Regulatory impact statement - Noise and wind energy facilities

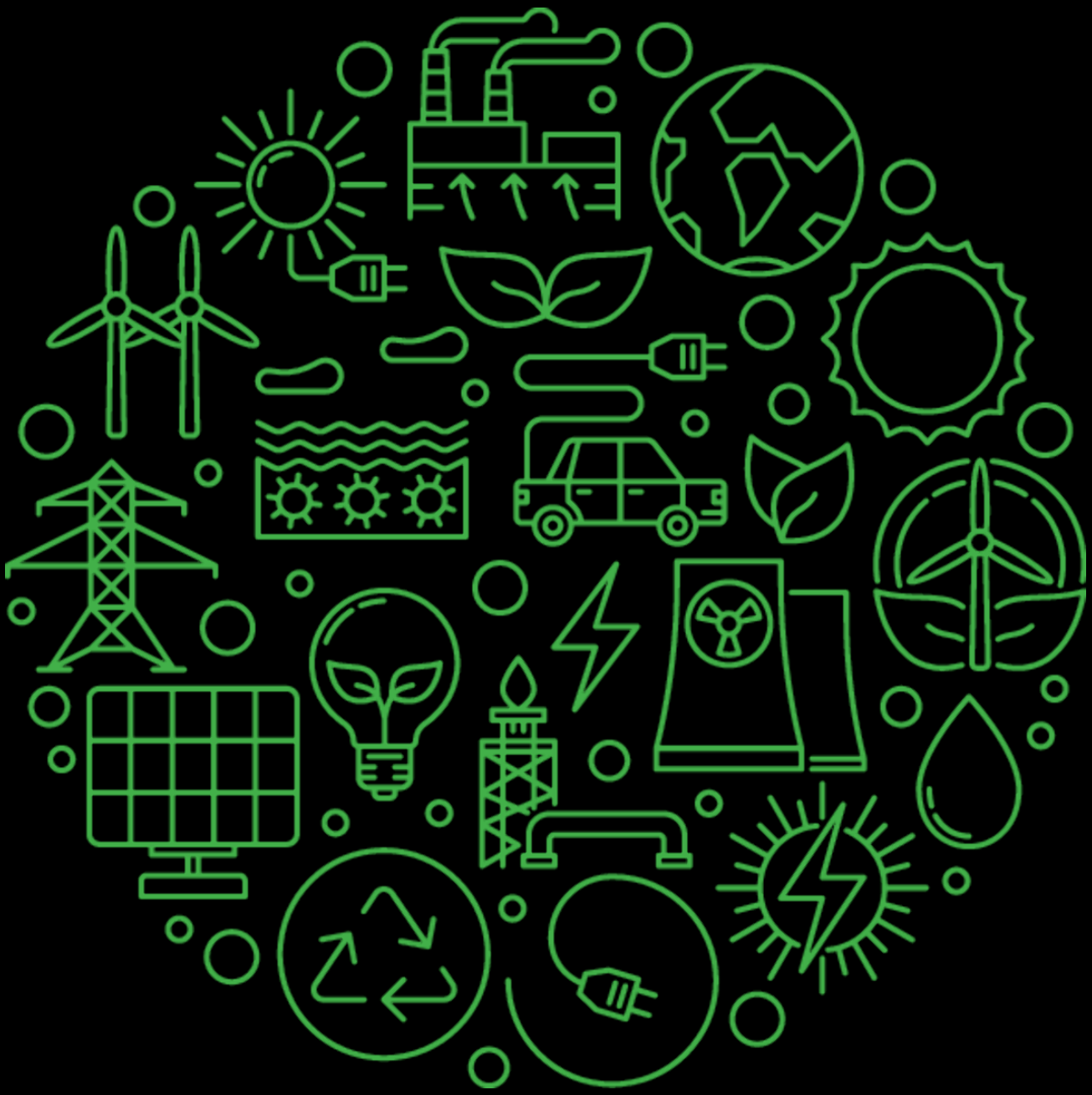
VICTORIA State Government | Environment, Land, Water and Planning

Regulatory Impact Statement: Noise and wind energy facilities

Prepared by Deloitte Access Economics on behalf of the Victorian Government

December 2020

Deloitte.



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Glossary

Acronym	Full name
ABS	Australian Bureau of Statistics
AMA	Australian Medical Association
Authority or EPA	Environment Protection Authority
BRV	Better Regulation Victoria
CIRP	Complaints Investigation and Response Plan
CMP	Complaints Management Plan
CIT	Commercial, Industrial and Trade
CO_2e	Carbon Dioxide equivalents
dB	decibel
DELWP	Department of Environment, Land, Water and Planning
DHHS	Department of Health and Human Services
EP Act	Environment Protection Act 2017 (to be amended by the EP Amendment Act 2018 – due to commence on 1 July 2021)
EP Regulations	The proposed *Environment Protection Regulations 2021* – which are expected to commence on 1 July 2021
GiC	Governor in Council
GSP	Gross State Product
GWh	Gigawatt hour
MW	Megawatt
NMP	Noise Management Plan
NRP	Noise Remediation Plan
NSFC	National Wind Farm Commissioner
NHMRC	National Health and Medical Research Council
NZ Standard (2010)	New Zealand Standard *Acoustics - Wind farm noise*, NZS6808:2010
NZ Standard (1998)	New Zealand Standard *Acoustics – The Assessment and Measurement of Sound from Wind Turbine Generators*, NZS6808:1998
P&E Act	The Planning and Environment Act *1987*
PHW Act	The Public Health and Wellbeing Act 2008
RIS	Regulatory Impact Statement
VPP	Victoria Planning Provisions
VRET	Victorian Renewable Energy Target
WEF	Wind Energy Facility
WHO	World Health Organisation

Foreword

This Regulatory Impact Statement (RIS) has been prepared with respect to an amendment to the proposed Environment Protection (EP) Regulations 2021. The amendment will provide clarity to wind energy facilities (WEFs), the community and regulators as to the regulation of noise from WEFs under the *Environment Protection Act 2017* (as amended) and the EP Regulations.

The preferred option will amend the proposed EP Regulations (which are set to commence on 1 July 2021) via the addition of a new Division. This new WEF Division would be included within Part 5.3 (Noise) of Chapter 5 (Environmental Protection).

This RIS sets out the objectives of the proposed WEF Regulations, explains their effect and assesses the nature and scope of the problem that they seek to address. It also sets out the likely impacts (costs and benefits) and discusses regulatory and non–regulatory alternatives.

How to respond to the proposed regulatory package

WEFs, other interested parties and members of the public are invited to make submissions responding to the RIS or the proposed Regulations.

All documents, including the proposed WEF Regulations and RIS, can be accessed via Engage Victoria's website: www.engage.vic.gov.au

Alternatively, comments may be provided via email to the following email address: windfarmnoise@delwp.vic.gov.au

Hard copy submissions will also be accepted and should be addressed to:

Director, Environment Protection
Department of Environment, Land, Water and Planning
1 Nicholson St, East Melbourne, Victoria 3000

For further assistance about the public comment process, or to obtain copies of the RIS and proposed Regulations, please call DELWP general enquiries 136 186.

Executive summary

The regulatory framework governing wind energy facilities will soon be amended

Victoria has some of the best wind energy sites in Australia. As at 31 August 2020, there were 29 operational WEFs in Victoria with 16 more either under construction or approved, and a further three WEFs seeking planning approval. These sites collectively account for 29% of Australian wind energy production.

This contribution has increased rapidly in recent years with Victoria's wind energy generation expanding by around 50% in the five years to 2019-20. Over the same period, wind's share of Victorian electricity generation rose from 6% to 13%. Reflecting this recent growth, wind energy is critical to Victoria's sustainable future. This is reflected in Victoria's Renewable Energy Target (VRET) which aims to increase renewable contributions to total energy generation to 50% by 2030.

Due to the nature of their operations, WEFs create noise and it is therefore important that noise emissions from windfarms are kept to reasonable levels. The existing regulatory framework for WEF noise is complex and will shortly be augmented by provisions in Victoria's *Environment Protection Act 2017* (as amended) ('the EP Act') and the proposed *Environment Protection Regulations 2021* ('the EP Regulations') which are expected to commence on 1 July 2021.

As Victoria's independent environmental regulator, the Environment Protection Authority (EPA) will be responsible for administering and enforcing the EP Act. In addition, a Bill seeking to remove wind turbine noise from the nuisance provisions in the *Public Health and Wellbeing Act 2008*, (PHW Act) is currently being considered by Parliament.

In addition to establishing a responsibility for EPA to manage WEF noise, the EP Act, once it commences, will impose obligations on WEF operators. Namely, section 25 of the incoming legislation sets out a general environmental duty (GED) to minimise the risks of harm to human health and the environment from pollution (including noise) and waste, so far as reasonably practicable, while section 166 prohibits the emission of unreasonable noise.

The focus of this RIS is concerned with reforms under the EP Act

The incoming GED and unreasonable noise provisions of the EP Act are general in nature and (similar to other CIT noise sources) do not explicitly reference turbine noise from WEFs. However the prediction, measurement and assessment of wind turbine noise is technically more complex than noise emissions from other CIT premises. This complexity arises for reasons including:

- wind turbines operate in a variety of wind conditions meaning the turbine-only component of the total noise level cannot be determined directly from similar measurements as that for other CIT premises (which are measured only in low wind conditions)
- the NZ Standard used for WEF noise prediction, measurement and assessment requires the use of regression analysis and logarithmic subtraction techniques to identify the WEF turbine-only contribution to the overall noise levels
- there is a need to determine whether 'Special Audible Characteristics' are present in turbine noise emissions, including tonality, amplitude modulation, and impulsive sound.

The unique complexity of WEF turbine noise contributes to the residual risk remaining under the incoming legislation. The problem of these residual risks (of the Base Case) are the focus of this RIS and include:

- **Community confidence** and the inherent uncertainties associated with the complex technical methods for determining appropriate operating performance for WEFs
- **Industry certainty** and the need for regulatory effectiveness and regulatory clarity to ensure transparency of compliance requirements

- **Complexity of noise measurement methods**. In addition to the factors outlined above, complex land-use interactions involving high amenity area noise limit penalties, and cumulative noise from adjacent WEFs increase the level of complexity that needs to be considered.

Ultimately this unique complexity, lack of confidence and lack of certainty could limit the effectiveness of the incoming legislation, impose unnecessary costs on stakeholders and potentially limit future growth of the wind energy sector in Victoria. Changes to the regulatory environment also present an opportunity to improve **consistency** by ensuring a common set of obligations are placed on all WEFs across the Victorian industry. Greater consistency is anticipated to further support industry certainty and community confidence.

This Regulatory Impact Statement (RIS) considers three options for the Regulations

Three high-level options are considered as part of this RIS:

1. **Base Case:** The Base Case consists of the primary legislation (including relevant provisions of the EP Act and the EP Regulations that are expected to commence on 1 July 2021) and the policy objective of EPA as the primary regulator of WEF turbine noise.
2. **Option 1 - Direct regulation:** Additional industry specific direct regulation introduced as an amendment to the incoming EP Regulations that prescribes what constitutes compliance with the GED and unreasonable noise provisions.
3. **Option 2 - Permits:** A permissions scheme is developed alongside the incoming legislation that allows EPA to issue permits for WEFs prescribing conditions which represent reasonably practicable requirements to minimise the risk of harm.

Under all three options the EP Act and the EP Regulations will commence on 1 July 2021. All three options will also include the outcomes of current consideration being given to the role of Councils in WEF compliance and enforcement activities, including an amendment to exclude wind turbine noise emissions from the nuisance provision of the PHW Act.

From 1 July 2021, EPA will become the primary regulator of WEF turbine noise in Victoria under the EP Act that places certain duties and obligations on all Victorian commercial and industrial premises and activities. Under all options WEFs must comply with the GED and unreasonable noise provisions. Options 2 and 3 impose the same requirements on the WEF industry but through differing mechanisms. These items are described below in Table i, with a Guideline to provide detail to support these requirements.

Table i: Items to be prescribed in Regulations (Option 1) or prescribed as permit conditions (Option 2)

Item prescribed	Notes
Prediction, measurement and assessment	A wind turbine noise assessment must be undertaken by a qualified acoustic consultant or practitioner in accordance with the NZ Standard and be accompanied by a report by an environmental auditor that verifies the noise assessment is in accordance with the NZ Standard.
Post construction noise assessment	A post construction noise assessment is required as currently required under the Victoria Planning Provisions. This will need to include a situation where a WEF is constructed in stages as currently required.
Noise Management Plan	A WEF operator must develop and implement a Noise Management Plan (NMP). The NMP has a broader scope than the NMP identified in the VPPs in line with the principles and obligations for all duty holders under the EP Act to prevent harm to human health and the environment and identify, assess and manage risks. A Complaint Management Plan (CMP) is an element of the NMP. A WEF operator must implement a CMP that details the procedures to respond to and resolve complaints.

	Noise remediation is an element of the NMP. A WEF operator must take action when non-compliance with the NZ Standard is found to have occurred.
Unreasonable noise	The obligation not to emit unreasonable noise will be satisfied if noise emissions from wind turbines are demonstrated to comply with the requirements of the NZ Standard
Annual Statement	A WEF operator must submit to the Authority an annual Statement that demonstrates ongoing compliance with the NZ Standard and associated approvals, and details how complaints (if any) and noise issues (if any) have been resolved.
Periodic Noise Assessments	In addition to the pre-construction and post-construction noise assessments, a WEF operator must also undertake a noise assessment every 5 years and provide the noise assessment report (with corresponding verification report) to the Authority.

Note: The regulations will provide transitional arrangements for the introduction of these matters. Items prescribed only apply to wind turbine noise (see NZ Standard definition) from operational WEFs and do not apply to other ancillary infrastructure noise, or noise emitted during the construction phase.

A Multi-Criteria Analysis assessed the costs and benefits of the options

The options in this RIS were assessed using Multi-Criteria Analysis (MCA) (see Table ii, below) supported by quantitative information where available. This approach provides a structured and transparent way of evaluating the options given the limited quantitative data that is available, particularly in respect to benefits. The MCA provides a robust method that can balance the different impacts.

Table ii: MCA criteria and weightings

Criteria	Description	Weighting
1. Costs to industry and Government	Cost of compliance for industry and costs to Government to implementation, monitoring and enforcement options	50%
Total costs weighting		**50%**
2. Reductions in complaints and legal disputes	Changes in the costs incurred by all stakeholders in managing complaints and legal disputes.	20%
3. Improved investment certainty	Improved investment conditions for the WEF sector with certainty providing reduced regulatory risk, leading to avoided lost investment for the Victorian WEF sector.	20%
4. Avoided search costs and over-compliance	Avoided costs to industry and government to determine what constitutes compliance with the GED and unreasonable noise provisions.	10%
Total benefits weighting		**50%**

Results of the analysis are summarised below for Option 1 and 2 compared to the Base Case (see Table iii). Costs to industry and Government are expected to increase under both options. For industry, costs (Criterion 1) are incurred mainly through the introduction of periodic noise assessments and submitting an Annual Statement to the EPA. For government, higher costs are associated with changes to the compliance and enforcement responsibilities. Both options are expected to deliver benefits in terms of avoided complaints and disputes (Criteria 2) as well as avoided search costs and over-compliance (Criterion 4).

Option 1 and 2 are also estimated to deliver benefits from continued investment in Victoria's WEF industry (Criterion 3). Option 1 is anticipated to deliver marginally greater benefits for this

criterion, as regulations provide a higher degree of certainty compared with a permit system, so it is the preferred option.

Table iii: MCA summary results

Criteria	Base case	Option 1	Option 2	MCA Weights
1. Costs to industry and government	0	-3	-3	50%
2. Avoided complaints and disputes	0	4	4	20%
3. Avoided investment uncertainty	0	5	4	20%
4. Avoided search costs and over compliance	0	3	3	10%
Weighted MCA score	**0**	**0.6**	**0.4**	

Note that Option 1 is likely to have relatively higher benefits than Option 2 in relation to criterion 2 and criterion 4 (for example the additional specificity Option 1 provides may avoid more complaints and disputes) however these differences are not sufficiently large to impact the scoring.

Option 1 is preferred as it will provides improved certainty

Option 1 (new direct regulation) is preferred to the Base Case (status quo) and Option 2 (Permit system). Option 1 provides greater certainty for industry as it clearly outlines WEF obligations in regulations and does not require WEFs to regularly seek permit renewals, as in Option 2 (which was perceived as not fully removing regulatory uncertainty).

Option 1 also delivers benefits above the Base Case (and similar to Option 2) in terms of avoided costs incurred in managing complaints and legal disputes and through avoiding search costs and over compliance. These benefits are partly offset by increases in costs to industry and government.

Implementation will not differ greatly from the current application of the Regulations

The preferred option will amend the proposed EP Regulations (which are set to commence on 1 July 2021) via the addition of a new Division. This new WEF Division would be included within Part 5.3 (Noise) of Chapter 5 (Environmental Protection) of the proposed EP Regulations.

The costs of implementation of the preferred option are discussed in detail in Chapter 4 of the RIS. Implementation will include changes to EPA's industry consultation and preparation of guidance materials (reflecting the complexity of the regulatory changes) and the need to recruit additional resources to support the compliance and enforcement function.

EPA will monitor the operation and effectiveness of the proposed Regulations

EPA will monitor the operation and effectiveness of the proposed Regulations in two ways:

- ongoing engagement with stakeholders, including through ongoing liaison with councils and industry
- ongoing review of trends in the wind energy industry (including for example trends in complaints and disputes).

This monitoring and broader stakeholder consultation will inform an ongoing assessment of whether the proposed Regulations are meeting the objectives of regulatory framework, which aims to minimise the risk of harm to human health and the environment so far as reasonably practicable.

The WEF regulations, as an amendment to the EP Regulations, will integrate into this broader review timescale. A full formal evaluation will be undertaken in 2031 as the proposed Regulations sunset in 10 years.

The evaluation of the EP Regulations will commence after the new legislative and regulatory framework has been operational for 4.5 years with the evaluation process expected to be completed in approximately 6 months.

1 Background

This chapter outlines the background to the regulations being proposed and the purpose of this RIS.

1.1 Introduction

Along with other renewable energy sources, wind energy is critical to Victoria's sustainable future. Many wind energy facilities (WEFs) have been constructed in recent years and as at 31 August 2020, there were 29 operational WEFs in Victoria. A further 16 WEFs were either under construction or approved, with three WEFs currently seeking planning approval.[1]

Due to the nature of their operations, WEFs create noise and it is therefore important that these noise emissions are kept to reasonable levels. The existing regulatory framework for WEF noise will shortly be augmented by provisions in Victoria's *Environment Protection Act 2017* (as amended) ('the EP Act') and the proposed *Environment Protection Regulations 2021* ('the EP Regulations') which are expected to commence on 1 July 2021. An exposure draft of those EP regulations can be found here: https://engage.vic.gov.au/new-environmental-laws/subordinate-legislation and further information on the EP Act may be found here:

https://www.epa.vic.gov.au/about-epa/laws/new-laws.

In addition, in response to the lack of certainty for the sector arising from the interactions between the existing planning regulatory framework for WEFs (established by the *Planning and Environment Act 1987*) and the nuisance provisions in the *Public Health and Wellbeing Act 2008*, (PHW Act), a Bill to amend the PHW Act to remove wind turbine noise from the scope of the nuisance provisions in the PHW Act is currently being considered by Parliament.[2]

As Victoria's independent environmental regulator, the Environment Protection Authority (EPA) will be responsible for compliance and enforcement activities under the EP Act. As noted above, it is a Government objective for EPA to become the primary regulator for noise from wind turbines. The focus of this RIS is concerned with reforms under the EP Act.

The EP Act will impose obligations on WEF operators and establish a responsibility for EPA to manage WEF noise. These obligations and responsibility will arise even without new regulatory provisions specific to WEFs.

Section 25 of the incoming legislation sets out a general environmental duty (GED) to minimise the risks of harm to human health and the environment from pollution (including noise) and waste. Sections 166 and 168 prohibit the emission of unreasonable and aggravated noise respectively.

Given this context, this RIS considers options to improve the regulation of noise from wind turbines at WEFs providing all stakeholders with greater confidence, clarity and certainty of WEF obligations to ensure noise emissions comply with the EP Act.

1.2 Wind energy

The wind energy industry is an important contributor to Victoria's efforts to reduce greenhouse gas emissions, makes a significant contribution to state's electricity generation capacity and also contributes to the economy more broadly.

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[1] Energy Victoria, Wind projects (2020) <https://www.planning.vic.gov.au/permits-and-applications/specific-permit-topics/wind-energy-facilities/wind-energy-projects-planning>
[2] Victorian Legislation, Public Health and Wellbeing Amendment Bill 2020 (2020) <https://www.legislation.vic.gov.au/bills/public-health-and-wellbeing-amendment-bill-2020>

Victoria has some of the best wind energy sites in Australia, and the Grampians and Barwon South West regions both have a large number of operating and planned WEFs. Together these two regions account for around 90% of WEFs in the state.[1]

Table 1-1: Summary of Victorian wind energy projects as at 24 September 2020

Status	Capacity (MW)	WEFs
Operating	2,346	29
Under construction	1,741	8
Approved not yet under construction	535	6
Planning permit application lodged and process underway	1,691	5
Total	**6,313**	**48**

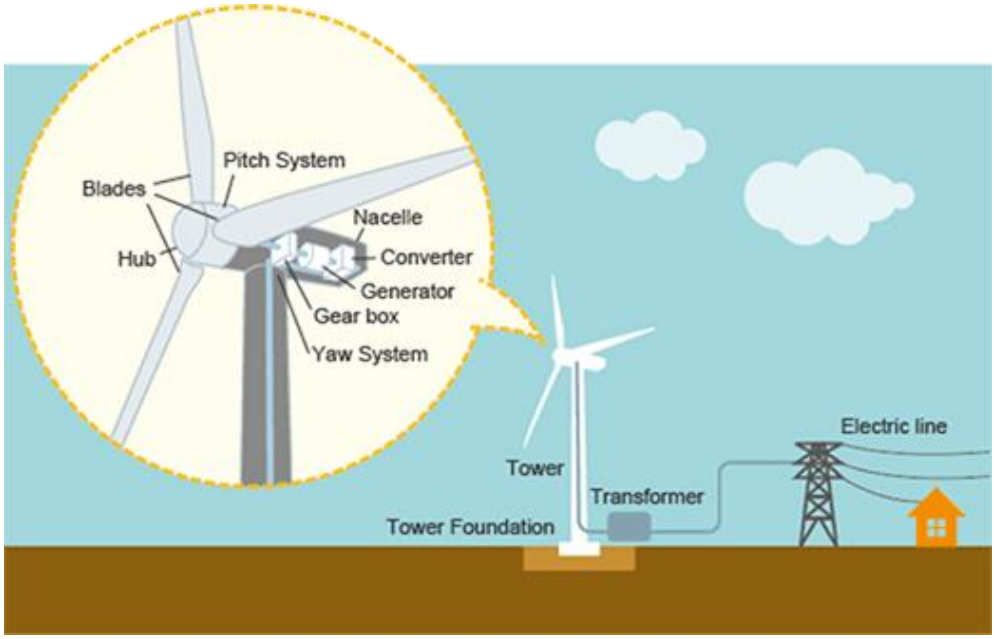
Source: DELWP[1]

1.2.1 Wind energy is an important supply of electricity in Victoria

Victoria's electricity generation has historically been dominated by non-renewable fuels, namely brown coal and natural gas.[3]

Wind electricity is primarily generated at land-based WEFs,[4,5] through turbines that convert wind to electricity via rotating blades. Most common wind turbines have a generator and rotor blades mounted on top of a steel tower that together can be over 200 meters high.

Figure 1-1: Stylised schematic of a WEF wind turbine connected to an electrical grid



Source: Toshiba Energy[6]

[3] Department of Industry, Science, Energy and Resources, Australian Energy Update 2019 <https://www.energy.gov.au/publications/australian-energy-update-2019>
[4] Also commonly referred to as wind farms
[5] The focus of this RIS is turbine noise from land based WEFs. However, wind electricity can also be generated at offshore facilities and through smaller sets of turbines that aren't connected to the electricity grid.
[6] Toshiba Energy Wind Power generation using wind energy <https://www.toshiba-energy.com/en/renewable-energy/product/wind-power.htm>

The Victoria Planning Provisions[7] (VPPs) define a WEF as "land used to generate electricity by wind force and includes land used for: (a) any turbine, building, or other structure or thing used in or in connection with the generation, of electricity by wind force, or (b) an anemometer[8]." The VPP definition specifically excludes "turbines principally used to supply electricity for domestic or rural use of the land". Generally, a WEF includes a series of wind turbines and the associated infrastructure to connect to the electricity grid.[9] Clause 52.32 of the VPPs sets out a range of requirements for WEFs.

WEFs vary in the number of turbines and the size of the rotors and are designed based on considerations including the physical features of the land, the prevailing wind resource and the available capacity of the connecting grid. WEFs are typically located on sites that have relatively strong and steady winds throughout the year. Proximity and access to key infrastructure (e.g. roads and the electricity grid) are also important considerations.

1.2.2 Wind is driving Victorian progress to renewable energy targets

The Victorian wind energy industry has grown considerably in recent years. In the five years to 2019-20, Victorian wind electricity generation has increased 52%. Over the same period, wind's share of total electricity generation rose from 6% to 13%.[10]

Wind, along with solar, are the primary sources of renewable electricity in Victoria. In 2019-20 more than 5,650 Gigawatt hours (GWh) of wind electricity was generated in Victoria. This accounted for:

- 66% of all renewable electricity generated in the state
- 13% of total Victorian electricity generation
- 29% of Australian wind electricity generation
- 14% of Australian renewable production.

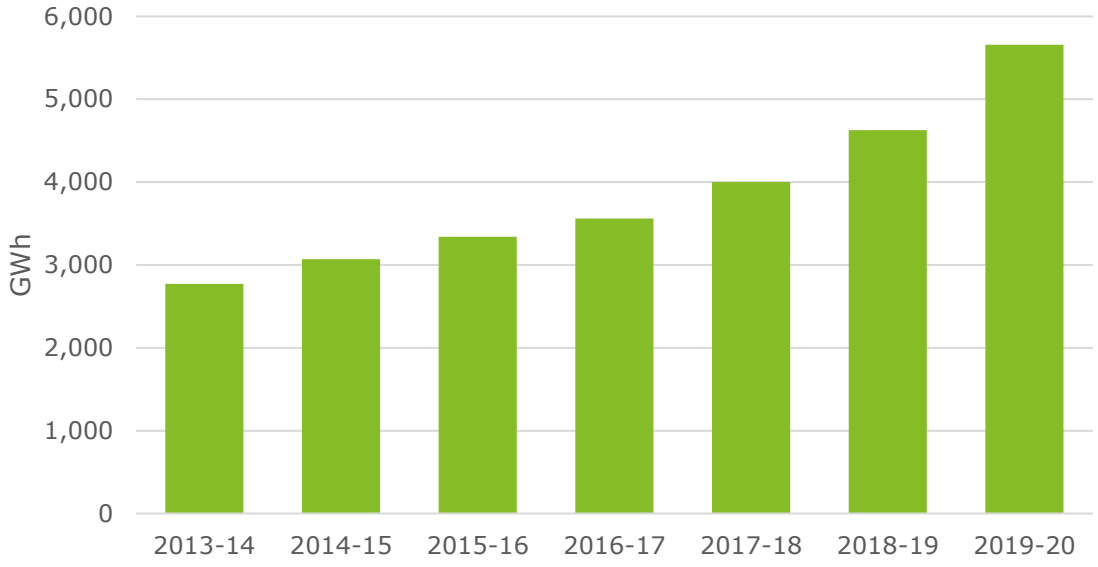
[7] Planning Victoria Development of Wind Energy Facilities in Victoria; Policy and Planning Guidelines (2019) <https://www.planning.vic.gov.au/__data/assets/pdf_file/0024/95361/Development-of-Wind-Energy-Facilities-Mar2019.pdf>

[8] In Clause 73.01 of the VPP, an anemometer is defined as a 'wind measuring device'. It is used to measure the wind speed and direction at a site.

[9] For more detail see Section 1.3 of Planning Victoria Development of Wind Energy Facilities in Victoria; Policy and Planning Guidelines (2019) <https://www.planning.vic.gov.au/__data/assets/pdf_file/0024/95361/Development-of-Wind-Energy-Facilities-Mar2019.pdf>

[10] Department of Industry, Science, Energy and Resources, Australian Energy Update 2019 <https://www.energy.gov.au/publications/australian-energy-update-2019>

Figure 1-2: Victorian wind energy generation



Sources: DISER[10]; NEMReview[11]
Note: NEMReview data from 2017-18

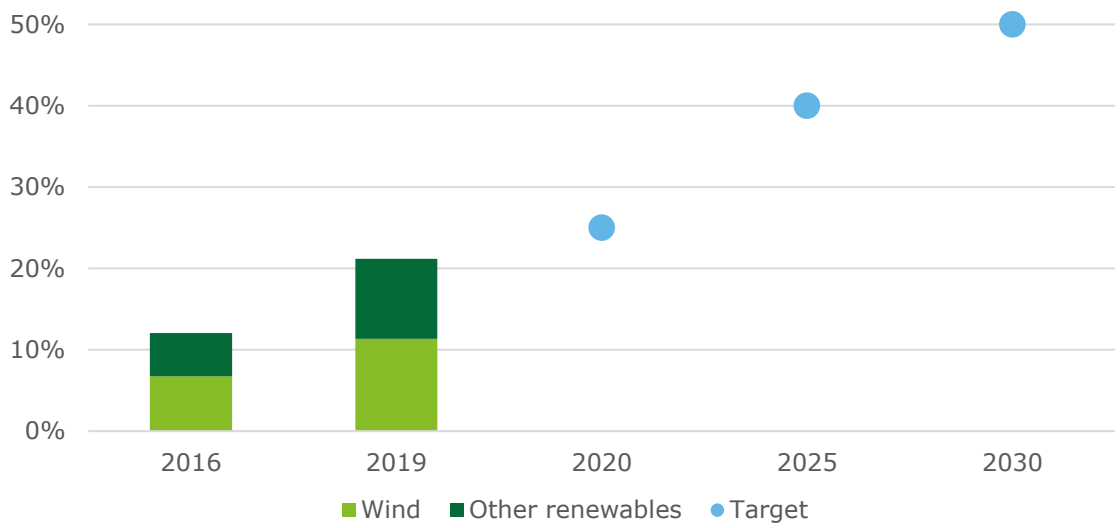
Wind electricity generation actively contributes to Victorian efforts in reducing greenhouse gas emissions. Electricity generated from wind energy emits 0.6 tonnes of Carbon Dioxide equivalents (CO_2e) per megajoule of energy generated, compared with an average of around 3,000 tonnes per megajoule across Victoria's brown coal-fired power plants.[12]

Increasing energy generated from wind will be an important way of ensuring that Victoria's Renewable Energy Target (VRET) can be achieved. Current Victorian Government policy is outlined in the VRET which aims to for renewable energy to account for total energy generation of 50% by 2030, building on existing, legislated renewable energy generation targets of 25% by 2020 and 40% by 2025.

In an assessment of the economic contribution of the VRET targets by 2030, Acil Allen[13] found that, by meeting those targets, gross state product (GSP) could be between $3.5 and $5.8 billion higher with employment between 2,600 and 4,067 higher.

[11] NEMReview <https://app.nemreview.info/#/>
[12] DELWP, Victorian Greenhouse Gas Emissions Report (2019) <https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0016/443014/Victorian-Greenhouse-Gas-Emissions-Report-2019.pdf>
[13] Acil Allen (2019) Victorian Renewable Energy Transition: Economic Impacts Modelling (2019) <https://www.energy.vic.gov.au/__data/assets/pdf_file/0023/430763/VRET-2030-Economic-Impacts-Modelling-Report.pdf>

Figure 1-3: Victorian renewable energy contributions and targets



Sources: DELWP[15], DISER[10]

According to the Australian Bureau of Statistics (ABS) Victoria's renewable energy industry supported 2,190 direct full-time equivalent jobs in Victoria in 2016-17.[14] Similarly DELWP estimates that large-scale renewable generation projects completed in Victoria during 2017-18 generated $291 million in capital expenditure, 640 jobs in construction and at least 23 ongoing jobs.[15]

The contribution of WEFs is likely to become more significant in the future. According to the AEMO's[16] 2020 central forecast, Victorian electricity consumption is projected to increase by around 13 per cent between 2020 and 2050. Given the VRET, this will require a large expansion in wind electricity generation capacity - Acil Allen's [17] analysis of the VRET modelled an increase of Victoria's wind energy generation by more than 125% between 2020 and 2030.

1.3 Relevant standard and legislative and regulatory framework in Victoria

In Victoria WEFs are regulated by a range of interrelated legislation, regulations and guidelines (see Appendix B). This section outlines the key elements of the regulatory framework but focusses on the EP Act and the EP Regulations. As Victoria's independent environmental regulator, EPA will be responsible for compliance and enforcement activities under the EP Act. Whilst there is an objective for EPA to become the primary regulator for noise from wind turbines this RIS focuses on reforms under the EP Act. This is because the aim of this RIS is to address the residual risk associated with solely relying on the incoming GED and the unreasonable noise provisions contained in this legislation. Feasible options identified to address this problem are outlined in Chapter 3.

Other related elements of the regulatory framework outlined in this section include:

- the *Planning and Environment Act 1987*

[14] Energy Victoria Victorian Renewable Energy Targets, 2017-18 Progress Report, <https://www.energy.vic.gov.au/__data/assets/pdf_file/0025/397123/VRET-2017-18-Progress-Report.pdf>
[15] DELWP, Victoria's renewable energy targets (2020) <https://www.energy.vic.gov.au/renewable-energy/victorias-renewable-energy-targets>
[16] AEMO, 2020 Electricity Statement of Opportunities (ESOO) – electricity consumption and demand forecasts used <http://forecasting.aemo.com.au/Electricity/AnnualConsumption/Operational>
[17] Acil Allen (2019) Victorian Renewable Energy Transition: Economic Impacts Modelling (2019) <https://www.energy.vic.gov.au/__data/assets/pdf_file/0023/430763/VRET-2030-Economic-Impacts-Modelling-Report.pdf>

- the Victoria Planning Provisions
- the New Zealand Standard Acoustics - Wind farm noise, NZS 6808:2010 (NZ Standard)
- the New Zealand Standard Acoustics – The Assessment and Measurement of Sound from Wind Turbine Generators, NZS 6808:1998 (1998 NZ Standard)
- the Development of Wind Energy Facilities in Victoria Policy and Planning Guidelines (DELWP, March 2019)
- the *Public Health and Wellbeing Act 2008*
- the *Climate Change Act 2017*.

1.3.1 The proposed Environment Protection Act 2017 (as amended) and the Environment Protection Regulations 2021 (as proposed)

The *Environment Protection Act* 2017 came into effect on 1 July 2018 before being amended in 2018. (Hereafter this document is referred to as 'the EP Act'). This legislation modernised EPA's corporate governance and strengthened its status as a science-based regulator. It has legislated the role of a Governing Board, Chief Executive Officer and Chief Environmental Scientist. A key purpose of the EP Act is "…*To protect human health and the environment by reducing the harmful effects of pollution and waste*".[18]

New provisions in the EP Act will commence on 1 July 2021 and it shifts the regulatory framework from a reaction-based approach to prioritising prevention, similar to the prevention-based approach set out in the Occupational Health and Safety regime. To achieve this, amongst other things, the EP Act introduces a new general environmental duty (GED) and a new permissions scheme for licences, permits and registrations.[19] While this incoming legislation shifts the management of risk towards prevention, the EP Act also has a range of enforcement powers relating to pollution incidents. Specific to this RIS, the new regime also includes provisions prohibiting the emission of unreasonable and aggravated noise.[20]

When deciding whether to recommend to the Governor in Council (GiC) to make regulations under the EP Act, the Minister must take into account a variety of considerations, including the principles of environmental protection set out in Part 2.3 of the EP Act (see section 465(5)) and any environment reference standards made under Part 5.2 of the EP Act (see section 99). In addition, prior to recommending any regulations be made under the EP Act, the Minister must have regard to, among other things, the potential impacts of climate change and the potential contribution to the State's greenhouse gas emissions (see section 17 of, and Schedule 1 to, the *Climate Change Act 2017* – clause 1.3.5 below). In considering whether to recommend the GiC make the proposed regulations attached to this RIS, the Minister has carefully considered all these matters.

The EPA has a range of enforcement powers under the Act which will come into effect on 1 July 2021. These include:

- Information Gathering Notice (s.255) which allows the Authority to serve an information gathering notice requiring provision of information or documents
- Notice to Investigate (s.273). which allows the Authority to issue a notice requiring a person to investigate the nature and extent of any harm or risk of harm to human health or the environment and to provide the Authority with any specified information regarding the investigation
- Directions (s.260). which allows an authorised officer to give a direction to a person to do, or cause to be done, any action or thing that the authorised officer reasonably believes is necessary to address the existence or likely existence of an immediate risk of material harm to human health or the environment.
- Improvement Notice (s.271). which allows for the Authority to issue an Improvement Notice to a WEF operator. This notice may include any action relating to the verification of compliance. (Section 271(3) of the EP Act allows for the Authority to include directions to a WEF operator that specify measures to be taken to remedy the matters referred to in an improvement notice.)

[18] Section 6 of the EP Act
[19] Section 1 of the EP Act
[20] See sections 166 and 168 of the EP Act

- Prohibition Notice (s.272). Section 272 of the EP Act allows the Authority to issue a Prohibition Notice to a WEF operator in a number of circumstances. This notice may include any action to prevent or minimise the risk of harm.

The EP Act also introduces 'Third-party civil remedies' which provides three alternate ways in which breaches of the Act can be investigated. Third-party civil remedies are orders granted by the courts and are available to a person who is harmed, or could be harmed, by another person's failure to meet their legal obligations.[21]

In order to seek a third-party civil remedy, an application must be made to the court. An application can only be made by a person whose interests are affected by a breach; or a person who has the leave of the Court to bring an application, with leave only granted if the Court is satisfied that:

- the application would be in the public interest; and
- the person had requested in writing that the EPA take enforcement or compliance action, but the EPA failed to take enforcement or compliance action within a reasonable time.

The set of remedies available are broad and outlined in Part 11.4 of the Act and include for example orders that restrain a person from engaging in specified conduct or the requirement to pay compensation to 'injured' persons.[22]

1.3.1.1 General environmental duty

The incoming GED is applicable to all businesses including the operators of WEFs. Under the GED, amongst other things it is the responsibility of a duty holder to:

- understand and assess the risks of harm from their activities to human health and the environment
- eliminate or reduce those risks, so far as reasonably practicable.

The GED states "*A person who is engaging in an activity that may give rise to risks of harm to human health or the environment from pollution or waste must minimise those risks, so far as reasonably practicable*."[23] To determine what is (or was at a particular time) reasonably practicable in relation to the minimisation of risks of harm to human health and the environment, the EP Act states (in section 6(2)) that regard must be had to the following matters:

- the likelihood of those risks eventuating
- the degree of harm that would result if those risks eventuated
- what the person concerned knows, or ought reasonably to know, about the harm or risks of harm and any ways of eliminating or reducing those risks
- the availability and suitability of ways to eliminate or reduce those risks
- the cost of eliminating or reducing those risks.

The state of knowledge assists in establishing what is reasonably practicable. State of knowledge is all the information that should be reasonably known about managing a business' risks under the GED. It includes general information that outlines an understanding of the risks a business might pose to human health and the environment, as well as steps that should be taken to eliminate and reduce those risks. EPA[24] provides guidance on industry sources of knowledge (as well as sources for government, regulators and other independent organisations) including:

- a noise protocol document (*Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues*), which is an incorporated document to the proposed EP Regulations
- technical guidance

[21] EPA, Your third-party civil remedies (2020) <https://www.epa.vic.gov.au/for-community/new-laws-community/your-third-party-civil-remedies>
[22] Section 309 of the EP Act
[23] Section 25 of the EP Act
[24] EPA, State of knowledge and industry guidance (2020) <https://www.epa.vic.gov.au/about-epa/laws/new-laws/state-of-knowledge-and-industry-guidance>

- documents showing how to perform activities safely
- manuals
- safety data, instructions and labels
- training on equipment use
- contracts between parties
- guidance from industry bodies.

A key component of current state of knowledge for WEF noise in Victoria is the NZ Standard, discussed below.

Contravention of the GED is an indictable offence and punishable by 2,000 penalty units in the case of an individual (or 10,000 penalty units in the case of a body corporate). Similarly, section 27 says aggravated breach of the GED is an indictable offence and punishable by 4,000 penalty units and/or 5 years imprisonment (or 20,000 penalty units for a body corporate). An aggravated breach of the GED occurs when the GED is intentionally or recklessly contravened resulting (or likely to result) in material harm to human health or the environment, and the person knew (or should have known) the contravention would (or was likely to) result in material harm.[25]

1.3.1.2 Unreasonable noise

Part 7.6 of the EP Act prohibits the emission of unreasonable noise. Section 166 (unreasonable noise) states:

> *"A person must not, from a place or premises that are not residential premises — (a) emit an unreasonable noise; or (b) permit an unreasonable noise to be emitted."*[26]

Unreasonable noise is defined by the EP Act in a general way as noise that is unreasonable having regard to:

- its volume
- intensity or duration
- its character
- the time
- place and other circumstances in which it is emitted
- how often it is emitted
- or any prescribed factors
- or it is prescribed to be unreasonable noise.[27]

The unreasonable noise provisions are applicable to all businesses including WEFs. Unreasonable noise (for industrial premises, residential premises and entertainment venues) is prescribed under the EP Regulations, which are expected to commence on 1 July 2021. Part 5.3 (Noise) of the EP Regulations contain a number of regulations that. refer to noise pollution. This includes Regulation 118 and Regulation 121 respectively prescribe unreasonable noise emitted from CIT premises.[28] However, because wind turbines require wind to operate, a different noise measurement methodology is required. For this reason, Regulation 117 states that noise from wind turbines at WEFs is not to be taken into account when assessing unreasonable noise at CIT premises.[29] The noise methodology prescribed for CIT premises and detailed in the Noise Protocol is not applicable to wind turbine noise, but it is applicable to any ancillary infrastructure at the WEF.

The EP Act 2017 (as amended) also establishes an obligation not to emit unreasonable noise, which commences on 1 July 2021. If a risk of harm is deemed to exist a remedial notice under

[25] Section 27 of the EP Amendment Act
[26] Section 166 of the EP Amendment Act
[27] Section 6(9) of the EP Amendment Act
[28] Regulations 118 and 121 of the EP Regulations
[29] Regulation 117 of the EP Regulations. Note: any other noise emitted from a WEF that is not emitted from a wind turbine is still subject to the unreasonable noise provisions

Chapter 10 of the EP Act 2017 could be served (several notices may apply).[30] Failure to comply with that notice would leave the business open to the penalties set out in Part 10.8 of the EP Act.

1.3.2 Planning and Environment Act 1987 and Victoria Planning Provisions

The *Planning and Environment Act 1987* (P&E Act) establishes a framework for planning the use, development and protection of land in Victoria in the present and long-term interests of all Victorians.[31] The Victoria Planning Provisions (VPPs) is a legal document, prepared and approved under the P&E Act as an instrument of planning control setting out the way in which land may be used.[32]

Clause 52.32 of VPPs outlines the planning provisions applicable to Victoria's WEFs. Its purpose is "*To facilitate the establishment and expansion of wind energy facilities, in appropriate locations, with minimal impact on the amenity of the area*." It applies to land used (or land proposed to be used and developed) for WEFs. As such, WEFs can only be developed in certain locations (for example, they cannot be developed in national parks)[33] and written permission needs to be obtained from landholders where any turbine is proposed to be located within 1 kilometre of an existing dwelling.

A permit is required to use and develop land for WEFs. To obtain a permit, an application must be made to the Minister for Planning. Although the Minister considers other aspects of the development proposal,[34] the application must contain a range of information specific to the site (including candidate turbine selection), the proposed structure(s), its context and likelihood of any noise impacts.[35]

As noted above, there are 29 operating WEFs in Victoria. Of these, 16 WEFs have a planning permit that reference the 1998 version of the NZ Standard. Four WEFs have an incorporated document that reference the 1998 Standard.

For permits issued for WEFs since October 2018, a new system was introduced including requirements for a pre-construction and post-construction noise assessment to be undertaken. One WEF has a planning permit which does not refer to either the 1998 or 2010 NZ Standard. As presented in Box 1 below the current standard planning permit conditions in the DEWLP *Development of Wind Energy Facilities in Victoria Policy and Planning Guidelines* (DELWP, March 2019) also include requirements that the proponent must prepare and submit a noise management plan as a condition of the planning permit prior to development.[36] The noise management plan must include detail of:

- a post-construction noise assessment report prepared in accordance with the NZ Standard[37] demonstrating whether the wind energy facility complies with the noise limits determined in accordance with the NZ Standard[38]
- an environmental audit report which accompanies each post-construction noise assessment report to verify that the assessment has been conducted in accordance with the NZ

[30] See for example Information Gathering Notice (s.255); Notice to Investigate (s.273); Directions (s.260) Improvement Notice (s.271). or Prohibition Notice (s.272).
[31] DELWP Using Victoria's planning system (2015) <https://www.planning.vic.gov.au/__data/assets/pdf_file/0017/95012/Using-Victorias-Planning-System-2015.pdf>
[32] DELWP. (n.d.). Victorian Planning Provisions 52.32 Wind energy facility. <https://planning-schemes.delwp.vic.gov.au/schemes/vpps/52_32.pdf>
[33] Clause 52.32-2 of Victoria Planning Provisions
[34] For example, the proposal's impact on the surrounding area in terms of noise, blade glint, shadow flicker or electromagnetic interference (See Clause 52.32-6 of Victoria Planning Provisions for more detail)
[35] Clause 52.32-4 of Victoria Planning Provisions
[36] DELWP. (2019, March). Development of Wind Energy Facilities in Victoria Policy and Planning Guidelines <https://www.planning.vic.gov.au/__data/assets/pdf_file/0024/95361/Development-of-Wind-Energy-Facilities-Mar2019.pdf.>
[37] According to the NZ Standard (2010) the base noise limits are defined as 40 dB LA90 or the background noise level LA90 + 5dB, whichever is higher.
[38] If the wind energy facility is constructed in stages, additional post-construction noise assessment reports for each stage must be submitted.

Standard.[39] EPA maintains a register of environmental auditors that can verify noise assessments

- noise investigation reporting protocols detailing procedures for complaints received in accordance with the endorsed Complaints Investigation and Response Plan, or for potential non-compliance[40]
- a noise remediation plan detailing how risks of non-compliance will be managed and procedures for when non-compliance with the NZ Standard is found to have occurred.[40]

Box 1: Standard Planning Permit Conditions

Noise

9. In conditions 10-20: 'the Standard' means New Zealand Standard 6808:2010, Acoustics – Wind Farm Noise sensitive location means a location that meets the definition in the Standard and that was present at [insert date of application].

Performance requirement

10. Subject to Condition 11, at any wind speed, noise emissions from the operation of the wind energy facility, when measured at noise sensitive locations, must comply with the limits specified in the Standard.

11. The limits specified in the Standard do not apply if an agreement has been entered into with the relevant landowner waiving the limits at a noise sensitive location. The agreement must be in a form that applies to the land comprising the noise sensitive location for the life of the wind energy facility, to the satisfaction of the responsible authority, and be provided to the responsible authority upon request.

Pre-Construction Noise Assessment

12. Before development starts, a Pre-Construction Noise Assessment based on the final turbine layout and turbine model to be installed must be undertaken and the results submitted to the responsible authority.

The Pre-Construction Noise Assessment must be prepared in accordance with the Standard and must demonstrate that the facility will comply with the performance requirements specified of the Standard to the satisfaction of the responsible authority.

13. The Pre-Construction Noise Assessment Report must be prepared in accordance with the Standard and must demonstrate that the facility will comply with the performance requirements specified by the Standard, to the satisfaction of the responsible authority.

14. The Pre-Construction Noise Assessment Report required by this permit must be accompanied by an environmental audit report prepared under Part IXD, Section 53V of the Environment Protection Act 1970 from an environmental auditor appointed under Part IXD of the Environment Protection Act 1970. The report must verify that the acoustic assessment undertaken for the purpose of the Pre-Construction Noise Assessment has been conducted in accordance with the Standard and meets the requirements of this permit.

Post-Construction Noise Assessment

15. Within 12 months of the first turbine commencing operation, a Post-Construction Noise Assessment prepared in accordance with the Standard and demonstrating whether the wind energy facility complies with the performance requirements of the Standard, must be submitted to the responsible authority. If the wind energy facility is constructed in stages, further Post- Construction Noise Assessment Reports prepared in accordance with this condition must be submitted to the responsible authority annually from the date of the first report being submitted until one year after the final turbine commences operation.

[39] Clause 52.32-5 of Victoria Planning Provisions

[40] DELWP. Development of Wind Energy Facilities in Victoria Policy and Planning Guidelines (2019, March) <https://www.planning.vic.gov.au/__data/assets/pdf_file/0024/95361/Development-of-Wind-Energy-Facilities-Mar2019.pdf.>

16. The Post-Construction Noise Assessment Report(s) required under Condition 14 must be accompanied by an environmental audit report prepared under Part IXD, Section 53V of the Environment Protection Act 1970 from an environmental auditor appointed under Part IXD of the Environment Protection Act 1970. The report must verify that the acoustic assessment undertaken for the purpose of the post-construction Noise Assessment has been conducted in accordance with the Standard and meets the requirements of this permit.

Noise management plan

17. Before development starts, a Noise Management Plan must be submitted to, approved and endorsed by the responsible authority. When endorsed the Noise Management Plan will form part of this permit.

The Noise Management Plan must specify details of:

Post-Construction Noise Assessment Reports: detailing how these will be prepared in accordance with the Standard, to demonstrate whether or not the wind energy facility complies with the performance requirements specified in the Standard.

Noise Investigation Reports: detailing procedures for when complaints are received in accordance with the endorsed Complaints Investigation and Response Plan required by this permit or when potential non-compliance with the performance requirements in the Standard is otherwise detected.

Noise Remediation Plans: detailing procedures for when non-compliance with the performance requirements in the Standard is found to have occurred.

The requirements for each of the documents referred to in condition 16 a, 16 b and 16 c, including what matters they must address, and when they must be submitted to the responsible authority.

18. The noise management plan must be accompanied by a peer review from an environmental auditor appointed under Part IXD of the Environment Protection Act 1970. The peer review report must verify that the noise management plan meets the requirements of the Standard and this permit.

19. The endorsed Noise Management Plan: must be implemented to the satisfaction of the responsible authority; and must not be altered or modified without the written consent of the responsible authority.

Peer review of reports

20. If requested by the responsible authority, the noise investigation reports required under Condition 16 b must be accompanied by a peer review from an environmental auditor appointed under Part IXD of the Environment Protection Act 1970 verifying that the report or plan meets the Standard and the requirements of this permit.

21. The environmental auditor or peer reviewer must be independent of the author of the report being reviewed.

1.3.3 New Zealand Standard *NZS6808:2010*

The purpose of *NZS6808:2010* (the NZ Standard (2010)) is to provide suitable methods for prediction, measurement and assessment of sound from WEFs. Methods are applied for pre-construction wind assessments and may be applied for confirming compliance with noise limits or in investigations and assessments of noise complaints. The NZ Standard has been adopted as a comprehensive and fit-for-purpose standard in the Victorian context.[41]

[41] Similar to the NZ standard, an Australian Standard exists (AS 4959-2010 Acoustics – Measurement, prediction and assessment of noised from wind turbine generators) that provides a methodology for assessing the impact of noise from wind turbine generators and guidelines for setting noise limits. The Australian Standard, not widely used in Australia, does not specify either the minimum noise level (40 dB in the NZ

The noise limits in the NZ Standard (1998) and NZ Standard (2010) are based on the World Health Organisation (WHO) Guidelines for Community Noise (1999). The Foreword to the NZ Standard (2010) states the noise limits *"Are considered reasonable for protecting sleep and amenity from wind farm sound at noise sensitive locations"*.[42]

The 2010 version of the NZ Standard superseded the 1998 version following a technical review that introduced several enhancements. This review concluded that the basic methodology of the 1998 version was robust and retained the recommended base noise limits of that standard. The difference in the 2010 version was to change the noise descriptor from L_{A95} to L_{A90} — which better prevents sound measurements being contaminated by extraneous sounds only present for a small part of the time — and introduced a 'High Amenity Area' consideration which allowed for more stringent limits to be applied under specific circumstances.[43]

The NZ Standard (2010) requires that sound associated with all wind turbine components (e.g. blades and gearbox) and any ancillary equipment in the immediate vicinity of the WEF be measured, but excludes sound from all on-site sources other than the wind turbines. Wind turbine noise levels are to be determined by measurements in accordance with the NZ Standard. These measurements include both background noise levels as well as contributions from operating turbines[44], with the turbine contribution determined by a method of logarithmic subtraction that is specified in the NZ Standard.

The NZ Standard (2010) also outlines noise limits (consistent with WHO guidelines) against which sound measurements are compared (Table 1-2). It states that at any wind speed, WEF sound level $L_{A90(10\,min)}$[45] should not exceed the background sound level by more than 5 decibels (dB), or a level of 40 dB $L_{A90(10\,min)}$,[46] whichever is greatest.

Victorian WEFs that received a planning permit prior to the introduction of the 2010 version of the NZ Standard generally refer to the 1998 NZ Standard although there are some permits that include site-specific noise conditions.[47]

Table 1-2: NZS6808:2010 noise limits

Background sound level	Noise limit $L_{A90(10\,min)}$	High amenity noise limit $L_{A90(10\,min)}$
>35 dB	Background + 5 dB	Background + 5 dB
30-35 dB	40 dB	Background + 5 dB
<30 dB	40 dB	35 dB

Note: The 1998 version of the NZ Standard includes the same base noise limits although it applies an L_{A95} metric.
Source: Standards New Zealand[48]

Standard) or the background exceedance (5 dB in the NZ Standard). The Australian Standard, also does not prescribe a specific penalty to be applied in a situation where a Special Audible Characteristic (SAC) is determined to be present in the wind turbine noise, unlike the NZ standard.

[42] Standards New Zealand. New Zealand Standard Acoustics – Wind farm noise NZS6808:2010

[43] According to the NZ standard the circumstances where a high amenity noise limit should be considered is "where a plan promotes a higher degree of protection of amenity related to the sound environment of a particular area". High amenity areas have been determined by EPA to include only those land use planning zones that are predominantly for residential purposes.

[44] Typically spanning a range of wind speed operating conditions from cut-in to 95% rated power.

[45] $L_{90(10\,min)}$ is the sound level which is equalled or exceeded for 90% of the measurement time of 10 minutes. Where a frequency weighting has been used it should be indicated in the symbol, for example $L_{A90(10\,min)}$

[46] Measured outside because sound attenuates or become quieter as it travels through walls and windows

[47] One WEF planning permit does not refer to either the 1998 or 2010 versions of the NZ Standard.

[48] Standards New Zealand. New Zealand Standard Acoustics – Wind farm noise NZS6808:2010

1.3.4 Public Health and Wellbeing Act 2008

Part 6 Division 1 of the *Public Health and Wellbeing Act 2008* (the PHW Act) deals with nuisances which are liable to be, dangerous to health or offensive.[49] It includes nuisances arising from noise. Section 61 states that "*A person must not (a) cause a nuisance; or (b) knowingly allow or suffer a nuisance to exist on, or emanate from, any land owned or occupied by that person*."[50]

Should a person believe that a nuisance exists, they may notify the Council in whose municipal area the alleged nuisance exists.[51] Section 60 states that "*A Council has a duty to remedy as far as is reasonably possible all nuisances existing in its municipal district*." As such, the Council must investigate the nuisance,[52,53] and if a nuisance does exist the Council must either:

- exercise the powers conferred by that section (if section 66 applies)
- issue an improvement or prohibition notice[54]
- bring proceedings under section 219(2) for an offence against the PHW Act
- advise the person notifying the Council of the nuisance of any available methods for settling the matter privately, if the Council believes that the matter is better settled privately.[55]

Consistent with the objective that EPA become the primary regulator of noise in Victoria, an amendment to the Public Health and Wellbeing Act 2008 (PHW Act) has been tabled in Parliament.[56] This Bill, among other things, excludes noise emissions from wind turbines from the scope of the nuisance provision to reflect the fact that the nuisance provisions were not made with the scale of the wind industry in mind, nor the technical complexity of wind turbine noise and emissions. These changes are not considered in this RIS.

1.3.5 The Climate Change Act 2017

One of the purposes of the *Climate Change Act 2017* is to set a long-term greenhouse gas emissions reduction target. Section 17 states authorities making certain decisions or taking certain actions, must have regard to the potential impacts of climate change, the potential contribution to the State's greenhouse gas emissions and any guidelines issued by the Minister.[57] As such, section 17 requires that EPA consider these matters in its decision-making.

Application of section 17 means that the Government is to have regard to climate change when making a recommendation to:

- make, amend or revoke regulations made under the EP Act 2017 (as amended) and
- make, amend or revoke an environmental reference standard.

1.4 Regulatory framework in other jurisdictions

Most other jurisdictions in Australia have similar frameworks for regulating WEF turbine noise as Victoria. The legislative frameworks in these regions generally include both environment protection and development and planning legislation. WEFs in South Australia for example are governed by the State's:

- Environment Protection Act 1993
- Environment Protection (Noise) Policy 2007, and

[49] Section 58 of the PHW Act
[50] Section 61 of the PHW Act
[51] Section 62(1) of the PHW Act
[52] Section 62(3) of the PHW Act
[53] A Council may investigate a nuisance which exists outside its municipal district if that nuisance affects the Council's own municipal district according to section 65.
[54] Section 197(2) of the PHW Act notes that once a prohibition notice has been issued regarding a nuisance, the Council may make a complaint to the Magistrates Court if (a) the person on whom the prohibition notice is served does not comply with it; or (b) in the opinion of the Council the nuisance to which the prohibition notice applies, although abated, is likely to recur.
[55] Section 62(3) and 63(4) of the PHW Act
[56] Victorian Legislation, Public Health and Wellbeing Amendment Bill 2020 (2020) <https://www.legislation.vic.gov.au/bills/public-health-and-wellbeing-amendment-bill-2020>
[57] Section 17(1) and Section 17(2) of the Climate Change Act 2017

– Development Plan contains the planning controls.

Reflecting the individual regulatory frameworks and the specific context of that region, each jurisdiction has differing acceptable noise limits and measurement procedures. In Tasmania for example, noise limits are set in the Tasmanian Environment Protection Policy (Noise) 2009, while noise limits and procedures for noise assessment in South Australia are specified in South Australian EPA guidelines.[58]

Despite the variation, the approaches align with recognised international standards and are relatively consistent across Australia with base noise limits for example ranging between 35 dB (WA, NSW and Qld – night) to 40 dB (Victoria and Tasmania). SA adopts a rural base noise limit of 35 dB and a non-rural base noise limit of 40 dB with Queensland also adopting a day base limit of 37 dB.

Across other jurisdictions the enforcement of compliance with standards and permit conditions relies upon a mix of WEF operator monitoring and reporting requirements as well as receiving complaints or alleged breaches of permit conditions with the complaint pathway specific to individual jurisdictions.

A summary of the Victorian regulatory framework relating to wind turbine noise compared to other jurisdictions is provided in Appendix B.

1.5 RIS process

EPA and DELWP have engaged Deloitte Access Economics to prepare this RIS in accordance with Better Regulation Victoria's (BRV's) *Victorian Guide to Regulation,*[59] the *Subordinate Legislation Act 1994* and its guidelines.[60] The rigorous assessment of regulatory and non-regulatory proposals within a RIS ensures that regulation best serves the Victorian community.

1.5.1 This RIS

The key purpose of this RIS is to examine the impact of different options for ensuring noise produced by WEFs complies with relevant legislation and meets acceptable community standards. This RIS follows the following steps:

4. identification of the problem
5. identification of the options
6. analysis of feasible options
7. implementation and evaluation of preferred option
8. stakeholder consultations (summarised in Appendix A)
9. costs, benefit and other impact assessment
10. implementation and evaluation.

1.5.2 Public comment

The proposed EP Amendment Regulations (which will give effect to the preferred option in this RIS) and this RIS will be released for 28 days to provide businesses, members of the public and other interested parties the opportunity to provide feedback on these items.

The process for public commentary is outlined in the Foreword to this report. The proposed EP Amendment Regulations and RIS are available on the Engage Victoria website at https://engage.vic.gov.au/.

The proposed EP Amendment Regulations will amend the broader proposed *Environment Protection Regulations 2021* —which are made under the EP Act and expected to commence on 1 July 2021 — can be found at: https://engage.vic.gov.au/new-environmental-laws/subordinate-

[58] South Australia EPA, Wind Farms (2020) <https://www.epa.sa.gov.au/environmental_info/noise/wind_farms>
[59] Commissioner for Better Regulation Victorian Guide to Regulation: A handbook for policy-makers in Victoria (2016) <http://www.betterregulation.vic.gov.au/Guidance-and-Resources>
[60] Victorian Government How to prepare regulatory impact assessments (2020) <https://www.vic.gov.au/how-to-prepare-regulatory-impact-assessments>

legislation and further information on the EP Act may be found at: https://www.epa.vic.gov.au/about-epa/laws/new-laws.

1.5.3 Addressing public comment

EPA and DELWP will consider all submissions received during the period of public review. EPA and DELWP will prepare a formal Response to Public Comment summarising the submissions received and its response. Submissions to the review, and the formal Response to Public Comment document, will also be made available on the Engage Victoria website referred to above.

1.5.4 Finalising the Regulations (if any)

The draft regulations will be finalised reflecting any changes that may arise from the public comment period.

2 Problem analysis

This chapter outlines the nature and the extent of the problem by setting out the nature of WEF turbine noise as a hazard, its risk to human health and the extent to which it is controlled by the primary legislation.

2.1 WEF noise hazards and risks

Noise is ubiquitous and arises in complex land use settings through both natural and non-natural means. This complex character means that noise, unlike some other public and environmental health harms, is inevitable because of human activity.

Noise is commonly defined as any disturbing or unwanted sound.[61] Individuals have different sensitivity to sound and their subjective experience is based on a range of factors, including:

- the perceptiveness of the person's hearing
- their broader environment or context (including background noise)
- their tolerance or acceptance of sound in their environment.[62]

Sound is a complex phenomenon with various characteristics that, for some people, might be perceived as pollution, including its volume, intensity or duration, character or how often it is emitted.

There has been long-running community concern about the noise impact of WEFs. The Senate Select Committee on Wind Turbines (2015) took evidence from a number of people who reside in proximity to wind turbines who have complained of a range of adverse health impacts. These include tinnitus, raised blood pressure, heart palpitations, tachycardia, stress, anxiety, vertigo, dizziness, nausea, blurred vision, fatigue, cognitive dysfunction, headaches, nausea, ear pressure, exacerbated migraine disorders, motion sensitivity, inner ear damage and sleep deprivation.[63]

While prolonged noise exposure can pose a risk to human health, scientific literature across a number of jurisdictions has consistently found that risks to human health from wind turbine noise emissions is low compared to noise emitted from other commercial, industrial and trade (CIT) premises.

The Department of Health for example, concluded in 2013 there was no evidence that sound which is at inaudible levels can have a physiological effect on the human body.[64] Similarly, the National Health and Medical Research Council (NHMRC) released a comprehensive assessment of the existing evidence of the impact of WEF noise on human health in 2015.[65] In it, the NHMRC concluded:

> "*…That there is no consistent evidence that wind farms cause adverse health effects in humans*."

[61] ScienceDirect, Noise Pollution (n.d.) <https://www.sciencedirect.com/topics/engineering/noise-pollution>
[62] EPA, Regulatory Impact Statement: proposed Environment Protection (Residential Noise) Regulations 2018(2018), page 13.
[63] Parliament of Australia, Select Committee on Wind Turbines <https://www.aph.gov.au/select_windturbines>
[64] Department of Health, Wind farms, sound and health: Technical Information (2013) <https://www.agl.com.au/-/media/aglmedia/documents/about-agl/how-we-source-energy/coopers-gap-wind-farm/4-wind-farms-sound-and-health-technical-information.pdf?la=en&hash=AB07E623E2279486B72983B42D0577E4>

NHMRC also found:

> "*…No direct evidence that exposure to wind farm noise affects physical or mental health… there is unlikely to be any significant effects on physical or mental health at distances greater than 1,500 m from wind farms*."

Based on its broader findings, NHRMC recommended further studies to improve the quality of evidence, particularly with respect to WEF noise and annoyance the research of which was found to be consistent but of poor quality. Research on WEFs and sleep disturbance was found to be less consistent (than annoyance) and of similarly poor quality, while proximity to WEFs and poorer quality of life was less consistent and of poor quality.

These findings broadly mirrored the position adopted by the Australian Medical Association[66] (AMA) which stated:

> "*The available Australian and international evidence does not support the view that the infrasound or low frequency sound generated by wind farms, as they are currently regulated in Australia, causes adverse health effects on populations residing in their vicinity. The infrasound and low frequency sound generated by modern wind farms in Australia is well below the level where known health effects occur, and there is no accepted physiological mechanism where sub-audible infrasound could cause health effects*."

In 2020 Flinders' University[67] studied wind turbine vibration characteristics and evaluated its effects on sleep. Vibrations were measured on bed frames, floors and windows within dwellings located between 2.4 and 5km from WEFs in South Australia. It found:

> *"…Measured vibration levels on the bed frame and floor were too low to cause discomfort."*

The University of NSW is currently undertaking a study funded by the NHMRC about whether WEFs affect the health of people who live close to WEFs. Results of this study are not yet available.[68]

2.1.1 Established noise limits are based on the risk of harm

Guidelines and standards currently utilised to regulate WEF turbine noise in Australia have been established with consideration of the evidence of the risk to human health.

A review of scientific evidence conducted by the World Health Organisation (WHO)[69] on the effects of wind turbine noise found no evidence on ischaemic heart disease, hypertension, permanent hearing impairment and reading skills and oral comprehension in children. Based on these findings, WHO recommended an average level L_{den} across the 24-hour day that is conditional due to the low quality of supporting evidence. The quality of evidence of night-time exposure to wind turbine noise was too low to support a recommendation.

As outlined in Section 1.3.3, the noise limits in the NZ Standard (1998) and NZ Standard (2010) are based on the WHO Guidelines for Community Noise (1999) that specify a noise limit of 30 dB LAeq inside bedrooms to prevent sleep disturbance. This equates to the noise limit in the NZ Standard of 40 dB LA_{90}(10 min) measured outside, as sound attenuates (or become quieter) as it travels through walls and windows.

2.2 Summary of the problem

As discussed in Chapter 1 the existing regulatory framework in relation to WEF noise will change in July 2021 as relevant provisions in the EP Act and the EP Regulations come into effect. This

[67] Nguyen, D., Hansen, K., and Zajamsek, B.. Human perception of wind farm vibration (2020) <https://journals.sagepub.com/doi/pdf/10.1177/1461348419837115>
[68] Woolcock Institute of Medical Research. (2020). Do wind farms cause health effects? <https://www.windfarmstudy.com/?/home>
[69] WHO Environmental Noise Guidelines for the European Region (2018) <https://www.euro.who.int/en/publications/abstracts/environmental-noise-guidelines-for-the-european-region-2018>

incoming legislation establishes the GED and unreasonable noise provisions and will be supported by the NZ Standard (1998 and 2010 versions as relevant) that prescribe the methodology for measuring noise levels and establishing noise limits for WEFs. The NZ Standards, therefore, are a primary element of the state of knowledge for the industry.[70]

The GED and unreasonable noise provisions are general in nature and (similar to other CIT noise sources) do not explicitly reference turbine noise from WEFs. The GED requires all duty holders (including WEF operators) to prevent or minimise the risks of harm to human health and the environment so far as reasonably practicable. The prediction, measurement and assessment of wind turbine noise is technically more complex than noise emissions from other CIT premises. This complexity arises for reasons including:

- wind turbines operate in a variety of wind conditions[71] meaning the turbine-only component of the total noise level cannot be determined directly from similar measurements as that for other CIT premises (which are measured only in low wind conditions)
- the NZ Standard requires the use of regression analysis techniques to identify the WEF turbine-only contribution to the overall noise levels
- there is a need to determine whether 'Special Audible Characteristics' are present in turbine noise emissions, including tonality, amplitude modulation, and impulsive sound.

The unique complexity of WEF turbine noise contributes to the residual risk remaining under the incoming legislation. The problem of these residual risks (of the Base Case) are the focus of this RIS and include:

- **Community confidence** and the inherent uncertainties associated with the complex technical methods for determining appropriate operating performance for WEFs
- **Industry certainty** and the need for regulatory effectiveness and regulatory clarity to ensure transparency of compliance requirements
- **Complexity of noise measurement methods**. In addition to the factors outlined above, complex land-use interactions involving high amenity area noise limit penalties, and cumulative noise from adjacent WEFs increase the level of complexity that needs to be considered.

Ultimately this unique complexity, lack of confidence and lack of certainty could limit the effectiveness of the incoming legislation, impose unnecessary costs on stakeholders and potentially limit future growth of the wind energy sector in Victoria. Changes to the regulatory environment also present an opportunity to improve **consistency** across the Victorian WEF industry, further supporting industry certainty and community confidence. At present, several operating WEFs operate with planning approval permits that include a range of different standards and planning permit noise conditions that are not consistent.

The effect of the incoming EP Regulations on key stakeholder groups is outlined in the following sections.

2.2.1 Low community confidence resulting in complaints and disputes

Community confidence in the regulation of windfarm noise is an important issue for the sector. The National Wind Farm Commissioner (NWFC) has made repeated recommendations for greater stakeholder consultation, to support transparency and confidence.[72] This includes for example:

> *"The opportunity exists for a clearer framework of standard setting and enforcement of standards, whereby there is independence in the setting and enforcement of standards from the planning function. Such independence*

[70] The New Zealand Standards are important elements of the state of knowledge. These standards have been interpreted and applied by VCAT, Planning Panels and Councils to a number of existing planning permit conditions. The approved planning permit conditions for existing WEFs are also part of the state of knowledge.
[71] Typically from wind speeds around 2-3 metres per second to around 15 meters per second
[72] National Wind Farm Commissioner, Presentation to the Moyne Shire Council (2020) <https://www.nwfc.gov.au/sites/default/files/nwfc-moyne-shire-presentation.pdf>

allows for increased community confidence in the objectivity of setting standards and assessing compliance."

The number of complaints made in relation to WEFs is an indicator of the need to improve community confidence. Available data from the NWFC[73] indicates that Victorian WEF complaints:

- account for the majority (56% of the total between 2016 and 2019) of the national total - likely explained by the number of WEFs in the state and Victoria's higher population density
- are predominantly related to planned (75% of the total), rather than operational WEFs (25%)
- have been decreasing between 2016 and 2019, falling from 242 to 108,
- have seen fewer noise or health-related complaints.

Data provided by EPA also suggests that complaints are often concentrated on a few specific WEFs. Between 2002 and 2012 EPA received 20 complaints related to six operational WEFs.

In addition to complaints, lack of community confidence in the regulatory regime for WEF noise can also lead to costs borne out in terms of legal disputes. This includes for example the Bald Hills dispute outlined in Box 2 as well as disputes raised with the Supreme Court of Victoria involving Westwind Energy in 2019 (which is now subject to special leave to appeal to the High Court) and The Sisters Wind Farm in 2010.[74,75]

Box 2: Bald Hills WEF and local community dispute

Bald Hills Wind Farm Pty Ltd owns and operates a WEF at Tarwin Lower, in the Victorian municipality of South Gippsland. Its 52 turbines which have been operating since May 2015 generate up to 380,000 MWh p.a. or 4.3% of Victoria's annual renewable energy.

As a condition of its planning permit, an acoustic consulting firm was engaged to conduct an independent noise assessment of the Bald Hills WEF. Its report issued in December 2016 found that the WEF was not fully compliant with the night time noise limits set in its planning permit. Bald Hills implemented a strategy to reduce night time noise in non-compliant areas before a subsequent report was issued in May 2017 stating compliance had been achieved.

But in 2016, a number of residents who lived nearby (the complainants) made a complaint to the South Gippsland Shire Council about noise nuisance impacts. The complaint made reference to the nuisance provisions in the PHW Act and sought an investigation by the Council into a potential breach of this Act. The dwellings of the complainants were all located in areas declared fully compliant by the first noise assessment report mentioned above.

In February 2017, the Council concluded that there was no nuisance in relation to the Bald Hills WEF. Following further legal action Council agreed to undertake a further assessment to consider whether a nuisance existed under the PHW Act.

In February 2018, a separate food safety and risk management consulting firm was engaged by the Council with a different scope to investigate the complaint. They found noise from the WEF was clearly audible from the complainants' residences but that there were reports demonstrating that the WEF was complying with noise limits on its permit. The report concluded that because the noise was frequently audible within the residences it was considered a nuisance.

[73] Ibid.
[74] Supreme Court of Victoria, Cumming & Ors v Minister for Planning & Anor [2019] VSC 811 (16 December 2019) (2019) <http://www.austlii.edu.au/cgi-bin/viewdoc/au/cases/vic/VSC/2019/811.html?context=1;query=%22Wind%20Farm%22%20%20noise;mask_path=au/cases/vic/VSC>
[75] Supreme Court of Victoria, The Sisters Wind Farm Pty Ltd v Moyne Shire Council & Ors [2010] VSC 607 (17 December 2010) (2010) <http://www.austlii.edu.au/cgi-bin/viewdoc/au/cases/vic/VSC/2010/607.html?context=1;query=%22Wind%20Farm%22%20%20noise;mask_path=au/cases/vic/VSC>

Following a second investigation in February 2019, Council made a decision (the March Resolution) stating that it believed a nuisance existed, but that it existed only intermittently. Based on this it advised that the matter was best settled privately.

In June 2020, Bald Hills approached the Supreme Court of Victoria[76] asking the Court to quash the Council's March Resolution or declare it invalid. Bald Hills argued the Resolution had an impact on its reputation, could affect its accreditation under the Renewable Energy (Electricity) Act 2000 and may impact its ability to obtain finance. Council however, defended its Resolution.

The Court found that the Council had regard to all mandatory considerations when it passed the Resolution and that Council had regard to any material put to it. It found that the Council fulfilled its legal obligations in investigating the alleged nuisance and that it was reasonable[77] for the Council to find a nuisance. The Court did not quash the March Resolution but it acknowledged the Resolution had an impact on Bald Hills' reputation.

Source: Supreme Court of Victoria[78]

2.2.2 Uncertainty and lack of clarity for businesses

In the context of the complexity associated with WEF turbine noise noted above and the lack of clarity and certainty regarding compliance with the unreasonable noise provisions, WEF operators may need to spend time and resources as well as engaging technical consultants or legal professionals to assist with compliance matters.

Another possible consequence is that businesses may, over time, implement additional measures above and beyond what may be reasonably practicable, in order to avoid the costs associated with managing and responding to complaints or to anticipate potential compliance actions by the EPA or legal action by community. These may include significant and frequent testing and monitoring, infrastructure expenditure on noise reduction beyond that required under the NZ standard, turbine adjustments beyond what would be required to prevent unreasonable noise.

As articulated above, a lack of clarity on regulatory expectations for WEF noise in Victoria has contributed to recent escalations of community concerns via legal actions. The addition of new avenues for complaint and action through the EP Act , without greater clarity on regulatory frameworks, is likely to enable such a trend to continue, incurring costs to industry in responding to those actions and undertaking any remediation or abatement.

The cost of abatement of noise emissions in such circumstances can be significant and may not be proportionate or commensurate with the risks.

This lack of clarity and complexity is compounded by a lack of consistency in the framework that regulates Victorian WEFs. Different regulatory controls exist for newer and older WEFs in Victoria under individual planning permits. This variation is illustrated below in Table 2-1 which summarises the different standards referenced in WEF planning permits for currently operating WEFs in Victoria. Not only are there a significant number of WEFs with the 1998 or 2010 version of the NZ standard referenced in their planning permits, there are also single instances in which permits have introduced a variation of these standards or have not explicitly referenced either Standard.

Table 2-1: Summary of standards referenced in planning permits for currently operating WEF

Referenced Standard	Number of WEFs
NZS6808:1998	20
NZS6808:2010	8
No specific standard referenced	1

Source: Data provided by EPA

These problems are also anticipated to effect investor confidence with demonstrated effects in diverting or moderating investments, and the potential for firms to leave the industry. A lack of community confidence (which can drive opposition to development or disputes during operation) has seen previous investments abandoned, including for example the Jupiter wind farm in NSW.[79] While regulatory risk is cited as a primary driver of investor confidence in renewables from industry.[80]

Ultimately reduced investment in wind energy in Victoria, could impact the state's ability to meet its legislated renewable energy targets, in addition to limiting the sector's contribution to Victorian employment and economic growth.

2.2.3 Uncertainty and lack of clarity for government

Uncertainty on the part of duty holders may also result in additional costs for government by generating more work requiring greater time and resources from EPA to effectively administer the regulatory framework. EPA might also face more costly investigations and complaints management if it does not have a clear and certain framework to enforce.

This is highlighted under the existing regulatory arrangements where the general nature of the nuisance noise provisions and the technically complex nature of WEF noise measurement and assessment have in some cases led to protracted disputes. Box 2 above describes the recent dispute between the Bald Hills WEF and members of the local community as the most widely known example of a nuisance complaint made to a council. This shows that lack of clarity and certainty around noise provisions can impose significant costs on government in addition to the costs borne by businesses and the community.

2.3 Objectives of the reforms

The objectives of the regulatory options discussed in this RIS are to reduce the costs of regulation for businesses, the community and EPA, while supporting investment in the wind energy industry and enhancing community confidence and trust in the regulatory framework for windfarm noise. These objectives are to be achieved by providing greater clarity and certainty in relation to the regulation of turbine noise from WEFs, over and above the provisions in the EP Act and the EP Regulations (the Base Case).

[79] Renew Economy, Jupiter wind farm plans abandoned in face of community opposition (2018) <https://reneweconomy.com.au/jupiter-wind-farm-plans-abandoned-face-community-opposition-87095/>
[80] Clean Energy Council, Clean Energy Outlook – Confidence Index <https://www.cleanenergycouncil.org.au/resources/resources-hub/clean-energy-outlook-confidence-index>

3 Options

This chapter outlines the feasible set of options considered in this RIS, an explanation of how feasible options were selected, and why other options were considered infeasible.

3.1 Options development

As part of the RIS process, it is necessary to consider different options that could achieve the Victorian Government's objectives. The *Subordinate Legislation Act 1994*, the *Subordinate Legislation Act Guidelines,*[81] and the *Victorian Guide to Regulation* recommend that this includes considering a range of options, including co-regulation and non-regulatory approaches, and those that reduce the burden imposed on business and/or the community.

The following process was used to identify feasible options for this RIS:

- examination of the planning framework and understanding existing VPP and planning permit controls to aid understanding of current requirements.
- interdepartmental working group confirming the ongoing technical application of the NZ Standard in the Victorian context.
- conduct of jurisdictional comparison including engagement with EPA South Australia, EPA New South Wales and NSW Planning.
- statement of the nature of the regulatory problem and confirmation via an interdepartmental Executive Officers Group
- agreement on the overarching objectives that any regulatory options need to support and confirmation via an interdepartmental Executive Officers Group and Project Control Board
- consideration of the principles of environment protection set out in the EP Act. Of particular relevance to the RIS are the following principles:
    - integration of environmental, social and economic considerations: applied in the options analysis to ensure a balanced consideration of the likely benefits and burdens associated with alternative regulatory options
    - proportionality: informed the initial assessment of the feasibility of regulatory options considered in the RIS and design of the elements of the regulatory framework
    - polluter pays: informed elements of the regulatory framework to provide a clear description of WEF operator obligations
    - evidence-based decision making: enacted through reference to the New Zealand Standards for wind turbine noise, and the current scientific knowledge relating to the potential for risks of harm associated with wind turbine noise
    - accountability: enacted through the consultation and engagement processes undertaken during the RIS that have informed the design of the proposed regulatory framework.
- agreement of criteria for option selection with confirmation by an interdepartmental Executive Officers Group and Project Control Board
- assessment of the scale of any residual risk associated with the base case within the new EP Act and EP regulations
- based on the assessment of the scale of residual risk, identification of instruments available in the new EP Act that may be applied to WEF noise regulation
- assessing instruments for viability in addressing the residual risk and alignment with the overarching outcomes and objectives of the regulatory reform

[81] Office of the Chief Parliamentary Counsel, *Subordinate Legislation Act Guidelines*.

- design considerations for the remaining viable options (direct regulation, and permission tiers) and compatibility with the EPA compliance and enforcement strategy

3.2 Feasible high-level options considered in this RIS

Three high-level options are considered as part of this RIS. Under all three options the EP Act and the EP Regulations will commence on 1 July 2021. From that date, EPA will become the primary regulator of WEF turbine noise in Victoria.

Under all options WEFs must comply with the GED and unreasonable noise provisions and include the outcomes of current consideration is being given to the role of Councils in compliance and enforcement activities, including an amendment to exclude wind turbine noise emissions from the nuisance provision of the PHW Act.

High-level options considered include:

- **Base Case**: The Base Case consists of the primary legislation (including relevant provisions of the EP Act and the EP Regulations that are expected to commence on 1 July 2021) and the policy objective of EPA as the primary regulator of WEF turbine noise.
- **Option 1** - Direct regulation: Additional industry specific direct regulation introduced as an amendment to the incoming EP Regulations that prescribes what constitutes compliance with the GED and unreasonable noise provisions.
- **Option 2** - Permits: A permissions scheme is developed alongside the incoming legislation that allows EPA to issue permits for WEFs prescribing conditions which represent reasonably practicable requirements to minimise the risk of harm.

Options 1 and 2 impose the same requirements on the WEF industry but through differing mechanisms. Each of the three options are outlined in more detail below, while options considered but not progressed are outlined in Section 3.3.

3.2.1 Base Case

As noted above, the elements of the Base Case are those that would be expected to commence on 1 July 2021 assuming no additional change to the EP regulatory framework.

These elements provide a common point of comparison for other options. Industry must therefore individually interpret (and respond to) the requirements of the GED and unreasonable noise provisions.

The Base Case includes new Environment Protection legislation (GED and unreasonable noise provisions) and elements of the existing regulatory framework (the *Planning and Environment Act 1987*, VPPs, NZ Standard) that will remain in place from July 2021.[82] It also includes the existing state of knowledge relating to wind turbine noise, including the understanding of, and arrangements organisations have in place to comply with the NZ Standard.

Under the Base Case the planning framework will continue to apply to a permit application up to and including the pre-construction noise assessment. As such it is assumed that the planning framework (including existing noise requirements, see Box 1 – points 9 – 21) would continue to be applied to new WEFs through the planning permit process. Following the pre-construction noise assessment, (and depending on changes made to the planning framework), the standard permit conditions that apply to the post construction, noise management plan, and peer review of reports will be included as requirements under the new regulatory framework under the EP Act and EP Regulations.

3.2.2 Option 1 - Regulations

In Option 1, incoming legislation would be supported by Regulations prescribing obligations to demonstrate compliance with the GED and unreasonable noise provisions. This would involve the

[82] The Base Case would include any future changes to the nuisance provisions of the PHW Act that have been outlined above that would apply equally to the Base Case and Option 1 and Option 2.

addition of a new Division to the proposed EP regulations. The new WEF Division would be included within Part 5.3 (Noise) of Chapter 5 (Environmental Protection) of the proposed EP Regulations. It would apply to all WEF operators and would impose the same conditions on industry as in Option 2 (permits), albeit through an alternative mechanism.

The Regulations will be supported by a Guideline (to be issued by EPA). As with the Base Case, EPA becomes the primary regulator of WEF turbine noise and would also include changes being progressed to the nuisance provisions of the PHW Act and the role of councils in compliance and enforcement activities.

The Regulations will prescribe what conduct, if carried out, will not amount to the emission of unreasonable noise from a WEF turbine. This would be based on the NZ Standard as it:

1. is consistent with the WHO guidelines and is considered a reasonable control for managing the risk to human health from wind farm sound at noise sensitive locations.
2. has a methodology that reflects the complexity wind turbine noise measurement,
3. is the primary existing state of knowledge

The regulations would also include noise limits at relevant noise sensitive areas that address the factors of unreasonable noise defined in the EP Act including for example its volume, intensity, and duration. It would also refer to the relevant state of knowledge for assessing or measuring unreasonable noise as defined in the Act.

Matters to be prescribed in Regulation under Option 1 are outlined in Section 3.4 (and are the same as for Option 2).

3.2.3 Option 2 – Permits

The EP Act provides EPA with a range of 'permissions' through which it can regulate noise from WEFs. Permits are one tier of those permissions; other tiers (licences and registrations) were options considered but not progressed (see Section 3.3).

The permit system would leverage section 62 of the EP Act which provides:

> "*A person is taken to perform a duty or satisfy an obligation under this Act if—*
>
> *(a) the person is the holder of a permission that provides for how the person is to perform the duty or satisfy the obligation; and*
>
> *(b) the person complies with the permission to the extent that the permission provides for performing the duty or satisfying the obligation*."

In Option 2, WEF operators would be required to apply to EPA for a permit[83] that grants permission to operate. This permit system would exist alongside the permits required under the *Planning and Environment Act 1987*. Permits could not be issued before the Environment Protection Legislation enters into force, which is expected on 1 July 2021. As such, transitional arrangements would be required to grant WEFs permission to operate as the incoming legislation enters into force.[84]

A permit application to EPA would need to include similar information to the current requirements for a planning permit application. This includes both the pre-construction and post construction noise assessment report and audit reports, as well as other requirements including the Noise Management Plan and its elements. Because planning permits remain a central component of all three options considered in this RIS, including the Base Case, the application requirements of the EPA permit application would not be an additional cost to industry.

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[83] Permits are one of three tiers of permissions alongside licences and or registrations. Licences and registrations are outlined in section 3.3, as options considered by not progressed.

[84] This is because the powers to issue or grant development licences, operating licences, pilot project licences, permits or registrations under section 43 of the EP Amendment Act only commence on 1 July 2021. Transitional arrangements would be required to give WEF operators the opportunity to comply with conditions.

Permits would be valid for up to 5 years, after which the WEF operator can apply (on multiple occasions) for a renewal. This renewal would extend the permit for a further 5-year period and would require submission of data to demonstrate ongoing compliance. WEFs would be liable to pay a permit fee.

The provisions in the permits would be the same as those prescribed in Regulations.

A permit system allows for somewhat improved flexibility over regulations in specifying pathways of compliance for WEF operators. Permit flexibility might for example allow for more stringent conditions, such as greater frequency of reporting requirements on WEFs where the high amenity area noise limit penalty is applicable, although this would lead to different requirements for different WEFs based on their location and surrounds. In addition, any such improved flexibility would likely be balanced with greater administrative oversight from the regulator. Importantly too, this flexibility is itself limited as maximum permit assessment time under the new EP Act would restrict permit assessments to a maximum of 42 business days working day, limiting the ability for the framework to address complex, bespoke considerations.

Under both Option 1 and Option 2, EPA becomes the primary regulator of WEF turbine noise, and both options include any revision to the nuisance framework and the role of councils in compliance and enforcement activities that may be considered in future.

3.3 High-level options considered but not progressed

Options considered but not progressed are outlined in the table below.

Table 3-1: High-level options considered but not progressed

Description of option	Reasons not progressed
Licences for WEFs issued under Chapter 4 of the EP Act	• licences are for high risk activities (such as hazardous waste facilities and fossil fuel-based power generation). The risks associated with noise from WEFs is not proportionate to the regulatory control of a licence (See Box 1) • licences would add an additional burden on wind energy sector and would be considered by the sector as additional 'red tape' • licensing WEFs would imply that WEFs pose a significant risk to human health and the environment that warrants high-level regulatory oversight. The lack of evidence to support this would likely undermine both community and industry confidence.
Registrations for WEFs issued under Chapter 4 of the EP Act	• registrations are for low risk activities and feature standardised conditions • registrations present similar costs for industry and EPA as permits but regulate lower risk activities • registration requires no EPA assessment and would be unlikely to improve the level of community confidence • registration offers no additional benefit over the direct regulation (Option 1).
EPA issues Compliance Code	• compliance codes cannot set mandatory duties or obligations (such as reporting requirements) and are not directly enforceable. Mandatory and directly enforceable instruments are generally preferred if an objective is to provide a high-level of assurance of compliance • not following a compliance code does not give rise to any civil or criminal penalty. It instead means a person is not 'deemed compliant' with the duty it relates to.

3.4 Requirements

The table below summarises the proposed requirements and actions that WEFs will need to undertake in order to comply with either the Regulations (Option 1) or EPA Permits (Option 2).

The requirements and actions set out below are designed to meet the objectives of reducing the costs of regulation for businesses, the community and EPA, supporting investment in the wind energy industry and enhancing community confidence and trust in the regulatory framework. Under both Options, the individual requirements are the same.

Most requirements set out below are already mandated in one form or another in existing planning permits for WEFs and thus represent minimal change from the Base Case. Proposed provisions relating to "Further Noise Assessments" are additional (noting that there is already a requirement that WEFs continue to comply with planning permit conditions over the lifetime of operation, and that a responsible authority may request a WEF operator to undertake an action in relation to compliance in specific circumstances). The following definitions are relevant to the prescribed items in Table 3.2:

- wind energy facility — means one or more wind turbines, owned or operated by the same person or body, that are installed in close proximity to each other (whether or not located on the same premises) and electrically connected to a common grid
- wind turbine — means a device used for extracting kinetic energy from the wind and all the components comprising the wind turbine (including blades, gearbox and generator) and associated equipment in its immediate vicinity, but does not include a wind turbine with a swept rotor area less than 200 metres squared
- wind turbine noise — means the noise produced by the wind turbines at a wind energy facility, as measured at a noise sensitive area.

A Guideline will provide detail to support these requirements.

Table 3-2: Items to be prescribed in Regulations (Option 1) or prescribed as permit conditions (Option 2)

Item prescribed	Notes
Prediction, measurement and assessment	A wind turbine noise assessment must be undertaken by a qualified acoustic consultant or practitioner in accordance with the NZ Standard and be accompanied by a report by an environmental auditor that verifies the noise assessment is in accordance with the NZ Standard.
Post construction noise assessment	A post construction noise assessment is required as currently required under the Victoria Planning Provisions. This will need to include a situation where a WEF is constructed in stages as currently required.
Noise Management Plan	A WEF operator must develop and implement a Noise Management Plan (NMP). The NMP has a broader scope than the NMP identified in the VPPs in line with the principles and obligations for all duty holders under the EP Act to prevent harm to human health and the environment and identify, assess and manage risks.[85] EPA may request and approve the procedures in the NMP. A Complaint Management Plan (CMP) is an -element of the NMP. A WEF operator must implement a CMP that details the procedures to respond to and resolve complaints.

[85] The preventative measures of the NMP must include procedures for:
(a) identifying, assessing, and controlling risks of harm to human health and the environment from wind turbine noise at the wind energy facility; and
(b) assessing compliance with the noise limits; and

	Noise remediation is an element of the NMP. A WEF operator must take action when non-compliance with the NZ Standard is found to have occurred.
Unreasonable noise	The obligation not to emit unreasonable noise will be satisfied if noise emissions from wind turbines are demonstrated to comply with the requirements of the NZ Standard
Annual Statement	A WEF operator must submit to the Authority an annual Statement that demonstrates ongoing compliance with the NZ Standard and associated approvals, and details how complaints (if any) and noise issues (if any) have been resolved.
Periodic Noise Assessments	In addition to the pre-construction and post-construction noise assessments, a WEF operator must also undertake a noise assessment every 5 years and provide the noise assessment report (with corresponding verification report) to the Authority. This provision is discussed in more detail in section 3.5 below.

Note: The regulations will provide transitional arrangements for the introduction of these matters. Items prescribed only apply to wind turbine noise (see NZ Standard definition) from operational WEFs and do not apply to other ancillary infrastructure noise, or noise emitted during the construction phase.

3.5 Periodic noise assessments

It is proposed that Option 1 and 2 would prescribe mandatory periodic noise assessments (in addition to the pre-construction and post construction noise assessments) that assess ongoing compliance with the relevant elements of the NZ Standard over the lifetime of the WEF.[86]

Stakeholders presented differing views on noise assessments to demonstrate ongoing compliance. These views included setting out requirements for noise assessments that can demonstrate compliance and providing clarity on the timeframe for noise re-testing in order to provide additional confidence to the community.

These views on community confidence were also echoed by local councils and industry, although industry in particular raised concerns regarding the potential cost of some assessment options.

Under the NZ Standard, several options for ongoing noise assessments regimes are possible. These variants differ according to how regularly they are undertaken (including whether they are periodic, or triggered by specific events), which WEFs (or even parts of WEFs) they might apply to, and what the tests assess (and therefore how the tests are conducted).

Five testing regimes have been considered and are outlined below.

In all regimes an audit-verification of the noise assessment report would be required (as it is for the pre and post construction noise assessment reports).

Regime 4 (detailed further below) was identified as the preferred regime and is reflected in the analysis in this RIS. Regimes 1, 2 and 3 were not progressed as they impose significant cost on industry, with stakeholders also identifying challenges in meeting existing electricity supply contracts under such regimes. Regime 5 was also not progressed as although it targets high risk areas, it does not provide the necessary confidence to the community that noise from all WEFs is being tested.

[86] The periodic noise assessment is only one of the requirements. All the elements outlined in Table 3.2 are required to satisfy the GED and unreasonable noise requirements.

Table 3-3: Options for testing regimes

Regime	Test standard	Measurement of Background Noise?	Industry scope	WEF scope	Periodicity
1	Full measurement procedures of the NZ Standard	✓	All WEFs	All of WEF	5 year
2	Full measurement procedures of the NZ Standard	✓	Risk tiered approach	All of WEF	Higher risk – every 3 years Other WEFs – 5 years
3	Full measurement procedures of the NZ Standard	✓	All WEFs	All of WEF	10 years
4	Measurement of turbine noise only	✘	All WEFs	All of WEF	5 years
5	Assessment of turbine noise in higher risk areas only	✘	All WEFs	Higher risk areas only	5 years

Testing regimes 1, 2 and 3 would require all WEFs to undertake noise assessments against the relevant standard (currently NZ 6808:2010 or NZ 6808:1998) using the full measurement procedures of the relevant standard including turning off all turbines for a lengthy period of time to re-establish baseline background noise levels. Regimes 2 and 3 are modified risk-based versions of regime 1 where assessment requirements would be more targeted if a WEF was deemed higher risk. Such regimes could apply a risk framework that considers of the WEF and its contextual setting – for example the proximity of turbines to residences.

Testing regimes 4 and 5 utilise the existing background noise level measurements from pre-and post-construction assessments. They would provide an adequate assessment of compliance in a situation where background noise levels do not significantly change over time from the pre-construction measurement levels.

Measuring the contribution of WEF turbines to noise levels can only be done with consideration of the background noise level. However in most cases it is likely that background noise level would only increase over time as wind interacts with other physical elements in close proximity to a noise sensitive area. Typically increases in background noise result from vegetation growth, which occurs steadily over an extended period of time. In this way, compliance with noise limits that utilise pre- and post-construction background levels would provide a conservative estimate of ongoing compliance.

In the (relatively unlikely) event that background noise levels do change over time, the New Zealand Standard and the Noise Management Plan for the WEF will contain alternative testing approaches that can deal with any significant change to background noise levels that may have occurred.

Where circumstances warrant, under the EP Act, EPA can issue notices that, among other actions, request a full assessment be undertaken where there is a likelihood that the pre-construction background noise levels may have changed significantly over time.

The testing regimes 4 and 5 require noise measurements at noise sensitive areas while turbines are operating. Regime 5 may be considered a subset of regime 4 with noise measurement only undertaken at specific noise sensitive areas (compared to regime 4 where noise measurements are undertaken at all identified noise sensitive areas in the pre-construction and initial post-construction noise assessments).

Costs associated with each of the testing regimes are discussed in Chapter 4.

4 Options analysis

This chapter compares three key options using a multi-criteria approach.

4.1 Method of assessment

The options in this RIS have been assessed using Multi-Criteria Analysis (MCA) supported by quantitative information where available. This approach provides a structured and transparent way of evaluating the options given the limited quantitative data that is available, particularly in respect to benefits.

MCA requires judgement of how the proposed options will contribute to a series of criteria that are chosen to reflect the benefits and costs associated with each option. Each criterion is assigned a weight reflecting its importance to the policy decision, and a weighted score is then derived for each option. The option with the highest weighted score is the preferred option. The MCA technique is outlined in Box 3.

Box 3: Multi Criteria Analysis

MCA involves assessment of policy options against decision criteria. MCA enables options to be compared in a way that utilises quantitative and qualitative evidence. The approach enables the inclusion of a wider range of criteria than those used in a typical financial analysis. For example, it may include social and health considerations. In addition, the approach is transparent and explicit about any necessary subjective judgements and assumptions made to determine options and criteria, and to assign scores and weights. The preferences of the decision maker reflected in these judgements and assumptions can be readily changed in a sensitivity analysis or by incorporating alternative indicators of community preference.

4.1.1 Criteria

The options have been assessed based on a framework that considers the criteria in the table below. For the purpose of this assessment, benefits and costs have been weighted equally at 50% each.

Costs to individual stakeholders are grouped together and are weighted 50%. There are three main benefit criteria. These are **avoided costs of managing complaints and legal disputes**, weighted 20%, **avoided lost investment in windfarm facilities due to investment uncertainty** (20%) and **avoided search costs over compliance** (10%; Table 4-1).

Of the individual criteria in the MCA, only Criterion 1 (Costs to individual stakeholders) and Criterion 2 (avoided costs of managing complaints and legal disputes) were able to be quantified. Where the costs and benefits of criteria were able to be monetised, MCA scores were applied consistently to those dollar estimates. In doing so, costs and benefits contribute equally to the MCA score relative to their estimated value. Differences that exist reflect the contribution of impacts of the Options that were not able to be quantified.

Table 4-1: MCA criteria and weightings

Criteria	Description	Weighting
1. Costs to industry and Government	Cost of compliance for industry[87] and costs to Government to implementation, monitoring and enforcement options	50%
Total costs weighting		**50%**
2. Reductions in complaints and legal disputes	Changes in the costs incurred by all stakeholders in managing complaints and legal disputes.	20%
3. Improved investment certainty	Improved investment conditions for the WEF sector with certainty providing reduced regulatory risk, leading to avoided lost investment for the Victorian WEF sector.	20%
4. Avoided search costs and over-compliance	Avoided costs to industry and government to determine what constitutes compliance with the GED and unreasonable noise provisions.	10%
Total benefits weighting		**50%**

4.1.2 Scale

The criterion rating scale has a range of −10 to +10, where a score of zero represents no change from the Base Case.

Table 4-2: MCA Scale

Score	Description
-10	Much worse than the Base Case
-5	Somewhat worse than the Base Case
0	No change from the Base Case
+5	Somewhat better than the Base Case
+10	Much better than the Base Case

Costs and benefits captured in this chapter include the items that are directly relevant and attributable to the proposed options.

There are limitations on quantification that can be undertaken for this RIS given data availability. Where possible, costs and benefits have been quantified to inform the MCA. The analysis has been informed by data from EPA on existing permits, data supplied in stakeholder consultations and relevant literature.

Given the level of uncertainty around data collected for this RIS, the general approach to estimating the costs and benefits in this RIS is to report conservative estimates. Where a range of plausible values is available, the average value was selected as representative of the sample.

4.2 Data and assumptions

4.2.1 Number of WEF operators

According to DELWP, as of 8 October 2020 there were 29 WEFs operating in Victoria spread across 19 operators.[88] A further 8 are reported as under construction. It is assumed for the purposes of this RIS that these 37 WEFs will be operating in the first year of analysis (2021-22).

[87] It is assumed the costs incurred in administering the system and monitoring, inspection and enforcement are passed onto businesses via cost recovery fees.
[88] DELWP, Wind farm projects (2020) <https://www.planning.vic.gov.au/permits-and-applications/specific-permit-topics/wind-energy-facilities/wind-energy-projects-planning>

4.2.2 Estimated industry growth

Although there will likely be variations in the number of permit application for WEFs in any given year, from 2021-22 onwards, the number of WEFs is assumed to increase in line with rate of increase used for Acil Allen's[89] modelling of the VRET.[90] Based on these assumptions, the number of WEFs in Victoria is expected to increase to 55 by 2030.

4.2.3 2021-22 values and NPV discount rate

All costs presented in this analysis have been inflated to 2021-22 (or FY22) values using Victorian DTF forecasts of inflation. Total costs are presented as the sum of costs over the life of the Regulations (i.e. 10 years) and are subject to a 4% real discount rate.

4.2.4 Cost of time – Government

The cost of time EPA's role in administering, monitoring and enforcing the regulations is estimated using the 2020 Victorian Public Service Enterprise Agreement.[91] The cost of time for a VPS grade 5 Officer is assumed given the specialised and science-based nature of the role. Under the Enterprise agreement, wages in FY22 for VPS grade 5 Officers range between $103,920 and $125,735 p.a. Using the average, it is therefore estimated that a full-time equivalent VPS officer costs $114,827.50 p.a. (or $63.79 per hour) before loading. Applying a 75% loading assumption to account for on-costs and corporate costs results in an hourly cost of $111.64 per hour.

4.2.5 Cost of time – WEF operators

The cost of the WEF operator's time is estimated using the average wage for persons working in professional, scientific and technical services which in 2018 dollars was $45.98 per hour.[92] This is inflated to 2021-22 dollars using the Victorian Wage Price Index ($50.49 per hour)[93] and a 75% loading is used to determine a total resourcing cost of $88.35 per hour. In the absence of information about on-costs for WEF operators, it is assumed that these are the same as for Government, although this is considered likely to be a high estimate.

4.2.6 Cost of time – the community

The cost of the community's time is estimated using the average wage of a Victorian which in 2018$ was $33.66 per hour[94] or $36.96 in FY22. No loading is applied.

4.2.7 Cost of investigating and managing complaints

Stakeholder feedback indicated complaints that were complex enough to require an escalated response cost around $40,000 for industry. It has been assumed that the cost to government is around $3,300 per complaint, utilising one FTE for a week.

For the community, submitting and pursuing a complaint is assumed to require a single FTE 2.5 days.

4.2.8 Cost of legal disputes

Stakeholder feedback indicated legal disputes cost, at a minimum, $1 million for industry and around $150,000 for government.

The cost to the community of entering into a legal dispute is assumed to cost $69,000 per dispute. This includes resources to pay court and legal fees (assumed to be around $58,000 per dispute), as well as time requirements. It is assumed each dispute involves three members of the community each of which requires of 12.5 days (collectively estimated to cost $10,400 per dispute).

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[89] Acil Allen (2019) Victorian Renewable Energy Transition: Economic Impacts Modelling (2019) <https://www.energy.vic.gov.au/__data/assets/pdf_file/0023/430763/VRET-2030-Economic-Impacts-Modelling-Report.pdf>

[90] Note: Acil Allen's modelling was informed by Victorian government forecasting

[91] Department of Treasury and Finance, VICTORIAN PUBLIC SERVICE ENTERPRISE AGREEMENT 2020 (2020) <https://www.dtf.vic.gov.au/funds-programs-and-policies/victorian-public-service-enterprise-agreement-2020>

[92] Average wage in 2018 dollars was $33.66 per hour (ABS 2018).

[93] Using the Victorian Wage Price Index (Department of Treasury and Finance Victoria, 2019) <https://www.dtf.vic.gov.au/state-financial-data-sets/macroeconomic-indicators>

[94] Average wage in 2018$ was $33.66 per hour (ABS,2018).

Assumed resource costs are an average of figures cited by the Attorney General ($100,725 as a proxy for the Victorian Supreme Court) and the Victorian Institute of Law ($16,575 as indicative of Victorian County Courts), rebased to current dollars.

According to the Victorian Attorney-General and Treasurer[95] fees range considerably across various types of dispute matters, as outlined in Table 4-3. For this RIS, the figure provided for County Court – 5-day trial – solicitor/client costs only ($16,575) was used, under the assumption that the technical complexity of WEF noise would require a relatively significant amount of court time.

Table 4-3: Midpoint of 2008 legal fee range by matter, in 2020 dollars, Law Institute of Victoria

Matter	Midpoint of fee range ($)
Magistrates' Court plea	$2,525
Magistrates' Court contest	$6,662
Bail application (Magistrates Court)	$3,506
Committal – 1 day – solicitor/client costs only	$7,236
County Court plea	$8,769
County Court – 5 day trial – solicitor/client costs only	$16,575

Source: Law Institute of Victoria[96]

No figures were identified that quantified the cost of matters that progress to the Victorian Supreme court. Figures reported in 2009 (rebased to 2020 dollars) by the Attorney General's Department for Federal Court costs are used as a proxy, reflecting the similar level of the two courts in Victoria's court hierarchy. According to the Attorney General's Department[97], the average cost for an individual undertaking a Federal Court Case would be $100,725 (excluding disbursements).

4.2.9 Assumed change in complaints and legal disputes

Option 1 and Option 2 are expected to cause a reduction in complaints and legal disputes involving WEFs compared to the Base Case. This is likely because both Option 1 and Option 2 will enhance community confidence, which the NWFC has indicated is a key to resolving complaints. In addition, clearly setting out the obligations in either a direct regulation or a permit condition will provide more clarity and certainty.

Both Option 1 and Option 2 are assumed to lead to a 30% reduction in complaints relative to the Base Case.

4.2.10 Periodic noise assessments

Options 1 and 2 require periodic noise assessments in accordance with the prescribed standard (see section 4.3.4), and it is assumed that these noise assessments will include an audit-verification by an environmental auditor appointed under the EP Act. Assumptions underpinning the cost of undertaking noise assessments are outlined below:

4.2.10.1 Acoustician engineer services

Undertaking a noise assessment requires hiring the services of an acoustic expert. The cost of these services depend on, among other factors, the type of test performed. Consultations provided the following costs as indicative for the three types of noise assessments quantified in this RIS:

[95] Law Institute of Victoria, Senate Inquiry in to Access to Justice (2008) <https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Legal_and_Constitutional_Affairs/Completed_inquiries/2008-10/access_to_justice/report/c04>
[96] Ibid.
[97] Attorney General's Department, A Strategic Framework for Access to Justice in the Federal Civil Justice System (2009) <http://www.communitylawaustralia.org.au/wp-content/uploads/2012/07/CLA_Report_Final.pdf>

- full measurement procedures of the Standard — $85,000 per WEF
- turbine assessment, whole of WEF — $45,000 per WEF
- turbine assessment, selected higher risk areas only — $28,000 per WEF.

These costs include call out fees that depend on the site location, as well as any equipment, data collection and analysis. They do not include the services of an auditor to verify the noise assessment.

4.2.10.2 Industry scope of testing

A variety of noise monitoring and measurements may be required from various parts of the industry. This includes through an industry wide approach or one that is risk based. It also includes testing against all turbines at a WEF, or a similar risk-based approach (where higher risk areas of a WEF are tested). Monetising the costs of risk-based testing approaches requires an assumption on the distribution of WEFs and turbines based on risk. In this analysis only two risk categories are used, "higher risk" and "all other".

Based on information provided through consultation, it is assumed that higher risk WEFs account for around 10% of WEFs.

4.2.10.3 Staff resourcing

It is assumed that each noise assessment requires WEF employee time and resources. These costs are assumed to be constant irrespective of the test or WEF and includes one FTE for a period of two weeks.

4.2.10.4 Foregone revenue

The assessment of background noise is required in certain types of noise assessments and requires turning off turbines. This impacts WEF electricity generation, and consequently revenue and profits. While these individual regimes were not progressed as part of this RIS, estimates of their impacts were required to inform the analysis. The following assumptions were used to quantify foregone revenue:

- **energy price received** — A midpoint of $65 per MWh, based on stakeholder information that average prices (both contracted and subject to spot prices) ranged between $50 and $80 per MWh
- **shut down period required** — Consultations indicate that full measurement procedures of the Standard (including both background noise measurement and turbine noise measurements) would require turning off turbines for a period of four weeks with revenue foregone for this period
- **average electricity generation** — A WEF is assumed to generate on average 7,761 Megawatt hours per week, reflecting current industry wide annual generation capacity (5,650 GWh) across 29 operational WEFs.[98,99]

4.2.11 Annual Statement requirements

It is highly likely that all current WEFs currently have access to the data required to submit an Annual Statement to the EPA. As such the costs of this requirement are estimated to consist of WEF employee time in collecting and collating the information for submission. It has been assumed for this RIS, that these actions would require one FTE, two and a half days each year.

4.3 Periodic noise assessments

As outlined in section 3.5 periodic noise assessment regime 4 is the preferred approach for WEFs to demonstrate partial compliance with the GED and unreasonable noise provisions through periodic noise assessments.

[98] Energy Victoria, Wind projects (2020) <https://www.energy.vic.gov.au/renewable-energy/wind-energy/wind-projects>
[99] Department of Industry, Science, Energy and Resources, Australian Energy Update 2019 <https://www.energy.gov.au/publications/australian-energy-update-2019>

Table 4-4 below outlines the estimated costs of the various testing regimes to industry and includes the costs of hiring an acoustic engineer, foregone revenue from shutting down turbines to assess background noise and the cost to WEFs in terms of employee time and resourcing. All noise assessments will require an audit-verification to be undertaken by an environmental auditor.

Across the five testing regimes, the costs of regimes 4 and 5 are relatively small compared to regimes 1 to 3 at $4 million and $2.6 million respectively. They also represent much less than 1% of projected industry revenue in present value terms over period 2022 to 2031.

For regimes 4 and 5, background noise testing is not required as part of ongoing compliance assessment and therefore industry does not forego revenue from being required to shut down turbines for an extended period. The costs of Regimes 4 and 5 mostly consist of the need to hire an acoustic engineer to undertake the noise assessment. The difference ($1.3 million) between these two regimes is driven by the lower cost associated with testing only a proportion of the identified noise sensitive areas (i.e. the higher risk areas only), as opposed to the all locations identified for measurement during the pre-construction and post-construction noise assessments. In a practical sense, Regime 5 acknowledges that the noise limit margins may be much larger at some noise sensitive areas compared to others.

Table 4-4: Costs of the proposed noise assessment regimes, $m present value terms

Cost	Base case	Regimes				
		1	2	3	4	5
	No further noise assessments	All WEFs, background noise test, every 5 years	All WEFs, background noise test, high risk every 3 years others every 5 years	All WEFs, background noise test, every 10 years	All WEFs, all turbines, no background noise test, every 5 years	All WEFs, higher risk turbines only, no background noise test, every 5 years
Hiring of an acoustic engineer	$0.0	$6.5	$7.0	$3.3	$3.4	$2.1
Forgone revenue	$0.0	$74.5	$79.9	$37.3	$0.0	$0.0
WEF employee time and resources	$0.0	$0.5	$0.5	$0.3	$0.5	$0.5
Total cost	**$0.0**	**$81.5**	**$87.4**	**$40.8**	**$4.0**	**$2.6**

Source: Deloitte Access Economics

Note: totals may not sum due to rounding

In comparison the cost of regimes 1, 2 and 3 are estimated to impose the highest costs on the WEF industry at $74.5 million (in present value terms discounted at 4%) and $79.9 million respectively. This mostly consists of foregone revenue as these Regimes require re-establishing background noise levels, which would not be a practical requirement to determine compliance. The relatively high costs of foregone revenue are also associated with Regime 3, although the total cost ($40.8 million) to industry is lower as noise assessments are required less often (10 years as opposed to 5 years).

On balance, testing Regime 4 is the preferred approach as it best balances the benefits of improved certainty, confidence and compliance with the cost imposed on industry. Although it does not mandate background noise measurement, under the EP Act the EPA can issue notices that

(among other actions) request such measurements in circumstances where the EPA considers necessary for any future compliance and enforcement activity.

Regime 4 is therefore reflected in the analysis below and other regimes are not progressed.

4.4 Criterion 1: Costs to industry and Government

This section outlines the estimated costs of the Options borne by industry and government. Costs to the community as assumed to be unchanged from the Base Case.

Costs to industry

4.4.1 Cost of Noise Management Plan

Options 1 and 2 prescribe that a WEF operator must develop and implement a Noise Management Plan (NMP) to the satisfaction of the Authority, covering a number of elements as outlined in section 3.4.

4.4.1.1 Complaints management plan

Options 1 and 2 prescribe that a WEF operator must include a Complaint Management Plan (CMP) as a element of the NMP that details procedures and actions to manage and resolve complaints made about WEF turbine noise.

At present, a Complaint Investigation and Response Plan (CIRP) is a requirement under the standard planning permit conditions contained in the *Policy and Planning Guidelines – Development of Wind Energy Facilities* (DELWP, March 2019). As such, WEF operators that have a CIRP as part of their planning permit will already comply with the CMP element requirement. A WEF that doesn't already have a CIRP would need to include a CMP element within their NMP.

According to data supplied by EPA, only one WEF does not have a CIRP mandated as part of its planning permit. This WEF is operated by a firm that has other WEFs in Victoria that each have a CIRP as part of their planning permit. It is therefore assumed all operational WEFs in Victoria currently have a CIRP.

The cost of inclusion of a CMP element within the NMP to future WEFs is therefore estimated to be the same under the Base Case, Option 1 and Option 2.

4.4.1.2 Noise Remediation Plans

Options 1 and 2 prescribe that a WEF operator must develop and implement a NMP. The NMP also includes a requirement for procedures in the event that a non-compliance is demonstrated to occur at a WEF.

At present, a Noise Remediation Plan (NRP)[100] is a requirement within the NMP under the standard planning permit conditions contained in the *Policy and Planning Guidelines – Development of Wind Energy Facilities* (DELWP, March 2019).

The cost of preparing and implementing NRP for current and future WEFs is estimated to be the same under the Base Case, Option 1 and Option 2 because the requirements are the same.

4.4.1.3 Noise management plan: other elements

Options 1 and 2 prescribe that, in addition to the CMP and noise remediation actions, a WEF operator's NMP must also include procedures for identifying, assessing, and controlling risks of harm to human health and the environment from wind turbine noise at the wind energy facility and assessing compliance with the noise limits.

These procedures are not a current requirement under planning permits. However the cost is neutral relative to the Base Case because, under the GED, all WEF facilities will already have a duty to identify, assess and manage risks to human health and the environment and implement

[100] A Noise Remediation Plan has been referred to by various names in planning permits including for example a Remediation Plan, Response Protocol, Acoustic Compliance Report and Noise Investigation Report.

systems and processes to reduce those risks as far as reasonably practical. Procedures proposed under the NMP do not change those obligations.

4.4.2 Cost of providing an Annual Statement

It is proposed that an operator of a WEF must provide an Annual Statement to EPA that includes:

- evidence confirming the wind turbines are operating in compliance with the relevant noise standards and any conditions (such as curtailment mode) set out in the planning permit or other authorising document for the wind energy facility
- details of the number of complaints (if any) received in the reporting period and how those complaints were resolved
- details of any noise remediation actions undertaken by the operator of the wind energy facility.

A review of existing planning permits has confirmed that similar reporting requirements currently exist within planning permits that allow for the responsible authority to request information such as a reference map of complaint locations, and an outline of complaints, investigation and remediation actions. The preventative focus of the GED is a new element and a new requirement for WEF operators to ensure they have controls in place to minimise the risks of harm to human health or the environment

This requirement will be supported through the provisions of the EP Act relating to information gathering notices. Such information may include maintenance logs, noise assessment data, and operational data to confirm that wind turbines are operating in accordance with any curtailment mode that has been required.

According to data supplied by EPA, only two WEFs do not currently have requirements in their planning permits to document (or report) information pertaining to items above. These two WEFs are operated by a business that has other WEFs in Victoria, which do require documenting such information. It is therefore assumed all WEFs in Victoria currently satisfy this requirement.

The cost of Annual Statements for future WEFs is estimated to consist only of the time resource needed to compile and submit relevant data for the statement. It is assumed that the required data and information to satisfy an Annual Statement already exists for all current WEFs. Collating and submitting this information is assumed to require an individual WEF to dedicate one FTE across two and a half days. For each WEF, this is estimated to total $1,657 per annum in resourcing costs. For the industry as whole, between 2022 and 2031, the total cost is estimated at $0.6 million in present value terms.

4.4.3 Standard for WEFs

Options 1 and 2 prescribe the prediction, measurement and assessment of WEF turbine noise in accordance with the New Zealand Standard, which is the standard currently prescribed under the existing VPPs. This provision ensures consistency through the continued application of the 2010 NZ Standard to all future WEFs and either the 1998 Standard or 2010 Standard (as relevant) for all legacy WEFs.

This provision would maintain consistency with the existing mandatory requirements of planning permits. As such, there are no additional costs associated with this requirement.

4.4.4 Noise limits

Options 1 and 2 prescribe that noise limits are determined in accordance with the 2010 NZ Standard for new WEFs and in accordance with the 1998 NZ Standard for WEFs whose planning permits directly reference the 1998 version of the Standard. These provisions are the same as those currently prescribed under the VPPs and so there are no additional costs associated with this requirement.

4.4.5 Post construction noise assessment

Options 1 and 2 prescribe that a mandatory post construction noise assessment is undertaken to verify that the WEF is compliant with noise limits that apply. This provision maintains parity with the existing planning framework, which requires pre and post construction noise assessments, and

as such, there are no additional costs associated with this requirement under either Option 1 or Option 2.

4.4.6 Verification of pre and post construction noise assessments

Options 1 and 2 prescribe that all pre-construction and post construction noise assessment reports would be verified by an environmental auditor accredited under the EP Act. This is proportionate to the review role that auditors play in assessing whether a noise assessment meets the NZ Standard requirements, which is currently prescribed in the VPP. As this would maintain consistency with the existing provisions, there are no costs associated with the proposed requirement.

4.4.7 Cost of non-compliance

Under both Options 1 and Option 2, the notice provisions of the EP Act enable EPA to request specific actions to be undertaken by a WEF operator in specific circumstances. In addition, a NMP would also include procedures for specific noise compliance testing (for example, Special Audible Characteristics) that may be required in specific circumstances.

The costs to WEFs of responding to these notices are the same under the Base Case and the two options because they are incurred only in the case of suspected non-compliance. These costs are not included in this RIS.

4.4.8 Periodic noise assessments

Under both options WEFs would be required to demonstrate ongoing compliance by undertaking periodic noise assessments every 5 years. Various testing regimes were considered (see sections 3.5 and 4.3) with Regime 4 the preferred approach.

This assessment regime would require all WEFs to test against the relevant standard, but not require new background noise measurements to be undertaken. Noise measurements would be required for turbines only and would be required to be undertaken at least once every 5 years. The cost to industry of this testing regime for the period 2022 to 2032 is estimated at $4.0 million in present value terms, with a summary of these costs outlined below.

Table 4-5: Summary of costs for further noise assessment Regime 4, $ million present value terms

Cost	Value (PV $m)
Professional advice	$3.4
Forgone revenue	$-
WEF employee time and resources	$0.5
Total cost	**$4.0**

Source: Deloitte Access Economics

Note: totals may not sum due to rounding

4.4.9 Cost of obtaining and renewing a permit

Option 2 requires every WEF operator to obtain a permit from EPA to operate. This requirement is in addition to the permits currently issued under the VPPs. EPA permits would be valid for 5 years and can be renewed (on multiple occasions) for an additional 5-year period.

Under Option 2, WEF operators would incur costs to prepare (and submit) an EPA permit application or permit renewal application. Costs include the cost to meet application requirements, the cost of the WEF operator's time to prepare an application and any applicable fees.

EPA permit applications are likely to require information that is largely already collected under the Base Case as part of planning permit application process. This includes pre-and post-construction noise assessments and a NMP and a range of strategic location data.[101] This suggests the marginal

[101] This includes for example the location of turbines, any noise sensitive receivers and the location of any proximate dwellings referenced in a planning permit.

cost to meet application requirements would be minimal. Deloitte has assumed that it takes 1 day to prepare a permit application and 0.5 days to prepare a permit renewal application.

The EPA permit fee structure is assumed to be based on a proxy permit activity from the proposed EP Regulations and permit fees work. This process was based on a cost recovery model in line with DTF guidance. A WEF assessment is anticipated to be in the more complex group of permits, which would require a greater amount of assessment. Fee structures for such complex permits will be at July 2021, 125.88 fee units for application and 28.56 fee units for renewal.[102] In FY22 dollar terms this equates to $1,896 per application and $430 per renewal.

In total it is estimated that the cost of obtaining and renewing permits between 2022 and 2031 for the WEF industry is around $160,443 in present value terms.

Costs to Government

4.4.10 Implementation and ongoing costs

For both Options 1 and 2, EPA will incur implementation and ongoing costs relative to the Base Case.

Implementation costs include the cost of approving NMPs, reviewing noise assessment reports, preparing and distributing guidance materials, internal training and in the case of Option 2 (see section 3.2.3), transitional arrangements. All options will require issuing guidance materials to support the final option, however Option 1 is likely to require the provision of less guidance compared to the Base Case or Option 2 as the regulations would explicitly address requirements of the incoming legislation. Similarly, internal training is estimated to be relatively higher under Option 2 and the Base Case than in Option 1. The cost of preparing guidance materials and internal training across the three Options, including the Base Case, are outlined in Table 4-6 and are assumed to be one-off costs incurred in FY22.

Table 4-6: Estimated cost to government of internal training and guidance materials

Cost	Base Case	Option 1	Option 2
Guidance materials	$100,000	$50,000	$75,000
Internal training	$150,000	$125,000	$150,000

Source: EPA

Ongoing costs include the costs of EPA's time to approve NMPs, review noise assessments, review Annual Statements, and undertake any associated compliance and enforcement activities. Together, this costs around $1.2 million per annum assuming 5 additional FTEs are required for these activities and assuming that EPA issues 2-3 compliance requests per annum. In present value terms this equates to a cost to government of $10.9 million.

Under Option 2, ongoing costs are assumed to be (at least in part) cost recovered through the EPA permit system. As such the total cost to government, including monitoring, guidance materials, internal training and transitional arrangements, for Option 2 ($10.6 million) is estimated to be slightly lower than Option 1 ($10.9 million) as Option 2 is assumed to be net of the costs to industry of a permit.

4.4.10.1 Summary: Costs to industry and Government

Quantifiable costs are estimated at $15.4 million (in present value terms) for both Option 1 and Option 2, relative to the Base Case. Costs to industry account for around a quarter of the total cost of the Options. While these costs are lower under Option 2, they are effectively offset by the costs

[102] Also includes Transfer (52·22 fee units) Amendment (22·87 fee units); if the assessment by the Authority exceeds 3·9 hours, an additional fee of 5·89 fee units for each hour (or part of an hour) of assessment (capped at 292·52 fee units) Surrender (47·08 fee units) Exemption (45·68 fee units); if the assessment by the Authority exceeds 6·4 hours, an additional fee of 7·16 fee units for each hour (or part of an hour) of assessment (capped at 73·03 fee units).

to industry of the permit system. The remainder of the quantifiable costs are incurred by EPA and reflect additional costs in terms of implementation and monitoring.

Given the costs of the options are similar, both Option 1 and 2 are scored -3, relative to the Base Case. The relatively low score here reflects in part that the costs to industry are estimated to be low. On a per WEF basis the cost to industry are estimated to be around $87,100 in present value terms in the decade to 2032, which represents much less than 1% of projected industry revenue in present value terms over this period.

Table 4-7: Summary of costs to Industry and Government, $ million present value terms

Costs	Option 1	Option 2
Industry		
NMP	Not additional	
Annual Statement	$0.6	$0.6
WEF standards	Not additional	
Noise limits	Not additional	
Post construction noise assessment (and verification)	Not additional	
Cost of non-compliance	Not applicable	
Compliance based noise assessments	$4.0	$4.0
Obtaining a permit (Option 2 only)	Not applicable	$0.2
Government		
Implementation and ongoing costs	$10.9	$10.6
Total Costs	**$15.4**	**$15.4**

Source: Deloitte Access Economics

Note: Values do not sum to totals due to rounding

Table 4-8: MCA Criteria 1: Cost to Industry and Government

MCA Criteria	Base case	Option 1	Option 2
Cost to industry and government	0	-3	-3

4.5 Criterion 2: Avoided costs of managing complaints and legal disputes for industry, community and government

As outlined in Section 1.2.3 noise associated wind energy facilities can be perceived by some people to be a nuisance. These impacts are reflected through a complaints process, which if unresolved can escalate to legal disputes. The costs of complaints and legal disputes are significant, requiring both time and resources from all stakeholders.

Option 1 and 2 are anticipated to result in a reduction in complaints and disputes compared to the Base Case. This is because the two options are expected to significantly improve certainty and clarity for all stakeholders and reduce the risk of incorrectly perceived non-compliance. During consultations stakeholders unanimously agreed that regulatory uncertainty was a key driver of complaints and disputes. Government and industry both argued that a clearer regulatory framework would lead to fewer complaints. Fewer complaints and legal disputes is therefore anticipated to deliver benefits of avoided costs incurred by the government and industry.

Importantly the new noise assessment requirements should also help to verify actual compliance, thereby reducing complaints.

Stakeholder consultations provided evidence of the role regulatory risk and uncertainty plays in leading to complaints and disputes. One council for example reported a recent spike in complaints following 'success' in other LGAs from the community disputing existing grey areas/overlaps related to noise nuisance.

Improved community confidence is expected to result from the provisions of the proposed regulatory controls which are identical under both options (noting that the permit option is likely to also require guidance to clarify unreasonable noise determination). This includes that the options will formalise the operating standards for WEFs and require:

- **a NMP** — A WEF operator must implement an approved Noise Management Plan that details preventative controls for how risks of non-compliance will be managed and remedial procedures for when non-compliance with the NZ Standard is found to have occurred
- **a CMP** — A WEF operator must implement a Complaint Management Plan that details the procedures to respond to and resolve complaints
- **Annual Statements** — A WEF operator must submit an Annual Statement that verifies turbines are operating in accordance with any prescribed modes of operation, a summary of how complaints received in the previous period have been resolved and how remediation actions in the previous period have addressed any noise non-compliance.
- **periodic noise assessments** — A WEF operator must repeat the post-construction noise assessment every 5 years and provide the noise assessment report (with corresponding verification report) to the Authority.

Option 1 and Option 2 both require the abovementioned items. While individuals are likely to continue to complain about noise if they perceive it is affecting their lives, the effectiveness of the regulatory scheme and the complaints management process will also have an effect on reducing and resolving complaints. As such, it is assumed that the number of complaints received under the Base Case will be larger than under Option 1 or Option 2.

As noted in section 2.2.1 complaints have been received by WEF operators, Councils, EPA and the National Windfarm Commissioner. Annual Reports of the National Windfarm Commissioner indicate that around 45 complaints were made against operating Victorian WEFs in the four years to 30 June 2020. This equates to around 1 complaint for every 3 WEFs in Victoria. Option 1 and Option 2 are both assumed to reduce annual complaints by 30% because both prescribe what is not unreasonable noise.

Both Options also assumed legal disputes are reduced by 30% relative to the Base Case. As outlined in Section 2.2.1 there is a history of legal disputes involving WEFs in Victoria. It is assumed the Base Case involves around 6 legal disputes between 2022 and 2031.

For all stakeholders it is anticipated that each individual complaint or legal dispute would require broadly the same time and resources in the Base Case as in Option 1 or Option 2 (this excludes search costs and the cost of over-complying covered in Criterion 4). As such the estimated change in the total cost of complaints and disputes is assumed to be a function of a change in the number of complaints and disputes only.

Based on stakeholder consultations, it is assumed that complaints (that were complex enough to require an escalated response) cost on average around $40,000 for industry. For government this cost is assumed to include one week from a single FTE at a cost of $4,180. For community, the cost of an individual complaint is assumed to consist of time requirements amounting to 2.5 days for an individual (around $700).

The assumed cost of an individual legal dispute was informed during stakeholder consultations that indicated cost for industry of $1 million per dispute (at a minimum) and around $150,000 for Councils. For community, the cost of legal disputes was assumed to be $69,000 per dispute, including both on legal fees and time requirements (with three community persons assumed to be involved per dispute).

Over the period 2022 to 2031 both Option 1 and Option 2 achieve benefits (or avoided costs) of at least $3.4 million in present value terms, relative to the Base Case.

There are also anticipated to be benefits that might not be reflected in the estimates above. In particular, some parts of the community might not historically have made complaints because they did not have any confidence in the broader noise regime or complaints process. The additional specificity of the new regime should provide additional confidence for these members of the community.

Benefits estimated above also assume a reduction based off data informed by the current environment of complaints and disputes. It is anticipated that the introduction of the GED and unreasonable noise provisions will lead to greater uncertainty and reduced clarity relative to the current environment. As such the number of complaints and disputes under the Base Case is anticipated to be higher than that of the current environment. As such any reduction in complaints or disputes would lead to greater benefits that estimated above.

It is possible that the costs of legal disputes in particular may be higher than that estimated here. Feedback from stakeholders outlined that such disputes often ran for several years and that costs were a minimum $1 million (indicating upper bound costs were likely considerably higher). Stakeholder consultations also reported that exploration of legal challenges had increased in a number of regions on the back of the Bald Hills dispute (see Box 2), indicating that the Base Case number of disputes (and the resulting deviation in the options) may be higher than assumed for this analysis. Therefore the estimated avoided costs of $3.4 million is considered to be a minimum and could be much more if legal challenges occur.

Option 1 and Option 2 are therefore ranked at +4 compared to the Base Case.

Table 4-9: MCA Criterion 2: Complaints and legal challenges

MCA Criterion	Base case	Option 1	Option 2
Complaints and legal challenges	0	+4	+4

4.6 Criterion 3: Avoided lost investment in windfarm facilities due to investment uncertainty

Wind energy requires significant capital investment to construct a WEF. Investment decisions are driven by a range of factors including the regulatory environment.

Other factors include wind resources and prevailing transport and energy distribution infrastructure, and these have driven considerable investment in Victorian WEFs despite a complex regulatory environment.

Ultimately government decisions set the environment in which a prospective WEF might operate. Any uncertainty in the regulatory framework introduces risk for investors and could potentially weaken investment in the sector. This would manifest in foregone investments, impacting economic development, and ultimately impacting Victoria's ability to meet VRET targets.

The Clean Energy Council's investor confidence index[103] is a survey of the renewables sector and includes regulatory uncertainty as a key consideration. The role of the regulatory environment is also highlighted by IRENA[104] with regulation "*affecting investment risk and in turn the cost of capital… These measures create the stable and predictable investment environment critical to ensure predictable project revenue streams*."

[103] Clean Energy Council, Renewable energy investment slows as policy uncertainty and regulatory challenges mount (2019) <https://www.cleanenergycouncil.org.au/news/renewable-energy-investment-slows-as-policy-uncertainty-and-regulatory-challenges-mount>
[104] IRENA, risk mitigation and structured finance (2016) <https://www.irena.org/documentdownloads/publications/irena_risk_mitigation_and_structured_finance_2016.pdf>

Stakeholder consultations were relied on to establish how the Options in this RIS might change investment confidence relative to the Base Case. All stakeholders consulted agreed that additional guidance (introduced through either Option in this RIS) would provide significantly more certainty for investors. This was because either Regulations or a Permit system would provide the industry with a stronger social licence to operate and remove regulatory uncertainty, particularly with respect to the governing of noise. One WEF operator reported that if current regulatory uncertainty were to continue under the Base Case their organisation would not purse further investments in Victoria. Other operators gave evidence of changes to investment strategies including avoiding some specific investments.

When comparing the options, stakeholders noted the success of permits/licences in other jurisdictions, but generally preferred the certainty provided through regulations. Several operators for example raised concerns that because a permit system would provide a permit to operate for 5 years and include a renewals process, it would not address some of the residual risks of uncertainty under the Base Case.

Stakeholders also raised concerns about the permit system's ability to address Base Case residual risk arising from the unreasonable noise provisions (see section 3.2.3 for more detail on permits and unreasonable noise). This included operators and government, both of which argued that these risks could ultimately reduce investor confidence by leaving components of the regulatory framework uncertain and unclear.

The scale of avoided costs of lost investment is illustrated by estimating the foregone economic activity in Victoria that could result from the failure of a WEF to be developed. Assuming an average capacity of 220 MW,[105] foregoing development of a single WEF in Victoria would mean a total of between $400-$500 million in capital expenditure would not proceed and 700-800 construction jobs would be lost.[106]

Once operational, a 220MW WEF would produce around 580,000 MWh of energy per annum.[107] At $65 per MWh, this equates to $37.9 million in foregone generated electricity.

Moreover, this loss in energy would need to be replaced by other sources, which are in general far more emissions intensive. Based on current emissions intensity levels (0.89 tonnes of CO_2e per MWh), generating energy from other sources in Victoria would create an additional 514,500 tonnes of carbon per annum. This equates to an increase in Victoria's annual electricity sector greenhouse gas emissions of around 1.2% (with 42.2 million tonnes of CO_2e produced in 2018-19).[108]

Reflecting the improved investment certainty under Option 1, it is ranked +5, with Option 2 ranked +4, with both options rated better than the Base Case but Option 2 ranked lower than Option 1 as it would require permits to be periodically renewed.

Table 4-10: MCA Criterion 3: Investment confidence

MCA Criterion	Base case	Option 1	Option 2
Cost to industry and government	0	+5	+4

[105] Planning Victoria, Wind energy projects (2020) <https://www.planning.vic.gov.au/permits-and-applications/specific-permit-topics/wind-energy-facilities/wind-energy-projects-planning >
[106] Assumes 3.5 Jobs and $2.1 million in CAPEX per MW, based on figures reported by DELWP, Victorian Renewable Energy Target: 2018-19 Progress Report <https://www.energy.vic.gov.au/__data/assets/pdf_file/0030/439950/Victorian-Renewable-Energy-Target-2018-19-Progress-Report.pdf>
[107] Assuming a 30% capacity factor, based off Energy Council, Capacity factors: Understanding the misunderstood<https://www.energycouncil.com.au/analysis/capacity-factors-understanding-the-misunderstood/>
[108] DELWP, Victorian Renewable Energy Target: 2018-19 Progress Report <https://www.energy.vic.gov.au/__data/assets/pdf_file/0030/439950/Victorian-Renewable-Energy-Target-2018-19-Progress-Report.pdf>

4.7 Criterion 4: Avoided search costs and over compliance

Search costs

Search costs are costs incurred when researching to inform an action. In the context of this RIS analysis search costs refer to the time and resources incurred by operators, government and community as they seek to understand the obligations of WEFs and other elements of the regulatory framework such as complaints pathways. Search costs also include the cost of any legal advice sought from legal practitioners to interpret the legislation and better understand the obligations for WEF operators.

There would be significant search costs under the Base Case where there is significant residual risk related to lack of clarity and uncertainty with the GED and unreasonable noise provisions. This includes for example industry as they seek to understand what is reasonably practicable in order to demonstrate compliance with the GED, or how to comply with the unreasonable noise provisions. Similar search costs are anticipated for the community and government as they seek to understand whether noise emissions from a WEF could be deemed unreasonable or whether controls so far as reasonably practicable have been implemented to minimize the risks of harm.

Option 1's regulatory provisions address all the residual risk under the Base Case and result in a clear set of consistent obligations for all operators. Regulations are easily accessible to all parties and therefore very transparent. Similarly, the permit system also encompasses a transparent set of obligations. As such, both Option 1 and Option 2 significantly reduce the search costs relative to the Base Case.

Over compliance

Due to uncertainty under the Base Case, there is a potential for businesses to over-comply with the legislation in order to avoid a breach because of the lack of clarity with the provisions as they stand in the EP Act. The extent of over-compliance is however difficult to determine both in the Base Case and in any other option.

However, because Option 1 and Option 2 both address all the residual risk under the Base Case and result in a clearer set of consistent obligations for all operators, over-compliance is likely to be almost entirely removed. As such, it is assumed that the costs of over compliance is highest under the Base Case and significantly lower under Options 1 and 2.

4.7.1.1 Summary: Avoided search costs and over compliance

Reflecting the arguments above, Option 1 and Option 2 are scored +3 relative to the Base Case.

Table 4-11: MCA Criterion 4: Avoided search costs and over compliance

MCA Criterion	Base case	Option 1	Option 2
Search costs	0	+3	+3

4.8 Summary of results

Scores for each criterion are summarised in the table below. With a slightly positive score, Option 1 is the preferred option. This reflects that Option 1 best meets the objectives in that it:

- is expected to provide investors with greater confidence and avoid forgone investment in Victoria's WEF industry, by providing an explicit and transparent regulatory framework in the EP regulations
- will reduce instances of non-compliance and complaints
- is anticipated to provide the largest benefits in terms of avoided search and over-compliance costs
- supports a preferred option that includes requirements for noise management plans, complaint management procedures, annual reporting and periodic noise assessment. While this imposes some costs to industry (mainly associated with new acoustic

measurement requirements) they will not be significant in the context of overall industry revenue.
- will improve community confidence and trust in the regulatory framework for windfarm noise.
- provides sufficient flexibility for the EPA to address high risk WEFs and areas of non-compliance, as well as being able (through the use of guidance) to deal with the evolution of the state of knowledge.

Table 4-12: MCA summary results

Criteria	Base case	Option 1	Option 2	MCA Weights
1. Costs to industry and government	0	-3	-3	50%
2. Avoided complaints and disputes	0	4	4	20%
3. Avoided investment uncertainty	0	5	4	20%
4. Avoided search costs and over compliance	0	3	3	10%
Weighted MCA score	**0**	**0.6**	**0.4**	

Note that Option 1 is likely to have relatively higher benefits than Option 2 in relation to criterion 2 and criterion 4 (for example the additional specificity Option 1 provides may avoid more complaints and disputes) however these differences are not sufficiently large to impact the scoring.

4.9 Preferred Option

Scores for each criterion are summarised in Table 4-12 above. Option 1 (new direct regulation is preferred to the Base Case (status quo) and Option 2 (Permit system). Option 1 provides greater certainty for industry as it clearly outlines WEF obligations in regulations and does not require WEFs to regularly seek permit renewals, as in Option 2 (which was perceived as not fully removing regulatory uncertainty).

Option 1 also delivers benefits above the Base Case (and similar to Option 2) in terms of avoided costs incurred in managing complaints and legal disputes and through avoiding search costs and over compliance. These benefits are partly offset by increases in costs to industry and government. The preferred option is outlined in more detail in the following sections.

4.9.1 Elements of the Preferred Option

Under the preferred option (and the Base Case as the status quo), the EP Act and the proposed EP Regulations 2021 will commence on 1 July 2021. From that date, EPA will become the primary regulator of WEF turbine noise in Victoria and WEFs must comply with the GED and unreasonable noise provisions of the incoming regulatory framework.

As an addition to the Base Case the preferred option will introduce regulations (via a new Division to be included within Part 5.3: Noise of Chapter 5: Environmental Protection of the proposed EP Regulations). It would apply to all WEF operators and will include prescribed items that outline compliance with the GED and unreasonable noise provisions (as an addition to the Base Case). The preferred option will also allow for any changes being progressed to the nuisance provisions of the PHW Act and the role of councils in compliance and enforcement activities.

As an addition to the Base Case the regulations will apply to all WEF operators and will set out the conduct, that if carried out, will not amount to the emission of unreasonable noise from a WEF turbine.

As an addition to the base case WEFs will be required to comply with NZ Standard (which can be accessed via the Standards New Zealand website[109]) as it:

[109] Standards New Zealand, NZS 6808:2010 <https://shop.standards.govt.nz/catalog/6808%3A2010%28NZS%29/view>

1. is consistent with the WHO guidelines and is considered a reasonable control for managing the risk to human health from wind farm sound at noise sensitive locations.
2. has a methodology that reflects the complexity wind turbine noise measurement,
3. is the primary existing state of knowledge and applies (either in its 2010 or 1998 version) to all but one existing Victorian WEF.

The regulations will also adopt noise limits determined in accordance with the relevant (NZ) standard at relevant noise sensitive areas that address the factors of unreasonable noise defined in the EP Act including for example its volume, intensity, and duration. It will also refer to the relevant state of knowledge for assessing or measuring unreasonable noise as defined in the Act.

Matters to be prescribed under the preferred option that are additional to the Base Case are detailed below in Table 4-13.

Table 4-13: Prescribed matters of the preferred option that are additional to the Base Case

Item prescribed	Notes
Prediction, measurement and assessment	A wind turbine noise assessment must be undertaken by a qualified acoustic consultant or practitioner in accordance with the NZ Standard and be accompanied by a report by an environmental auditor that verifies the noise assessment is in accordance with the NZ Standard.[110]
Post construction noise assessment	A post construction noise assessment is required as currently required under the Victoria Planning Provisions. This will need to include a situation where a WEF is constructed in stages as currently required.
Noise Management Plan (NMP)	A WEF operator must develop and implement a NMP. The NMP has a broader scope than the NMP identified in the VPPs in line with the principles and obligations for all duty holders under the EP Act to prevent harm to human health and the environment and identify, assess and manage risks.[111] A Complaint Management Plan (CMP) is an element of the NMP. A WEF operator must implement a CMP that details the procedures to respond to and resolve complaints. Noise remediation is also an element of the NMP. A WEF operator must take action when non-compliance with the NZ Standard is found to have occurred.
Unreasonable noise	The obligation not to emit unreasonable noise will be satisfied if noise emissions from wind turbines are demonstrated to comply with the requirements of the NZ Standard
Annual Statement	A WEF operator must submit to the Authority an annual Statement that demonstrates ongoing compliance with the NZ Standard and associated approvals, and details how complaints (if any) and noise issues (if any) have been resolved.
Periodic Noise Assessments	In addition to the pre-construction and post-construction noise assessments, a WEF operator must also undertake a noise assessment every 5 years and provide the noise assessment report (with corresponding verification report) to the Authority.

Note: Items prescribed only apply to wind turbine noise (see NZ Standard definition) from operational WEFs and do not apply to other ancillary infrastructure noise, or noise emitted during the construction phase.

[110] Standards New Zealand, NZS 6808:2010 <https://shop.standards.govt.nz/catalog/6808%3A2010%28NZS%29/view>

[111] The preventative measures of the NMP must include procedures for:
(c) identifying, assessing, and controlling risks of harm to human health and the environment from wind turbine noise at the wind energy facility; and
(d) assessing compliance with the noise limits; and

4.9.2 Competition and small business impacts

This section assesses the small business and competition impacts of the preferred option.

Small businesses may experience disproportionate effects from regulation for a range of reasons, including for example that small businesses likely have access to relatively fewer resources to interpret compliance requirements or meet substantive compliance requirements. Small businesses may also lack the economies of scale that allow fixed regulatory costs to be spread across a large customer base.

It is estimated that the preferred option will impose an estimated quantifiable cost of $4.6 million in present value terms on industry in the 10 years between 2022 and 2031. This equates to costs of around $12,000 per annum for individual WEFs. Costs in dollar terms are likely to be broadly similar for smaller and larger WEFs. Most of the additional costs imposed on industry are incurred as part of ongoing noise assessments. A significant portion of this cost (advised to be around a third on average during stakeholder consultations) is effectively constant across small and large WEFs due to the fixed costs components of acoustic engineer consultant fees.

Relative to Base Case revenue or costs, these additional costs of the preferred option are likely to be higher for small businesses. This reflects the variation in the scale of Victoria's WEF industry which ranges from maximum power generation capacity of less than 10 MW to over 200 MW.[112] Despite this variation, the costs imposed are estimated to impose a small burden even on the smallest operating WEFs in Victoria. Assuming WEFs generate on average, 30% of rated power and an energy price of $65 per MWh,[113] costs to the smallest Victorian WEFs (which have maximum power generation capacities of between 4.1 and 7.2 MW) could account for between 1.0% and 1.7% of annual revenue.

DELWP/EPA consider that the costs imposed on industry are necessary to address the residual risk problems of the Base Case (of uncertainty, lack of clarity, and community confidence) and that the benefits outweigh the costs.

The Victorian Guide to Regulation requires a RIS to assess the impact of regulations on competition. Regulations can affect competition by preventing or limiting the ability of businesses and individuals to enter and compete within particular markets. In undertaking this assessment we have considered these questions:

- is the proposed measure likely to affect the market structure of the affected sector(s) – i.e. will it reduce the number of participants in the market, or increase the size of incumbent firms?
- will it be more difficult for new firms or individuals to enter the industry after the imposition of the proposed measure?
- will the costs/benefits associated with the proposed measure affect some firms or individuals substantially more than others (e.g. small firms, part-time participants in occupations etc.)?
- will the proposed measure restrict the ability of businesses to choose the price, quality, range or location of their products?
- will the proposed measure lead to higher ongoing costs for new entrants that existing firms do not have to meet?
- is the ability or incentive to innovate or develop new products or services likely to be affected by the proposed measure?

The preferred option is not anticipated to negatively impact competition for the Victorian WEF industry. Regulations are assumed to provide a greater degree of confidence for investors making entry into the industry relatively more attractive thereby facilitating an increase in competition. Operating costs are anticipated to be the main 'barrier to entry' that changes under the preferred

[112] Planning Victoria, Wind energy projects (2020) <https://www.planning.vic.gov.au/permits-and-applications/specific-permit-topics/wind-energy-facilities/wind-energy-projects-planning >
[113] Energy Council, Capacity factors: Understanding the misunderstood<https://www.energycouncil.com.au/analysis/capacity-factors-understanding-the-misunderstood/>

option. As outlined above the estimated cost increases are anticipated to be small (relative to revenue) even for Victoria's smallest WEFs. The change in operating costs is also estimated to be small when compared to upfront capital costs (estimated to be in the range of $400-$500 million for a WEF with an average capacity of 220 MW).[114] As such the effect of the additional operating costs of the preferred option on industry barriers to entry is anticipated to be negligible.

The preferred option is not anticipated to impact market pricing, or impose a significant variation in costs across differing WEFs in the wind energy sector, or change incentive structures for the wind energy industry in terms of innovation, research or development.

[114] Planning Victoria, Wind energy projects (2020) <https://www.planning.vic.gov.au/permits-and-applications/specific-permit-topics/wind-energy-facilities/wind-energy-projects-planning >

5 Implementation and evaluation

This chapter outlines plans for the implementation, enforcement and evaluation of the Regulations.

5.1 Implementation

The key questions for implementation are:

- What needs to be done and when
- Who will do it?
- Who will monitor implementation including risk management and identification?

5.1.1 What needs to be done and when

This section provides an overview of the tasks needed to implement the proposed regulations, how this is being addressed by EPA, and the expected timing for completion.

The preferred option involves the addition of a new Division to the proposed EP regulations (which are set to commence on 1 July 2021). This new WEF Division would be included within Part 5.3 (Noise) of Chapter 5 (Environmental Protection) of the proposed EP Regulations.

A summary of the implementation tasks and timing is provided in Table 5-1 below, key tasks of stakeholder communication, preparation of guidance material and resourcing needs are described in the following sections.

Table 5-1: Implementation tasks and timing

Task	Timing
Public consultation on RIS	The proposed Regulations (which will take effect via amending the proposed EP Regulations 2021) and this RIS will be released for a 28-day period.
Develop and deliver education and information campaign to promote awareness of the new legislative and regulatory framework. This would also inform duty holders (and the public) of their obligations under the framework.	Upon making of the Regulations (anticipated April 2021) there will be specific education and information rolled out to support duty holders, with the education campaigns likely to continue throughout 2021.
Prepare and send communication informing stakeholders and Government Departments that proposed Regulations have gone "live". Education and information campaigns to be developed and delivered to support duty holder understanding of their duties and obligations under the new direct regulations.	Upon making of the Regulations (anticipated April 2021) and again on July 1 2021 upon commencement of new EP legislation. This will continue through 2021 alongside other information and education campaigns for the new EP legislation.
Provide feedback to all participating parties and public who expressed interests during RIS process (required under the Subordinate Legislation Act 1994).	May 2021

Develop compliance and enforcement policy for new EP legislation and proposed Regulations	A draft policy was publicly released in December 2019, with the final policy to be established before July 2021.
Develop evaluation information and data strategy	January 2021 - July 1 2021, and ongoing.
Internal training of staff about systems, processes and procedures to be able to administer and enforce the new direct regulations.	By July 1 2021, and ongoing, including workforce planning: March 2021 Regulatory strategy, planning and management capability: anticipated March 2021
Resource planning and Management (including additional hires if required)	July 1 2021 (and ongoing).
Liaison with other regulators for which the incoming Regulations change roles and responsibilities.	July 1 2021, ongoing.
Develop new or update existing guidance materials to support the new direct regulations.	Taking effect July 1 2021 (development of guidance is to commence and will be released before commencement of the regulations).
Review need for updated or amended internal EPA operating procedures, methodologies, systems, processes, procedures and databases to support new direct regulations.	Internal Review function: established July 1 2021.
Quality Assurance and independent evaluation implementation for transition to new legislative and regulatory framework	Required to be in place by 1 July 2021

Note: The delivery of some of these tasks are subject to funding availability.

5.1.1.1 Stakeholder communications

The Regulations establishes a new regulatory environment for wind farm turbine noise in Victoria.

These changes will have consequential impacts for a select number of stakeholders in Victoria (principally wind farm operators), but also local councils and the broader public.

A stakeholder communications and engagement plan will be developed to identify the stakeholders in the implementation process, what their interest is likely to be, and how the stakeholder relationships are to be managed. It will include a communications strategy to ensure that all stakeholders are aware of the incoming legislative changes and provides appropriate information to assist those stakeholders. This stakeholder communication and engagement plan will include:

- general education, awareness and guidance about the new legislation, who it applies to and how it works.
- engagement and consultation to develop specific guidance for the WEF industry to comply with the GED and unreasonable noise provisions under the incoming legislation. EPA will, where appropriate, engage directly with the WEF industry (see below).
- engagement and consultation on the development of key policy documents, such a Compliance and Enforcement Policy.

Stakeholder communications during implementation would leverage that already underway in informing the options and the collaborative drafting process for the preferred option which has involved EPA, DELWP, OCPC and industry stakeholder groups.

5.1.1.2 Preparation of guidance material

Guidance materials will be required to support the details of the obligations in the preferred regulatory option. These materials will also aid the general public in understanding the new obligations of duty holders. This guidance material would complement a range of materials that

EPA has already delivered that provides targeted information about the incoming legislative and regulatory framework. See for example materials on the GED[115] and environmental obligations[116].

EPA will work collaboratively with industry and other key stakeholders as required to develop industry guidance. Guidance materials are anticipated to be required for the following prescribed items:

- relevant standard
- noise management plans, including:
  - Complaint Management Plan, and
  - Noise Remediation Plan
- Annual Statements
- supplementary noise assessments.

Guidance materials will detail what is required of the WEF industry to demonstrate compliance with the items above. These materials would be updated as required to be consistent with the state of knowledge and themselves form part of state of knowledge related to WEF noise under the GED.

In some cases the necessary guidance would be considered to be part of the state of knowledge and capability of acoustic consultants that would inform the contents of a NMP.

5.1.1.3 Resourcing needs

As outlined in Section 4.4.10, EPA will require additional resources to support monitoring and evaluation activities. These activities include:

- approving noise management plans (when requested by EPA) including:
  - Complaint Management Plan, and
  - Noise Remediation Plan
- reviewing of noise assessments
- reviewing Annual Statements
- undertaking compliance and enforcement activities, and
- supporting industry to strengthen community confidence
- responding to and investigating community noise reports

EPA estimates that these activities would require an additional 5 FTEs with potential for increase dependent on future sector growth.

Obtaining these additional employee resources will require sufficient time to allow for the approval of requisite funding bids, advertise, assess, recruit and train personnel. Importantly these roles will likely require specialist understanding of technical information related to WEF noise. This process is likely to take more than 100 days and would be impacted by remote working environment of COVID.

5.1.2 Who will be doing it

EPA will be primarily responsible for implementation of the proposed Regulations. DELWP will provide input into key strategic policy development and support EPA in identifying any necessary linkages with whole of Government policy, specifically providing support in determining whether any whole of Government policies or changes to legislation influence the implementation of the new subordinate legislation.

5.1.3 Who will monitor implementation?

Monitoring of implementation, including identification and management of implementation risks, will be undertaken by EPA, with support from DELWP.

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[115] EPA, General Environmental Duty (2020) <https://www.epa.vic.gov.au/for-business/new-laws-and-your-business/general-environmental-duty>

[116] EPA, Understanding Your Environmental Obligations (2020) <https://www.epa.vic.gov.au/for-business/new-laws-and-your-business/understanding-your-environmental-obligations>

5.2 Evaluation

Evaluation of the proposed Regulations will take two forms – ongoing monitoring and assessment, plus a formal review of the regulations in 2027.

5.2.1 Ongoing monitoring and assessment

EPA will collect data relating to the Regulations and windfarm noise on regular basis. A primary source of data will be the Annual Statements provided by windfarm operators. The exposure draft of the Regulations accompanying this RIS indicate the contents of the Annual Statements include information such as:

- the number of noise complaints received by the WEF
- the outcome of each of the complaints, including whether any non-compliance was identified
- how any remediation actions have addressed any non-compliance
- confirmation that turbines are operating in any required operating modes

The EPA will also collect information including data on noise complaints received by the National Windfarm Commissioner and by the EPA itself. Enforcement action taken by the EPA will also be compiled.

The EPA will also undertake ongoing engagement with industry, the National Windfarm Commissioner, Councils and other stakeholder groups. These will include at least one meeting annually to discuss the Regulations, windfarm noise and any issues of concern for relevant parties.

5.2.2 Formal review of the regulations

The proposed Regulations will sunset in 2031. This will be the next time the Regulations are due for a full formal evaluation, likely to be undertaken via preparation of a future RIS. The WEF regulations, as an amendment to the EP Regulations, will integrate into this broader review timescale.

The evaluation of the EP Regulations will commence after the new legislative and regulatory framework has been operational for 4.5 years with the evaluation process expected to be completed in approximately 6 months.

This will provide sufficient time for both the EP Act (including the GED and unreasonable noise provisions) as well as the subordinate regulations, to become bedded down. Importantly it will also allow for the majority of WEFs to undergo a first round of periodic noise assessments to be conducted, and for the costs, efficacy and results of the further noise assessments to be evaluated.

The evaluation will assess whether the objectives of the Regulations have been met. The evaluation framework will need to collect information on the following:

- design and implementation of the Regulations
- the extent to which the outcomes of the Regulations have been achieved (i.e. the effectiveness of the Regulations)
- the actual impact of the Regulations against the expected impact captured in this RIS in terms of costs and benefits incurred by all relevant stakeholders
- any lessons learnt including any unintended consequences of the Regulations
- any options to improve the Regulations if deemed necessary as a result of the evaluation.

A set of evaluation questions spanning the elements above would be developed by EPA. Evaluation questions would be answered by collecting data and information on a series of relevant indicators identified for each evaluation question. Data sources that would inform the indicators (and by implication answer the evaluation question) include:

- the ongoing monitoring and assessment described above
- stakeholder consultations with various government agencies, WEF operators and communities situated near WEFs

The evaluation will be undertaken by DELWP or by an independent organisation on behalf of DELWP.

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Appendix A - Stakeholder consultation

Who was consulted?

The focus of the targeted engagement prior to the release of this RIS has aimed to build understanding and inform the content of this RIS. Consultation has therefore been undertaken on that basis. Community consultation will follow through to the public comment phase of this RIS.

Deloitte undertook virtual stakeholder engagement with a group of relevant stakeholders to develop and assess the options outlined in this RIS. Stakeholders consulted include:

- 7 Victorian WEF operators
- the National Wind Farm commissioner (NWFC)
- the Clean Energy Council
- 3 Victorian councils
- DELWP & EPA
- DHHS

Deloitte also participated in two WEF Industry Reference Group meetings and two Council Forums. Each of these meetings were facilitated by DELWP and covered the problem and options of this RIS and included a broader set of WEF operators and Victorian councils.

Engagement with councils as part of these consultations were important in understanding the nature of complaints raised by communities and the effectiveness of current regulatory controls. Community concerns were also considered through the analysis of complaint trends from the NWFC as well as councils who presented key concerns raised by community. It should be noted that a number of stakeholders (including industry and councils) made submissions during the public consultation period for the proposed EP Regulations at the end of 2019. These submissions formed part of the information base that has now been extended through more detailed and targeted consultations with these and other stakeholders.

How were they consulted?

Stakeholders were consulted in one of three ways:

- semi-structured (in mostly one-on-one) interviews
- small group consultations
- stakeholder reference groups

What information was collected?

During consultations, questions were asked about:

- the nature, extent and cost of complaints on WEF noise, and the stakeholder's role in dealing with those complaints
- whether or not the stakeholder was engaged in (or aware of) any legal actions
- the problems with current regulatory framework as it pertains to WEF noise
- the impact of introducing the GED and unreasonable noise provisions without further guidance
    - the views and preferences of stakeholders on options, and what would be prescribed either within direct regulation or through permit conditions
    - the impacts, costs and benefits associated with direct regulation or a permit system prescribing further guidance.

How information collected has been incorporated into the RIS?

The information collected has been incorporated into the RIS primarily to inform the analysis of the costs and benefits associated with the proposed options.

Key themes by topic

Several key themes emerged from the stakeholder consultations, which are summarised below.

5.2.2.1 Table A-1: Key themes from stakeholder consultation

Theme	Key discussion points

Noise complaints and legal actions	• Most operators had received noise complaints
	• A significant portion of complaints were reported as easily managed (in line with a complaints management plan)
	• A few operators sited a consistently high volume of complaints on specific sites which are largely from a handful of stakeholders
	• Two operators have ongoing legal actions against their WEFs
	• One operator reported that there are generally three types of disputes:
	  ○ Simple disputes that are resolved relatively quickly and are cheap
	  ○ More complex disputes thar require extra investigations which cost around $30,000 to $40,000 plus internal time
	  ○ Legal actions which cost between $500,000 and $1 million
	  ○ One council reported an ongoing investigation has to date cost $150,000
	• Two operators reported spending in excess of $1 million in addressing a single lawsuits or complaint.

Problems with the current regulatory framework	• Most stakeholders raised concerns that a WEF operator could be complying with the noise limits in their planning permits, yet still found to create a nuisance under the PHW Act • Due in part to the above regulatory issues, stakeholders were uniformly in agreement that clarity and certainty under the incoming legislation is required. • All stakeholders agreed the community needs viable pathways for complaint resolution should issues arise • Concern that the NZ Standard was developed for New Zealand's regulatory framework which means that the standard needs to be adapted to meet Victorian conditions (for example: by defining high amenity areas referenced in the NZ Standard) • Concern that the NZ Standard might not catch all instances of noise for example: faulty yaw brakes or broken bolts on the turbine which would create an irritating intermittent noise undetected by the NZ Standard • One industry stakeholder said it is important that EPA own the standard and continue to adapt it to the Victorian context
Understanding of the incoming legislation	• Most stakeholder reported a limited familiarity with the incoming regulatory framework under the new EP Act • Industry were generally of the opinion that without additional guidance the planning permits granted under the VPP demonstrated compliance with the incoming regulations (i.e. the GED and unreasonable noise provisions) despite this not being the case. • All stakeholders supported the need for additional guidance to provide clarity and certainty
Defining unreasonable noise and the GED for WEF operators	• Most stakeholders agreed that the NZ Standard should be the standard in defining unreasonable noise • When presented with alternatives or flexibility, operators generally preference a clear uniform standard under which the industry should operate.

Direct regulation versus permits	• In general, industry stakeholders favoured clarity and certainty in options to minimise future complaints and legal actions • Some industry stakeholders suggested that the NSW permit system might be worth looking at as one of the better regulatory systems • Several stakeholders argued that a permit system provides less certainty for investors than regulations. As it requires renewal with a specified periodic requirement. • One stakeholder suggested that permits should be as transparent and provide an equal level of certainty to the community as regulation if the permits are published online.
Ongoing compliance:	• Most stakeholders were generally supporting of the need for ongoing compliance and that testing would likely be needed to support this. • Some industry stakeholders though argued that once a WEF has achieved historical compliance there wasn't really a role for ongoing testing. • One stakeholder said that some parts of industry may not support further noise assessments out of fear that older WEFs may no longer be compliant, and adjustments would be required to achieve compliance. • One stakeholder said that further noise assessments should only be done for new WEFs because it is impacts investment decisions and impacts whether the site would have been set up to enable ongoing noise management
Ongoing compliance: cost of testing	• Noise assessments that reassess background noise levels using the full measurement methodology of the NZ Standard may see turbines shut down for between 2-6 weeks having significant impacts on revenue. • A range of cost estimates were reported for further noise assessments ranging from around $500,000 to multiple millions. • One stakeholder suggested using an estimate of between $50-80/Mw and applying an assumption that the wind turbine would have generated electricity 30% of the time that it is shut down for Further noise assessments • One stakeholder expressed concern that a blanket approach of requiring shut down testing would fall disproportionately on smaller operators
Ongoing compliance: testing requirements	• Most stakeholders didn't raise an objection to mandatory Further noise assessments, but preferred longer periods between assessments due to costs. • Concerns were also raised about the ability of mandatory assessments to pick up 'special audible characteristics' or other issues that might be 'averaged' out • Alternative triggers (to specified periods) for testing that were identified included the number of complaints, although most operators expressed concerns that complaints if unverified could lead to gaming of the system. • Some industry and Council stakeholders suggested that there was merit in having noise assessments independently verified because it created certainty for the community and Councils • Issues regarding testing which were raised by a few stakeholders including ○ that the NZ Standard requires consent from neighbouring landowners

	○ that it becomes difficult to assess background noise when multiple WEFs are in close proximity to one another. • A cheaper alternative that was raised is testing at intermediate locations but while it reduces the costs, it is not consistent with the NZ Standard
Annual reporting; complaint and noise management plans	• Most industry stakeholders saw value in some sort of annual reporting process to increase transparency and reduce complaints • One stakeholder said that while they were supportive of annual reporting, they said that it was important that the information reported was simple, non-technical and easy for the community to understand (i.e. noise assessment should not be publicly available but maybe EPA puts out a letter saying the operator is compliant.) • Some argued that it was important that this arrangement was consistent across the State otherwise it would undermine its effectiveness • One stakeholder raised that industry should be publicly disclosing ongoing compliance with any existing curtailment requirements to be complaint. • Some stakeholders argued the cost of these conditions would be minimal, either the information already existed or was straight forward to compile. • Most operators cited having existing complaints management plans or noise remediation plans • Councils flagged the need for plans and reporting to evolve with the state of knowledge
Community confidence and complaints	• Stakeholders unanimously agreed that reduced/avoided legal costs, reduced dispute resolution costs, and increased community confidence were the main benefits of the Options • Some stakeholders have suggested that historically community consultation during the planning phase was not as advanced as it is today, and this poor consultation has led to more complaints on these wind firms • Several operators argued that a clearer regulatory framework would lead to fewer complaints • One WEF gave a detailed example of how addressing regulatory uncertainty led to a measurable reduction in complaints. • One council reported a recent spike in complaints following 'success' in other LGAs from the community disputing existing grey areas/overlaps related to the PHW Act.
Industry investment confidence	• One operator claimed that the current regulatory framework in Victoria would preclude them from pursuing similar investments in Victoria based on their experience • Another operator cited changes to their investment strategy in Victoria • Others claim it has changed the way that they operate in Victoria rather (than their investment decisions). • One operator said that further noise assessments (if it involved shutting turbines down) is likely to be considered by financial institutions in their financial operating models before capital is granted

Appendix B – Regulatory framework

Jurisdictional comparison

Table B-1: WEFs jurisdictional comparison

	Victoria (current framework)	South Australia	New South Wales	Western Australia	Queensland
Regulatory framework	Environment Protection Act 1970 Planning and Environment Act 1987 Victoria Planning Provisions clause 52.32 Public Health and Wellbeing Act 2008	Environment Protection Act 1993 Environment Protection (Noise) Policy 2007 Development Plan contains the planning controls	Protection of the Environment Operations Act 1997. *Environment* Protection Licence (EPL) Environmental Planning and Assessment Act 1979 Development Consents	Environmental Protection Act 1986 Environmental Protection (Noise) Regulations 1997 Planning and Development Act 2005	Planning Act 2016 Planning Regulation 2017
Technical standard	Adopts NZS 6808:2010 methodologies for the assessment of overall A-weighted noise levels (based on a modified version of that prescribed in the UK document ETSU-R-97 The Assessment and Rating of Noise from WEFs) For WEFs permitted prior to 2010 the NZS 6808:1998 applies.	Working Group on Noise from Wind Turbines (Final Report, ETSU for DTI, 1996) UK Department of Trade and Industry 1996, The assessment and rating of windfarm noise, Noise Working Group Final Report, ETSU−R−97. The Wind farms environmental noise guidelines (2009) provide noise criteria for new wind farm	NSW has adopted the South Australian document "Windfarms - environmental noise guidelines" with some variations. Wind farm developments are granted approval by authorities, depending on the size of the Capital Investment Value and megawatt (MW) output of the wind farm project. These authorities include the Local	Guidelines for Wind Farm Development, Planning Bulletin Number 67, WA Planning Commission, May 2004 Draft Position Statement: Renewable energy facilities May 2018 (Intended to replace Bulletin 67)	Wind farms are approved by the State Assessment and Referral Agency, within the QLD Department of Infrastructure, Local Government and Planning State Code 23 refers to the NZ Standard 6808:2010 and the SA (2009) guidelines

	Victoria (current framework)	South Australia	New South Wales	Western Australia	Queensland
		developments that are consistent with the New Zealand Standard NZS 6808.	Council, Joint Regional Planning Panel, and the Planning Minister and Planning Assessment Commission. An overview can be found in the State government's Wind Energy: Assessment Policy		
Noise assessment condition	Base Limit: 40 dB LA90(10min) Includes high amenity 5dB adjustment to noise limit Time Periods: 24-hour period. Night-time assessment (10 pm to 7 am) Wind direction for compliance assessment: All directions Setback: 1km	Base Limit: Rural 35 dB LAeq,10min, Non rural 40 dB LAeq,10min Time Periods: 24-hour period only. Wind direction for compliance assessment: Downwind ±45° Setback: 2km	35 dB LAeq,10mins or the background noise (LA90(10 minute)) by more than 5 dB(A), whichever is the greater Time Periods: 24-hour period only Wind direction for compliance assessment: Downwind ±45°	35 dB LAeq,10mins or the background noise (LA90(10 minute)) by more than 5 dB(A), whichever is the greater Time Periods: 24-hour period only Wind direction for compliance assessment: Downwind ±45° Setback: The minimum distance is 1.5 km.	Base Limit: 35 dB (Night) 37 dB (Day) LAeq,10mins (Night) or the background noise (LA90(10 minute)) by more than 5 dB(A), whichever is the greater Time Periods: Day (6 am to 10 pm), night (10 pm to 6 am) Wind direction for compliance assessment: Not specified
Guidelines	Development of Wind Energy Facilities in Victoria Policy and Planning Guidelines (March 2019), Department of Environment, Land Water and Planning (DELWP)	SA Environment Protection Authority 2009, Wind farms environmental noise guidelines. Minister for Planning approved the statewide Wind Farm Development Plan Amendment (DPA) in 2012. The DPA designates wind farms a Category 2 development (third party appeal rights not	NSW Department of Planning and Environment 2016, Wind Energy: Noise Assessment Bulletin, NSW DPE, Sydney. NSW Department of Planning and Environment, 2011. Draft NSW Planning Guidelines: Wind Farms. NSW has adopted the 2009 South Australian document	Western Australia, Department of Environment (DoE) endorses the criteria and approach of assessing wind farms based on background noise levels, as described in the SA EPA Wind Farms Environmental Noise Guidelines.	Wind Farm State Code 23 State Code 23: Wind Farm Development Planning Guidelines June 2018 Provides acoustic criteria for host lots and non-host lots.

	Victoria (current framework)	South Australia	New South Wales	Western Australia	Queensland
		available) except where they include turbines within 2km of dwellings or towns and other zones that could be detrimentally affected	Wind farms environmental noise guidelines supplemented with the specific variations for NSW requirements		
Approvals Process	The State government (Minister for Planning) is responsible for issuing permits for WEFs. The Minister can also call for an EES for a WEF if deemed necessary. EPA has received one EES for a WEF based on potential for cumulative noise impacts (number of WEF in area). DELWP Guidelines for WEFs Noise Assessment and independent Audit EPA Victoria manages Auditor program via auditor guidelines	Local councils are responsible for assessing and approving wind farm proposals, unless the project is classified as public infrastructure, whereby the Minister is responsible for making a decision on the proposal. Includes predictive noise assessments that rely on background noise measurements at all relevant receiver locations, and wind data collected for a sufficient period.	Must comply with Development Consent issued under the Environmental Planning and Assessment Act 1979.	The Western Australian Planning Commission (WAPC) is the responsible authority for determining development applications for wind farms within regional reserves. Where a proposal would have a significant effect on the environment, it must be referred to EPA by the decision-making authority	State Assessment and Referral Agency (SARA) is responsible for assessment of the development application. It applies State Development Assessment Provisions (SDAP) including State code 23: Wind farm development (the code) contained in the State Development Assessment Provisions (SDAP) Conditions of approval in relation to the noise criteria of the code require the proponent to undertake operational noise monitoring within the first 12 months of the wind farm being fully operational.
Operation and compliance	Noise Limit conditions in the Planning Permit Council is responsible for managing compliance and this would involve a similar acoustic assessment as done for the pre	Council manages compliance and this requires a similar noise data collection process to be repeated when the wind farm is operational.	The Department of Planning and Environment has requirements for regular monitoring and reporting of the performance of the project over time, however, 'regular' is not defined. Monitoring and	Implementation by local councils through the local planning framework, local planning strategies, local planning schemes and local planning policies.	State Code 23 provides a methodology for undertaking a noise impact assessment for a wind farm, and a methodology for noise monitoring (used for determining compliance with the noise criteria included

	Victoria (current framework)	South Australia	New South Wales	Western Australia	Queensland
	and post construction phase assessments and audit. Currently there is no ongoing requirement to confirm compliance, other than the planning permit conditions that indicate the relevant noise conditions must be complied with during operation.	Compliance checking will require a similar noise data collection process to be repeated when the wind farm is operational. The SA guidelines describe the methodology for noise assessment for compliance purposes, however, does not prescribe a periodic re-assessment frequency.	reporting assesses whether a wind energy project is operating in compliance with its approved noise limits. Conditions of consent require the proponent to prepare a compliance assessment methodology and to undertake noise compliance monitoring.	Impact on public amenity must be managed through an Environmental Management Plan that considers establishment, operation, maintenance and decommissioning of wind farms.	within the code and any conditions of approval). Noise monitoring duration should be a minimum of six weeks to provide sufficient noise data for day and night periods.
Complaint process	The EES process provides the main avenue for stakeholders to raise objections early in the proposal development. The role of the National Wind Farm Commissioner includes receiving and referring complaints from concerned community residents about WEFs The local council is responsible for investigating and complaint made under the PHW Act. For other complaints the Council would engage an acoustic consultant to assess noise condition compliance.	The SA approach includes provision for waiving third party appeal beyond 2km from a dwelling. This would restrict complaints to dwellings less than 2kms from turbines. The guidelines also allow for alternative techniques to be used for compliance measurements at a single receiver. This alternative should include at least four site visits with each visit including eight hours of monitoring or more and equally including day and night time periods	NSW allows for a private agreement to be negotiated and voluntarily entered into between a proponent and a landowner to manage some or all impacts on that property. The Department of Planning and Environment is responsible for following up suspected breaches reported by members of the public. NSW includes requirement to comply with publishing of performance results via the project website. If noise compliance monitoring indicates that noise from turbines exceeds the approved noise limits, the proponent must identify reasonable and feasible noise mitigation and	Noise emissions from wind turbines are required to meet the standards prescribed under the Environmental Protection (Noise) Regulations 1997. Local planning policy can be used to provide specific development standards applicable to renewable energy facilities.	Demonstrating compliance with the performance outcomes requires a noise impact assessment undertaken by a suitably qualified acoustic consultant with suitable acoustic experience demonstrating compliance with the prescribed acoustic levels in the Code. The results of operational noise monitoring will be used for determining compliance. The conditions of approval require that operational noise monitoring be conducted twice within the first year of the development being fully operational (i.e. all proposed turbines operating).

	Victoria (current framework)	South Australia	New South Wales	Western Australia	Queensland
			management measures to achieve compliance including a timetable for implementation.		

Source: EPA Victoria

Guideline 1411: Noise from industry in regional Victoria

These guidelines provide the methods to set recommended maximum noise levels for industry in regional Victoria ('recommended levels'). The guidelines apply to ancillary infrastructure at WEFs, but not to the noise generated by wind turbines at WEFs.[117]

DELWP Policy and Planning Guidelines for Development of Wind Energy Facilities

The purpose of these guidelines is to set out:

- A framework to provide a consistent and balanced approach to the assessment of wind energy projects across the state;
- A set of consistent operational performance standards to inform the assessment and operation of a wind energy facility project; and
- Guidance as to how planning permit application requirements might be met.[118]

In general, it provides more detailed information and guidance on the types of information that is required to support a planning permit application, which meets clause 52.32 of VPP.

The National Wind Farm Commissioner (NWFC) and dispute resolution

The Office of the National Wind Farm Commissioner helps community members address their concerns about renewable energy projects including WEFs. The Office also identifies and promotes best practices for the wind industry, working with stakeholders from all levels of government, industry and the community.[119] The NWFC performs the following roles with respect to renewable energy projects:

- Facilitating the referral and resolution of complaints received from concerned residents about proposed or operating projects
- Providing greater transparency on information
- Identifying and promoting best practices related to the planning, development and operation of projects, including standards and compliance, complaint handling procedures and community engagement.

The NWFC process for handling complaints is outlined in the Commissioner's complaints handling policy.[120]

[117] EPA. (2011). 1411: Noise from industry in regional Victoria. <https://www.epa.vic.gov.au/about-epa/publications/1411>
[118] DELWP. (2019). Development of Wind Energy Facilities in Victoria Policy and Planning Guidelines
[119] NWFC, About us <https://www.nwfc.gov.au/about>
[120] NWFC, Complaints Handling Policy <https://www.nwfc.gov.au/sites/default/files/nwfc-complaint-handling-policy-ver2-2.pdf?v=1547089933>

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