Your ref
Our ref 277342-10
File ref

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Ryan Corner Development Pty Ltd.
c/- Umwelt (Australia) Pty Ltd
Level 7, 180 Flinders Street
Melbourne VIC 3000
Attn: Grace Abou Abdallah

31 August 2021

Dear Ms Abou Abdallah

Ryan Corner Wind Energy Facility
Planning Permit No. 20060222-A
Audit of Pre-construction Environmental Noise Assessment

I refer to the request to provide my view on the validity of the audit of the Pre-construction Environmental Noise Assessment of the approved Ryan Corner Wind Energy Facility (WEF), undertaken in July 2021 under the *Environment Protection Act 1970* (1970 Act) (July 2021 Audit). Specifically, the question is as to whether the audit would have substantially the same findings and recommendations if it were undertaken under the *Environment Protection Act 2017* (2017 Act), if it was based on the same documents and directions as when I undertook the audit in July 2021 under the 1970 Act.

The following is provided in response to this request.

Background

1. I refer to the environmental audit of the pre-construction environmental noise assessment was based undertaken by Marshall Day Acoustics (MDA) of the approved Ryan Corner WEF, to be located near Port Fairy, Victoria. A copy of the July 2021 Audit report, dated 07 July 2021, is attached.

2. The July 2021 Audit was prepared under section 53V of the 1970 Act. Specifically, the auditor was engaged on 10 June 2021, with formal notification of the statutory audit made to EPA (EPA CARMS No 78659-3 issued).

3. Consistent with its own internal quality processes, the July 2021 Audit report was reviewed by EPA for both regulatory and technical content before it is made publicly available. No issues were raised with the audit.

4. The audit was prepared to accompany a planning permit amendment application prepared under S97I of the *Planning and Environment Act 1987* (Vic).

5. The 2017 Act and *Environment Protection Regulations* 2021 (Vic) commenced on 1 July 2021, replacing the 1970 Act and its regulations. This change occurred during the period in which the July 2021 Audit was conducted.

6. Part 16.4 of the 2017 Act provided transitional provisions to address environmental audits where an auditor has notified EPA that they have been engaged to conduct an audit under the provisions of the 1970 Act, but the audit has not been completed by 01 July 2021. Specifically, audits can be completed under the 1970 Act and there is no time period for audits that are in progress as of 01 July 2021, and the audit scope can remain as developed under S53V of the 1970 Act (Transition guidance of environmental auditors, EPA Publication 1978, dated June 2021).

7. I have subsequently been requested for my opinion on whether my audit would reach the same conclusions today if I was to conduct an environmental audit under Part 8.3, Division 3 of the 2017 Act, based upon the same documents and directions as applied when I conducted the July 2021 Audit.

8. This request raises a basic issue – the above section of the 2017 Act refers to a statutory audit (similar to the S53V audit conducted under the 1970 Act). However, the Environment Protection Regulations 2021 (Vic) as amended 01 August 2021 do not include a requirement to undertake an equivalent regulatory audit of a pre-construction noise assessment, although requires an "environmental auditor review" of Post-Construction Noise Assessment (Reg 131D) and Noise Management Plan (Reg 131E). Recent discussions with EPA indicate that they would term these audits as non-regulatory verification audits.

9. The EPA has not issued any guidance on WEF verification audits to be conducted under the 2017 Act, as a verification audit does not need to be notified or submitted to EPA. I am informed by EPA that if guidance were to be provided, they would expect the process to be largely the same as that conducted within an audit as previously defined under the old guidelines (Wind Energy Facility Noise Auditor Guidelines - EPA Publication 1692).

10. The DELWP has issued a guideline (New Regulations for wind farm noise, July 2021), to support the guideline Development of Wind Farm Facilities in Victoria – Policy and Planning Guidelines (DELWP Guidelines), that states in part "… the requirement to conduct a pre-construction (predictive) noise assessment to demonstrate that the facility can comply with the New Zealand Standard." It is understood that Clause 52.32-4 of the Victorian Planning Provisions and the Moyne Planning Scheme, upon which the DELWP Guidelines are based, was amended on 03 July 2021 and does require an environmental audit report of the pre-construction (predictive) noise assessment report prepared under Part 8.3, Division 3 of the 2017 Act by an environmental auditor appointed under Part 8.3, Division 1 of the 2017 Act to accompany a new application. I understand that this apparent misalignment between DELWP and EPA has yet to be resolved.

Conclusions

11. An environmental audit conducted by me under Part 8.3, Division 3 of the 2017 Act today, based upon the same documents and instructions as the July 2021 Audit, would involve substantially the same objectives as the July 2021 Audit. Specifically, it would assess compliance of the Pre-construction Noise Assessment undertaken by MDA with the New Zealand Standard NZS 6808-2010 Acoustics - Wind Farm Noise (Standard), including 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.

These objectives are the same as the noise standards required by Condition 31 of Planning Permit No 20060222-A.

12. In lieu of any EPA guidance on conduct of verification audits under the 2017 Act, and consistent with preliminary EPA advice provided above (9), I would expect the audit methodology under the 2017 Act to be largely consistent with Section 2.4.1 of Wind Energy Facility Noise Auditor Guidelines (EPA Publication 1692) used previously for the July 2021 Audit.

13. The form of the audit report would need to be amended if conducted under the 2017 Act, allowing for the new terminology and reference to relevant new sections of the Act and associated regulations and/or guidelines introduced under the 2017 Act.

14. Accordingly, I confirm that if I was to conduct a new audit today under the 2017 Act briefed with the same documents and directions as for when I conducted the July 2021 Audit, I would reach substantially the same findings and recommendations as I reached in the July 2021 Audit. However, note that one of the recommendations is for development of a Noise Management Plan (NMP) for the operational phase of the WEF, given that Planning Permit 200060222-A does not require a NMP - this recommendation is now redundant with the introduction of the Environment Protection Regulations 2021 (Vic) as amended 01 August 2021, specifically Reg 131E that provides for a Noise Management Plan, effective from 01 January 2022. Please contact me if you have any queries in relation to the above matters or require any further information.

Yours Sincerely

David Spink
Director
Environmental Strategies Pty Ltd
EPA Appointed Environmental Auditor (2017 Act)

Dr Kym Burgemeister
Principal
Arup Pty Ltd

Enc

INFORMATION REGARDING ENVIRONMENTAL AUDIT REPORTS

August 2007

VICTORIA'S AUDIT SYSTEM

An environmental audit system has operated in Victoria since 1989. The *Environment Protection Act 1970* (the Act) provides for the appointment by the Environment Protection Authority (EPA Victoria) of environmental auditors and the conduct of independent, high quality and rigorous environmental audits.

An environmental audit is an assessment of the condition of the environment, or the nature and extent of harm (or risk of harm) posed by an industrial process or activity, waste, substance or noise. Environmental audit reports are prepared by EPA-appointed environmental auditors who are highly qualified and skilled individuals.

Under the Act, the function of an environmental auditor is to conduct environmental audits and prepare environmental audit reports. Where an environmental audit is conducted to determine the condition of a site or its suitability for certain uses, an environmental auditor may issue either a certificate or statement of environmental audit.

A certificate indicates that the auditor is of the opinion that the site is suitable for any beneficial use defined in the Act, whilst a statement indicates that there is some restriction on the use of the site.

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Email: environmental.audit@epa.vic.gov.au

Ryan Corner Development Pty Ltd

Ryan Corner Wind Farm

Pre-construction Environmental Noise Assessment Audit

277342-10

Audit 3 | 7 July 2021

Job number 27734210

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Document verification

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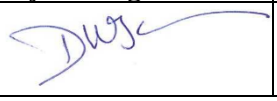
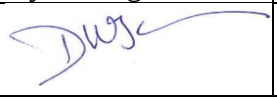
Job title		Ryan Corner Wind Farm			**Job number** 27734210
Document title		Pre-construction Environmental Noise Assessment Audit			**File reference**
Document ref		277342-10			
Revision	**Date**	**Filename**			
Draft 2	30 June 2021	**Description**	Audit 3 Draft2		
			Prepared by	Checked by	Approved by
		Name	David Spink Kym Burgemeister	Kym Burgemeister	Kym Burgemeister
		Signature			
Final	07 July 2021	**Filename**			
		Description	Final report		
			Prepared by	Checked by	Approved by
		Name	David Spink Kym Burgemeister	Kym Burgemeister	Kym Burgemeister
		Signature			
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Appendices

Appendix A

Ryan Corner Site Visit

Appendix B

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

07 July 2021

Copies	Recipient	Copies	Recipient
1 PDF	**Guillermo Alonso** 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	**Ms Christine Hartley** 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) of the proposed Ryan Corner Wind Farm to be located near Port Fairy, Victoria (the site). The site is on land generally bounded by the Hamilton – Port Fairy Road, Fingerboard Road and Shaw River.

Ryan Corner Development Pty Ltd (RCD), a wholly owned subsidiary of Global Power Generation Australia Pty Ltd (GPGA), is proposing to construct the wind farm at the site. Hereafter the wind farm will be referred to as the Wind Energy Facility (WEF) which is consistent with Victorian Government terminology.

This audit is the third one undertaken for the Ryan Corner WEF, as summarised below. All three audits have been prepared under Part IXD, Section 53V of the Act by David Spink, an Environmental Auditor appointed under Part IXD of the Act. Each audit involved an assessment of the relevant pre-construction (predictive) noise assessment report, to determine if the proposal can comply with the *New Zealand Standard NZS 6808:2010 Acoustics – Wind Farm Noise* (Standard).

- **Audit No. 1 (EPA CARMS No. 78659-1)**

  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 No. 20060222-A). This extension of the Planning Permit was due to expire if the works were 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, and will expire if the development is not completed by 29 August 2023. This application for extension included an audit report (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 No. 78659-1). The audit was based on the information provided in a noise assessment report prepared by Marshall Day Acoustics (MDA) (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).

- **Audit No. 2 (EPA CARMS No. 78659-2)**

  RCD nominated a preferred turbine model (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 was also slightly altered in location (micro-sited). The audit was based on the information provided in a pre-construction noise assessment report (Marshall Day Acoustics– Ryan Corner Wind Farm – Pre-construction Noise Assessment, Rpt 003 20180786, dated 30 October 2020) (2020 Assessment Report), which included a noise assessment based on the preferred turbine selection and

amended turbine layout. The background monitoring report (Marshall Day Acoustics – Ryan Wind Farm Background Noise Monitoring Rp 002 20180786, dated 20 August 2020) (2020 Background Monitoring Report) was also referenced for the audit.

- **Audit No. 3 (EPA CARMS No. 78659-3) (this audit report)**

  RCD has undertaken a review of the 2020 Assessment Report, particularly in regard to:

  - Strict compliance with Condition 2(b) of Planning Permit 20060222-A ("… dwellings that existed on 28 February 2017") to a 5km distance from the WEF, and
  - Micro-siting a total of 13 turbines.

  The reduction from 56 down to 52 turbines assessed in the 2020 Assessment Report has been retained.

  MDA subsequently issued a pre-construction report (Marshall Day Acoustics – Ryan Corner Wind Farm Pre-Construction Noise Assessment Rp 003 R03 20180786, dated 10 June 2021) (2021 Assessment Report),

  The background monitoring report has also been reviewed, and issued as a subsequent report (Marshall Day Acoustics – Ryan Corner Wind Farm Background Noise Monitoring Rp 002 R03 20180786, dated 10 June 2021) (2021 Background Monitoring Report).

It is understood that RCD intends to submit the 2021 Assessment Report to DELWP, as part of the documentation for an application for amendment of the Planning Permit. The auditor has been advised by RCD that the selection of a preferred turbine has not triggered the amendment application, rather this is due to proposed changes to the wording of the Planning Permit and other conditions which do not relate to the turbines.

DELWP has advised that the application for amendment of the Planning Permit 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 submission should include an environmental audit of the 2021 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 also refers to a number of other 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. 78659-3
Auditor	David Spink
Auditor account number	43572
Auditor appointment end date	24 October 2021
Audit service order number	8007014
Name of person requesting audit	Guillermo Alonso
Relationship of person requesting audit to site	Director and Engineering Manager, Ryan Corner Development Pty Ltd, a wholly owned subsidiary of Global Power Generation Australia Pty Ltd
Name of premises owner	Various, N/A
Date of auditor engagement	10 June 2021
Completion date of audit	07 July 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
Current land use zoning	FZ – Farming
EPA region	South West
Municipality	Moyne Shire Council
Dominant – Lot on plan	N/A
Additional – Lot on plan	N/A
Site/ premises name	Ryan Corner Wind Farm
Building/complex sub-unit No.	N/A

Street/Lot – Lower No.	
Street/Lot – Upper No.	
Street Name	Hamilton-Port Fairy
Street Type (road, court, etc)	Road
Suburb	Ryan Corner
Postcode	3284
GIS coordinates of site centroid **Latitude (GDA94)** **Longitude (GDA94)**	 142.134 -8.23955
Members and categories of support team utilised	Dr Kym Burgemeister Arup Pty Ltd – Principal and Australasian Acoustics Skills Leader Acoustics subject matter expert
Further work or requirements	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 recommendations of the Office of the National Wind Farm Commissioner[1]. 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). 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.
Nature and extent of continuing risk	A risk of noncompliance with the *New Zealand Standard NZS 6808:2010 Acoustics – Wind Farm Noise* (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.
Outcome of Audit	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 Rp 002 R03 20180786, dated 10 June 2021 (2021 Background Monitoring Report).

[1] Annual Report to the Parliament of Australia, Office of the National Wind Farm Commissioner, 31 March 2017.

	1. The initial background monitoring locations identified in the NCTP[2] (Figure 1 and Appendix B) were based on the Senvion 4.2MW140 turbine. However, the 2021 Background Monitoring Report (Section 2.1) provides a site plan with noise contours based on the preferred turbine (Vestas V136 4.2MW). The plots are relatively similar, indicating that the locations selected for the background monitoring are appropriate and are at, or representative of, all the sensitive receivers that are within the 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 and again on 11 June 2021 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 2020 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 112m, but does provide 2 individual anemometer heights at 20m and 40m. These data have been used to calculate a wind shear exponent using a power law, and extrapolated the wind speed at 112m. This methodology is appropriate. 7. The background noise data have been analysed appropriately. **Pre-construction Noise Assessment**

[2] Marshall Day Acoustics Ryan Corner Wind Farm Noise Compliance Test Plan, Rpt 001 01DRAFT 20180786, dated 20 August 2018.

	Refer to report entitled Marshall Day Acoustics – Ryan Corner Wind Farm – Pre-Construction Noise Assessment (Report 003 R03 20180786, dated 10 June 2021) (2021 Assessment Report). Also note that the 2021 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). 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(A)' approach has been adopted. 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". The auditor accepts the explanation provided by MDA in the 2021 Assessment Report (Section 3.2) as the current approach complies with the Standard (Section 5.2) and Planning Permit No. 20060222-A (Condition 31(a)). 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 2021 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 a previous audit (EPA CARMS No. 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[3]. 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[4]. 11. Consideration of Special Audible Characteristics (SACs): MDA has assessed the likelihood that the turbines will result in tonal noise

[3] 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)
[4] DELWP Guideline S5.1.2 refers to the Cherry Tree Wind Farm vs Mitchell Shire Council (2013)

	emission based on the measured tonal audibility of the selected turbine measured in accordance with IEC 61400-11:2012[5] 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 implementation of a Noise Management Plan through the Environmental Management Plan to address any non-compliance and potential associated penalties has been recommended (refer to recommendations above). 12. Noise Prediction Methodology: The noise level predictions have been undertaken using the ISO 9613-2:1996[6] 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. Sensitive Receiver Locations - There is an increase in the number of sensitive receiver dwellings considered in the 2021 Assessment Report, compared with the 2017 Assessment Report. Specifically, 157 noise sensitive dwellings are considered, compared to 111 previously. This will reasonably account for all sensitive receivers that are potentially impacted by noise from the WEF. Note that only properties that existed prior to 28 February 2017 were considered (as specified in Planning Permit 20060222-A, condition 2(b)). RCD advised that an additional sensitive receiver location designated Location 113 was identified recently to the south of the WEF (ie after the NCTP was prepared) – understood to be confirmed by RCD to MDA on 11 April 2021. As mentioned in Section 2.1 and Appendix A of the audit report, the auditor inspected this area on 11 June 2021, and was able to confirm that background monitoring locations used by MDA were nearer to the south of the WEF, and could therefore be used to assess compliance at Location 113. 14. The predicted noise levels comply with the limits set in the Standard. Specifically: a. Table 7 and Appendix G of the 2021 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). 15. Potential uncertainty in predicted noise levels: MDA used SoundPlan 8.2 software, utilising the international standard ISO

[5] IEC 61400-11: 2012 Wind turbines – Part 11: Acoustic noise measurement techniques, International Electrotechnical Commission

[6] International Standard ISO 9613-2:1996 Acoustics - Attenuation of sound during propagation outdoors – Part 2: General method of calculation (ISO 9613-2)

	9613-2:1996[7] sound propagation model, in conjunction with the digital terrain model of the site. The ISO 9613-2:1996 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. 16. 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. 17. Consideration of Cumulative Impacts: The 2021 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 2017 Planning Permit amendment hearing. The panel report[8] 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. 18. Additional Auditor Considerations: a. Potential Change in Turbine Power Sound Levels: Comparison of provided data indicates that the preferred turbine (Vestas V136-4.2MW) is no noisier than the range approved for the three currently approved options under Planning Permit 20060222-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 2021 Assessment Report, (Appendix H, Table 11) indicates that the use of the preferred 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 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 preferred turbine (Vestas V136-4.2MW) (2021 Assessment Report, Figure 3, page 16), and the three approved options (2017 Assessment Report, Appendix E).

[7] International Standard ISO 9613-2:1996 Acoustics - Attenuation of sound during propagation outdoors – Part 2: General method of calculation (ISO 9613-2)

[8] Moyne Planning Scheme - Applications to amend Planning Permits 2006/0221 and 2006/0222 Hawkesdale and Ryan Corner Wind Energy Farms (dated 24 October 2017)

Table 2: Physical Site Information

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

Signed

David Spink
Environmental Auditor (Industrial Facilities)
Appointed pursuant to the *Environment Protection Act 1970*

List of Acronyms

Acronym	Definition
AGL	Above Ground level
AS/NZS	Australian and New Zealand Standard
EPA	Environment Protection Authority, Victoria
DELWP	Department of Environment, Land, Water, and Planning (Victoria)
MDA	Marshall Day Acoustics Pty Ltd
NCTP	Noise Compliance Test Plan
NMP	Noise Management Plan
NZS	New Zealand Standard
SAC	Special Audible Characteristic
Standard	NZS 6808:2010 Acoustics – Wind Farm Noise
WEF	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 wholly owned subsidiary of Global Power Generation Australia Pty Ltd (GPGA), is proposing to construct a WEF at the site.

This audit is the third one undertaken for the Ryan Corner WEF, as summarised below. All three audits have been 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. Each audit involved an assessment of the relevant pre-construction (predictive) noise assessment report, to determine if the proposal can comply with the *New Zealand Standard NZS 6808:2010 Acoustics – Wind Farm Noise* (Standard).

- **Audit No. 1 (EPA CARMS No. 78659-1)**

  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 No. 20060222-A). This extension of the Planning Permit was due to expire if the works were 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, and will expire if the development is not completed by 29 August 2023. This application for extension included an audit report (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 No. 78659-1). The audit was based on the information provided in a noise assessment report prepared by Marshall Day Acoustics (MDA) (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).

- **Audit No. 2 (EPA CARMS No. 78659-2)**

  RCD 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). The audit was based on the information provided in a pre-construction noise assessment report (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 preferred turbine selection and amended turbine layout. The background monitoring

report (Marshall Day Acoustics – Ryan Wind Farm Background Noise Monitoring Rp 002 20180786, dated 20 August 2020) was also referenced for the audit (2020 Background Monitoring Report).

- **Audit No. 3 (EPA CARMS No. 78659-3) (this audit report)**

  RCD has undertaken a review of sensitive receiver locations used in the 2020 Assessment Report particularly in regard to strict compliance with Condition 2(b) of Planning Permit 20060222-A ("… dwellings that existed on 28 February 2017"), to a distance of 5km from the WEF. Following this review, MDA issued a subsequent report (Marshall Day Acoustics – Ryan Corner Wind Farm Pre-Construction Noise Assessment Rp 003 R03 20180786, dated 10 June 2021) (2021 Assessment Report), The scope of the 2020 Assessment Report has been incorporated into the 2021 Assessment Report.

  The 2021 Assessment Report summarises the changes assessed (Section 2.1)

  - The proposed layout corresponds to the endorsed layout of the wind farm, as accounted for in the 2017 Assessment Report, revised by the removal of four (4) turbines (B35, B39, B41 and B47), and;
  - The relocation of thirteen (13) turbines (B8, B10, B15, B16, B17, B18, B20, B21, B22, B25, B31, B63 and B70).

  The background monitoring report has also been reviewed, and issued as a subsequent report (Marshall Day Acoustics – Ryan Corner Wind Farm Background Noise Monitoring Rp 002 R03 20180786, dated 10 June 2021) (2021 Background Monitoring Report).

It is understood that RCD intends to submit the 2021 Assessment Report to DELWP, as part of the documentation for an application for amendment of the Planning Permit. The auditor has been advised by RCD that the selection of a preferred turbine has not triggered the amendment application, rather this is due to proposed changes to the wording of the Planning Permit and other conditions which do not relate to the turbines.

DELWP has advised that the application for amendment of the Planning Permit 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 20060222-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 the EPA Guideline (Publication 1692).

1.2 Audit Objectives

The objective of the audit was to assess compliance of the Ryan Corner WEF Pre-construction Noise Assessment (Marshall Day Acoustics – Ryan Corner Wind Farm Pre-Construction Noise Assessment Rp 003 R03 20180786, dated 10 June 2021) (2021 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).

Activity undertaken (in respect of which the environmental audit is to be conducted	Wind Energy Facility (WEF)
Components of the activity to be considered	Noise from turbine blades, generators, gear boxes and hydraulic systems
Segment(s) of the environment to be considered	Ryan Corner environs surrounding the WEF. WEF centred at GPS Coordinates: Latitude: 142.134 Longitude: -8.23955
Element(s) to be considered	Atmosphere/ aesthetics
Beneficial Use(s) to be considered	Residential accommodation, recreation and farming
Risk Assessment	Effect of amenity of receptor sites applicable to operational noise of WEF
Time Period	Indefinite, from commencement of WEF operation
Exclusions	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[9], 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[10] and SEPP N-1[11]) are unsuitable.

[9] Advisory Note 35, Amendment VC 78 Wind energy facility provisions – Clause 52.32, March 2011.
[10] AS 1055.1-1997 *Acoustics - Description and measurement of environmental noise - General procedures,* Standards Australia, 1997.
[11] *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[12], the draft National Guidelines[13], the UK ETSU-R-97[14] and the Annual Report of the National Wind Farm Commissioner[15] 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 No. 78659-1). An additional inspection of the site was conducted by the auditor on 11 June 2021, specifically for this current audit process (EPA CARMS No. 78659-3).
- 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:

[12] AS4959:2010 Acoustics – Measurement prediction and assessment of noise from wind turbine generators.
[13] *National Wind Farm Development Guidelines – Draft*, Environment Protection and Heritage Council, July 2010.
[14] *The Assessment and Rating of Noise from Wind Farms*, UK Department of Trade and Industry, ETSU-R-97, September 1996.
[15] *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 Rp 003 R03 20180786, dated 10 June 2021) (2021 Assessment Report),
- Marshall Day Acoustics – Ryan Corner Wind Farm Background Noise Monitoring Rp 002 R03 20180786, dated 10 June 2021 (2021 Background Monitoring Report)
- 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 20180786, dated 20 August 2020) (2020 Background Monitoring Report)
- Marshall Day Acoustics - Ryan Corner Wind Farm Noise Compliance Test Plan (Report 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)
- Department of Environment, Land, Water & Planning. Letter re Extension of Time, Planning Permit No 20060222-A (dated 02 November 2020)
- 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

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[16].

The auditor undertook a site inspection on 06 April 2020 as part of a previous audit (EPA CARMS No. 78659-1), with a follow up inspection on 11 June 2021 specifically in relation to this current audit ((EPA CARMS No. 78659-3). The auditor was accompanied on both occasions by an RCD employee. No residents were spoken to during the site visits.

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

The scope of both site inspections was to:

- Confirm 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.

In addition, the inspection on 11 June 2021 was to follow up on an issue raised in the 2021 Background Monitoring Report, Reference Section 2.1 as follows:

An additional receiver location designated 113 was identified to the south of the wind farm after the NCTP was prepared. Two preferred monitoring locations were already defined in the NCTP at locations that are nearer to the south of the wind farm, and therefore no additional compliance monitoring locations are proposed.

One of the key objectives of the site visit was to review the background monitoring locations used by MDA for the background monitoring assessment. MDA advised that the background monitoring undertaken in 2020 could be used for this current assessment.

The findings of the site visits are provided in Appendix A. In summary, the site inspection confirmed that the locations chosen by MDA for the background monitoring assessment (as reported in the 2021 Background Monitoring Report) were appropriate as representative monitoring background locations for sensitive receivers in the area. The additional sensitive receiver Location 113 was noted and confirmed that the monitoring locations used for the background monitoring were appropriate. 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.

[16] Wind Energy Facility Noise Auditor Guidelines, Publication 1692, Section 2.4.1

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 first 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 (2020 Background Monitoring Report), and further updated in 2021 (Marshall Day Acoustics – Ryan Corner Wind Farm Background Noise Monitoring Rp 002 R03 20180786, dated 10 June 2021) (2021 Background Monitoring Report).

The scope of the audit involved a review of the 2021 Background Monitoring Report.

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[17] (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) based on the 26 turbines; it was noted that this was based on the Senvion 4.2MW 140 turbine (Appendix B).

The 2021 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 preferred Vestas V136-4.2MW turbine. Location 9 in the draft NCTP was omitted from the program as it was found to be a commercial building rather than a residence. Of the 8 background noise measurement locations, 7 are noise sensitive receiver locations[18], 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

[17] Marshall Day Acoustics - Ryan Corner Wind Farm Noise Compliance Test Plan (Report v No 001 01draft 20180786, dated 20 August 2018)
[18] 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.

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.

As noted above, the initial background monitoring locations identified in the draft NCTP (Figure 1 and Appendix B) were based on the Senvion 4.2MW140 turbine. However, the 2021 Background Monitoring Report (Section 2.1) provides a site plan with noise contours based on the preferred turbine (Vestas V136 4.2MW). The plots are relatively similar, indicating that the locations selected for the background monitoring are appropriate and are at, or representative of, all the sensitive receivers that are within the 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 2021 Background Monitoring Report provides helpful details regarding the individual measurement locations in Appendix G, with aerial photography, maps and photographs of each site which indicate appropriate positioning of the noise loggers at each site.

Periods with extraneous noise levels, identified in accordance with research by Griffin et. al.[19], 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 have 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 112m but does provide 2 individual anemometer heights at 20m and 40m. These data have been used to calculate a wind shear exponent using a power law, and extrapolate the wind speed at 112m. This methodology is appropriate.

The background noise level and filtered wind speed data has been analysed using a 3rd 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.

[19] Griffin, D., Delaire, C. and Pischedda, P., 2013, *Methods of identifying extraneous noise during unattended noise measurements*, 20th International Congress of Sound & Vibration.

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 Rp 003 R03 20180786, dated 10 June 2021) (2021 Assessment Report),

It is noted that this is not a stand-alone report, and reference needs to be made for some issues to a 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).

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 2021 Background Monitoring Report (Tables 6 & 7) and the 2021 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). MDA provide the following statement in regard to this issue (2021 Assessment Report, Section 3.2):

At the time of preparing the 2017 noise assessment, which accompanied the application to amend the planning permit for the wind farm, an updated background noise survey was yet to be undertaken (the available data at the time was collected in 2006 in accordance with the now superseded version of the New Zealand Standard, NZS 6808:1998). Accordingly, in lieu of updated background noise data at that time, a conservative assessment was presented on the basis of the minimum limit of 40 dB. In the time since the 2017 noise assessment was prepared, an updated background noise survey was completed in 2020.

The auditor accepts the explanation provided by MDA in the 2021 Assessment Report (Section 3.2) as the current approach complies with the Standard (Section 5.2) and Planning Permit No. 20060222-A (Condition 31(a)). As will be discussed later, the modelling predicts that this previous limit (40 dB(A)) is likely to be achieved by 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)[20] and the South Australian wind farm environmental guidelines[21]. 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 2021 Background Monitoring Report or the 2021 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 No. 78659-1). 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 raised at a Planning Panel on the proposed amendment to the Planning Permit[22]. The Panel accepted the submission made by the Proponent (GPGA) 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 Planning Panel, and from the VCAT determination for the Cherry Tree Wind Farm in relation to High Amenity zonings[23].

Consideration of Special Audible Characteristics (SACs)

[20] 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.
[21] Wind farms environmental noise guidelines, Environment Protection Authority South Australia, July 2009.
[22] Moyne Planning Scheme - Applications to amend Planning Permits 2006/0221 and 2006/0222 Hawkesdale and Ryan Corner Wind Energy Farms (dated 24 October 2017)
[23]DELWP Guidelines, S5.1.2 refers to Cherry Tree Wind Farm vs Mitchell Shire Council (2013)

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 preferred turbine (Vestas V136 4.2MW) will result in tonal noise emission based on the tonal audibility measured in accordance with IEC 61400-11:2012[24] 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 8.2 software, utilising the international standard ISO 9613-2:1996[25] 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 preferred turbine (Vestas V136 4.2MW) determined in accordance with IEC 61400-11[26] 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[27]; however, they are commonly adopted as good practice for wind farm noise assessment.

[24] IEC 61400-11: 2012 Wind turbines – Part 11: Acoustic noise measurement techniques, International Electrotechnical Commission
[25] International Standard ISO 9613-2:1996 Acoustics - Attenuation of sound during propagation outdoors – Part 2: General method of calculation (ISO 9613-2)
[26] IEC 61400-11: 2012 Wind turbines – Part 11: Acoustic noise measurement techniques, International Electrotechnical Commission
[27] International Standard ISO 9613-2:1996 Acoustics - Attenuation of sound during propagation outdoors – Part 2: General method of calculation (ISO 9613-2)

2.3.3 Sensitive Receiver Locations

There is an increase in the number of sensitive receiver dwellings considered in the 2021 Assessment Report, compared with the 2017 Assessment Report. Specifically, 157 noise sensitive dwellings are considered, compared to 111 previously. This is understood to be because previously the selection of sensitive receivers was not limited by a specific distance to the WEF. Following a review of property locations in early 2021, sensitive receiver locations within 5 km of the WEF have been identified, on the basis that WEF sound levels further than 5 km from the nearest turbine will be significantly lower than the requirements of the Planning Permit, and therefore not relevant to the assessment. An outer bound of 5 km for the identification of sensitive receivers is considered sufficiently conservative. This will reasonably account for all sensitive receivers that are potentially impacted by noise from the WEF. Note that only properties that existed prior to 28 February 2017 were considered (as specified in Planning Permit 20060222-A, condition 2(b)).

RCD advised that an additional sensitive receiver location designated Location 113 was identified recently to the south of the WEF (ie after the NCTP was prepared) – understood to be confirmed by RCD to MDA on 11 April 2021. As mentioned in Section 2.1, the auditor inspected this area on 11 June 2021, and was able to confirm that background monitoring locations used by MDA were nearer to the south of the WEF, and could therefore be used to assess compliance at Location 113.

2.3.4 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 2021 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).

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…”. The auditor was not provided with documented evidence on the stakeholder agreements during the audit. 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.

2.3.5 Potential Uncertainty in Noise Levels

As discussed above, MDA used SoundPlan 8.2 software, utilising the international standard ISO 9613-2:1996[28] 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 9613-2:1996 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.

2.3.6 Risk Assessment

The EPA Guideline (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 and 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[29], 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 recommendations of the Office of the National Wind Farm Commissioner[30].

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

[28] International Standard ISO 9613-2:1996 Acoustics - Attenuation of sound during propagation outdoors – Part 2: General method of calculation (ISO 9613-2)
[29] Marshall Day Acoustics - Ryan Corner Wind Farm Noise Compliance Test Plan (Report v No 001 01draft 20180786, dated 20 August 2018)
[30] Annual Report to the Parliament of Australia, Office of the National Wind Farm Commissioner, 31 March 2017

construction issues; however, Condition 18 requires this EMP to "be reviewed and if 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 2021 Assessment Report does not mention cumulative noise assessment. This issue was raised with MDA during a 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[31] dated 24 October 2017 did not make any comments with regard to the potential cumulative effects between Yambuk and Ryan Corner WEFs.

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

2.5 Additional Auditor Considerations

It is understood that the 2021 Assessment Report (and 2021 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 by RCD that the selection of a preferred turbine 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.

[31] 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 information provided in Section 2 of this report 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 2021 Assessment Report confirms that:

- The methodology for the pre-construction noise assessment has been generally undertaken in accordance with the Standard.
- The modelling predicts compliance with the applicable noise criteria at all of the Non-Participant Landholders.

However, there are a two basic questions concerning the proposed change of turbine (Vestas V136-4.2MW) instead of the approved turbine 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). In addition, a total of 13 turbines are to be slightly altered in location (micro-sited);

1. Will the preferred turbine be noisier or quieter than the currently approved turbine options?
2. How will the noise profile of the preferred 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 2021 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 preferred 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 – 2021 Assessment Report Figures 1 & 2. The Vestas V136-4.2MW data is based on information provided by Vestas, and sighted during the audit[32].
- 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 preferred 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.

[32] 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 preferred turbine array compare with the noise profiles of the currently approved turbine options in the Planning Permit?

This question is addressed in the 2021 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 preferred turbine (Vestas V136-4.2MW) in the WEF (in conjunction with removal of four turbines, and micro-siting of 13 turbines), is predicted to be similar to the quieter of the currently approved turbines (Senvion 3.0M122), and potentially quieter than noise 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 preferred turbine (Vestas V136-4.2MW) (2021 Assessment Report, Figure 3, page 16), and the three approved options (2017 Assessment Report, Appendix E). As a general comment, the contours for the preferred 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 Act, of the pre-construction noise assessment undertaken by MDA of the Ryan Corner WEF. The audit has been completed to assess compliance with the Standard, as required by EPA Guideline (Publication 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 Rp 002 R03 20180786, dated 10 June 2021 (2021 Background Monitoring Report).

1. The initial background monitoring locations identified in the NCTP[33] (Figure 1 and Appendix B) were based on the Senvion 4.2MW140 turbine. However, the 2021 Background Monitoring Report (Section 2.1) provides a site plan with noise contours based on the preferred turbine (Vestas V136 4.2MW). The plots are relatively similar, indicating that the locations selected for the background monitoring are appropriate and are at, or representative of, all the sensitive receivers that are within the 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

[33] Marshall Day Acoustics Ryan Corner Wind Farm Noise Compliance Test Plan, Rpt 001 01DRAFT 20180786, dated 20 August 2018.

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 and 11 June 2021 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 2021 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 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.
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 Rp 003 R03 20180786, dated 10 June 2021) (2021 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. 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”. The auditor accepts the explanation provided by MDA in the 2021 Assessment Report (Section 3.2) as the current

approach complies with the Standard (Section 5.2) and Planning Permit No. 20060222-A (Condition 31(a)).

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 2021 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 No. 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[34]. The auditor accepts this position (ie a High Amenity Zone does not apply), based on this guidance from the above Planning Panel and from the VCAT determination for the Cherry Tree Wind Farm in relation to High Amenity zonings[35].
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[36] 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 implementation of a Noise Management Plan through the Environmental Management Plan to address any non-compliance and potential associated penalties has been recommended (refer to recommendations below).
12. Noise Prediction Methodology: The noise level predictions have been undertaken using the ISO 9613-2:1996[37] 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. Sensitive Receiver Locations - There is an increase in the number of sensitive receiver dwellings considered in the 2021 Assessment Report, compared with the 2017 Assessment Report. Specifically, 157 noise sensitive dwellings are considered, compared to 111 previously. This will reasonably account for all sensitive receivers that are potentially impacted by noise from the WEF. Note that only properties that existed prior to 28 February 2017 were considered (as specified in Planning Permit 20060222-A, condition 2(b)). RCD advised that an additional sensitive receiver location designated Location 113 was identified recently to the south of the WEF (ie after the NCTP was prepared) – understood to be confirmed by RCD to MDA on 11 April 2021. As mentioned in Section 2.1 and Appendix A of this audit report, the auditor inspected this area on 11 June 2021, and was able to confirm that background monitoring locations used

[34] 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)
[35] DELWP Guideline S5.1.2 refers to the Cherry Tree Wind Farm vs Mitchell Shire Council (2013)
[36] IEC 61400-11: 2012 Wind turbines – Part 11: Acoustic noise measurement techniques, International Electrotechnical Commission
[37] International Standard ISO 9613-2:1996 Acoustics - Attenuation of sound during propagation outdoors – Part 2: General method of calculation (ISO 9613-2)

by MDA were nearer to the south of the WEF, and could therefore be used to assess compliance at Location 113.

14. The predicted noise levels comply with the limits set in the Standard. Specifically:
    a. Table 7 and Appendix G of the 2021 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).
15. Potential uncertainty in predicted noise levels: MDA used SoundPlan 8.2 software, utilising the international standard ISO 9613-2:1996[38] sound propagation model, in conjunction with the digital terrain model of the site. The ISO 9613-2:1996 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.
16. 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.
17. Consideration of Cumulative Impacts: The 2021 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[39] 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 Planning Panel of this assessment, the auditor does not seek further information on cumulative impacts.
18. Additional Auditor Considerations:
    a. Potential Change in Turbine Power Sound Levels: Comparison of provided data indicates that the preferred 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 2021 Assessment Report (Appendix H, where Table 11) indicates that the use of the preferred 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 the other two approved turbines (Vesta 126, GE 3.2-130). This is reflected in the predicted noise contours for the preferred turbine

[38] International Standard ISO 9613-2:1996 Acoustics - Attenuation of sound during propagation outdoors – Part 2: General method of calculation (ISO 9613-2)
[39] Moyne Planning Scheme - Applications to amend Planning Permits 2006/0221 and 2006/0222 Hawkesdale and Ryan Corner Wind Energy Farms (dated 24 October 2017)

(Vestas V136-4.2MW) (2021 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 recommendations of the Office of the National Wind Farm Commissioner[40].
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).
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.

[40] Annual Report to the Parliament of Australia, Office of the National Wind Farm Commissioner, 31 March 2017.

Appendix A

Ryan Corner Site Visit

A1 Ryan Corner Site Visit

Dates of site visits: 08 April 2020 and 11 June 2021

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[41]. The auditor visited this site on 08 April 2020, as part of a previous environmental audit (EPA CARMS No. 78659-1), with a follow up site inspection specifically for this current audit (EPA CARMS No. 78659-3). The auditor was accompanied on both occasions by an RCD employee.

MDA advised that the background monitoring (including selected monitoring locations) conducted between May and July 2020, and as documented in the 2021 Background Monitoring Report, had also been used for this current assessment. The following is a summary of the site visits held 08 April 2020 and 11 June 2021.

General comments:

The proposed site of the Ryan Corner WEF 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.

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

The general site inspection route on 08 April 2020 initially involved a drive across the centre of the proposed WEF 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). The route from thereon, and on 11 June 2021, specifically targeted the background monitoring locations "as best we could" from public roads surrounding the site, in addition to adjacent sensitive receiver sites (both Participant and Non-Participant Landholders).

No discussions were held with local residents during either site inspections.

The appropriateness of the background monitoring sites was discussed with MDA before the initial site inspection.

Note: The proposed monitoring locations were selected on the basis of identifying sites with predicted noise levels greater than 35 dB(A), as required by the Standard. The 2020 background monitoring was a repeat of an earlier 2008 monitoring program, that the auditor and MDA considered should be reviewed to check whether local conditions had changed (eg trees grown). Further communications were held with RCD and MDA after completion of each site visit to confirm a number of issues identified.

Summary of Observation

[41] Wind Energy Facility Noise Auditor Guidelines, Publication 1692, Section 2.4.1

Receptor Site No	Stakeholder?	Sensitivity	Comment on Proposed Background Monitoring Location
7	No	Occupied residence	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 & B76). 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 & 8 are stakeholder sites.
10	No	Occupied residence	Located beyond the southern end of the proposed site at the end of the internal road mentioned above, on Fingerboard Road. 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. 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. It was noted that the Yambuk Wind Farm was visible further to the west.
11	No	Occupied residence	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. Review of a recent site aerial photograph indicates some reasonably mature vegetation on the residential block. 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).
26, 27, 29, 31	No	Occupied residences	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). These residences will have varying line of site visibility to various turbines across a reasonably flat terrain on this side of the proposed site. It is noted that there are 2 closer stakeholder sites on this road (Sites 28 & 30).

Receptor Site No	Stakeholder?	Sensitivity	Comment on Proposed Background Monitoring Location
77 – replaced by 78	No	Occupied residence	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. It is noted that there are 2 closer stakeholder sites in the vicinity (Sites 78 & 79). 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)

Appendix B

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

B1 NZS 6808:2010 Checklist

Information Source:

Marshall Day Acoustics – Ryan Corner Wind Farm Pre-Construction Noise Assessment Rp 003 R03 20180786, dated 10 June 2021) (2021 Assessment Report),

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	LAeq adopted for source levels. LAeq 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.	2021 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 (GPGA) 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.	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	2021 Assessment Report does not	This issue was raised with MDA during the previous audit process (EPA CARMS 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[42] 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.	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	2021 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	 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	S2.3	Sound power adopted for prediction and assessment, representing	Comply

[42] Moyne 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	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	S2.3 Figure 1	-	Comply
S6.2.2	Use sound power levels based on hub-height wind speeds.	S2.3 Figure 1	Hub-height wind speed sound power data adopted	Comply
S8.1	Report of wind farm sound level predictions shall provide			Comply.
	a) A map showing topography in the vicinity of the wind farm, the position of the wind turbines and noise sensitive locations	Appendix D		
	b) Noise sensitive locations for which wind farm sound levels are calculated	Appendix D		
	c) Wind turbine sound power levels	S2,3 Figures 1 & 2, S2.2 Table 1		
	d) The make and model of the wind turbines	S2.2 Table 1		
	e) The hub height of the wind turbines	S2.2 Table 1		
	f) Distance of noise sensitive locations from the wind turbines	Appendix C		
	g) Calculation procedure used	S4.0, Appendix F		
	h) Meteorological conditions assumed	S4.0, Appendix F		
	i) Air absorption parameters used	S4.0, Appendix F		
	j) Ground attenuation parameters used	S4.0, Appendix F		
	k) Topography/screening assumed	S4.0 Appendix F		
	l) Predicted far-field wind farm sound levels	S5.0 Table 7, Appendix G S5.1 Table 3, S7.0, Tables 4, 5 & 6, Appendix E		