

Ryan Corner Development Pty Ltd  
**Ryan Corner Wind Farm**  
Pre-construction Environmental  
Noise Assessment Audit

277342-10

Final | 1 February 2021

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

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

Job number 27734210







Arup Australia Pty Ltd ABN 76 625 912 665

**Arup**  
Sky Park  
One Melbourne Quarter  
699 Collins Street  
Docklands Vic 3008  
Australia  
[www.arup.com](http://www.arup.com)

**ARUP**

# Document verification

# ARUP

<b>Job title</b>		Ryan Corner Wind Farm		<b>Job number</b>	
				27734210	
<b>Document title</b>		Pre-construction Environmental Noise Assessment Audit		<b>File reference</b>	
<b>Document ref</b>		277342-10			
<b>Revision</b>	<b>Date</b>	<b>Filename</b>			
Draft 1	14 Jan 2021	<b>Description</b>	First draft		
			Prepared by	Checked by	Approved by
		Name	David Spink Kym Burgemeister	Kym Burgemeister	Kym Burgemeister
		Signature			
Final	01 Feb 2021	<b>Filename</b>			
		<b>Description</b>	Final report		
			Prepared by	Checked by	Approved by
		Name	David Spink Kym Burgemeister	Kym Burgemeister	Kym Burgemeister
Signature					
		<b>Filename</b>			
		<b>Description</b>			
			Prepared by	Checked by	Approved by
		Name			
		Signature			
		<b>Filename</b>			
		<b>Description</b>			
			Prepared by	Checked by	Approved by
		Name			
		Signature			
<b>Issue Document verification with document</b>					
<input checked="" type="checkbox"/>					

# Contents

---

	Page
<b>Distribution</b>	<b>3</b>
<b>Executive Summary</b>	<b>4</b>
<b>List of Acronyms</b>	<b>12</b>
<b>1 Overview of Environmental Audit</b>	<b>13</b>
1.1 Background	13
1.2 Audit Objectives	15
1.3 Audit Scope	15
1.4 Audit Criteria	16
1.4.1 DELWP Guideline	16
1.4.2 EPA Guideline	16
1.4.3 Planning Guideline	16
1.5 Audit Methodology	17
1.6 Documents Reviewed for the Audit	17
<b>2 Key Audit Findings</b>	<b>20</b>
2.1 Review of the Site	20
2.2 Background Noise Assessment	21
2.2.1 Background Noise Monitoring Locations	21
2.2.2 Background Noise Monitoring	22
2.3 Pre-Construction Noise Assessment	23
2.3.1 Noise Limits	24
2.3.2 Noise Prediction Methodology	25
2.3.3 Predicted Noise Levels	26
2.3.4 Potential Uncertainty in Noise Levels	27
2.3.5 Risk Assessment	27
2.4 Consideration of Cumulative Noise Levels	28
2.5 Additional Auditor Considerations	28
2.5.1 Potential Change in Turbine Power Sound Levels	29
2.5.2 Potential Change in Predicted Noise Profile of Site	30
<b>3 Audit Conclusions and Recommendations</b>	<b>30</b>
3.1 Conclusions	30
3.2 Recommendations	33

## Appendices

### Appendix A1

## Ryan Corner Site Visit

### **Appendix A2**

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

## Distribution

---

### Pre-construction Environmental Noise Audit Report, Ryan Corner Wind Farm, Port Fairy, VIC 3284

1 February 2021

Copies	Recipient	Copies	Recipient
1 PDF	<b>Guillermo Alonso</b> Director and Engineering Manager Ryan Corner Development Pty Ltd Suite 4, Level 3, 24 Marcus Clarke Street, Canberra ACT 2601	1 PDF	Manager Environmental Audit Environmental Audit Unit EPA Victoria 200 Victoria Street Carlton Vic 3053
1 PDF	<b>Ms Fiona Koutivos</b> ERM Pty Ltd Level 6/ 99 King Street Melbourne Vic 3000	1 PDF	Arup Project File

## Executive Summary

---

An environmental audit ('the audit') was conducted in accordance with Section 53V of the *Environment Protection Act 1970* (the Act) of the pre-construction noise assessment undertaken by Marshall Day Acoustics Pty Ltd (MDA) for the proposed Ryan Corner Wind Farm to be located near Port Fairy, Victoria (the site). Hereafter the wind farm will be referred to as the Wind Energy Facility (WEF) which is consistent with Victorian Government terminology.

Ryan Corner Development Pty Ltd (RCD), a subsidiary of Global Power Generation Australia Pty Ltd (GPG), is proposing to construct a WEF at the site.

The site is located within the Shire of Moyne. The original Planning Permit No 20060222 was issued by the Minister for Planning on 21 August 2008. The Planning Permit was extended on 21 Dec 2017, including an amendment to "increase the height of turbines, reduce the number of turbines, and to modify conditions under the permit" (Planning Permit 20060222-A). This extension of the Planning Permit was due to expire if the works are not completed by 29 August 2020.

A further extension to the Planning Permit was approved by the Department of Environment, Land, Water and Planning (DELWP) on 2 November 2020, and will expire if the development is not completed by 29 August 2023. This application for extension included an audit prepared under Part IXD, Section 53V of the *Environment Protection Act 1970* (the Act) by David Spink, an Environmental Auditor appointed under Part IXD of the Act. The audit report comprised an assessment of compliance of the pre-construction (predictive) noise assessment report, demonstrating that the proposal can comply with the *New Zealand Standard NZS 6808:2010 Acoustics – Wind Farm Noise* (Standard) (Report Document Reference Pre-construction Environmental Noise Assessment Audit Ryan Corner Wind Farm, Port Fairy, Victoria 3284, Senversa Project Number M17916, Prepared for Ryan Corner Development Pty Ltd, 27 August 2020, EPA CARMS 78659-1). The audit was largely based on the information provided in a report entitled Marshall Day Acoustics– Ryan Corner Wind Farm – NZS 6808:2010 Noise Assessment (Rpt 001 R02 2014362ML, dated 21 April 2017) (2017 Assessment Report). At that stage, the assessment included three turbine options – Vestas V126 (3.3MW), Senvion M122 (3.0MW) and GE 3.2-130 (3.2MW).

RCD have since nominated a preferred turbine model for the site (Vestas V136-4.2MW) and elected to remove four (4) turbines from the layout considered in the 2017 Assessment Report (ie a reduction from 56 to 52 turbines, with turbines designated B35, B39, B47 and B49 removed). Turbine B43 is also to be slightly altered in location (micro-sited). RCD has now prepared a Pre-construction Noise for the project (Marshall Day Acoustics– Ryan Corner Wind Farm – Pre-construction Noise Assessment, Rpt 003 20180786, dated 30 October 2020) (2020 Assessment Report), which includes a noise assessment based on the final turbine selection and turbine layout.

RCD intends to submit the 2020 Assessment Report to DELWP, in addition to an application for amendment of the Planning Permit for other proposed changes. The auditor has been advised that the change in turbine type has not triggered the amendment application, rather this is due to proposed changes to the wording of the Planning Permit and conditions which do not relate to the turbines.

DELWP has advised that the 2020 Assessment Report must satisfy the requirements of the *Development of Wind Farm Facilities in Victoria – Policy and Planning Guidelines*

(DELWP, March 2019) (DELWP Guideline). Specifically in regard to noise generation, the report should also include an environmental audit of the 2020 Assessment Report, prepared under Part IXD, Section 53V of the Act by an Environmental Auditor appointed under Part IXD of the Act, comprising an assessment of compliance of the pre-construction (predictive) noise assessment report, demonstrating that the proposal can comply with the Standard. This audit report is a record of the independent audit required for submission with this current application for amendment of Planning Permit No.20060222-A.

EPA Victoria has issued *Wind Energy Facility Noise Auditor Guidelines* (Publication 1692, October 2018) (EPA Guideline) to complement the DELWP Guideline, that sets out the requirements for an audit of pre-construction noise (Section 2.4.1). The EPA Guideline refers to a number of EPA requirements, primarily *Environmental Auditor Guidelines for the Preparation of Environmental Audit Reports on Risk to The Environment* (Publication 952) and *Environmental Auditor Guidelines for Conducting Environmental Audits* (Publication 953)

The audit of the proposed Ryan Corner WEF was consistent with these requirements of the EPA Guideline.

A summary of the audit and its findings are outlined in **Tables 1** and **2** below, consistent with *Environmental Auditor Guidelines - Provision of Environmental Audit Reports, Certificates and Statements* (EPA Publication 1147.2, December 2012).

**Table 1: Summary of Audit Information**

Summary Information	Details
EPA File Reference No.	CARMS No. 78659-2
Auditor	David Spink
Auditor account number	43572
Auditor appointment end date	24 October 2021
Audit service order number	8006879
Name of person requesting audit	Guillermo Alonso
Relationship of person requesting audit to site	Director and Engineering Manager, Ryan Corner Development Pty Ltd
Name of premises owner	Various, N/A
Date of auditor engagement	11 November 2020
Completion date of audit	01 February 2021
Reason for audit	Pre-construction noise audit for Ryan Corner Wind Farm
Audit categorisation	Noise compliance with New Zealand Standard NZS 6808:2010 Acoustics – Wind Farm Noise
Environmental segments	Land within the neighbourhood, noise and air
EPA notice, licence or other reference number	N/A

<b>Current land use zoning</b>	FZ – Farming
<b>EPA region</b>	South West
<b>Municipality</b>	Moyne Shire Council
<b>Dominant – Lot on plan</b>	N/A
<b>Additional – Lot on plan</b>	N/A
<b>Site/ premises name</b>	Ryan Corner Wind Farm
<b>Building/complex sub-unit No.</b>	N/A
<b>Street/Lot – Lower No.</b>	
<b>Street/Lot – Upper No.</b>	
<b>Street Name</b>	Hamilton-Port Fairy
<b>Street Type (road, court, etc)</b>	Road
<b>Suburb</b>	Ryan Corner
<b>Postcode</b>	3284
<b>GIS coordinates of site centroid</b>	
<b>Latitude (GDA94)</b>	142.134
<b>Longitude (GDA94)</b>	-8.23955
<b>Members and categories of support team utilised</b>	Dr Kym Burgemeister Arup Pty Ltd – Principal and Australasian Acoustics Skills Leader Acoustics subject matter expert
<b>Further work or requirements</b>	<ol style="list-style-type: none"> <li>1. The post-construction noise level monitoring specified under the approved Noise Compliance Test Plan (NCTP) should be undertaken by an independent acoustic consultant in line with recent recommendations of the Office of the National Wind Farm Commissioner<sup>1</sup>.</li> <li>2. A Noise Management Plan (NMP) should be developed for the operational phase of the WEF, to include measures to manage turbine noise in cases where operational noise non-compliance with the Standard was identified through the NCTP and any additional noise monitoring. Given that Planning Permit 20060222-A does not directly require a NMP, it is further recommended that it be included under Conditions 17 and 18 (Environmental Management Plan).</li> <li>3. Documented evidence of all stakeholder agreements should be required for review as part of the auditor review of the</li> </ol>

<sup>1</sup> Annual Report to the Parliament of Australia, Office of the National Wind Farm Commissioner, 31 March 2017.



	initial NCTP report required by Condition 34 of Planning Permit 20060222-A.
<b>Nature and extent of continuing risk</b>	A risk of noncompliance with the <i>New Zealand Standard NZS 6808:2010 Acoustics – Wind Farm Noise</i> (Standard) is taken to be a risk to the beneficial use of the environment, specifically with respect to the amenity of residents in the noise sensitive locations. Based on the predicted sound levels, it is expected that the risk to this beneficial use will be low, due to compliance with the Standard.
<b>Outcome of Audit</b>	<p>The following is a summary of the key findings of the audit.</p> <p><b>Background Noise Assessment</b></p> <p>Refer to report entitled Marshall Day Acoustics – Ryan Corner Wind Farm – Background Noise Monitoring (Rpt 002 20180786, dated 20 August 2020) (Background Monitoring Report).</p> <ol style="list-style-type: none"> <li>1. The background noise monitoring locations are shown on a site plan in Figure 1 of the Background Monitoring Report. A check was made to compare this noise contour plot based on the Senvion 4.2M140 turbine, with the three turbine options in the 2017 Assessment Report (Appendix E) and the proposed turbine option Vestas V136 4.2MW (2020 Assessment Report, Figure 3). The plots are relatively similar, with potentially the predicted 35 db(A) plot and other higher noise level contours for the proposed turbine option closer to the windfarm. This indicates that the locations selected for the background monitoring are conservative and are at, or representative of, all the sensitive receivers that are within the predicted 35 dB(A) wind farm sound contour, in accordance with Section 7.1.4 of the Standard.</li> <li>2. The background noise monitoring undertaken by MDA appropriately considered sensitive receiver locations, including Participant (Stakeholder) and Non-participant Landholders. It is noted that one of the initial sites selected had to be moved to an intermediate location due to permission not been given by the Landholder to place monitoring equipment in the vicinity of the residence.</li> <li>3. The site inspection by the auditor on 08 April 2020 confirmed that the locations chosen by MDA were appropriate as representative monitoring background locations for sensitive receivers in the area. No significant local topographical features or other additional sensitive receivers were noted that might need to have been considered for inclusion in the background noise monitoring locations selected by MDA, to undertake an appropriate assessment.</li> <li>4. Background noise monitoring was undertaken by MDA at 8 locations between May and July 2020. The background noise level data has been undertaken over a time period of between 5–7 weeks (depending on location) which is</li> </ol>

	<p>considerably in excess of the minimum recommended requirement of 10 days (1,440 data points). The Background Monitoring Report provides helpful details regarding the individual measurement locations in Appendices G - N, with aerial photography, maps and photographs of each site which indicate appropriate positioning of the noise loggers.</p> <ol style="list-style-type: none"> <li>5. The background measurements have been undertaken using appropriate measurement equipment (including windshields) and include a traceable calibration.</li> <li>6. The background noise level data has been referenced to wind speed measurements undertaken at a meteorological mast installed on the site. The mast does not include an anemometer at the proposed turbine hub height of 112m, but does provide 2 individual anemometer heights at 20 and 40 m. These data have been used to calculate a wind shear exponent using a power law, and extrapolate the wind speed at 112 m. This methodology is appropriate.</li> <li>7. The background noise data have been analysed appropriately</li> </ol> <p><b>Pre-construction Noise Assessment</b></p> <p>Refer to report entitled Marshall Day Acoustics – Ryan Corner Wind Farm – Pre-Construction Noise Assessment (Report 003 20180786, dated 30 October 2020) (2020 Assessment Report).</p> <p>Also note that the 2020 Assessment Report refers on a number of issues to the previous report entitled Marshall Day Acoustics – Ryan Corner Wind Farm – NZS 6808:2010 Noise Assessment (Report 001 R02 2014362, dated 21 April 2017 (2017 Assessment Report).</p> <ol style="list-style-type: none"> <li>8. The pre-construction noise assessment methodology generally complies with the requirements of the Standard. The noise predictions were conducted in accordance with the appropriate standards and guidelines.</li> <li>9. General Noise Limits:       <ol style="list-style-type: none"> <li>a. The approach used in the assessment is to adopt the ‘Base Limit’ criterion of 40 dB(A), at all Non-Participant Landholders up to a background noise level of 35 dB(A). For background noise levels above 35 dB(A), the maximum ‘Background +5 db(A)’ approach has been adopted. This approach is consistent with the Standard, and as also required by Condition 31 of Planning Permit 20060222-A. It is noted that this is a shift from the approach taken in the 2017 Assessment Report, which stated “For the purpose of this assessment, the NZS 6808:2010 base noise limit of 40 dB LA90 at all wind speeds has been used for all noise sensitive locations”.</li> <li>b. The adoption of a limit for Participant Landholders is not strictly considered under the Standard, however, it is agreed that adopting a 45 dB(A) base noise limit for</li> </ol> </li> </ol>
--	---

	<p>Participant Landholders is reasonable, on the basis of adopting best practice.</p> <p>10. Consideration of High Amenity Noise Limits: MDA does not provide any consideration of the use of a High Amenity Noise Limit in the 2020 Assessment Report. Assessment of noise compliance was against general noise limits only. To provide clarification, the matter was discussed in the 2017 Assessment Report (Section 3.3), and reviewed in the previous audit (EPA CARMS 78559-1). MDA considered the use of a High Amenity Noise Limit in accordance with the Standard, and concluded that a High Amenity Noise Limit should not be applied. The matter was subsequently raised at a Planning Panel on the proposed amendment to the Planning Permit<sup>2</sup>. The auditor accepts this position (ie a High Amenity Zone does not apply), based on this guidance from the above Panel and from the VCAT determination for the Cherry Tree Wind Farm in relation to High Amenity zonings<sup>3</sup>.</p> <p>11. Consideration of Special Audible Characteristics (SACs): MDA have assessed the likelihood that the turbines will result in tonal noise emission based on the measured tonal audibility of the selected turbine measured in accordance with IEC 61400-11:2012<sup>4</sup> and reported by the manufacturer. This data indicates that the tonal audibility level is likely to be below 1.3 dB at all assessed wind speeds, and that tonality is not expected to be a characteristic of the WEF. MDA concludes that it is not necessary to apply a penalty to the predicted noise levels. The auditor accepts this assessment, on the basis that SACs will be assessed through the NCTP, and that a Noise Management Plan will be implemented through the Environmental Management Plan to address any non-compliance and potential associated penalties.</p> <p>12. Noise Prediction Methodology: The noise level predictions have been undertaken using the ISO 9613-2:1996<sup>5</sup> noise propagation model. In the opinion of the auditor and his team, the calculation parameters that have been adopted for temperature, humidity and ground absorption are reasonable, and correspond to best practice.</p> <p>13. The predicted noise levels comply with the limits set in the Standard. Specifically:</p> <p>a. Table 7 and Appendix G of the 2020 Assessment Report indicates that the predicted wind farm sound levels are below 40dB(A). This complies with the</p>
--	--

<sup>2</sup> Panel Report - Moyne Planning Scheme Applications to amend Planning Permits 2006/0221 and 2006/0222 Hawkesdale and Ryan Corner Wind Energy Farms (dated 24 October 2017)

<sup>3</sup> DELWP Guideline S5.1.2 refers to the Cherry Tree Wind Farm vs Mitchell Shire Council (2013)

<sup>4</sup> IEC 61400-11: 2012 Wind turbines – Part 11: Acoustic noise measurement techniques, International Electrotechnical Commission

<sup>5</sup> International Standard ISO 9613-2:1996 Acoustics - Attenuation of sound during propagation outdoors – Part 2: General method of calculation (ISO 9613-2)

	<p>criteria at all of the Non-Participant Landholder noise sensitive receivers.</p> <p>b. The assessment also indicates that the wind farm sound levels also comply with the 45 dB(A) noise criterion at the Participant Landholder (Stakeholder) residences, with all also below 40 dB(A).</p> <p>14. Potential uncertainty in predicted noise levels: MDA used SoundPlan 8.0 software, utilising the international standard ISO 9613<sup>6</sup> sound propagation model, in conjunction with the digital terrain model of the site. The ISO 9613 sound propagation model has been demonstrated to generally result in conservative noise predictions. All acoustic measurements and noise predictions are subject to measurement and calculation uncertainty. While MDA's analysis is not subject to a detailed Uncertainty Analysis, it does generally adopt conservative assumptions. We agree with this approach for modelling noise from WEFs.</p> <p>15. Risk Assessment: A risk of noncompliance with the Standard is taken to be a risk to the beneficial use of the environment, specifically with respect to the amenity of residents in the noise sensitive locations. Based on the predicted noise levels, it is expected that the risk to this beneficial use will be low, due to compliance with the Standard.</p> <p>16. Consideration of Cumulative Impacts: The 2020 Assessment Report does not mention cumulative noise assessment. This issue was raised with MDA during the previous audit process (EPA CARMS No. 78659-1). Cumulative impact from the Codrington and Yambuk Wind Farms to the south west were considered as part of the planning permit amendment hearing. The panel report<sup>7</sup> dated 24 October 2017 did not make any comments with regard to the potential cumulative effects between Yambuk and Ryan Corner. Given acceptance by the panel of this assessment, the auditor does not seek further information on cumulative impacts.</p> <p>17. Additional Auditor Considerations:</p> <p>a. Potential Change in Turbine Power Sound Levels: Comparison of provided data indicates that the proposed turbine (Vestas V136-4.2MW) is no noisier than the range approved for the three currently approved options under Planning Permit 20060221-A (Vestas V126 (3.3MW), Senvion M122 (3.0MW) and GE 3.2-130 (3.2MW), and appears comparable to the quietest option (Senvion M122).</p>
--	--

<sup>6</sup> International Standard ISO 9613-2:1996 Acoustics - Attenuation of sound during propagation outdoors – Part 2: General method of calculation (ISO 9613-2)

<sup>7</sup> Moyne Planning Scheme - Applications to amend Planning Permits 2006/0221 and 2006/0222 Hawkesdale and Ryan Corner Wind Energy Farms (dated 24 October 2017)

	<p>b. Potential Change in Predicted Noise Profile of Site: The 2020 Assessment Report, (Appendix H, where Table 11) indicates that the use of the proposed turbine (Vestas V136-4.2MW) in the WEF (in conjunction with removal of four turbines), is predicted to be similar to the quieter of the currently approved turbines (Senvion 3.0M122), and potentially quieter than noise at these locations from the use of the other two approved turbines (Vesta 126, GE 3.2-130). This is reflected in the predicted noise contours for the proposed turbine (Vestas V136-4.2MW) (2020 Assessment Report, Figure 3, page 15), and the three approved options (2017 Assessment Report, Appendix E).</p>
--	---

**Table 2: Physical Site Information**

<b>Historical land use</b>	<b>Farming</b>
<b>Current land use</b>	Farming
<b>Surrounding land use – north</b>	Farming
<b>Surrounding land use – south</b>	Farming
<b>Surrounding land use – east</b>	Farming
<b>Surrounding land use - west</b>	Farming
<b>Proposed land use zoning</b>	FZ Farming – no change
<b>Nearest surface water receptor – name</b>	Not relevant for this audit
<b>Nearest surface water receptor – direction</b>	Not relevant for this audit
<b>Groundwater segment</b>	Not relevant for this audit

Signed


**David Spink**

Environmental Auditor (Industrial Facilities)

Appointed pursuant to the *Environment Protection Act 1970*

## List of Acronyms

---

<b>Acronym</b>	<b>Definition</b>
<b>AGL</b>	Above Ground level
<b>AS/NZS</b>	Australian and New Zealand Standard
<b>EPA</b>	Environment Protection Authority, Victoria
<b>DELWP</b>	Department of Environment, Land, Water, and Planning (Victoria)
<b>MDA</b>	Marshall Day Acoustics Pty Ltd
<b>NCTP</b>	Noise Compliance Test Plan
<b>NMP</b>	Noise Management Plan
<b>NZS</b>	New Zealand Standard
<b>SAC</b>	Special Audible Characteristic
<b>Standard</b>	NZS 6808:2010 Acoustics – Wind Farm Noise
<b>WEF</b>	Wind Energy Facility

# 1 Overview of Environmental Audit

---

## 1.1 Background

A windfarm has been proposed at Ryan Corner on land generally bounded by the Hamilton – Port Fairy Road, Fingerboard Road and Shaw River, near Port Fairy, Victoria (the site). Hereinafter the wind farm will be referred to as the Wind Energy Facility (WEF) which is consistent with Victorian Government terminology.

Ryan Corner Development Pty Ltd (RCD), a subsidiary of Global Power Generation Australia Pty Ltd (GPG) is proposing to construct a WEF at the site.

The site is located within the Shire of Moyne. The original Planning Permit No. 20060222 was issued on 21 August 2008 by the Minister for Planning for the proposed Ryan Corner WEF. The Planning Permit was extended on 21 Dec 2017, including an amendment to “increase the height of turbines, reduce the number of turbines, and to modify conditions under the permit” (Planning Permit 20060222-A). This extension of the Planning Permit was due to expire if the works are not completed by 29 August 2020.

A further extension to the Planning Permit was approved by the Department of Environment, Land, Water and Planning (DELWP) on 02 November 2020. This application for extension included an audit prepared under Part IXD, Section 53V of the *Environment Protection Act 1970* (the Act) by David Spink, an Environmental Auditor appointed under Part IXD of the Act. The audit report comprised an assessment of compliance of the pre-construction (predictive) noise assessment report, demonstrating that the proposal can comply with the *New Zealand Standard NZS 6808:2010 Acoustics – Wind Farm Noise* (Standard) (Report Document Reference: Pre-construction Environmental Noise Assessment Audit Ryan Corner Wind Farm, Port Fairy, Victoria 3284, Senversa Project Number M17916 Prepared for: Ryan Corner Development Pty Ltd, 27 August 2020, EPA CARMS 78659-1). The audit was largely based on the information provided in a report entitled Marshall Day Acoustics– Ryan Corner Wind Farm – NZS 6808:2010 Noise Assessment (Rpt 001 R02 2014362ML, dated 21 April 2017) (2017 Assessment Report). At that stage, the assessment included three turbine options – Vestas V126 (3.3MW), Senvion M122 (3.0MW) and GE 3.2-130 (3.2MW).

RCD have since nominated a preferred turbine model for the site (Vestas V136-4.2MW) and elected to remove four (4) turbines from the layout considered in the 2017 Assessment Report (ie a reduction from 56 to 52 turbines, with turbines designated B35, B39, B47 and B49 removed). Turbine B43 is also to be slightly altered in location (micro-sited). RCD has now prepared a Pre-construction Noise for the project (Marshall Day Acoustics– Ryan Corner Wind Farm – Pre-construction Noise Assessment, Rpt 003 20180786, dated 30 October 2020) (2020 Assessment Report), which includes a noise assessment based on the final turbine selection and turbine layout.

RCD intends to submit the 2020 Assessment Report to DELWP, in addition to an application for amendment of the Planning Permit for other proposed changes. The auditor has been advised that the change in turbine type has not triggered the amendment application, rather this has been triggered by proposed changes to the wording of the Planning Permit and conditions which do not relate to the turbines.

DELWP has advised that the 2020 Assessment Report must satisfy the requirements of the *Development of Wind Farm Facilities in Victoria – Policy and Planning Guidelines* (DELWP, March 2019) (DELWP Guideline). Specifically in regard to noise generation:

*The pre-construction (predictive) noise assessment report must be accompanied by an environmental audit prepared under Part IXD, Section 53V of the Environment Protection Act 1970 by an Environmental Auditor appointed under Part IXD of the Environment Protection Act 1970. The environmental audit report must verify that the acoustic assessment undertaken for the pre-construction (predictive) noise assessment report has been conducted in accordance with the New Zealand Standard NZS6808:2010, Acoustics – Wind Farm Noise.*

This audit report is a record of the audit required for submission with this current application for amendment of the Planning Permit No 20060221-A.

It is noted that Condition 31 of the Planning Permit states (in part):

*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 28 February 2017, to the satisfaction of the Minister for Planning.*

*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.*

The submission is consistent with Section 52.32 of the Victorian Planning Provisions (VC148), and in particular, Sections 52.32-4 and 52.32-5 (24/01/2020, VC160), which explicitly require a mandatory pre-construction (predictive) noise assessment demonstrating that the proposal can comply with the Standard, and an environmental audit report (this report) of the pre-construction (predictive) noise assessment report prepared under Part IXD, Section 53V of the *Environment Protection Act 1970*, verifying that the noise assessment report has been prepared in accordance with the Standard.

EPA Victoria has issued *Wind Energy Facility Noise Auditor Guidelines* (Publication 1692, October 2018) (EPA Guideline) to complement the DELWP Guideline, that sets out the requirements for an audit of pre-construction noise (Section 2.4.2). The EPA Guideline refers to several EPA requirements, primarily:

- Environmental Auditor Guidelines for the Preparation of Environmental Audit Reports on Risk to The Environment (Publication 952).
- Environmental Auditor Guidelines for Conducting Environmental Audits (Publication 953)

The audit of the Ryan Corner WEF was consistent with these requirements of the EPA Guideline.

Note: Hereinafter the New Zealand Standard 6808:2010 Acoustics – Wind Farm Noise will be referred to as the Standard, consistent with the terminology used in EPA Publication 1692 Wind Energy Facility Noise Auditor Guidelines (October 2018) (EPA Guideline).



## 1.2 Audit Objectives

The objective of the audit was to assess compliance of the Ryan Corner WEF Pre-construction Noise Assessment, as provided in the 2020 Assessment Report, with the requirements set out in:

- 1 New Zealand Standard NZS 6808:2010 Acoustics – Wind Farm Noise (Standard). Specifically, that
  - a. The assessment has been conducted in accordance with the Standard
  - b. The predicted noise impacts comply with the limits set in the Standard
- 2 Sections 4.3.3 (c) and 5.1.2 (a) of the DELWP Guideline
- 3 Audit requirements of the EPA Guideline

In essence, the audit was to assess the risk of amenity impact to the nearby residents from noise generated from the WEF.

## 1.3 Audit Scope

The following table directly responds to the additional requirements of the EPA's Publication 952 (referred to above).

<b>Activity undertaken (in respect of which the environmental audit is to be conducted)</b>	Wind Energy Facility (WEF)
<b>Components of the activity to be considered</b>	Noise from turbine blades, generators, gear boxes and hydraulic systems
<b>Segment(s) of the environment to be considered</b>	Ryan Corner environs surrounding the WEF. WEF centred at GPS Coordinates: Latitude: 142.134 Longitude: -8.23955
<b>Element(s) to be considered</b>	Atmosphere/ aesthetics
<b>Beneficial Use(s) to be considered</b>	Residential accommodation, recreation and farming
<b>Risk Assessment</b>	Effect of amenity of receptor sites applicable to operational noise of WEF
<b>Time Period</b>	Indefinite, from commencement of WEF operation
<b>Exclusions</b>	Construction noise Sub-station noise Compliance with other noise requirements of Planning Permit 200602222-A (Moyne Shire Council)

## 1.4 Audit Criteria

### 1.4.1 DELWP Guideline

The DELWP Guideline states that the WEF must comply with the noise limits recommended for dwellings and other noise sensitive locations, set out in the Standard.

The noise limits specified in the Standard are:

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

These noise limits produced in the Standard apply to all times of the day and night.

### 1.4.2 EPA Guideline

The EPA Guideline (Publication 1692) includes the following definition:

*Risk of harm in relation to WEFs is defined as the potential for noise generated from WEFs to impact upon nearby noise sensitive locations.*

Publication 1692 further states that *Victoria has adopted ... NZS 6808:2010 (the Standard) ... as the standard which defines the assessment criteria, methodology and noise limits for WEFs.*

### 1.4.3 Planning Guideline

The planning provisions require the noise assessment for wind farm projects to be undertaken in accordance with the Standard (amendment VC78<sup>8</sup>, 15 March 2011).

Condition 31 of Planning Permit 20060222-A specifies the requirements of the Standard, and states that “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.”

Specific guidelines such as the Standard have been developed to address the unique requirements for the prediction, measurement and assessment of sound from wind farms because the usual measurement and assessment standards adopted in Victoria (such as AS 1055<sup>9</sup> and SEPP N-1<sup>10</sup>) are unsuitable.

---

<sup>8</sup> Advisory Note 35, Amendment VC 78 Wind energy facility provisions – Clause 52.32, March 2011.

<sup>9</sup> AS 1055.1-1997 *Acoustics - Description and measurement of environmental noise - General procedures*, Standards Australia, 1997.

<sup>10</sup> *State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1*, Victoria Government Gazette No. S31, 1989.

There are other standards and guidelines such as AS4959:2010<sup>11</sup>, the draft National Guidelines<sup>12</sup>, the UK ETSU-R-97<sup>13</sup> and the Annual Report of the National Wind Farm Commissioner<sup>14</sup> that can provide helpful background information and secondary guidance that can also assist with the assessment of projects where the Standard does not provide detailed or explicit guidance.

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

## 1.5 Audit Methodology

The audit methodology was relatively consistent with Section 2.4.1 of the EPA Guideline, and included:

- Inception meeting with RCD management.
- Review of the proposed Ryan Corner WEF development and planned operation
- Review of relevant documentation (refer to Section 1.6)
- Site inspection of the proposed Ryan Corner WEF project area and the surrounding environment – note that the auditor inspected the site on 06 April 2020, as part of the previous S53V audit (EPA CARMS 78659-1). No additional site inspection was deemed necessary. Refer to Section 2.1.
- Assessment of the rigour of the approach to identifying surrounding noise sensitive locations, including background noise assessments.
- Review of the pre-construction noise assessment, including site-specific issues and technical details (overall methodology, baseline noise monitoring equipment, modelling program, alignment with the Standard).
- Review of predicted potential noise impacts, including comparison of the preferred turbine model for the site (Vestas V136-4.2MW) with the turbine options previously approved
- Residual risk assessment, including a qualitative statement on the risk of non-compliance (and operational plans to manage potentially adverse impacts).
- Preparation of the environmental audit report.

## 1.6 Documents Reviewed for the Audit

Documents specific to the Ryan Corner WEF:

---

<sup>11</sup> AS4959:2010 Acoustics – Measurement prediction and assessment of noise from wind turbine generators.

<sup>12</sup> *National Wind Farm Development Guidelines – Draft*, Environment Protection and Heritage Council, July 2010.

<sup>13</sup> *The Assessment and Rating of Noise from Wind Farms*, UK Department of Trade and Industry, ETSU-R-97, September 1996.

<sup>14</sup> *Annual Report to the Parliament of Australia*, Office of the National Wind Farm Commissioner, 31 March, 2017.

- Marshall Day Acoustics – Ryan Corner Wind Farm – Pre-Construction Noise Assessment (Report 003 20180786, dated 30 October 2020 (2020 Assessment Report))
- Marshall Day Acoustics– Ryan Corner Wind Farm – NZS 6808:2010 Noise Assessment (Rpt 001 R02 2014362ML, dated 21 April 2017) (2017 Assessment Report).
- Marshall Day Acoustics - Ryan Corner Wind Farm – Background Noise Monitoring (Report 002 01Draft 20180786, dated 07 August 2020)
- Marshall Day Acoustics - Ryan Corner Wind Farm – Background Noise Monitoring (Report 002 20180786, dated 20 August 2020) (Background Monitoring Report)
- Marshall Day Acoustics - Ryan Corner Wind Farm Noise Compliance Test Plan (Report v No 001 01draft 20180786, dated 20 August 2018) (Draft NCTP)
- Marshall Day Acoustics - Ryan Corner Baseline monitoring locations (Pers Comm C. Delaire MDA, email dated 06 April 2020)
- ERM - Ryan Corner Wind Farm Development Plan (Drawing No 0105123\_001 Layout 2001104.mxd)
- Ryan Corner Development Pty Ltd: Drawing No RCWF-DP-02-v10 - Vestas V-136 4.2MW
- Ryan Corner Planning Permit No 20060222-A (dated 21 Dec 2017)
- Moyne Planning Scheme - Applications to amend Planning Permits 2006/0221 and 2006/0222 Hawkesdale and Ryan Corner Wind Energy Farms (dated 24 October 2017)
- Senversa Pty Ltd Pre-construction Environmental Noise Assessment Audit, Ryan Corner Wind Farm, Port Fairy, Victoria 3284. (Senversa Reference M17916, dated 27 August 2020)
- Vestas Wind Systems A/S - V136-4.2 MW 50 Hz, PO1, 230933 Results of acoustic noise measurements according to IEC 61400-11 Edition 3.0 (Report No.: 10161571-A-1-A Dated: 09 September 2019)
- Vestas Document no. 0067-7065 V06 2018-05-02 Performance Specification V136-4.0/4.2 MW 50/60 Hz (Dated 03 May 2018)
- Vestas Document no. DMS 0067-4732 V03 V136-4.0/4.2 MW Third octave noise emission
- Department of Environment, Land, Water and Planning. Letter to Global Power Generation Australia Pty Ltd, confirming extension of Planning Permit 20060222-A to 29 August 2023 (letter dated 02 November 2020)
- Panel Report - Moyne Planning Scheme Applications to amend Planning Permits 2006/0221 and 2006/0222 Hawkesdale and Ryan Corner Wind Energy Farms (dated 24 October 2017)

#### General references:

- New Zealand Standard NZS6808:2010 Acoustics – Wind Farm Noise
- DELWP - Development of Wind Farm Facilities in Victoria – Policy and Planning Guidelines (March 2019)
- EPA Victoria - Wind Energy Facility Noise Auditor Guidelines (Publication 1692, October 2018)

- EPA Victoria - Environmental Auditor Guidelines for the Preparation of Environmental Audit Reports on Risk to The Environment (Publication 952).
- EPA Victoria - Environmental Auditor Guidelines for Conducting Environmental Audits (Publication 953)
- Victoria Planning Policy (Amendment VC124 – 2015) Clause 52-32-5
- Annual Report to the Parliament of Australia, Office of the National Wind Farm Commissioner, 31 March 2017.

## 2 Key Audit Findings

---

The following key audit findings address the objectives of the audit set out in **Section 1.2**. The methodology used was consistent with **Section 1.5**.

### 2.1 Review of the Site

The auditor undertook a site inspection in 2020 as part of the previous independent audit (EPA CARMS No. 78659-1), undertaken to be submitted with the application by RCD for an extension of Planning Permit 20060222-A.

The previous site inspection was preceded by a tele-conference meeting with senior RCD management and MDA technical staff on 01 April 2020 to:

- Confirm of the scope of site access and data requirements.
- Gain an understanding of the process used for selection of background monitoring locations (sensitive receiver sites), including siting alternative locations when agreement was not reached with preferred landholders.

An inspection of the site was held on 06 April 2020. The auditor was accompanied on the site visit by Nathan Micallef, a local employee of the proponent (RCD). Because of the social distancing restrictions in force in Victoria at that time due to the Corona virus pandemic, the site visit involved travel in 2 vehicles, with hands free mobile telephone communication and a number of stops to review and discuss local conditions.

One of the key objectives of the site visit was to review the background monitoring locations used by MDA for background monitoring assessment - the table included in Appendix A1. summarises this information.

It was understood that Neighbourhood Stakeholder Agreements (“Participant Landholder”) had been established with some landowners. For clarity, all other residences are considered to be “Non-Participant Landholders”.

In summary, the site inspection confirmed that the locations chosen by MDA were appropriate as representative monitoring background locations for sensitive receivers in the area, including the township of Hawkesdale. No significant local topographical features or other additional sensitive receivers were noted that might need to have been considered for inclusion in the background noise monitoring locations selected by MDA, to undertake an appropriate assessment.

It is a requirement for an auditor to undertake an “inspection of the WEF project site and the surrounding environment” as part of the scope of an audit of pre-construction noise. However, MDA advised that the previous background monitoring (including selected monitoring locations) would be used for this current assessment. Given this being the case, and that it was understood that no significant changes to the local sensitive receptors or topographical features had occurred on or near the proposed WEF site since April 2020, it was considered that a further site visit was not warranted. This matter was discussed with EPA, who stated that given that the auditor had previously attended the site earlier in 2020, it was really the responsibility of the auditor “to satisfy yourself that you would be able to defend those measures as fulfilling the requirements, (and) we don’t see that as an issue from

our perspective”. (Email from Andrew Lewis, Senior Audit Officer, Environmental Unit, EPA, dated 23 September 2020).

## 2.2 Background Noise Assessment

This component of the audit is not strictly a condition of the current Planning Permit (or S52.32 of the Victorian Planning Provisions); however, the assessment of predicted operational noise levels requires appropriate confidence in the methodology and outcomes of the background noise monitoring which may form the basis of the noise level criteria at individual sensitive receiver locations.

As stated in Section 2.1, MDA proposed that the previous background monitoring (including selected monitoring locations) would still be appropriate for the current assessment.

The background monitoring reviewed in the previous audit (EPA CARMS No. 78659-1) was based on Marshall Day Acoustics - Ryan Corner Wind Farm – Background Noise Monitoring (Report 002 01Draft 20180786, dated 07 August 2020).

Since this previous audit, MDA has further updated this report (Marshall Day Acoustics - Ryan Corner Wind Farm – Background Noise Monitoring (Report 002 20180786, dated 20 August 2020 (Background Monitoring Report)). The scope of the audit involved a review of this Background Monitoring Report.

As a preliminary task, a cross check of both reports was undertaken to confirm that the reports were consistent with each other, and that no potentially significant changes in findings had been introduced since the previous audit. In summary, this established that apart from a few insignificant clerical changes, the only potentially significant change was inclusion of explanatory text on additional extraneous noise associated with the monitoring at Location 78(s) (ie filtering of “...elevated noise levels associated with building work at the property, gardening activities and extraneous noise on the microphone”, with subsequent minor changes in Tables 4 and 5, Background Monitoring Report Sections 2.3 and 3.1 respectively). It is noted that Location 78(s) is a stakeholder residence and therefore subject to the adopted 45 dB(A) noise criterion.

### 2.2.1 Background Noise Monitoring Locations

It is understood that the initial background monitoring locations were based on work undertaken by MDA in developing a draft Noise Compliance Test Plan<sup>15</sup> (draft NCTP), as required by Condition 32 of the Planning permit. The draft NCTP identified a total of 9 preferred sensitive receiver locations that would be monitored for post-construction noise compliance monitoring, subject to permission being granted by the landholders. The locations were targeted to noise sensitive receivers within the predicted 35 dB(A) wind farm sound contour. The draft NCTP also notes that if permission was not able to be obtained for the monitoring, alternative locations shall be considered. The draft NCTP included a noise contour plot (Figure 1) that includes the currently approved 26 turbines; it was noted that this was based on the Senvion 4.2MW 140 turbine (Appendix B).

The Background Monitoring Report (Section 2.1) has adopted 8 of the 9 locations from the draft NCTP, noting that a revised contour plot (Figure 1) now refers to the Senvion 4.2MW 140 turbine. Location 9 in the draft NCTP was omitted from the program as it was

---

<sup>15</sup> Marshall Day Acoustics - Ryan Corner Wind Farm Noise Compliance Test Plan (Report v No 001 01draft 20180786, dated 20 August 2018)

found to be a commercial building rather than a residence. Of the 8 background noise measurement locations, 7 are noise sensitive receiver locations<sup>16</sup>, and 1 is an intermediate location located at a stakeholder property between sensitive receiver locations and the WEF.

It is noted that one of the landholders at the identified locations (77) did not grant permission to undertake the background noise monitoring, therefore an intermediate location (78(S)) was selected instead. This is not fundamentally problematic; however, it does mean that, should issues arise in the future, there are no contemporary recorded background noise levels at this specific sensitive receiver – only representative levels measured at the intermediate location.

Addressing the issue of generating a contour plot to identify potentially sensitive receivers, the auditor notes that the basis for using the Senvion 4.2MW140 turbine as the basis for generating the contour plot has not been discussed in either the draft NCTP or the Background Monitoring Report. The auditor accepts that using a 4.2MW turbine is an appropriately conservative option for selecting potentially sensitive receiver locations, and certainly preferable for the purposes of this audit to using one of the currently approved options in the Planning Permit as it is a similar power output to the proposed turbine option (Vestas V136 4.2MW).

An initial check was made to compare the noise contour plot in the Background Monitoring Report (Figure 1) based on the Senvion 4.2MW140 turbine, with the three turbine options in the 2017 Assessment Report (Appendix E). Whilst there were some differences in the contours, the Senvion 4.2MW140 turbine contours were considered to be appropriately conservative compared with the other three plots, to have used these to initially identify sensitive receiver locations.

A check was then undertaken of the noise contour plot for the proposed turbine option Vestas V136 4.2MW (2020 Assessment Report, Figure 3) against the noise contour plot for the Senvion 4.2MW140 (Background Monitoring Report, Figure 1). The plots are relatively similar, with potentially the predicted 35 dB(A) noise contour and other higher noise level contours for the proposed turbine option closer to the windfarm. This indicates that the locations selected for the background monitoring are conservative and are at, or representative of, all the sensitive receivers that are within the predicted 35 dB(A) wind farm sound contour, in accordance with Section 7.1.4 of the Standard.

## 2.2.2 Background Noise Monitoring

Background noise monitoring for the project was undertaken by MDA at 8 locations between May and July 2020. The background noise level data has been undertaken over a time period of between 6–7 weeks (depending on location) which is considerably in excess of the minimum recommended requirement of 10 days of data (1,440 data points). The background measurements have been undertaken using appropriate measurement equipment (including windshields) and included a traceable calibration. The report provides helpful details regarding the individual measurement locations in Appendix G of the Background Monitoring Report, with aerial photography, maps and photographs of each site which indicate appropriate positioning of the noise loggers at each site.

---

<sup>16</sup> As defined in NZS 6808-2010 as locations of noise sensitive activity, associated with a habitable space or education space in a building not on the wind farm site.



Periods with extraneous noise levels, identified in accordance with research by Griffin et al.<sup>17</sup>, have been removed from the analysis. While this is not strictly required by the Standard, it is shown to remove data pairs with generally higher noise levels from the regression analysis, and so will result in a conservative assessment of the background noise level.

Furthermore, because some quarrying was being undertaken near one of the receivers (10) at the time of the measurements, data was also excluded where it coincided with quarrying works as a precaution. This generally resulted in the removal of daytime noise and wind-speed data, which is also likely to result in a conservative assessment of background noise level, since background noise levels are generally lower during the evening and night-time. Extraneous noise affecting the measurements at three of the receivers (7, 10, 11) has been removed from the analysis. Again, this is reasonable, and likely to result in a conservative assessment of the background noise level.

The background noise level data has been referenced to wind speed measurements undertaken at a meteorological mast installed on the site (RC5). The mast does not include an anemometer at the proposed turbine hub height of 112 m but does provide 2 individual anemometer heights at 20 m and 40 m. These data have been used to calculate a wind shear exponent using a power law, and extrapolate the wind speed at 112 m. This methodology is appropriate.

The background noise level and filtered wind speed data has been analysed using a 3<sup>rd</sup> order polynomial regression, which is appropriate. Regression analysis was undertaken for both the 24-hour data, and night-period data only, in accordance with the Planning Permit.

The reported square of the correlation coefficient ( $r^2$ ) is generally 0.25–0.43 considering all time data, and improves to 0.28–0.49 for the night-period data only. This is not particularly high, and is representative of a relatively wide range of results, rather than highly correlated data.

It is noted that the measured noise levels correspond to the noise floor of the measurement equipment at several locations (31, 78(S)), which is likely to influence the regression curve at low wind speeds for these locations. This is of no practical consequence, since the minimum criterion, 40 dB(A), has been adopted at all sensitive receiver locations at lower wind speeds ie up to a hub wind speed of around 10 m/s, regardless of the measured background noise level.

## 2.3 Pre-Construction Noise Assessment

MDA has undertaken a preconstruction noise assessment, as provided in the report entitled Marshall Day Acoustics – Ryan Corner Wind Farm – Pre-Construction Noise Assessment (Report 003 20180786, dated 30 October 2020) (2020 Assessment Report).

It is noted that this is not a stand-alone report, and reference needs to be made for some issues to the previous assessment report that supported the currently approved Planning Permit 20060222-A, entitled Marshall Day Acoustics – Ryan Corner Wind Farm – NZS 6808:2010 Noise Assessment (Report 001 R02 2014362, dated 21 April 2017 (2017 Assessment Report)).

---

<sup>17</sup> Griffin, D., Delaire, C. and Pischedda, P., 2013, *Methods of identifying extraneous noise during unattended noise measurements*, 20<sup>th</sup> International Congress of Sound & Vibration.

The assessment is generally undertaken in accordance with the Standard. Key findings are discussed below.

### 2.3.1 Noise Limits

#### Consideration of General Noise Limits

Section 5.2 of the Standard defines acceptable noise limits as follows:

*As a guide to the limits of acceptability at a noise sensitive location, at any wind speed wind farm sound levels ( $L_{A90(10\ min)}$ ) should not exceed the background sound level by more than 5 dB, or a level of 40 dB  $L_{A90(10\ min)}$ , whichever is the greater.*

While background noise level measurements have been undertaken for the project, as noted above, the approach used in the assessment is to adopt the ‘Base Limit’ criterion of 40 dB(A), at all Non-Participant Landholders up to a background noise level of 35 dB(A). For background noise levels above 35 dB(A), the maximum ‘Background +5 dB’ approach has been adopted. This approach is consistent with the Standard, and as also required by Condition 31 of Planning Permit 20060222-A.

Noise limits based on these criteria and the background monitoring results are presented in both the Background Monitoring Report (Tables 6 & 7) and the 2020 Assessment Report (Tables 4 & 5). Separate noise limits have been developed based on the night-time monitoring data, as required.

It is noted that this is a shift from the approach taken in the 2017 Assessment Report, which stated “For the purpose of this assessment, the NZS 6808:2010 base noise limit of 40 dB  $L_{A90}$  at all wind speeds has been used for all noise sensitive locations” (Section 6.3). As will be discussed later, the modelling predicts that this previous limit (40 dB(A)) is likely to be achieved by both the turbine options in the currently approved Planning Permit, and the proposed turbine (Vestas V136- 42MW).

Furthermore, the adoption of a limit for Participant Landholders is not strictly considered under the Standard; however, it is discussed in the Working Group on Noise from Wind Turbine recommendations (ETSU-R-97)<sup>18</sup> and the South Australian wind farm environmental guidelines<sup>19</sup>. It is therefore concurred that adopting a 45 dB(A) base noise limit for Participating Landholders is reasonable, on the basis of adopting best practice.

#### Consideration of High Amenity Noise Limit

MDA does not provide any consideration of the use of a High Amenity Noise Limit in the Background Monitoring Report or the 2020 Assessment Report. Assessment of noise compliance was against general noise limits only.

To provide clarification, the matter was discussed in the 2017 Assessment Report (Section 3.3) and reviewed in the previous audit (EPA CARMS 78559-1). MDA considered the use of a High Amenity Noise Limit in accordance with the Standard, and concluded that a High Amenity Noise Limit should not be applied. Based on this finding, MDA therefore assessed noise compliance against the general noise limits only. The matter was subsequently

---

<sup>18</sup> The Assessment and Rating of Noise from Wind Farms, The Working Group on Noise from Wind Turbines, ETSU-R-97, UK Department of Trade and Industry, September 1996.

<sup>19</sup> Wind farms environmental noise guidelines, Environment Protection Authority South Australia, July 2009.

raised at a Planning Panel on the proposed amendment to the Planning Permit<sup>20</sup>. The Panel accepted the submission made by the Proponent (GPG) that *the Standard and the (DELWP) Guidelines reference to the VCAT Cherry Tree Farm decision have been appropriately considered in the current approvals for (the) ... site.*

The Panel concluded:

*There is nothing substantive in the amended proposal .. that affects the Panel's further consideration of ....Yambuk... as a "High Amenity Area".*

The auditor accepts this position (ie a High Amenity Zone does not apply), based on this guidance from the above Panel and from the VCAT determination for the Cherry Tree Wind Farm in relation to High Amenity zonings<sup>21</sup>.

### **Consideration of Special Audible Characteristics (SACs)**

Wind farm sound that exhibits special audible characteristics, such as tonality, impulsiveness or amplitude modulation is subject to penalties between 1–6 dB to account for the additional audibility and annoyance caused by sound with these characteristics. However, as noted in Section 5.4 of the Standard, special audible characteristics cannot always be predicted in advance.

Therefore, MDA have assessed the likelihood that the proposed turbine will result in tonal noise emission based on the tonal audibility of the proposed turbine measured in accordance with IEC 61400-11:2012<sup>22</sup> and reported by the manufacturer. This data indicates that the tonal audibility level is likely to be below 1.3 dB at all assessed wind speeds, and that it is not necessary to apply a penalty to the predicted noise levels.

The auditor accepts this assessment, on the basis that SACs will be assessed through the NCTP, and has also recommended that a Noise Management Plan should be implemented through the Environmental Management Plan to address any non-compliance and potential associated penalties (Refer to the Risk Assessment, Section 2.3.5).

### **2.3.2 Noise Prediction Methodology**

The approach used by MDA has been reviewed, with the following key findings:

Noise propagation model: MDA used SoundPlan 8.0 software, utilising the international standard ISO 9613-2:1996<sup>23</sup> sound propagation model, which has been shown in national and international studies to provide reasonable results for wind farm noise level predictions. In the opinion of the auditor and his team, the calculation parameters that have been adopted for temperature, humidity and ground absorption are reasonable, and correspond to best practice.

Choice of turbine for assessment – the source levels used in the noise predictions are based on the measured sound power level data and spectral (octave band) data for the selected

<sup>20</sup> Moyne Planning Scheme - Applications to amend Planning Permits 2006/0221 and 2006/0222 Hawkesdale and Ryan Corner Wind Energy Farms (dated 24 October 2017)

<sup>21</sup> DELWP Guidelines, S5.1.2 refers to Cherry Tree Wind Farm vs Mitchell Shire Council (2013)

<sup>22</sup> IEC 61400-11: 2012 Wind turbines – Part 11: Acoustic noise measurement techniques, International Electrotechnical Commission

<sup>23</sup> International Standard ISO 9613-2:1996 Acoustics - Attenuation of sound during propagation outdoors – Part 2: General method of calculation (ISO 9613-2)

turbine (Vestas V136 4.2MW) determined in accordance with IEC 61400-11<sup>24</sup> as required by Section 6.2.1 of the Standard.

The noise level predictions have adopted the following conservative assumptions:

- Barrier effect limited to 2 dB
- Screening based on turbine tip height, not hub height
- +3 penalty for ‘concave’ ground topography (‘valley’ effects).

These considerations are not explicitly required by the Standard or implemented in ISO 9613-2:1996<sup>25</sup>; however, they are commonly adopted as good practice for wind farm noise assessment.

NOTE: Appendix A2 to this report (NZS6808 checklist) shows non-compliance for one aspect of the requirements of the Standard - a requirement to include a topographical map in the assessment report, although the topography of the site was included in the noise propagation model.

### 2.3.3 Predicted Noise Levels

It is accepted that the pre-construction noise assessment has been generally undertaken in accordance with the requirements of the Standard, and the resulting assessment demonstrates that the predicted noise levels for the WEF will achieve the noise criteria established by the Standard. Specifically:

- Table 7 and Appendix G of the 2020 Assessment Report indicates that the predicted wind farm sound levels are below 40 dB(A). This complies with the criteria at all of the Non-Participant Landholder noise sensitive receivers.
- The assessment also indicates that the predicted sound levels also comply with the 45 dB(A) noise criterion at the Participant Landholder (Stakeholder) residences, with all also below 40 dB(A).

The auditor was not provided with documented evidence on these stakeholder agreements during the audit. It is noted that Condition 31 of the Planning Permit requires that “evidence of the agreement must be provided to the satisfaction of the Minister for Planning upon request...”. Ideally, this documentation should be provided for review in this audit process as it relates to applicable noise criteria at Non-Participant Landholder sites; however, it is understood that not all relevant documentation may be in place at this stage of the site development. As a practical approach, it is recommended that relevant documentation be provided for review as part of the auditor review of the initial NCTP report required by Condition 34 of the Planning Permit.

---

<sup>24</sup> IEC 61400-11: 2012 Wind turbines – Part 11: Acoustic noise measurement techniques, International Electrotechnical Commission

<sup>25</sup> International Standard ISO 9613-2:1996 Acoustics - Attenuation of sound during propagation outdoors – Part 2: General method of calculation (ISO 9613-2)

### 2.3.4 Potential Uncertainty in Noise Levels

As discussed above, MDA used SoundPlan 8.0 software, utilising the international standard ISO 9613 sound propagation model as the method to calculate the level of broadband A-weighted wind farm noise expected to occur at surrounding sensitive receiver locations.

The software in conjunction with the digital terrain model of the site, has been used to evaluate the path between each turbine and receiver pairing, and then subsequently applies the adjustments to each turbine's predicted noise contribution where appropriate. The ISO 9613<sup>26</sup> sound propagation model has been demonstrated to generally result in conservative noise predictions.

All acoustic measurements and noise predictions are subject to measurement and calculation uncertainty. While MDA's analysis is not subject to a detailed Uncertainty Analysis, it does generally adopt conservative assumptions. We agree with this approach for modelling noise from WEFs.

### 2.3.5 Risk Assessment

EPA Publication 1692 requires a risk assessment, including a qualitative statement of the risk of non-compliance.

This audit focussed on risk to sensitive receivers, at locations defined as Participant or Non-Participant Landholders. The criteria for Non-Participant Landholders were those specified in the Standard (refer to Section 1.4 of this report).

A risk of noncompliance with the Standard is taken to be a risk to the beneficial use of the environment, specifically with respect to the amenity of residents in the noise sensitive locations. Based on the predicted sound levels, it is expected that the risk to this beneficial use will be low due to compliance with the Standard.

The auditor notes that Conditions 32-34 of the Planning Permit 20060222-A require an independent post-construction noise monitoring program, "accompanied by a report from an environmental auditor...". RCD has engaged MDA to prepare a draft NCTP<sup>27</sup>, that is understood to serve the same purpose. The draft NCTP includes assessment of potential SACs (with potential penalties if assumed tonality is not met) (Section 5.8).

A recommendation is that the post-construction noise level monitoring specified under the NCTP should be undertaken by an independent acoustic consultant in line with recent recommendations of the Office of the National Wind Farm Commissioner<sup>28</sup>.

In addition, it is noted that Planning Permit 20060222-A does not specify that an Operational Noise Management Plan be developed. Such a plan would include measures to manage turbine noise in cases where operational noise non-compliance with the Standard was identified through the NCTP and any additional noise monitoring. However, Condition 17 requires an endorsed Environmental Management Plan (EMP), initially addressing construction issues; however, Condition 18 requires this EMP to "be reviewed and if

---

<sup>26</sup> International Standard ISO 9613-2:1996 Acoustics - Attenuation of sound during propagation outdoors – Part 2: General method of calculation (ISO 9613-2)

<sup>27</sup> Marshall Day Acoustics - Ryan Corner Wind Farm Noise Compliance Test Plan (Report v No 001 01draft 20180786, dated 20 August 2018)

<sup>28</sup> Annual Report to the Parliament of Australia, Office of the National Wind Farm Commissioner, 31 March 2017

necessary amended, in relation to matters pertaining to the continued operation of the wind farm facility, in consultation with the Moyne Shire Council and where relevant DELWP Environment Portfolio to the satisfaction of the Minister for Planning every 5 years...". It is recommended that an Operational Noise Management Plan be developed (that could potentially include the NCTP) and be included in the EMP process required by Condition 17.

## 2.4 Consideration of Cumulative Noise Levels

The 2020 Assessment Report does not mention cumulative noise assessment. This issue was raised with MDA during the previous audit process (EPA CARMS No. 78659-1)

MDA provided the following (Pers. Comm C. Delaire MDA to F Koutsivos ERM, email dated 13 August 2020):

*Cumulative impact from the Codrington and Yambuk Wind Farms to the south west were considered as part of the planning permit amendment hearing (as detailed in Section 5.2.4 of my evidence (- Ev 001 20170909 dated 1 August 2017).*

It was concluded that:

*[...] the separating distances between the subject wind farms and the surrounding wind farms are too great for cumulative noise to be a consideration, whether in terms of perceived noise levels or compliance with NZS 6808:2010. In particular, at noise sensitive locations near to the surrounding wind farms, the predicted noise levels of the subject wind farms would be significantly below the threshold at which NZS 6808:2010 states that cumulative noise no longer needs to be considered (i.e. 10 dB below the level of the surrounding wind farms). Conversely, at noise sensitive locations in the vicinity of the subject wind farms, the predicted noise levels of surrounding wind farm would also be significantly below the threshold where cumulative noise influences no longer need to be considered.*

Furthermore, the Panel report<sup>29</sup> dated 24 October 2017 did not make any comments with regard to the potential cumulative effects between Yambuk and Ryan Corner.

Given acceptance by the Panel of this assessment, the auditor does not seek further information on cumulative impacts.

## 2.5 Additional Auditor Considerations

It is understood that the 2020 Assessment Report and Background Monitoring Report are intended to be submitted as part of the suite of documents concerning an application for further amendment to Planning Permit 20060222-A. The auditor has been advised that the change in turbine type has not triggered the amendment application, rather this is due to proposed changes to the wording of the Planning Permit and conditions which do not relate to the turbines.

The information provided in Section 2 addresses the objectives of the audit, as stated in Section 1.2. Specifically, the audit has identified that the information provided by MDA in the 2020 Assessment Report confirms that:

---

<sup>29</sup> Moyne Planning Scheme - Applications to amend Planning Permits 2006/0221 and 2006/0222 Hawkesdale and Ryan Corner Wind Energy Farms (dated 24 October 2017)

- The methodology for the pre-construction noise assessment has been generally undertaken in accordance with the Standard.
- The modelling indicates compliance with the applicable noise criteria at all of the Non-Participant Landholder, and Participant Landholder noise sensitive receivers.

However, there are two basic questions concerning the proposed change of turbine (Vestas V136-4.2MW) instead of the turbines options ((Vestas V126 (3.3MW), Senvion M122 (3.0MW) and GE 3.2-130 (3.2MW)), and the removal of four (4) turbines from the layout considered in the 2017 Assessment Report (ie a reduction from 56 to 52 turbines, with turbines designated B35, B39, B47 and B49 removed). Turbine B43 is also to be slightly altered in location (micro-sited);

1. Will the proposed turbine be noisier or quieter than the currently approved turbine options?
2. How will the noise profile of the proposed turbine array compare with the noise profiles of the currently approved turbine options in the Planning Permit?

These two questions concerning the proposed change of turbine are not directly addressed, or are somewhat unclear, in the 2020 Assessment Report - the following comments are provided on these issues by the auditor, as they are likely to arise during the approval process. The following is based on the auditor's review of both the above reports, and additional information provided in the 2017 Assessment Report.

### 2.5.1 Potential Change in Turbine Power Sound Levels

*Will the proposed turbine (Vestas V136-4.2MW) be noisier or quieter than the currently approved turbine options (Vestas V126 (3.3MW), Senvion M122 (3.0MW) and GE 3.2-130 (3.2MW)?*

MDA has provided sound power level data for the turbines as follows:

- Vestas V136-4.2MW – 2020 Assessment Report Figures 1 & 2. The Vestas V136-4.2MW data is based on information provided by Vestas, and sighted during the audit<sup>30</sup>.
- Vestas V126 (3.3MW), Senvion M122 (3.0MW) and GE 3.2-130 (3.2MW) – 2017 Assessment Report Figures 1 & 2, and Appendix G. Reference sources for these data are provided in the 2017 Assessment Report, Section 2.2.2.

Comparison of these data indicates that the proposed turbine (Vestas V136-4.2MW) is no noisier than the range approved for the three currently approved options, and appears comparable to the quietest option (Senvion M122). Note that discussion of SACs is provided separately in Section 2.3.1 of this audit report.

<sup>30</sup> Vestas doc V136-4.0/4.2 MW Third octave noise emission (Doc no 0067-4732 VO3) and Vestas doc - V136-4.2MW 50Hz, PO1 230933 Results of acoustic noise measurements according to IEC 61400-11 Edition 3.0 (Report No 1061571-A-1-A dated 09 Sep 2019) and Vestas Document no. 0067-7065 V06 2018-05-02 Performance Specification V136-4.0/4.2 MW 50/60 Hz (dated 03 May 2018)

## 2.5.2 Potential Change in Predicted Noise Profile of Site

*How will the noise profile of the proposed turbine array compare with the noise profiles of the currently approved turbine options in the Planning Permit?*

This question is addressed in the 2020 Assessment Report, Appendix H, where Table 11 provides a summary of comparison of modelling results at sensitive receiver sites. These results indicate that the use of the proposed turbine (Vestas V136-4.2MW) in the WEF (in conjunction with removal of four turbines), is predicted to be similar to the quieter of the currently approved turbines (Senvion 3.0M122), and potentially quieter than noise at these locations from the use of the other two approved turbines (Vesta 126, GE 3.2-130).

This result is noted qualitatively in the modelled noise contour maps for the proposed turbine (Vestas V136-4.2MW) (2020 Assessment Report, Figure 3, page 16), and the three approved options (2017 Assessment Report, Appendix E). As a general comment, the contours for the proposed turbine (Vestas V136-4.2MW) in conjunction with removal of four turbines are “no worse” than for the three approved turbine options, and may in fact have decreased, reducing the total area where potential sensitive receivers within the 35 dBA contour are located.

## 3 Audit Conclusions and Recommendations

---

### 3.1 Conclusions

An environmental audit (‘the audit’) was conducted in accordance with Section 53V of the *Environment Protection Act 1970* (the Act) of the pre-construction noise assessment undertaken by MDA of the Ryan Corner Wind Farm to be located near Port Fairy, Victoria (the site). The audit has been completed to assess compliance with the Standard, as required by EPA Guideline 1692.

The following is a summary of the key findings of the audit.

#### **Background Noise Assessment**

Refer to report entitled Marshall Day Acoustics – Ryan Corner Wind Farm – Background Noise Monitoring (Rpt 002 20180786, dated 20 August 2020) (Background Monitoring Report).

1. The background noise monitoring locations are shown on a site plan in Figure 1 of the Background Monitoring Report. A check was made to compare this noise contour plot based on the Senvion 4.2M140 turbine, with the three turbine options in the 2017 Assessment Report (Appendix E) and the proposed turbine option Vestas V136 4.2MW (2020 Assessment Report, Figure 3). The plots are relatively similar, with potentially the predicted 35 dB(A) noise contour and other higher noise level contours for the proposed turbine option closer to the windfarm. This indicates that the locations selected for the background monitoring are conservative and are at, or representative of, all the sensitive receivers that are within the predicted 35 dB(A) wind farm sound contour, in accordance with Section 7.1.4 of the Standard.
2. The background noise monitoring undertaken by MDA appropriately considered sensitive receiver locations, including Participant (Stakeholder) and Non-participant Landholders. It is noted that one of the initial sites selected had to be moved to an intermediate location



due to permission not been given by the Landholder to place monitoring equipment in the vicinity of the residence.

3. The site inspection by the auditor on 08 April 2020 confirmed that the locations chosen by MDA were appropriate as representative monitoring background locations for sensitive receivers in the area. No significant local topographical features or other additional sensitive receivers were noted that might need to have been considered for inclusion in the background noise monitoring locations selected by MDA, to undertake an appropriate assessment.
4. Background noise monitoring was undertaken by MDA at 8 locations between May and July 2020. The background noise level data has been undertaken over a time period of between 5–7 weeks (depending on location) which is considerably in excess of the minimum recommended requirement of 10 days (1,440 data points). The Background Monitoring Report provides helpful details regarding the individual measurement locations in Appendices G–N, with aerial photography, maps and photographs of each site which indicate appropriate positioning of the noise loggers.
5. The background measurements have been undertaken using appropriate measurement equipment (including windshields) and include a traceable calibration.
6. The background noise level data has been referenced to wind speed measurements undertaken at a meteorological mast installed on the site. The mast does not include an anemometer at the proposed turbine hub height of 112 m, but does provide 2 individual anemometer heights at 20 and 40 m. These data have been used to calculate a wind shear exponent using a power law, and extrapolate the wind speed at 112 m. This methodology is appropriate.
7. The background noise data have been analysed appropriately.

### **Pre-construction Noise Assessment**

Refer to report entitled Marshall Day Acoustics – Ryan Corner Wind Farm – Pre-Construction Noise Assessment (Report 003 20180786, dated 30 October 2020) (2020 Assessment Report).

It is noted that this is not a stand-alone report, and reference needs to be made for some issues to the previous assessment report that supported the currently approved Planning Permit 20060222-A, entitled Marshall Day Acoustics – Ryan Corner Wind Farm – NZS 6808:2010 Noise Assessment (Report 001 R02 2014362, dated 21 April 2017 (2017 Assessment Report)).

8. The pre-construction noise assessment methodology generally complies with the requirements of the Standard. The noise predictions were conducted in accordance with the appropriate standards and guidelines.
9. General Noise Limits:
  - a. The approach used in the assessment is to adopt the ‘Base Limit’ criterion of 40 dB(A), at all Non-Participant Landholders up to a background noise level of 35 dB(A). For background noise levels above 35 dB(A), the maximum ‘Background +5 dB’ approach has been adopted. This approach is consistent with the Standard, and as also required by Condition 31 of Planning Permit 20060222-A. It is noted that this is a shift from the approach taken in the 2017 Assessment Report, which stated “For the purpose of this assessment, the NZS 6808:2010 base noise limit of 40 dB  $L_{A90}$  at all wind speeds has been used for all noise sensitive locations”.

- b. The adoption of a limit for Participant Landholders is not strictly considered under the Standard, however, it is agreed that adopting a 45 dB(A) base noise limit for Participant Landholders is reasonable, on the basis of adopting best practice.
10. Consideration of High Amenity Noise Limits: MDA does not provide any consideration of the use of a High Amenity Noise Limit in the 2020 Assessment Report. Assessment of noise compliance was against general noise limits only. To provide clarification, the matter was discussed in the 2017 Assessment Report (Section 3.3) and reviewed in the previous audit (CARMS 78559-1). MDA considered the use of a High Amenity Noise Limit in accordance with the Standard, and concluded that a High Amenity Noise Limit should not be applied. The matter was subsequently raised at a Planning Panel on the proposed amendment to the Planning Permit<sup>31</sup>. The auditor accepts this position (ie a High Amenity Zone does not apply), based on this guidance from the above Panel and from the VCAT determination for the Cherry Tree Wind Farm in relation to High Amenity zonings<sup>32</sup>.
11. Consideration of Special Audible Characteristics (SACs): MDA have assessed the likelihood that the turbines will result in tonal noise emission based on the measured tonal audibility of the selected turbine measured in accordance with IEC 61400-11:2012<sup>33</sup> and reported by the manufacturer. This data indicates that the tonal audibility level is likely to be below 1.3 dB at all assessed wind speeds, and that tonality is not expected to be a characteristic of the WEF. MDA concludes that it is not necessary to apply a penalty to the predicted noise levels. The auditor accepts this assessment, on the basis that SACs will be assessed through the NCTP, and that a Noise Management Plan will be implemented through the Environmental Management Plan to address any non-compliance and potential associated penalties.
12. Noise Prediction Methodology: The noise level predictions have been undertaken using the ISO 9613-2:1996<sup>34</sup> noise propagation model. In the opinion of the auditor and his team, the calculation parameters that have been adopted for temperature, humidity and ground absorption are reasonable, and correspond to best practice.
13. The predicted noise levels comply with the limits set in the Standard. Specifically:
- a. Table 7 and Appendix G of the 2020 Assessment Report indicates that the predicted wind farm sound levels are below 40 dB(A). This complies with the criteria at all of the Non-Participant Landholder noise sensitive receivers.
- b. The assessment also indicates that the wind farm sound levels also comply with the 45 dB(A) noise criterion at the Participant Landholder (Stakeholder) residences, with all also below 40 dB(A).
14. Potential uncertainty in predicted noise levels: MDA used SoundPlan 8.0 software, utilising the international standard ISO 9613<sup>35</sup> sound propagation model, in conjunction with the digital terrain model of the site. The ISO 9613 sound propagation model has been demonstrated to generally result in conservative noise predictions. All acoustic

---

<sup>31</sup> Panel Report - Moyne Planning Scheme Applications to amend Planning Permits 2006/0221 and 2006/0222 Hawkesdale and Ryan Corner Wind Energy Farms (dated 24 October 2017)

<sup>32</sup> DELWP Guideline S5.1.2 refers to the Cherry Tree Wind Farm vs Mitchell Shire Council (2013)

<sup>33</sup> IEC 61400-11: 2012 Wind turbines – Part 11: Acoustic noise measurement techniques, International Electrotechnical Commission

<sup>34</sup> International Standard ISO 9613-2:1996 Acoustics - Attenuation of sound during propagation outdoors – Part 2: General method of calculation (ISO 9613-2)

<sup>35</sup> International Standard ISO 9613-2:1996 Acoustics - Attenuation of sound during propagation outdoors – Part 2: General method of calculation (ISO 9613-2)

measurements and noise predictions are subject to measurement and calculation uncertainty. While MDA's analysis is not subject to a detailed Uncertainty Analysis, it does generally adopt conservative assumptions. We agree with this approach for modelling noise from WEFs.

15. Risk Assessment: A risk of noncompliance with the Standard is taken to be a risk to the beneficial use of the environment, specifically with respect to the amenity of residents in the noise sensitive locations. Based on the predicted noise levels, it is expected that the risk to this beneficial use will be low, due to compliance with the Standard.
16. Consideration of Cumulative Impacts: The 2020 Assessment Report does not mention cumulative noise assessment. This issue was raised with MDA during the previous audit process (EPA CARMS No. 78659-1). Cumulative impact from the Codrington and Yambuk Wind Farms to the south west were considered as part of the planning permit amendment hearing. The panel report<sup>36</sup> dated 24 October 2017 did not make any comments with regard to the potential cumulative effects between Yambuk and Ryan Corner. Given acceptance by the panel of this assessment, the auditor does not seek further information on cumulative impacts.
17. Additional Auditor Considerations:
  - a. Potential Change in Turbine Power Sound Levels: Comparison of provided data indicates that the proposed turbine (Vestas V136-4.2MW) is no noisier than the range approved for the three currently approved options under Planning Permit 20060221-A (Vestas V126 (3.3MW), Senvion M122 (3.0MW) and GE 3.2-130 (3.2MW), and appears comparable to the quietest option (Senvion M122).
  - b. Potential Change in Predicted Noise Profile of Site: The 2020 Assessment Report, (Appendix H, where Table 11) indicates that the use of the proposed turbine (Vestas V136-4.2MW) in the WEF (in conjunction with removal of four turbines), is predicted to be similar to the quieter of the currently approved turbines (Senvion 3.0M122), and potentially quieter than noise at these locations from the use of the other two approved turbines (Vesta 126, GE 3.2-130). This is reflected in the predicted noise contours for the proposed turbine (Vestas V136-4.2MW) (2020 Assessment Report, Figure 3, page 15), and the three approved options (2017 Assessment Report, Appendix E).

## 3.2 Recommendations

1. The post-construction noise level monitoring specified under the approved Noise Compliance Test Plan (NCTP) should be undertaken by an independent acoustic consultant in line with recent recommendations of the Office of the National Wind Farm Commissioner<sup>37</sup>.
2. A Noise Management Plan (NMP) should be developed for the operational phase of the WEF, to include measures to manage turbine noise in cases where operational noise non-compliance with the Standard was identified through the NCTP and any additional noise monitoring. Given that Planning Permit 20060222-A does not directly require a NMP, it

---

<sup>36</sup> Moyne Planning Scheme - Applications to amend Planning Permits 2006/0221 and 2006/0222 Hawkesdale and Ryan Corner Wind Energy Farms (dated 24 October 2017)

<sup>37</sup> Annual Report to the Parliament of Australia, Office of the National Wind Farm Commissioner, 31 March 2017.

is further recommended that it be included under Conditions 17 and 18 (Environmental Management Plan).

3. Documented evidence of all stakeholder agreements should be required for review as part of the auditor review of the initial NCTP report required by Condition 34 of Planning Permit 20060222-A.

# Appendix A1

## Ryan Corner Site Visit

# A1 Ryan Corner Site Visit

---

**Date of site visit: 08 April 2020**

## **Introduction**

As noted in Section 2.1, it is a requirement for an auditor to undertake an “inspection of the WEF project site and the surrounding environment” as part of the scope of an audit of pre-construction noise. The auditor had visited this site on 08 April 2020, as part of the previous environmental audit.

MDA advised that the background monitoring (including selected monitoring locations) conducted between May and July 2020, as documented in the Background Monitoring Report, had also been used for this current assessment. Given this being the case, and that it was understood that no significant changes to the local sensitive receptors or topographical features had occurred on or near the proposed WEF site since April 2020, it was considered that a further site visit was not warranted.

This matter was also discussed with EPA, who stated that given that the auditor had previously attended the site earlier in 2020, it was really the responsibility of the auditor “to satisfy yourself that you would be able to defend those measures as fulfilling the requirements, (and) we don’t see that as an issue from our perspective”. (Email from Andrew Lewis, Senior Audit Officer, Environmental Unit, EPA, dated 23 September 2020).

The following is a summary of the site visit held 08 April 2020.

## **General comments:**

The proposed site of the Ryan Corner Wind Farm is generally an undulating site, with some rocky outcrops noted. The general area on and adjacent to the proposed site is used for the most part for farming activities, with well-established farmhouses and associated outbuildings. There are several areas on the site where quarrying has taken place, and it is understood that these could be a local source of material for future development of the wind farm. There is a plantation located to the west of the site, near the township of St Helens.

The auditor was accompanied on the site visit by Nathan Micallef, a local employee of the proponent Global Power Generation (GPG). Because of the distance restrictions in force in Victoria due to the corona virus pandemic, the site visit involved travel in 2 vehicles, with hands free mobile telephone communication and a number of stops to review and discuss local conditions.

The general route initially involved a drive across the centre of the proposed windfarm on a relatively poor internal road (entering approximately from near Residence 11 and leaving the site adjacent to Residence 10 – refer to site plan for locations).

All the proposed turbine locations (total 56) are situated within an area of cleared land. The Ryan Corner wind farm site is marked by a gated entrance and upgraded road onsite, located on the Hamilton – Port Fairy Road.

All receptor sites proposed by MDA for the updated background monitoring were inspected from the road. No residents were contacted during the site inspection.

The appropriateness of these sites was discussed with MDA before the site inspection. The proposed monitoring locations were selected on the basis of identifying sites with predicted noise levels greater than 35 dB(A), as required by NZS 6808:010.

The background monitoring was a repeat of an earlier monitoring program, that the auditor and MDA considered should be reviewed to check whether local conditions had changed (eg trees grown). A further discussion was held with GPG and MDA on the day after completion of the site visit to confirm a number of issues identified.

### Summary of Observation

Receptor Site No	Stakeholder?	Sensitivity	Comment on Proposed Background Monitoring Location
7	No	Occupied residence	<p>Located beyond the southern end of the proposed site, on Fingerboard Road. Significant trees on the east and west sides of the residential block (ie may affect background noise) but may have potential direct “line of site” to nearest turbines (B6, B10, B13, B14, B15 &amp; B76).</p> <p>Appears to be a good indicator/ proxy for housing cluster located further south (Sites 1-6, Site 8). It is noted that Sites 4, 5 &amp; 8 are stakeholder sites.</p>
10	No	Occupied residence	<p>Located beyond the southern end of the proposed site at the end of the internal road mentioned above, on Fingerboard Road.</p> <p>Significant trees surrounding the residential block, except on the east side where the road is located. Noted that quarrying activities are also located to the east of this site.</p> <p>Appears to be a good indicator/ proxy for housing cluster located further to the south west (Sites 80 – 89, 107). It is noted that none of these are stakeholder sites; however, are generally significantly further away from the nearest turbines than Site 10.</p> <p>It was noted that the Yambuk Wind Farm was visible further to the west.</p>
11	No	Occupied residence	<p>Located at the northern end of the proposed site at the end of internal road mentioned above. The residence is set well back from the road, and the auditor could only view from the main gate off Riverside Drive.</p> <p>Review of a recent site aerial photograph indicates some reasonably mature vegetation on the residential block.</p> <p>Overall, the location of Site 11 would indicate that readings taken would be a good indicator / proxy for housing located further to the north (Sites 32,33, 38).</p>
26, 27, 29, 31	No	Occupied residences	<p>These residences are all located on the Hamilton – Port Fairy Road, on the eastern side of the site. These residences are all located close to the road, and all have varying degrees of vegetation on the residential blocks (although Site 31 appears to be more extensive).</p> <p>These residences will have varying line of site visibility to various turbines across a reasonably flat terrain on this side of the proposed site.</p> <p>It is noted that there are 2 closer stakeholder sites on this road (Sites 28 &amp; 30).</p>

Receptor Site No	Stakeholder?	Sensitivity	Comment on Proposed Background Monitoring Location
77 – replaced by 78	No	Occupied residence	<p>This residence is located to the west of the proposed site, off Davidsons Road. There does not appear to be many site options in this area, and it is agreed that Site 77 is a reasonable compromise. Discussion was held with Marshall Day about undertaking monitoring at a site in St Helens; however, the noise level at the nearest receiver in St Helens (Site 65) is 32 dB, and therefore further assessment is not considered necessary in accordance with NZS 6808:2010 from a technical perspective. It was subsequently agreed that Site 77 would be a reasonable proxy for sites further to the west, including St Helens.</p> <p>It is noted that there are 2 closer stakeholder sites in the vicinity (Sites 78 &amp; 79).</p> <p>Note: The owner of Site 77 subsequently declined to allow the baseline noise monitoring to be conducted on his property, citing Covid-19. The assessment was subsequently undertaken on Site 78 (a stakeholder site)</p>



## **Appendix A2**

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

## A2 Appendix 2: NZS 6808:2010 Checklist

### Information Source:

Marshall Day Acoustics – Ryan Corner Wind Farm – Pre-Construction Noise Assessment  
(Report 003 20180786, dated 30 October 2020)

NZS6808:2010 Section/Clause	NZS 6808:2010 Requirement	Reference from Information Source	Assessment	Compliance
S3.1.3	Adopt A-frequency weighted L90 centile level for wind farm sound	S2, Figure 1 and Figure 2	L <sub>Aeq</sub> adopted for source levels. L <sub>Aeq</sub> levels will result in conservative predictions compared to L90 level.	Comply
S5.2	Adopt an outdoor limit of background + 5dB, or a level of 40 dBLA90(10min), whichever is the greater	S3.2	Noise limit of 40 dB(A) adopted at all non-participant receivers to 35dB(A), and background plus 5 dB beyond	Comply
S5.3	Consider a High Amenity noise limit where a plan promotes a higher degree of protection.	2020 Assessment Report does not specifically consider a High Amenity noise limit	The issue of a High Amenity Noise Limit was raised at a Planning Panel on the previous amendment to the Planning Permit. The Panel accepted the submission made by the Proponent (GPG) that the Standard and the (DELWP) Guidelines reference to the VCAT Cherry Tree Wind Farm decision have been appropriately considered in the current approvals for (the)... site.	Comply
S5.4	Design the wind farm so that wind farm sound does not have Special Audible Characteristics.	MD S2.3	IEC 61400-11 test emission data for comparable model indicates tonal audibility < 1.3 dB at all assessed wind speeds. Amplitude modulation is impractical to determine pre-construction.	Comply
S5.5	Other factors, including ultrasound, infrasound, low frequency sound and vibration and ground-borne vibration are not required to be assessed.	-	Factors not required to be assessed	Comply
S5.6	Apply limits to the cumulative sound level of all wind farms	Assessment Report 2020 does not	This issue was raised with MDA during the previous audit process (EPA MARMS No.	Comply

	affecting any noise sensitive location.	mention cumulative noise assessment.	78659-1). The issue of cumulative impacts from the Codrington and Yambuk Wind Farms to the south west were considered as part of the planning permit amendment hearing. The panel report <sup>38</sup> dated 24 October 2017 did not make any comments with regard to the potential cumulative effects between Yambuk and Ryan Corner. Given acceptance by the panel of this assessment, the auditor does not seek further information on cumulative impacts.	
S5.7	Uncertainty.	MDA S2.3	+1 dB adjustment adopted to account for typical values of test uncertainty	Comply
S6.1.1	Undertake predictions to determine environmental noise impact before installation takes place	2020 Assessment Report	-	Comply
S6.1.2	Predictions to take into account a) Sound power levels and positions of wind turbines b) Directivity of propagation c) Meteorological conditions d) Attenuation due to geometric spreading e) Attenuation due to atmospheric absorption f) Ground attenuation g) Miscellaneous attenuation h) Barrier and terrain screening	MDA S2.3 Fig 1 & 2 Appendix B Assumed Omni S4.0 and Appendix F S4.0 and Appendix F S4.0 and Appendix F S4.0 and Appendix F S4.0 and Appendix F S4.0 and Appendix F	Appropriate modelling, propagation and attenuation parameters have been adopted	Comply
S6.1.3	Use an appropriate sound propagation calculation method applicable to wind turbines.	S4.0 and Appendix F	ISO 9613-2:1996 used with the adoption of appropriate modelling parameters	Comply
S6.1.4	Wind farm sound levels determined by calculating in octave-bands from at least 63 Hz to 4kHz	S2.3 Figure 2 and S4.0, Appendix F.	Octave bands from 63Hz-4kHz have been adopted for the noise modelling.	Comply
S6.1.5	Predict levels covering the hub-height wind speed range for which power data is available	MDA S2.3	Sound power adopted for prediction and assessment, representing	Comply

<sup>38</sup> Moynce Planning Scheme - Applications to amend Planning Permits 2006/0221 and 2006/0222 Hawkesdale and Ryan Corner Wind Energy Farms (dated 24 October 2017)

	from the manufacturer (including corresponding to the highest sound level generated by the turbine)		the maximum noise level emissions of the turbine.	
S6.1.6	Levels predicted for wind speed corresponding to 95% rated power for determining 35 and 40 dB sound level contours	MDA S4.0	Predictions based on highest source level corresponding to 100% rated power and maximum sound power output.	Comply
S6.2.1	Sound power levels used for predictions obtained from the wind turbine manufacturer determined in accordance with IEC 61400-11 unless otherwise stated	MDA S2.3 Figure 1	-	Comply
S6.2.2	Use sound power levels based on hub-height wind speeds.	MDA S2.3 Figure 1	Hub-height wind speed sound power data adopted	Comply
S8.1	Report of wind farm sound level predictions shall provide a) A map showing topography in the vicinity of the wind farm, the position of the wind turbines and noise sensitive locations b) Noise sensitive locations for which wind farm sound levels are calculated c) Wind turbine sound power levels d) The make and model of the wind turbines e) The hub height of the wind turbines f) Distance of noise sensitive locations from the wind turbines g) Calculation procedure used h) Meteorological conditions assumed i) Air absorption parameters used j) Ground attenuation parameters used k) Topography/screening assumed l) Predicted far-field wind farm sound levels	MDA Appendix D  MDA Appendix D S2,3 Figures 1 & 2, S2.2 Table 1 S2.2 Table 1 S2.2 Table 1 Appendix C S4.0, Appendix F S4.0, Appendix F S4.0, Appendix F S4.0, Appendix F MDA S4.0 Appendix F S5.0 Table 7, Appendix G  MDA S5.1 Table 3, MDA S7.0, Tables 4, 5 & 6, Appendix E		Strictly does not comply. No topographic map is included in the Information Source.  However: GPG has subsequently provided the auditor with a topographical map, and this will be included in the submission to DELWP.  The auditor and his team are aware that MDA used topographical data within the SoundPlan assessment.