Planning Panels Victoria

Willatook Wind Energy Facility

EES Inquiry and Planning Permit Application Panel Report

Environmental Effects Act 1978
Planning and Environment Act 1987

16 January 2023

VICTORIA State Government

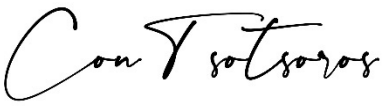
Environmental Effects Act 1978

Planning and Environment Act 1987

EES Inquiry and Panel Report

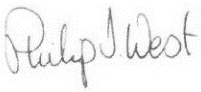
Willatook Wind Energy Facility

16 January 2023



Con Tsotsoros, Chair

Rachael O'Neill, Deputy Chair



Phil West, Member

Jacquelle Gorski, Member

Planning Panels Victoria

Report 1 Contents

Page

PART A: BACKGROUND 1

1 The inquiry and panel process 2

1.1 Inquiry and Panel appointment and role 2
1.2 IAP process 3
1.3 Report approach and structure 4

2 The project 6

2.1 Chronology of events 6
2.2 The project area and context 6
2.3 Project details 8
2.4 Project rationale and assessment 10
2.5 Scoping requirements and evaluation objectives 11

3 The assessment framework 13

3.1 Required approvals 13
3.2 Legislation 13
3.3 Planning Scheme policy and provisions 15
3.4 Policies and strategies 17
3.5 Guidelines, standards and protocols 18

PART B: ENVIRONMENTAL EFFECTS ASSESSMENT 20

4 Ground and surface water 21

4.1 Groundwater 21
4.2 Surface water 23

5 Biodiversity and habitat 29

5.1 Brolga 29
5.2 Southern Bent-winged bat 47
5.3 Flora and Fauna 52

6 Noise and vibration 57

6.1 Background 57
6.2 Noise measurements 57
6.3 Noise modelling of wind turbine noise 65
6.4 Noise criteria 71
6.5 High amenity 73
6.6 Special Audible Characteristics ..... **Error! Bookmark not defined.**
6.7 Compliance monitoring 75
6.8 Cumulative noise impacts 76
6.9 Substation and battery energy storage system 79
6.10 Wind energy facility construction impact 81
6.11 Quarry blasting 82

Planning Panels Victoria

7 Landscape and visual amenity 85

7.1 Background 85
7.2 Landscape and visual impact ..... **Error! Bookmark not defined.**

8 Heritage 95

8.1 Aboriginal cultural heritage 95
8.2 Historical cultural heritage 97

9 Potential quarry 100

10 Other issues 105

10.1 Aviation safety 105
10.2 Traffic and transport 109
10.3 Bushfire risk 114
10.4 Land use and planning 117
10.5 Overall cumulative effects 120

11 Integrated assessment and environmental framework ..... Error! Bookmark not defined.

11.1 Net community benefit and ecologically sustainable development 122
11.2 Environmental Management Framework 123

PART C: NATIONAL ENVIRONMENTAL SIGNIFICANCE 124

12 Matters of national environmental significance 125

Appendices A to H are in Report 2

List of Tables

Page

Table 1 Inquiry response to Terms of Reference 2
Table 2 Chronology of events 6
Table 3 Relevant wind energy facilities in the region 8
Table 4 Scoping requirements and evaluation objectives 11
Table 5 Zone and overlay purposes 16
Table 6 Summary of background noise levels at each monitoring location 59
Table 7 Vestas V162 wind turbine sound power level at various wind speeds 65
Table 8 Modelled wind turbine noise levels various wind speeds at stakeholder residences for CONCAWE and ISO 9613 models 66
Table 9 Modelled wind turbine noise levels various wind speeds at a sample of non-stakeholder residences for CONCAWE and ISO 9613 models 67

Planning Panels Victoria

List of Figures

		Page
Figure 1	Regional context	7
Figure 2	The project	10
Figure 3	Background noise measurements locations	59
Figure 4	Derived criteria at D15 - 2169 Woolsthorpe – Heywood Road	60
Figure 5	Measured background noise levels at D15 - 2169 Woolsthorpe – Heywood Road	60
Figure 6	Wind speed versus measured night-time background noise levels at D37 – 930 Kangertong Road	61
Figure 7	Wind speed versus measured background noise levels at D37 – 930 Kangertong Road (Sonus)	62
Figure 8	Measured night-time background noise levels at D37 – 930 Kangertong Road	62
Figure 9	Contour plot of ISO 9613 modelled turbine noise levels	68
Figure 10	Wind energy facilities near Willatook project area	77
Figure 11	Noise contours (ISO prediction method) of wind turbine noise from Macarthur and Willatook wind energy facilities	78
Figure 12	Noise contours of night-time noise from substation and battery energy storage system	80
Figure 13	Predicted blast vibration contours for quarrying activities	83
Figure 14	Location of airports, other landing areas and the Willatook facility	106

Glossary and abbreviations

AEP	Annual Exceedance Probability
BBAMP	Bird and Bat Adaptive Management Plan
dB	Decibel
CEMP	Construction Environmental Management Plan
CHMP	Cultural Heritage Management Plan
DELWP	Department of Environment, Land, Water and Planning
DELWP (Approvals)	DELWP, Development Approvals & Design
DELWP (BSW)	DELWP, Barwon South West Region
draft Brolga Standards	*Victorian Brolga Assessment and Mitigation Standards* (DELWP, 2020)
EES	Environment Effects Statement
EMF	Environmental Management Framework
EP Act	*Environment Protection Act 2017*
EPA	Environment Protection Authority (Victoria)
EP Regulations	*Environment Protection Regulations 2021*
EP Amendment Regulations	*Environment Protection Amendment (Wind Turbine Noise) Regulations 2022*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ERR	Earth Resources Regulation: Victoria's regulator of earth resource activities
Eurobat Guidelines	Eurobats Publication Series No. 6 *Guidelines for consideration of bats in wind farm projects* – Revision 2014
FFG Act	*Flora and Fauna Guarantee Act 1988*
GED	General environmental duty
GDE	Groundwater Dependent Ecosystems
Glenelg Council	Glenelg Shire Council
Glenelg Hopkins CMA	Glenelg Hopkins Catchment Management Authority
IAP	Inquiry and Panel
Interim Brolga Guidelines	*Interim guidelines for the assessment, avoidance, mitigation and offsetting of potential wind farm impacts on the Victorian Brolga population,* DSE 2011, Revision 2012
LiDAR	Light Detection and Ranging

LVIA	Landscape and Visual Impact Assessment
Moyne Council	Moyne Shire Council
m/s	metres each second
MSA	Minimum Safe Altitude
NZ Standard	*New Zealand Standard NZS6808:2010, Acoustics – Wind Farm Noise*
PE Act	*Planning and Environment Act 1987*
the permit applications	Moyne Planning Scheme permit applications PA2201620 and P22065
the project	see Willatook facility
Proponent	Willatook Wind Farm Pty Ltd
SAC	Special Acoustic Characteristic
SBW bat	Southern Bent-wing bat
SWVLAS	South West Victoria Landscape Assessment Study
VCAT	Victorian Civil and Administrative Tribunal
VFR	Visual Flight Rules
Warrnambool Council	Warrnambool City Council
WEF Guidelines	*Development of Wind Energy Facilities in Victoria Policy and Planning Guidelines* (DELWP 2021)
Willatook facility	Willatook wind energy facility proposed through Moyne Planning Scheme Permit Application PA2201620 (otherwise referred to as WWF)
Willatook Society	Willatook Landscape Presentation Society Incorporated

Overview

Project summary	
The project	Willatook Wind Energy Facility
Permit applications	Moyne Planning Scheme Permit Application PA2201620 affects land shown in Figure 2 (subject land) and seeks to: - use and develop land in the Farming Zone for a wind energy facility and associated activities, consistent with the requirements of Clause 52.32 (Wind energy facility) - use and develop land for a utility installation - undertake earthworks - remove native vegetation - alter dry stone walls Moyne Planning Scheme Permit Application P22065 seeks to remove native vegetation from the subject land
The Proponent	Willatook Wind Farm Pty Ltd
Project area	The project area is shown at Figure 2
Victorian statutory approvals	Cultural Heritage Management Plan – *Aboriginal Heritage Act 2006* Planning permits – *Planning and Environment Act 1987* Work authority and work plan – *Mineral Resources (Sustainable Development) Act 1990*
Commonwealth statutory approvals	The project – *Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)*
Exhibition	Permit applications: 20 July to 18 August 2021
Submissions	47 submissions received for the planning permit application (Appendix B1) 67 submissions received for the EES (Appendix B2)

Inquiry and Panel process	
The Inquiry and Panel	Con Tsotsoros (Chair), Rachael O'Neill (Deputy Chair), Jacquelle Gorski and Phil West
Supported by	Georgia Thomas, Project Officer, PPV
Directions Hearing	By video conference, 2 September 2022
Panel Hearing	In person and by video conference, 11, 12, 13, 14, 17, 18, 19, 24, 25, 26 and 27 October and 2, 3 and 4 November 2022
Site inspections	Unaccompanied, 10 October and 2 November 2022
Parties to the Hearing	See Report 2 Appendix C
Citation	Willatook Wind Energy Facility EES [2022] PPV
Date of this report	16 January 2023

Planning Panels Victoria

Executive summary

Victoria's Renewable Energy Action Plan seeks to increase renewable energy generation to 40 per cent of the state's energy use by 2025. It recognises wind energy facilities as a form of renewable energy.

The *Climate Change Act 2017* sets out a long-term emissions reduction target of net zero greenhouse gas emissions by 2050 and interim targets to be achieved by specified dates. State planning policy in all Victorian planning schemes seeks to support the provision and use of renewable energy in a manner that ensures appropriate siting and design considerations are met. Strategies to achieve this include:

- facilitate renewable energy development in appropriate locations and protect them from competing and incompatible uses
- reserving suitable land for future renewable energy infrastructure
- considering the economic, social and environmental benefits of renewable energy generation to the broader community while minimising the effects of a proposal on the local community and environment
- supporting wind energy facilities in locations with consistently strong winds.

The Moyne Shire is in a region with consistently strong winds and is home to 7 operating wind energy facilities. This may double to 14 facilities or about 12 per cent of total municipal land if facilities either with a permit or pending approval are constructed. Willatook Wind Farm Pty Ltd proposes one of those wind energy facilities in Willatook.

Willatook is in the Moyne Shire, about 32 kilometres northwest of Warrnambool and 3 kilometres northeast of Orford. Budj Bim National Park which includes the world heritage listed Mt Eccles and Lake Condah area is about 16 kilometres from the subject land. Moyne Shire also accommodates Warrnambool Airport which has a prescribed airspace.

The subject land and the broader area, has wetlands which attract wildlife including brolgas and bats.

The subject land has been selected because, among other reasons, it is strategically located, has strong reliable winds, is near high voltage transmission lines and connection infrastructure, has relatively low population density around it, and is away from tourist areas.

The Willatook facility, as proposed through Permit Applications PA2201620 and P22065:

- seeks to construct 59 wind turbines with a maximum height of 250 metres on a footprint of up to 99.5 hectares of a 4,154 hectare site in Willatook
- is anticipated to have an indicative capacity generation of 350 megawatts, with an annual generation of over 1300 gigawatt hours
- would power more than 200,000 homes in Victoria each year.

The Minister for Planning determined the project required an Environmental Effects Statement, and appointed the Inquiry and Panel (IAP) on 24 June 2022.

The permit applications were exhibited from 20 July to 18 August 2021 and attracted 47 submissions. The EES attracted 67 submissions. All submissions were referred to the IAP for its consideration. Issues raised in the submissions related to ground and surface water; biodiversity and habitat including the brolga and Southern bent-wing bats; noise and vibration; landscape and

visual amenity; heritage; proposed onsite quarry; aviation safety; traffic and transport and bushfire risk.

Ground and surface water

The environmental management measures in the Environmental Management Framework set an appropriate framework for managing groundwater during construction and operation of the wind energy facility. The construction of wind turbine foundations and access tracks and impermeable surfaces, once established, may have a localised impact to the groundwater table but are unlikely to negatively impact groundwater in the subject land.

Any future quarry, including potential impacts on groundwater, would be further investigated through a separate approval process.

The Environmental Effects Statement and permit application generally have appropriately assessed surface water. The environmental management measures in the Environmental Effects Statement and the permit conditions set an appropriate framework for managing surface water during different project phases.

The wetland inundation modelling would benefit from including rainfall data between 2020 and 2022 to determine current wetlands that hold water for 120 or more days at least once every 10 years.

Access tracks and hardstand areas can sensitively respond to existing drainage patterns and ecological values in the project area by ensuring that engineered structures are constructed to adequately maintain natural flow paths.

Biodiversity and habitat

The subject land has a complex of wetlands which form part of a network beyond the project area that are used for breeding and foraging over a considerable proportion of the year. This presents challenges for the wind energy facility.

The Willatook facility could deliver an acceptable cumulative impact on the brolga and Southern Bent-wing bat if it is redesigned to apply larger turbine-free buffers and to relocate turbines, consistent with recommendations of the Inquiry and Panel.

Publicly available standardised monitoring data should be available at a regional level to better understand whether the cumulative effects of operating and proposed wind energy facilities in south-west Victoria will significantly impact the brolga and Southern Bent-winged bat.

Brolga

The default 3.2 kilometre turbine-free buffer from a breeding site, as generally recommended in the Interim Brolga Guidelines:

- should be applied as a precautionary measure if a proposal is not supported by a relevant assessment
- should not be applied to the Willatook facility because the proposal is supported by relevant assessment which seeks to justify a reduced buffer.

The collision risk for the Willatook facility is considered low, consistent with estimated collisions at other wind energy facilities in the region. However, the project is likely to result in an unacceptable impact on the brolga because:

- the proposed 700-metre buffer, comprising 400 metres for foraging and 300 metres for disturbance, is insufficient to avoid significant impacts on breeding
- wetlands which can support brolgas were excluded from the impact assessment.

The Cockatoo Swamp Complex and surrounding wetlands form a network of wetlands which provide suitable breeding, foraging and roosting habitat during the brolga breeding period. The Environmental Effects Statement has inappropriately considered functional wetlands as only those that hold water for 120 or more days at least once every 10 years, greater than 0.6 hectares in size and with 20 per cent or more emergent vegetation cover. There is insufficient evidence to justify this criteria.

Historic breeding wetlands should be maintained as breeding wetlands, irrespective of whether they are considered to hold water for 120 or more days. The breeding home range of each known breeding wetland should be protected.

Wetlands should be considered suitable unless they have been confirmed as 'permanently drained'. Partially drained wetlands should be included in the brolga breeding home range.

Before the detailed design phase of the project, a LiDAR assessment should also extend beyond the project boundary to the east and south to confirm the project's access tracks will not impede natural hydrological flows between the properties that border the project area.

Before the final siting of turbine location, a LiDAR assessment should be conducted to confirm if wetland 25816 (Wild Dog Swamp) is an isolated wetland or located within 2 kilometres of suitable brolga breeding wetlands.

Modelled rainfall data influences the extent of wetland inundation and data from 2020 to 2022 would likely alter the assumed hydrological conditions for the wetlands and depict a greater extent of wetlands considered 'suitable' and inundated for at least 120 consecutive days.

Wetland 25932, though external to the project area is a recorded brolga breeding wetland, and wetlands within 2 kilometres should be considered in the brolga breeding home range and buffered accordingly.

A turbine-free buffer of 900 metres plus 95-metre rotor blade offset should be applied from the edge of each wetland and dam identified as suitable brolga habitat within the 2-kilometre brolga breeding home range. A foraging buffer of 600 metres would be more appropriate than the proposed 400 metres. Turbine-free buffers should apply to both current and historical breeding wetlands.

Isolated breeding wetlands should be protected with a 1369-metre buffer, plus a 300-metre disturbance buffer and a 95-metre blade length setback.

When weighed up with policies on renewable energy and when applying 995-metre buffers around brolga breeding wetlands and 200-metre buffers for the SBW bat, the project is acceptable. Applying these buffers would result in about 20 wind turbines on the subject land which is about one third of the total number of turbines proposed through the permit application. Approval for additional turbines would be subject to a detailed assessment at such time.

Southern Bent-wing bat

The Willatook facility will not significantly impact the Southern Bent-winged bat population if:

- a 200-metre turbine free buffer is applied around remnant and planted vegetation to avoid all potential foraging habitat in the project area

- turbines have a minimum cut-in speed of 4.5 metres each second during spring and summer when bat activity is higher, with this speed reviewed after the results of future trials of the effectiveness of this mitigation.

Flora and fauna

The Environmental Effects Statement has appropriately assessed the potential impacts to species listed in the *Environment Protection and Biodiversity Conservation Act 1999* and *Flora and Fauna Guarantee Act 1988*.

The Environmental Effects Statement includes appropriate management controls and mitigation measures which generally avoid and minimise impacts to all species, except for brolgas and bats.

A South West Renewable Energy Framework which includes measures to protect biodiversity values would assist regional-based wind energy facility planning, however this is beyond the scope of the Willatook facility proposal.

Noise and vibration

The measured background noise levels reported in the EES were undertaken in 2010. While these measurements were deemed appropriate, there were concerns about their relevance because of the age of the measurements. The Proponent should undertake further background noise measurements before construction commences.

The noise modelling of the operational turbine noise levels was undertaken using a potential turbine model. The modelling showed that the turbine noise levels will be less than 40 dB at non-stakeholder dwellings. The Proponent will undertake further turbine noise modelling of the actual turbine generator model before construction.

The EES used a noise limit criterion of 40 dB L_{A90} for the project. The option of using a criterion of background noise level +5 dB was not considered because the modelling showed that the turbine noise levels at impacted dwellings will be less than 40 dB L_{A90}.

The *Environment Protection Regulations 2021* govern how turbine noise is managed. The regulations refer to the *New Zealand Standard NZS6808:2010, Acoustics – Wind Farm Noise* to determine the noise limits, how measurement and modelling are undertaken and when the high-amenity criterion can be applied. The EES did not include the high-amenity criterion in the turbine noise limits for the project.

The EES modelled the turbine noise from the Willatook project and the Macarthur Wind Energy Facility to the north of the project area. The modelling indicated that the cumulative noise levels at location between the two wind energy facilities did not exceed the noise criterion set for either the Willatook project or the Macarthur Wind Energy Facility.

Compliance measurements and reporting of the turbine noise from the project will be in accordance with the requirements of the *Environment Protection Regulations 2021*.

Noise from the battery energy storage system and terminal substation will need to comply with the Environment Protection Regulations 2021. The project demonstrated that the noise from the facilities will meet the criteria at the nearest dwelling.

The construction of the various components of the project will be guided by the Construction Management Plan. The noise impacts from the potential quarry activities, tower construction and

generator installation and building of access roads will need to be managed. Construction activities should be avoided at night-time.

Landscape and visual amenity

Like any wind energy facility of this scale, the project will have a significant visual impact on the existing low scale rural landscape. The question is whether the impact is acceptable and whether any mitigation measures are needed.

The Landscape Visual Impact Assessment provides an appropriate comprehensive analysis of the landscape and visual impact, including its cumulative impact with existing and approved wind energy facilities.

There will be cumulative impacts through the siting of the project when viewed in conjunction with existing and approved wind energy facilities, however, the Willatook project will appear in the background from various vantage points which does not constitute an unacceptable impact.

There will be visual impacts on some residential properties that cannot be mitigated, but this must be balanced with the net benefit to the broader community resulting from renewable energy.

Heritage

The Environmental Effects Statement and permit applications have appropriately considered Aboriginal cultural heritage and historical cultural heritage. The project, when implemented with relevant management plans, will result in an acceptable impact on heritage. This extends to:

- Budj Bim Cultural Landscape (National Heritage List and World Heritage List) which currently does not have a World Heritage Environs Area buffer beyond its boundary
- Budj Bim National Heritage Landscape – Mt Eccles and Lake Condah Area (National Heritage List)
- old lava flows that have been identified as being relevant to Aboriginal cultural heritage that may be present on the subject land.

The project is unlikely to negatively impact Aboriginal cultural heritage if management conditions such as construction no-go zones are implemented. The Dry Stone Wall Management Plan and associated permit conditions will ensure future works sensitively respond to dry stone walls.

Potential quarry

A quarry is not proposed through a planning permit application but will be considered through a future separate statutory process. That process should consider:

- the potential quarry's impact to the groundwater resource and the extent of groundwater drawdown
- the extent of reduced groundwater levels which may impact aquatic Groundwater Dependent Ecosystems (GDE) and potential wetlands within the brolga home range
- impact from the reduced water table, and the degree of impact which would depend on the reliance that existing users and GDE have on groundwater and the extent, timing and duration of impacts resulting from project activities.

Impacts to visual amenity, geophysics, heritage, surface water, groundwater and noise and vibration can be managed through the Planning Permit and Environmental Management Framework subject to implementing IAP recommended changes to Environmental Management Measures and permit conditions.

Aviation safety

The project proposes wind turbines which would breach Warrnambool Airport's prescribed air space. This issue remains unresolved. If Warrnambool Airport is not willing to realign its flight path so the two can co-exist, then the offending wind turbines should be redesigned to not enter prescribed air space. The IAP's preferred permit conditions seek to address this.

Traffic and transport

The mitigation measures in the Environmental Effects Statement Traffic Impact Assessment are generally appropriate to manage traffic related project impacts, including access from the Port of Portland, and will be managed through a Traffic Management Plan. Environmental Management Measures TT11 and TT12 should remain as exhibited.

Bushfire risk

The Environmental Effects Statement and permit applications have appropriately considered external bushfire risk to the proposed wind energy facility. The Willatook facility and battery storage will result in an acceptable bushfire risk on the local community if the proposed permit conditions, including those from the Country Fire Authority and Moyne Shire Council, are included.

There is no evidence the wind turbines will negatively affect aerial fire fighting. The scale of vegetation intended to screen the visual impact of wind turbines is unlikely to result in an unacceptable bushfire risk.

Land use, planning and overall cumulative effects

The project appropriately responds to the draft land use and planning objective of the Environmental Effects Statement scoping requirements.

Based on available information, the Willatook facility combined with other operating facilities is unlikely to result in a unacceptable cumulative impact if recommended measures and permit conditions are applied.

Each proponent of a wind energy facility should be required to provide data related to issues such as brolgas and bats in a standardised comparable format so it can be saved into a publicly accessible information sharing platform that can be analysed on a regional scale such as south-west Victoria. There is no formal recommendation because this is beyond the scope of the Willatook facility proposal.

Matters of national environmental significance

The Inquiry and Panel finds the construction and operation of the Willatook facility is unlikely to significantly impact matters of national environmental significance including nationally threatened species, threatened ecological communities and migratory species if the Environmental Management Measures and permit conditions recommended in Report 2 Appendices F and G are implemented.

Recommendations

Based on the reasons set out in this Report, the Inquiry and Panel recommends:

1. **Include Wetlands W1, W3, W4, W7, W10, W12 (26028), W13, 25241, 25710, 25721, 25729, 25731, 25741, 25816, 25932, 25941, FD2, FD16, FD21 and 12a as suitable brolga**

breeding wetlands within the brolga breeding home range unless they are permanently drained.

2. **Before a permit decision, the Proponent conduct additional assessments for:**
   a) **wetland 25698 to confirm if it is hydrologically unsuitable for brolgas or permanently drained**
   b) **wetland 25668 to determine the reasons for the LiDAR assessment reducing its extent.**
3. **Following the outcome of assessments in Recommendation 2, the Minister for Planning issue:**
   a) **Planning Permit PA2201620 (Moyne Planning Scheme) for the Willatook wind energy facility with the conditions shown in Appendix G and subject to**
   b) **Planning Permit P22065 (Moyne Planning Scheme) for native vegetation removal with the conditions shown in Appendix H.**

PART A: BACKGROUND

Planning Panels Victoria

1 The inquiry and panel process

1.1 Inquiry and Panel appointment and role

The Minister for Planning appointed the Inquiry and Panel (IAP) on 24 June 2022 pursuant to section 9(1) of the *Environment Effects Act 1978* (EE Act) and section 8 of the *Planning and Environment Act 1987* (PE Act) to inquire into and report on the 59-turbine wind energy facility proposed in Willatook (the project).

The Minister for Planning signed the Terms of Reference for the Inquiry on 24 June 2022 shown in Appendix A.

1.1.1 Terms of Reference

Clause 5 of the Terms of Reference require the IAP as the Inquiry to:

a. review and consider the environmental effects statement (EES), submissions received in relation to the project and the predicted environmental effects;
b. consider and report on the potential environmental effects of the project, including their significance and acceptability, and in doing so have regard to the draft evaluation objectives in the EES scoping requirements and relevant policy and legislation;
c. identify any measures it considers necessary and effective to avoid, mitigate or manage the environmental effects of the project within acceptable limits, including any necessary project modifications; and
d. advise on how this relates to relevant conditions, controls and requirements that could form part of the necessary approvals/consent for the project.

1.1.2 Inquiry response to Terms of Reference

Terms of Reference Clause 36 sets out what the Inquiry must include in its report. Table 1 references the report section which responds to each requirement.

Table 1 Inquiry response to Terms of Reference

Terms of Reference report requirements	Relevant report reference
Clause 36	
a. analysis and conclusions with respect to the environmental effects of the project and their significance and acceptability	Chapters 4 to 11
b. findings on whether acceptable environmental outcomes can be achieved, having regard to legislation, policy, best practice, and the principles and objectives of ecologically sustainable development	Chapters 4 to 11
c. recommendations and/or specific measures that it considers necessary and appropriate to prevent, mitigate or offset adverse environmental effects having regard to legislation, policy, best practice, and the principles and objectives of ecologically sustainable development	Chapters 4 to 11
d. recommendations on any feasible modifications to the design or management of the project that would offer beneficial outcomes, including any considered appropriate to prevent or mitigate significant adverse environmental effects	Chapters 4 to 11
e. recommendations for any appropriate conditions that may be	Chapters 4 to 11

	lawfully imposed on any approval for the project, or changes that should be made to the planning permit in order to ensure that the environmental effects of the project are acceptable having regard to legislation, policy, best practice, and the principles and objectives of ecologically sustainable development	
f.	recommendations as to the structure and content of the proposed environmental management framework, including with respect to monitoring of environmental effects, contingency plans and site rehabilitation	Appendix F
g.	recommendations with respect to the structure and content of the planning permit	Appendices G and H
h.	specific findings and recommendations about the predicted impacts on matters of national environmental significance and their acceptability, including appropriate controls and environmental management	Chapter 12
Clause 37		
a.	information and analysis in support of the Inquiry's findings and recommendations	Chapters 4 to 11
b.	a list of all recommendations, including cross-references to relevant discussions in the report	Executive summary
c.	a description of the public hearing conducted by the Inquiry, and a list of those persons consulted with or heard	Chapter 1.2
d.	a list of all submitters in response to the exhibited EES	Appendix B
e.	a list of the documents tabled during the proceedings	Appendix D

1.2 IAP process

(i) Directions Hearing

The Directions Hearing was held by video conference on 2 September 2022, followed by written directions set out in the IAP's letter to parties dated 7 September 2022.

(ii) Public Hearing

The main Hearing was held at Warrnambool and by video conference over 15 days between 11 October and 4 November 2022. Recordings of the expert witness evidence in chief and cross examination were made available to parties. Parties to the Hearing are shown in Appendix C.

All documents and materials circulated during the IAP process:

- were assigned a document number
- recorded on the IAP's document list
- published on the Engage Victoria website
- appear in Appendix D.

Hearing procedural matters are summarised in Appendix E.

(iii) Site inspections

The IAP members conducted unaccompanied inspections on 10 October and 2 November 2022. Numerous parties nominated specific sites and features for this inspection, after the IAP provided the opportunity to do so by 26 September 2022.

1.3 Report approach and structure

The IAP received a significant volume of information including:

- 67 submissions on the EES
- 47 submissions on the permit applications
- 243 tabled documents.

In its report, the IAP has considered but not addressed every issue put to it, nor has it responded to every written submission or further submission made to it at the Hearing. Due to time constraints, it has distilled its considerations through identifying the high-level key issues and what it considers to be the determinative issues in its review, considerations, findings and recommendations.

(i) Report structure

The IAP has prepared two reports.

Report 1 – Key considerations, discussion, findings and recommendations

Report 1 is set out as:

- PART A: BACKGROUND
  - Chapter 1: The Inquiry process
  - Chapter 2: The project
  - Chapter 3: The assessment framework
- PART B: ENVIRONMENTAL EFFECTS ASSESSMENT
  - Chapter 4: Ground and surface water
  - Chapter 5: Biodiversity and habitat
  - Chapter 6: Noise and vibration
  - Chapter 7: Landscape and visual amenity
  - Chapter 8: Heritage
  - Chapter 9: Potential quarry
  - Chapter 10: Other issues
  - Chapter 11: Integrated assessment and environmental framework
- PART C: NATIONAL ENVIRONMENTAL SIGNIFICANCE AND RESPONSE TO THE TERMS OF REFERENCE
  - Chapter 12: Matters of national environmental significance.

Report 2 – Appendices

Report 2 contains:

- Appendix A: Terms of Reference
- Appendix B: Submitters to the planning permit and EES
- Appendix C: Parties to the Hearing
- Appendix D: Document list
- Appendix E: Procedural matters
- Appendix F: Inquiry recommended Environmental Management Measures

- Appendix G: Panel recommended Planning Permit PA2201620 conditions
- Appendix H: Panel recommended Planning Permit PA22065 conditions.

(ii) Terminology

Wind energy facility

The IAP refers to a wind energy facility which accurately describes the proposed land use and development. This report includes quotes which refer to a 'wind farm'. Any reference to a wind farm is interchangeable with the term 'wind energy facility'.

DELWP

The Department of Environment, Land, Water and Planning (DELWP) made submissions at the Hearing through the following units:

- Development Approvals
- Forest, Fire and Region (Barwon Southwest)
- Impact Assessment Unit.

The report refers to DELWP without noting each unit because DELWP is a single state government department. The IAP acknowledges that each unit has different roles.

New state government departments

On 1 January 2023, the state government formed, among others, two new departments:

- Department of Department of Energy, Environment and Climate Action
- Department Transport and Planning.

For simplicity, the report refers to DELWP which existed during most of the IAP process.

State government departments referred to in this report reflect their names before 1 January 2023.

2 The project

2.1 Chronology of events

Table 2 Chronology of events

Date	Event
2018	
September	Project referred to the Minister for Planning under the *Environment Effects Act 1978* (EE Act)
27 December	Minister for Planning determined to require an Environmental Effects Statement (EES) under the EE Act for the proposed Willatook wind energy facility (Willatook facility)
2019	
8 April	Project referred to the Commonwealth Minister for the Environment under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
July and August	Draft scoping requirements were publicly exhibited for three weeks
12 June	Commonwealth Minister for the Environment delegate determined that the project is a 'controlled action' and requires assessment and approval under the EPBC Act
August	Minister for Planning approved and published the final EES scoping requirements
2022	
2 May	Proponent lodged planning permit application PA2201620 for the Willatook facility with the Minister for Planning
6 May	Proponent lodged planning permit application P22065 (native vegetation) with Glenelg Shire Council
23 May	Proponent requested authorisation to exhibit the EES
24 June	Minister for Planning appointed the Inquiry and Panel (IAP) and signed the associated Terms of Reference Department of Environment, Land, Water and Planning authorised EES exhibition
4 July – 12 August	EES and permit applications were exhibited – 114 submissions were received (EES for the EES and 47 for the permit applications)

2.2 The project area and context

The subject land, otherwise referred to as the project area, comprises 4,154 hectares of land identified within the 'Willatook Wind Farm Boundary' identified in Figure 1.

The subject land is:

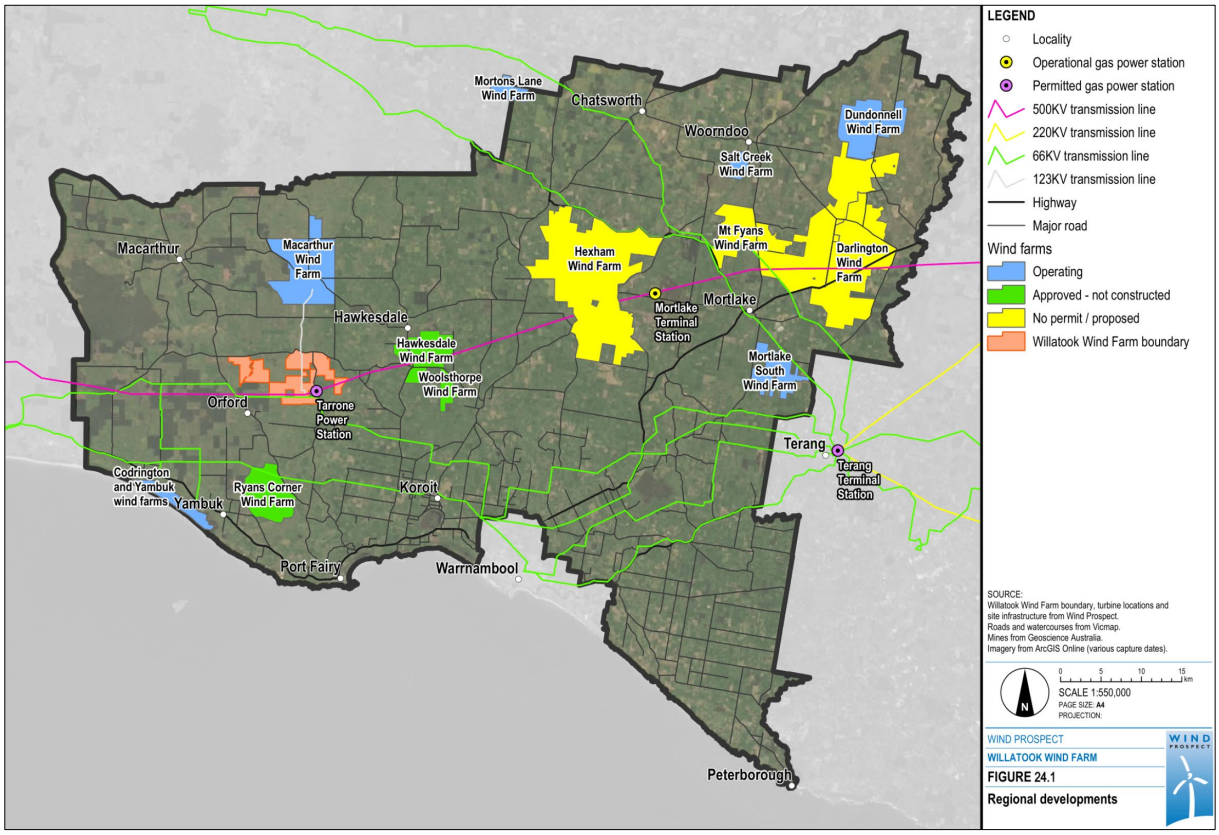
- in the Moyne Shire
- south of Woolsthorpe–Heywood Road
- east of Rowbottoms Road and Hamilton–Portland Road
- across both sides of Tarrone North Road
- around the existing Tarrone Terminal Station

- near and around the 500 kilovolt Moorabool to Heywood high voltage overhead transmission lines.

The subject land is about:

- 3 kilometres northeast of Orford and 10 kilometres southwest of Hawkesdale
- 16 kilometres east of the Budj Bim National Park which includes the world heritage listed Mt Eccles and Lake Condah area
- 22 kilometres northwest of Warrnambool Airport
- 32 kilometres northwest of the Warrnambool centre.

Figure 1 Regional context



Source: EES Chapter 24, Figure 24.1

The project is proposed in a region which has operating, permitted and proposed wind energy facilities, as shown in Figure 1 and Table 3.

Table 3 Relevant wind energy facilities in the region

Facility	Location	From subject land	No of turbines	Tallest tip height (m)
Operating				
Macarthur	~10km from Macarthur	~7km	140	135
Salt Creek	~40km from Hamilton	~55km	15	150
Dundonnell	~23km from Mortlake	~70km	80	189
Mortlake South	~5km from Mortlake township	~55km	35	186
Codrington	~25km from Port Fairy	~18km	14	81
Yambuk	~20km from Port Fairy	~16km	20	106
Mortons Lane	~25km from Hamilton	~40km	13	150
Permitted				
Ryan Corner	~12km from Port Fairy	~9km	52	180
Hawkesdale	Several km from Hawksedale	~7km	23	180
Woolsthorpe	~4km from Woolsthorpe	~12km	20	168
Proposed / no permit				
Willatook	~3km from Orford	-	59	250
Mt Fyans	~5km from Mortlake	~45km	85	200
Hexham	~15 km from Mortlake and Woolsthorpe	~25km	108	250
Darlington	abuts Dundonnell and Mt Fyans site areas	-	-	-
Total turbines			**664**	

Source: EES Chapter 24, Figure 21.1 and Table 24.2

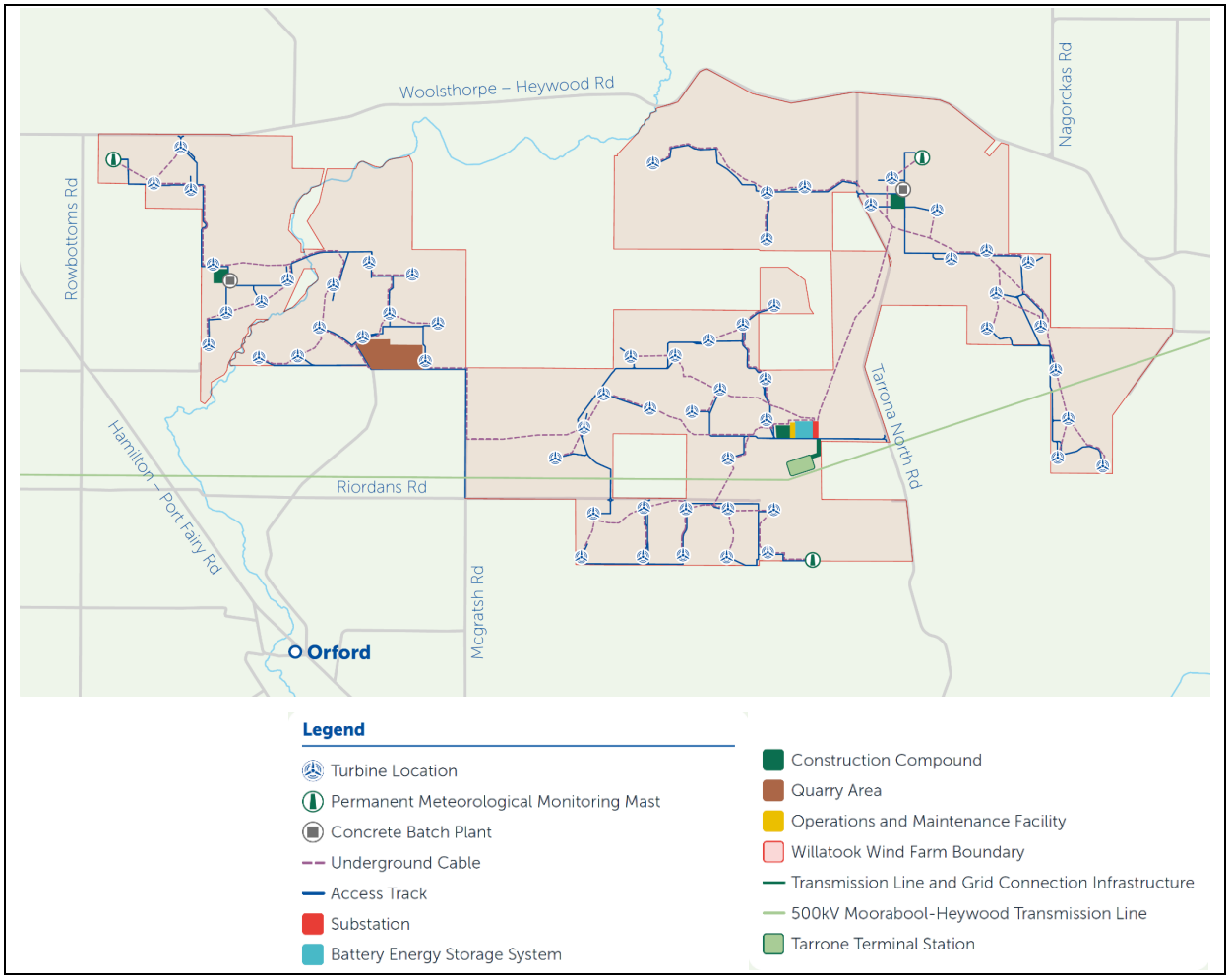
2.3 Project details

EES Chapter 5 describes the project. The permit applications propose a wind energy facility, as shown in Figure 2, comprising:

- 59 wind turbines with a maximum height of 250 metres to the blade tip
- an indicative capacity generation of 350 megawatts
- an annual generation of over 1300 gigawatt hours
- about 112.6 kilometres of underground 33 kilovolt electricity cable with fibre-optic cabling to connect the wind turbines to the on-site substation
- about 62.1 kilometres of trenches to bury the cable up to one metre below the surface
- an on-site substation with a footprint of up to 70 metres by 220 metres to connect to the Moorabool to Heywood transmission line through the Tarrone Terminal Station
- up to three permanent meteorological masts and the construction of a single-lane access track roughly 3 metres in width
- an operations and maintenance facility about 70 metres by 220 metres
- wind turbine hardstand area of 6500 square metres for each turbine totalling 38.3 hectares for all project turbines

- four staging areas up to 320 metres in length and passing lanes of 25 metres in length
- access tracks that are approximately 60 kilometres in length and 6 metres wide
- a battery energy storage system with a capacity of 200 megawatts and 400 megawatt hours consisting of 20-foot modular batteries with transformers, high-voltage AC coolers. It would be situated on a hardstand area of up to 2 hectares
- a synchronous condenser with:
  - capacity of about 30 megavolt amperes
  - a footprint of approximately 15 by 20 metres
- 12 project area access points from the Woolsthorpe–Heywood Road, Tarrone North Road, Riordans Road and Old Dunmore Road of 6 metres in width and a minimum 30 metre turning radius
- a temporary construction compound comprising office facilities, amenities and car parking
- three concrete batching plants
- four laydown hardstand areas for the storage of wind turbine components and equipment
- a temporary onsite quarry of approximately 30 hectares, with the extraction area being 10.5 hectares and a maximum depth of 14 metres.

Figure 2 The project



Source: EES Summary

2.4 Project rationale and assessment

EES Chapter 2 sets out the project rationale, which is broadly summarised below.

(i) Subject land characteristics

The subject land was selected for the project because it:

- has strong and reliable winds, as confirmed through long-term wind monitoring
- is near existing high voltage transmission lines and connection infrastructure
- is surrounded by relatively low population density in open farmland, away from larger coastal populations and tourist areas
- has good vehicle access to a port and existing road network
- has a relatively flat terrain for constructing a wind energy facility
- is largely cleared, with few environmental constraints
- is appropriately zoned (mostly Farming Zone) which allows a wind energy facility subject to meeting certain planning provisions.

(ii) Policy context

The project is influenced by local, state and national government policies, and international frameworks. These include:

- United Nations sustainable development goals and targets
- 2016 Paris agreement to limit global warming to below 2 degrees Celsius
- Australian government renewal energy target and initiatives agreement, including those in response to the Paris agreement
- Victorian government's Renewable Energy Roadmap, Renewable Energy Action Plan, Climate Change Strategy
- Victoria Planning Provisions and local and regional planning policies.

(iii) Project objectives

The project would:

- deliver affordable and reliable electricity generated by renewable energy to the electricity grid
- support Victoria's Renewable Energy Target
- support the Commonwealth Government's greenhouse gas emissions reduction target
- improve network strength through the development of a firmed power supply
- minimise negative, and maximise positive, effects on the environment and communities
- support the local community and the local economy
- support participating and neighbouring landowners
- engage and work with community and stakeholders to identify any potential environmental impacts and implement appropriate mitigation and/or monitoring measures.

2.5 Scoping requirements and evaluation objectives

The Minister for Planning issued the EES scoping requirements in August 2019. The scoping requirements outlined the matters to be investigated in the EES. In setting out these matters, the scoping requirements identified the environmental effects and evaluation objectives which are outlined in Table 4.

Table 4 Scoping requirements and evaluation objectives

Environmental effect	Evaluation objective
Biodiversity and habitat	To avoid or minimise potential adverse effects on biodiversity values within and near the site including native vegetation, listed threatened species and ecological communities, and habitat for these species. Where relevant, offset requirements are to be addressed consistent with state and Commonwealth policies
Catchment values and hydrology	To maintain the functions and values of aquatic environments, surface water and groundwater quality and stream flows and avoid adverse effects on protected beneficial uses
Geoheritage values	To minimise and manage potential adverse effects to geoheritage values.
Amenity	To minimise and manage adverse air quality and noise and vibration effects on residents and local communities as far as

	practicable during construction, operation and decommissioning having regard to applicable limits, targets or standards.
Cultural heritage	To avoid or minimise adverse effects on Aboriginal and historic cultural heritage and associated values.
Land use and socioeconomic	To avoid and minimise adverse effects on land use (including agricultural and residential), social fabric of the community (with regard to wellbeing, community cohesion), local infrastructure, electromagnetic interference, aviation safety and to neighbouring landowners during construction, operation and decommissioning of the project.
Traffic and roads	To avoid and minimise adverse effects on roads and road users during construction, operation and decommissioning of the project.

3 The assessment framework

EES Chapter 3 and Appendix H (Planning and land use planning) sets out the relevant legislative framework, planning policies and provisions, as set out in this chapter.

3.1 Required approvals

(i) State approval process

The project needs to be assessed under the State EE Act. The EES process is an assessment process only and will inform the project approvals. It does not result in project approval.

The planning permits are the key state approval needed for the project. The Planning Application Report identifies the following permit triggers for the project:

- Clause 35.07 (Farming Zone): change in use of land and buildings and works for a wind energy facility and utility installation
- Clause 36.04 (Transport Zone): use and develop land for a utility installation
- Clause 37.01 (Special Use Zone Schedule 6): use and develop land for a wind energy facility, and use and develop a utility installation
- Clause 42.01 (Environmental Significance Overlay Schedule 4): remove native vegetation
- Clause 52.05 (Signs): develop business identification signage in the Farming Zone (Category 4 – Sensitive areas)
- Clause 52.17 (Native vegetation): remove native vegetation
- Clause 52.29 (Land adjacent to the Principal Road Network): create or alter access to a Transport Zone 2 (Woolsthorpe–Heywood Road)
- Clause 52.32 (Wind energy facility): use and develop land for a wind energy facility
- Clause 52.33 (Post boxes and dry stone walls): demolish, remove or alter a dry stone wall.

Other approvals, as identified in the EES, include:

- an approved Cultural Heritage Management Plan under the *Aboriginal Heritage Act 2006* to manage works in areas of cultural heritage sensitivity
- a permit to remove listed flora and fauna under the *Flora and Fauna Guarantee Act 1988*
- a works approval under the *Mineral Resources (Sustainable Development) Act 1990* (Vic).

(ii) Commonwealth approval process

The project was deemed a 'controlled action' under the EPBC Act on 12 June 2019 and the EES process is an accredited process to assess impacts on matters of national environmental significance. Under the EPBC Act, the (Federal) Minister for Environment will decide on whether to approve the project or to approve it subject to conditions.

3.2 Legislation

(i) Environment Protection Act 2017

The *Environment Protection Act 2017* (EP Act):

- does not specifically address impacts of wind energy facilities
- details high level requirements which enable the development of specific mechanisms to manage wind energy facility impacts such as turbine noise.

The EP Act requires a general environmental duty (GED) for all industries and individuals in Victoria who are "*engaged in an activity that may give rise to risks of harm to human health or the environment from pollution of waste must minimise those risks, so far as reasonably practicable*".

Most industries in Victoria achieve the GED requirements, with the EPA working with non-compliant industries to achieve GED. For wind energy facility projects, achieving the permitted noise limits is required to achieve the GED.

(ii) Environment Protection Regulations 2021

The *Environment Protection Amendment (Wind Turbine Noise) Regulations 2021*:

- came into effect on 18 October 2022 and determine the turbine noise limits for a wind energy facility such as the project
- amended the initial *Environment Protection Regulations 2021* so that wind turbine noise could be managed by the Environment Protection Authority
- was due to the new requirements for all industrial environmental impacts in Victoria to be managed by the EP Act
- set out what wind facility operators must do to comply with the EP Act
- resulted in Amendment VC206 to the Victorian Planning Provisions which amended Clause 52.32 to remove the requirement for post-construction noise permit conditions for wind energy facilities.

Part 5.3 of the *Environment Protection Regulations 2021* was amended to include Division 5 – Wind turbine noise, with addition conditions:

- 131A – Wind turbine noise agreements between the facility owner/operator and the relevant landowner as to the noise limits that will apply to the land
- 131B – The relevant standard that will apply to the wind energy facility; in this regulation the standard is the New Zealand Standard 6808:2010 (NZ Standard)
- 131C – Duties of the wind energy facility to ensure that the noise from the facility complies with the NZ Standard
- 131D – Requirements for post-construction noise assessments
- 131E – Noise management plan to be developed by the owner/operator of the facility,
- 131F – Preparation of an annual statement
- 131G – Wind turbine noise monitoring within 3 months of the 5th anniversary and every subsequent 5 years (from 1 January 2024)
- 131H – Definition of unreasonable noise
- 131I – Functions of environmental auditors.

Section 131CA of the regulations requires that the operator of the facility "*must ensure that the wind turbine noise from the facility complies with the noise limit for that facility*".

Section 131 H of the regulations deems wind turbine noise as being unreasonable if the noise limit is exceeded. Whilst other sections of the regulation define aggravated noise from residential activities, commercial, industry and trade activities and entertainment venues, wind turbine noise is not considered aggravated.

(iii) Public Health and Well-being Act 2008

Legislative changes have occurred to the nuisance provisions of the *Public Health and Well-being Act 2008* as a result of the introduction of the EP Act 2017. Turbine noise and other emissions

from wind energy facilities have been specifically excluded from the nuisance provisions of the Public Health and Well-being Act.

3.3 Planning Scheme policy and provisions

EES Appendix H (land use and planning) outlines the relevant state and local planning policy as set out in the Victoria Planning Provisions, Moyne Planning Scheme, and other supporting strategic documents. The relevant planning scheme policies are outlined below.

(i) State Planning Policy

Clause 11.01 (Settlement) seeks to support development and investment in small towns that are facing economic and population challenges (11.01-1S Settlement – Great South Coast).

Clause 11.02 (Managing growth) seeks to maintain access to productive natural resources and an adequate supply of well-located land for energy generation, infrastructure and industry (11.02-1S – supply of urban land).

Clause 12.01 (Biodiversity) seeks to:

- use biodiversity information to identify important areas of biodiversity, including key habitat for rare or threatened species and communities, and strategically valuable biodiversity sites (12.01-1S protection of biodiversity)
- strategically plan for the protection and conservation of Victoria's important areas of biodiversity (12.01-1S protection of biodiversity)
- ensure that decision making takes into account the impacts of land use and development on Victoria's biodiversity, including consideration of cumulative impacts and fragmentation of habitat (12.01-1S protection of biodiversity).

Clause 12.03 (Water bodies and wetlands) seeks to ensure development does not compromise bank stability, increase erosion or impact on a water body or wetland's natural capacity to manage flood flow (12.03-1S river corridors, waterways, lakes and wetlands).

Clause 13.05 (Noise) seeks to:

- ensure that development is not prejudiced and community amenity and human health is not adversely impacted by noise emissions (13.05-1S noise management)
- minimise the impact on human health from noise exposure to occupants of sensitive land uses (13.05-1S noise management).

Clause 13.06 (Air quality) seeks to:

- assist the protection and improvement of air quality
- minimise air pollutant exposure to occupants of sensitive land uses near the transport system through suitable siting, layout and design responses (13.06-1S air quality management).

Clause 14.01 (Agriculture) seeks to protect the state's agricultural base by preserving productive farmland (14.01-1S – protection of agricultural land).

Clause 19.01 (Energy) seeks to:

- facilitate renewable energy development in appropriate locations (19.01-2S renewable energy)
- support wind energy facilities in locations with consistently strong winds over the year (19.01-2S renewable energy)

- consider the economic, social and environmental benefits to the broader community of renewable energy generation while also considering the need to minimise the effects of a proposal on the local community and environment (19.01-2S renewable energy)
- facilitate renewable energy generation and storage to meet on-site energy needs (19.01-1S energy supply)
- plan for and sustainably manage the cumulative impacts of alternative energy development (19.01-2R: renewable energy – Great South Coast).

(ii) Moyne Planning scheme provisions

The Farming Zone and Special Use Zone apply to the subject land and the Bushfire Management Overlay and Environmental Significance Overlay Schedules 4 and 5 apply to part of it. The land abuts Transport Zone 2.

A common purpose of zones and overlays is to implement the Municipal Planning Strategy and the Planning Policy Framework. Other zone and overlay purposes are set out in Table 5.

Table 5 Zone and overlay purposes

Purposes	
Zones	
Farming	To provide for the use of land for agriculture. To encourage the retention of productive agricultural land. To ensure that non-agricultural uses, including dwellings, do not adversely affect the use of land for agriculture. To encourage the retention of employment and population to support rural communities. To encourage use and development of land based on comprehensive and sustainable land management practices and infrastructure provision. To provide for the use and development of land for the specific purposes identified in a schedule to this zone.
Special Use	To facilitate the development and use of a gas-fired power station. To provide for electricity generation using natural gas as the energy source.
Transport Zone 2	To identify significant roads.
Overlays	
Bushfire Management	To ensure that the development of land prioritises the protection of human life and strengthens community resilience to bushfire. To identify areas where the bushfire hazard warrants bushfire protection measures to be implemented. To ensure development is only permitted where the risk to life and property from bushfire can be reduced to an acceptable level.
Environmental Significance	To identify areas where the development of land may be affected by environmental constraints. To ensure that development is compatible with identified environmental values.

Other relevant planning provisions

Planning Scheme Clauses 52.05 (Signs), 52.17 (Native vegetation), 52.29 (Land adjacent to the Principal Road Network), 52.32 (Wind energy facility) and 52.33 (Post boxes and dry stone walls) are relevant to the permit applications.

Clause 52.32 (Wind energy facility)

The purpose of Clause 52.32 is to facilitate the establishment and expansion of wind energy facilities, in appropriate locations, with minimal impact on the amenity of the area. It requires a permit to use land to develop a wind energy facility.

Clause 52.32 requires:

- A pre-construction (predictive) noise assessment report demonstrating that the proposal can comply with the New Zealand Standard NZS6808:2010, Acoustics – Wind Farm Noise, including an assessment of whether a high amenity noise limit is applicable under Section 5.3 of the Standard.
- An environmental auditor appointed under Part 8.3 of the *Environment Protection Act 2017* must prepare a report that verifies if the acoustic assessment undertaken for the purpose of the pre-construction (predictive) noise assessment report has been conducted in accordance with the Standard.

The decision guidelines require the approval authority to consider:

- *Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria* (Department of Environment, Land, Water and Planning, November 2021).
- The New Zealand Standard NZS6808:2010, Acoustics – Wind Farm Noise.

3.4 Policies and strategies

(i) Great South Coast Regional Growth Plan 2014

The Great South Coast Regional Growth Plan 2014 identifies important regional economic opportunities that promote growth including the development of new and renewable energy infrastructure.

(ii) Great South Coast Regional Strategic Plan 2014-19

The Great South Coast Regional Strategic Plan 2014-19 provides a strategy for the long-term sustainable growth of the Great South Coast through the identification of challenges and opportunities to achieve sustainable economic and social development.

(iii) Protecting Victoria's Environment – Biodiversity 2037

Protecting Victoria's Environment – Biodiversity 2037 is a plan that promotes collaboration across government to improve conservation of Victoria's biodiversity. In particular, the plan aims to reduce biodiversity loss through habitat conservation.

(iv) Victoria's Climate Change Strategy

The Victorian Governments Climate Change Strategy is a roadmap to net-zero emissions and climate resilience by 2050. The government has set targets to reduce the state's greenhouse gas

emissions from 2005 levels by 28–33 per cent by 2025 and 45–50 per cent by 2030. The transition to renewable energy is a key objective in achieving this strategy.

3.5 Guidelines, standards and protocols

(i) Development of Wind Energy Facilities in Victoria, Policy and Planning Guidelines

The *Development of Wind Energy Facilities in Victoria, Policy and Planning Guidelines*, DELWP, July 2021 (WEF Guidelines) provides the framework for a planning permit proposing a wind energy facility. Regarding turbine noise, the WEF Guidelines state:

> The proponent is required to submit a pre-construction (predictive) noise assessment report demonstrating that the proposal can comply with New Zealand Standard NZS6808:2010, Acoustics – Wind Farm Noise, including and assessment of whether a high amenity noise limit is applicable under Section 5.3 of the Standard.
>
> …
>
> From the 1 July 2021 *Environment Protection Act 2017* introduces changes aimed to position the Environment Protection Authority (EPA) as the single regulator of operational wind turbine noise. Amendment VC203 to the VPP and all planning schemes supported these changes by removing planning requirements for the regulation of operational wind turbine noise for a wind energy facility.

The pre-construction noise assessment report must be accompanied by a report undertaken by a qualified environmental auditor (EPA appointed); the audit report will give an opinion of the acoustic assessment being conducted in accordance with NZS6808:2010.

(ii) New Zealand Standard NZS6808:2010, Acoustics – Wind Farm Noise

The *New Zealand Standard NZS6808:2010, Acoustics – Wind Farm Noise* (NZ Standard):

- provides guidance in the measurement and modelling of turbine noise as well as setting the noise limits depending upon the background noise level, planning zones and amenity
- has been subjected to many wind energy facility proposal assessment reviews as well as a challenge at *VCAT (P2910/2012, Cherry Tree Wind Farm Pty Ltd v Mitchell Shire Council*, 2013).

The Standard states:

> The recommended noise limits recommended in this Standard provide a reasonable rather than an absolute level of protection of health and amenity.
>
> …
>
> 5.1.1 Limits for wind farm sound are required to provide protection against sleep disturbance and maintain reasonable amenity at noise sensitive locations.
>
> …
>
> **5.2 Noise Limit**
>
> 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.
>
> …
>
> **5.3 High Amenity Areas**
>
> 5.3.1 ….. A high amenity noise limit should be considered where a plan promotes a high degree of protection of amenity related to the sound environment of a particular area, for example where evening and night-time noise limits in the plan for general sound sources are more stringent that 40 dB $L_{Aeq(15\,min)}$ or 40 dBA L_{10}. A high amenity limit should not be applied in any location where background noise levels,

> assessed in accordance with section 7, are already affected by other sources, such as road traffic sound.

The 'plan' referred to in the New Zealand Standard is defined in the New Zealand Resources Management Act and "*means a regional plan or a district plan*". The equivalent in the Victorian context would be a planning zone, planning overlay, or an area identified in a precinct strategic plan.

The noise limits in the New Zealand are intended to provide reasonable protection against loss of amenity or sleep disturbance; while the noise limits apply to the outside of a noise sensitive location, the resultant noise levels within a noise sensitive building should be adequate to preserve the amenity and sleep.

(iii) EPA Noise Protocol

The EPA Noise Limit and Assessment Protocol (Noise Protocol):

- applies to the assessment and application of noise limits to commerce, industry and trade as well as entertainment venues (both indoors and outdoors)
- does not apply to turbine noise from the proposed wind energy facility
- will apply to the quarrying of materials during the construction period, operation of the battery storage facility, terminal facility and the workshop and office facilities
- has a different approach for activities in rural areas to that of an urban area.

The noise limits in rural areas are:

- based on estimate of the background noise levels at the noise source and the impacted dwelling
- not onerous on the industry in that the controls recognise the balancing of the development and operation of industry, commerce and trade development in quiet rural areas while not allowing noise levels to degrade the local amenity.

(iv) EPA Civil construction, building and demolition guide

The EPA *Civil construction, building and demolition guide*, Publication 1834, November 2020 replaces several EPA publications dealing with noise impacts from a variety of construction and demolition activities. A wind energy facility would need to comply with these guidelines.

Generally, the control of noise and vibration from construction sites is not fully dependent on establishing noise limits for activities and monitoring compliance, but to apply management protocols that result in processes that minimise the noise impacts of the various activities.

PART B: ENVIRONMENTAL EFFECTS ASSESSMENT

Planning Panels Victoria

4 Ground and surface water

4.1 Groundwater

(i) The issues

The issues are:

- whether impermeable surfaces, wind turbine foundations and access tracks will negatively disrupt groundwater recharge and natural flows
- whether a potential quarry will result in drawdown that will compromise groundwater dependent ecosystems
- whether dewatering of groundwater associated with a potential quarry will negatively affect the water table if a 10 hectare dam is established.

(ii) Background

EES

The EES Scoping Requirement specific to groundwater is:

> Potential for the project to have a significant effect on surface water and/or groundwater and its beneficial uses, including through the temporary on-site quarry.

Environmental Management Framework (EMF) environmental management measures GW01 to GW11 and EES Chapter 9 Groundwater, Appendix B Hydrogeological and Hydrological Investigation, Appendix E Biodiversity and Attachment II Preliminary Draft Quarry Work Plan are all relevant to groundwater.

Groundwater assessment

Water Technology Pty Ltd prepared the Willatook Wind Farm Hydrogeological and Hydrological Investigation (EES Appendix H). The hydrogeological assessment is summarised in EES Chapter 9 (Groundwater). Aspects relating to Groundwater Dependent Ecosystems (GDE) are considered in the biodiversity impact assessment completed by Nature Advisory Pty Ltd (EES Appendix D) and the impacts of the quarry to the groundwater are explored in Attachment II (Preliminary Draft Quarry Work Plan).

The EES groundwater assessment included a desktop assessment of the geology and the hydrogeological aquifers in the project area. Groundwater level measurements were taken during May 2016 and again in February 2021 at up to six registered groundwater bores. Hydraulic conductivity was assumed using existing groundwater models developed by SKM in 2010. Groundwater salinity was assumed through the Visualising Victoria's Groundwater database.

(iii) Evidence and submissions

The Proponent considered the EES adequately described the hydrogeology and the groundwater conditions within the project area, particularly the influence of potential quarry construction on groundwater. No party called an expert witness on groundwater.

The Proponent submitted:

- the quarry would be far enough from agricultural bores and aquatic and terrestrial GDE to protect relevant groundwater environmental values

- construction of wind turbine foundations would have a localised impact on groundwater, with no long term impacts.

The Proponent referred to the EES which informs:

- further investigations would be completed before quarry construction to better inform groundwater drawdown predictions
- management and mitigation measures will be captured in relevant construction, operational and decommissioning plans to manage potential groundwater impacts.

Moyne Council considered the EES has not adequately addressed the hydrogeological drawdown from the project's potential quarry.

EPA submitted:

- there has been insufficient consideration placed on all applicable and future groundwater environmental values, with EPA noting that further consideration is required on sub-terranean groundwater fauna
- groundwater total dissolved solids differs between Segment A2 and Segment C, and a conservative approach should be to adopt a more precautionary Segment A2 for the purpose of the EES process[1]
- future assessment should consider all applicable present and future groundwater values of Segment A2, including groundwater fauna
- EMF management measures should be modified to include groundwater monitoring and remove the limitation of isolating assessments to existing groundwater bores.

No other parties raised any other substantive submissions relevant to groundwater.

(iv) Discussion

The EES describes the relatively shallow groundwater system below ground as integrated with surface water across the project area. Surface water bodies across the project area influences groundwater recharge with groundwater flows driven by infiltrating rain which changes according to the season.

Excavation of the wind turbines foundation and access tracks of up 3.5 metres is likely to result in an acceptable impact on the groundwater resource if there is no works or construction from July to end of November when surface water inundation and groundwater recharge is more pronounced.

The potential quarry will be subject to a separate approval process which will include further investigations. Future investigations should consider the impact on groundwater drawdown and on the ability for a wetland within the drawdown radius to remain inundated and support brolga breeding.

The EMF sets out management and mitigation measures during construction, operational and decommissioning plans to manage potential groundwater impacts. It seeks a water management plan which should:

[1] Segments define geographic areas that have broad difference in their natural characteristics, baseline water quality and beneficial uses to be protected.

- include clear management objectives, monitoring requirements and controls that minimise potential impacts of groundwater extraction to surface water across the project area
- consider the salinity of groundwater before using dust suppression and confirm the relevant environmental values are not compromised by construction and operation of the Willatook facility
- include a baseline monitoring program, integrating a network of wells at least 1080 metres from the quarry to better understand impacts during quarry construction.

The IAP agrees with EPA there merit in applying a more precautionary Segment A2 for the purpose of the EES. This would help to understand the risk of harm to the relevant environmental values from construction and operation.

There is merit in EPA's suggestion to install additional monitoring wells and baseline monitoring, as it would better inform the potential impact pathways from the quarry.

(v) Findings and recommendation

The Inquiry and Panel finds:

- The environmental management measures in the Environmental Management Framework set an appropriate framework for managing groundwater during construction and operation of the wind energy facility.
- The construction of wind turbine foundations and access tracks and impermeable surfaces, once established may have a localised impact to the groundwater table but are unlikely to negatively impact groundwater in the subject land.
- Any future quarry, including potential impacts on groundwater, will be further investigated through a separate approval process.

The Inquiry and Panel recommends:

1. **Amend Environmental Management Measures, as shown in Report 2 Appendix F, to make groundwater related changes to measures GW02, GW05 and GW07.**

4.2 Surface water

(i) The issues

The issues are:

- whether the EES and permit application have appropriately assessed surface water
- whether impermeable hardstands and access tracks will result in acceptable on-site and offsite wetland hydrology (flow rate and volume) and water quality.
- whether natural hydrological flows will be impeded across the landscape, impacting ephemeral wetlands.

(ii) Background

EES

The EES Scoping Requirement specific to surface water is:

> Potential for the project to have a significant effect on surface water and/or groundwater and its beneficial uses, including through the temporary on-site quarry.

EMF management measures SW01 to SW09 and EES Chapter 10 Surface Water, Appendix B Hydrogeological and Hydrological Investigation, Appendix C1 Brolga Impact Assessment and Appendix E Biodiversity are all relevant to surface water.

Surface water assessment

A combination of desktop information, modelling and field-based surveys were used to characterise surface water within the investigation area. These included:

- Flood modelling of the Moyne River, Shaw River, Back Creek and all areas within the Willatook Wind Farm development area.
- An assessment of 1 and 10 per cent Annual Exceedance Probability (AEP) flood depth at the proposed turbine locations.
- Calculation of 1 and 10 per cent AEP flow rates at each of the proposed waterway crossing locations.
- Water balance modelling at the temporary on-site quarry.

To determine the potential flooding impacts, flood behaviour within the project catchments was assessed using two types of modelling:

- Hydrologic modelling (rainfall runoff) of the Moyne River catchment for the 10 per cent and 1 per cent AEP events using modelling software RORB.
- Hydraulic modelling (rain-on-grid, or direct rainfall) of the Shaw River catchment and the project area using hydraulic modelling software TUFLOW, run for a range of flood events.

The hydrological modelling was used to define the existing flood conditions within the catchment by estimating the runoff generated during a rainfall event. Hydraulic modelling was used to establish the extent of the floodplain and streamflow characteristics for different flood events and assess the potential surface water impacts to the quarry site, watercourse crossing points and wind turbine locations for the 1 and 10 per cent AEP event.

Field surveys were conducted including fish sampling, field-verification of the wetlands mapped within the DELWP Victorian Wetland Inventory database (DELWP mapped wetlands), and the identification of other aquatic habitats within the project area such as creeks and ephemeral drainages. Acid sulfate soils were sampled at four sampling locations and analysed to identify potential acid sulfate soil. Potential hydrological and water quality impacts from the construction, operation and decommissioning of the project were assessed for each identified surface water feature based on the flood modelling results, as well as the flora and fauna impact assessments.

(iii) Evidence and submissions

The Proponent submitted:

- with the implementation of management controls, impacts to the Shaw River, Back Creek, Moyne River and ephemeral wetlands from the project were assessed to range from negligible to low.
- creek crossings required for access tracks could be managed to minimise impact to water quality during construction activities.
- a 100-metre buffer placed around all DELWP mapped wetlands to exclude all project infrastructure will avoid physical disturbance to wetlands and their fringes and limit the likelihood of poor-quality surface water runoff from construction works zones reaching these areas.

The Proponent explained that the EES includes hydrologic and hydraulic modelling which assesses potential duration of inundation across wetland areas within the project area, and whether they can hold water for more than 120 consecutive days between the 2009-2019 period.

During evidence-in-chief, Mr Hughes explained:

- the access tracks and turbine footings would be elevated at a number of locations yet they would not impact the natural flow paths of the wetlands and waterways within and outside the project area
- appropriately engineered structures such as culverts and pipes would be considered during detailed design to maintain natural flows
- the DELWP mapped wetlands do not represent wetland conditions
- the EES' hydrological and hydraulic assessment and modelling of the wetlands better depicts the condition of wetlands
- the hydraulic and hydrological modelling of wetlands and their catchments on the subject land:
  - was based on available topographic data
  - did not include detail around specific wetlands, the habitat they provide or their specific hydraulic regimes
  - was assessed in other components of the EES.

Mr Hughes stated:

- the project area is topographically and hydrologically complex, and further assessment would be completed during the detailed design phase
- changes to drainage patterns, either increasing or decreasing flow to a given area, can lead to ecological changes
- natural flows would not be impacted by the Willatook facility's infrastructure
- appropriate engineered features would be designed into the project to allow for drainage across properties to avoid impacts.
- the Proponent provided the LiDAR dataset to Water Technology
- the high resolution topographic data flown specifically for the Willatook facility was largely limited to the project area
- the hydraulic modelling would have been assisted with LiDAR data outside the project boundary, noting that the assessment of wetlands and their hydrological characteristics had limitations as a consequence.

Mr Hughes indicated additional modelling could not be completed to simulate the extent of wetlands inundated for 60 days in the time available.

In its submission, DELWP:

- accepted the project's use of a hydrological model to determine suitable wetland habitat within 2 kilometres of confirmed breeding sites (based on holding water for at least 120 consecutive days) for the purpose of identifying wetlands that contributed to breeding home ranges around breeding sites
- did not support the exclusion of wetlands that were considered 'relatively small' and lacked emergent vegetation
- explained it was not its understanding or intention that inundation duration would be used to discount known or historic breeding sites as sought by the Proponent
- advised it had engaged Water Technology to prepare a technical guidance note:

  - to provide guidance on methodology appropriate to determine wetland inundation characteristics
  - to support consistent approaches to wetland assessment and is in its early stages and estimated to be completed and delivered to DELWP in the first half of 2023.

EPA submitted:

- insufficient consideration has been placed on applicable and future surface water environmental values
- monitoring upstream and downstream from the site during and after construction should be performed to identify any potential impacts from the site, by comparing against adequately characterised baseline water quality before construction
- conducting daily or real-time turbidity monitoring upstream and downstream during construction would be optimal for detecting impacts, and checking and improving control measures.
- relevant EMF management measures should be revised to:
  - require additional background water quality monitoring before construction commences to inform upstream and downstream monitoring results collected during and after construction
  - conduct daily or real-time turbidity monitoring upstream and downstream during construction.

Moyne Council submitted:

- there is a lack of definition of wetlands outside the project area
- the EES omitted LiDAR data
- there were extensive DELWP mapped wetlands east and south of the project area that have been excluded from the hydraulic modelling, and this limited the extent of wetlands that could be considered functional wetlands and contribute to the understanding of the brolga breeding home range in the project area.
- there was insufficient information on the internal road networks
- 2022 was especially wet and there were 10 per cent AEP rain events and two rain events that were close to the 1 per cent AEP within the year.

Glenelg Hopkins Catchment Management Authority (CMA) submitted:

- not all wetlands/low lying areas to the south of the project area have been mapped
- it will assess the specific works proposed, including road and cable crossings, and apply conditions to minimise impacts on waterway health specific to the works through a Works on Waterway Licence
- offsets for structures likely to present risks to (designated) waterways should be identified in future revisions of the documentation or in the Environmental Management Plan
- it is important that sediment and erosion control measures are in place during construction.

A number of parties considered:

- the information on wetland characteristics and suitability of wetlands as brolga breeding habitat contained errors and was unclear
- the presence of surface water was particularly expansive in 2020 and 2022 to the east and south of the project area, near Back Creek, the Moyne River floodplain and Wild Dog Swamp

- construction activities and project infrastructure will impact waterways, particularly Back Creek which is downstream of the project area
- brolga breeding can occur in wetlands inundated for 60 days
- 2022 did not have greater rainfall than previous years, according to their gauges – annual rain was more intense across shorter periods.

Several parties provided photos, video and information to support their submission that the extent of inundation across the project area is far more expansive than that modelled by the EES.

(iv) Discussion

There is a complex series of ephemeral wetlands in and around the project area which are linked during periods of high rainfall. The EES has appropriately considered surface water, mapping the extensive wetlands that exist across the project area. The modelling which inform the project:

- helps to understand the extent of ephemeral wetlands that may interact with the Willatook facility
- acknowledges there are areas where wetlands have not been adequately described.

The 100-metre buffer around all mapped wetlands on the Victorian Wetland Inventory and watercourses including the Shaw River, Back Creek and smaller drainages will assist mitigate impacts during construction.

Wild Dog Swamp has been identified as a functional wetland, holding water for 120 or more days and also a confirmed breeding site. This wetland has been described as an isolated waterbody but Mr Hughes indicates the wetlands around wetland 25816 (Wild Dog Swamp) may be extensive. Additional LiDAR data to the east and south of the project area would have provided a better understanding of the wetlands in this location and of potential wetlands beyond the project area that could contribute to the home range of brolga breeding wetland 25816 (Wild Dog Swamp).

Photographs and video provided at the Hearing show extensive inundation across the Moyne River floodplain, to the east and south between the project boundary and Moyne River in 2020 and 2022. The inundation modelled across the project area is informed by the rainfall time series data and will vary if alternative time series data was modelled. Applying rainfall between January 2020 and December 2022 would have likely resulted in a greater number of wetlands in the project area sustaining water for more than 120 consecutive days.

To avoid any impacts to wetlands during periods of inundation and avoid impacts to natural flow paths during construction, the IAP considers works should avoid periods of wetland inundation. This will avoid water entering excavations during construction and reducing water quality within wetlands at times when inundation is most pronounced.

The detailed design of engineered structures across water bodies and wetlands will be critical to maintaining surface water flows on and outside the project area, particularly across neighbouring properties. The detailed design of engineering solutions to maintain natural flows across neighbouring property boundary will be a critical to the drainage across property boundaries. The Glenelg Hopkins CMA Works on Waterways Licence application will allow the Glenelg Hopkins CMA to assess and approve the engineered structures proposed to maintain the natural hydrology of designated waterways in the project area.

The 100-metre buffer around all mapped wetlands on the Victorian Wetland Inventory and watercourses including the Shaw River, Back Creek and smaller drainages will assist mitigate

impacts during construction. The suggested 100 metre buffer from any watercourse around the quarry and associated infrastructure material plants suggested by the Glenelg Hopkins CMA is welcomed by the IAP.

EPA's suggested changes to the EMF management measures would help to better understand potential surface water impacts. This includes requiring additional background water quality monitoring before construction commences and conducting daily or real-time turbidity monitoring.

(v) Findings and recommendation

The Inquiry and Panel finds:

- The Environmental Effects Statement and permit application, generally have appropriately assessed surface water.
- The environmental management measures in the Environmental Effects Statement and the permit conditions set an appropriate framework for managing surface water during different project phases.
- The wetland inundation modelling would benefit from including rainfall data between 2020 and 2022 to determine current wetlands that meet the inundation criteria of holding water for at least 120 consecutive days at least once every 10 years.
- Access tracks and hardstand areas can sensitively respond to existing drainage patterns and ecological values in the project area by avoiding construction and works during inundation periods and by engineering structures to adequately maintain natural flow paths.

The Inquiry and Panel recommends:

2. Amend Environmental Management Measures, as shown in Report 2 Appendix F, to make surface water related changes to measures SW03 and SW04.

5 Biodiversity and habitat

5.1 Brolga

5.1.1 Background

EES

The EES scoping requirements evaluation objective is:

> To avoid or minimise potential adverse effects on biodiversity values within and near the site including native vegetation, listed threatened species and ecological communities, and habitat for these species. Where relevant, offset requirements are to be addressed consistent with state and Commonwealth policies.

Relevant EES information includes:

- Chapter 11
- Chapter 26 (Environmental management framework) measures BR01 to BR07
- Appendices C1 (Brolga Impact Assessment)
- Appendix C2 (Ecological Peer Review)

Permit application

The permit application proposes 795-metre buffers around specific breeding wetlands (consisting of a 400-metre foraging buffer, a 300-metre disturbance buffer and a 95-metre rotor blade offset), based on the site specific investigations outlined in the Brolga Impact Assessment and hydrological modelling.

Brolga impact assessment

EES Chapter 11 summarises the assessment of potential impact on the brolga, and measures taken to avoid and minimise these impacts in accordance with the *Interim guidelines for the assessment, avoidance, mitigation and offsetting of potential wind farm impacts on the Victorian Brolga population,* DSE 2011, Revision 2012 (Interim Brolga Guidelines).

Appendix C1 (Brolga Impact Assessment) explains the methodology and results from the brolga assessment based on field work from 2018 to 2021 and earlier surveys from 2009 to 2013.

In summary, EES Chapter 11 and Appendix C1 state:

- brolgas have been repeatedly observed nesting in the Cockatoo Swamp complex area and within 10 kilometres of the project area
- hydrological modelling combined with field assessments predicted that 11 seasonal wetlands and 3 farm dams within 3 kilometres of the project can provide suitable brolga habitat based on the nominated criteria, including 6 sites with historical brolga breeding records associated within them
- there were no reported sightings of brolga in numbers that would indicate flocking activity within 10 kilometres of the project area so flocking was not considered relevant to the assessment
- wetlands were considered functional wetlands if they provided habitat for brolga breeding, foraging or night-time roosting and:
  - held water for at least 120 consecutive days during the brolga breeding season surveys (or modelled to do so at least once every 10 years)

  - were at least 0.6 hectares (the minimum defined size based on review of known breeding wetland sizes)
  - had a component of emergent vegetation cover of at least 20 per cent cover
- to minimise the impact of the project to the brolga population, a 795-metre turbine free buffer is proposed around the perimeter of the 2,658-hectare Cockatoo Swamp and known breeding wetlands and functional wetlands
- the buffer comprises a 400-metre foraging buffer, a 300-metre disturbance buffer and the 95-metre rotor blade length
- a risk-based approach was applied to the project and turbine collision risk was modelled, consistent with the Interim Brolga Guidelines
- the model predicts that where brolgas avoided wind turbines 90 per cent of the time, there would be 0.06 collisions each year on average, or 1.7 collisions over the 25-year life of the project
- a Population Viability Assessment which assessed the impact to the Victorian brolga population predicted the population size would decline by between 0.3 and 0.8 birds over the project life compared with baseline conditions, or 0.1 per cent of the south east Australian brolga population.

Ecological peer review

EES Appendix C2 was an independent peer review of:

- the Brolga Impact Assessment (April 2022 version 10.9)
- the Flora and Fauna Impact assessment (May 2022 version 7.8)
- Chapter 11 (Brolga).

The peer review concluded the project assessment has appropriately and addressed matters raised by the EES Scoping Requirements related to brolgas and the SBW bat within the constraints of existing available information.

Interim Brolga Guidelines

The Interim Brolga Guidelines:

- set out the process for investigating and mitigating potential impacts of wind energy facilities on the brolga
- state a wind energy facility may impact brolgas through direct effects, particularly mortality from colliding with turbines; indirect effects including habitat avoidance; and barrier effects.
- recommend a three-step assessment approach:
  - Initial Risk Assessment (desk top studies)
  - Impact Assessment (breeding and non-breeding season surveys)
  - Mitigation and Offset (avoid impacts, collision risk analysis, Population Viability Analysis, compensation strategies).
- state:

  As a general recommendation, these guidelines recommend that a 3.2 km and 5 km radius turbine-free buffer from breeding sites and flock roost sites respectively, will adequately meet the objectives set for these habitats. However, recognising that the spatial requirements of Brolgas are not well understood, a proponent may propose reduced buffer areas providing that they can be shown to meet the objectives set for breeding and non-breeding habitats. Proposed buffer distances should meet with the satisfaction of the DSE.

Draft Brolga Assessment and Mitigation Standards

The *Victorian Brolga Assessment and Mitigation Standards* (DELWP, 2020) (draft Brolga Standards):

- updates the Brolga Guidelines
- are informed by new research into the habitat used by flocking and breeding Brolga
- seeks that the Victorian brolga population is not more threatened from the impact of wind energy facilities in Victoria.
- were exhibited in November 2022 and have not been finalised.

5.1.2 Buffers

(i) The issue

The issue is whether the proposed foraging and disturbance turbine-free buffers are appropriate.

(ii) Evidence and submissions

The Proponent submitted that a site specific turbine free buffer of 795 metres is appropriate to protect the functional breeding wetlands in the project area. The Proponent added that the site-specific 795-metre turbine free buffer is:

- based on the Interim Guidelines for Brolga, research completed by Veltheim and the South West Victorian Brolga Research Project on brolga behaviour in south west Victoria and flight observations over many years in the region
- similar to or larger than those used for other approved or operating wind energy facilities in the Victorian range of the brolga, such as at Dundonnell, Golden Plains and Stockyard Hill
- comprised of a 400-metre foraging buffer, a 300-metre disturbance buffer and a 95-metre blade length setback
- based on the site-specific investigations outlined in EES Appendix C1 (Brolga Impact Assessment) and Veltheim and the South West Victorian Brolga Research Project research that pre-fledged chicks moved an average distance of 442 metres to and from night roost wetlands measured as a radius from the roost site within the wetland (range: 0 to 1,964 metres).

Mr Lane explained:

- the 795-metre buffer incorporates functional wetlands considered capable of providing foraging, breeding and night roosting habitat, non-wetland areas around these wetlands and movement corridors between them
- turbine free buffers were supported by Nature Advisory's observational flight movements of brolga, brolga home range mapping published at other wind farm projects as well as recent published research
- the buffers encompass a combined total of 1,718.69 hectares across the project area or over three times the maximum 523-hectare home range size estimated by Veltheim and the South West Victorian Brolga Research Project.

DELWP submitted that a breeding home range is an "*area of habitat around a breeding site that a Brolga uses for daily activities including feeding and roosting".* These change during the Brolga's breeding and non-breeding (flocking) seasons.

The Draft Standards suggest breeding habitat buffers to protect brolga breeding habitat. Brolga breeding habitat is defined as the wetland and non-wetland habitat used by brolgas during the breeding season for the rearing of chicks to fledging. It includes the following habitat elements:

- The wetland used for nest building and egg incubation
- The wetland(s) used for roosting and foraging
- The non-wetland area(s) used around and between these wetlands for foraging and movement.

DELWP and Moyne Council considered the 795-metre buffer inadequate for the brolga breeding home range. Numerous other submissions did not support the EES's turbine free buffer of 795 metres.

DELWP and Moyne Council sought a minimum 900-metre turbine free buffer, comprising:

- a 600-metre foraging/home range buffer
- a 300-metre disturbance range buffer.

The 900 metres was in addition to the 95-metre rotor blade offset.

Document 241a tabled by the Proponent shows how 3 turbines could be removed and further 3 turbines relocated to accommodate the 600-metre brolga foraging buffer.

DELWP submitted that if a site-specific buffer is adopted, it would require:

- a 2-kilometre breeding home range buffer from the edge of a suitable brolga breeding wetland
- a turbine free buffer of 600 metres around the wetlands within the breeding home range to protect at least 90 per cent of foraging habitat used by pre-fledged brolga chicks and 99 per cent of the average area of the home range
- a 300-metre disturbance buffer in addition to the home range buffer to allow full use of the habitat within the home range, based on the assumption that foraging brolga will not approach within 300 metres of turbines
- an additional 95-metre rotor blade length setback
- for isolated wetlands, a turbine-free buffer of 1369 metres to protect 95 per cent of movements of chicks (based on Veltheim and co research), plus a disturbance buffer of 300 metres, and a 95-metre blade length setback
- buffers should commence at the edge of all wetlands within the 2 kilometre likely movement range of breeding brolga wetlands, consistent with the Draft Standards.

Willatook Society submitted:

- there should be 3.5-kilometre buffers (being 3.2 kilometres plus 300 metres) around all potential nesting sites, including all wetlands shaded blue in EES Appendix C1 Figure 15, all functional wetlands, plus wetland 25932
- the Proponent inappropriately modelled the turbine-free buffers from the middle of a functional wetland rather than the edge
- it is not possible to predict the behaviour of a brolga breeding pair and assume the location of a nest during every breeding attempt.

There were several submissions which considered:

- the default buffer of 3.2 kilometres outlined in the Interim Brolga Guidelines should be applied

- Veltheim and the South West Victorian Brolga Research Project recorded in excess of 80,000 pre-fledge chick movements and only a limited data set (approximately 2,500 movements) were considered by the Proponent to determine site specific buffers.
- information on adult brolga movements was excluded from the EES, including brolga flight data which indicated brolga move between wetlands during the breeding season.
- EES Appendix C2 concluded a foraging buffer of 400 metres from a wetland is insufficient to encompass *"even the average distance moved from a wetland by pre-fledged Brolgas"*

A submitter, Mr Cumming requested a 5 kilometre turbine-free buffer from the brolga breeding wetlands, similar to default buffers to protect flocking sites. He said an adult brolga would fly between wetlands in a region and may take over 1 kilometre to reach altitude when leaving a wetland. He provided an internal memo[2] from DELWP dated August 2020 that describes a range of breeding habitat buffer options, with a recommendation to approve a 900-metre buffer, comprising 600-metre foraging buffer and a 300-metre disturbance buffer. The DELWP memo states:

> (1) that the draft (Standard) foraging area buffer may not adequately consider the scientific uncertainty regarding adult Brolga home range requirements prior to chick hatching, noting that data is lacking on adult Brolga foraging distance prior to chick hatching, and
>
> (2) the proposed breeding habitat buffer requirements may not protect all pre-fledged chick movements because the proposed buffers are based on the average distance moved (450 metres), rather than the range of movements.
>
> …
>
> for a 'group of breeding wetlands' (defined as suitable breeding wetlands within two kilometres of each other), the movement corridors between the wetlands in the group are included in the breeding habitat buffer. This is because the pre-fledged chicks have been shown to move up to 1,964 metres to and from night roost wetlands.

The Proponent considered the DELWP memo supported the 400-metre foraging area turbine-free buffer, which was proposed as a home range buffer in the memo.

(iii) Discussion

Different turbine free buffers were suggested during the Hearing to protect the Cockatoo Swamp, including:

- site-specific reduced buffer of 795 metres, comprising a 400-metre foraging buffer, 300-metre disturbance buffer and 95-metre rotor blade length setback
- site-specific reduced buffer of 995 metres, comprising a 600-metre foraging buffer, 300-metre disturbance buffer and 95-metre rotor blade length setback
- default buffer of 3.2 kilometres, as defined in the Interim Brolga Guidelines
- default flocking buffer of 5 kilometres, as defined in the Interim Brolga Guidelines.

The site-specific turbine free buffer of 795 metres suggested by the Proponent is not appropriate in the Cockatoo Swamp Complex and its surrounding network of wetlands. The IAP agrees with submissions that suggested a foraging buffer of 400 metres is insufficient,. The independent peer review of EES Appendix C1 (EES Appendix C2) also concluded that a 400-metre foraging buffer would not be sufficient to encompass the average distance moved from a wetland by pre-fledged brolgas.

[2] Document 76

The Interim Brolga Guidelines recommends a default buffer of 3.2 kilometres around brolga breeding sites. The 3.2-kilometre default buffer begins with the nest site, identifies the wetlands within 2 kilometres of the nesting site, adds 900 metres from the edge of the wetlands, and applies an additional 300-metre disturbance buffer to allow full use of the habitat within the home range. The Interim Brolga Guidelines supports reduced buffers informed by site-specific investigations of brolga activity.

The Proponent has identified a number of the project area wetlands as suitable breeding habitat, and considers the default buffer of 3.2 kilometres can be reduced based on extensive research of brolga and their habitat that supports the project. Turbine free buffers have been nominated by the Proponent around discreet breeding wetlands to exclude wind turbines and limit disturbance, as depicted in EES Appendix C1 Figure 15.

Applying a turbine-free buffer from a nesting site at Cockatoo Swamp Complex is complicated by the network of wetlands that appear to contribute to this establishment of wetlands and brolga breeding home range. EES Map Book Figure MB40 shows the distribution of wetlands concentrated between Shaw Creek and Moyne Creek that are in or near the project area. The calculation of the buffers is difficult within this complex as the extent of the complex is vast and Figure MB40, supported by Figures 8 and 9 in EES Appendix C1, show the historic or confirmed brolga breeding wetlands and functional wetlands according to the inundation criteria of 120 or more days at least once every 10 years.

In the situation of Cockatoo Swamp complex, the IAP considers it inappropriate to limit the buffers to those wetlands modelled in the hydrological assessment as discreetly inundated for 120 or more days at least once every 10 years as noted in Appendix C1 Figure 16. The IAP agrees with DELWP which did not agree with "*winnowing of known / recorded breeding sites through the application of criteria relating to perceptions or assessments of quality, inundation, etc.*"

The IAP agrees with DELWP that:

> The approach to buffering a wetland complex like Cockatoo Swamp is to include all wetlands within the 2km likely movement range of breeding brolgas. Turbine free areas are created around the wetlands likely to be used for roosting or foraging, and areas between the wetlands to allow brolgas to move between those wetlands. Wetlands within that area essentially need turbine free buffers around them to allow brolgas to feed across them and adjoining dryland areas, without avoiding areas because turbines are too close.

Regarding the group of suitable wetlands, the Draft Standards state:

> a 900-metre buffer should be applied to the subject wetland and all breeding wetlands within two kilometres. The buffer must be applied from the boundary of the mapped wetlands. This requirement includes a 600-metre foraging buffer, to protect Brolga foraging habitat and movements during the pre-fledging period, and an additional 300-metre disturbance buffer as a precautionary measure to protect Brolgas from disturbance impacts at the edge of the foraging buffer.

Veltheim and the South West Victorian Brolga Research Project determined:

> simulations demonstrate that the chicks appeared to use similar core home range areas at single versus multiple wetland groups, but if there was an available wetland within two km, they often move to these wetlands. To account for this, the proposal in the draft standards requires movement corridors between suitable Brolga breeding wetlands to be buffered as well.

The Draft Standards are yet to be finalised, therefore have little weight, however they provide a comprehensive compilation of the most recent literature available on the south-west brolga to inform breeding home range habitat protection.

The IAP accepts that in the case of Cockatoo Swamp, a precautionary approach is required when protecting breeding habitat and applying site specific turbine free buffers.

The IAP considers that site-specific 995-metre turbine-free buffers should be applied:

- to farm dams and wetlands located within 2 kilometres of suitable brolga breeding wetlands that meet the inundation criteria.
- from the edge of all wetlands considered to meet the inundation criteria (yellow polygons) according to Map Book Figure MB40, noting that brolgas are known to nest on the edges of permanent wetlands, such as farm dams.

The Interim Brolga Guidelines Level 3 assessment requires that turbine free buffers are applied to all breeding and non-breeding habitats to avoid significant impacts (i.e. site all wind energy facility infrastructure outside of the breeding or non-breeding home range associated with a habitat). It further requires unavoidable residual risks to be quantified and offset.

A 2-kilometre buffer is appropriate around a nest site, noted by DELWP as the breeding home range. The IAP notes that a number of submissions contend that the home range for the project should include wetlands within the Cockatoo Swamp complex that support breeding, flocking, feeding, and roosting.

Veltheim's research states:

- further studies, particularly of the movements of breeding adults are required to inform buffer sizes
- brolga home range variations can make it challenging to apply generic buffers, based on average home range size or movement ability of pre-fledged chicks
- it is more appropriate to ensure that habitat elements including breeding site, night roost, foraging areas and potential movement corridors between these habitats are incorporated into buffers at each breeding site, based on their spatial arrangement in the landscape.

The proposed site-specific buffer of 795 metres is inadequate to protect the Cockatoo Swamp Complex and surrounding wetlands. The conservation of brolga will be more successful if efforts are focussed on protecting complexes of multiple wetlands that support suitable brolga breeding wetlands, such as Cockatoo Swamp.

Construction activities in the project area can disturb breeding brolga so they should be avoided during brolga breeding season.

(iv) Findings and recommendations

The Inquiry and Panel finds:

- The proposed buffer of 795 metres proposed for the Willatook facility would not sufficiently protect breeding brolga in the project area.
- A turbine-free buffer of 900 metres plus 95 metre rotor blade offset should be applied from the edge of a wetland and dams mapped as a suitable wetland within 2 kilometres of the brolga breeding home range.
- The home range buffer of 600 metres is more appropriate than the proposed 400 metres.
- Isolated wetlands should have a turbine-free buffer of 1369 metres plus a disturbance buffer of 300 metres, and a 95-metre blade length setback.
- Turbine-free buffers should apply to both current and historical breeding wetlands.

The Inquiry and Panel recommends:

1. **Amend Planning Permit PA2201620, as shown in Report 2 Appendix B, to require the brolga breeding wetland buffer to be:**
   a) **measured from the edge of the wetland**
   b) **increased from 700 metres to 900 metres from the 95-metre rotor blade length setback for any wetland within the 2 kilometre breeding home range of a wetland that holds water for at least 120 consecutive days at least once every 10 years (includes W1, W3, W4, W7, W10, W12 (26028), W13, 25710, 25731, 25741, 25816, 25932, 25941, FD2, FD16, FD21, 12a shown in Figure 9 of the Environmental Effects Statement Appendix C1)**
   c) **1369 metres plus a disturbance buffer of 300 metres, and a 95-metre blade length setback for isolated wetlands that hold water for at least 120 consecutive days at least once every 10 years.**

5.1.3 Wetlands

(i) The issue

The issue is whether the EES has appropriately defined and considered wetlands suitable for brolga habitat in its assessment.

(ii) Evidence and submissions

The Proponent referred to the EES which explains:

- an individual wetland needs to remain suitable for brolga for at least 4 months or 120 consecutive days to support a successful breeding attempt which is the minimum time required for brolga to build a nest, lay eggs, incubate the eggs, and for chicks to grow to an age where they can walk to nearby wetlands and to avoid predation, particularly from foxes
- the inundation criteria of 120 or more days of continuous inundation 1 in every 10 years is the primary instrument for wetlands to be deemed hydrologically functional wetlands and providing suitable breeding and night roosting habitat for the brolga
- detailed hydrologic assessment determined that 17 of the 26 wetlands assessed in detail met the inundation criteria required for the areas to be hydrologically suitable for brolga breeding and night roosting.

In his evidence and at the Hearing, Mr Hughes:

- as noted in Chapter 4.2(iii):
  - considered the topography of the project area was diverse and hydrologically complex
  - noted that the hydraulic modelling to determine functional wetlands and suitable breeding locations was completed using high resolution LiDAR data within the wind energy project boundary
  - noted that not all areas outside the wind energy facility boundary were considered in the hydrological assessment of the project area
  - considered the access tracks and turbine footings would not impact the natural flow paths of the wetlands and waterways in and outside the project area
  - suggested appropriately engineered structures such as culverts and pipes, would be considered during detailed design to maintain natural flows within and outside the project area.

  - noted that aerial data captured by drone was likely cropped to create the LiDAR mapping data before submission to Water Technology for hydraulic modelling of wetland suitability
  - considered including LiDAR data outside the wind energy facility property boundaries would have assisted the wetland assessment
- considered the DELWP mapped wetlands are not representative of wetland conditions and the hydrological assessment completed by Water Technology created a better representation of the functionality of the wetlands for brolga breeding
- presented that the detailed hydrologic assessment determined 17 of the 26 wetlands assessed in detail met the inundation criteria of at least 120 days required for the areas to be hydrologically suitable for brolga breeding and night roosting

At the Hearing, Mr Lane stated:

- the EES and its assumptions to confirm which farm dams and wetlands were functional wetlands, holding water for at least 120 consecutive days was based on modelling completed by Water Technology
- there is sufficient buffering of brolga breeding habitat by the nominated turbine free buffers of 795 metres around 10 wetlands in the project area
- breeding opportunities in the project area:

  Have been protected with a turbine-free buffer combining a number of potential breeding home ranges plus disturbance and turbine blade buffers, totalling 1,718 hectares, an area over three times the maximum Brolga breeding home range estimated by Veltheim and the South West Victorian Brolga Research Project.
- wetlands less than 0.6 hectares, small dams and permanently or partially drained wetlands were not functional and it was not necessary to buffer these areas.

Mr Hughes considered that, based on advice from Nature Advisory and manual assessment of wetlands, the following wetlands were not considered appropriate brolga habitat:

- all inundated areas that had a small size (only slightly over 0.1 hectares)
- shallow wetlands (less than 300 millimetres)
- permanently or partially drained if an excavated earthen channel had been constructed from the wetland invert to a connecting drain, downstream waterway or downstream wetland.

The wetlands identified in EES Appendix C1 and further explained during evidence-in-chief by Mr Lane that warrant buffering were identified as W1, W12c, W12w, W12e and W4 (brolga breeding wetlands) and Wetland 25941, W5, FD2, FD21 and FD23 (functional wetlands or farm dams).

During the Hearing, the Proponent noted that the independent peer review completed by Biosis (Appendix C1) concluded that:

> evaluation of suitability of wetlands for brolgas was an improvement over simple reliance on the DELWP mapping which does not necessarily reflect modification and current conditions of wetlands.

At the Hearing, Mr Lane noted that brolga surveys were conducted in September 2022 and:

- he was unclear of the results but indicated the breeding season had only begun and one brolga breeding pair had been observed in the area around DELWP wetland 25845, southwest of the project area
- Cockatoo Swamp was too wet to survey and drone footage would be captured in October 2022 to determine brolga presence in Cockatoo Swamp and the project area.

Mr Lane stated:

- EES Appendix C1 Figure 9 correctly presented those wetlands as functional wetlands and historical or confirmed brolga breeding wetlands
- wetlands were used as the basis from brolga breeding home range protection with 795-metre turbine free buffers as depicted in EES Appendix C1 Figure 15.

In its submission and at the Hearing, DELWP:

- accepted the project's use of a hydrological model to determine suitable wetland habitat within 2 kilometres of confirmed breeding sites based on inundation duration of at least 120 consecutive days for the purpose of identifying breeding home ranges around breeding sites
- considered a breeding home range as an area of habitat around a breeding site that a brolga uses for daily activities including feeding and roosting, comprising wetlands and intervening (non-wetland) areas
- considered wetlands and non-wetland areas around a brolga breeding site to be suitable brolga home range habitat
- advised it had engaged consultants to prepare a technical guidance note:
  - to provide guidance on methodology appropriate to determine wetland inundation characteristics
  - to support consistent approaches to wetland assessment and
  - is in its early stages and estimated to be completed and delivered to DELWP in the first half of 2023
- did not support excluding wetlands that were considered 'relatively small size' and lacked emergent vegetation
- did not support the use of inundation duration to discount known or recorded breeding sites in the project area through application of the criteria nominated by the Proponent
- explained wetlands should only be excluded if they have been permanently drained.

Mr Lane and DELWP considered permanently drained wetlands in the project area to be unsuitable for breeding purposes. DELWP was concerned the EES' definition of a functioning wetland had inappropriately excluded suitable wetlands.

Moyne Council submitted:

- there is a lack of definition of wetlands outside the project area
- the Proponent's wetland modelling omitted LiDAR data
- extensive wetlands east and south of the project area have been excluded from the hydraulic modelling and this limits the extent of wetlands that could be considered functional wetlands and suitable breeding habitat
- 2022 had experienced at least one rain event considered a one-in-10-year event (10 per cent AEP) and two rain events close to a one in hundred year event (1 per cent AEP).

Willatook Society submitted:

- the assessment of viable breeding habitats in and around the project area excluded a number of wetlands that brolga have been known to use
- not all wetlands recognised as functional wetlands and holding water for 120 or more days have been buffered
- the EES appears to predict brolga behaviour and assume which wetlands the by brolga may choose

- the Cockatoo Swamp complex is the largest and most prominent wetland in the area for at least 10 kilometres and the entire wetland complex should be protected by turbine-free buffers
- the project should be located at least 5 kilometres from the subject land where there are no wetlands or historic brolga breeding habitat.

Several parties submitted:

- wetlands inundated for 60 days provide appropriate breeding habitat for brolga
- brolga will move on foot and fly to multiple wetlands in a home range
- the EES did not recognise all buffer wetlands where brolga have been observed
- photographs and drone footage displaying extensive areas of inundation across the landscape following rain in 2020 and 2022, with brolga inhabiting wetlands that were not recorded in the EES
- rain fall volumes were similar across previous years, but inundation has been exacerbated as rainfall has been concentrated to shorter more intensified periods
- all potential wetlands that have the potential for brolga breeding should be buffered
- the labelling of DELWP wetlands was confusing.

(iii) Discussion

South-west Victoria contains a network of ephemeral wetlands. Semi-permanent and permanent waterbodies including farm dams provide important brolga breeding, roosting and foraging habitat. This is recognised as a brolga breeding home range.

The EES notes the DELWP mapped wetlands have relied on digitised aerial imagery which can affect the accuracy of determining current wetland conditions. Recent modelling completed by the Proponent does improve the understanding of wetland condition beyond the current information available on DELWP mapped wetlands in the region.

The IAP has considered the wetlands with guidance in the draft standard and Interim Brolga Guidelines. The pending DELWP technical guidance note which standardises the methodology for assessing wetlands will improve clarity and reduce delays during the application and assessment stages. The Draft Standard is yet to be finalised but it has relied on extensive literature generated over the last 10 years since the Interim Brolga Guidelines were published in 2012.

Based on available information, the IAP accepts that:

- brolgas will use a range of wetlands and non-wetland areas during its breeding season for both breeding and non-breeding activities
- brolgas require water for nest building, egg incubation, roosting, foraging and the rearing of chicks to fledging
- once a suitable wetland is found, brolgas will spend one month nest building and one month incubating eggs
- at least another month of water is required to support chicks to an age where walking movements to other wetlands is possible
- wetlands where nests are located can often dry up and this coincides with the increased movement of the adult brolga and pre-fledge chicks across a broader range of wetlands
- brolgas switch between other suitable wetlands located within 2 kilometres of the breeding wetland when multiple wetlands are available

- a series of wetlands and non-wetland areas within 2 kilometres of a breeding wetland is considered suitable to support the breeding brolga and their pre-fledge chick
- brolgas will primarily move between wetlands on foot and the frequency of flights is low
- wetlands inundated for as little as 60 days can provide breeding habitat.
- wetlands are still suitable for brolga breeding (including nest building, egg incubation and roosting) even if they are:
  - less than 0.6 hectares in size
  - less than 20 per cent emergent vegetation
  - partially drained.

Therefore, the 28 brolga breeding sites identified within 10 kilometres of the project area should be protected unless they have been permanently drained. Wetlands within 2 kilometres of the recorded breeding wetlands should be buffered if they hold water for at least 120 consecutive days at least once every 10 years. If no other wetlands are within 2 kilometres of the recorded breeding sites, they should be considered isolated and appropriately buffered, as discussed in Chapter 5.1.3.

EES Appendix C1 relied on modelled rainfall data between 2009 and 2019 and notes:

- the 2020 breeding season experienced higher than average rainfall across the region during spring, resulting in flooding
- wetlands were full throughout the breeding season extending into summer.

The 2022 rainfall is relevant because it indicates that the wetlands can remain saturated for extended periods of time, in excess of those modelled in the EES.

Photos and videos of wetland inundation appear to focus on areas near Back Creek and the Moyne River floodplain near Wild Dog Swamp. Brolga breeding pairs have frequently been recorded at Wild Dog Swamp and this wetland appears to provide important brolga breeding habitat.

EES mapping delineates the wetlands in the project area but excludes wetlands to the east and south. This exclusion limits the assessment of Wild Dog Swamp (Wetland 25816) and the potential that this wetland may contribute to a network of wetlands to the south and east, being more hydrologically linked with Back Creek and Moyne River than presented in the EES. LiDAR data beyond the project boundary would have assisted to confirm if:

- wetlands within 2 kilometres of Wild Dog Swamp meet the inundation criteria and require buffering
- Wild Dog Swamp should be considered an isolated wetland or within a network of wetlands.

It is unclear why wetland 26028 has been separated into three wetlands W12e, W12c, W12w, when this wetland contributes extensively to Cockatoo Swamp. Perhaps the reduction of wetland 26028 has been considered appropriately through the hydrologic modelling. As highlighted by DELWP, all recognised brolga breeding wetlands should continue to be recognised as such and should not be reconfigured based on the inundation criteria of at least 120 days. The entire wetland 26068 should be treated as a breeding wetland and wetlands located 2 kilometres from the edge of this wetland should be protected with turbine free buffers.

The IAP considers that the wetland numbered as W4 by the Proponent is an important breeding wetland as it has supported brolga breeding pairs since at least 2018. Figure MB40 shows the wetland with varying inundation potential extending to the south west. The entirety of W4 in

Figure MB40 should be considered brolga breeding habitat and a 2 kilometre breeding home range should commence at the outer most edge of this wetland.

The inundation potential is limited for W3 as the EES notes the LiDAR assessment has reduced the boundary of wetland W3. W3 is located to the east of W4 and being inundated for 120 or more days, should be considered suitable brolga breeding habitat and buffered accordingly.

Wetland 25932 should also be considered as suitable breeding habitat as it is a historical brolga breeding wetland. An assessment of its 2-kilometre radius should be conducted to determine if it is isolated or within a network of wetlands and buffers should be applied, as required.

The EES has not considered wetland 25698 as a functional wetland so found it unnecessary to apply a turbine-free buffer. The EES considers wetland 25698 as "*Permanently drained, surface water patchy in July, no surface water in August. Reeds and sedges present, grazed by cattle*."

EES Appendix C1 notes:

> A pair was observed foraging at a drained wetland along Tarrone North Road in July 2020 at Wetland 25698. This wetland is located between the breeding site at Wetland W4 and Wild Dog Swamp. It is not clear if this pair was the pair that usually breed at Wetland W4, the pair that has been seen at Wild Dog Swamp and associated Moyne River floodplain or was an additional pair visiting the area. It was only recorded in the area once.

Wetland 25698 appears to be an extensive wetland and approximately 2.5 kilometres from both W4 and Wild Dog Swamp. The recorded observation at this wetland indicates brolga may potentially extend their home range to distances beyond 2 kilometres. Further consideration should be given to determining whether this wetland is suitable brolga breeding home range habitat and turbine free buffers apply.

To protect brolga breeding home range habitat, as a precautionary approach:

- the brolga breeding home range around brolga breeding wetlands identified in Appendix C1 Figure 8 should be buffered, with buffers measured from the edge of the wetlands rather than the centre
- wetlands that hold water for at least 120 consecutive days at least once every ten years as identified in Appendix C1 Figure 9 should be considered suitable brolga breeding wetlands and appropriately buffered.

This approach is further supported by Figure 2 of EES Appendix 4 *Brolga Habitat Assessment* (of EES Appendix C1) which depicts the farm dams and wetlands considered to provide suitable habitat for brolga, specifically wetlands identified as W1, W3, W4, W7, W10, W12 (26028), W13, FD2, FD16, FD21, 12a, 25731, 25741, 25816, 25932, 25957 and 25974.

Each wetland outlined above should ideally be considered suitable breeding wetlands and potential brolga breeding home range habitat. Further consideration of the extent of buffers at these wetlands should be completed in consultation with DELWP.

EES Appendix B Figure 43 shows a number of proposed turbine footprints and access tracks at near flow paths that would inundate some areas by up to 1 metre under a worst case scenario of a 1 per cent AEP. This is of concern for wetlands on the southern project boundary. The network of access tracks, their elevation and width could impact the natural flowpaths of wetlands across the project area particularly where access tracks and turbines are located adjacent to property boundaries if appropriate engineering solutions are not employed. The design of access tracks and turbine foundations to maintain flow paths should be completed in consultation with DELWP and

Glenelg Hopkins CMA through a Works on Waterways Licence where designated waterways are intersected.

The EES notes that some sections of access track would need to be raised to allow safe access and egress during flood events and the likelihood this inundation will happen more frequently should be considered. The specifics of the design have yet to be determined. This will be required to be completed in consultation with Glenelg Hopkins CMA.

To avoid reduced water quality in designated wetlands and brolga breeding wetlands during periods of inundation and avoid impeding natural flow paths during construction, the IAP considers works should avoid periods of wetland inundation. The proponent has nominated General Works and Activities on Waterway Licence Condition 3 of the Typical Glenelg Hopkins CMA Works on Waterways Licence Requirements and the IAP considers this condition should be applied:

> Works should be undertaken during dry conditions and when water flow is minimal. All operations should cease if wet conditions prevail.

As described by DELWP, the approach to buffering a wetland complex like Cockatoo Swamp is to include all wetlands within the 2-kilometre likely movement range of breeding brolgas. If a wetland is isolated with no other wetland within 2 kilometres, its home range should be buffered by 1369 metres, with an additional 300-metre disturbance buffer and 95-metre rotor blade length setback.

(iv) Findings and recommendations

The Inquiry and Panel finds:

- The Cockatoo Swamp Complex and surrounding wetlands form a network of wetlands suitable for brolga breeding, foraging and roosting habitat during the breeding period.
- The assessment of wetlands in the project area has not adequately defined all relevant wetlands in the project area.
- Wetlands which are modelled to hold water for at least 120 consecutive days at least once every 10 years and are not permanently drained should be considered functional irrespective of size and the percentage of emergent vegetation because there is insufficient evidence to justify their exclusion.
- Partially drained wetlands should not be excluded from the brolga breeding home range.
- The distance between wetlands should be measured from the wetland edge rather than from the centre.
- The lack of LiDAR assessment of wetlands to the east and south of the project area limits the assessment of wetlands around of Wild Dog Swamp (Wetland 25816). This wetland cannot be confirmed as an isolated wetland or alternatively if it is located within 2 kilometres of suitable breeding home range wetlands.
- Modelled rainfall data influences the extent of wetland inundation and data from 2020 to 2022 would likely change the hydrological conditions for the wetlands and depict a greater extent of wetlands considered 'suitable' and inundated for 120 or more days.
- Wetland 25932, though external to the project area, is a recorded brolga breeding wetland within 2 kilometres and should be considered in the brolga breeding home range and buffered accordingly.

The Inquiry and Panel recommends:

2. **Include Wetlands W1, W3, W4, W7, W10, W12 (26028), W13, 25241, 25710, 25721, 25729, 25731, 25741, 25816, 25932, 25941, FD2, FD16, FD21 and 12a as suitable brolga breeding wetlands within the brolga breeding home range unless they are permanently drained.**
3. **Before a permit decision, the Proponent conduct additional assessments for:**
    a) **wetland 25698 to confirm if it is hydrologically unsuitable for brolgas or permanently drained**
    b) **wetland 25668 to determine the reasons for the LiDAR assessment reducing its extent.**

5.1.4 Brolga impact

(i) The issue

The issue is whether the project will result in an unacceptable impact on the brolgas.

(ii) Evidence and submissions

Over 65 submissions referred to the project's potential impact on brolgas.

The Proponent considered the Willatook facility could be constructed and operated to avoid and mitigate impacts to brolgas. It submitted:

- the wetlands adjacent to the project area can be buffered with the proposed 700 metre plus 95-metre rotor blade offset to protect the functional wetlands identified by its ecologists at Cockatoo Swamp complex and wetland 25816 (Wild Dog Swamp)
- the minimum blade height of 40 metres from ground level is considered to minimise potential collision risk with the brolga based on flight behaviour data gathered by Nature Advisory for over 15 years in south west Victoria
- the collision risk modelling:
    - considered eight wetlands identified in the project area as potential brolga breeding sites, 5 in the north west and 3 in the east
    - assessed a number of scenarios, including 1 to 1.3 breeding pair occupying the north west and east wetlands under varying scenarios
    - calculated the annual rate of collisions each year between 0 to 5 brolgas struck in the life of the project, this was considered a conservative estimate
- the Population Viability Assessment in EES Appendix C1 determined that 1 to 2 brolgas would require replacing within the south west population to offset the predicted loss from the Willatook facility.

Mr Lane considered the Willatook facility will not have a long-term impact on brolga population and mitigation, and proposed turbine free buffers will be effective at avoiding impact to brolga. In his evidence and at the Hearing, he stated:

- the breeding season survey effort has totalled seven breeding seasons out of 12 between 2009 and 2021 – this is considered to provide a reliable indication of brolga breeding activity on the subject land and in the surrounding Radius of Investigation
- during the 2022 survey, 2 breeding pairs had been observed in the Radius of Investigation but the data was not yet available and he could not confirm the results
- the collision risk modelling estimated 0 to 5 birds will collide with Willatook wind turbines, which is considered low compared to other wind energy facilities

- the mortality rate of brolga predicted at the Willatook facility can be adequately offset by adopting the Compensation Plan and protecting and enhancing alternative brolga breeding wetlands
- the compensation plan seeks to replace the worst-case estimate of the number of brolga affected by the project (5 individuals over 25 years)
- compensation plans have only been regulated for the past 5 years, and there has not been a successful breeding pair at an offset site
- he has researched brolgas in south-west Victoria and does not believe the Willatook facility will result in a cumulative impact to the brolga population.
- the Willatook facility's construction and operation can be effectively managed to avoid impacting the brolga
- bird and bat adaptive management plans are effective tools to mitigate impacts from a wind energy facility.

The peer review of EES Appendix C1 stated:

- there have been no reported collisions of brolga with a wind turbine
- the calculation of the collision risk (assuming a 90 per cent avoidance rate) was conservative, and equated to 1 in 10 brolga flights that make no attempt to avoid an impending collision.

DELWP submitted:

- one brolga death was recorded at Dundonnell and an examination found the death was unlikely to have been caused by the wind energy facility
- it recently received a second report of a mortality at a wind energy facility in the south west region – details of the cause were not publicly available during the Hearing.

Moyne Council submitted that powerline and transmission lines should be underground and the assets (lines and transmission connections) should be shared between wind energy facility proponents.

Willatook Society submitted:

- the wind energy facility will drive brolgas away from the area, with a high likelihood of not returning
- existing breeding home ranges should be protected and not substituted with other wetlands
- it is inappropriate to replace an already successful wetland complex that supports breeding pairs by attempting to compensate for the loss of this habitat by creating a breeding habitat in another location
- the Willatook facility should be relocated at least 5 kilometres south south east from the proposed location, as the Proponent had not mapped DELWP wetlands to the east of the project area.

Submitters considered:

- only 200 breeding pairs are left in Victoria's south-west region
- one additional brolga death from the Willatook facility is unacceptable to the population
- the collision risk modelling only considered 1.3 breeding pairs in the project area, when anecdotal evidence suggests the project area may support more breeding pairs
- the loss of a breeding female would result in a greater impact to the population than loss of a male

- brolga monitoring data is not publicly available so the public cannot review monitoring information collected by wind energy facility operators
- brolga monitoring was conducted by consultants engaged by wind energy facility operators which did not provide confidence in the accuracy of data collected
- Victoria's brolga population is poorly monitored, and there is low confidence in current population estimates
- construction and operational activities on the subject land will disturb brolgas
- quarry blasting will deter brolga from the area, consistent with other wind energy facilities
- wind energy facilities displace brolgas, and displaced brolgas do not return to breeding wetlands
- the Draft Standards should require a greater degree of mitigation and offsetting of wind energy facility impacts with stronger investment in wetland management to improve conservation outcomes for brolgas
- the offset site should be secured before the wind energy facility begins to operate.

(iii) Discussion

Since its inception, the Willatook project has been modified to reduce the number and location of wind turbines across a significantly reduced footprint. Micro-siting the turbines has resulted in a number of wetlands in the Cockatoo Swamp complex being avoided.

A wind energy facility, without appropriate design and planning, can directly and indirectly impact brolgas. Direct impacts include turbine and powerline collisions. Indirect impacts include loss of habitat resulting from wind turbine infrastructure in areas used for breeding, roosting, foraging and flocking habitat.

The Willatook project has generally followed the Interim Brolga Guidelines which aim to:

- remove impacts from flocking and nesting home ranges through turbine free buffers, to avoid any significant reduction in breeding success and to exclude any significant impact on the survivorship of brolgas while occupying a flocking site
- develop a site-specific collision risk model for brolgas
- model the risk to the brolga population through Population Viability Analysis
- mitigate the estimated brolga loss to produce a zero net impact on the Victorian population.

However, the Willatook facility may result in negative direct and indirect impacts to breeding habitat in the project area if it is developed as proposed. The project area is not a flocking habitat. The Proponent has appropriately considered and excluded the area for flocking and impact to flocking activity.

The proposed turbine configuration is likely to displace brolgas from suitable breeding wetlands. Wetlands across the brolga breeding home range will be disconnected and impeded by access tracks and wind turbine infrastructure. The Cockatoo Swamp complex of wetlands will be severed from wetlands in the broader area to its east, south and west.

It will take about 2 years to construct the wind turbines including footings, meteorological masks, internal access tracks, underground cabling and the terminal. The extent of construction activities may impede movement of brolga across the home range or result in brolgas avoiding certain habitat.

Construction near the breeding and non-breeding wetlands could indirectly impact the breeding pair and pre-fledge chicks and the use of breeding and non-breeding wetlands in the home range. Construction activities should be avoided during the breeding season between July and December to minimise this impact.

The project's proposal to bury transmission lines through boring or trenching in the project area will help minimise brolga impact.

The collision risk modelling simulated a strike rate of 0 to 5 brolga for the 25 year life of the Willatook facility. Based on an expected minimum population of 625 birds, the Willatook project probability viability rate was calculated as reducing the brolga population by 0.8 birds (90 percent collision avoidance rate) to 0.3 birds (99 percent avoidance rate) across the 25 years lifespan of the project, without compensation.

The collision risk modelling for Dundonnell wind energy facility predicted the preferred final wind energy facility layout will lead to a long term, annual average of between 0.09 and 0.91 brolga collisions with wind turbines.[3] The probability viability rate for Dundonnell estimated that at a 95 per cent avoidance rate of 809 birds (the estimated minimum south west Victorian population (in 2014)) would result in reduction of four birds in the population over the life of the wind energy facility. An 90 per cent avoidance rate would result in a population decline of 13 birds.

Overall, the modelled Willatook collision risk with turbines is low compared to other wind energy facilities because brolgas primarily spend their time during the breeding season foraging or incubating eggs and the frequency of flights is low. The IAP accepts submission that with approximately 200 breeding pairs left in south west Victoria, the loss of breeding bird could have a significant impact on the population.

The monitoring requirements in the Bird and Bat Adaptive Management Plan (BBAMP) would benefit from ongoing monitoring of wind turbine impacts conducted for the life of each wind energy facility. This would allow ongoing impacts to be recorded for all wind energy facilities and appropriate adaptive management can be applied to avoid or minimise impact throughout the life of the project. The BBAMP should also stipulate the periods when monitoring is required.

The cumulative effect of collision risk from wind energy facilities in the region should be collated to determine the potential extent of collision risk to the population across the region. Monitoring data should not consider impact to brolgas from one wind energy facility in isolation. As of November 2022, Macarthur and Dundonnell are the two operating wind energy facilities in south-west Victoria where brolgas could interact. Ryans Corner and Mortlake East are under construction and will be commissioned in the near future. To date, there has been no publicly reported brolga collisions with wind turbines. Examination results of brolga deaths at wind energy facilities should be released to the public as soon as they become available.

There would be benefit in sharing monitoring data collected by wind energy facilities through a central and accessible location to better understand:

- brolga behaviour across south-west Victoria
- the cumulative risks to brolga across the south-west population.

The Interim Brolga Guidelines requires that the impacts on the Victorian brolga population are 'fully offset' through the implementation of a Brolga compensation plan.

[3] Document 42

The IAP agrees with submissions which sought to:

- protect and enhance successful breeding habitat, where possible, rather than replacing them with a offset site with unknown breeding success
- secure an offset site before the wind energy facility commences operation, consistent with native vegetation offset sites.

The IAP is cognisant the potential on-site quarry has not been formally proposed at this stage and will form part of a separate approval process. That process will consider its potential impacts on brolgas and the appropriate buffer.

(iv) Findings and recommendations

The Inquiry and Panel finds:

- The Willatook facility can result in an acceptable impact on the brolgas if it is redesigned to apply larger turbine-free buffers and to relocate turbines.
- The Cockatoo Swamp Complex provides the largest breeding habitat within at least 10 kilometres from the Willatook project area.
- The wind turbines should be located an appropriate distance from the wetlands identified as suitable for nest building, foraging and roosting.
- Direct and indirect impacts to breeding brolga is likely during construction and operation of the Willatook facility, and can be mitigated through measures and permit conditions.
- Indirect impacts are more likely with the potential for brolga to avoid wetlands and non-wetland habitat near the wind energy facility.
- The collision risk is considered low for the Willatook facility, with estimated collisions lower than other wind energy facilities in the region.
- Protecting breeding wetlands that have been identified as successfully supporting breeding pairs should be preferred rather than seeking compensation wetlands with unknown breeding success.
- Brolga monitoring data collected from wind energy facilities in Victoria:
  - should be saved and accessed by stakeholders through a central information hub
  - would help assess the cumulative impacts of wind energy facilities on key species of avifauna and bats.

The Inquiry and Panel recommends:

4. **Amend Environmental Management Measures, as shown in Report 2 Appendix F, to revise SW03 so that the Environmental Management Plan includes a measure for avoiding construction from July to end of November.**

5. **Amend Planning Permit PA2201620, as shown in Report 2 Appendix G, to:**
   a) **avoid works from July to end of November**
   b) **require a brolga monitoring and compensation plan in consultation with the Department of Energy, Environment and Climate Action and to the satisfaction of the responsible authority.**

5.2 Southern Bent-winged bat

(i) The issue

The issue is whether the impacts on the Southern Bent-winged bat (SBW bat) will be acceptable.

(ii) Background

Relevant information:

- EES Chapter 12 (Biodiversity and habitat)
- EMF management measures BH05 to BH010.

(iii) Evidence and submissions

The Proponent submitted that a number of fauna surveys have been completed by a range of specialist consultants since 2011 to inform the potential impact of the Willatook facility on SBW bats.

The Proponent submitted:

- bat activity in the area was low compared to other locations
- the site does not support significant foraging habitat
- risks from the Willatook facility to this critically endangered species is low
- at a request of the IAP, Document 68 which identified the known maternity and roosting caves in the south west region
- the 125 metre turbine free buffer is appropriate.

Mr Lane gave evidence that:

- analysis of SBW bat activity in the project area has been the most extensive assessment of this species, with 4,691 detector-nights of survey undertaken over five of the eleven years between 2009 and 2020 at more than 100 separate recording sites
- bat analysis of the subject land involved over 500 survey nights since 2010, using ultrasonic detection equipment
- survey results indicated bats were identified in and adjacent to the project area within a limited range of treed areas
- areas confirmed to be SBW bat habitat during the onsite bat surveys should be buffered with 125-metre turbine-free buffers
- bat activity reduces 125 metres from the identified foraging areas and turbine-free buffers at this distance are appropriate from the edge of the rotor swept area to avoid impact to this critically endangered species.
- as an additional precautionary measure, a cut in speed of 4.5 metres per second is proposed for turbines within 200 metres of potential suitable SBW bat habitat
- increasing monitoring frequency provides valuable data on wind turbine impacts to bats
- there would be value in increasing the monitoring frequency
- government is responsible for driving consistency in BBAMPs across wind energy projects.

The Proponent and DELWP referred to the nominated buffer of 200 metres in the Eurobat guidelines. DELWP, Moyne Council and Willatook Society supported a 200-metre buffer at the Willatook facility and considered the 125 metres to be inappropriate. Several submitters sought to apply the most conservative measure as a precautionary approach because the extent of impact to the bat is unknown.

At the Hearing and for reference purposes, the Proponent provided a map[4] which displayed a 200-metre buffer around identified remnant and planted vegetation in the project area.

The Proponent submitted that ultrasonic detection equipment detected bats only up to 45 metre above ground. Mr Lane opined that the SBW bats are unlikely to fly at heights above 45 metres, contending that a minimum blade height 40 metres above ground is sufficient to protect bats during flight.

DELWP submitted:

- findings in Victoria suggest that the species regularly undertakes large movement distances, with tracked individuals flying up to 85 kilometre (average 35 kilometres) out from caves each night and regularly moving between roosts about 60 kilometres apart
- a number of SBW bat roosting caves and one maternity cave within the 85-kilometre maximum nightly distance are located east, west and south of the project area
- the Willatook facility would not have a long term impact on any threatened non-bat species provided that the appropriate mitigation measures were undertaken
- the bat is a small species that can fly at or close to the rotor swept area height
- the extent of information to understand potential impacts of the project on biodiversity values, including bats, brolga and wetlands have not been adequately assessed
- a 120-metre buffer distance is based on pre-construction field surveys undertaken at Dundonnell Wind Farm, which were not designed to determine buffer distance for this species
- it is inappropriate to only buffer areas confirmed to be SBW bat habitat during onsite surveys, as this limits those areas surveyed and the number of detectors deployed
- curtailment should be adopted for the life of the wind energy facility not just trialled in a small number of selected turbines within 200 metres of higher SBW bat activity areas
- higher cut in speeds than the nominated 4.5 metres each second should be considered.

DELWP considered the proposed mitigation measures for the bat were inadequate. It added:

> There is an excessive reliance on a 40 metre minimum rotor swept height as the primary mitigation measure for the SBWB
>
> the project poses a 'low' risk to the SBWB, despite advice from DELWP through the TRG[5] process stating that information on SBWB flight height remains uncertain and requires further scientific investigation (DELWP 2020, TSSC 2021).

Moyne Council submitted:

- the impact to bats is largely unknown, particularly bat mortalities from wind energy facilities
- migration routes in the area of the Willatook facility are unconfirmed
- a sensible approach would be to pause the approval of additional wind energy facilities in the region and obtain information to better understand impacts of wind energy facilities
- there has been a 'cavalier' approach to protecting this critically endangered species, with regard to the project
- wind energy facilities are a known threat to bats and there are considered uncertainties about effects and mitigation to protect the bat from further decline and extinction.

[4] Document 67

[5] Technical Reference Group

Some submitters considered:

- the BBAMP to be inadequate
- monitoring only captures a subset of mortality with records not captured for most mortality events
- reduced speeds across all turbines to appropriate, believing there would be little economic detriment to the wind energy facility operator
- the proposed 2 year trial to determine effectiveness of cut-in speeds to be inadequate
- the cut-in speeds should be increased beyond the 4.5 seconds metres each second suggested by the Proponent
- the ecological effects are high with difficulty in adequate assessment of cumulative effects
- the next step for a critically endangered species (unless it recovers) is extinction.

(iv) Discussion

Both the nationally significant SBW bats and state significant Yellow-bellied Sheath-tailed bat have been recorded in the project area during both Spring and Autumn survey periods, particularly in the vicinity of vegetated areas across the site.

SBW bats in south west Victoria largely congregate at three maternity caves in South Australia, Portland and Warrnambool from spring to autumn. SBW bat activity is recognised highest during the warmer months of the year in temperate Australia (October to March) when wind speed and temperatures are favourable and there is greater insect activity. International studies suggest there may be cumulative impacts of wind energy facilities on migratory species, with the impacts reportedly greater at particular times of the year and under certain weather conditions.

There are no roosting and maternity caves in the project area. The subject land is about 35 kilometres from eight roosting caves, including an additional cave identified by DELWP at Codrington, approximately 17.2 kilometres from the south-west corner of the project area. The project area is near the Warrnambool and Portland maternity caves.

There EES inadequately describes the flight path the bats used to frequent the foraging habitats in the vicinity of the project area. The absence of caves in the project area suggests bats could be using the project area as a seasonal movement or migratory path between roosting and maternity caves. It may be possible bats move through the project area between feeding and temporary roost sites, or they may merely be seasonally moving through the project area to more suitable feeding areas or to maternity and roosting caves.

The EES considered that SBW bat activity was greater at ground level and notes their typical behaviour in open areas is to fly closer to the ground. This contradicts a research paper by Bennett et al which reports that bats can fly high.

The IAP agrees with DELWP that the presence of SBW bats at turbine height cannot be disregarded particularly if bats use the project area to move between feeding habitats and caves.

The SBW bat is listed as critically endangered under the federal and state EPBC Act and FFG Act. DELWP has prepared a National Recovery Plan for SBW bats under the EPBC Act. A wind energy facility is recognised in the National Recovery Plan as having a significant impact on the bat, and recommends actions if wind energy facilities are built close to an important site or potentially within a movement corridor or migration route. Actions include:

- developing mitigating actions and extensive post-construction monitoring

- wind energy facilities within the range of the SBW bat should undergo rigorous pre-construction assessments and post-construction monitoring, so that any impacts can be detected
- exploring and developing new techniques for improving preconstruction assessments
- collating all mortality data into a central registry and sharing it between relevant parties so that it can be used to improve scientific understanding of threats to the subspecies.

The IAP agrees with parties that the 200-metre turbine-free buffer from foraging habitat should be applied to all potential SBW bat habitat. This buffer is consistent with the Eurobats Publication Series No. 6 *Guidelines for consideration of bats in wind farm projects – Revision 2014* (Eurobat Guidelines) which proposes a 200-metre wind turbine buffer from surrounding woodlands. The Proponent submitted that the Willatook facility 125-metre turbine free buffer from confirmed foraging habitat is greater than the 50-metre buffer recommended in the Natural England Technical Information Note TIN050 which indicates that "*evidence in Britain is that most bat activity is in close proximity to habitat features."* It added:

> One reason for the difference is that the European guidelines are catering for a greater diversity of species, some of which are known to fly very long distances, often in the open, away from woodland.

The 200-metre turbine-free buffer from potential foraging habitat, from the rotor blade tip, will protect the variety of bats, including the SBW bats and Yellow-bellied Sheath-tailed bats, from direct collision with turbines and from barotrauma (injury from flying in low-pressure regions close to operating turbine blades). The 200-metre buffer distance from potential foraging habitat shown in Document 67 should be adopted.

The large area of scattered tress in the south west corner of the subject land may provide important foraging habitat. The highest rate of SBW bat and Yellow-bellied Sheath-tailed bat calls were recorded during surveys in this plantation. The blue gum plantation may be harvested in 2026/27. Notwithstanding this, the 200-metre buffer is still relevant in this location, as it cannot be ruled out the plantation may remain for a longer period or once it is removed it will be replanted with new blue gum trees that will grow to maturity and provide SBW bat habitat.

Bennett et al 2022 reported on a study at a wind energy facility in Portland Victoria where curtailment (reduced operation of the facility) significantly reduced bat fatalities by 54 per cent, with marginal annual power and revenue loss. This research describes curtailment as the primary mitigation strategy undertaken in the Northern Hemisphere to reduce turbine-associated mortality. The curtailment should be applied between dusk and dawn October to March inclusive to reduce bat turbine impacts at wind energy facilities and potential barotrauma, particularly at sites with known populations of endangered and threatened species such as the Willatook facility.

The cut-in speed specified in the BBAMP should be increased to at least 4.5 metres each second to help reduce potential bat casualties. This is consistent with the speed suggested by the Proponent. Any variation to this speed will be determined through the proposed 2 year trial. There is no information to support claims the trial would be inadequate.

Regarding the adequacy of the surveys, EES Appendix D describes a recent report by Symbolix (2020) on post-construction bird and bat monitoring of wind energy facilities in Victoria that indicates there have been 8 mortality records of SBW bats from less than 3 wind energy facilities, based on data sourced from 10 wind energy facilities between 2014 to 2019. One of the mortalities was recorded at Macarthur Wind Farm, which is about 5 kilometres from the project area. The recorded mortalities represent a subset of the actual number of mortalities, as not all

individuals killed will be found and counted. Van Harten et al reported that, although deceased bats are recovered at wind energy facilities, there is a high degree of uncertainty around mortality estimates and population level impacts are unknown. The IAP considers there should be more frequent monitoring during periods of higher bat activity to assist with considering appropriate cut-in speeds.

The BBAMP and ongoing monitoring should be audited by an independent qualified ecologist or environmental auditor.

The IAP agrees with DELWP that there is still a gap in the understanding of SBW bats. SBW bat mortality recorded at other wind energy facilities near the subject land suggests there is a risk that SBW bats are active at turbine height. There is risk is compounded by the Willatook facility's larger turbines of 250 metres (height) and 95 metres (width).

The Victoria Planning Provisions require cumulative impact of issues such as potential bat impact to be considered. However, the ability to clearly understand the cumulative impacts is challenged by the lack of consolidated information. BBAMPs should have a consistent format which can be integrated into uniform and consolidated reporting across wind energy facilities to enable:

- broader scale and more strategic monitoring
- the long term cumulative impact assessment of wind energy facilities on bat species.

Based on available information, the IAP agrees with DELWP that the approach to managing impacts to SBW bats should be to avoid first, through buffering, and then minimisation through curtailment. Measures to protect SBW bats such as applying the 200-metre turbine-free buffer, curtailing wind turbines during periods of higher bat activity and increasing the monitoring frequency of bat surveys will provide a greater level of protection and understanding for all bat species that may use the project area.

(v) Findings and recommendations

The Inquiry and Panel finds:

- The Willatook wind energy facility will not significantly impact the Southern Bent-winged bat population if a 200-metre turbine free buffer is applied around remnant and planted vegetation to avoid all potential foraging habitat in the project area.
- Turbines should have a minimum cut-in speed of 4.5 metres each second during spring and summer when bat activity is higher, ahead of future trial results.
- Publicly available standardised monitoring should be available at a regional level to better understand whether the cumulative effects of operating and proposed wind energy facilities in south-west Victoria will significantly impact the Southern Bent-winged bat.

The Inquiry and Panel recommends:

6. Amend Planning Permit PA2201620, as shown in Report 2 Appendix G, to:
   a) apply a minimum 200-metre turbine free buffer from potential foraging habitat
   b) revise conditions for the bird and bat adaptive management plan.

5.3 Other flora and Fauna

(i) The issues

The issues are:

- whether the project avoids and minimises adverse impacts on native vegetation

- whether the project will have an acceptable impact on FFG Act and EPBC Act listed species
- whether the project when located in a region of existing operating and permitted wind energy facilities comprising up to 412 wind turbines, will cumulatively result in an acceptable impact on the brolgas and SBW bats.

(ii) Background

EES evaluation objective and EMF measures

The EES scoping requirements evaluation objective is:

> To avoid or minimise potential adverse effects on biodiversity values within and near the site including native vegetation, listed threatened species and ecological communities, and habitat for these species. Where relevant, offset requirements are to be addressed consistent with state and Commonwealth policies.

Relevant EES information includes Chapter 9 (Groundwater), Chapter 10 (Surface water), Chapter 12 (Biodiversity and habitat), Appendix B (Hydrology and Hydrogeology) and Appendix D (Flora and Fauna Assessment).

The flora and fauna assessment

The Flora and Fauna Assessment (EES Appendix D) assess the impacts of the Willatook facility to the flora and fauna in the project area. The project proposes to remove 4.274 hectares of native vegetation and a large tree from the project area and the over-dimensional transport route.

Access tracks and power cabling have been realigned and infrastructure has been micro-sited to avoid and minimise native vegetation removal. Two threatened flora species (Trailing Hop-bush – EPBC Act 'vulnerable'; and Swamp Everlasting – EPBC Act 'vulnerable', FFG Act 'critically endangered') which were found during the targeted surveys have also been avoided.

Native vegetation within the proposed development footprint was surveyed for threatened ecological communities in October and December 2018 and October and December 2021. Two EPBC Act ecological communities listed as 'critically endangered'– Grassy Eucalypt Woodland of the Victorian Volcanic Plain and Seasonal Herbaceous Wetland of the Temperate Lowland Plain – were recorded within this targeted survey area.

Field surveys recorded 103 fauna species.

The hydrogeological and hydrological impact assessment found:

- the likely effects to terrestrial and ground water dependant ecosystems, in particular wetlands and waterways, arising from the construction and operation of the Willatook facility is low
- it is unlikely that the project would detrimentally impact any ground water dependant ecosystems that may occur within the Willatook site
- terrestrial vegetation on the subject land is generally shallow-rooted and of low stature and would not be dependent on groundwater.

(iii) Evidence and submissions

The Proponent submitted:

- the EES comprehensively assesses the potential impacts to flora and fauna in the project area

- a comprehensive range of ecological assessments have been completed for the project since 2010
- there have been targeted surveys to determine the occurrence and current extent of listed species at the wind energy facility, including bird utilisation surveys, migratory bird surveys, bat surveys, striped legless lizard surveys, aquatic habitat surveys, swamp skink surveys and habitat assessments, and growling grass frog habitat assessments.
- The project has been designed to avoid and minimise impacts to species listed under the EPBC Act.
- Management measures are appropriate to reduce impact.

Mr Lane stated:

- the subject land is largely cleared of its original native vegetation and indigenous fauna habitat due to a long history of agricultural development and use
- it is unlikely that any flora species listed as rare or threatened under the EPBC Act or FFG Act lives on the subject land
- the turbine and access track layout have been modified to avoid areas of native vegetation
- native vegetation unable to be retained during the design and construction phases would be offset according to the Guidelines for the removal, destruction or lopping of native vegetation (DELWP, 2017)
- the required offset is 1.206 General Habitat Units.

DELWP was satisfied:

- adequate steps had been taken to avoid and minimise native vegetation removal
- the required offsets can be secured.
- with the amended Native Vegetation Removal (NVR) report that details the native vegetation removal required for the whole project.

DELWP did not object to granting the planning permit for native vegetation removal subject to certain conditions including an approved offset plan, as shown in Report 2 Appendix G.

Numerous submissions noted there were species protected by FFG Act and EPBC Act on adjacent properties which were not identified in the Willatook project area.

(iv) Discussion

Since the Willatook facility was first proposed in 2010:

- extensive surveys have adequately assessed the extent of likely EPBC Act and FFG Act listed species in the project area
- there has been considerable ecological assessments across a broad project area
- micro-siting of wind turbines to reduce the project footprint and number of turbines has:
  - significantly reduced the potential impact on flora and fauna potentially impacted by the project
  - avoided or minimised most EPBC and FFG listed species avoided or minimised.

The Proponent has appropriately applied the avoid and minimise principles to reduce native vegetation removal. The IAP agrees with DELWP's suggested permit conditions because they would clarify and improve the operation of future offset processes. No-go-zones should be established around all areas to be protected during construction.

Two species recorded during the surveys were listed threatened bats – the SBW bats (EPBC Act Critically Endangered, FFG Act Critically Endangered) described in Chapter 5.2, and Yellow-bellied Sheath-tailed bat (FFG Act Vulnerable). Of the tens of thousands of recorded bat calls from all surveys, 150 were attributed to the SBW bat and 16 to Yellow-bellied Sheath-tailed bat.

The impact to the Yellow-bellied Sheath-tailed bat can be managed through the BBAMP and adoption of monitoring and mitigation measures, consistent with those recommended for the SBW bats.

Birds make up the majority of fauna present at the subject land, with 96 bird species recorded within the investigation area and surrounding areas between 2009 and 2020. The most common species recorded were Little Raven, Australian Magpie, Eurasian Skylark, Common Starling, Magpie-lark and Long-billed Corella. Most bird sightings (95 per cent) were recorded below 40 metres in height, with the remaining 5 per cent being recorded between 40 and 250 metres in height.

EES Appendix D notes:

> Considering the bird assemblage present within the WWF site is not unique, consisting both common and well represented native and introduced species, the impact on the overall native bird populations was assessed to be very low. If the project was constructed there would be expected to be some bird deaths from collisions with wind turbines, as would other operating wind farms in the region.

Apart from the brolga, the only listed species observed during the bird surveys was the fork-tailed swift, which is listed as a migratory species under the EPBC Act. It is not expected that the fork-tailed swift will be adversely impacted by the project.

The EPBC Act listed and FFG Act listed Growling Grass Frog, Little Galaxias and Yarra Pygmy Perch have been recorded in the project area. The mitigation and management measures proposed in the EES will help avoid and minimise impact to these listed species.

The IAP agrees with requiring a threatened species management plan, as sought by DELWP. The plan should apply to the construction and operation of Willatook facility.

The number of wind turbines concentrated within Moyne Shire may have a regional impact to particular species. EES Appendix D indicates between 7 and 10.8 bat mortalities occur at a turbine each year in Western Victoria. The rate is not reported as significantly different for different sizes of turbines. For birds, significantly more mortalities occur at larger turbines. A small turbine has between 3.4 and 4.1 bird mortalities each year while a large turbine has between 5 and 6.7.

As noted in previous chapters, a BBAMP has been drafted for the Willatook facility. The BBAMP is important to monitor impacts to biodiversity within a wind energy facility area. The BBAMP should consider all species at risk from the Willatook facility, adopting appropriate monitoring and adaptive management for a range of at risk species.

The BBAMP should:

- have an independent qualified ecologist auditing the content of the BBAMP and ongoing monitoring to ensure the BBAMP reflect current operational obligations and relevant legislation
- require ongoing monitoring of wind turbines for the life of the Willatook facility to:
  - better understand the ongoing impacts
  - apply appropriate adaptive management which avoids or minimises impact.

(v) Findings and recommendations

The Inquiry and Panel finds:

- The Environmental Effects Statement has appropriately assessed the potential impacts to species listed in the *Environment Protection and Biodiversity Conservation Act 1999* and *Flora and Fauna Guarantee Act 1988*.
- The Environmental Effects Statement includes appropriate management controls and mitigation measures which generally avoid and minimise impacts to all species, except for brolgas and bats.
- A South West Renewable Energy Framework which includes measures to protect biodiversity values would assist regional-based wind energy facility planning, however this is beyond the scope of the Willatook facility proposal.

The Inquiry and Panel recommends:

7. **Amend Environmental Management Measures, as shown in Report 2 Appendix F, to make flora and fauna related changes to measures BH02 and BH03.**
8. **Amend Planning Permit PA2201620, as shown in Report 2 Appendix G, to make native vegetation management and offset related changes.**

6 Noise and vibration

6.1 Introduction

(i) The issues

The issues are:

- whether the measurements of the existing background noise levels in 2010 are still relevant and adequate for the determination of the project noise criteria
- whether the noise levels from the proposed wind turbines will achieve the noise limits as required in the EP Regulations
- whether the choice of wind turbine and the modelling of noise from the turbines will show compliance with the noise limits
- whether battery energy storage system and terminal facilities comply with the noise limits of the EPA Noise Protocol
- whether the construction activities including the operation of the quarry, project roads and erection of the turbine towers and installation of the generating unit complies with the requirements of the Noise and Vibration Management Plan.

(ii) Background

The two main noise impacts from the project are the turbine noise associated with the operation of the wind energy facility and noise associated with the various construction activities.

The Proponent engaged Sonus Pty Ltd to undertake a noise and vibration assessment of the project. Sonus undertook measurements of the background noise levels at 12 locations, determined the noise limits for the turbine noise from the project, modelled the turbine noise levels, prepared noise contour plans for the project, assessed the construction noise and vibration impacts and amelioration requirements and prepared a noise and vibration management plan.

The Proponent engaged:

- EnviroRisk Management to verify the noise and vibration assessment undertaken by Sonus in accordance with the requirements of the EP Act
- Resonate Consultants to independently peer review of both the noise and vibration assessment and the noise and vibration management plan.

EMF management measures are NV01 to NV15.

6.2 Noise measurements

(i) The issue

The issue is how noise should be measured when assessing potential impact from the Willatook facility.

(ii) Evidence and submissions

Evidence on noise and vibration was called from:

- Mr Turnbull of Sonus and Mr Evans of Resonate Consultants by the Proponent
- Mr Huson of L Huson & Associates by the Willatook Society.

Mr Turnbull referred to the EES Chapter 13 (Noise and vibration) which states:

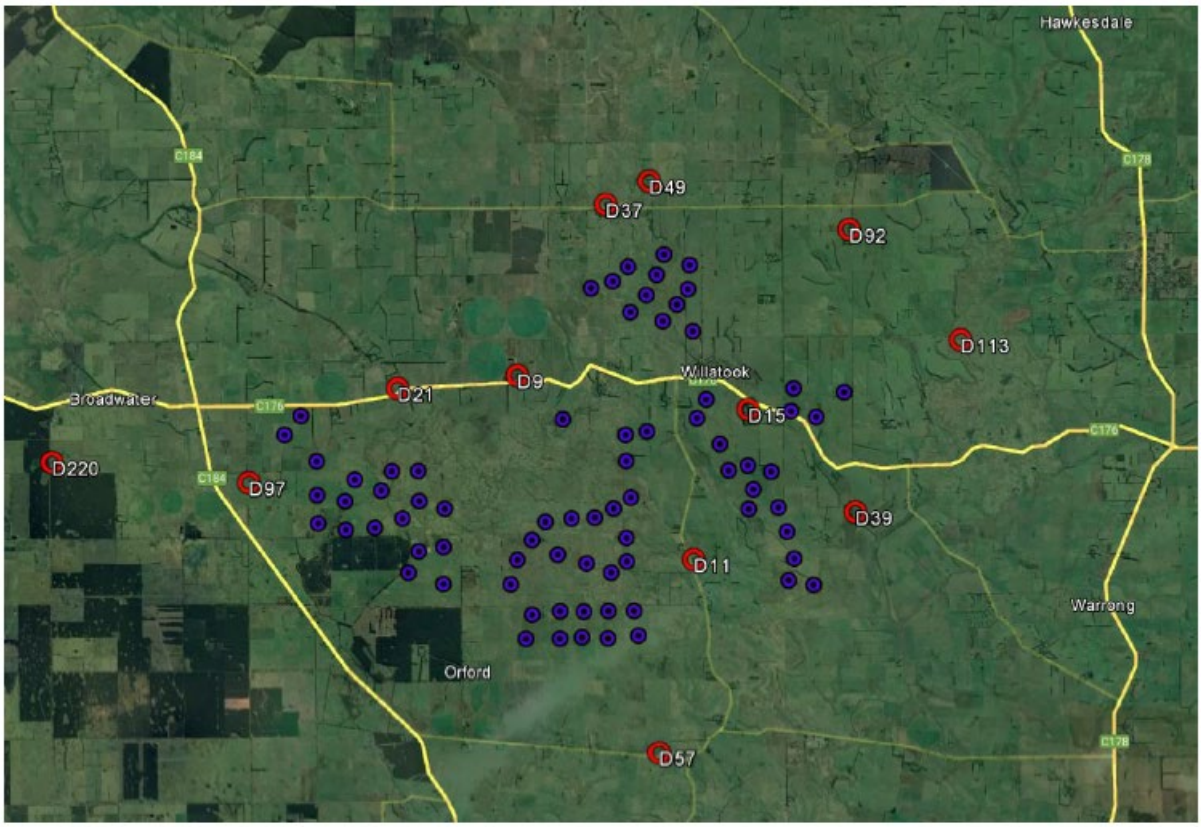
- background noise measurements were undertaken at 12 dwellings within and outside the project area between 30 September to 10 November 2010 (see Figure 3)
- measurements were undertaken to determine the existing background noise levels at 10-minute intervals
- extraneous noise sources such as rainfall, were deleted from the background noise database before the regression analysis
- the rainfall periods were determined from weather databases
- the measured noise data was correlated with the measured wind speed at a hub height 169 metres for each 10-minute interval to determine the noise criteria at each monitoring location.

Additional background noise measurements were undertaken at 4 dwellings between October 2017 and February 2018. Mr Turnbull referred to the comparison of the measured noise levels and wind speed (at 169 metres high) for each monitoring location (see Table 6). The noise measurement data shows that some noise measurement sites are noisier than others and that generally background noise levels increase by 5 to 10 dB L_{A90} with increase in wind speed.

Mr Turnbull explained the background noise level parameter, L_{A90}, is defined as the noise level at which 90 per cent of the noise is greater than the noise value, or a noise level where 10 per cent of the noise is less than the noise value. The low volume of passing road traffic near some of the measurement locations is only a small part of the noise landscape for 90 per cent of the time at these locations; a higher traffic volume, influencing the noise levels for most of an hour or day would be required to significantly influence the hourly or daily L_{A90} noise levels.

At the time of the 2018 measurements, it was intended that the measured noise levels would assist in the post-construction compliance assessment of the project. These measurements potentially included noise from the operating Macarthur wind energy facility to the north of the Willatook project area. The measurements were not used to determine the pre-construction noise levels as Sonus was of the opinion that pre-construction measurements should be undertaken closer to and before the actual construction period of the Willatook facility.

Figure 3 Background noise measurements locations



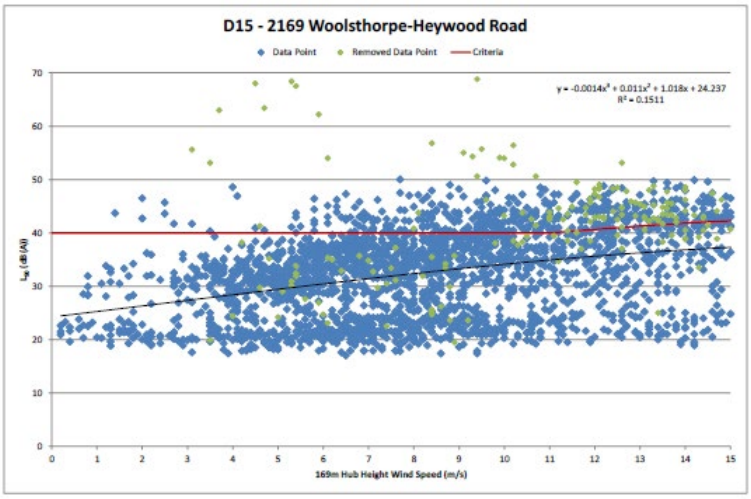
Source: Willatook Wind Farm, Environmental Noise Assessment, April 2022, Sonus Pty Ltd, (Appendix E)

Table 6 Summary of background noise levels at each monitoring location

169m Hub height wind speed	Background Noise Level (LA90) (dB(A))											
	D9	D11	D15	D21	D37	D39	D49	D57	D92	D97	D113	D220
3 m/s	27	31	27	27	32	31	30	24	27	30	24	31
4 m/s	28	32	28	28	32	32	31	26	28	31	26	31
5 m/s	29	33	29	28	33	33	32	28	30	32	27	32
6 m/s	30	33	30	29	33	34	33	29	31	33	28	32
7 m/s	31	34	31	30	34	35	33	31	32	34	29	33
8 m/s	32	35	32	31	35	36	34	32	33	35	30	33
9 m/s	33	35	23	32	35	36	35	33	34	36	31	34
10 m/s	33	36	34	32	36	37	35	34	35	36	32	34

Source: EES Appendix E
Note: m/s = metres each second

Figure 4 Derived criteria at D15 – 2169 Woolsthorpe – Heywood Road

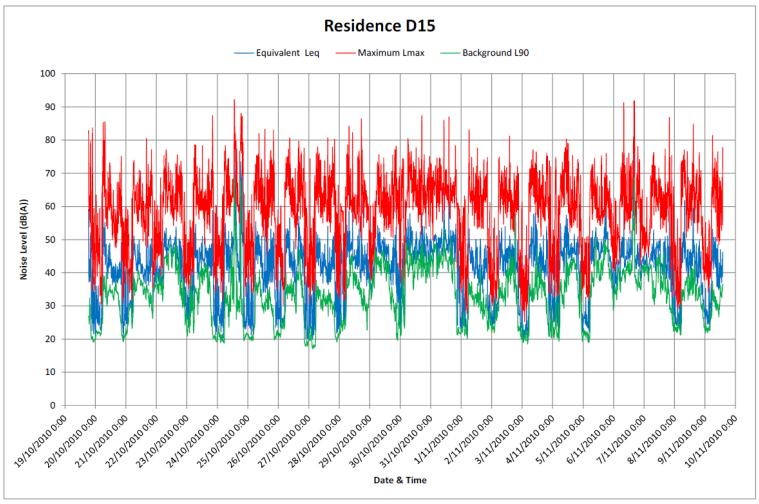


Source: EES Appendix E

At the Directions Hearing, the IAP requested the Proponent provide the time-based noise measurements so that the time of the day when the low background noise levels occurred could be reviewed. Mr Turnbull provided the time-based noise measurement data for all 2010 measurement sites in his evidence. Figure 5 shows the time series for the measured background noise levels at location D15. The data in Figure 5 shows quiet periods at night-time that is not seen in the information provided by the Proponent in the EES documents or Sonus in their Environmental Noise Assessment.

The time series plots, and the regression analysis used to determine the criteria for the other background noise measurement locations while not shown in this report were reviewed by the IAP.

Figure 5 Measured background noise levels at D15 – 2169 Woolsthorpe–Heywood Road



Source: Mr Turnbull evidence

The Proponent referred to the Resonate Acoustics peer review and the Environmental Noise Assessment and the Construction Noise Assessment reports undertaken by Sonus. Resonate Acoustics did not review the report of background noise monitoring (Appendix E of the Environmental Noise Assessment). The peer review notes:

> Noting that the background noise monitoring was conducted over 10 years ago and indicates that background noise levels are typically 35 dB L_{A90} or lower across the assessed

> wind speed range, the Environmental Noise Assessment takes a cautious approach to the background noise by adopting the minimum applicable base wind turbine noise limit of 40 dB L_{A90}. We agree that this cautious approach is appropriate and means that the Environmental Noise Assessment is not reliant on the background noise levels for assessing whether the Project can comply with applicable noise limits.

The Proponent also referred to the audit report by EnviroRisk Management Pty Ltd which undertook a verification assessment of the environmental noise assessment in accordance with the requirements for an EPA Auditor. Regarding the background noise monitoring program in 2010, EnviroRisk found:

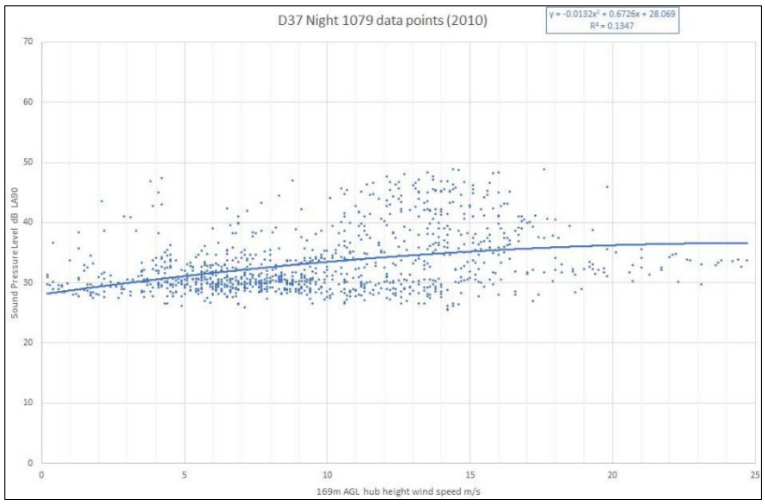
- insufficient information to establish whether the background noise levels vary seasonally or across the night period
- the absence of a separate night-time background noise measurement detail
- Limited detail on the representativeness of the noise monitoring locations
- no measurements in the township zones such as Orford
- seasonal variation in the vegetation coverage at locations with deciduous vegetation may influence the background noise levels
- additional information should be supplied to describe the noise measurement conditions such as the data that was excluded and why.

The EnviroRisk report recommended:

> Background noise data be reviewed against representativeness, seasonal and/or night period variation influences prior to confirming or otherwise whether a noise limit above the 40 dB LA90 base limit is appropriate at any noise sensitive location.

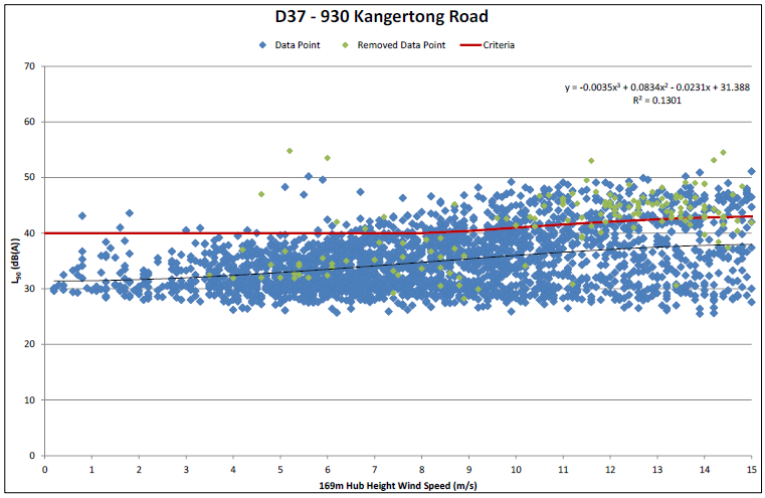
Mr Huson prepared a plot of the night-time background noise level against wind speed for the measurements taken at location D37 – 930 Kangertong Road, shown in Figure 6. This is compared to the Sonus data for the same location for hourly data (daytime and night-time) Figure 7. There is an expected lower noise level at night-time which is shown by the regression line in the Huson plot being a few decibels less than the regression line in the Sonus plot.

Figure 6 **Wind speed versus measured night-time background noise levels at D37 – 930 Kangertong Road**



Source: Mr Huson evidence

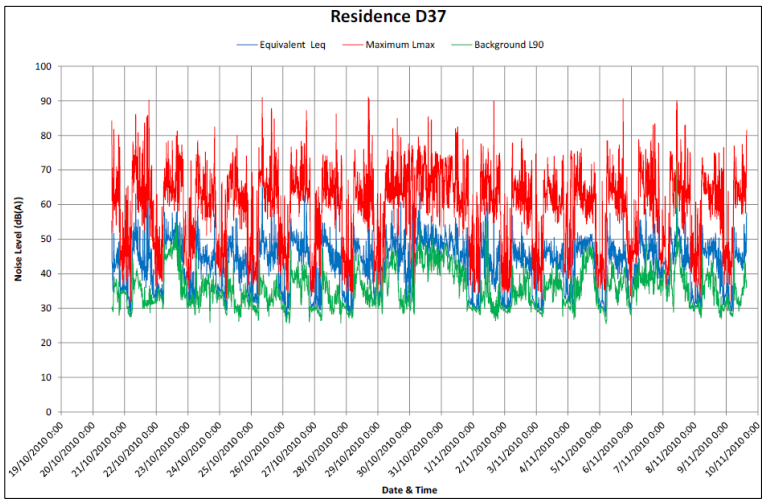
Figure 7 **Wind speed versus measured background noise levels at D37 – 930 Kangertong Road (Sonus)**



Source: Mr Turnbull evidence

Figure 8 of the time series noise level data at D37 – 930 Kangertong Road shows that the background noise levels at night-time on most nights during the measurements are about 30 dB L_{A90}.

Figure 8 **Measured night-time background noise levels at D37 – 930 Kangertong Road**



Source: Mr Turnbull evidence

Moyne Council submitted:

- the noise assessment needs to be rigorous and robust and based on the best available information to ensure that the project *"comfortably meets the relevant standards rather than demonstrating marginal compliance"*
- its concern regarding the date of the background noise assessment had been substantiated by expert evidence during the hearing, in that it was agreed that the measurements did not reflect the current landscape that influences background noise, including growth and planting, and in some instances, removal of vegetation
- establishing background noise levels is critical to establish acceptable noise levels and to measure compliance.

(iii) Discussion

There are important aspects to the requirement to undertake measurements of the existing background noise levels to meet the requirements of the Guidelines and the NZ Standard:

- The derived regression line of background noise levels for various wind speeds is used to determine the noise compliance criteria
- The derived noise level at various wind speeds which is subtracted from the total noise level (background wind noise plus wind turbine noise) to determine the compliance of the wind turbine noise against the noise criteria at various wind speeds.

The general background noise levels expressed at L_{Amax} and L_{Aeq} are also low at night-time along with the L_{A90} parameter. The parameter L_{Amax} is the peak noise in the 10-minute measurement period and could be caused by farm machinery, insects, birds, farm animals or humans. The parameter L_{Aeq} represents the average noise energy for the 10-minute measurement period and follows the trend of the L_{A90} noise levels.

For all these parameters to be lower at night-time compared to the daytime period, then the noise environment at the night-time at this location is relatively quiet. This trend is also seen at the other noise measurement locations in the project area except at locations D37 and D92 which have relatively higher background noise levels.

It is noted that the noise monitoring sites D9, D15 and D21 are adjacent to the Woolsthorpe–Heywood Road, and the background noise levels would be expected to be influenced to some extent by the traffic using the road. However, the noise monitoring sites D9, D15 and D21 are relatively quiet compared to some other remote sites, which indicates the noise from the local traffic does not significantly influence the background noise levels at some measurement sites.

The background noise measurements undertaken by Sonus were used to determine the relationship between the measured existing noise level expressed as $L_{A90\,(10\,min)}$ and wind speed at the potential turbine hub height, which is 169 metres above the ground level for this project (see Figure 4). From this derived relationship the noise criteria (wind turbine noise limit) of either 40 dB $L_{A90\,(10\,min)}$ or background noise level +5 dB, which is the greater, can be determined for various wind speeds.

At noise measurement location D15 (2169 Woolsthorpe–Heywood Road), the derived regression relationship (black line) is at least 5 dB less that the 40 dB $L_{A90\,(10\,min)}$ criteria (red line) up to a wind speed of about 11 metres each second (m/s) (see Figure 4).

Figure 4 shows there are periods when the measured background noise levels are less than 20 $L_{A90\,(10\,min)}$ for the full range of wind speeds. It does not show when the low background noise levels occurred.

For example at location D15, using the derived background noise levels in Table 6:

- at a wind speed of 3 metres each second the derived background noise level is 27 dB $L_{A90\,(10\,min)}$ – at this wind speed the combined noise level of background plus wind turbine noise is permitted to be 40 dB $L_{A90\,(10\,min)}$
- at a wind speed of 10 metres each second the derived background noise level is 34 dB background $L_{A90\,(10\,min)}$ with a permitted turbine noise of 40 dB $L_{A90\,(10\,min)}$ would result in a total noise level of about 41 $L_{A90\,(10\,min)}$.

- at a wind speed of 15 metres each second the derived background noise level is 37 dB background $L_{A90\,(10\,min)}$. At this wind speed the turbine noise level is permitted to be 42 dB $L_{A90\,(10\,min)}$, which would result in a combined noise level of about 44 dB $L_{A90\,(10\,min)}$.

Determining compliance of the turbine noise level is a complex acoustic process and is not as simple as subtracting the background noise levels from the measured wind energy facility noise and comparing the result against the criteria noise level. The combined background noise plus turbine noise can and potentially will exceed the turbine noise limit (40 dB $L_{A90\,(10\,min)}$) even when the turbine noise contribution is 40 dB $L_{A90\,(10\,min)}$ or less.

Usually, the background noise level time series data as shown in Figure 5 is not presented by wind energy facility proponents as the main reason to undertaken background noise levels is to determine the noise criteria at various wind speeds as required by the NZ Standard resulting in the regression line in the background noise versus wind speed plot in Figure 7.

The assessment of high amenity of an area as determined in the NZ Standard is reliant on knowing the existing background noise levels and determining the change in the background noise levels with the introduction of a wind energy facility. The time series plot, for example, shown in Figure 5, allows a clear understanding of the existing noise levels.

The Proponent has committed to adopting a noise criterion of 40 dB L_{A90} – the measurement of the background noise levels to determine the noise criteria is less important. However, background noise measurements will need to be undertaken by the Proponent before the construction commences to establish the existing noise environment in the project area and to conform with the EP Regulations.

(iv) Findings and recommendation

The Inquiry and Panel finds:

- The Willatook facility should adopt a maximum 40dB $L_{A90\,(10min)}$ noise criteria.
- The noise measurement data is 10 years old and should be updated before construction of the Willatook facility commences.
- To enable a better understanding of variation in noise levels, the Proponent should provide time plots for each measurement location.
- There is insufficient information to establish whether the background noise levels vary seasonally or across the night period.
- There is an absence of a separate night-time background noise measurement detail.
- There was limited detail on the representativeness of the noise monitoring locations.
- That there were no measurements in Orford.
- There was no attempt to address the issue of seasonal variation in the vegetation coverage at locations with deciduous vegetation may influence the background noise levels.
- Additional information should be supplied to describe the noise measurement conditions such as the data that was excluded and why it was excluded.
- Future reporting of the existing background noise levels should include an actual time series expressed as LA90, LAeq, LAmax for the hours and days of the measurements.
- Future noise measurements should address the issues of measurement location choice, seasonal variation influencing the background noise measurements and why and when data was excluded.

The Inquiry and Panel recommends:

9. Amend Planning Permit PA2201620, as shown in Report 2 Appendix G, to:
- **a) change the reporting requirements for background noise measurements**
- **b) require the reporting of the noise measurements as a time series noise plot for the 24 hour period.**

6.3 Noise modelling of wind turbine noise

6.3.1 Modelled noise

(i) The issues

The issues are:
- whether the wind turbine type and model adopted by the project is sufficiently definitive.
- whether the model for the wind turbine noise, including input parameters are appropriate.
- whether noise from the battery storage facility, possible quarry, and project terminal substation will result in an acceptable outcome.

(ii) Evidence and submissions

Sonus modelled the noise from the potential turbines using both the CONCAWE and ISO 9613 noise propagation models. Both the models were implemented in the SoundPlan noise modelling software.

The Sonus Environmental Noise Assessment report contains the results of the turbine noise modelling. The noise source for the modelling was 59 Vestas V162 wind turbines. The noise source height was 149 metres at the turbine hub height; it was explained by Mr Turnbull that this was, for the purpose of the modelling, nearly the same height of 169 metres that would be used for the project.

The turbine sound power level increases with increase in wind speed, from a threshold wind speed of 3 metres each second to a maximum noise level at 10 metres each second, Table 7 shows the sound power level for various wind speeds for the Vestas V162 wind turbine as shown in the Environmental Noise Assessment report.

Table 7 Vestas V162 wind turbine sound power level at various wind speeds

Wind speed (m/s)	3	4	5	6	7	8	9	10	>10
SPL (A-wgt)	93.9	94.1	94.3	96.2	99.2	102	104.1	104.3	104.3

The turbine start speed is 3 metres each second and the highest sound power level is 10 metres each second and greater wind speeds. The turbine noise source varies by 10 dB over the wind speed range which will result in a potential 10 dB noise level range at the residences. The highest sound power level used in the Sonus noise models is 104.3 dB(A).

The propagation variables included:
- separation between the noise sources and the receivers
- the topography between the noise sources and the receivers
- the hardness of the ground
- atmospheric absorption at different noise frequencies

- meteorological conditions.

Sonus determined the local topography for the transmission of the turbine noise from all the turbines and impacted residences. Input variations included:

- atmospheric conditions varied between 10°C and 80 per cent humidity (CONCAWE) to 10°C and 70 per cent humidity (ISO 9613)
- acoustically soft ground (CONCAWE) to 50 per cent soft/50 per cent hard ground (ISO 9613)
- barrier attenuation of 2 dB for both models
- 1.5 metres receiver height (CONCAWE) and 4 metres receiver height (ISO 9613)
- 3 dB correction applied where there is a depression in the local terrain.

Sonus indicated that the sound power level for the proposed wind turbine used in the noise model had an allowance for uncertainty as the input parameters were selected to over-predict the modelled noise levels.

Mr Turnbull referred to the modelled wind turbine noise levels for the stakeholder residences which are shown in Table 8. Table 9 shows a sample of the modelled noise level for the non-stakeholder residences. The modelled noise levels using the two models are provided in both tables for comparison.

Table 8 **Modelled wind turbine noise levels various wind speeds at stakeholder residences for CONCAWE and ISO 9613 models**

Dwelling ID	3m/s		4m/s		5m/s		6m/s		7m/s		8m/s		9m/s		10m/s		11+m/s	
	ISO9613	CONCAWE	ISO9613	CONCAWE	ISO9613	CONCAWE	ISO9613	CONCAWE	ISO9613	CONCAWE	ISO9613	CONCAWE	ISO9613	CONCAWE	ISO9613	CONCAWE	ISO9613	CONCAWE
D1	25	27	26	27	26	28	28	30	31	33	34	35	36	38	36	38	36	38
D2	25	26	25	27	25	27	27	29	30	32	33	35	35	37	35	37	35	37
D3	24	26	24	26	25	26	27	28	30	31	32	34	35	36	35	36	35	36
D4	28	30	28	30	29	30	31	32	34	35	36	38	38	40	39	40	39	40
D6	30	32	30	32	31	33	32	34	35	37	38	40	40	42	41	43	41	42
D8	27	29	28	30	28	30	30	32	33	35	36	38	38	40	38	40	38	40
D12	23	25	24	25	24	26	26	27	29	30	32	33	34	35	34	36	34	36
D14	21	22	22	22	22	23	24	25	27	28	30	30	32	32	32	33	32	33
D15	27	29	27	29	28	29	29	31	32	34	35	37	37	39	37	39	37	39
D19	22	23	23	24	23	24	25	26	28	29	31	32	33	34	33	34	33	34
D28	28	30	28	30	28	30	30	32	33	35	36	38	38	40	38	40	38	40
D44	28	30	28	30	29	30	31	32	34	35	36	38	38	40	39	40	39	40
D88	28	30	28	30	28	30	30	32	33	35	36	38	38	40	38	40	38	40
D373	23	25	24	25	24	25	26	27	29	30	32	33	34	35	34	35	34	35
D375	29	31	29	31	29	31	31	33	34	36	37	39	39	41	39	41	39	41

Source: Willatook Wind Farm, Environmental Noise Assessment, April 2022, Sonus Pty Ltd, (Appendix E)

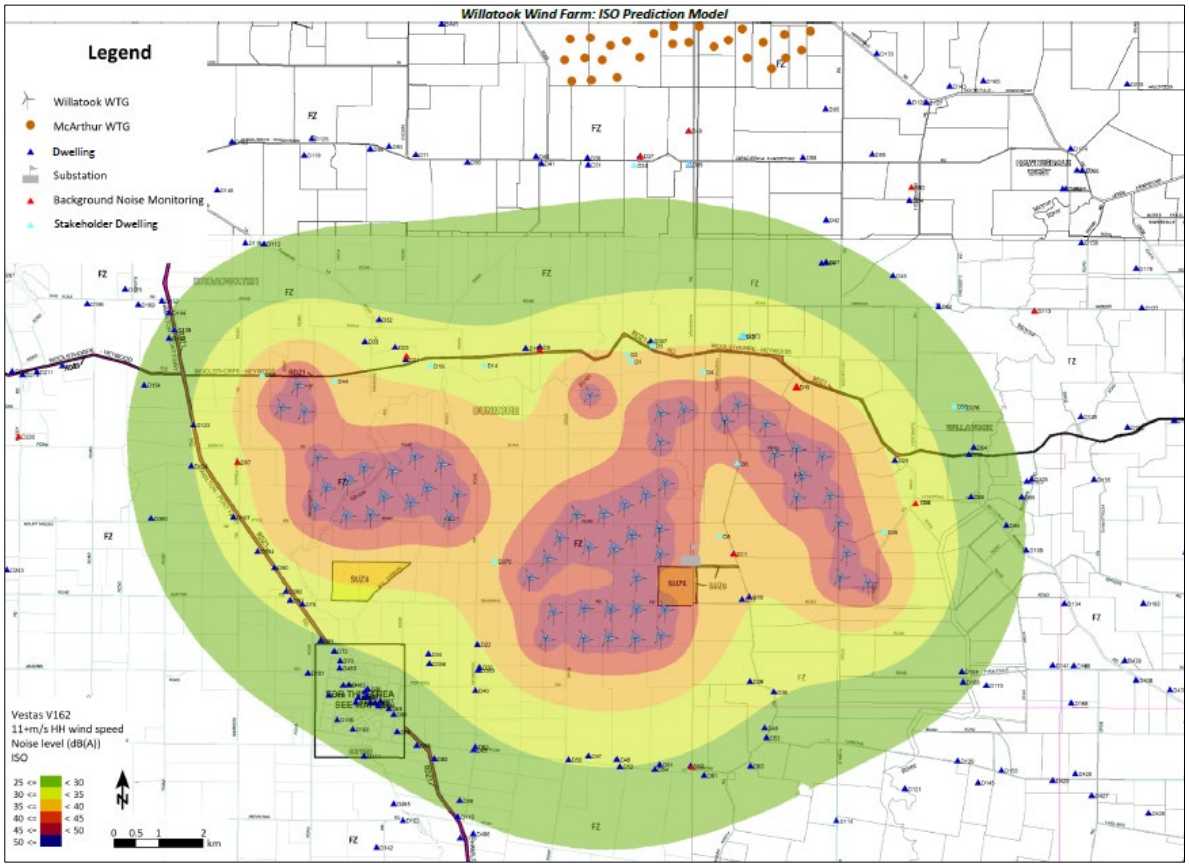
Table 9 **Modelled wind turbine noise levels various wind speeds at a sample of non-stakeholder residences for CONCAWE and ISO 9613 models**

Dwelling ID	3m/s		4m/s		5m/s		6m/s		7m/s		8m/s		9m/s		10m/s		11+m/s	
	ISO9613	CONCAWE	ISO9613	CONCAWE	ISO9613	CONCAWE	ISO9613	CONCAWE	ISO9613	CONCAWE	ISO9613	CONCAWE	ISO9613	CONCAWE	ISO9613	CONCAWE	ISO9613	CONCAWE
D9	22	22	22	23	22	23	24	25	27	28	30	31	32	33	32	33	32	33
D10	21	21	22	22	22	22	24	24	27	27	30	30	32	32	32	32	32	32
D11	26	28	27	28	27	29	29	31	32	34	35	36	37	39	37	39	37	39
D17	25	26	25	27	26	27	27	29	30	32	33	35	35	37	36	37	36	37
D18	25	26	25	26	25	27	27	29	30	32	33	34	35	37	35	37	35	37
D21	22	23	23	24	23	24	25	26	28	29	31	32	33	34	33	34	33	34
D22	24	25	25	26	25	26	27	28	30	31	33	34	35	36	35	36	35	36
D23	22	22	22	23	22	23	24	25	27	28	30	31	32	33	32	33	32	33
D25	24	25	24	26	24	26	26	28	29	31	32	34	34	36	34	36	34	36
D26	21	22	22	22	22	22	24	24	27	27	30	30	32	32	32	32	32	32
D29	23	24	23	25	24	25	26	27	29	30	31	33	34	35	34	35	34	35
D32	20	20	20	21	21	21	23	23	26	26	28	29	31	31	31	31	31	31
D33	22	23	23	24	23	24	25	26	28	29	30	32	33	34	33	34	33	34
D34	21	21	21	21	22	22	24	24	27	27	29	29	32	32	32	32	32	32

Source: Willatook Wind Farm, Environmental Noise Assessment, April 2022, Sonus Pty Ltd, (Appendix E)

Mr Turnbull referred to contour plot of ISO 9613 modelled turbine noise levels (see Figure 12). This figure shows the location of the southern turbines of the Macarthur wind energy facility north of the contour plot. Noise from the Macarthur facility was not included in this model.

Figure 9 Contour plot of ISO 9613 modelled turbine noise levels



Source: Willatook Wind Farm, Environmental Noise Assessment, April 2022, Sonus Pty Ltd, (Appendix E)

Mr Huson presented evidence on the potential errors in the noise model ranging from inaccurate sound power levels for the wind turbines, inaccuracies in the atmospheric conditions, incorrect assignment of ground correction factor and receptor heights. Mr Huson considered:

- the error of the model was typically greater than 3 dB when using accurate input assumptions
- that the uncertainty of the modelled noise levels had not been stated
- that a hard ground correction factor should be applied rather the 50 per cent soft ground factor used by Sonus, resulting in higher modelled noise levels
- noise levels at the residences were significantly underestimated
- a margin of at least +2 dB should added to the modelled noise levels at the residence and that the margin should be included in a permit condition noise limit.

Mr Huson also indicated that modelling guidance could be found in the *Wind Farm Environmental Noise Guidelines*, EPA South Australia, November 2021.

(iii) Discussion

The EES indicates that the turbine noise levels at the nearest non-stakeholder residences are less than 40 dB $L_{A90\,(10min)}$ at all wind speeds. In Figure 9, the outer contour band of <30 to 25 dB $L_{A90\,(10min)}$ covers the Orford town area. From the modelling it is shown that high amenity criteria is not required for Orford as the modelled noise levels are less than the high amenity criteria of 35 dB $L_{A90\,(10min)}$. It is noted that the modelled noise levels relate specifically to the Vestas V162 generator

and that potentially the turbine noise environment in Orford could be different is a different turbine is chosen by the operator.

Generally, the modelled noise levels using the CONCAWE model are 1 to 2 dB higher than the modelled noise levels using the ISO9613 noise model.

The modelled noise levels at dwellings in Table 9 show a range variation of about 10 dB $L_{A90\,(10\,min)}$ for wind speeds of 3 m/s to >10 m/s that corresponds to the 10 dB range of the sound power level of the Vestas 162 turbine shown in Table 7.

For the stakeholder residences, the modelled turbine noise levels are less than the noise criteria of 45 dB $L_{A90\,(10\,min)}$ and for the non-stakeholder residences the modelled noise levels are less than the criteria of 40 dB $L_{A90\,(10\,min)}$.

The Sonus noise report indicated that there was a level of over prediction in the modelled noise levels because of the conservative values for the sound power level for the proposed turbine and the model input parameters.

The noise contours in Figure 9 are for the highest modelled noise level from the Willatook facility using the ISO9163 model; the noise contours will contract towards the turbines as the noise levels from the turbines decrease with a decrease is the wind speed.

The IAP is satisfied with the modelling and the modelled noise levels, because

- The noise modelling will need to be undertaken again when the model wind turbine has been chosen
- When the Willatook facility commences operation, it will need to demonstrate compliance with the turbine noise criteria

While the expert discussion of the various uncertainties in modelling techniques and other modelling variables may be used to cast doubt or create confidence in the modelling process, at the commencement of operations, the turbine noise levels will need to comply with the noise criterion and the requirements of the EP Regulations.

(iv) Finding and recommendation

The Inquiry and Panel finds the model for the wind turbine noise, including input parameters are appropriate to determine compliance with the criteria.

The Inquiry and Panel recommends:

10. Amend Environmental Management Measures, as shown in Report 2 Appendix F, to change the requirements of NV08.

6.3.2 Special audible characteristics

(i) The issue

The issue is whether Special Audible Characteristics should be included during the modelling stage.

(ii) Evidence and submission

Mr Turnbull stated:

- the Special Acoustic Characteristics (SACs) include tonality, impulsiveness and amplitude modulation from the potential wind turbines will be negligible

- the frequency specification of the Vestas 162 wind turbine does not show any degree of tonality
- an objective assessment for tonality from the wind turbines will be required as part of the compliance assessment.

In Resonate Acoustics statement, Mr Evans agreed with Mr Turnbull, that any SACs associated with the wind turbines would need to be assessed as part of the compliance assessment. Mr Evans stated that for SACs:

- not able to be assessed at the planning stage
- NZS 6808:2010 specifies objective procedures to assess special audible procedures characteristic during post-construction noise monitoring
- contingency measures exist in the event they occur and will need to be implemented.

Mr Huson expressed concern about SACs not being considered in detail and that at the planning stage the assurances of the Proponent to minimise the potential SACs is all that can be considered.

The experts to the Joint Statement of Acoustic Witnesses agreed that assessment of the potential SACs is to be undertaken after the start of the operation of the facility as part of the compliance testing, with Mr Huson requesting that the SACs be assessed "*subject to verified independent test results in the pre-construction assessment*".

Several parties referenced the Supreme Court decision of *Uren v Bald Hills Wind Farm (25 March 2022)*. In this case there was significant discussion about the presence of tonality and amplitude modulation with less consideration of the impulsiveness of the wind turbine noise. On the evidence presented, Justice Richards found that there was a tonal component to the wind turbine noise that should have been identified and rectified.

Mr Huson provided two noise measurements – one of 10 minutes of noise measurements taken at a dwelling 800 metres from two turbines and another of a 1-minute period of the same measurements. The noise level variation is about 4 to 6 decibels. Mr Huson considered the averaging of the noise levels to determine the L_{A90} value removes the effect of the noise levels from the individual blade movements.

(iii) Discussion

The NZ Standard addresses the potential impacts from SACs and details methods to measure the extent of tonality, impulsiveness and amplitude modulation. The standard recommends adding up to 6 dB $L_{A90(10min)}$ to the measured wind turbine noise level if SACs are present. Whilst the standard recommends a SACs penalty and a method of assessment, these requirements can be open to interpretation.

The IAP considers that turbines that inherently have SACs emissions should not be used in this project to avoid adverse and prolonged delays while seeking to rectify the issues. The permit conditions regarding SACs should be clarified so that the requirements:

- are easily identified and applied by the Proponent and facility operator
- are easily understood by the local community.

(iv) Findings and recommendations

The Inquiry and Panel finds:

- Turbine models with inherent special audible characteristics should not be considered for the project.

- Special Audible Characteristics are a significant issue and should be included during the modelling of the potential turbine noise levels.

The Inquiry and Panel recommends:

11. Amend Environmental Management Measures, as shown in Report 2 Appendix F, to change the requirements of NV08.

12. Amend Planning Permit PA2201620, as shown in Report 2 Appendix G, to require noise level penalties for the presence of Special Audible Characteristics.

6.4 Noise criteria

6.4.1 General criteria

(i) The issue

The issue is what prescribed noise criteria should be applied when assessing the Willatook facility.

(ii) Evidence and submissions

The Proponent referred to the Environmental Noise Assessment report prepared by Sonus, which referenced the requirement of the WEF Guidelines. The guidelines state:

- A wind energy facility must comply with the noise limits in the New Zealand Standard NZS 6808:2010 Acoustics – Wind Farm Noise (the Standard).
- The Standard specifies a general 40 decibel limit (40 dB $L_{A90\,(10min)}$) for wind energy facility sound levels outdoors at noise sensitive locations, or that the sound level should not exceed the background sound level by more than five decibels (referred to as 'background sound level + 5 dB'), whichever is the greater.
- A 45-decibel limit is recommended for stakeholder dwellings. A stakeholder dwelling is a dwelling located on the same land as the wind energy facility, or one that has an agreement with the wind energy facility to exceed the noise limit.
- Under Section of the Standard, a 'high amenity noise limit' of 35 decibels may be justified in special circumstances. All wind energy facility applications must be assessed using Section 5.3 of the Standard to determine whether a high amenity noise limit is justified for specific locations, following procedures outlined in 5.3.1 of the Standard. Guidance can be found on this issue in the VCAT determination for the Cherry Tree Wind Farm.

Mr Turnbull referred to the requirements of the EP Act and the *Environment Protection Amendment (Wind Turbine Noise) Regulations 2022* in his evidence. Mr Turnbull discussed the relationship between the requirements of the EP Regulations overriding the WEF Guidelines, and that the EP Regulations referenced the NZ Standard such that the requirements of the NZ Standard determine the compliance requirements of the EP Regulations.

Mr Huson made reference to the fact the Epact NZ Standard has been specified in the EP Regulations and that the NZ Standard is mainly concerned with the protection of sleep. Mr Huson's other concerns degrading the criteria were about high amenity and construction noise which are addressed further in this report.

(iii) Discussion

The EP Regulations were amended so that wind turbine noise could be managed by the EPA. This change was due to the new requirements for all industrial environmental impacts in Victoria to be managed by the EP Act. New sections incorporated from the *Environment Protection (Wind*

Turbine Noise) Regulations 2022 set out what wind facility operators must do to comply with the EP Act.

The EP Regulations remove the noise management responsibility from the "responsible authority" to the EPA. The regulations have specific requirements for the facility operator including ensuring compliance with the NZ Standard. The regulations specify which version of the NZ Standard applies to a wind energy facility depending upon when a permit was granted for the facility.

The regulations also specify the noise limit that applies to a dwelling where an agreement has been entered into between the occupier and the facility (stakeholder agreement). The noise limit for the dwelling where an agreement was made after 1 November 2021 is:

- 45 dB(A) or
- the background noise level plus 5 dB.

The regulations only specify the NZ Standard and therefore no other noise standards or criteria are considered. The regulations also take precedence over the WEF Guidelines or any other relevant guidelines.

The wind turbine noise modelling showed the wind energy facility noise at non-stakeholder noise sensitive residences impacted by the project would have maximum wind turbine noise less than 40 dB $L_{A90\,(10min)}$ for all wind speeds.

The Proponent has adopted a noise limit at non-stakeholder residences of 40 dB $L_{A90\,(10min)}$ at all wind speeds. For a stakeholder residence the criteria is to limit the wind energy facility noise level to background noise level + 5dB or 45 dB $L_{A90\,(10min)}$, whichever is the greater.

Not adopting the requirement of background noise level + 5 dB, does not mean that operator will not have to determine the regression relationship of background noise level for a range of wind speed as this regression relationship will be required to determine noise limit compliance.

Regarding GED, the EP Act states:

> …..all industries and individuals in Victoria who are engaged in an activity that may give rise to risks of harm to human health or the environment from pollution of waste must minimise those risks, so far as reasonably practicable.

Most industries in Victoria achieve the GED requirements, with the EPA working with non-compliant industries to achieve GED. For wind energy facilities, achieving the permitted noise limits is required to achieve the GED. The GED requirements also encourage industry to not only achieve regulation compliance but to minimise the environmental emissions by achieving a higher standard than the regulation requirements.

The Proponent indicated the Willatook facility can achieve turbine noise levels less than 40 dB L_{A90} at the non-stakeholder dwellings for all wind speeds, eliminating the criteria to achieve background noise level +5 dB L_{A90}. The IAP agrees with the Proponent because its approach supports the principles of GED by aiming to achieve a more stringent requirement than is required.

(iv) Finding and recommendation

The Inquiry and Panel finds the Willatook facility should adopt a maximum 40 dB $L_{A90\,(10min)}$ noise criteria at all wind speeds, consistent with what Willatook Wind Farm Pty Ltd volunteered to achieve.

The Inquiry and Panel recommends:

13. Amend Planning Permit PA2201620, as shown in Report 2 Appendix B, to apply a noise criterion of 40 dB $L_{A90\,(10min)}$ at all wind speeds, consistent with what Willatook Wind Farm Pty Ltd volunteered to achieve,

6.4.2 High amenity

(i) The issue

The issue is whether the Orford township and the farming zone land surrounding the subject land should be defined as high amenity when determining the noise level criteria.

(ii) Evidence and submissions

Mr Turnbull referred to the WEF Guidelines and section 5.3 of the NZ Standard which is replicated in Chapter 3.5 of this report. He explained the project did not adopt the high amenity noise criteria in NZ Standard section 5.3.1. He relied on the requirement that the plan needs to promote a high degree of protection of local amenity. In this requirement, the plan in the equivalent Victorian context is the zoning requirements of a local planning scheme. If a local planning scheme seeks to provide a high amenity acoustic environment in a zone, then the NZ Standard high amenity requirements should be considered.

Mr Turnbull referred to the VCAT decision regarding the Cherry Tree Wind Farm project where the tribunal decided the Farming Zone did not warrant high amenity consideration because:

> The purpose of the Farming zone is to encourage agricultural use, which is not an inherently quiet land use.

Mr Turnbull considered a high amenity noise criterion was not warranted because the Farming Zone does not promote a higher degree of protection of amenity related to the sound environment. This approach is consistent with the VCAT decision for Cherry Tree wind energy facility and the panel report for the Golden Plans wind energy facility.

Hr Huson stated:

- the WEF Guidelines refer to the noise limits in the NZ Standard so residences in the project area should have been assessed against the high amenity noise criteria
- because residences in Orford may be subjected to turbine noise levels less than 30 dB(A), there is no requirement to assign a high amenity rating to Orford
- the Willatook facility wind turbines may result in noise levels greater that 35 dB(A) at Orford, and residents in Orford would not be protected from the elevated noise levels.
- existing background noise levels over many weeks and several locations in the project area were very low (below 17 dB(A)) and the objective assessment test of section C5.3.1(e) would support the justification of a high amenity for these farming areas. Accordingly, the base target noise limit for certain dwellings in the Farming Zone should be set at 35 dB(A) L_{A90} and not 40 dB(A) L_{A90}
- the Cherry Tree Wind Farm VCAT decision is a guide and both earlier decisions (Sisters Wind Farm) and later decisions take opposing views
- recent Panel reports have recommended a permit condition to assess noise using NZS6808:2010 and that high amenity is required to be considered using the relevant section of this standard.

(iii) Discussion

The IAP acknowledges the EP Regulations:

- determine the noise level criteria for turbine noise in Victoria
- specify the use of the NZ Standard when determining the turbine noise criteria
- do not refer to planning zones or the application of the high amenity criteria to various zones.

The WEF Guidelines includes a mandatory requirement for a proponent to "*submit a pre-construction (predictive) noise assessment report demonstrating that the proposal can comply with New Zealand Standard NZS6808:2010, Acoustics – Wind Farm Noise, including an assessment of whether a high amenity noise limit is applicable under Section 5.3 of the Standard*."

The WEF Guidelines refers to the VCAT Cherry Tree Wind Farm for guidance on the issue of applying high amenity noise limits to a wind energy facility. It is the IAP's opinion that the VCAT Cherry Tree Wind Farm decision is not a determinant in the application of the high amenity noise limit, but it is another tool that is to be used in understanding the application of high amenity to various zones including farming zones.

The Farming Zone seeks to encourage agricultural uses which are inherently noisy activities. However, it is reasonable to assume that there may be relative quiet periods during the evening and night when there is no noisy agricultural activity.

NZ Standard Section C5.3.1 (b) requires the difference between the estimated post-installation sound level and the background level for 10-minute time intervals in the evening (7pm to 10pm) and night-time (10pm to 7am) periods to be calculated. The requested evidence provided to the IAP shows that the existing background noise levels at several noise monitoring locations are of the order of 20 dB $L_{A90(10min)}$ (see section 7.4). The IAP considers that it is essential that in the circumstances where the existing background noise levels at night-time are low, then the requirements of the WEF Guidelines and the NZ Standard are carried out and reported.

It does not appear that Mr Turnbull undertook the high amenity calculations in accordance with sections 5.3.1, C5.3.1, 5.3.2 or 5.3.3 of the NZ Standard as required by the WEF Guidelines.

Consistent with previous wind energy facility panel reports and VCAT decisions, the Township Zone is regarded as a high amenity area and qualifies to be assessed accordingly. The Township Zone area in Orford is outside the predicted 30 dB $L_{A90(10min)}$, (that is the predicted wind energy facility noise levels are less than 30 dB $L_{A90(10min)}$), however the high amenity criteria should be applied for consistency.

(iv) Findings

The Inquiry and Panel finds:

- Noise impacts and noise criteria should be assessed in accordance with the *Environment Protection Regulations 2021* before the Willatook facility begins operating.
- The Orford township should be defined as high amenity because of its Township Zone.

6.5 Compliance monitoring

(i) The issue

The issue is whether the EES environmental measures and permit conditions are appropriate for future compliance monitoring.

(ii) Evidence and submissions

The WEF Guidelines require that wind turbine noise from a wind energy facility comply with the NZ Standard. The Policy and Planning Guidelines also notes that the EPA is the single regulator of operational wind turbine noise.

Mr Turnbull and Mr Evans did not provide any evidence on compliance monitoring, other than post-construction measurement will be undertaken in accordance with the EPA Regulations and the subsequently the NZ Standard.

Mr Huson referenced other planning permits and observed that :

> In a recent decision … Judge Richards clarified that because noise from a wind farm is intermittent that a test against the noise limit for 10% of any individual night is an appropriate way to protect sleep.
>
> I consider that a condition requiring compliance with permitted noise limits for 90% of any night will provide appropriate protection against sleep disturbance, which is the objective behind the recommended noise limits in NZS6808:2010.

Mr Huson showed a permit condition for the Salt Creek facility that requires the night period to be separately assessed and a breach of the noise limit for 10 per cent of the night is a breach of the permit condition.

Moyne Council sought to ensure the noise assessment process is rigorous, and robust, based on best available information and ensures that the proposal comfortably meets relevant standards rather than demonstrating marginal compliance. In referred to the Court's decision in Uren v Bald Hills, which Moyne Council considered:

> … makes it clear that in a practical sense, noise impacts of wind farms can have serious consequences even when they are operated in purported compliance with regulatory standards. In order to protect surrounding amenity, wind farm proposals, including the Project, should demonstrate rigorous and robust noise assessments that demonstrate relevant standards are comfortably met.

(iii) Discussion

The assessment procedure in the NZ Standard:

- is a broad-brush approach to determining compliance
- recommends that noise samples are of 10 minutes duration over a minimum of a 10-day period
- recommends, if there are wind conditions that are not represented in the data set, to conduct further noise measurements to fill the gap or to derive more than one regression line to determine compliance.

The NZ Standard does not determine compliance over a time period. The compliance checking is not time sensitive in that it does not show hourly compliance nor the degree of compliance during the important night-time periods.

The regression line for the background noise levels at various wind speeds is a line of best fit between a range on measurement points that could be more than 10 dB $L_{A90\,(10min)}$ either side of the regression line. While the wind turbine noise would be expected to be less variable than weather affected background noise levels, it would be expected that at any measurement location the turbine noise levels would vary to some degree depending on wind speed variation.

What is not shown in the compliance procedure in 7.6.1 of the NZ Standard is the amount of time that wind turbine noise is not compliant even if the testing results show compliance with the noise criteria.

If the compliance testing shows the wind turbine noise level is at, or just less than, the noise limit, then it would be expected that there are periods when the measured wind turbine noise levels are greater than the noise limit, if the spread of measured noise levels is an indication.

However, the IAP is restricted to the requirements of the EP Regulations and cannot prescribe any permit conditions that deviate from these regulations. However, the adoption by the Willatook facility of a 40 dB $L_{A90\,(10min)}$ should be included in a permit condition. While the condition would not alter what the EPA would require for compliance, the condition would record that the Proponent has willingly adopted a more stringent noise criteria of 40 dB $L_{A90\,(10min)}$ at all wind speeds.

Issues raised by Mr Huson and the Moyne Council justify permit conditions which include:

- A requirement to provide time series noise plots (noise level versus time of day) of the noise parameters L_{Amax}, L_{Aeq} and L_{A90}:
  - for the future measurements of background noise level
  - the compliance measurements during the commissioning of the wind energy facility
  - the compliance measurements during any other turbine noise measurement requirement.
- A requirement for the Willatook facility to report the percentage of time during the night-time period that the turbine noise level exceeds the noise criteria during the 10-minute measurement periods. This will be required during the during the commissioning measurements of the wind energy facility and during any other turbine noise measurement that are required by the EP regulations.

(iv) Finding and recommendation

The Inquiry and Panel finds the EES environmental management measures and permit conditions for future compliance monitoring should include a requirement to report the time series noise levels for the duration of the measurements and the percentage of the night-time period when the turbine noise level exceeds the noise criteria.

The Inquiry and Panel recommends:

14. Amend Planning Permit PA2201620, as shown in Report 2 Appendix G, to change the reporting requirements for the compliance noise measurements.

6.6 Cumulative noise impacts

(i) The issue

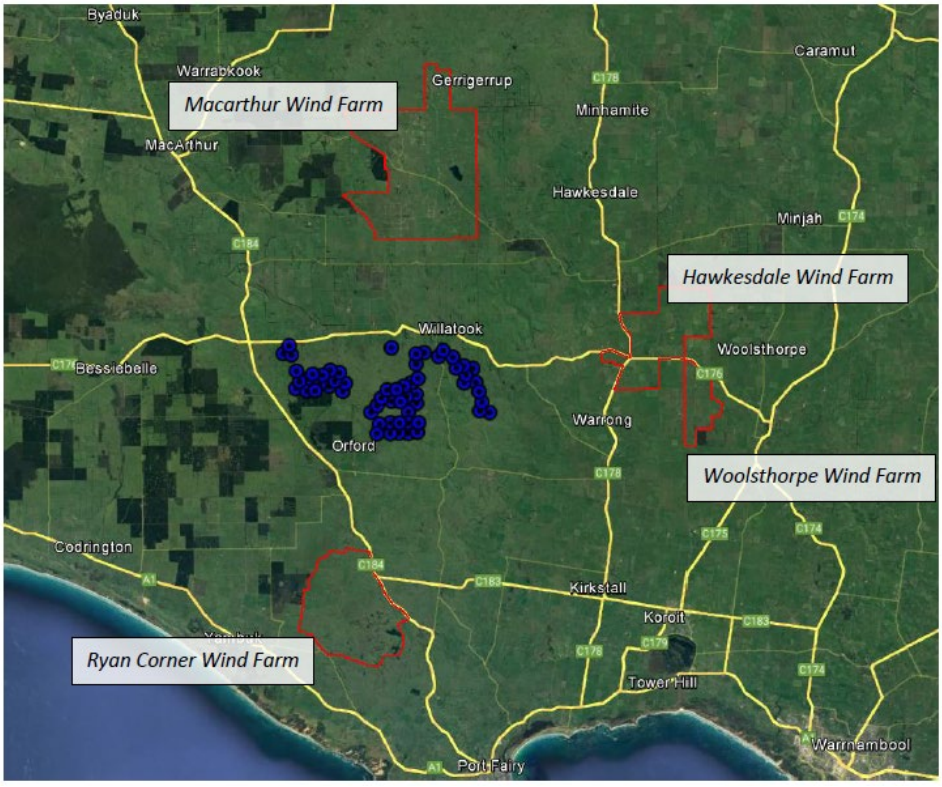
The issue is whether the noise impacts from the Willatook and surrounding wind energy facilities will result in an acceptable cumulative noise impact.

(ii) Evidence and submissions

The Sonus Environmental Noise Assessment Report includes a map of the Willatook facility area and the location of other nearby wind facilities either operating or in the planning stage. This map is shown in Figure 10. The report discussed the cumulative impacts of the Willatook project and the Macarthur facility which is to the north of the Willatook project area. The modelled combined wind turbine noise contours are from the assessment report and shown in

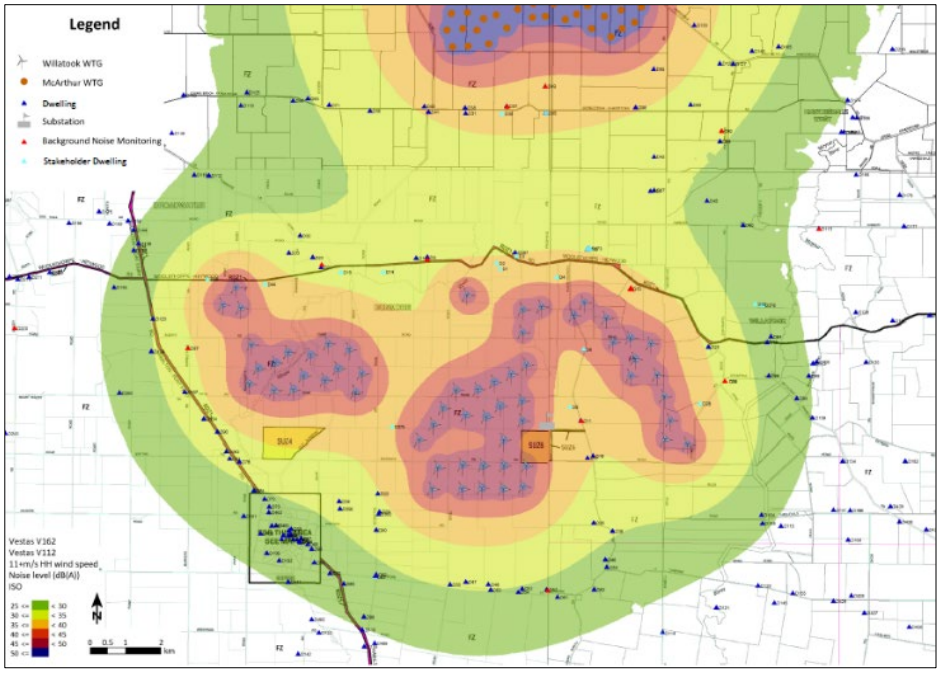
Mr Turnbull concluded that the combined noise impact of the future Willatook project and the existing Macarthur facility will not result in an exceedance of the noise criteria at residences in the vicinity of the project area or at residences in the Macarthur wind energy facility area. It was Mr Turnbull's view that the noise levels from all of the existing or planned wind energy facilities in the area will not result in an exceedance of the noise criteria at residences in the vicinity of the Willatook project area.

Figure 10 Wind energy facilities near Willatook project area



Source: Willatook Wind Farm, Environmental Noise Assessment, April 2022, Sonus Pty Ltd, (Appendix E)

Figure 11 **Noise contours (ISO prediction method) of wind turbine noise from Macarthur and Willatook wind energy facilities**



Source: Willatook Wind Farm, Environmental Noise Assessment, April 2022, Sonus Pty Ltd, (Appendix E)

Moyne Council submitted:

- it was concerned about the cumulative turbine noise impacts at residences in the Moyne Shire because of the poliferation of operating, approved or proposed wind energy facilities
- its objection to the Willatook facility was due to this proliferation
- the NZ Standard:
  - considers cumulative noise impacts by setting an upper limit on noise from multiple wind energy facilities based on the upper limit that applies across the 24 hour period
  - does not recognise the impost that may arise at some dwellings which are affected by multiple turbines or multiple wind energy facilities affected by noise from multiple directions
- some dwellings will be surrounded by turbines, so no matter which way the wind blows, the turbine noise may be heard, even though the NZ Standard noise limit is achieved.

(iii) Discussion

The NZ Standard requires that the noise level from a new wind energy facility in an area that is already exposed to existing wind energy facility noise, will achieve the noise limits in 5.2 (Noise Limit) and 5.3 (High Amenity Areas) of the standard.

This situation where the cumulative noise impacts could result in exceedances of the noise criteria has not arisen for the Willatook project because the Macarthur facility is several kilometres from the Willatook project. The cumulative wind turbine noise levels at residences between the two facilities are predicted to be less than the noise criteria for either facility, as shown in the noise contour plot in Figure 11. This prediction was based on wind blowing from each wind energy facility towards a residence at the same time, which, of course, cannot occur in reality.

The IAP understands Moyne Council's concern regarding the cumulative impact of wind energy facilities prolifirating throughout its municipality. This is beyond the scope of the IAP to make any recommendations and Council should consider approaching the relevant state government department to pursue this further.

(iv) Finding

The Inquiry and Panel finds the cumulative turbine noise from the Willatook wind facility and other nearby wind energy facilities will result in noise limit compliance.

6.7 Substation and battery energy storage system

(i) The issue

The issue is whether the noise levels from the substation and battery energy storage system will result in an acceptable noise impact.

(ii) Evidence and submissions

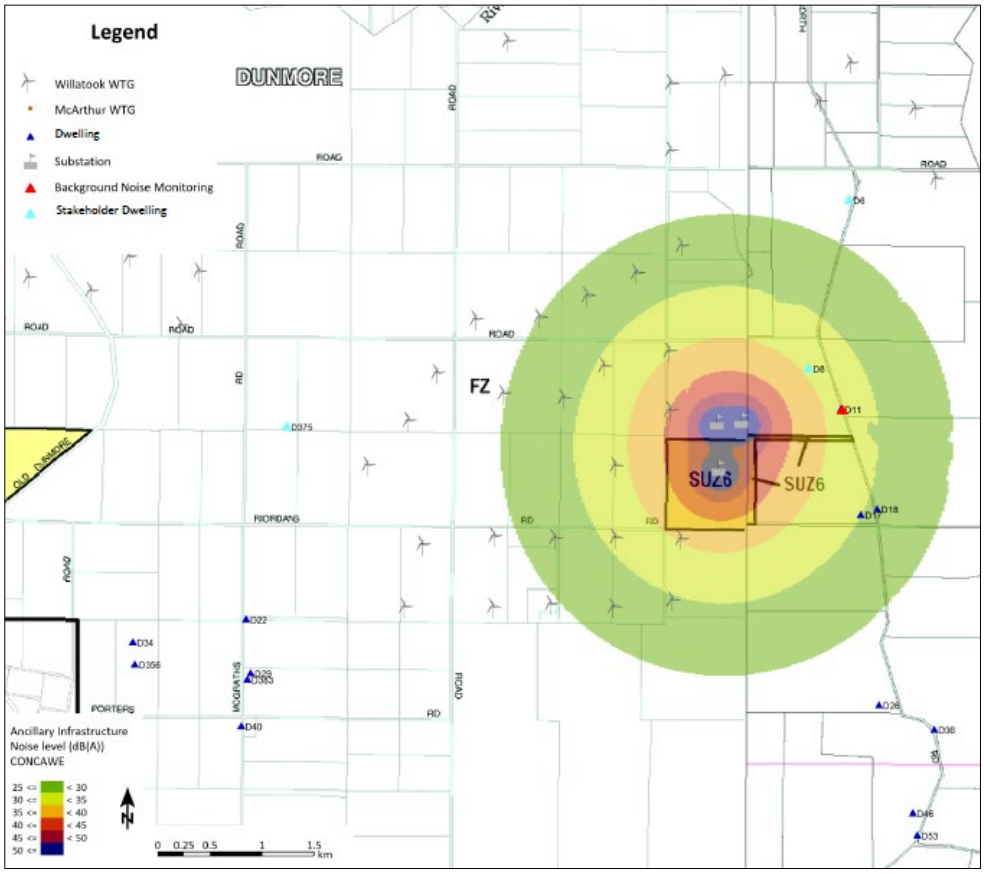
The project will include a permanent electrical terminal substation and battery energy storage system and potential temporary quarry and concrete batching plants. A noise impact assessment by Sonus were undertaken for each of these facilities.

Mr Turnbull stated:

- a noise impact assessment of the various ancillary equipment had been undertaken and compared to the noise criteria specified in the EPA Noise Protocol
- noise modelling of the substation and battery energy storage system facilities was undertaken
- the unattenuated noise contour map for the night-time period at Figure 12 shows that there are 4 residences that may be impacted by the facilities.

Mr Turnbull indicated that mitigation measures may be required to achieve the noise protocol requirements. Mitigation could include specifying quieter transformers at the substation and quieter cooling fans at the battery energy storage system.

Figure 12 Noise contours of night-time noise from substation and battery energy storage system



Source: Willatook Wind Farm, Environmental Noise Assessment, April 2022, Sonus Pty Ltd, (Appendix E)

(iii) Discussion

The substation and battery energy storage system are located to the north of the proposed Tarrone Terminal Station. The closest residence to the substation and battery energy storage system facilities is about 890 metres away at residence D11.

The noise modelling of the substation and battery energy storage system included noise from the Tarrone Terminal Station. The resultant noise levels did not exceed the noise criteria set in the Noise Protocol at the nearest residence.

Noting the Proponent advised that the location of the substation and battery energy storage system is fixed, and only small changes in the layout of the site can be accommodated, the final choice of the equipment used in the substation and battery energy storage system is not final. This is an opportunity to deploy quieter equipment and then remodel the noise impacts from the facilities as the final design of the equipment is determined. If the noise levels are still excessive or unacceptable then other mitigation measures such as noise barriers that could be installed at the site.

(iv) Findings

The Inquiry and Panel finds:

- The noise levels from the substation and battery energy storage system must comply with the Noise Protocol.

- Quieter equipment at the substation and battery energy storage system will result in lower noise levels from these facilities and reduce the requirements for potential noise amelioration measures
- Noise levels from the substation and battery energy storage system will result in an acceptable noise impact.

6.8 Wind energy facility construction impact

(i) The issue

The issue is whether construction for the Wind energy facility can be managed to an acceptable noise outcome.

(ii) Evidence and submissions

The Proponent indicated the project would take about 2 years to construct, with the earliest starting time being in mid-2024. This assumes there are no delays in the pre-construction requirements.

The Proponent referred to the Sonus assessment of potential noise and vibration impacts during the construction phase. It explained:

- the construction plan seeks to erect one of several wind turbines in an area and once completed, move on to another area and repeat the construction activity
- residents' exposure to turbine construction activities at individual or clusters of turbines would not be for the entire project construction phase
- longer-term construction activities such as the mining of materials from the quarry and the supply of concrete for the tower bases will probably extend for the entire construction phase.

Mr Turnbull's statement of evidence summed up the investigations that Sonus and the Proponent undertook to identify the noise impacts of the construction activities. Mr Turnbull found:

- The *EPA Civil construction, building and demolition guide* (2020) provided guidance as to how to minimise the construction noise impacts.
- Predicted construction noise levels will be less than 40 dB(A) L_{eq} and could be considered low noise impact.
- Noise for construction activities outside normal hours would need to be undertaken in accordance with the requirements of the EPA guide.
- Managing construction noise will need to consider the requirements of the General Environmental Duty sections of the EP Act.
- Noise from the concrete batching plant will be managed in accordance to the requirements of the Noise Protocol, and the predicted noise levels at residences will meet the criteria of 40 dB(A).
- The Construction Management Plan will need to specify the management of construction noise to minimise the impacts at residences.

Mr Turnbull indicated that the noise from the quarrying activities is predicted to achieve the Noise Protocol night-time criteria, allowing quarrying works to be undertaken at any time during a day or day of the week.

Mr Evans and Mr Huson raised concerns about the assumed existing background noise levels used to determine the construction noise criteria.

(iii) Discussion

There are no non-stakeholder dwellings within 1 kilometre of a wind turbine, and no dwellings that will be significantly impacted from the construction noise emitted for the activities at a wind turbine. This is not to say that the noise of the construction activities will be inaudible at residences near the construction activities. The predicted noise levels from construction activities are less than 40 dB(A) L_{eq}, and is considered at low impact.

The Sonus report indicated that there could be four concrete batching plants located within the project area. The closest residence to a concrete batching plant is 1200 metres for residence D357. The predicted plant noise level at the D357 residence is 37 dB(A), compared to a noise criterion of 40 dB(A).

While Mr Turnbull indicated that the noise from the quarrying activities is predicted to achieve the Noise Protocol night-time criteria, there was no evidence presented to confirm this assessment.

Other construction noise impacts such as vehicle traffic on local roads are not controlled by the Noise Protocol but will be guided by the Civil construction, building and demolition guide and the Construction Management Plan.

It is important to develop a process where the progressive details of construction activities are conveyed to the local community in a timely manner so that the impacts can be minimised or alleviated. Night-time work activities should be avoided, and the CMP should emphasise that night-time activities are to only be undertaken if not avoidable.

(iv) Finding and recommendation

The Inquiry and Panel finds the construction for the Willatook wind energy facility can be managed to an acceptable noise outcome.

The Inquiry and Panel recommends:

15. Amend Environmental Management Measures, as shown in Report 2 Appendix F, to change the requirements of NV01 to address local community engagement.

6.9 Quarry blasting

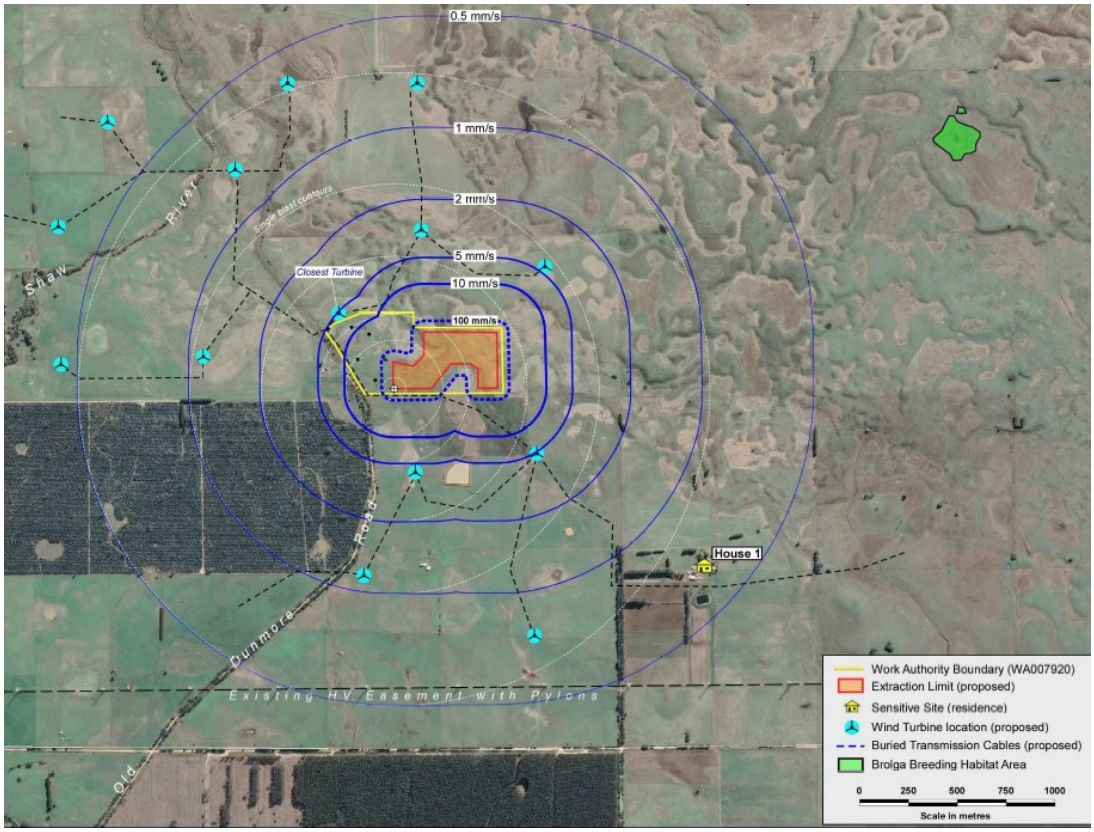
(i) The issue

The issue is whether audible noise levels from blasting will negatively impact surrounding residents and whether the vibration from blasting will be disturbing.

(ii) Background

The Blast impact assessment report includes a map which predicts blast vibration contours for quarrying activities (see Figure 13Figure 13). From the map the quarry site and nearby dwelling are shown as well as the vibration contours radiating out from the quarry.

Figure 13 Predicted blast vibration contours for quarrying activities



(iii) Evidence and submissions

Blasting noise from the quarry was not assessed by Sonus. Sonus concluded that the audible noise levels from the blasting will be negligible at the most exposed residence; without supporting information.

The Terrock Consulting Engineers (Terrock) report of April 2022 assessed the noise and vibration impacts of blasting at the possible quarry site.

The Terrock report states:

> Audible noise levels from blasting are not currently subject to regulation, though the dBA levels can be estimated from airblast measurements.
>
> Airblast (overpressure) is a low frequency (<20Hz), sub-audible change of air pressure that occurs as explosive energy radiates through the atmosphere around a blast site.
>
> The assessment shows compliance with the ERR 115 dBL airblast limit will be achieved for all standard specification blasts at the proposed quarry regardless of the face height or direction.
>
> Because the closest sensitive site (House 1) would be exposed to lower, behind-blast levels, airblast at the closest house would be at or below the threshold of perception. Airblast would also be imperceptible at more distant receptors (>3km) regardless of face direction.

Vibration impacts of the quarry blasting was assessed by Terrock. The residence at House 1 in Figure 13 is approximately 1400 metres from the estimated blast area. The predicted maximum vibration level at this residence is 0.31–0.63 millimetres each second. Terrock concluded:

> These levels are around one-tenth of the ERR 5 mm/s limit and around 3% of the threshold for cosmetic damage shown in AS2187.2 (2006). Therefore, the risk of damage at House 1 or more distant sensitive sites is negligible.

The Proponent submitted:

> Vibration from blasting at the quarry was predicted to emphatically comply with limits established by Earth Resources Regulation, as well as the limits for cosmetic damage to buildings under AS2187-2 (2006).

It is planned that blasting will happen on a regular basis, no more than twice a month for the potential 2-year life of the quarry and limited to weekdays.

(iv) Discussion

Terrock indicated that it did not undertake a noise assessment within the audible noise range. Whilst there is a relationship between airblast noise levels and audible noise levels, no attempt was made by either Terrock or Sonus to estimate the potential audible noise levels at residences near the quarry.

If the quarry is proposed through a separate process, further modelling of the audible noise levels from the quarry related blasting should be undertaken before works commence on the quarry.

(v) Findings and recommendation

The Inquiry and Panel finds:

- Based on available information, that impacts from audible noise levels from blasting have not been addressed so it is not possible to determine whether quarrying activities will negatively impact surrounding residents.
- If the quarry is proposed through a separate process, an estimate of the audible noise levels resulting from the blasting should be required at affected dwellings before any works commence on the quarry.

The Inquiry and Panel recommends:

16. Amend Environmental Management Measures, as shown in Report 2 Appendix F, to include an audible blasting noise assessment in NV08.

7 Landscape and visual amenity

(i) Background

EES evaluation objective and EMF measures

The landscape and visual objective in the Scoping requirements is:

> To minimise and manage potential adverse effects for the community with regard to landscape and visual amenity.

EMF management measures LV01 to LV04 are relevant to landscape and visual.

The Landscape and Visual Impact Assessment

The Landscape and Visual Impact Assessment (LVIA) is included at EES Appendix F1 and concludes:

- the project is in an area with low sensitivity to visual change and can accommodate the visual change
- the landscape in the study area has been extensively modified
- the landscape near the subject land and to the east and south, is more complex where views change dramatically from clear long views to screened views
- the project's visual impact from:
  - the Port Fairy to Warrnambool Rail Trail, Budj Bim, Mount Rouse, Mount Napier and Tower Hill (which are significant landscapes and vantage points) is low – based partly on distance, screening afforded by topography, vegetation and the viewing direction
  - nearby towns is low-negligible to nil – views from most locations are filtered or screened by a combination of topography, vegetation or buildings, and other structures
  - major roads is negligible to low – due to views being limited by roadside vegetation, plantation areas and farmland and screening afforded by nearby and surrounding topography
  - the Princes Highway and scenic coastal routes are towards the south of the subject land and at a distance where even if turbines are visible, is negligible
  - local roads is low – views and visibility of the turbines from local roads would vary greatly depending on location and proximity to the subject land
- there are very few locations where there is potential for simultaneous views due to the topography, the siting of the road network and landscaping, which partially filter views for road users along Hamilton–Port Fairy Road to the west through to Macarthur
- there are potential and barely discernible views from the south at the Princes Highway, limited to the upper portions of the turbines which would be visible beyond the closer turbines at Ryan Corner
- individual dwellings near the subject land have:
  - the greatest potential for visual impacts
  - have existing vegetation around then that will filter or screen views of the turbines.

The LVIA recommended that landscape screening be offered to owners with dwellings within 6 kilometres of a turbine.

A peer review of the LVIA is included at EES Appendix F2 and finds the LVIA:

- is "*well presented, written and structured and the findings are mostly sound and supportable*"

- applies appropriate methods in line with best practice and statutory guidelines
- proposes appropriate measures to limit impacts
- has sound findings and reasonable conclusions.

Farming Zone

Regarding visual and landscape amenity, the Farming Zone includes decision guidelines which requires the responsible authority must consider, as appropriate:

- The Municipal Planning Strategy and the Planning Policy Framework.
- The impact of the siting, design, height, bulk, colours and materials to be used, on the natural environment, major roads, vistas and water features and the measures to be undertaken to minimise any adverse impacts.
- The impact on the character and appearance of the area or natural features of architectural, historic or scientific significance or of natural scenic beauty or importance.

Clause 52.32

Clause 52.32 (Wind energy facility) sets out decision guidelines, which as relevant to a visual assessment, is to consider the impact of the development on significant views, including visual corridors and sightlines.

Victorian wind energy facilities guidelines

The WEF Guidelines state:

- the Victorian Government recognises that the community places a high value on landscapes with significant visual amenity due to their environmental, social and economic benefits
- strategic planning plays an important role in identifying and managing these landscapes
- wind energy facilities will have a degree of impact on the landscape
- a responsible authority:
  - needs to determine whether or not the visual impact in the landscape is acceptable
  - needs to consider the state, regional and local planning policy framework
  - should consider the planning scheme objectives for the landscape, including whether the land is in an Environmental Significance Overlay, Vegetation Protection Overlay, Significant Landscape Overlay or a relevant strategic study that is part of the planning scheme.

South West Victoria Landscape Assessment Study

Planisphere prepared the South West Victoria Landscape Assessment Study (SWVLAS) for the former Department of Planning and Community Development in 2013. The SWVLAS:

- recognises and values the geological formations that occur within the landscape, but also notes that the landscape has undergone change since European settlement
- identifies eight Landscape Character Types and Landscape Character Areas
- identifies a range of landscapes that are of State significance, including as relevant, Mount Rouse, Budj Bim (Mount Eccles and Tyrendarra Lava Flow), Mount Napier and Harmans Valley and Lava Flow and views of State and regional significance including Mount Rouse, Harmans Valley and Lake Surprise
- is not referenced in the Moyne Planning Scheme.

The subject land is in the Western Volcanic Plains Landscape Character Type, which covers the most expansive area in the SWVLAS.

(ii) The issues

The issues are:

- whether the EES and permit applications have appropriately considered landscape and visual impact, including cumulative effects
- whether the project will result in an acceptable landscape and visual impact.

(iii) Evidence and submissions

The Proponent submitted that landscape and visual assessments inform the process, but a planning assessment determines whether the impacts are acceptable. It added, a planning assessment of landscape and visual impacts rests on the following 'core' propositions:

- Turbines will be visible and at times dominant – the impact of turbines on the landscape is widely recognised by planning policy.
- Visual impact must consider the significance of the location from which views of the turbines is afforded, the number of people who will see the turbines, the duration of the view and the setting of the turbines.
- The assessment is an objective one and is not subjective based on views of particular individuals or groups.
- The assessment should be based on the significance attributed to landscape or a view identified in the planning scheme.
- The WEF Guidelines require the assessment give closer consideration to significant landscapes and vantage points, as acknowledged by the planning system and other environmental legislation.
- The Planning Scheme, through the WEF Guidelines, provides evaluation criteria for the assessing landscape and visual impacts, including cumulative impacts with other wind energy facilities.

The Proponent considered the LVIA satisfactorily addresses the criteria in the WEF Guidelines for assessing visual impact. Regarding the witnesses' application of different guidelines – Mr Burge's application of *Guidelines for Landscape and Visual Assessment (3rd edn) (UK Landscape Guidelines)* and Dr Williamson's application of the NSW Wind Energy Assessment: Visual Assessment Bulletin (NSW Landscape Bulletin) – it submitted that the Planning Scheme or guidelines do not recommend or require one approach over another.

It submitted that it does not dispute that the Project could have a high visual impact where there are uninterrupted views to the turbines, but that it is a matter of whether the visual and landscape effects are acceptable in planning terms.

In its closing submission, the Proponent referred to the Geoheritage Assessment at EES Appendix A which concluded that approving the project would not prevent Council from preparing a Planning Scheme amendment to apply the Significant Landscape Overlay.

The Proponent called landscape expert evidence from Mr Burge who was an author, reviewer and approver of the LVIA. Having regard to the LVIA, Mr Burge concluded:

- there will be negligible to low impact on major roads because of vegetation and topography.
- there will be negligible to low impact on local roads based on the sensitivity of landscape and duration of views.

Mr Burge explained:

- dwellings on neighbouring properties would have the greatest potential for cumulative visual impact
- mitigation measures were needed for 6 out of the 8 affected dwellings which were assessed
- mitigation measures would be in the form of new plantings near the dwelling yard boundary
- the project would be a background element in views due to distance from significant landscapes, including Budj Bim and Mount Rouse
- there will be limited to no impact on volcanic landforms that are protected by the existing Significant Landscape Overlay
- the project will not detrimentally remove or cover features or reshape surfaces of the Mount Rouse lava flows
- regarding cumulative impact:
  - the project would be confined to an area of established and approved wind energy facilities
  - there are few locations where there is potential for simultaneous views of wind turbines
  - the greatest impact would be from dwellings on neighbouring properties
- the area has a low sensitivity to visual change and is an area that can accommodate visual change caused by the project
- the landscape has been extensively modified
- views from towns will be screened.

In evidence in chief, Mr Burge highlighted that the visual analysis does not just rely on turbine visibility, but that there are other contributing factors, including topography, vegetation, screening limited by buildings and/or structures, distance, landscape and viewer sensitivity and the potential number of viewers.

Mr Burge advised he 'ground truthed' his recommendation for landscape screening on residential properties by inspecting the Mura Warra wind energy facility which currently has the tallest turbines at 220 metres. He considered the screening successfully mitigates views.

Mr Burge highlighted the existing Significant Landscape Overlay does not apply to the subject land and its surrounds. The IAP questioned whether his findings would have differed had the overlay applied. He responded:

- it would depend on what the overlay provisions sought to protect
- the LVIA assessment sought to assess the wind turbine locations having regard to observations of the Macarthur wind energy facility, which is constructed on land with similar features
- the construction of roads or turbine pads would not erode significant elements, because there would still be views of undulating terrain, rock clusters and vegetated areas among the turbines.

Moyne Council referred to Mr Burge's evidence and the LVIA[6] which acknowledge the project is "*infilling an area of existing and approved wind farms, thereby reducing the geographical extent of*

[6] EES Appendix F1, p9

windfarms in the region and 'concentrating' them away from areas such as urban areas, protected and key landscapes, highways and tourist routes".

Moyne Council was concerned about the landscape and visual effects of this proposal as well as the cumulative impact which it termed the "*dramatic change to the landscape of the Shire*." It sought to have these effects considered and managed wholistically where practical.

Moyne Council explained:

- the cumulative effects relate to an increased visual dominance of an energy industry over large parts of its municipal landscapes – they were not just about particular views
- while the proposed wind turbines are in an area of existing and approved wind energy facilities, the clustering of the Willatook facility with other existing and approved wind energy facilities will have a cumulative impact
- the cumulative visual impact fell short of achieving the objective of Clause 12.05-2S which seeks to protect and enhance significant landscapes
- the SWVLAS which identifies the subject land as being partly in the Mount Rouse significant landscape area recommends the Significant Landscape Overlay be applied to this area
- the Willatook project may potentially impact the Mount Rouse significant landscape area and the ability to apply the Significant Landscape Overlay.

Moyne Council highlighted Mr Burge's response to the IAP's questions that views from Mount Rouse would be in the order of 200 turbines, including from Macarthur wind energy facility and the proposal. It submitted the cumulative impact on views to and from Budj Bim has not been sufficiently resolved, submitting that it is important to preserve the historical and cultural significance. It was critical of its perceived reliance by the Proponent on landscaping, including its continuing integrity, to mitigate views from residential properties.

Willatook Society made similar submissions, noting:

- the project will negatively affect residents' views, tourist views (particularly on the roads leading to Budj Bim) and will detract from the Budj Bim experience
- the PE Act requires the protection of land (as a natural resource), the conservation of places and the need to secure a pleasant environment for residents and visitors to Victoria
- the Planning Scheme requires the need to protect and conserve environmentally sensitive areas.
- Mr Burge concluded that some houses would have a high visual impact but impacts could be reduced to negligible or low through screening.

Willatook Society called Dr Williamson as a landscape expert and relied on this evidence. In his evidence-in-chief, Dr Williamson stated he reviewed the LVIA and found:

- procedural steps were not clearly conveyed
- there was some confusion and overlapping of terms and concepts
- the assessment logic is not clearly explained
- these issues weakened the credibility of the LVIA and its conclusions.

In his written evidence, Dr Williamson considered:

- the rationale for representative viewpoints is not always clear and in some instances have not been selected

- the cumulative impact of the Willatook and 6 other operating facilities has not been fully addressed, including impacts on sequential and simultaneous views.

Dr Williamson explained that the LVIA's assessment:

- does not adopt the Planisphere Landscape Types and it does not fully acknowledge areas of significance
- has a convoluted and confusing landscape sensitivity analysis
- underestimates the visual impact of the turbines on the surrounding landscape
- has a questionable selection and number of viewpoints, though the photomontages appear to be technically correct
- does not consider all relevant dwellings and it relies too heavily on landscaping to mitigate impacts
- does not clearly state a rigorous procedure and criteria for assessing sequential views along highways and other routes in the region
- assessed only one viewpoint on Penshurst–Warrnambool Road but did not assess other highly used local roads such as Woolsthorpe–Heywood Road, Tarrone Lane, Willatook–Warrong Road, Tarrone North Road, Warrnambool–Caramut Road and Spencer Road
- does not address the extensive series of constructed or approved wind energy facilities along the Hamilton Highway because it limits the sequential cumulative impact analysis to 20 kilometres from Willatook.

Mr Burge and Dr Williamson considered views from dwelling D124. Mr Burge observed that the dwelling is sited on a hill with very clear views to the north, south and east and that based on the topography, it would be challenging to achieve landscape screening to mitigate views of the proposed turbines. He concluded that this one dwelling will have a high level of impact that cannot be mitigated and that the majority of the turbines will be visible from this dwelling. In response to IAP questions, Mr Burge replied that views from this dwelling may include wind turbines at Macarthur, Hawkesdale, Woolsthorpe and Ryan Corner.

The IAP questioned Mr Burge how this outcome was reconciled with the Scoping Requirements which seeks to minimise impacts and for a proponent to outline and evaluate potential design and siting options to minimise effects. Mr Burge replied:

- there will be dwellings with a high level of visual impact, and that this occurred at Delburn
- if it was a sensitive location, for example where it had views towards Mount Rouse, then that would warrant a different consideration.

It was Dr Williamson's opinion that reliance on landscaping does not recognise the importance of "*ordinary views from rural dwellings*" and observed that "*views over flat to rolling pastural landscapes, plantations or bushland may not seem like significant landscape experiences to urban dwellings, but for rural residents, these everyday landscapes can give them visual relief from work on the farm and the pleasures of the landscape settings in which they live*." Dr Williamson was also of the view that a detailed analysis should be undertaken in line with the NSW Guidelines that considers the cumulative impact of proposed and existing turbines within 8 kilometres or potentially up to 16 kilometres.

Submitters were concerned about the visibility of the proposed turbines, including what they perceive to be an "*industrialisation of the farmland that will inhibit agricultural investment*." Collectively, they submitted:

- landscape screening would inhibit views from inside their dwelling over paddocks and to livestock
- landscaping would compromise the energy efficiency of their dwelling, blocking sunlight from the north
- additional landscaping in proximity to dwellings presents a fire risk
- farming land is their workplace and they will be surrounded by wind energy facilities with visible wind turbines
- blade flicker could potentially impact farming activities, leading to an unsafe workplace
- the wind turbines at the Macarthur wind energy facility are highly visible from Tower Hill and Yambuk, over 35 kilometres away
- the Willatook wind turbines, when combined with the Hawkesdale and Woolsthorpe win energy facilities will present a continual line and appear as an 'industrial area'
- the EES did not adequately address cumulative impacts.

(iv) Discussion

The IAP agrees with the LVIA that concentrating wind energy facilities within one portion of the Moyne Shire would minimise potential impacts in other parts of the region. However, this concentration may worsen the cumulative visual impact of viewing hundreds of structures of up to 250 metres to blade tip height. This height which equates to roughly 82 residential storeys, is normally found in Melbourne's Central City. The Willatook facility will be across 4,154 hectares.

There is no doubt the proposed wind turbines are large structures that will notably alter views of the landscape. Nobody argued otherwise.

The WEF Guidelines acknowledge a wind energy facility will have a degree of impact on the landscape. An assessment is required to determine whether the Willatook facility's visual impact on the landscape is acceptable.

The IAP has considered the Planning Scheme objectives for landscape, including overlay provisions and whether the land is part of a relevant strategic study. The SWVLAS is not part of the Planning Scheme and there is no planning scheme amendment to implement its recommendations (even though it was completed nearly 10 years ago). Therefore, this study can only be given little weight.

It is beyond the IAP's scope to consider whether enabling the Willatook facility would affect the ability to apply the Significant Landscape Overlay. The Geoheritage assessment at EES Appendix A referred to by the Proponent finds:

- the cumulative impact of wind energy facilities on geoscience significance is beyond its scope
- the proposed construction and operation of the Willatook facility will "*maintain the high level of geoscience significance of the site and the broader aspects of Mount Rouse and associated lava flows exposed at the present project site*"
- the complex terrain is largely on private property and not generally available for public access.

The IAP agrees with Mr Burge that undulating terrain, rock clusters and vegetated areas would continue to be visible. It accepts the detailed Geoheritage assessment and considers the proposal will not compromise the significant landscape's integrity. Therefore, it consistent with the objective of Clause 12.05-2S, particularly the strategy to "*ensure development does not detract from the natural qualities of significant landscape areas*."

There was general agreement between expert witnesses regarding the visual significance of Mount Rouse and Budj Bim at a distance of 28 to 30 kilometres. Distance alone does not determine how sensitive a turbine will be when viewed in the landscape. Other factors include location, existing screening from things such as vegetation or topography.

The IAP agrees with Mr Burge that the sensitivity is negligible, largely because of distance and screening provided by vegetation and topography. This is consistent with the IAP's inspection from Budj Bim. At such a distance and location, the Willatook wind turbines would be background elements to the Macarthur turbines in a diminished form.

The LVIA has appropriately defined significant landscape, and applied a robust assessment methodology and assessment points. Budj Bim, including the world heritage area, has been recognised for the significant landscape within its boundary and not because of its interaction with other landscapes. Within this context:

- any Budj Bim experience occurs onsite and will not be affecting by views of wind turbines along roads leading to the national park
- there is no evidence the project will negatively affect Budj Bim's historical and cultural significance.

Regarding views and visibility of turbines from roads, the IAP accepts the conclusions in the LVIA and is satisfied that it has thoroughly assessed the project's visibility from the surrounding road network. There may be points where the wind turbines are:

- visible, or more visible than in other locations
- seen within the context of other approved wind turbines.

However, visibility in itself is not the relevant consideration.

Distance, vegetation and topography will restrict or filter views of the project's wind turbines from the Princes Highway, major roads and tourist routes. In many instances, the wind turbines will be confined to the tips and will be seen in the background to the approved Ryan Corner wind energy facility. These visual restrictions would also limit the extent of cumulative visual effects. The duration of views would be limited by vehicles moving along roads, and would vary between driver and passengers.

Local roads generally have a relatively lower level of use, and are predominantly frequented by the local community. The project's wind turbines will be visible from local roads and alter the landscape, however, the IAP accepts the LVIA's finding that views from local roads will be acceptable.

The IAP agrees with the LVIA and Mr Burge's evidence that:

- the greatest potential for visual impacts would be from dwellings near the project
- the siting of the proposed turbines, in conjunction with the existing and potential landscape screening, will minimise and appropriately manage potential adverse effects for residents
- many dwellings, including the 23 identified in Dr Williamson's evidence had been assessed or there had been attempts to assess the dwellings.

The IAP notes that 5 of the 25 dwellings were assessed as having the potential for a high level of visual impact from key views near the dwelling and 3 of the 25 dwellings have the potential for a moderate to high level of visual impact. One dwelling (D124) was assessed as challenging to mitigate views or where mitigation may also remove views that are considered desirable.

For many properties, views are currently screened or limited by vegetation and there will be properties where screening is more challenging or unable to mitigate views of the proposed turbines. There are valid reasons raised by submitters as to why they would not prefer additional landscaping around their dwellings. It may be that as with planning considerations, it is a matter of weighing visibility of the turbines versus energy efficiency of a dwelling or visibility of stock. It is likely that the mitigation measure will not suit all, and that there should be some flexibility around the landscape screening offered to affected landowners. The proposed landscape condition allows for an opt-in or out approach. Management measures LV03 also allows for consideration of various issues, including bushfire management, and provides for consultation on a case-by-case basis. Both the proposed permit condition and LV03 requires consultation and consideration of properties within 6 kilometres, which is the figure adopted by Mr Burge.

The IAP considers that adopting the distance of 6 kilometres is appropriate as it is the upper limit in the zone of visual influence which is where a turbine has the potential to be "*highly visible and will usually dominate the landscape*" as described in the LVIA. It follows that on the basis that the IAP accepts the LVIA's analysis and findings, that the IAP accepts Mr Burge's zones of visual influences adopted in the LVIA.

The IAP acknowledges submitters' concerns regarding visibility of turbines from further afield in their properties and their submissions that the paddocks are their place of work. However, the IAP is required to consider the sensitivity of the landscape to change and it has been previously accepted practice by Panels to consider the impacts in and around dwellings. The Guidelines also refer to the consideration of siting and design to minimise impacts on views from dwellings, as opposed to reference to properties.

Of the dwellings which were assessed:

- none had key views to protected feature or landscapes
- some had vegetation which currently restricts their views
- there may be somewhere new landscape screening may be acceptable, appropriate or mitigate against views of wind turbines.

Clause 52.32-5 acknowledges a wind energy facility will impact significant views and requires the responsible authority to consider this when assessing the planning permit application. However, there is no planning policy or provision seeking to avoid views of wind turbines from dwellings. The Scoping requirements seeks to "*minimise and manage adverse effects"*.

Based on the extent of existing relevant planning policies and provisions, on balance, the proposal is acceptable from a landscape perspective. The net community benefit arising from providing renewable energy to thousands of households would far outweigh the view and visual impact on 6 to 8 dwellings. This observation does not diminish the outcome for farmers who reside on their land, but is made having regard to balancing objectives.

Whilst the issues did not form the basis of submissions at the Hearing, the IAP agrees with the Proponent's proposed changes to management measures LV01, LV02 and LV04 to ensure consideration of other parts of the project, not just the turbines, and the need for mitigation measures.

The IAP agrees with Dr Williamson that the LVIA would have benefitted from assessing sequential views when considering the cumulative visual impact. A more strategic approach, as requested by Moyne Shire, would assist in better understanding the cumulative impact resulting from the scale

and number of operating and approved wind turbines. However, this did not affect the ability to assess whether the project will result in an acceptable visual impact.

(v) Findings

The Inquiry and Panel finds:

- The Landscape Visual Impact Assessment provides an appropriate comprehensive analysis of the landscape and visual impact, including its cumulative impact with existing and approved wind energy facilities.
- There will be cumulative impacts through the siting of the project when viewed in conjunction with existing and approved wind energy facilities, however, the Willatook project will appear in the background from various vantage points which does not constitute an unacceptable impact.
- There will be visual impacts on some residential properties that cannot be mitigated, but this must be balanced with the net benefit to the broader community resulting from renewable energy.

8 Heritage

8.1 Aboriginal cultural heritage

(i) Background

EES

An EES scoping requirements evaluation objective is:

> To avoid or minimise adverse effects on Aboriginal and historic cultural heritage and associated values.

EMF management measures AH01 to AH03 and EES Chapter J are relevant to Aboriginal cultural heritage.

Aboriginal cultural heritage assessments and plan

Ecology and Heritage Partners prepared the Willatook Wind Farm Aboriginal Cultural Heritage Impact Assessment on 4 March 2022. It forms part of permit application PA22101620 and EES Appendix J and acknowledges contributions from:

- Gunditj Mirring Traditional Owners Aboriginal Corporation
- Eastern Maar Aboriginal Corporation
- Framlingham Aboriginal Trust
- First Peoples – State Relations.

The Cultural Heritage Management Plan (CHMP) and report identified two Aboriginal places in the project area:

- VAHR Registered 1 – Earth feature (mound)
- VAHR Registered 2 – Stone Artefact Scatter.

The report states:

- activity in the project area was predicted to not harm the two identified Aboriginal places
- the places have a low archaeological/scientific significance, and the risk rating is low
- the nearest National and World listed Aboriginal places are more than 10 kilometres from the project area, namely:
  - Budj Bim Cultural Landscape (National Heritage List and World Heritage List)
  - Budj Bim National Heritage Landscape – Mt Eccles and Lake Condah Area (National Heritage List)
- the cumulative impact of the project is low.

In response to the CHMP, the project was altered to relocate infrastructure to areas where there will be no impacts to known Aboriginal cultural heritage.

Planning Scheme

Moyne Planning Scheme Clause 15.03 (Heritage) seeks to protect and conserve places of heritage significance and Aboriginal cultural heritage significance.

(ii) The issues

The issues are:

- whether the EES and permit applications have appropriately considered Aboriginal cultural heritage
- whether the project is likely to negatively impact Aboriginal cultural heritage.

(iii) Evidence and submissions

Moyne Council submitted the project needs to be assessed in its context near the 5,470-hectare Budj Bim National Park about 16 kilometres from the subject land, which is also inscribed in the UNESCO World Heritage List. It added:

> The official values identified in its National Heritage Listing recognise that the landscape of the Tyrendarra lava flow in the Mt Eccles/Lake Condah area is of outstanding heritage value.
>
> While there is currently no 'World Heritage Environs Area' buffer declared for Budj Bim that dictates the limitation of development in the surrounding area, it is clear that the preservation of the historical values of Budj Bim is an important consideration for the surrounding area more broadly.

The Proponent explained:

- the EES found there was a low likelihood that unidentified Aboriginal cultural heritage places or artefacts existed where project infrastructure is planned
- the impact on unknown Aboriginal cultural heritage places was assessed to be low, based on having management measures, including the unexpected find procedure in the Cultural Heritage Management Plan (CHMP)
- EES Appendix J and the proposed management and mitigation measures adequately response to Aboriginal cultural heritage.

There were submissions which considered:

- the project has not appropriately considered Aboriginal cultural heritage in the area
- destruction from the wind turbines contradicts 'caring for Country'
- the ancient lava flow from Penhurst to Port Fairy is culturally significant.

(iv) Discussion

The EES and permit applications have appropriately considered Aboriginal cultural heritage, predominantly through the Aboriginal Cultural Heritage Impact Assessment.

Onsite Aboriginal cultural heritage is protected through the *Aboriginal Heritage Act 2006.* This Act prohibits a responsible authority from issuing a planning permit until a required cultural heritage management plan has been prepared by a suitable qualified heritage adviser and evaluated by a Registered Aboriginal Party.

The IAP supports the draft permit condition which would require:

- the EMP to provide clear demarcation on the ground of any areas to be avoided and undisturbed
- a suitably qualified ecologist or cultural heritage adviser to advise on the demarcation before relevant construction activities commence.

The EES and permit applications have appropriately considered the world heritage listed Budj Bim and Lake Condah based on their existing recognised boundaries. The IAP acknowledges the sites were inscribed in the UNESCO World Heritage List in July 2019 and that there may be further work in the future to define and declare a World Heritage Environs Area buffer. However, the permit applications can only consider potential impact based on existing heritage protection rather than assumed future work.

EES Appendices J and K which support Chapters 18 and 19 respectively acknowledge the old lava flows within the subject land's environs which formed from continuous volcanic activity over 6 million years. They find the geographic region relates to tangible and intangible landscape values which is highly relevant to Aboriginal cultural heritage that may be present on the subject land.

(v) Findings

The Inquiry and Panel finds:

- The Environmental Effects Statement and permit applications have appropriately considered Aboriginal cultural heritage.
- The EES and permit applications have appropriately considered:
  - Budj Bim Cultural Landscape (National Heritage List and World Heritage List) which currently does not have a World Heritage Environs Area buffer beyond its boundary
  - Budj Bim National Heritage Landscape - Mt Eccles and Lake Condah Area (National Heritage List)
  - old lava flows which have been identified as being relevant to Aboriginal cultural heritage that may be present on the subject land.
- The project is unlikely to negatively impact Aboriginal cultural heritage if management conditions such as construction no-go zones are implemented.

8.2 Historical cultural heritage

(i) Background

EES

An EES scoping requirements evaluation objective is:

> To avoid or minimise adverse effects on Aboriginal and historic cultural heritage and associated values.

EMF management measures HH01 to HH06 and EES Chapter K are relevant to historical cultural heritage.

Heritage assessments

Ecology and Heritage Partners prepared the Willatook Wind Farm Historical Heritage Impact Assessment on 24 March 2022. It forms part of permit application PA22101620 and EES Appendix K and acknowledges contribution from Heritage Victoria.

The report identifies the Woolsthorpe–Heywood Road ruin and Landers Lane dry stone wall as two known places with heritage value in the project area.

Woolsthorpe–Heywood Road ruin

The report states:

- the road ruin is listed on the Victorian Heritage Inventory (VHI H7321-0105)
- efforts will be made to avoid impacting the road ruin and Heritage Victoria will be consulted regarding ongoing management of the place
- if impact to the place is found to be unavoidable, an application must be made to Heritage Victoria for appropriate consent.

Landers Lane dry stone wall

The report states:

- the stone wall is protected through the Moyne Planning Scheme because it was constructed before 1940
- the stone wall has no state protection, though it was previously in the Victoria Heritage Inventory (VHI D7321-0040)
- *Heritage Act 2017* protects all archaeological remains and Heritage Victoria must be advised in writing of any impact to the stone wall.

PE Act and Planning Scheme

Section 4(1)(d) of the *Planning and Environment Act 1987* (the Act) seeks to:

- conserve and enhance those buildings, areas or other places which are of scientific, aesthetic, architectural or historical interest, or otherwise of special cultural value
- balance the present and future interests of all Victorians.

Moyne Planning Scheme:

- Clause 15.03 (Heritage) seeks to protect and conserve places of heritage significance and Aboriginal cultural heritage significance.
- Clause 52.33 (Post boxes and dry stone walls) seeks to conserve dry stone walls and requires a permit to demolish, remove or alter a dry stone wall constructed before 1940.

(ii) The issues

The issues are:

- whether the EES and permit applications have appropriately considered historical cultural heritage
- whether the project is likely to negatively impact historical cultural heritage.

(iii) Evidence and submissions

There were submissions which considered:

- the Willatook and Ryan Corner wind energy facilities area has significant historical cultural heritage which has been overlooked
- the project would negatively impact major cultural heritage and other heritage such as dry stone walls

(iv) Discussion

The EES and permit applications acknowledge statutory protection and processes associated with historical cultural heritage on the subject land. They have appropriately considered and assessed identified and potential cultural heritage through the supporting assessments.

The IAP supports the draft permit conditions which would require:

- the EMP to provide clear demarcation on the ground of any areas to be avoided and undisturbed
- a suitably qualified ecologist or cultural heritage adviser to advise on the demarcation before relevant construction activities commence.
- through the Construction Environmental Management Plan (CEMP), any dry stone altered for a purpose other than a gate, to be rebuilt to their existing condition by an experienced stone mason

- an Unexpected Finds Protocol to address the discovery of historical heritage places.

(v) Findings

The Inquiry and Panel finds:

- The EES and permit applications have appropriately considered historical cultural heritage.
- The Dry Stone Wall Management Plan and associated permit conditions will ensure future works sensitively respond to dry stone walls.
- The project, when implemented with relevant management plans, will result in an acceptable impact on historical cultural heritage.

9 Potential quarry

(i) Background

EES

The potential quarry is referred to in EES Chapter 9 (Groundwater), Appendix A (Geoheritage), Appendix B (Hydrology and Hydrogeology), Appendix D (Flora and Fauna Assessment), Appendix E4 (Quarry Blasting) and Attachment II (Preliminary Draft Quarry Work Plan).

EMF management measures GW01 to GW11, SW05 to SW09, BR05, NV07, SE01, AQ01 and AQ03 are relevant to the quarry.

Quarry assessment and Work Plan

The Willatook project is estimated to require approximately 450,000 cubic metres of basaltic crushed rock. The crushed rock is required for the construction of tracks, hardstands, the temporary construction compound, and may also be used in the wind turbine foundations. The material for the project will be sourced from a proposed temporary on-site quarry (subject to approval of the Quarry Work Plan) or alternatively from existing commercial quarries in the area.

The proposed quarry work authority area is about 30 hectares, with the extraction area being 10.5 hectares with a maximum depth of 14 metres. The total disturbance area of the quarry is estimated to be 24.7 hectares, including 10 hectares of hardstand areas. It is proposed that the quarry would be established, and excavation would start, during the enabling works. It is expected the quarry would be in use for up to 24 months.

The primary approval required for the quarry will be the final Work Plan and Work Authority under the Mineral Resources (Sustainable Development) Act 1990. A draft Work Plan has been prepared and will need to be finalised and endorsed by the relevant state government department as a separate process to the EES.

(ii) The issues

The issues are if the quarry proceeds:

- whether it would impact the groundwater resource in the project area
- whether it would impact the brolga breeding home range and wetlands in the project area.

(iii) Evidence and submissions

The Proponent submitted:

- the proposed quarry location and design avoids community, environmental, hydrological, cultural, biodiversity and geo-morphological constraints, and has gone through several iterations after feedback from stakeholders
- the on-site quarry location is ideally proposed in an area with few extraction bores or potential GDE and considers that its location minimises potential impacts to people and the environment
- a final quarry work plan would be created based on the draft document in EES Attachment II Preliminary Draft Quarry Work Plan

- the draft work plan includes details of how the quarry would be constructed, operated and decommissioned, as endorsed by Earth Resources Regulation. It would be supported by a risk management plan and risk treatment plans setting out how potential impacts would be controlled
- measures specific to the quarry work plan are components of the EMF.

EPA submitted:

- the quarry is not part of the permit application and that a work plan and work authority will be sought after the EES Assessment
- it will assess the proposal when it is referred to EPA under either the *Mineral Resources (Sustainable Development) Act 1990* or the EPA/ERR Memorandum of Understanding
- groundwater, surface water, noise and vibration aspects still need to be considered
- applicable and future surface water environmental values have not been sufficiently considered
- existing baseline water quality should be adequately characterised before construction commences and additional EMF management measures have been suggested
- applicable and future groundwater environmental values and sub-terranean groundwater fauna have not been sufficiently considered
- it did not support the reliance on actions and measures outlined in the EES
- noise criteria is established as the design evolves, and EMF management measures should be revised to ensure the project requirements set for noise are relevant to the stages of the project.

(iv) Discussion

The primary issues with the temporary quarry are:

- potential impact to the groundwater resource from the quarry intersecting the shallow water, as discussed in Chapter 4.1
- impact to aquatic GDE including wetlands and indirect impacts to brolga.

Hydrogeology and hydrology

The EES focussed on the quarry impacts to hydrogeology and groundwater aquifers under the subject land. Groundwater is exceptionally shallow at the quarry site, and interception with the groundwater table is expected 3 metres below ground. Groundwater drawdown as a consequence of construction of the quarry pit inflow has been predicted to reduce groundwater levels a distance of 518 to 1080 metres from the quarry. Under the scenario, inflows are expected to be around 77 cubic metres each day. However, the sensitivity analysis of key parameters suggests that inflows of 15 to 521 cubic metres each day cannot be discounted at this stage of the project. The higher inflow of 521 cubic metres each day is likely to be worst case if hydraulic conductivity is higher than expected.

The EES notes uncertainties surrounding the hydraulic conductivity and the IAP notes there is currently a lack of certainty on the quarry's impact to the groundwater resource which will be resolved through future investigations. The EES provides clear relevant guidance on what is needed, including:

- further groundwater investigations before quarry construction to improve confidence in groundwater drawdown predictions
- ongoing monitoring during quarry operation to validate the drawdown predictions

Additional groundwater monitoring wells should be installed at least 1,000 metres from the quarry and baseline groundwater inflow and quality monitoring should be conducted before and during quarry construction commencing. This action is consistent with EPA's suggested revisions to EMF management measures s GW05 and GW07.

The IAP agrees with EPA that groundwater should be considered as Segment A2, and the EES should have considered applicable present and future groundwater values relevant to this Segment. This would enable a more rigorous monitoring program to understand the extent of the quarry impacts before, during and after construction.

Flora, fauna and matters of national environmental significance

The EES notes that the quarry location has been selected to avoid all known ecological constraints, including native vegetation and DELWP mapped wetlands within the project area. EES Appendix D indicates vegetation mapped within the quarry site does not meet the threshold to be classified as a native vegetation patch according to the *Guidelines for the removal, lopping or destruction of native vegetation* (DELWP, 2017) nor were threatened species identified or potentially likely to occur at the site.

The closest brolga breeding wetland to the proposed quarry site was assessed to be 2.1 kilometres. The location of this wetland is unconfirmed in the EES, and it could potentially be W4 (Wetland 25721), W12a or W12c (which appear to be part of Wetland 26028) which are near the quarry according to EES Appendix C1 Figure 8. The Glenelg Hopkins CMA has recommended the quarry be at least 100 metres from designated waterways.

Based on the EES, groundwater is primarily recharged by surface water and rainfall, it is possible that groundwater drawdown may impact the hydrology of ephemeral wetlands, causing wetlands to dry faster than they would otherwise without the quarry. This could impact the wetlands considered suitable for brolga breeding.

The IAP is cognisant the separate approval process for any quarry proposal would investigate matters such as the extent of impact on aquatic GDE and the brolga. EES Appendix B, Figure 45 predicts the groundwater drawdown under base case and worst case scenarios would be 2 and 6 metres, respectively at wetland ID 4439978. This ephemeral wetland represents 2 per cent of the potential aquatic GDE area within the Project Site Boundary. The other 5 wetlands that will experience drawdown make up 15 per cent of the potential aquatic GDEs area. It is unclear why these wetlands within the radius of quarry drawdown have been considered unsuitable for brolga breeding yet assessed in the hydrogeological and hydrological assessment as contributing 15 per cent of the aquatic GDE otherwise referred to as 'ephemeral wetlands' in the project area. Further consideration is required to determine if these wetlands highlighted in Figure 45 should be considered suitable brolga breeding wetlands and buffered accordingly, and the justification for their exclusion.

The EES finds groundwater is not the primary water source for the wetlands and aquatic GDE, instead ephemeral wetlands are dominated by surface water and rainfall. Due to the EES reporting across multiple reports that groundwater-surface water interactions are well connected, the IAP considers that groundwater drawdown may likely reduce the availability of surface water. The prospect of groundwater drawdown reducing availability of surface water in wetlands has not been adequately explored.

The IAP did not have the opportunity to question a groundwater specialist about the potential impact of groundwater drawdown on the ability for an ephemeral wetland to retain surface water,

particularly those wetlands that form part of the brolga breeding home range and considered to hold water for at least 120 continuous days at least once every 10 years.

The IAP has recommended that the brolga home range buffer of 900 metres plus a 95-metre rotor blade offset is applied around all wetlands within 2 kilometres of brolga breeding wetlands, including those that hold water for 120 or more days. This buffer would encapsulate the quarry between wetland 25974, W7 and W10 which are all considered suitable wetlands and within the brolga breeding home range. If the 995-metre buffer is preferred, the location of the quarry would be unacceptable due to its proximity between suitable wetlands, remaining inundated for 120 or more days.

Other impact pathways in the EES and considered acceptable by the IAP include:

- **Visual impact** – The quarry site is not visible from the main public roads, being at least 2 kilometres from the closest general public access point at Riordans Road to the south. The proposed quarry site is 1.4 kilometres from the closest private dwelling.
- **Geophysics** – The geomorphology of the area immediately south and east of Shaw River has state significance as it is one of the largest contiguous areas of the Mount Rouse – Port Fairy lavas. The proposed quarry is on this flow and project construction would result in localised disturbance to surface geological features in these locations and a high magnitude impact on this feature, which would be permanent.
- **Aboriginal cultural heritage** – Aboriginal heritage was not identified at the quarry site during extensive assessments across the project area. An approved Cultural Heritage Management Plan (no. 11090) contains cultural heritage management measures that will minimise potential impact to cultural heritage.
- **Noise and vibration** – Blasting at the quarry would likely occur no more than twice each month, with the quarry operation proposed for around two years. For the closest dwelling to the extraction area (about 1,400 metres), the maximum ground vibration level from the closest standard blast is predicted to be 0.31–0.63 millimetres each second, one tenth of the Earth Resources Regulation limit of 5 millimetres each second and around 3 per cent of the threshold for cosmetic damage. The EES reports that the sensitivity of brolga to ground motions and low air blast and noise levels from distant blasts is unknown, yet blast events at quarries is considered unlikely to disturb brolga nesting or foraging based on observations and presence of other bird species near regional quarries. The proposed quarry is located approximately 2.1 kilometres from the closest brolga breeding wetland. A Blast Monitoring Plan to ensure project-related disturbance does not aversely effect brolga breeding attempts, behavioural monitoring of brolga is proposed throughout the breeding season period.

(v) Findings and recommendation

The Inquiry and Panel finds:

- Any potential quarry will be assessed through a separate Works Authority Plan process and should consider:
  - impact to the groundwater resource and the extent of groundwater drawdown
  - the extent of reduced groundwater levels which may impact aquatic GDE and potential wetlands within the brolga home range

  - impact from the reduced water table, and the degree of impact which would depend on the reliance that existing users and GDE have on groundwater and the extent, timing and duration of impacts resulting from project activities.
- Impacts to visual amenity, geophysics, heritage and noise and vibration can be managed through the Planning Permit and Environmental Management Framework subject to implementing IAP recommended changes to measures and permit conditions.

The Inquiry and Panel recommends:

17. Amend Environmental Management Measures, as shown in Report 2 Appendix F, to make quarry related changes to measure SW06.

10 Other issues

10.1 Aviation safety

(i) The issues

The issues are:

- whether the project will result in an acceptable impact on Warrnambool airport's operations
- whether the EES mitigation measures appropriately respond to aviation issues.

(ii) Background

The EMF management measures are AVI01 to AVI03.

- AVI103 requires the marking and maintaining marking of the meteorological monitoring masts
- AVI102 requires the notification of relevant stakeholders about the location and heights of wind turbines and meteorological masts.
- AVI103 requires the Proponent to apply the CFA Design Guidelines and Model Requirements – Renewable Energy Facilities to the construction and operation of the wind energy facility.

EES Appendix O (Aeronautical Impact Assessment) identifies existing aviation operations and activities within 30 nautical miles (about 56 kilometres) of the project area to determine the potential impact to aviation safety.

There are 3 regulated airports within 30 nautical miles of the project area – Portland, Hamilton and Warrnambool. Warrnambool City Council (Warrnambool Council) owns and operates Warrnambool Airport. There are 9 unregulated private airstrips on properties near the project area which are either used infrequently for activities such as aerial agricultural operations (spraying or spreading), unused or decommissioned.

(iii) Evidence and submissions

The Proponent called Mr Jennings of Chiron Aviation Services to provide aviation evidence. Mr Jennings was the author of the Aeronautical Impact Assessment. Mr Jennings addressed:

- the issue of the turbines penetrating the approach path to the Warrnambool Airport
- details of impacts on other uses in the area around the subject land.

Mr Jennings stated:

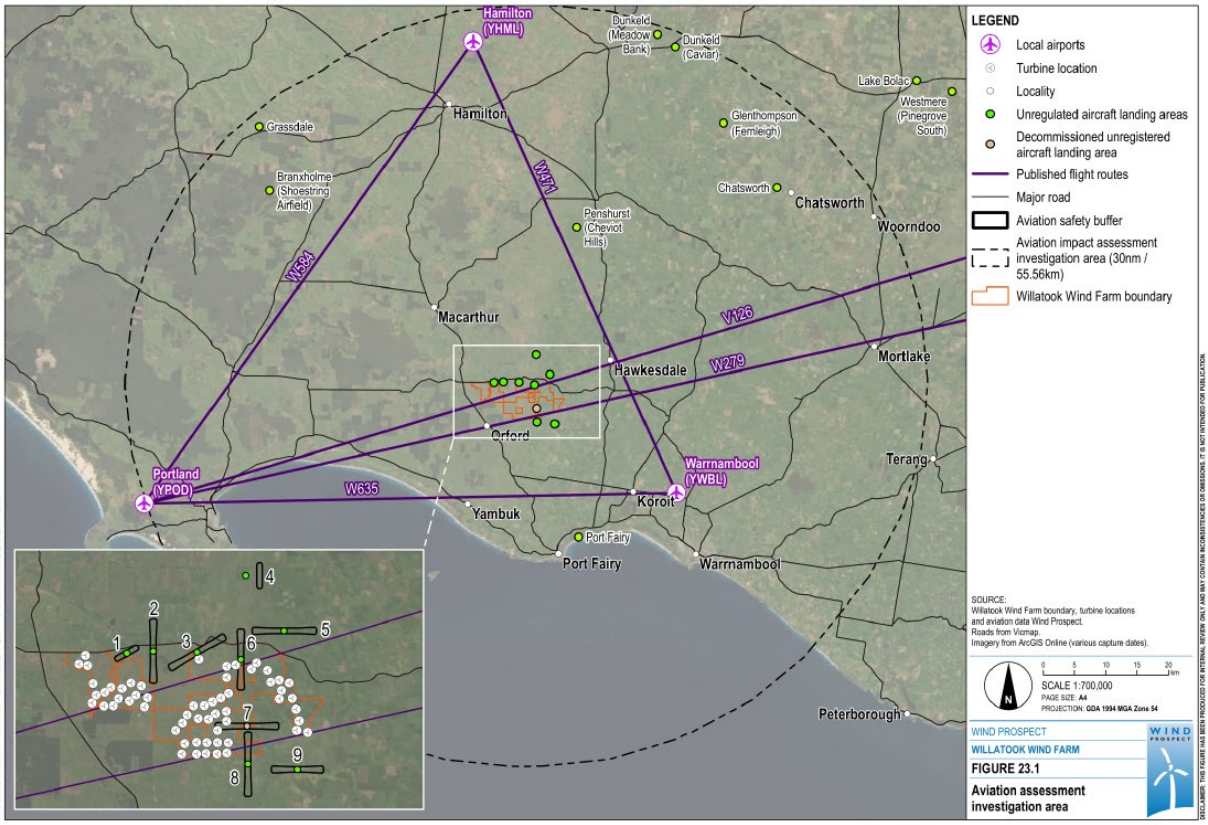
- the proposed turbines will not impede the Obstacle Limitation Surface (OLS) for the Warrnambool, Portland and Hamilton airports (the Obstacle Limitation Surfaces are a series of measures associated with each runway that define the limit to which objects may intrude into the operational airspace so that aircraft may operate safely at an airport)
- the project will not impact the Instrument Approach Procedures for the Portland and Hamilton airports
- a few of the proposed turbines will impact the Instrument Approach Procedure for the Warrnambool Airport.

Mr Jennings stated:

> Whilst the proposed turbines are beyond the 10 nautical mile Minimum Safe Altitude of the Warrnambool Aerodrome, there are several turbines within the 5 nautical mile buffer zone used to calculate this Minimum Safe Altitude. To enable the proposed maximum wind turbine tip height to be accommodated, the 10 nautical mile Minimum Safe Altitude would need to be raised by 100 feet (or 30.5 metres) from 2,100 feet to 2,200 feet to satisfy the requirements of ICAO PANS-OPS document 9905 to ensure minimum factors of safety are maintained. The same modification is also required for the Procedures for Air Navigation Services – Aircraft Operations surface for the Warrnambool aerodrome (YWBL RNAV-Z RWY 13) non-precision approach. This change would only affect Instrument Flight Rules aircraft, with the change predicted to have minimal impact to their pilots. Agreement with the Warrnambool Aerodrome and the Instrument Approach Procedure designer (Airservices Australia) is required to have the recommended amendments made to the Instrument Approach Procedure. If agreement to these changes cannot be reached with the aerodrome operator, the blade tip heights of five wind turbines would need to be reduced 1.5 and 14 metres to avoid modifying the Procedures for Air Navigation Services – Aircraft Operations.

Mr Jennings considered the project would result is some limitations on aerial agricultural operations immediately surrounding wind turbines and meteorological masts, largely be experienced by stakeholder (participating) landholders. He expected the wind turbines would not cause unacceptable risks to aerial firefighting.

Figure 14 Location of airports, other landing areas and the Willatook facility



There is a planned extension of the Warrnambool Airport runway 13 to the northwest towards the Willatook facility. EES Chapter 23 states:

> Any expansion to Runway 13 would require the current Instrument Approach Procedures to be redesigned and the commencement reference point changed. Since the Project is located more than 10 nautical miles from Runway 13, with the exception of changes to the 10 nautical mile Minimum Safe Altitude … and approach extension of 500 metres or more,

> which is significantly greater than the proposed 300 metre runway extension, could be accommodated without influence from the project.

Mr Jennings summarised the main impediment to the use of the Warrnambool Airport is to aircraft using Instrument Approach Procedures approaching from the north near the Willatook facility. Pilots using Instrument Flight Rules would need to be aware of the changes to the flight path into the Warrnambool Airport if the project is approved. The change to the Minimum Safe Altitude (MSA) from 2,100 feet to 2,200 feet would be between 15 nautical miles and 10 nautical miles from the Warrnambool Airport. The heights are above the ground surface and do not include the height of the ground surface above the Australian Height Datum. The turbines affected by the requirements are T39, T48, T49, T51 and T54.

Mr Jennings explained:

- Warrnambool Council and the Warrnambool Airport Reference Group have been in discussion with the Proponent about the proposed changes to the MSA for the instrument approach to the airport and the need for the Council to support the changes allowing the flight procedure documents to be changed.

Warrnambool Council submitted that it:

- opposed to any changes to the MSA and the potential influence that the location of the wind turbines may have on the future extension of the runway 13/31 in a northwest direction
- did not consent to the potential changes to the airport operations.

Moyne Council, which supported Warrnambool Council's position, explained the Warrnambool Airport:

- is essential regional infrastructure located in the Moyne Shire that must be protected from encroachment
- provides a vital connection between Moyne Shire and the rest of Victoria, providing air ambulance services (both fixed-wing and helicopters)
- performs an important role in sustaining the offshore gas industry and providing a more general connection for business and visitors to the Moyne Shire.

Moyne Council questioned why the Proponent prepared an EES without gaining approval for the changes to the airport operations. Moyne Council submitted:

> It is not sufficient to suggest that the Airport should adjust to accommodate the Project or to abandon the potential to expand its footprint and operations. To the contrary, Council considers that the Project should avoid imposing on the Airport by removing or reducing the height of affected turbines. It is the agent of change here, encroaching on a major longstanding regional infrastructure asset.

After reviewing the planning permit application, the Civil Aviation Safety Authority (CASA) stated:

- it was not aware of any changes to the PANS-OPS (the rules for instrument approach and departure procedures) or reduced turbine heights
- it considered any infringements of any PANS-OPS present an unacceptable risk to safe operations in the vicinity of the project area
- the Willatook facility, as proposed, would have an unacceptable effect on the safety of existing and future air transport operations at Warrnambool Airport until the impacts at the Warrnambool Airport are resolved.

Submitters were concerned the project would impede emergency service flights in the area as well as aircraft used for agricultural purposes. Regarding firefighting, Mr Jennings stated:

> Aerial firefighting is conducted at low level using specialist aircraft flown by appropriately rated pilots in accordance with the VFR. The pilot is required to maintain visibility with the ground – therefore they will remain clear of smoke so that they can accurately and safely drop the fire retardant.
>
> The pilot in command will consider the presence of the WWF when planning the firefighting tasks and assess the risks of the operation. Aerial firefighting can and does occur within and around wind farms.

Police and ambulance aerial services indicated:

- the presence of the turbines would not stop aerial emergency services from operating
- pilots would be aware of the wind energy facility and would know how to safely operate within or near the project
- fixed wind aircraft either flying through the area or using Warrnambool Airport, would operate normally and in accordance with flight procedures.

Mr Jennings observed that emergency services operators were mostly concerned about operations in the vicinity of meteorological masts, noting that the masts are hazardous in that they are difficult to locate because of their colouring and the slim profile of the mast and guy wires.

Mr Jennings explained that:

- pilots using aircraft to apply fertilisers and weed and pest controls were aware that wind energy facilities limit some aerial applications, however, they manage to operate safely near wind energy facilities
- these pilots were mainly concerned about the meteorology masts because they are more difficult to see
- masts would be marked in accordance with the *National Airports Safeguarding Framework Guideline D: Managing the Risk of Wind Turbine Farms as Physical Obstacles to Air Navigation* to manage this potential impact.

Mr Jennings recommended the base around the outer guy wires be marked in a contrasting colour to the ground. He noted that agricultural pilots did not support the use of strobe lights to indicate the location of meteorological masts because they regard the lights as being ineffective.

(iv) Discussion

The primary runway alignment at the Warrnambool airport is in a north west/south east direction (runway 13 and 31) such that when an aircraft approaches the Warrnambool airport from the north it would use runway 13. There is a second runway in a north east/south west direction (runway 22 and 04) which would appear not be impacted by the project, and hence there was little discussion about the impacts of it on the approach/departure for this runway.

Approaching Warrnambool Airport from the north, pilots of aircraft would be aware of the Willatook facility to the right of the aircraft; Figure 14 shows the location of it relative to Warrnambool Airport as well as the unregulated aircraft landing areas within the project area. The Lowest Safe Altitude at 15 to 10 nautical mile is 3,300 feet, which would not change if there is a alteration in the MSA by 100 feet.

The IAP accepts Mr Jennings' evidence that aircraft using Visual Flight Rules (VFR) will not be significantly impacted by the presence of the Willatook facility, because pilots using VFR in the vicinity of the project are required to be aware of the location of the turbines and meteorological masts. The presence of the turbines and meteorological masts would be recorded in the Airservices Australia Vertical Obstacle Database and the obstacles are promulgated on charts and

by Notice to Airmen, so that pilots know that there are tall obstacles are in the area. Pilots using VFR would also be aware of the presence of the obstacles associated with the Willatook facility.

The IAP agrees with Mr Jennings that the base attachment point is painted a contrasting colour. This should be implemented through a permit condition.

The proposed extension to runway 13, resulting in the changes to the approach procedures and therefore the pilot notification and obstacle recording procedures would be of a similar complexity to the changes required to increase the MSA if the Willatook facility is constructed.

Most of the 9 unregulated aircraft landing areas in Figure 14 are rarely used. Of the landing areas, one is used between 5 to 10 times a year, 3 are either decommissioned or unused, while the rest are rarely used. The functioning landing areas are used for private use or agricultural services. As these landing areas are unregulated, their use will require the pilot to be aware of the obstacles in the area.

At this stage, the outcome of discussions between the operator of Warrnambool Airport (Warrnambool Council) and the project regarding the various changes to flight rules are uncertain. It is beyond the scope of the IAP to recommend that the MSA be altered and that it is a matter for Warrnambool Council.

(v) Findings and recommendations

The Inquiry and Panel finds:

- Wind turbines T39, T48, T49, T51 and T54 should not intrude into the 10 nautical mile Minimum Safe Altitude approach to Warrnambool Airport.
- Installation of these five turbines could be accommodated by either:
  - increasing the Minimum Safe Altitude height by 100 feet, or
  - reducing the turbine tip height to avoid the intrusion
- Emergency services aircraft will be able to use Warrnambool Airport and surrounding air space if the Willatook facility is built.
- The meteorological masts should be treated to be clearly visible to aircraft pilots.

The Inquiry and Panel recommends:

18. Amend Planning Permit PA2201620, as shown in Report 2 Appendix B, to:
   a) require wind turbines T39, T48, T49, T51 and T54 not intrude into the Minimum Safe Altitude for the Warrnambool Airport
   b) require the mast guy wires to be treated so that the base section of the wires and the area around the base attachment point is a contrasting colour to the ground.

10.2 Traffic and transport

(i) The issues

The issues are:

- whether the mitigation measures in the EES Transport Impact Assessment are appropriate to manage potential traffic and transport impacts
- whether the proposed access route from the Port of Portland is appropriate.

(ii) Background

The Draft evaluation objective of the Scoping Requirements is:

> To avoid and minimise adverse effects on roads and road users during construction, operation and decommissioning of the project.

Relevant information:

- Transport Impact Assessment – Appendix G to the EES
- EMF management measures are TT01 to TT12.

(iii) Evidence and submissions

The Proponent called expert evidence on traffic from Mr Walley of Ratio Consultants. At the Hearing, Mr Walley outlined:

- preferred routes, traffic generation, upgrades and two scenarios which considered sourced material from an on-site or an existing quarry
- mitigation measures for constructing and decommissioning the project.

The mitigation measures set out in Mr Walley's evidence are summarised as:

Avoidance

- rely on the arterial road network for construction activity wherever possible
- identify a preferred construction material and Oversize Overmass haulage routes between quarry sites, Port of Portland and the site

Mitigation

- temporary road infrastructure improvements to facilitate short-term project transport effects
- permanent road infrastructure improvements where there is a nexus with project transport effects
- traffic management plans to manage project traffic movements and avoid or mitigate specific short and long term traffic impacts
- road maintenance and management agreements to address road maintenance and reinstatement
- stakeholder consultation and engagement to assist the development of appropriate traffic management measures and to communicate any road network changes required by the project

Rehabilitation

- road management agreements to remove external redundant transport Project infrastructure at the end of the project life.

Mr Walley advised the mitigation measures are based on:

- best practice designed to avoid impacts by limiting traffic as much as possible to arterial roads
- temporary or permanent improvements to infrastructure
- a Traffic Management Plan that addresses road maintenance and management agreements, reinstatement and stakeholder consultation and communication through the process, including road closures.

The approach is to "*leave the roads in as good or better condition than before the project started*."

Comparing traffic volumes where there is an on-site quarry as opposed to an external quarry, the anticipated heavy vehicle traffic will be more broadly spread with an internal quarry, with expected daily volumes being on average of four heavy vehicles each hour compared to eight heavy vehicles each hour (based an on-site quarry providing 80 per cent of material required for construction of footings and internal roads). If off site material is required, there are four quarries that might supply material. Mr Walley advised the IAP that he had inspected the route to each quarry, and each has been largely confined to arterial roads. In response to questions by the IAP, Mr Walley advised that it was likely that the majority of material would be sourced from the Tarrone quarry, which is closest to the site, but in any event, he was satisfied that the traffic generation from other quarries could be accommodated without significant impact.

Regarding route options between the Port of Portland and the subject land, Mr Walley explained:

- the options were identified in consultation with Department of Transport
- Option 1 was preferred because it generally relies on arterial roads
- any potential clearance issue with transporting parts can be addressed through the Traffic Management Plan and relevant approvals sought.

Mr Walley was satisfied that:

- the travel height of 5.1 metres for the proposed turbine blade can be transported on the preferred route, which includes bridges with a clearance height of 5.2 metres
- the alternate route which he reviewed and is presently used by another wind energy facility could also accommodate vehicles transporting the turbine blades, and that it can be subject to further assessment when the exact turbine that will be used is known.

Mr Walley supported Moyne Council's suggestion to appoint an independent auditor and for the mitigation tools to include a Green Travel Plan and a Traffic Management Plan. He considered it best practice to undertake works, including the upgrade of the Woolsthorpe–Heywood Road before construction, but not necessarily before the quarry is developed.

In response to questions from Moyne Council regarding the lack of reporting or data from previous wind energy facilities, Mr Walley responded:

- the Traffic Management Plan and conditions of permit provide the opportunity to co-ordinate between projects and is the appropriate time to manage cumulative impacts
- the Transport Impact Assessment provides an overview of the project and its specifications.

Moyne Council supported:

- the proposed upgrades to the Woolsthorpe–Heywood Road
- an on-site quarry, in principle, to reduce traffic effects on the surrounding road network.

Moyne Council was concerned about construction traffic impacts and impacts arising from other projects. It submitted:

- based on such previous experience, the impacts from light vehicles have been underestimated and that despite proposed upgrades, that the local road network will not be able to safely accommodate the increase in traffic volumes
- a Traffic Management Plan needs to require that local road infrastructure is fit for purpose and well maintained during construction.
- construction traffic is a constant source of community complaints to Council
- measures should be put in place to clearly set out approved construction routes in the Traffic Management Plan

- enforcement measures should be implemented, including through the appointment of a road safety auditor, identification displayed on vehicles and inclusion of a penalty structure for non-compliance with the Traffic Management Plan.

Glenelg Council submitted:

- it was concerned with the route for wind turbine components, which involves navigating four bridges and clearances along Henty Highway from the Port of Portland
- it had reservations about the clearance heights of 5.2 metres of the bridges along the Highway and the advice and experience arising from previous proposals
- despite Mr Walley's evidence that the blade cord dimension of 4.5 metres can be configured to be transported within that clearance, other operators have previously advised Council that components would need a maximum dimension of 4.3 metres to clear the overhead obstructions.
- components cannot be transported on State arterial roads
- over dimensional vehicles would need to rely on local roads from the Port of Portland before reconnecting to Henty Highway.

Glenelg Council referred to an existing, temporary over dimensional route that is currently being used by a small scale wind energy facility. Glenelg Council added:

- it has received numerous concerns from residents regarding trucks using local roads
- should the Proponent rely on using local roads, it would need to apply to Council for approval and that there is no certainty around approval
- it would prefer arterial roads be used for transportation.

Glenelg Council submitted:

- it understood the state government has committed $25 million towards upgrade Henty Highway, to address the height restrictions of bridges
- it has unable to obtain a progress update from Department of Transport, despite attempts
- it requested the IAP to recommend that the Minister for Planning request the Minister for Transport Infrastructure to prioritise and implement upgrades to the Henty Highway.

Department of Transport did not appear at the Hearing but submitted its response as determining referral authority, including advice, that it did not object to the permit application based on its recommended conditions.

(iv) Discussion

Based on work undertaken during the preparation of the Transport Impact Assessment and through Mr Walley's evidence, the IAP is satisfied that traffic and transport matters have been addressed to satisfy the objective of the Scoping Requirement and can be adequately managed.

While Moyne Council submitted the Transport Impact Assessment underestimated traffic volumes, it did not advance this submission through evidence. The IAP acknowledges the submissions of residents and Moyne Council regarding increased traffic volumes on the surrounding road network. There will be an increase in vehicle movements on the surrounding road network, and that these will be perceptible to residents. In the event that an on-site quarry is not developed, heavy vehicle movements will be greater than would otherwise be the case.

The IAP accepts the anticipated volumes detailed in the Transport Impact Assessment and Mr Walley's evidence that there is capacity to accommodate the volumes, in addition to the proposed

upgrades and works. The Transport Impact Assessment includes a cumulative assessment of the project in conjunction with concurrent construction of the Woolsthorpe and Mt Fyans wind energy facilities. The assessment concludes that the combination of traffic between this project and the Woolsthorpe wind energy facility would result in a minor increase in traffic volumes and that it was unlikely that there would be an overlap in routes with this project and the Mt Fyans project. The IAP agrees with Mr Walley that the specifics and further refinements would be captured in the Traffic Management Plan and cumulative impacts would be considered in plans for other wind energy facilities.

The IAP acknowledges that material may be sourced from existing quarries should an on-site quarry not be established and that this may also be addressed in the Traffic Management Plan. It notes Mr Walley's evidence that his assessment of traffic impacts would not be affected if the Tarrone quarry was unable to provide sufficient material at the time of construction and noted that two of the tree other quarries are to the east of the subject land, would rely on Woolsthorpe–Heywood Road and would not have an impact on the mitigation measures discussed in the Transport Impact Assessment.

The IAP notes Mr Walley's evidence that the alternate route could be used, based on his inspection of it, should the preferred route not be suitable for some components. Glenelg Council's request seeking the IAP make a recommendation to the Minister for Transport is beyond its scope. However, as part of its consideration of the cumulative impacts of this project, approved projects and with more coming on stream, the movement of components to this project will overlap with movement of components to other wind energy facilities within the region.

Department of Transport's proposed conditions reflect various issues raised through submissions, including appointment of a road safety auditor, recording traffic movements, identification on vehicles and mitigation measures, including operating hours and speed limits for trucks on routes to provide for safety measures around school bus routes and resident safety and compliance requirements. In response to a question from Mr Power, Mr Walley responded that the Proponent's proposed conditions were acceptable.

However, the IAP observes that the DoT conditions are more prescriptive and in light of the importance that a Traffic Management Plan has as part of the approval process, that this is more appropriate than the Proponent's alternate wording in the Draft Conditions and should form the basis of any approval. Furthermore, Department of Transport is a determining referral authority and the permit must include its conditions or be refused. Moyne Council's preferred version of the Draft Conditions requires upgrades to roads before construction. In the absence of evidence that there is a nexus between the proposal and the need to upgrade roads, the IAP prefers that any roadworks deemed necessary arises through the assessment required as part of the Traffic Management Plan.

It follows that the IAP does not agree with the Proponent's proposed deletion of TT11 and TT12 of the EMF management measures and that these should remain.

(v) Findings

The Inquiry and Panel finds:

- The mitigation measures in the Environmental Effects Statement Traffic Impact Assessment are generally appropriate to manage traffic related project impacts, including access from the Port of Portland, will be managed through a Traffic Management Plan.

- Environmental Management Measures TT11 and TT12 should remain, as shown in Report 2 Appendix F.

10.3 Bushfire risk

(i) The issues

The issues are:

- whether the proposed wind energy facility and battery storage will result in an acceptable bushfire risk on the local community
- whether the EES and permit applications have appropriately considered external bushfire risk to the proposed wind energy facility
- whether the wind turbines will negatively affect aerial fire fighting
- whether vegetation intended to screen the visual impact of wind turbines will result in an unacceptable bushfire risk.

(ii) Background

Relevant information:

- EES Chapter 16.6 (Impact assessment) and EMF management measures TT01 to TT12
- Moyne Planning Scheme Clauses 13.02-1S (Bushfire planning) and 22.03-8 (Fire protection)
- Subject land is in a Bushfire Prone Area and has a small portion in the Bushfire Management Overlay which seeks:

  To strengthen the resilience of settlements and communities to bushfire through risk based planning that prioritises the protection of human life.

(iii) Evidence and submissions

The Proponent explained the subject land is predominantly grassland or grazed paddocks, is generally flat with less than 5 degrees and will have good access once it upgrades the roads.

There were submissions which considered:

- some terrain, including rocky volcanic areas, prohibit fire fighting
- the wind turbines and large batteries may malfunction and start grassfires and bushfires
- the proposed wind turbines will restrict aerial fire fighting
- adding further turbines to existing wind energy facilities in the area will heighten bushfire risk
- roads on the subject land will not control fire because fire can jump roads
- the EES has not considered simultaneous fires in the area or fire fighter availability
- wind energy facilities do not seem to have fire management plans
- vegetation screening to dwellings in response to the proposed wind turbines would increase fire risk.

Country Fire Authority (CFA) recommended the following conditions be included on the permit:

AMENDED PLANS

1. The plans must be generally in accordance with the plans submitted with the application but modified to show any changes required to comply with CFA conditions 2-4.

CFA CONDITIONS

In conditions 2 to 4:

'The CFA Guidelines' means The CFA's Design Guidelines and Model Requirements for Renewable Energy Facilities (newest version at time of submitting plan for endorsement).

2. Before plans are endorsed under condition 1, in consultation with the CFA, a Risk Management Plan must be submitted to, approved and endorsed by the responsible authority. The Risk Management Plan must be prepared in accordance with the CFA Guidelines, and:
    a. Describe the risks and hazards at the facility to and from the battery energy storage system and related infrastructure.
    b. Include a dedicated fire water supply for the battery energy storage system of a quantity no less that 576kL:
        i. Provided otherwise in accordance with the CFA Guidelines and AS 2419.1-2005: Fire hydrant installations.
        ii. Located at the main entrance to the facility.
        iii. Commissioned prior to the arrival of the battery energy storage system enclosures/containers at the facility.
    c. Specify the separation distance, based on radiant heat flux (output) as an ignition source, between:
        i. Adjacent battery containers/enclosures.
        ii. Battery containers/enclosures and related battery infrastructure, buildings/structures, and vegetation.
    d. List and describe all other controls for the management of on and off-site hazards and risks at the facility (including all proposed battery energy storage system safety and protective systems).
    e. Provide an evidence-based determination of the effectiveness of the risk controls against the identified hazards, including justification for omission of any battery safety and protective systems.
    f. Be peer-reviewed by a suitably qualified, independent third party.
    g. Form the basis for the design of the facility.
3. Before plans are endorsed under condition 1, an Emergency Management Plan (EMP) and Fire Management Plan (FMP) must be submitted to, approved and endorsed by the responsible authority. The EMP and FMP must be prepared in consultation with the CFA and be in accordance with the CFA Guidelines.
4. Before the use commences, all fire protection measures shown on the endorsed plans (including separation distances, emergency vehicle access, firefighting water supply and equipment, and fire breaks) must be implemented. The fire protection measures must be maintained on a continuing basis for the life of the permit, to the satisfaction of the responsible authority.

No party opposed CFA's proposed conditions. Moyne Council requested further conditions which sought to:

- require a fire prevention and emergency response plan as part of the endorse EMP
- have the Minister for Planning rather than the responsible authority endorse the risk management plan
- have local CFA Brigades and Moyne Council's Municipal Emergency Management representatives updated on construction and operation activities and risks to the satisfaction of the responsible authority before each declared fire season.

The Proponent called expert evidence on bushfire risk from Mr Taylor and Mr Potter of Fire Risk Consultants Pty Ltd who co-authored a single expert report which appended a Risk Management Plan, September 2022. Mr Taylor and Mr Potter stated the project would manage and reduce fire risk through:

- new access roads that will also serve as a fire access track and fire break network

- identifying fires or activities that may cause fires earlier through the presence of maintenance operators and other staff
- an increased amount of firefighting water at strategic locations
- modern fire detection and suppression systems in the nacelles and battery packs.

Mr Taylor and Mr Potter added:

- the wind energy facility's proposed layout and development will not impede fire suppression operations
- installing the industry best practice detection and suppression systems in the nacelles will significantly reduce the already low likelihood of a fire
- the extent and impact of major fires on private assets, property, agriculture, critical infrastructure and community can be mitigated
- in Victoria, bushfire safety is a shared responsibility between the fire services, state and local governments, communities and individuals
- bushfire risk associated with constructing and operating the wind energy facility and battery energy storage system can be mitigated to an acceptable level through:
  - a risk management plan
  - a fire management plan
  - emergency management plan.

Mr Taylor and Mr Potter explained that their recommendations including bushfire risk measures:

- follow CFA Guidelines
- will ensure the wind energy facility and battery storage do not increase risk to the surrounding community.

At the Hearing, in response to questions regarding vegetation screening, Mr Taylor and Mr Potter referred to Planning Practice Note 64 (Local planning for bushfire protection) for guidance. They said bushfire risk depended on the vegetation's length, size and whether there were breaks in its stretch. Vegetation would generally have to be between 4 to 5 hectares because it could be considered a risk.

(iv) Discussion

The need to prioritise human life, as sought by Clause 13.02-1S, does not apply here because the permit applications do not propose to introduce or intensify permanent settlement on the subject land. The issue is whether the project would result in an unacceptable bushfire risk on and beyond the subject land.

Measures are needed to appropriately manage potential bushfire risk. CFA's requested permit conditions, which have been included in all final versions of the draft permit conditions submitted by parties, would satisfactorily address potential risk and management issues arising from the wind energy facility and battery storage. The IAP agrees with Mr Taylor and Mr Potter that the recommended bushfire risk measures generally follow CFA Guidelines.

The IAP considers the permit would benefit from Moyne Council's permit conditions requiring:

- a fire prevention and emergency response plan as part of the endorsed EMP
- before development commencing, local CFA brigades and Moyne Shire Municipal Emergency Management representatives, to be inducted for a site and safety briefing

- local CFA Brigades and Moyne Council's Municipal Emergency Management representatives to be updated on construction and operation activities and risks before each declared fire season.

These actions would ensure relevant authorities are prepared through an integrated bushfire response. These requirements should be included in the fire prevention and emergency response plan forming part of the EMP to differentiate them from the CFA permit conditions.

They responsible authority should endorse the risk management plan rather than the Minister for Planning. The IAP was not persuaded by submissions to this change responsibility.

The IAP was not presented with any information to support claims regarding the wind turbines negatively impacting aerial firefighting. CFA and the Civil Aviation Safety Authority (CASA) did not raise specific concern regarding aerial firefighting, though CASA considered the proposed project would have an unacceptable effect on the safety of existing and future air operations at Warrnambool Airport.

(v) Findings and recommendations

The Inquiry and Panel finds:

- The Environmental Effects Statement and permit applications have appropriately considered external bushfire risk to the proposed wind energy facility.
- The proposed wind energy facility and battery storage will result in an acceptable bushfire risk on the local community if the proposed permit conditions, including those from the Country Fire Authority and Moyne Shire Council, are included.
- There is no evidence the wind turbines will negatively affect aerial firefighting.
- The scale of vegetation intended to screen the visual impact of wind turbines is unlikely to result in an unacceptable bushfire risk.

The Inquiry and Panel recommends:

19. Amend Planning Permit PA2201620, as shown in Report 2 Appendix B, to:
- **a) require a fire prevention and emergency response plan as part of the endorsed environmental management plan**
- **b) require through the fire prevention and emergency response plan, local CFA brigades and Moyne Shire Municipal Emergency Management representative to be initially inducted and updated before each declared fire season.**

10.4 Land use and planning

(i) The issue

The issue is whether the project responds appropriately to the draft land use and planning objective of the Environmental Effects Statement scoping requirements.

(ii) Background

The Draft evaluation objective in the EES scoping requirements is:

> To avoid and minimise adverse effects on land use (including agricultural and residential), social fabric of the community (with regard to wellbeing, community cohesion), local infrastructure, electromagnetic interference, aviation safety and to neighbouring landowners during construction, operation and decommissioning of the project.

Land use and planning is discussed at Chapter 16 of the EES, Aviation is addressed at Chapter 23 of the EES and Electromagnetic interference is addressed at Chapter 22 of the EES. Chapter 16 concludes that the project will avoid and minimise adverse effects on agricultural and residential land use during the stages of the project, and that this will be implemented through the EMF. It concludes that land use impacts during operation are minor as the area of land occupied by project infrastructure is 2.4 per cent that this this will not adversely impact on farming operations on the land.

Chapter 22 notes that wind turbines can cause interference to electromagnetic signals because of physical disruption of radiocommunication signals by complete obstruction, diffraction, reflection or scattering of signals. Where possible, measures have been implemented to avoid electromagnetic inference impacts to services. It concludes that implementation of the EMF measures means that interference to existing services is unlikely or low.

A Shadow Flicker and Blade Glint Assessment is included at EES Appendix M. The report notes that based on the modelling, it is predicted that 24 dwellings will experience some high-intensity shadow flicker, 13 of which are stakeholder dwellings and 11 of which are non-stakeholder dwellings. It notes that of the 13 stakeholder dwellings, it is predicted that 13 will experience theoretical shadow flicker for durations longer than the current guidelines. Of the 11 non-stakeholder dwellings, it is predicted that none will experience shadow flicker beyond the recommended limits.

Relevant land use and planning EMF management measures are LP01 to LP03. Aviation management objectives are included at AVI01 to AVI03. EMF management measures relating to electromagnetic interference are EMI01 to EMI11. Shadow flicker is included at SF01 and SF02.

Through the EES, the Proponent sought to identify potential adverse effects and, where there will be adverse effects, put in place management measures by way of the EMF.

(iii) Evidence and submissions

Submissions regarding electromagnetic interference referenced poor television reception as a result of the Macarthur wind energy facility and poor mobile phone reception. Submitters were also concerned with potential blade flicker, citing examples from the Macarthur wind energy facility.

Submitters supported alternative energy, but were concerned that the Willatook facility would be incompatible with farming operations and that ultimately the presence of multiple wind energy facilities, will inhibit agricultural investment in the region, will increase biosecurity risks and will result in the "*industrialisation of the farmland*." They submitted that farming families are the "*backbone of communities*."

Local residents were also concerned with the perceived negative impact on the community and the decline in social fabric, which in part arises as a result of a divided community between supporters and opponents of the wind turbines.

(iv) Discussion

The IAP is cognisant of the multi-generational farming families who are:

- committed to regenerative and sustainable farming practices
- concerned how the Willatook facility may affect their livelihood and wellbeing, including through potential impacts from acoustics, blade flicker and visual impacts.

However, the IAP must consider the potential for impacts and mitigation measures having regard to the Policy and Planning Guidelines and the EMF. Regarding shadow flicker and electromagnetic interference, the proposed measures in the EMF accord with the guidelines, including through ensuring shadow flicker must not exceed 30 hours each year. This protection is reinforced through recommended permit conditions 24 and 25.

There are planning policy objectives that seek to protect productive agricultural land and equally there are policy objectives that seek to encourage and implement wind energy facilities. These policies must be weighted and noting that the IAP did not hear any evidence that the farming practices could not continue or that the project would compromise the integrity of the agricultural land, it concludes that the objectives can be achieved.

(v) Finding

The Inquiry and Panel finds the project appropriately responds to the draft land use and planning objective of the Environmental Effects Statement scoping requirements.

11 Integrated assessment and environmental framework

11.1 Overall cumulative effects

(i) The issue

The issue is whether the cumulative impact of the Willatook facility and other operating and permitted wind energy facilities comprising up to 412 wind turbines will be acceptable on the surrounding region.

(ii) Background

The Wind Energy Facilities Guidelines state:

Flora and fauna impacts assessment

> **Cumulative barrier effects**
>
> Migratory or otherwise mobile species may require turbine-free corridors through which to travel between critical sites (e.g. breeding and nonbreeding habitats);
>
> …
>
> **Landscape and visual impact**
>
> The visual impact of the development relates to…proximity to an existing or proposed wind energy facility, having regard to cumulative visual effects.

Relevant EES evaluation objectives are:

> To avoid or minimise potential adverse effects on biodiversity values within and near the site including native vegetation, listed threatened species and ecological communities, and habitat for these species. Where relevant, offset requirements are to be addressed consistent with state and Commonwealth policies.
>
> To minimise and manage potential adverse effects for the community with regard to landscape and visual amenity.

The EES Scoping Requirements seeks to:

> Assess the potential cumulative effects on listed species of fauna, in particular Brolga and Southern bent-wing bat, from the project in combination with other nearby approved or operating wind energy facilities.
>
> …
>
> Assess the potential for cumulative impacts associated with the development of the project in the context of existing built infrastructures and nearby proposed/approved wind farm developments.

EES Chapter 24 (Cumulative effects) is relevant and identified operating, permitted and proposed wind energy facilities.

(iii) Evidence and submissions

Relevant evidence and submissions on cumulative effects associated with brolga, bats, visual amenity and aviation are outlined in earlier chapters and are not repeated here.

Moyne Council submitted that it resolved in November 2018 to oppose further wind energy facilities until recommendations 8.2.1 to 8.2.7 in the *National Wind Farm Commissioners 2017 Annual Report* were implemented in Victoria. Recommendations generally called for:

- a more strategic and coordinated approach to identifying appropriate sites for wind energy facilities
- consideration of the cumulative effects of projects on communities.

Moyne Council explained that all operating, permitted and wind energy facilities proposed in its municipality would use 12 per cent of the total municipal land. It sought a more regional-based strategic approach to better understand the impacts such a scale would have on its community and matters such as agricultural activities.

Moyne Council sought to ensure the effects of the Willatook facility are properly assessed in the absence of strategic work. This includes understanding the impact of a local community being effectively surround by wind energy facilities. It submitted the potential cumulative impacts of the project with surrounding facilities had not been adequately considered.

(iv) Discussion

The Victoria Planning Provisions require cumulative impacts to be considered when assessing a wind energy facility proposal.

In earlier chapters, the IAP has considered the cumulative impact on specific issues such as the brolgas, bats and visual landscape. The IAP considers the Willatook facility combined with other operating facilities is unlikely to result in a unacceptable cumulative impact if recommended measures and permit conditions are applied.

However, according to the figures in EES Chapter 24, the Moyne Shire will have 471 wind turbines if the Willatook facility and the three approved projects are constructed. This includes the existing 317 turbines currently operating in the region. This number will become 664 turbines if Mt Fyans and Hexham are also approved as proposed. The IAP has considered the cumulative impact of the Willatook facility with existing and approved facilities because it is uncertain whether proposed facilities will be approved.

The scale and concentration of wind turbines in the Moyne Shire appears to be unprecedented elsewhere in Victoria. The Moyne Planning Scheme explains the Shire occupies about 5,600 square kilometres. Based on Moyne Council's 12 per cent calculation, wind energy facilities would occupy about 672 square kilometres (or 67,200 hectares) of land. This is greater than the entire Wyndham municipal area in Melbourne.

The ability to consider cumulative impact is likely to become more complicated as more wind energy facilities operate, are approved and proposed in the Moyne Shire. The IAP's recommended permit conditions to have the Willatook facility operator publicly share information goes part way to better understand cumulative impacts.

There would be merit in requiring all wind energy facility operators to provide relevant information in a consistent format so that it can be consolidated and compared across different facilities.

(v) Findings

The Inquiry and Panel finds:

- Based on available information, the Willatook facility combined with other operating and approved facilities is unlikely to result in a unacceptable cumulative impact if recommended measures and permit conditions are applied.

- Each proponent of a wind energy facility should be required to provide data related to issues such as brolgas and bats in a standardised comparable format so it can be saved into a publicly accessible information sharing platform that can be analysed on a regional scale such as south-west Victoria, however this is beyond of the scope of the Inquiry and Panel to recommend.

11.2 Net community benefit and ecologically sustainable development

Evidence and submission details to the issues outlined below are in previous relevant chapters and are not repeated here.

(i) Discussion

The EES final scoping requirements state:

> The EES should demonstrate how the project will achieve a balance of economic, social and environmental outcomes that contribute to ecologically sustainable development and provide a net community benefit.

The subject land is located on and around a complex of wetlands where fauna breed and reside for a considerable proportion of each year. In its proposed form, the project would have a significant impact on the brolga and SBW bat. These fauna are national recognised under the EPBC Act so their protection has considerable more weight than achieving state policy objectives.

The project's significant impact on these fauna is directly attributable to the EES:

- excluding wetlands which are important for breeding
- applying insufficiently sized buffers.

When weighed up with policies on renewable energy and when applying 995-metre buffers around brolga breeding wetlands and 200 metre buffers for the SBW bat, the project is acceptable. Applying these buffers would result in about 20 wind turbines on the subject land which is about one third of the total number of turbines proposed through the permit application. Approval for additional turbines would be subject to a detailed assessment at such time.

A wind energy facility of this scale, being up to 250 metres, will have a significant visual impact on its immediate surrounds, including neighbouring properties with dwellings. The Willatook project is no exception, however:

- there is no policy in the Planning Scheme which identifies the affected landscapes as significant which warrant special protection
- there is no identified viewshed protection towards or from the Budj Bim world heritage area
- there will be no significant visual impacts from key tourist vantage points or heavily trafficked roads.

The IAP considers policies seeking renewable energy to power Victorian households outweigh the visual impact on individual properties within the project's immediate environs.

The project can achieve the noise levels specified in the Victoria Planning Provisions, namely the New Zealand Standard NZS6808:2010, Acoustics – Wind Farm Noise. The IAP process was not an opportunity to review the appropriateness of these standards and it was not presented with

compelling evidence to apply a considerably more restrictive standard. There are no competing noise policy objectives to weigh up.

With careful management and mitigation measures, the project can:

- sensitively respond to Aboriginal and historical cultural heritage, thereby meeting relevant state heritage policies
- result in an acceptable outcome on ground and surface water, traffic, bushfire management, and Warrnambool Airport's operations.

The potential quarry does not form part of the permit applications and would form part of a separate future approval process. The IAP has flagged potential issues to be considered if the quarry proposal proceeds.

(ii) Finding

The Inquiry and Panel finds the environment effects of the Willatook facility can be managed to an acceptable level and the relevant project approvals should be granted subject to the recommendations in this report.

11.3 Environmental Management Framework

(i) Discussion

The EMF proposed in EES Chapter 26, subject to addressing and mitigating issues in earlier chapters, in conjunction with planning permit conditions, provides a sound framework for managing environmental impacts to an acceptable level.

The EMF is empowered through the permit conditions, as shown in Appendix G (Report 2).

The IAP has recommended a permit condition requiring endorsed documents including plans such as the EMF be made available on the project website to enable transparency.

(ii) Finding

The Inquiry and Panel finds the Environmental Management Framework is appropriate for managing the project before, during and after construction, subject to recommendations in this report.

PART C: NATIONAL ENVIRONMENTAL SIGNIFICANCE

Planning Panels Victoria

12 Matters of national environmental significance

(i) EES evaluation objective

The EES scoping requirements set the following evaluation objective:

> To avoid or minimise potential adverse effects on biodiversity values within and near the site including native vegetation, listed threatened species and ecological communities, and habitat for these species. Where relevant, offset requirements are to be addressed consistent with state and Commonwealth policies.

(ii) EES Chapter 25 (Matters of National Environmental Assessment)

The EES considers matters of national environmental assessment in Chapter 25. The assessment found it is unlikely there will be a significant impact on:

- Flora
  - Swamp Everlasting
  - Trailing Hop-bush
  - Basalt Peppercress, Button Wrinklewort, Clover Glycine and Matted Flax-lily
  - Dense Leek-orchid, Gorae Leek-orchid, Maroon Leek-orchid, and Swamp Fireweed
- Fauna
  - Southern Bent-wing Bat
  - Grey-headed Flying Fox
  - Growling Grass Frog
  - Striped Legless Lizard
  - Little Galaxias and Yarra Pygmy Perch.

The assessment found there is a potential to significantly impact the Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains.

The assessment concludes:

> While impacts from the project were assessed as having the potential to occur for a range of these communities and species, these impacts would not to be significant as defined by the MNES[7] Significant Impact Guidelines. This assessment was largely based on the scale of predicted impacts, the importance of the project site as habitat for these species, and measures that have been proposed to limit potential impacts.
>
> The clearance of 0.49 hectares of Seasonal Herbaceous Wetland of the Temperate Lowland Plain was conservatively assessed as having the potential to result in a significant impact. This impact would be offset in accordance with the EPBC Act Environmental Offsets Policy (Department of Sustainability, Environment, Water, Population and Communities, 2012).

(iii) Discussion

Evidence and submissions related to flora and fauna are considered in Chapter 5 and are not repeated here.

[7] Matters of National Environmental Assessment

As identified earlier, the IAP considers the EES has appropriately applied the avoid and minimise principles to reduce vegetation removal. This is evident through the Willatook facility's evolved design over the years which has resulted in a considerably reduced footprint. The impact on EPBC Act listed flora species and ecological communities will be minimised as far as practicable.

For reasons explained in Chapter 5, the Willatook facility, if constructed as proposed, is likely to significantly impact the brolga and SBW bat. The impact is unlikely to be significant if the measures and permit conditions recommended by the IAP are implemented.

Regarding other EPBC Act listed species, the EES has appropriately assessed and included measures to help mitigate and manage potential impacts. This is further reinforced through the proposed and IAP-recommended permit conditions.

(iv) Finding

The Inquiry and Panel finds the construction and operation of the Willatook wind energy facility is unlikely to significantly impact nationally listed species and ecological communities if the measures and permit conditions recommended in Report 2 Appendices F and G are implemented.