times of the complaints. If repeated complaints are recorded, a trend review (where applicable) as described in Section 11.0 shall be presented to gauge whether there is any indication of a correlation between complaints, wind speed, wind direction and wind farm operating state.

- Details of any maintenance activities undertaken (including any unscheduled servicing events).

This shall comprise a summary of maintenance activities that are materially relevant to wind turbine noise emissions, including periodic inspections to identify blade damage and any activities related to wind turbine gearboxes.

- Details of any noise remediation actions taken.

This shall comprise information about any changes implemented to address noise levels in the event that noise is identified as an issue to be addressed (e.g. based on maintenance activities, investigation of complaints or noise compliance monitoring).

The annual statement must also demonstrate whether the wind turbine noise complied with:

- the noise limits set out in the relevant noise standard; or
- the applicable alternative monitoring point criteria if the assessment of the wind turbine noise is conducted at an alternative monitoring point.

Based on the low noise risk for the Ryan Corner Wind Farm outlined in Section 5.2, the annual statement of compliance is to be based on the following:

- A desktop review of any complaints (if any) and maintenance activities.
- A desktop review of whether there is likely to have been any changes to noise levels during the previous financial year which could affect compliance with the relevant standard.

8.0 WIND TURBINE NOISE MONITORING

This section describes wind turbine noise monitoring for the following purposes:

- To address the requirement for the EP Regulations for repeat monitoring every 5 years.
- To inform a noise investigation report.

8.1 Alternative monitoring points

In accordance with regulation 131F (2)(a), a suitably qualified and experienced acoustic engineer will need to be engaged to determine the procedures for conducting wind turbine noise monitoring (to address the 5 -yearly monitoring requirements of the EP Regulations or to inform a noise investigation report). Specifically, this will be the choice of receiver or alternative monitoring points, the locations for the monitoring, and the timing of the monitoring. The appropriate procedures are to be determined based on an updated assessment of noise risk accounting for:

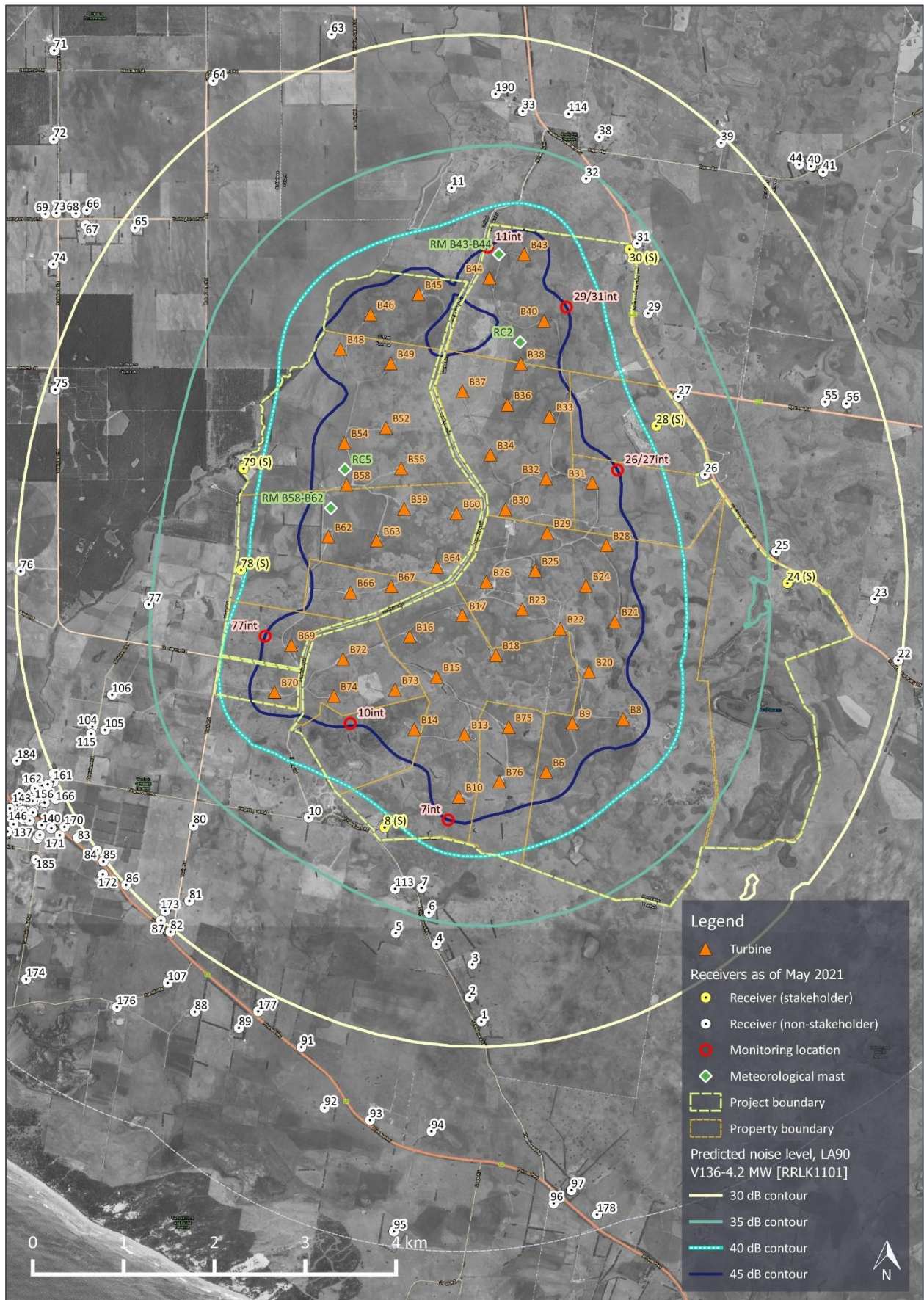
- the risk assessment procedures detailed in Section 5.1
- the information presented in Section 5.2
- the results of previous noise monitoring
- any changes to the operations or circumstances of the wind farm which are relevant to noise risk.

Given the medium inherent / low residual noise risk of the Ryan Corner Wind Farm, the updated assessment of noise risk is expected to comprise review of the post-construction assessment and annual statements to verify the noise risk remains low with appropriate risk controls in place.

Noise measurements at receivers are commonly affected by background noise interference, and this can lead to inconclusive assessment outcomes. To reduce the likelihood of inconclusive outcomes, preference would generally be given to alternative monitoring points where wind turbine noise levels are higher and background noise levels are lower. The suitability of this approach is supported by the low wind farm noise levels demonstrated by the noise modelling presented in Section 5.2. However, monitoring at receivers may be warranted to address complaints (if they arise) or in the unlikely event of a significant change in the risk profile of the wind farm (e.g. due to a change in the noise emission characteristics of the turbines over the life of the project).

The candidate alternative monitoring points are indicated in Section 6.1 and shown separately on the map in Figure 9.

Figure 9: Candidate alternative monitoring points and predicted noise level contours



8.2 Alternative monitoring point noise limits

As detailed in EPA Publication 2061, where alternative monitoring points are used, a *well-established theoretical or empirical relationship between the noise levels at the alternative measurement point and the receiver location should be used and appropriately justified in the NMP*.

For the Ryan Corner Wind Farm, a theoretical relationship for the nearest receivers is likely to be suitable, on account of the clear margin of compliance between wind turbine noise levels and the noise limits at the receivers (as demonstrated by the noise modelling presented in Section 5.2). The alternative monitoring point criteria are defined in **Error! Reference source not found..**

The alternative monitoring point criteria are to be defined according to the following:

- The actual location where the equipment is deployed for each alternative monitoring point (noting that the specific location selected will be subject to practical considerations including access constraints and the proximity of any localised sources of background noise near the candidate alternative monitoring points).
- The predicted noise level calculated using the ISO 9613-2 calculation procedure and noise modelling inputs described in Section 5.2.1, subject to a ± 1 dB uncertainty margin to the predictions to account for variations in the tolerance of the calculations at intermediate and receiver distances.

In advance, the alternative monitoring point criteria for the candidate alternative monitoring points shown in Figure 9 are given in Table 13 and Table 14 for the all-time and night-time periods respectively. The criteria are based on the receiver noise limits in Section 4.0. The alternative monitoring point criteria will need to be recalculated if the actual alternative monitoring points differ from the candidate locations.

Table 13: Candidate alternative monitoring point criteria – all-time, dB L_{A90}

Location	Hub height wind speed, m/s ^[1] ^[2]												
	3	4	5	6	7	8	9	10	11	12	13	14	15
7int ^[3]	47.4	47.4	47.4	47.4	47.4	47.4	47.4	47.4	47.4	47.4	47.4	47.4	47.4
10int	47.2	47.2	47.2	47.2	47.2	47.2	47.2	47.9	49.6	51.6	53.7	56.0	58.6
11int ^[3]	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6
26/27int ^[4]	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6
29/31int	48.1	48.1	48.1	48.1	48.1	48.1	48.1	48.1	49.3	51.1	53.0	55.1	57.4
77int ^[5]	49.1	49.1	49.1	49.1	49.1	49.1	49.1	49.1	49.1	49.1	49.1	49.1	49.1

- 1 112 m above ground level at RC5 596663 E, 5762388 N (MGA94 zone 54), for all candidate alternative monitoring locations except for 26/27int
- 2 112 m above ground level at RC2 598592 E, 5763788 N (MGA94 zone 54) for candidate alternative monitoring location 26/27int only
- 3 All-time noise limits at receivers 7 and 11 are not background dependent as discussed in Section 4.0, meaning that the alternative monitoring point criteria are based on the base (minimum) noise limit
- 4 Noise limit adjusted all-time period is 1800 – 0600 hrs for candidate alternative monitoring location 26/27int only
- 5 Alternative monitoring point criteria are based on the base (minimum) noise limit as the results of background noise monitoring at receiver 77 are not available at the time of preparation of this NMP

Table 14: Candidate alternative monitoring point criteria – night-time, dB L_{A90}

Location	Hub height wind speed, m/s ^[1] ^[2]												
	3	4	5	6	7	8	9	10	11	12	13	14	15
7int	47.4	47.4	47.4	47.4	47.4	47.4	47.4	47.4	47.4	48.9	50.7	52.7	54.9
10int	47.2	47.2	47.2	47.2	47.2	47.2	47.2	47.2	48.2	50.3	52.6	55.3	58.4
11int	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6	48.4	51.3	54.4
26/27int ^[3]	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6
29/31int	48.1	48.1	48.1	48.1	48.1	48.1	48.1	48.1	48.1	48.1	49.0	51.2	53.6
77int ^[4]	49.1	49.1	49.1	49.1	49.1	49.1	49.1	49.1	49.1	49.1	49.1	49.1	49.1

- 1 112 m above ground level at RC5 596663 E, 5762388 N (MGA94 zone 54), for all candidate alternative monitoring locations except for 26/27int
- 2 112 m above ground level at RC2 598592 E, 5763788 N (MGA94 zone 54) for candidate alternative monitoring location 26/27int only
- 3 Noise limit adjusted night-time period is 2200 – 0600 hrs for candidate alternative monitoring location 26/27int only
- 4 Alternative monitoring point criteria are based on the base (minimum) noise limit as the results of background noise monitoring at receiver 77 are not available at the time of preparation of this NMP

8.3 Timing

Regulation 131G of the EP Regulations applies on and from 1 January 2024 and requires the operator of a wind farm to submit a noise compliance monitoring report, and an accompanying report by an environmental auditor, to the Authority every five (5) years.

The specific requirements stated in regulation 131F are:

- (2) *Within 3 months of the fifth anniversary of the wind energy facility commencing operation, and every subsequent 5 years, the operator of the facility must—*
 - (a) *engage a suitably qualified and experienced acoustician to determine procedures and conduct monitoring to ensure that wind turbine noise from the facility complies with—*
 - (i) *the noise limits set out in the relevant noise standard; or*
 - (ii) *the applicable alternative monitoring point criteria if the assessment of the wind turbine noise is conducted at an alternative monitoring point; and*
 - (b) *ensure that a report of the matters set out in paragraph (a) is prepared; and*
 - (c) *engage an environmental auditor to undertake a review under regulation 164(ca)(ii) of the report referred to in paragraph (b); and*
 - (d) *give a copy of each report prepared under paragraphs (b) and (c) to the Authority.*

The timing of the wind farm turbine noise monitoring reports is linked to the commencement of operations. However, the date of commencement of operations is not specifically defined in the EP Regulations, and no distinctions are made for wind farms which begin operating in stages. For the purposes of wind turbine noise monitoring, the date of commencement of operations is the same date referenced for the post-construction noise assessment (see Section 6.2).

To address the EP Regulations, a wind farm noise monitoring report must be submitted within five (5) years and three (3) months of the commencement of operation of the completed wind farm, and every five (5) years subsequently (e.g. 10 years and 3 months following commencement of operation of the completed wind farm).

Completion of a documented and audited noise compliance monitoring study involves a number of steps which require third party input, such as environmental audits and synthesis of wake-free wind speed data by a suitably qualified wind engineer. Noise monitoring surveys are also frequently extended to address either unsuitable weather conditions, unsuitable wind farm operations, or a combination of the two.

To enable submission of the reports within the required timeframe, Table 16 provides an indication of notional time allowances which may need to be factored into the process.

Table 15: Key elements of noise monitoring process – notional time allowances

Item	Notional time allowance
Confirm and document the procedures to be used for wind turbine noise monitoring	1 month
If noise monitoring at receivers is planned, secure permissions for nominated survey locations and, if required, seek a review of the procedures for wind turbine noise monitoring by an environmental auditor	1 – 2 months
Conduct noise monitoring	2 – 3 months (allowing for a minimum period of 6 weeks' monitoring, and the potential for survey extensions)
Synthesise de-waked site wind speed data and collate/review wind farm SCADA system operational data	1 month
Analyse the noise monitoring data, assess compliance with the applicable noise limits, and prepare a noise compliance report for review by an environmental auditor	1 – 2 months
Complete environmental auditor review and implement any required changes to the noise compliance report following the review to enable submission to the Authority	1 – 2 months
Total	7 – 11 months

8.4 Compliance monitoring and analysis procedures

The monitoring shall be conducted in accordance with the relevant standard, NZS 6808:2010, subject to the procedural variations required to accommodate measurements at alternative monitoring points, and as required by the planning permit (i.e. the authorising document for the purposes of the EP Regulations).

Specific details of the noise monitoring and analysis to be conducted for the selected monitoring locations are detailed in Appendix F. However, the following general requirements are noted:

- **Monitoring duration:** monitoring should be conducted for a period of at least six (6) weeks to enable a range of conditions to be captured. The survey period may need to be extended if atypical weather conditions occur during the survey (with respect to rainfall or wind speeds and directions) or disrupted wind farm operations preclude a meaningful assessment of compliance (e.g. as a result of turbine faults or restrictions on energy production).
- **Survey timing:** the scheduling of the survey should account for the seasonal wind directions of the site indicated in Appendix H, with preference given to conducting surveys at the times of year when downwind noise propagation conditions from the wind farm are most prevalent (accounting for the broader range of directions which correspond to downwind propagation for wind farm operating conditions). Where this cannot be practically accommodated, the data analysis shall consider the potential for wind turbine noise levels to differ at other times of year.

- **Representative operations:** wind farm operational data recorded by the SCADA system shall be analysed to verify representative operations during the noise monitoring period. Any periods when wind turbine noise may have been materially reduced by the effects of disrupted operations or atypical curtailments shall be identified and excluded from the analysis. If insufficient data is available for a meaningful analysis (and the monitoring has already been extended or decommissioned), refined operational procedures may be implemented, but the uncertainty introduced into the assessment must be quantified and accounted for in the compliance assessment (see further specific details of these procedures in Appendix F).
- **Attended observations:** at least three (3) sets of attended observations for evaluating the presence of SACs are to be conducted during the monitoring. Attended observations must always be conducted in the vicinity of receivers and at times when both the wind farm is operating, and conditions are suitable for conducting observations (e.g. dry weather conditions). Preference should be given to conducting attended observations at times when the receivers are downwind from the wind farm where practical to do so. At least one (1) of the three (3) sets of attended observations should be conducted during the night period (2200-0700 hrs).
- **Alternative monitoring point SAC adjustments:** if SAC related adjustments to the noise level at the corresponding receiver have been determined to be warranted, the applicable adjustments to the wind turbine noise levels at the alternative monitoring point will generally need to be determined from an objective assessment of noise monitoring data obtained at the receiver. This is due to the significant uncertainties associated with establishing a relationship between SACs at alternative monitoring points and the corresponding receiver. In some instances, a conservative assessment based on an objective assessment of SACs using data obtained at an alternative monitoring point may be used to provide a conservative assessment (for example, the absence of tonality in the data at the alternative monitoring point may be used to conclude the absence of tonality at the receiver) but may not provide definitive assessment outcomes. The justification for the selected approach must be documented in the compliance report.

8.5 Noise compliance monitoring report

The noise compliance monitoring reports shall document the following:

- An assessment of the wind farm's compliance with the operational noise performance requirements of the relevant standard;
- Requirements for further noise investigations if the results of the noise compliance testing are not sufficient to conclude that the wind turbine noise is compliant with the relevant standard (see noise investigation reports in Section 9.0);
- A requirement to prepare a noise remediation plan if the results of the noise compliance testing demonstrate that the wind turbine noise is not compliant with the relevant standard; and
- Any recommended modifications to the NMP in light of the findings of the NMP review and wind turbine noise monitoring (see NMP review cycle requirements in Section 12.0).

The noise compliance monitoring reports shall adhere to the documentation requirements detailed in Section 8.3 of NZS 6808:2010, and the general requirements of AS 1055:2018, and shall include the following:

- Supporting documentation for the site wind speed and direction data referenced in the assessment.
- Charts illustrating the noise measurement results clearly identifying all samples that have been filtered from the analysis due to rainfall or the identification of extraneous noise influences. The analysis shall be supplemented by a summary table for each noise monitoring location detailing the total number of measurements points, the number of points that have been removed, and the final number of data points that the analysis has been based on.

The noise compliance monitoring reports shall also include the following:

- Full details of all attended observations conducted for the purpose of identifying where SACs are potentially present in the wind turbine noise. If objective analysis is undertaken to investigate potential SACs, full details of the analysis and results shall be documented, including a description and justification for any procedures that have been used to screen results that are unlikely to be related to the operation of the wind farm.
- Full details of any supplementary procedures that have been adopted as part of conducting the compliance assessment.

9.0 NOISE INVESTIGATION REPORTS

Noise investigation reports are to be prepared when additional noise testing (i.e. additional to the testing required at five-yearly intervals) is instigated in the following situations:

- Complaints have been received and management of the complaint, in accordance with the approved noise complaint, evaluation and response process (see Section 11.0 and Appendix I) indicates that measurements are required in order to verify the compliance status of the wind farm.
- A potential for non-compliance has been established by some other means, defined as follows:
 - The noise compliance testing conducted at five-yearly intervals in accordance with regulation 131F of the EP Regulations was not able to demonstrate compliance, and alternative targeted investigations (i.e. other than simply extending the duration of the noise compliance testing to obtain additional data) are required to determine whether the wind farm is compliant with the relevant standard; and/or
 - The operating configuration of the wind farm has been altered, or major components of the wind turbines (e.g. blades or power conversion plant) have been replaced with alternative equipment, and the noise emission characteristics of the wind farm may have changed. This is primarily relevant to situations where there is uncertainty around the effect of the change on noise levels (i.e. uncertainty around whether the change could decrease or increase either noise levels or tonality). It is however also relevant to situations where changes have been implemented in accordance with a noise remediation plan and the effectiveness of the mitigation measures require verification.

The type of additional testing to be carried out must be selected according to the circumstances which instigated the requirement for a noise investigation report.

The appropriate form of testing may range from noise emission tests (i.e. sound power level testing) or measurements at reference locations, through to a repeat of the testing conducted at five-yearly intervals (subject to permission to access residential properties where relevant).

In instances where the need for the noise investigation report relates to SACs, the additional investigations will generally need to be conducted at or in the vicinity of the relevant receivers.

Targeted investigations may comprise on/off testing of wind turbines for specific wind conditions, or investigation of potential SACs for specific wind conditions.

The scope and form of additional noise testing to be undertaken for the purpose of a noise investigation report shall be determined by a suitably qualified and experienced acoustic engineer. Measurements, attended observations and analysis procedures for the additional compliance testing shall be consistent with the procedures detailed in Appendix F and Appendix G where relevant.

Prior to conducting the additional testing for the noise investigation report, a brief additional testing statement describing the purpose, selected method and scheduling of the investigation shall be prepared and made available to the Authority upon request. Any potential delays to the commencement of the additional testing, such as requirements for specific weather conditions or access constraints, must be documented in the additional testing statement.

The additional testing shall be commenced as soon as practically possible after the need to conduct the testing is identified.

The additional testing statement shall specify the timeframe for submission of the noise investigation report to the Authority or, where instructed by the Authority, to an environmental auditor.

The noise investigation reports shall document the following:

- An assessment of the wind farm's compliance with the relevant standard.
- Any requirements for further investigations if the results of the noise compliance testing are not sufficient to conclude that wind turbine noise is compliant with the relevant standard.
- A requirement to prepare a noise remediation plan if the results of the additional noise testing demonstrate that wind turbine noise is not compliant with the relevant standard.

The noise investigation reports shall also adhere to the documentation requirements detailed in Section 8.3 of NZS 6808:2010, and the general requirements of AS 1055:2018, and shall include the following:

- A concise summary of the reason why the additional noise testing was instigated.
- A complete description of the measurement and analysis procedures adopted for the additional noise testing including, where necessary, details of any variations from the procedural specifications detailed in Appendix F and Appendix G.
- Supporting documentation for the site wind speed and direction data referenced in the compliance assessment.
- Charts illustrating the noise measurement results clearly identifying all samples that have been filtered from the analysis due to rainfall or the identification of extraneous noise influences. The analysis shall be supplemented by a summary table for each noise monitoring location detailing the total number of measurements points, the number of points that have been removed, and the final number of data points that the analysis has been based on.
- If relevant, full details of all attended observations conducted for the purpose of evaluating SACs. If objective analysis is undertaken to investigate SACs, full details of the analysis and results shall be documented, including a description and justification for any procedures that have been used to screen results that are unlikely to be related to the operation of the wind farm.

10.0 WIND TURBINE NOISE REMEDIATION PLANS

Noise remediation plans shall be produced when the results of compliance monitoring demonstrate that wind turbine noise associated with the Ryan Corner Wind Farm is not compliant with the noise limits of the relevant standard.

The noise remediation plans shall document the following:

- A concise summary of the testing that has been undertaken to determine that wind turbine noise is not compliant with the relevant standard.
- The receivers where non-compliance has been directly or indirectly established.
- The wind conditions in which non-compliance has been established.
- A performance specification for the noise reduction that must be achieved for the wind turbine noise to be compliant at all relevant receivers. The performance specification shall be expressed in terms of the magnitude of the noise level reduction that must be achieved, and the wind speeds and wind directions that the performance specifications apply to.
- Details of the noise mitigation measures to be implemented in order to achieve the performance specification and, where appropriate, supporting evidence to demonstrate that the measures are expected to enable compliance to be achieved (e.g. sound power level information for reduced noise modes).
- A time frame for implementing the proposed noise mitigation measures;
- A brief statement describing the selected method of additional noise testing that will be conducted to assess the effectiveness of the mitigation measure(s) and reassess compliance with the requirements of the relevant standard.
- A time frame for conducting additional noise testing and producing a noise investigation report.

Noise mitigation measures may comprise changes to the operating configuration of the wind farm (i.e. noise optimisation modes or shutdowns during selected wind conditions), engineering measures which involve replacement or modification of major turbine components, or a combination of the two.

In situations where rectification of the source of an identified non-compliance is expected to involve longer term design, development and implementation, the remediation plan shall identify intermediate mitigation strategies that will be implemented until the final mitigation strategy is implemented. Intermediate mitigation strategies shall also be defined in situations where a non-compliance has been identified, but the precise magnitude of the non-compliance remains to be quantified through additional noise testing.

If intermediate mitigation strategies are to be utilised, the noise remediation plan shall document both the intermediate and longer-term mitigation strategies, including details of the implementation timing and the additional testing that will be undertaken to assess compliance after each measure is implemented.

11.0 NOISE COMPLAINT MANAGEMENT PROCEDURES

Conditions 35 to 41 of the planning permit, as reproduced in Appendix E, outline requirements for handling of complaints related to the wind farm, including noise complaints. Condition 35 requires the creation of a Complaint Investigation and Response Plan (CIRP) to the satisfaction of the Authority before development of the wind farm begins.

In accordance with Condition 35, a CIRP has been prepared and endorsed by the Minister for Planning (CIRP dated 5 May 2022 and endorsed 6 May 2022).

All noise complaints are to be managed in accordance with the approved complaint evaluation procedure.

The endorsed CIRP includes comprehensive procedures and documentation protocols. For reference purposes, the complaint register detailed in the endorsed CIRP is reproduced in Appendix I as an indication of the complaint data to be recorded.

To inform the preparation of the annual statement (see Section 7.0), if there were recurring complaints in the preceding financial year, a review shall be carried out to determine if there was a trend to the recorded complaints which could suggest a correlation between complaints and a specific set of conditions. For example, the review should assess if recurring complaints relate to a specific weather condition (i.e. a particular range of wind speeds and/or directions) and/or wind farm operating conditions. If complaints were recurring and found to relate to a particular set of conditions, the following shall be reviewed:

- The frequency of occurrence of the identified conditions (i.e. to determine if the identified condition is a regular occurrence or atypical).
- The extent to which the identified conditions are likely to have been represented in the noise compliance monitoring for the wind farm (i.e. if the conditions are likely to have occurred during the noise compliance monitoring, and whether the conditions are likely to have occurred more or less frequently during the noise compliance monitoring).
- The similarity or otherwise of the identified conditions to the conditions of increased noise risk (i.e. do the identified conditions coincide with the conditions when compliance margins for the wind farm are at a minimum).
- The requirement or otherwise for a noise investigation report (see Section 9.0).

As part of the evaluation of complaints generally, and as part of the review undertaken to inform the annual statements, consideration should be given to whether there is any indication that the wind turbine noise could constitute an unreasonable noise, having regard to the EP Act listed factors comprising:

- its volume, intensity or duration
- its character
- the time, place and other circumstances in which it is emitted
- how often it is emitted
- any prescribed factors.

As part of any broader periodic review of the environmental management framework for the wind farm, the approved complaint evaluation procedure shall be reviewed to determine if the procedures remain appropriate for the wind farm, or if refinements are warranted.

12.0 NMP REVIEW CYCLE

The NMP will be updated and amended if/when required in response to:

- external reviews of the NMP by an EPA accredited auditor
- regulator requirements
- any changes in circumstances that alter the risk profile of the wind farm with respect to noise such as, (e.g. alter the risk profile of the wind farm with respect to noise such as a change to the configuration of the wind farm, a change in the noise characteristics of the wind farm, or a change to noise sensitive locations in the area around the wind farm).

The NMP will also be formally reviewed, and amended as required, as part of the noise monitoring completed every 5 years in accordance with the EP Regulations. Specifically, as part of confirming and documenting the procedures to be used for wind turbine noise monitoring, the NMP shall be reviewed by a suitably qualified and experienced acoustic engineer to verify:

- the applicable legislation and guidelines, accounting for any updates or changes
- the risk profile of the wind farm with respect to noise, accounting for the annual statements prepared since the last monitoring was conducted
- the noise monitoring and assessment procedures required.

If material changes the noise monitoring and assessment procedures outlined in this NMP are required to address a change in the risk profile of the wind farm, the need for a review of the procedures by an environmental auditor should be evaluated prior to conducting the monitoring.

After the noise monitoring has been completed, the formal review of the NMP shall be completed by the suitably qualified and experienced acoustic engineer responsible for conducting the monitoring, accounting for the results of the monitoring. The findings of the review are to be documented in the noise compliance monitoring report, including whether any changes or updates to the NMP are recommended.

13.0 ORGANISATIONAL ENVIRONMENTAL STRATEGY

The roles and responsibilities that are relevant to the management of noise from the wind farm are outlined in Table 17.

The induction and training of all staff involved in management of environmental noise includes review and familiarisation with the environmental management plan for the wind farm, which now incorporates this NMP. The NMP is a central reference for training staff about the ongoing commitments of the wind farm operator with respect to noise management and the general environmental duty, including the roles of staff and contractors in fulfilling these commitments.

A diagram illustrating the organisational structure is provided in Figure 10.

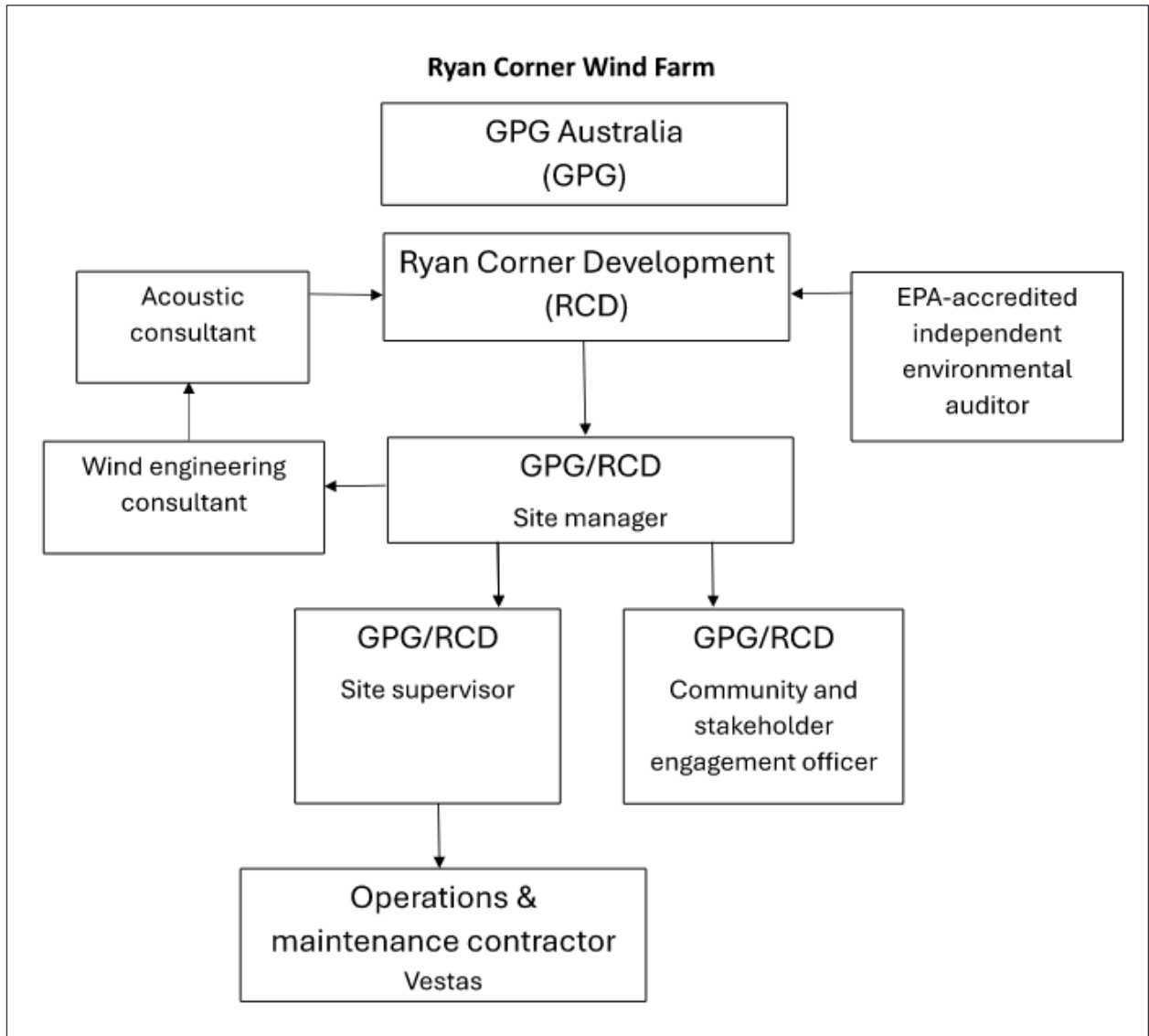
Table 16: Summary of roles and responsibilities

Role / organisation	Responsibilities
Operations & Maintenance (O&M) Contractor (Vestas)	• Day to day responsibility for operation of the wind farm • Monthly reporting to Global Power Generation Australia Pty Ltd (GPG) (or as required) • Manage regular and unscheduled maintenance activities, including routine inspections and fault detection • Monitor and assess the site for damage and deterioration • Investigation of noise issues identified by noise monitoring or complaints, as and when instructed by GPG • Supply records concerning maintenance activities and any turbine modifications to support the preparation of annual statements in accordance with this NMP
Global Power Generation Australia Pty Ltd (GPG)	• Oversee O&M Contractor management of the wind farm • Maintain the NMP for the wind farm, and assign the duties established by the NMP (assignment to GPG staff and the O&M Contractor as appropriate) • Oversee compliance matters for the project including engagement with regulators, auditors and external consultants • Ensure GPG staff and contractors are aware of responsibilities in managing compliance and responding to complaints • Ensure GPG staff and contractors are suitably trained to manage compliance and manage, investigate and respond to complaints • Submission of compliance reports to the Authority

Role / organisation	Responsibilities
Ryan Corner Wind Farm Site Manager	• Oversee turbine maintenance programs and turbine performance issues managed by the O&M Contractor • Review of regular maintenance and performance reports from O&M Contractor • Manage community engagement and resolution of complaints • Liaise with contractors in managing investigations into wind turbine performance and maintenance issues • Commissioning and management of external contractors/consultants, including works related to: – Annual statements – Wind turbine noise monitoring – Noise investigation reports – Noise remediation plans – Independent environmental audits – Wind data sourcing – Periodic review of the NMP and associated procedures • Supply of operations data required for noise compliance assessments • Instruct the O&M Contractor in relation to any procedural requirements to be addressed in relation to unexpected (non-routine) maintenance activities, accounting for noise compliance considerations
Ryan Corner Wind Farm Site Supervisor	• Liaise with the O&M Contractor as required on maintenance matters • Provide operational information and records to the Ryan Corner Wind Farm Operations Manager and GPG where required • Liaise with landowners, escalate maintenance, operations or engagement matters as required to GPG • Liaise with residents to obtain permission to conduct the compliance monitoring
Community Engagement and Stakeholder Officer	• Oversee GPG's community-based activities • Receive and acknowledge community enquiries and complaints • Maintain correspondence registers and complaints records • Respond to questions and provide guidance on the complaint investigation process • Request further information from complainants • Escalate complaint resolutions to GPG Management
Acoustic consultant	• Conduct noise monitoring and analysis as required to support the preparation of annual statements and five-yearly noise monitoring reports • Support periodic review and update of the NMP • Preparation of noise investigation reports and noise remediations plans if required

Role / organisation	Responsibilities
Wind engineering consultant	• Development and verification of the methods for producing wake-free site wind speed data as required for assessing of noise compliance monitoring data • Supply assessment wind speed data sets to be used for assessing noise compliance monitoring data, if required • Supply a statement for inclusion in the noise compliance reports detailing all measurement and analysis procedures used to synthesise the assessment wind speed data set
EPA-accredited independent environmental auditor	• Review the NMP • Review updates to the NMP • Review wind turbine noise monitoring reports prepared every five (5) years • If requested by the Authority, review noise investigation reports and noise remediation plans

Figure 10: Organisation structure relevant to noise management (courtesy of GPG)



APPENDIX A GLOSSARY OF TERMINOLOGY

Alternative monitoring point	A location, other than a location determined in accordance with the relevant noise standard, for the assessment of wind turbine noise.
Alternative monitoring point criteria	The criteria (expressed in decibels) that apply at an alternative monitoring point to assess compliance with the noise limits set out in the relevant noise standard.
Amplitude modulation	Sound that is characterised by a rhythmic and higher than normal rise and fall in sound level at regular intervals.
A-weighting	The process by which noise levels are corrected to account for the non-linear frequency response of the human ear.
dB	Decibel. The unit of sound level.
EP Act	<i>Environment Protection Act 2017</i>
EP Regulations	<i>Environment Protection Regulations 2021</i>
Frequency	The number of pressure fluctuation cycles per second of a sound wave. Measured in units of Hertz (Hz).
Impulsiveness	Sound that is characterised by a distinct and very rapid rise in sound level (e.g. a car door closing or the impact sound of a hammer)
GED	General environmental duty under the <i>Environment Protection Act 2017</i>
Hertz (Hz)	Hertz is the unit of frequency. One hertz is one cycle per second. One thousand hertz is a kilohertz (kHz).
L _w	The sound power level. The level of total sound power radiated by a sound source.
L _{WA}	The “A” weighted sound power level.
L _{A90}	The A-weighted noise level equalled or exceeded for 90 % of the measurement period. This is commonly referred to as the background noise level.
Relevant standard	NZS 6808:2010 <i>Acoustics – Wind farm noise</i> as modified by the authorising document.
Special audible characteristics	Features of a sound which, when present, increase the likelihood of adverse reaction to the sound. These characteristics include amplitude modulation impulsiveness, and tonality.
Tonality	Sound characterized by a single frequency component or narrow-band components that emerge audibly from the total sound (e.g. whines or hissing sounds)

The basic quantities used within this document to describe noise adopt the conventions outlined in ISO 1996-1:2016 *Acoustics - Description measurement and assessment of environmental noise – Part 1: Basic quantities and assessment procedures*. Accordingly, all frequency weighted sound pressure levels are expressed as decibels (dB) in this report. For example, sound pressure levels measured using an “A” frequency weighting are expressed as dB L_A. Alternative ways of expressing A-weighted decibels such as dBA or dB(A) are therefore not used within this report.

APPENDIX B TURBINE COORDINATES – MGA94 ZONE 54

Wind turbine	Easting, m	Northing, m	Terrain elevation, m
B6	598,877	5,759,061	30
B8	599,727	5,759,643	30
B9	599,166	5,759,598	32
B10	597,917	5,758,790	26
B13	597,978	5,759,475	30
B14	597,425	5,759,531	30
B15	597,672	5,760,108	32
B16	597,376	5,760,551	30
B17	597,955	5,760,786	35
B18	598,326	5,760,346	37
B20	599,349	5,760,165	40
B21	599,635	5,760,715	40
B22	599,032	5,760,635	40
B23	598,613	5,760,850	40
B24	599,316	5,761,108	40
B25	598,757	5,761,276	40
B26	598,219	5,761,151	37
B28	599,542	5,761,555	40
B29	598,888	5,761,690	40
B30	598,430	5,761,948	40
B31	599,385	5,762,242	40
B32	598,877	5,762,286	40
B33	598,914	5,762,968	40
B34	598,263	5,762,550	39
B36	598,452	5,763,098	40
B37	597,956	5,763,248	40
B38	598,599	5,763,549	40
B40	598,854	5,764,021	40
B43	598,636	5,764,754	40
B44	598,253	5,764,493	40
B45	597,473	5,764,315	39
B46	596,945	5,764,092	38

Wind turbine	Easting, m	Northing, m	Terrain elevation, m
B48	596,613	5,763,711	30
B49	597,168	5,763,552	30
B52	597,115	5,762,847	30
B54	596,658	5,762,679	27
B55	597,282	5,762,400	30
B58	596,683	5,762,220	28
B59	597,315	5,761,955	30
B60	597,891	5,761,905	35
B62	596,480	5,761,649	26
B63	597,013	5,761,607	30
B64	597,676	5,761,315	31
B66	596,725	5,761,036	30
B67	597,173	5,761,103	30
B69	596,072	5,760,456	30
B70	595,888	5,759,942	24
B72	596,642	5,760,305	30
B73	597,214	5,759,966	30
B74	596,541	5,759,897	30
B75	598,465	5,759,554	30
B76	598,363	5,758,957	30

APPENDIX C RECEIVER COORDINATES – MGA94 ZONE 54

Receiver ID	Easting, m	Northing, m	Terrain elevation, m	Distance to the nearest wind turbine, m	Nearest wind turbine
<i>Outside the project boundary (without a noise agreement relating to the listed dwelling)</i>					
1	598,165	5,756,320	18	2,485	B10
2	598,037	5,756,586	21	2,210	B10
3	598,065	5,756,947	18	1,852	B10
4	597,672	5,757,168	17	1,644	B10
5	597,223	5,757,293	12	1,654	B10
6	597,587	5,757,515	12	1,322	B10
7	597,507	5,757,787	15	1,090	B10
10	596,263	5,758,560	12	1,370	B74
11	597,837	5,765,483	36	1,080	B44
20	603,544	5,758,700	30	3,933	B8
21	603,057	5,759,864	32	3,339	B8
22	602,753	5,760,291	32	3,097	B8
23	602,494	5,760,963	32	2,872	B21
25	601,409	5,761,483	40	1,872	B28
26	600,625	5,762,317	42	1,247	B31
27	600,332	5,763,187	42	1,343	B31
29	599,999	5,764,104	43	1,154	B40
31	599,879	5,764,871	52	1,253	B43
32	599,318	5,765,584	52	1,080	B43
33	598,620	5,766,326	45	1,576	B43
34	598,524	5,767,933	52	3,183	B43
35	598,473	5,768,413	52	3,664	B43
36	603,749	5,757,188	26	4,714	B8
37	598,511	5,768,790	55	4,040	B43
38	599,461	5,766,042	55	1,534	B43
39	600,803	5,765,977	52	2,491	B43
40	601,794	5,765,722	52	3,305	B43
41	601,927	5,765,659	52	3,415	B43
42	603,152	5,766,331	52	4,784	B43
43	603,280	5,766,546	52	4,979	B43
44	601,662	5,765,739	52	3,184	B43

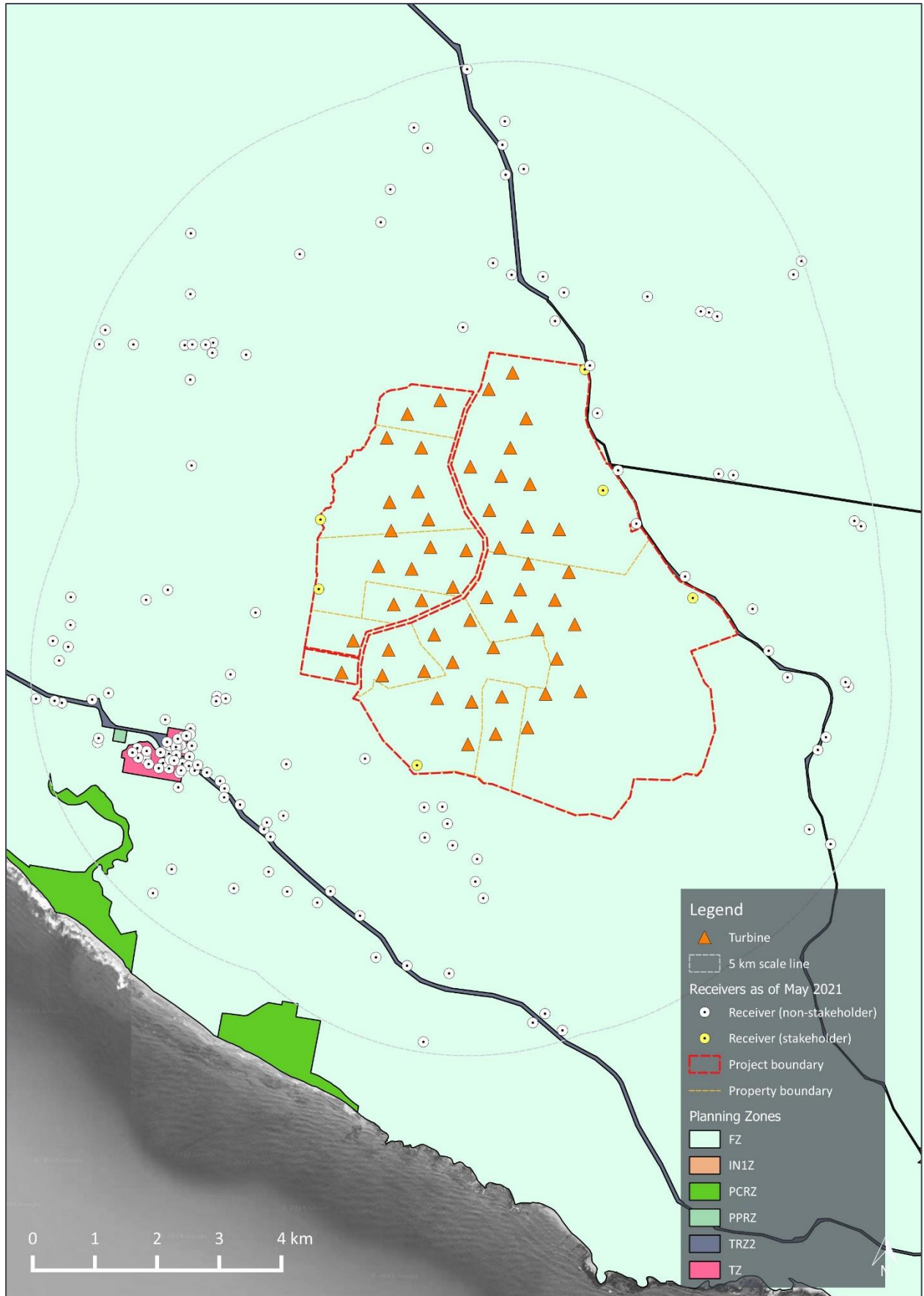
Receiver ID	Easting, m	Northing, m	Terrain elevation, m	Distance to the nearest wind turbine, m	Nearest wind turbine
49	604,238	5,762,291	32	4,755	B28
50	604,036	5,759,714	27	4,311	B8
55	601,948	5,763,131	42	2,715	B31
56	602,185	5,763,111	42	2,934	B31
60	597,271	5,768,362	47	3,859	B43
61	597,049	5,768,689	49	4,244	B43
62	596,671	5,767,698	47	3,479	B45
63	596,517	5,767,170	45	3,013	B45
64	595,213	5,766,658	45	3,097	B46
65	594,351	5,765,043	38	2,627	B48
66	593,822	5,765,237	39	3,183	B48
67	593,809	5,765,074	38	3,120	B48
68	593,701	5,765,203	39	3,274	B48
69	593,364	5,765,197	38	3,574	B48
70	592,539	5,765,208	38	4,342	B48
71	593,462	5,766,992	50	4,533	B46
72	593,456	5,766,016	43	3,911	B48
73	593,486	5,765,207	38	3,468	B48
74	593,453	5,764,643	34	3,296	B48
75	593,474	5,763,265	24	3,172	B48
76	593,093	5,761,269	17	3,090	B69
77	594,503	5,760,903	17	1,636	B69
80	594,997	5,758,470	12	1,724	B70
81	594,951	5,757,644	12	2,484	B70
82	594,742	5,757,306	12	2,877	B70
83	593,721	5,758,337	12	2,699	B70
84	593,933	5,758,201	12	2,620	B70
85	594,005	5,758,080	12	2,651	B70
86	594,254	5,757,821	12	2,680	B70
87	594,639	5,757,430	12	2,808	B70
88	595,011	5,756,426	12	3,626	B70
89	595,496	5,756,248	12	3,512	B10
91	596,183	5,756,037	12	3,255	B10

Receiver ID	Easting, m	Northing, m	Terrain elevation, m	Distance to the nearest wind turbine, m	Nearest wind turbine
92	596,439	5,755,369	12	3,728	B10
93	596,939	5,755,236	12	3,688	B10
94	597,615	5,755,112	12	3,692	B10
95	597,202	5,754,013	12	4,832	B10
96	598,961	5,754,321	12	4,591	B10
97	599,157	5,754,466	12	4,500	B10
104	593,883	5,759,559	12	2,044	B70
105	594,023	5,759,524	12	1,915	B70
106	594,100	5,759,911	12	1,791	B70
107	594,713	5,756,743	12	3,409	B70
113	597,214	5,757,778	13	1,237	B10
114	599,124	5,766,297	56	1,622	B43
115	593,869	5,759,482	12	2,074	B70
116	592,743	5,761,108	15	3,356	B70
117	591,533	5,761,152	12	4,522	B70
118	591,528	5,760,705	12	4,428	B70
119	591,245	5,760,449	12	4,672	B70
120	591,491	5,760,355	12	4,418	B70
121	591,345	5,760,134	12	4,548	B70
122	590,973	5,759,520	20	4,934	B70
123	591,271	5,759,488	12	4,640	B70
124	591,389	5,759,455	12	4,526	B70
125	591,877	5,759,507	12	4,036	B70
126	592,139	5,759,612	12	3,766	B70
127	591,981	5,758,887	12	4,048	B70
128	591,962	5,758,819	12	4,085	B70
129	592,603	5,758,729	12	3,504	B70
130	592,525	5,758,657	12	3,602	B70
131	592,616	5,758,573	12	3,549	B70
132	592,752	5,758,681	12	3,381	B70
133	592,740	5,758,594	12	3,426	B70
134	592,739	5,758,536	12	3,450	B70
135	592,785	5,758,472	12	3,435	B70

Receiver ID	Easting, m	Northing, m	Terrain elevation, m	Distance to the nearest wind turbine, m	Nearest wind turbine
136	592,974	5,758,660	12	3,185	B70
137	593,016	5,758,488	12	3,221	B70
138	593,112	5,758,401	12	3,177	B70
139	593,277	5,758,331	12	3,070	B70
140	593,325	5,758,479	12	2,953	B70
141	593,192	5,758,527	12	3,046	B70
142	593,126	5,758,542	12	3,099	B70
143	593,055	5,758,701	12	3,095	B70
144	593,111	5,758,638	12	3,070	B70
145	593,144	5,758,631	12	3,043	B70
146	593,165	5,758,627	12	3,026	B70
147	593,182	5,758,626	12	3,011	B70
148	593,227	5,758,617	12	2,975	B70
149	593,235	5,758,655	12	2,951	B70
150	593,237	5,758,677	12	2,939	B70
151	593,080	5,758,827	12	3,023	B70
152	593,099	5,758,773	12	3,026	B70
153	593,137	5,758,761	12	2,996	B70
154	593,170	5,758,759	12	2,966	B70
155	593,223	5,758,745	12	2,923	B70
156	593,250	5,758,746	12	2,899	B70
157	593,250	5,758,784	12	2,883	B70
158	593,238	5,758,807	12	2,885	B70
159A	593,218	5,758,828	12	2,895	B70
159B	593,457	5,759,043	12	2,594	B70
160	593,254	5,758,877	12	2,844	B70
161	593,453	5,758,953	12	2,630	B70
162	593,328	5,758,913	12	2,762	B70
163	593,304	5,758,776	12	2,837	B70
164	593,301	5,758,740	12	2,855	B70
165	593,357	5,758,725	12	2,811	B70
166	593,480	5,758,766	12	2,683	B70
167	593,441	5,758,590	12	2,798	B70

Receiver ID	Easting, m	Northing, m	Terrain elevation, m	Distance to the nearest wind turbine, m	Nearest wind turbine
168	593,408	5,758,455	12	2,894	B70
169	593,432	5,758,441	12	2,881	B70
170	593,575	5,758,459	12	2,750	B70
171	593,523	5,758,367	12	2,843	B70
172	593,998	5,757,938	12	2,757	B70
173	594,685	5,757,534	12	2,694	B70
174	593,154	5,756,784	12	4,178	B70
175	592,853	5,756,400	12	4,665	B70
176	594,153	5,756,477	12	3,877	B70
177	595,707	5,756,431	12	3,234	B10
178	599,438	5,754,198	12	4,839	B10
179	603,674	5,758,904	26	4,017	B8
180	598,815	5,768,023	54	3,276	B43
181	597,905	5,769,626	62	4,928	B43
182	592,087	5,765,440	38	4,847	B48
183	591,990	5,765,211	37	4,861	B48
184	593,051	5,759,185	12	2,938	B70
185	593,261	5,758,099	12	3,211	B70
186	592,947	5,758,406	12	3,320	B70
187	593,305	5,758,370	12	3,026	B70
188	593,392	5,758,925	12	2,698	B70
189	604,131	5,762,376	32	4,663	B28
190	598,321	5,766,515	43	1,792	B43
191	603,406	5,757,424	32	4,297	B8
192	603,989	5,759,788	28	4,265	B8
<i>Within the project boundary</i>					
8	597,099	5,758,453	22	891	B10
24	601,534	5,761,138	34	1,948	B21
28	600,089	5,762,865	42	947	B31
30	599,796	5,764,808	52	1,167	B43
78	595,519	5,761,282	22	1,000	B69
79	595,547	5,762,397	22	1,151	B54

APPENDIX D SITE LAND ZONING MAP



APPENDIX E PLANNING PERMIT – NOISE AND COMPLAINT REQUIREMENTS

Figure 11: Planning permit noise conditions 31 to 34

NOISE STANDARD

31. Except as provided below in this condition, the operation of the wind energy facility must comply with New Zealand Standard 6808:2010 Acoustics – Wind farm noise in relation to any dwelling existing on land in the vicinity of the wind energy facility as at 1 December 2021, to the satisfaction of the Minister of Planning. In determining compliance with the standard, the following requirements apply:
- (a) The sound level from the wind energy facility, when measured outdoors within 10 metres of a dwelling at any relevant nominated wind speed, must not exceed the background level (LA90) by more than 5 dB or a level of 40 dB LA90, whichever is the greater. If access cannot be gained to undertake testing within 10 metres of a property, consent from the Minister for Planning may be sought to test at another location.
 - (b) Compliance at night must be separately assessed with regard to night time data. For these purposes the night is defined as 10.00pm to 7.00am.
 - (c) Where special audible characteristics, including tonality, impulsive sound or excessive amplitude modulation occur, the measured noise level with the identified special audible characteristics will be modified by applying a penalty of up to +6 dB LA90 in accordance with Section 5.4 of the Standard.

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

NOISE COMPLIANCE ASSESSMENT

32. An independent post-construction noise monitoring program must be commissioned by the proponent within 2 months from the commissioning of the first turbine and continue for 12 months after the commissioning of the last turbine, to the satisfaction of the Minister for Planning. The independent expert must have experience in acoustic measurement and analysis of wind turbine noise. The program must be carried out in accordance with New Zealand Standard 6808:2010 as varied by Condition 31 above. The operator under this permit must pay the reasonable costs of the monitoring program.
33. The results of the post-construction noise monitoring program, data and details of compliance and non-compliance with the New Zealand Standard must be forwarded to the Minister for Planning within 14 months after the commissioning of any turbine. The results must be written in plain English and formatted for reading by laypeople.
34. All noise compliance reports must be accompanied by a report from an environmental auditor appointed under the Environment Protection Act 2017 with their opinion on the methodology and results contained in the noise compliance testing plan. If a suitable auditor cannot be engaged, the proponent may seek the written consent of the Minister for Planning to obtain an independent peer review of the noise report instead.

Figure 12: Planning permit complaints conditions 35 to 41

COMPLAINTS

Complaint Investigation and Response Plan

35. Before development starts, a Complaint Investigation and Response Plan must be submitted to the Minister for Planning for endorsement. Once endorsed, the plan will form part of this permit.
36. The Complaint Investigation and Response Plan must:
 - (a) respond to all aspects of the construction and operation of the wind energy facility;
 - (b) be prepared in accordance with Australian/New Zealand Standard AS/NZS 10002:2014 – Guidelines for complaint management in organisations;
 - (c) include a process to investigate and resolve complaints (different processes may be required for different types of complaints).
37. The endorsed Complaint Investigation and Response Plan must be implemented to the satisfaction of the Minister for Planning and be publicly available online. The endorsed Complaint Investigation and Response Plan must not be altered or modified without the written consent of the Minister for Planning.

Publishing information about complaints handling

38. Before the development starts the following information must be made publicly available and readily accessible from the wind energy facility project website to the satisfaction of the Minister for Planning:
 - (a) a copy of the endorsed Complaints Investigation and Response Plan;
 - (b) a toll free telephone number and email contact for complaints and queries to the operator of the wind energy facility.

Complaints Register

39. Before the development starts, a Complaints Register must be established which records:
 - (a) the complainant's name and address (if provided), including (for noise complaints) any applicable property reference number contained in the report titled *Ryan Corner Wind Farm NZS 6808:2010 Noise Assessment* (Marshall Day Acoustics, 21 April 2017);
 - (b) a receipt number for each complaint, which must be communicated to the complainant;
 - (c) the time and date of the incident, and the prevailing weather and operational conditions at the time of the incident;
 - (d) a description of the complainant's concerns, including (for a noise complaint) the potential occurrence of special audible characteristics;
 - (e) the process for investigating the complaint, and the outcome of the investigation, including:
 - (i) the actions taken to resolve the complaint;
 - (ii) for noise complaints, the findings and recommendations of an investigation report undertaken in accordance with the endorsed Noise Management Plan.
40. All complaints received must be recorded in the Complaints Register.
41. The complete copy of the Complaints Register must be provided, along with a reference map of complaint locations, to the Minister for Planning on each anniversary of the date of this permit and at other times on request.

APPENDIX F NOISE COMPLIANCE TESTING PROCEDURES

In accordance with regulation 131G (2)(a), a suitably qualified and experienced acoustician will need to be engaged to determine the procedures for conducting monitoring. Specifically, the acoustician will determine the choice of receiver or alternative monitoring points, the locations for the monitoring, and the timing of the monitoring.

The following sections provide a framework of procedures for the monitoring.

F1 Operational noise measurement locations

F1.1 Measurements at receivers

Measurement systems at receivers shall be positioned in the vicinity of the dwelling. The following confirms the key aspects of NZS 6808:2010 with respect to measurement locations, as varied by the authorising document:

- The measurements shall not occur within 5 m of a vertical reflecting surface.
- The measurements shall occur within 10 m of the dwelling (as specified in Condition 31(a) in the planning permit).
- For locations where background noise monitoring was conducted, the measurements should ideally occur as close as practically possible to the location of the background noise monitoring undertaken prior to commencement of operation of the wind farm.

If practical constraints or landowner/resident preferences preclude placement of the noise monitor in accordance with the above procedures, alternative equivalent locations shall be identified and selected. The reasons for the deviation and the justification for the selected equivalent location must be documented in the compliance report.

F1.2 Alternative measurement points

The objective of alternative measurement points is to obtain data at a position where there is a greater likelihood of being able to measure the noise that is related to the operation of the wind farm.

Subject to access constraints, alternative monitoring points should be located as follows:

- Between the wind turbines and the receivers as near as practically possible to the predicted 45 dB L_{A90} contour line (as illustrated in Figure 7).
- As far as practically possible from any tall vegetation or structures that are likely to increase background noise levels during periods of increased wind.

F2 Operational noise measurement procedures

F2.1 Acoustic data

Measurements at receivers and alternative monitoring points shall be conducted in general accordance with NZS 6808:2010, subject to the following project-specific procedural clarifications and requirements:

- The measurements shall comprise unattended monitoring for the measurement durations defined in Section F3 of this NMP.
- The L_{A90} noise level shall be determined in consecutive 10-minute intervals synchronised with the interval commencing on the hour and each 10-minute increment following the start of each hour.
- All noise measurements shall be conducted using low noise floor (≤ 20 dB) instrumentation that is certified to Class 1 standards (highest standard of instrumentation for field measurements) in accordance with AS/IEC 61672.1-2019 *Electroacoustic – Sound level meters – Specifications*.
- The independent (laboratory) calibration date of the sound level measurement instrumentation must be within two (2) years of the measurement period, as specified in Section 5.5 of AS 1055: 2018 *Acoustics – Description and measurement of environmental noise*.
- Microphones shall be fitted with enhanced wind shield systems (enlarged primary wind shields or secondary wind shields) designed on the basis of the guidance contained in the UK Institute of Acoustics publication *A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise* dated May 2013 (the IOA GPG).
- Subject to the consent of the residents/landowners, 2-minute audio recordings shall be obtained for every 10-minute interval of the survey. The sampling rate for audio recordings shall be sufficient to allow assessment of tonality, if required, across the frequency range 20-5,000 Hz (subject to the consent of the residents when monitoring at noise sensitive locations).

NZS 6808:2010 does not provide prescriptive guidance for conducting narrow band tonality analysis of long-term unattended datasets or the type of data to be recorded for this purpose. A 2-minute audio sample is specified to enable an analysis of tonality for each 10-minute period using the applicable procedure and a practical data accumulation rate for the entire duration of the survey period.

- Instantaneous one-third octave band sound pressure levels (fast response) shall be recorded in 100 ms intervals to enable an analysis of amplitude modulation if required.

NZS 6808:2010 does not stipulate data requirements for conducting an objective assessment of amplitude modulation. The data specified above is required for an assessment of amplitude modulation in accordance with the procedure specified subsequently.

Further information and guidance about data to be obtained during attended observations is provided in Section F4.1.

F2.2 Site wind speeds

Site wind speeds shall be collected in 10-minute intervals throughout the noise measurement period. The timing of each 10-minute interval shall be synchronised with the interval commencing on the hour and each 10-minute increment following the start of each hour.

This data shall be used to determine the wind speeds 112 m AGL (the hub height of the turbines) corresponding to free-field conditions (i.e. free from turbine wake effects) at the original mast location used during the pre-construction noise monitoring as detailed in Table 4.

All procedures used to determine 112 m AGL free-field wind speeds at the original mast location used during the pre-construction noise monitoring shall be validated and documented by the wind engineer for the project (see wind engineer responsibilities in Section 13.0). This should align with the reporting requirements for the post-construction noise assessment report, wind turbine noise monitoring reports, and noise investigation reports, as detailed in Section 6.4, Section 8.5 and Section 9.0 respectively.

F2.3 Other data

The following additional data requirements are noted:

- Local wind speeds: wind speeds at 1.5 m AGL shall be measured in 10-minute intervals at a minimum of one (1) location during the period of noise measurements. The use of enhanced wind shield systems (detailed in Appendix F2.1) shall be the primary method of addressing the potential for wind-induced extraneous noise across the measurement microphones. However, local wind speeds in the vicinity of the noise measurement systems shall be obtained to provide a secondary reference when reviewing the trends of the measured noise data.
- Rainfall: rainfall shall be measured in 10-minute intervals at a minimum of one (1) noise monitoring location during the survey.
- Site operational data: the operational status of each turbine shall be recorded in 10-minute intervals and shall contain sufficient detail to differentiate whether a turbine was operating (including its mode of operation), available to operate, configured in an atypical mode of operation or shutdown.
- Site records: site personnel shall be advised of the noise monitoring and shall be requested to record any observations with respect to atypical operations or noise levels (related to both the wind farm and ambient environment) which may influence the measurements. These observations, as well as any noise complaints independently recorded via the site's complaint management system, shall be provided to the acoustic consultant. As a minimum, each record shall include details of the time, duration and location of the observation.

The timing of each 10-minute interval for the above data shall be synchronised with the interval commencing on the hour and each 10-minute increment following the start of each hour.

F3 Operational noise measurement timing and duration

Unattended measurements for the purposes of the EP Regulations shall comprise a minimum of six (6) weeks continuous monitoring, extended by up to six (6) weeks if required to obtain sufficient data. Specifically, extended surveys may be required to:

- obtain data for wind speeds and conditions that are:
 - representative of the range generally expected at the wind farm site (long term wind speed and direction trends are provided in Appendix H for reference)
 - representative of the normal operating range of the turbines (the target minimum wind speed range is 3 m/s to 13 m/s at hub height, based on the notional wind speeds when the turbines commence operating and reach their maximum rated power)
- address non-uniform distributions or a sparsity of noise measurement data in certain wind speeds or directions that may be consequential to the assessment outcome
- address significant variations in measurement data which may be the result of seasonal factors or contaminating sounds, and which cannot be addressed with selective data filtering.

A preliminary analysis of the data may be required to assess the suitability of the data prior to completion of the measurements (refer to Appendix G of this NMP for details of analysis procedures). If significant data limitations remain evident after the surveys have been extended by six (6) weeks, the merits of an additional survey extension shall be reviewed by the acoustic consultant responsible for conducting the testing. If further extensions are not considered to be warranted, the compliance assessment strategy for the location(s) in question shall be reviewed in consultation with the Authority.

This measurement duration has been selected to:

- exceed the 10-day minimum survey duration referred to in NZS 6808:2010
- enable data to be captured over a range of conditions.

F4 Special Audible Characteristics

This section details procedures for the assessment of special audible characteristics (SACs) at receivers.

F4.1 General assessment procedures

The potential presence of SACs in the noise associated with the wind farm shall be reviewed.

In instances where SACs comprising amplitude modulation, impulsiveness or tonality are identified, an objective assessment of the sound's character shall be undertaken to inform the application of penalties to the measured noise levels.

F4.2 Identification of SACs – attended observations

The identification of SACs shall be based on attended observations undertaken by a qualified acoustic engineer with experience in the assessment of wind farm sound.

At least three (3) sets of attended observations shall be undertaken during the noise compliance testing as follows:

- During deployment of the monitoring instrumentation
- During interim visits to the site
- During retrieval of the monitoring installation.

Scheduling of the deployment and retrieval of the monitoring is dependent on practical considerations including timing of access to residential properties. However, the wind farm must be operating at the time of the attended observations, and attempts shall be made to arrange the periods of attendance to coincide with suitable weather conditions for conducting wind farm observations.

The attended observations shall be undertaken in the vicinity of the receivers the compliance testing is being undertaken for (irrespective of whether the monitoring for the receiver takes place at the receiver or an alternative monitoring point).

Suitable conditions are generally:

- Winds between approximately 5 m/s and 13 m/s at the turbine hub height
- Little or no rainfall
- Times when background noise levels are expected to be lower.

At least one (1) set of the attended observations shall be conducted during the night period.

The attended observations should ideally include downwind conditions between the wind farm and the preferred noise sensitive location. However, this will be dependent on the available wind conditions and will not always be practical. If wind conditions preclude observations under downwind conditions in the vicinity of the receivers, observations should be made at alternative orientations to the wind farm which are downwind of the wind farm at comparable separation distances (subject to practical access constraints).

If the available weather conditions and operating conditions at the time of attendance do not permit representative observations to be made, additional attended observations may need to be carried out.

Each set of attended observations shall comprise observations for at least 10-minutes. The minimum duration of the observations shall be increased to 30-minutes per observation location when the sound of the wind farm is clearly audible.

During each attended observation, and at all locations, audio samples shall be obtained to provide a record of the sound environment at the time of the inspection and provide a basis for further objective assessment if required.

APPENDIX G NOISE COMPLIANCE ANALYSIS PROCEDURES

The analysis of unattended monitoring data obtained at receivers and alternative monitoring points shall be conducted in accordance with NZS 6808:2010, subject to the clarifications and project-specific requirements detailed in the following subsections.

G1 Rainfall

Any 10-minute period in which rainfall occurred shall be filtered and therefore removed from the analysis. The measurement data shall also be reviewed to identify and filter periods following rainfall in which the trend of the measurements indicates the noise levels are likely to have been elevated as a result of wet roads or flow noise associated with drainage systems and local watercourses.

G2 Extraneous noise screening

The measured noise data shall be reviewed to identify and filter periods in which extraneous noise sources are likely to have affected the measurements. Extraneous noise sources include, but are not limited to, domestic machinery, agricultural operations, construction noise or elevated bird/frog/insect noise.

Individual 10-minute measurement samples that are likely to have been affected by high frequency extraneous noise shall be identified and filtered from the analysis when the following conditions¹⁸ are satisfied:

- The highest A-weighted one-third octave band noise level is greater than 1 kHz; and
- The identified one-third octave band A-weighted noise level is greater than a level of 20 dB L_{A90} and is within 5 dB of the broadband A-weighted noise level for the 10-minute sample in question.

The sound of a wind farm is unlikely to result in tones above 1 kHz (due to high levels of atmospheric sound absorption at frequencies above 1 kHz) and, in the unlikely event of such a tone occurring, is unlikely to dominate the level of a one-third octave band. Further, prior observations and assessments of the wind farm have not indicated the presence of tones above 1 kHz in the noise of the wind turbines. However, the procedure outlined above shall not be used to remove any measurement sample where the identified one-third octave band corresponds to a frequency in which the attended observations have indicated the potential for tones related to the operation of the wind farm. Further discussion of extraneous noise screening related to seasonal variations is provided in Section G4.

G3 Atypical wind farm operation screening

The objective of the analysis is to assess whether the noise levels of the wind farm comply with the relevant standard when all of the wind turbines are operating normally. It is therefore necessary to address periods when noise levels may have been lower as a result of turbines being atypically curtailed (i.e. reduced power and noise emissions, whether as a result of maintenance related issues or external energy market restrictions, but not as a result of the site's noise curtailment strategy) or shutdown.

The operational records for each turbine shall therefore be reviewed for each 10-minute period to identify any periods of curtailment or shutdown. These periods shall then be addressed using either the simplified or detailed analysis options described below. It is important to note that the simplified analysis is a very conservative procedure which limits the compliance assessment to noise levels measured during periods that are not affected by atypical curtailment. The simplified analysis option will therefore commonly result in the removal of large quantities of data for sites where atypical turbine curtailment occurs more frequently. If the simplified analysis yields insufficient data, the detailed analysis option will need to be used.

¹⁸ Griffin, D., Delaire, C., & Pischedda, P. (2013). Methods of identifying extraneous noise during unattended noise measurements. *20th International Congress of Sound & Vibration*.

G3.1 Simplified option

This analysis method is based on removing any 10-minute intervals in which the total noise level of the wind farm at a receiver may have been reduced. This approach provides a relatively simple and robust assessment for situations when turbine outages are relatively infrequent. This approach should therefore be used as the basis for operational filtering wherever practical to do so. However, depending on the operating configuration of the wind farm, this approach can result in the exclusion of large quantities of data from the assessment. In these situations, the detailed analysis option would need to be used.

For the purposes of the simplified analysis method, any 10-minute period in which relevant turbines are curtailed or shutdown shall be identified and removed from the analysis (for the relevant monitoring location being considered). The turbines that are considered not relevant for each receiver are those turbines with the lowest predicted noise levels which collectively result in a predicted noise level 15 dB¹⁹ lower than the total predicted noise level of the wind farm at the receiver. This means that if any or all of the non-relevant turbines were to not operate during a given measurement period, the reduction in total noise level would be 0.1 dB or less. The net effect of any curtailed or shutdown turbines would therefore be negligible, and the retained data is representative of full power operation of the wind farm.

G3.2 Detailed option

If the simplified analysis method results in the removal of excessive data, alternative detailed methods should be used to quantify and account for the potential effects of atypical curtailment or shutdowns. The following outlines suitable options for this purpose:

- **Turbine specific filtering:** if an individual turbine, or select group of turbines, is regularly subject to atypical curtailment or shutdown during the compliance monitoring, this option involves modification of the simplified approach. Specifically, the data may be filtered as per the simplified analysis option, but independently of the operating state of these turbines, provided that the net effect of their curtailment is inconsequential to the compliance outcomes.
- **Reduced number of relevant turbines:** this option involves modification of the simplified approach by reducing the number of turbines that are classified as relevant. Specifically, non-relevant turbines may be alternatively defined as those turbines which collectively represent a minor and inconsequential contribution (e.g., non-relevant turbines may be defined as those which collectively contribute 1 dB or less to the total predicted noise level).
- **Curtailment effect evaluation:** this option involves calculating the net effect of atypical curtailment and shutdowns in each 10-minute interval. Compliance may then be assessed based on the data for periods when the curtailment effect is minor (e.g., 1 dB or less).

For all of the above options, to verify that atypical turbine curtailment or shutdowns are inconsequential to the compliance outcome, the calculated margin of compliance must be greater than the effect of atypical curtailment and shutdowns that is permitted in the retained data. For example, if the selected method permits data points to be retained when the effect of atypical curtailment or shutdown is calculated to be up to 1 dB, then the compliance assessment based on the retained data must demonstrate compliance by at least 1 dB to verify that the potential reduction in noise level during the monitoring period did not alter the compliance outcome.

¹⁹ A level that is 10 dB below the noise source under investigation is generally used for environmental noise assessment work considered. However, a source of noise that is 10 dB lower in level will contribute 0.4 dB to the total noise level. A 0.4 dB level variation may alter a wind farm compliance assessment outcome. Hence the selection of a lower threshold based on being 15 dB lower than the level of the highest turbine contribution.

G4 Review of seasonal considerations

Seasonal variations can affect both the level of background sound and operational wind farm noise.

G4.1 Background sound

The main potential sources of seasonal variations in background sound are:

- Rainfall (see data filtering procedures in Section G1)
- Insect and bird noise (see data filtering procedures in Section G2)
- Local domestic plant such as air-conditioning or heating
- Changes in domestic or agricultural activity in the vicinity of the monitoring location.

Other sources of background sound variation may relate to changes in vegetation, wind direction and wind shear.

The data shall be reviewed to identify any anomalous trends that are indicative of significant seasonal variations. These types of effects may be evident as elevated noise levels at low wind speeds (0 to 3 m/s at hub height), or striations in the data characterised by relatively constant levels across a range of wind speeds (e.g. as would occur if domestic or agricultural machinery significantly influences the measurements).

Any identified variations in the measured levels that are considered to have been attributed to seasonal changes in background sound levels shall be filtered from the analysis where possible. If the effect cannot be reliably filtered, and the effect is sufficient to preclude an assessment of the wind farm's compliance, supplementary procedures (see Section G7) or repeat measurements will be required.

G4.2 Wind farm noise

The main potential source of seasonal variation in wind farm noise levels is wind direction and wind speed.

The wind directions and wind speeds that occur during the survey shall be reviewed to determine whether the conditions were representative of the range generally expected at the wind farm site, having regard to the long-term trend data provided in Appendix H. In particular, if upwind or crosswind conditions are found to have occurred more regularly than is generally expected at the site, repeat measurements will generally be required.

In some cases, a sensitivity analysis or supplementary assessment procedures (see Section G7) may be sufficient to enable an assessment of compliance without further measurement extensions.

For example, while NZS 6808:2010 is based on evaluating compliance for the aggregated measurement data for the range of conditions normally expected at the site (subject to subset considerations noted in Section G5), an analysis limited to data obtained under downwind conditions may be sufficient to demonstrate compliance. Additionally, the availability of limited data for high wind speeds may be addressed by reference to other information relating to the change in the wind farm's sound emission with increasing wind speed (e.g. manufacturer sound power level documentation in accordance with IEC 61400-11:2012 or measurement data obtained at other compliance monitoring locations around the wind farm – see supplementary procedures in Section G7).

The assessment is referenced to hub height wind speeds and therefore seasonal wind shear variations are primarily relevant to potential variations in background noise levels rather than wind farm noise levels. However, wind shear may be relevant to the assessment of SACs. This is due to increased wind shear having the potential to result in lower background noise levels and the potential for wind shear to affect the sound characteristics of the wind farm. Attended observations must therefore include time periods when increased wind shear could be expected (note the requirement in Section F3 for at least two (2) sets of attended observations to occur during the night).

G5 Identification of potential data subsets

The measurement data shall be reviewed in accordance with section 7.2.1 of NZS 6808:2010 to identify any distinctive trends or large variations in level which warrant definition and analysis of a subset of the data. These subsets may be defined by wind direction, time of day or a combination of the two.

Any identified subsets that are found to warrant analysis shall be assessed separately when comparing the measured noise levels with the compliance limits.

G6 Adjustment for background noise levels

The background noise level obtained prior to commencement of operation of the wind farm may be used to adjust compliance monitoring results for the influence of background noise levels. The adjustment shall be applied to the regression analysis of the compliance monitoring data in accordance with clause 7.5.3 of NZS 6808:2010.

The background noise adjustment may not be used in conjunction with extraneous noise screening procedure detailed in Appendix G2 (a background adjustment is reliant on comparison of data sets measured and analysed using equivalent procedures, and the extraneous noise screening procedure was not used to derive the background noise levels).

Further, to assess noise levels during the night period in accordance with the authorising document, the results for individual 10-minute periods need to be considered and cannot strictly be adjusted for background noise levels.

G7 Supplementary procedures

The data filtering and background noise adjustment procedures detailed in Section G1 to Section G4 shall be used to reduce the influence of background noise levels.

If the residual influence of background noise precludes a definitive assessment of compliance from a test conducted in strict accordance with NZS 6808:2010 (and the provisions of the EP Regulations and this NMP), supplementary procedures may be used to provide additional information to understand the sources of uncertainty which are contributing to an inconclusive assessment outcome.

A supplementary analysis may be undertaken by comparing data measured at the compliance monitoring locations during upwind and downwind conditions. Higher noise levels during downwind conditions are indicative of the results being influenced by the operation of the wind farm. Conversely, comparable noise levels during upwind and downwind conditions are indicative of an environment dominated by the influence of sources that are not related to the operation of the wind farm.

For the assessment of noise levels at receivers, concurrent measurements at intermediate locations nearer to the wind farm (reference points or alternative monitoring points) may be used to provide supporting information about the likely contribution of the wind turbines to the total noise levels at the receivers. For this purpose, noise measurement data obtained at intermediate locations may be used in the following ways:

- Noise level versus wind speed profile: data obtained at an intermediate location may be used to define the profile of the change in measured wind turbine noise levels with increasing wind speeds. This profile can then be compared to the profile measured at the compliance monitoring location to determine if increasing noise levels at the receiver location are likely to be attributable to the wind farm (i.e. the profiles at the intermediate and the compliance monitoring location are equivalent) or the influence of wind related background noise levels (i.e. the profiles at the intermediate and the compliance monitoring location are not equivalent)

- Supporting the identification of periods affected by extraneous noise: if the measured noise level in a given 10-minute period is higher at the receiver than at the intermediate location, this supports that the measured noise level at the receiver may have been affected by noise sources unrelated to the operation of the wind farm and, may justify exclusion of the data point. This procedure may only be used for pairs of intermediate and receiver locations that are equivalently exposed to wind turbine noise, such that it can be reliably concluded that the wind turbine noise level at the receiver will always be lower than at the intermediate location (e.g. this procedure should not be used in a situation where line of sight between the intermediate location and the wind farm is obscured by terrain, as may be the case for an intermediate monitor located in a valley). Further, this procedure should generally not be used in conjunction with the adjustment for background noise levels (other than situations where the intermediate and receiver comparison is used to support that a discrete set of periods has been clearly affected by extraneous noise which warrants filtering from the dataset).
- Extrapolation: data obtained at an intermediate location may be extrapolated to the compliance monitoring location in accordance with the procedure documented in Section 11.2 of ISO 1996-2:2017 *Acoustics — Description, measurement and assessment of environmental noise — Part 2: Determination of environmental noise levels*. The extrapolation shall be undertaken based on the same prediction methodology utilised for the pre-development noise report, subject to the addition of a 1 dB uncertainty margin to the predictions to account for variations in the tolerance of the calculations at intermediate and receptor distances.

If the additional information provided from the analysis of data obtained at the intermediate locations does not address the residual assessment uncertainty, an alternative method of enabling an assessment of the wind farm at the compliance monitoring locations will need to be defined. This may involve a targeted assessment of specific conditions (i.e. wind speeds, wind directions and times of day) or on/off testing.

G8 Objective assessment methods

The potential presence of SACs in the noise associated with the wind farm shall be reviewed based on the following:

- The attended observations Appendix F4.2.
- Site records detailed in Section F2.3, including the observations of site personnel and any complaints recorded via the site's complaint management system.

If the review indicates the noise of the wind farm may contain SACs comprising amplitude modulation, impulsiveness or tonality are identified, an objective assessment of the sound's character shall be undertaken to inform the application of adjustments to the measured noise levels.

The following sections specify the procedures to be used when an objective assessment of SACs is required, and clarification of the application of adjustments. These procedures are representative of current industry good practice. If improved methods become available in future (primarily from regulatory authorities, standards organisations or peak industry bodies), or if additional guidance on their application becomes available, the methods should be reviewed, and the NMP updated if and when required.

G8.1 Amplitude modulation

The UK IOA AM procedure for amplitude modulation is specified in lieu of the interim procedure noted in Appendix B of NZS 6808:2010. This is consistent with the advice in NZS 6808:2010 which indicated that more robust methods were expected to become available for amplitude modulation. The relevant text from CB3.2 of NZS 6808 states:

This method is considered to be an adequate interim test that has been used in New Zealand. It is envisaged that appropriate objective tests for modulation special audible characteristics will be developed in future to replace B3.2 or provide a more robust objective method than B3.2.

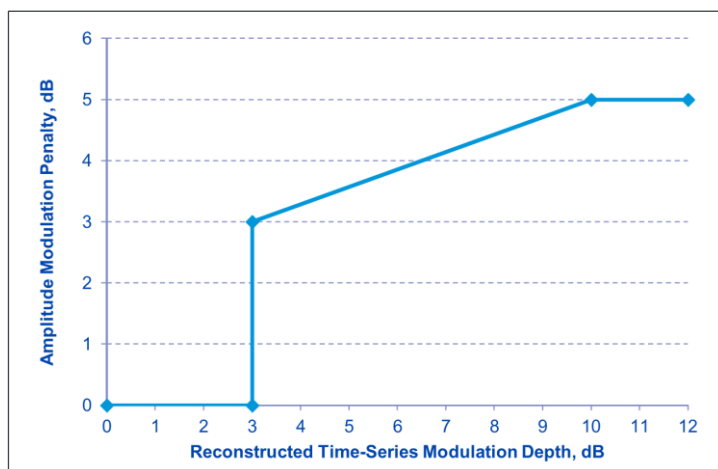
While the UK IOA AM procedure provides a detailed procedure to quantify amplitude modulation, based on extensive research in the time since NZS 6808:2010 was published, it does not define a method for determining the penalty which should be applied when amplitude modulation is assessed to be present.

Relevant guidance on a penalty regime which is specific to the nominated UK IOA AM procedure is documented in the UK government commissioned research titled Review of the evidence on the response to amplitude modulation from wind turbines and the findings documented in the report Wind Turbine AM Review Phase 2 Report dated August 2016 (the UK government AM review).

The UK government AM review shall be referenced in determining the appropriate penalty to be applied, unless updated research concerning penalty schemes for amplitude modulation is published for use with the UK IOA AM procedure (published either by the UK government, the UK IOA or an equivalent peak industry body). For reference, the proposed penalty regime presented in the conclusion of the UK government AM review is reproduced in Figure 13. The proposed penalty regime is based on the peak to trough modulation depth determined in accordance with the UK IOA AM procedure, and a sliding scale of penalty value according to the magnitude of the modulation depth.

The sliding scale penalty regime is to be used in lieu of the fixed 5 dB penalty detailed in NZS 6808:2010. This approach has been selected on the premise that the principle of a sliding scale of penalty for more advanced SAC assessment procedures is established in NZS 6808:2010 in relation to tonality and narrow band-analysis techniques. Further, the sliding scale penalty regime outlined in the UK government AM review was specifically developed for use with the UK IOA AM procedure, which has been nominated as a more robust procedure, of the type envisaged by NZS 6808:2010.

Figure 13: UK government AM review proposed adjustment regime



The proposed adjustment regime is based on the peak to trough modulation depth determined in accordance with the UK IOA AM procedure, and a sliding scale of penalty value according to the magnitude of the modulation depth.

Just prior to the preparation of this NMP, a new IEC publication on wind turbine noise was released in March this year (IEC TS 61400-11-2²⁰). This publication includes guidance on the implementation of the UK IOA AM procedure and should be considered as part of the application of the procedure.

²⁰ IEC TS 61400-11-2 *Wind energy generation systems – Part 11-2: Acoustic noise measurement techniques – Measurement of wind turbine sound characteristics in receptor position*

G8.2 Impulsiveness

Australian Standard 1055:2018 *Description and measurement of environmental noise* (AS 1055:2018), Appendix E (informative) *Objective method for application of an impulse adjustment to receiver noise*, is to be used to assess potential impulsiveness.

The AS 1055:2018 method has been specified in the absence of any defined procedure in NZS 6808:2010 or the planning permit.

The sliding scale adjustment of AS 1055:2018 regime is to be used in lieu of the fixed 5 dB adjustment detailed in NZS 6808:2010. This approach has been selected for the following reasons:

- There is no formal guidance or basis for setting a specific threshold when a fixed value 5 dB adjustment should be applied when using contemporary objective assessment methods and sliding scale rating schemes.
- The principle of a sliding scale of adjustment for more advanced SAC assessment procedures is established in NZS 6808:2010 in relation to tonality and narrow band-analysis techniques.
- The sliding scale adjustment regime in AS 1055:2018 is specific to the rating procedure, and there is no clear way to adapt the method to a fixed penalty approach.

G8.3 Tonality

International Standard ISO 1996-2:2017 *Acoustics — Description, measurement and assessment of environmental noise — Part 2: Determination of sound pressure levels* 2017 (ISO 1996-2:2017) – specifically, the narrow band method defined in Annex J *Objective method for assessing the audibility of tones in noise — Engineering method* (Annex J) – is to be used to assess potential tonality.

The procedure for tonality in accordance with ISO 1996-2:2017 is nominated on account of being the latest international guidance for conducting narrow band analysis of noise levels at receiver locations, and for consistency with contemporary procedures in Victoria for the assessment of wind turbine noise.

G8.4 Application of adjustments for SACs

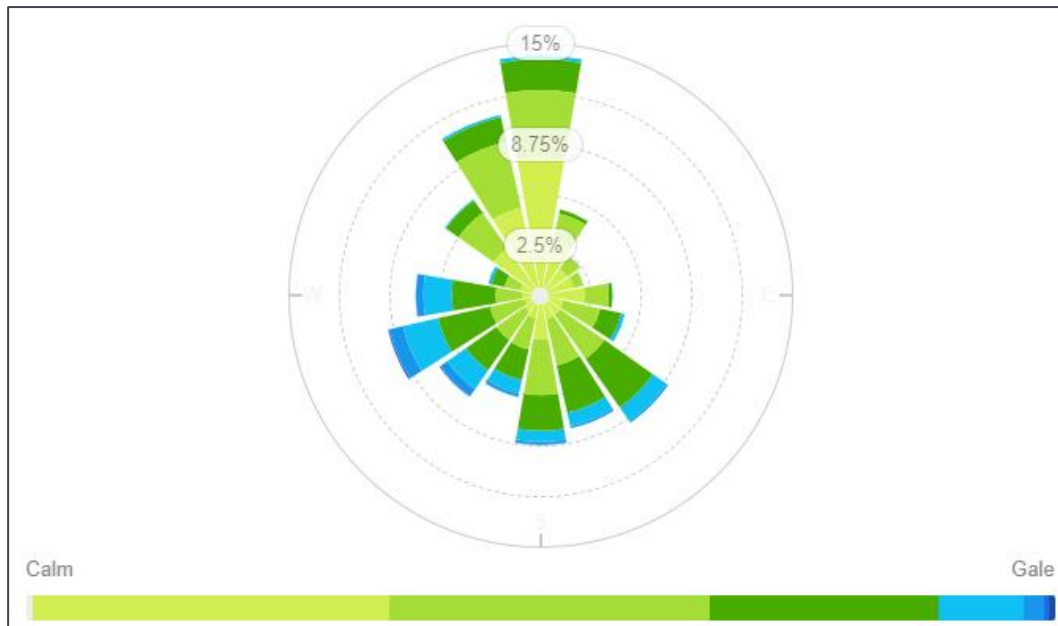
If adjustments for SACs are found to be warranted, the penalties shall be applied to the noise of the wind farm in accordance with NZS 6808:2010. The following aspects of NZS 6808:2010 are clarified as follows:

- The adjustments shall be applied to the individual 10-minute samples in which SACs are identified, prior to conducting a regression analysis of the complete measurement data set; and
- A maximum adjustment of up to + 6 dB shall be applied for the presence of one or more SACs (i.e. the penalties do not apply cumulatively), and shall be determined according to the sliding scale penalty values as detailed in the preceding sections.

If adjustments are to be applied to the results of unattended noise measurement data, based on the results of analysis of the audio recordings during the survey, caution must be applied to avoid the application of penalties as a result of false-positive results from objective assessment methods. For example, adjustments should not be applied to individual measurement samples in which an objective assessment has identified a potential SAC which has not been observed (e.g. tones identified in the unattended data at frequencies other than those that have been observed from the operation of the wind farm). Some level of data filtering is therefore expected to be implemented when applying SAC related adjustments to the results of unattended noise measurement data.

APPENDIX H SITE WIND SPEED AND DIRECTION TRENDS

H1 Annual wind rose



Bureau of Meteorology Port Fairy station 5 year average (May 2019 to May 2024)
Data courtesy of willyweather.com.au

H2 Monthly wind roses



**APPENDIX I EXTRACT FROM ENDORSED COMPLAINTS INVESTIGATION AND RESPONSE PLAN –
COMPLAINT REGISTER**

RYAN CORNER WIND FARM – COMPLAINTS REGISTER

[illegible]

1	Attach map
2	Including Preferred Method of Contact (or representative contact details)
3	Complaint type examples include: Landowner Agreement, Neighbour Agreement, Noise, Safety, Traffic, TV/Radio Interference, Visual and Others
4	Including audible characteristics
5	Including Whether Immediate Escalation is Required, the process for investigating the complaint, the actions taken to resolve the complaint, the finding and recommendations of an investigation report undertaken in accordance with the Noise Management Plan
6	Complaint status include: Registered, Acknowledged, Being Addressed, Replied, Internally Escalated, Escalated to AEIC, Closed
7	Complaint satisfaction categories include: Very satisfied, Satisfied, Neutral, Not Satisfied, Escalating

Appendix B

A.1 Summary of response to EPA Guideline requirements

Reference:

- Wind Energy Facility Noise Regulation Guidelines (EPA Publication, EPA Website)
- Ryan Corner Wind Farm Noise Management Plan (Marshall Day Acoustics Pty Ltd, Report No. Rp 001 01Draft 20230730, date 10 January 2024)

Element	NMP Section Reference(s)	Auditor Comment	Auditor Conclusion
Organisational Environmental Strategy (regulation 131 E(2)(a))			
Definition of organisational and other responsibilities in relation to the measurement, assessment and management of noise emissions from the WEF	13.0	The various roles and responsibilities are appropriately summarised in Table 17. Would benefit from a schematic showing inter relationship between organisations and responsible parties	Recommendation
Requirements for reporting and record-keeping, including document control systems, incident reporting and tracking, and records to be retained	13.0	The Requirements are summarised in Table 17. Examples of record keeping include: • O&M Contractor (Vestas) is responsible for monthly reporting to GPG, and supplying records concerning maintenance and other turbine modifications NMP. Also responsible for investigation of noise monitoring or complaints (as an when instructed by GPG). • Farm Operations Manager is responsible for relevant reporting requirements (eg noise investigation reports, noise remediation plans). • Ryan Corner Community Engagement Officer is to maintain correspondence registers and complaint records	Compliant
Regulatory Standards (regulation 131 E(2)(a))			
Summary of legislative framework requirements	3.1 – 3.5	A summary of relevant aspects is provided of EP Act, EP Regulations, Planning Permit and NZS 6808:2010 has been provided.	Compliant
Outline of environmental noise objectives, including the relevant consent conditions	3.4 3.5 4.0 Appendix E	Site-specific “noise” conditions including noise limits are provided	Compliant
Noise Sensitive Areas and Alternative Monitoring Points (regulation 131 E(2)(b)(i), (c)(i) and (ii))			
Identification and justification of noise sensitive receiver locations, alternative measurement points, and applicable alternative monitoring point criteria, land use category and operational noise limits that apply at each of these locations	2.2 4.0 8.2 Appendix C Appendix D	Noise sensitive receiver locations (Total 161 identified within 5 km of the WTGs, located at distances ranging from 893 m to 4,989 (Section 2.2). Coordinates of receivers are provided in Appendix C, and locations illustrated on the site plan in Appendix D. Operational noise limits for non stakeholder representative locations are provided in Section 4.1, and for stakeholder locations in Section 4.2. It is noted that additional monitoring was undertaken at Location 26 due to the non	Recommendation provided

Element	NMP Section Reference(s)	Auditor Comment	Auditor Conclusion
		compliance with a monitoring location requirement included in the Planning Permit – understood to be a 10m maximum distance from the dwelling as per Condition 31(a) – this differs from the NZS 6808:2010 requirement that allows for a distance of up to 20m, as was used in the original background monitoring. Alternative monitoring locations and noise limits are provided in Section 8.2, with locations shown in Figure 9 Incomplete - Land use categories at and around the windfarm have not been provided	
Map of noise sensitive locations in relation to the WEF, and alternative monitoring points.	Appendix D 6.2	Site Plan (Appendix D) includes these requirements for sensitive receivers (both stakeholder and non-stakeholder locations) Figure 9 in Section 6.2 shows locations of alternative monitoring points.	Compliant
Risk Assessment and Controls (regulation 131E (2)(a))			
Operational noise modelling, including method, input data and results	5.2.1	Pre-construction noise modelling assessment for the selected WTG (Vestas V136-4.2MW), and reported in Ryan Corner Wind Farm Pre-Construction Noise Assessment (MDA, Report No. 003 R03 20180786, dated 10 June 2021). A summary of this assessment is provided in summary provided in Section 5.2.1 of the NMP. Incomplete – Need to provide modelling report reference in the NMP	Recommendation
Risk analysis and assessment, including the identification of major noise sources and evaluating and assessing risks of harm to human health and the environment from wind turbine noise	5.2.4 5.2.5	The risk assessment is based on Assessing and Controlling Risk: A Guide for Business (EPA Publication 1695.1, August 2018). However, the logic behind the steps in controlling hazards and risks needs to address the 4 step process in the above publication (page 5), leading to a Risk Register – identify hazards, assess risks, implement controls, check controls needs to be identified for each individual noise risk, not just summarised down to one risk rating with all measures tabulated Compliance with the GED is not solely about meeting the applicable noise limits (Section 5.2.1). The risk controls (Section 5.2.4) may well be appropriate but until the specific hazards/ risks have been systematically identified and appropriate management approaches identified and implemented (or have the potential to be implemented) to an “acceptable” risk level, then this basic GED requirement cannot be demonstrated to have been met... Incomplete: Needs an activity/ issues based noise risk register	Recommendation
Evaluation of likelihood and consequence of risks, development of a risk matrix and risk management approach Note: EPA Publication 1695 Assessing and Controlling Risk provides a framework for risk assessment	5.1.2 5.2.5	Appropriate tables provided in Section 5.1.3 and Section 5.2.5; however, individual noise-based “unmitigated” and “mitigated” risks have not assessed against the likelihood/ consequence ratings. No risk register provided Incomplete – as per previous comment above	Recommendation

Element	NMP Section Reference(s)	Auditor Comment	Auditor Conclusion
Consideration of control measures to address noise related hazards and determination of residual risks	5.2.4	Section 5.2.4 refers to only 2 control measures: • An endorsed community complaint and evaluation procedure • A site inspection and maintenance strategy This does not represent a satisfactory risk approach as it is unclear as to which risks these are responding to. In addition, no details have been provided for the “site inspection and maintenance strategy”. Incomplete – as per previous comment Incomplete – no details provided on what constitutes a site inspection and maintenance strategy...particularly those aspects involving potential noise issues.	
Operational performance (regulation 131 E(2)(c))			
Details of noise measurement procedures, including equipment requirements, timing and duration	6.0 8.0 Appendix F	Sufficient details are provided.	Compliant
Wind-speed measurement locations and analysis approach for wind speed data	8.2 Appendix F	Acceptable	Compliant
Noise level and wind-speed measurement data analysis approach, including for subjective and objective evaluation of Special Audible Characteristics (SACs), and procedures for data exclusion, where necessary	8.0 Appendix F4 Appendix G	Section G8 needs to be finalised	TBA
Approach for attended subjective observations	8.0 Appendix F	SACs will be objectively assessed at receiver locations. Specific approaches for attended subjective observation of and objective analysis of Amplitude Modulation, Impulsiveness or Tonality are provided. It is recommended that an approach to additional attended subjective observations during routine inspections by site staff is considered by the operator.	Recommendation
Summary of results of operational noise monitoring and compliance assessment, including at alternative monitoring points	5.2.2	No post-construction monitoring conducted to date. The NMP states that <i>once the post-construction monitoring has been completed, the findings are to be used to inform an updated assessment of the risk profile of the wind farm and their impact on the noise risk assessment must be considered in an update to this NMP.</i>	Not assessed
Summary of baseline meteorological conditions (consistent with compliance documentation required under Section 8.3 of NZS 6808: 2010 including atmospheric conditions (wind speed and direction, rainfall))	Appendix H	Site wind speed and direction graphs are provided. It is recommended that the annualised wind rose and meteorological conditions for the site are also documented in the NMP for reference.	Recommendation
Site Inspection and Maintenance (regulation 131 E(2)(a))			

Element	NMP Section Reference(s)	Auditor Comment	Auditor Conclusion
Details of the maintenance plan and routine maintenance activities	13.0	Only a summary of maintenance responsibilities is noted in Table 17. The NMP makes no specific reference to the maintenance plan or routine maintenance activities that are generally undertaken. Incomplete - Need to be provided with examples of the Vestas-RCWF proposed site inspection and maintenance strategy (Section 5.2.4) and associated documentation mentioned in Table 17.	
Requirements of ongoing condition monitoring and inspections that may influence noise emissions	13.0	Incomplete - NMP should summarise the approach to ongoing maintenance, condition monitoring and inspections.	
Procedures for unexpected (non-routine) maintenance activities	13.0	Incomplete - Similarly, NMP should summarise the broad procedures that are adopted for unexpected (non-routine) maintenance activities.	
Procedures for scheduled inspections and monitoring	13.0	Incomplete - NMP should summarise the approach to ongoing maintenance, condition monitoring and inspections.	
Noise Complaint Management Procedures (regulation 131 E(2)(e))			
Reflecting good practices set out in AS/NZS 10002:2014 Guidelines for complaint management in organizations, compliant management procedures should include:	11.0 Appendix I	Condition 35 of the Planning Permit required RCWF to develop a Complaint Investigation and Response Plan. This plan was to be provided to the Minister for Planning for endorsement, and then <i>be implemented to the satisfaction of the Minister for Planning and be publically available online</i> (Ref: Ryan Corner Complaints Investigation and Response Plan, Ryan Corner Wind Farm, Planning Permit NO. 20060222-2, GPG Naturgy Group). Note: It would be difficult to require an amendment to a ministerially-endorsed plan unless there is potentially significant issues. However, it is noted in Section 11.0 that the plan will be <i>reviewed to determine if the procedures remain appropriate for the wind farm, or if refinements are warranted</i> .	
Details of how the community can lodge a complaint, including contact details	Appendix I	RCWF contact detail is provided	Compliant
A Complaint Register to record information for each report received, which may include:	Section 10.0 Appendix I	A Complaint Register is included in the plan	Compliant
• The name and address of the person making the complaint		TBC	
• Procedures on how complainants' detail will be maintained, including any relevant privacy policy		TBC	
• A receipt number for each complaint, which is to be communicated to the person making the complaint		TBC	

Element	NMP Section Reference(s)	Auditor Comment	Auditor Conclusion
Any applicable property reference number (for example, when connected to a background sound measurement location)		Inferred	
The time, prevailing conditions and a description of the concerns reported		Inferred	
Investigation and response procedures which may include			
A proforma noise investigation report		No	
Procedures for the analysis of complaint data against environmental conditions and WEF operational data		None specifically included, although Section 11.0 refers to consideration of trends when compiling annual statements	
Procedures for taking measurements to assess wind turbine noise levels in response to complaints	9.0	General procedures are documented	Compliant
Procedures for communication, consultation, and engagement with any relevant stakeholders		TBC	Compliant
WEF Operators should also consider a proactive program for contacting community in nearby noise sensitive areas to determine if there are unreported complaints.			Not assessed
Noise Remediation Procedures (regulation 131E (2)(d))			
For situations where a non-compliance has been detected (either as a result of investigating a complaint or through routine monitoring procedures), the NMP must set out noise remediation procedures to address non-compliance and to reduce noise emissions.	10.0	Noise remediation plans when results of compliance monitoring demonstrate non-compliance (Section 10.0). There is no action identified in either Section 10.0 or the Complaint Investigation and Response Plan, for monitoring as a step for followup of complaints (However), the steps provided in Section 10.0 are sufficient to address the issue.	Compliant
Training (regulation 131E (2)(a))			
Develop and implement a training program for employees engaged in the operation of the WEF, including the provision of information, instruction, supervision and training,	13.0	It is understood that the O and M Contract requires the Contractor (Vestas) to implement appropriate training/skilling program for staff for the operation of the WTGs. This includes specific training on the specific Vestas model used on site, site-based inductions, and regular toolbox meetings. <i>Incomplete -Need to sight evidence that these re happening (eg. From the monthly reports). The Auditor</i>	Recommendation

Element	NMP Section Reference(s)	Auditor Comment	Auditor Conclusion
particularly in regard to their duties under the EP Act		<i>can then state that this evidence has been reviewed, , and they are acceptable form. This should include, in particular, a session regarding the Environment Protection Act 2017 (and EP Regulations), and the General Environmental Duty.</i>	
Review (regulation 131E (2)(a))			
Program for review, including the development of the annual statement, five-yearly turbine monitoring and NMP review cycle.	6.0 8.0 12.0	<i>Incomplete - General review requirements (and responsibilities for review) are included, however there is no specified timeframe for review of the NMP itself.</i>	Recommendation