Hexham
Wind Farm

Chapter 4

Assessment framework

WIND PROSPECT

4.1 Overview

This chapter describes how the potential impacts of the project were assessed, how their assessment influenced the project design, and how the Environmental Management Framework was developed. Chapter 28 – ***Environmental management framework*** then describes how the project's environmental, social and heritage impacts would be managed, taking into consideration all the assessment work carried out, as outlined in this assessment framework chapter and culminating in this EES.

The assessment framework for this EES responds to the EES scoping requirements issued by the Minister for Planning in September 2024, and has also been informed by:

- the Ministerial guidelines for assessment of environmental effects under the Environment Effects Act 1978 (Ministerial Guidelines) (DTP, 2023b)
- the project objectives (described in Chapter 1 - ***Introduction***)
- the evaluation objectives contained within the EES scoping requirements
- the objectives and requirements of relevant legislation, guidelines and policies
- community and other stakeholder input and feedback, including that provided by the Technical Reference Group appointed by DTP. Members of the Technical Reference Group represent Government agencies and regional authorities that have a statutory or policy interest in the project. Further information about the Technical Reference Group is provided in Chapter 7 – ***Stakeholder consultation***.

While there is some overlap between the EES process and project approvals (as described in Chapter 3 – ***Legislation and policy framework***), this EES standardises the assessment and reporting approach to enable all specialist reports to be read and understood through a common framework. Notwithstanding, some specialist studies do need to follow specific legislative requirements with assessment frameworks of their own, so some differences in the approach taken by those specialists exist. These are described in this chapter and within each specialist chapter and related specialist study.

Prior to the EES impact assessment process, a site selection process was undertaken that identified a project site that met or had a reasonable potential to meet the project's objectives, including avoidance or minimisation of environmental, social and heritage impacts (see Chapter 5 – ***Project alternatives and design*** development for more details about how and why the project site was chosen).

Once the project site and concept design were selected, the project's potential impacts were assessed in accordance with the EES scoping requirements, as outlined in the below steps:

1. Identify the key issues and risks that the project poses through its construction, operation and decommissioning, and prioritise and focus the investigations, assessments and approaches to avoid and minimise potential impacts in accordance with the requirements outlined in the Ministerial Guidelines. Key issues and risks were identified via preliminary desktop and field studies, including the characterisation of the existing environment.
2. Conduct existing conditions assessments to characterise the bio-physical environment, and the social and heritage values in and around the project site, to identify values that could be impacted by the project (see discipline-specific Chapters 8 – 25).
3. Assess the potential impacts of project construction, operation and decommissioning on the identified values prior to the implementation of mitigation, considering the potential severity, extent, duration, likelihood and significance of the impact (see discipline-specific Chapters 8 – 25). This included an assessment of cumulative impacts (see Chapter 26 – ***Cumulative effects***). If the potential impacts were found to be a moderate level of significance or above, alternative project designs and/or construction and decommissioning methods were assessed. The assessment was conducted in accordance with the approach outlined in Section 4.4.6.
4. Propose design refinements and/or mitigation measures to avoid, minimise, mitigate, rehabilitate/restore or offset the potential impacts.
5. Identify likely residual impacts that could not be avoided or minimised further, and evaluation of the significance of these impacts.
6. Develop measures to manage the residual impacts and include these in the Environmental Management Framework. This included monitoring and evaluation criteria to check that predicted outcomes are being achieved by the project and proposing contingency measures if the project is not achieving these.

4.2 EES assessment framework

As described in the Scoping Requirements for the Hexham Wind Farm Environment Effects Statement (EES scoping requirements) issued by the Minister for Planning (the Minister), "*the purpose of the EES is to provide a sufficiently detailed description of the project, assess its potential effects on the environment and assess alternative project layouts, designs and approaches to avoid and mitigate effects*". The meaning of 'environment' includes physical, biological, heritage, cultural, social, health, safety and economic aspects, as outlined in the Ministerial Guidelines.

The final EES scoping requirements were informed by public comments on the draft version and set out the specialist studies required, and the matters to be investigated as part of the EES. The scope of the specialist studies was also informed by issues raised during stakeholder engagement activities, including feedback from the Technical Reference Group before and during EES preparation, and by issues identified as the project design was refined.

'Risk', 'impact' and 'effect' are important terms referred to throughout the EES and supporting documents. The EES has taken a 'risk-based' approach to guide the scope of environmental, social and cultural studies conducted for the project. The assessment approach has focused on the evaluation of the risks for potential impacts. The approach aims to avoid, minimise, and manage impacts as much as reasonably practicable, thereby reducing the risk of significant impacts.

The key components of the EES assessment framework are:

- Evaluation framework – Commonwealth and State Government policies and procedures and the final EES scoping requirements set by the Minister provide the foundation for the EES assessment. These were used to work out what needed to be investigated and the scope of specialist studies to be carried out.
- Assessment approach – Included investigating and characterising the environment (i.e., existing conditions of the project site and surrounding area), focusing on key sensitivities. This provided the basis for an initial risk assessment that guided the direction of subsequent impact assessments and provided a better understanding of interdependencies between specialist studies. This ultimately led to refinements to the project design and the development of specific mitigation measures. Assessment of project alternatives and cumulative impacts were key elements of the approach. The project refinement outcomes are detailed in Chapter 5 – ***Project alternatives and design development*** and results of the cumulative impact assessment is summarised in Chapter 26 – ***Cumulative effects***.
- Consultation – Comprehensive stakeholder consultation was an important part of the project design development process and for the preparation of this EES. The consultation process and outcomes are detailed in Chapter 7 – ***Stakeholder consultation***.
- Environment Effects Statement – The outputs from the specialist studies are brought together in this EES. At the conclusion of the EES assessment process, the Minister's assessment will inform the statutory approvals decisions.

The relationships between the components of the EES assessment framework are shown in Figure 4.1.

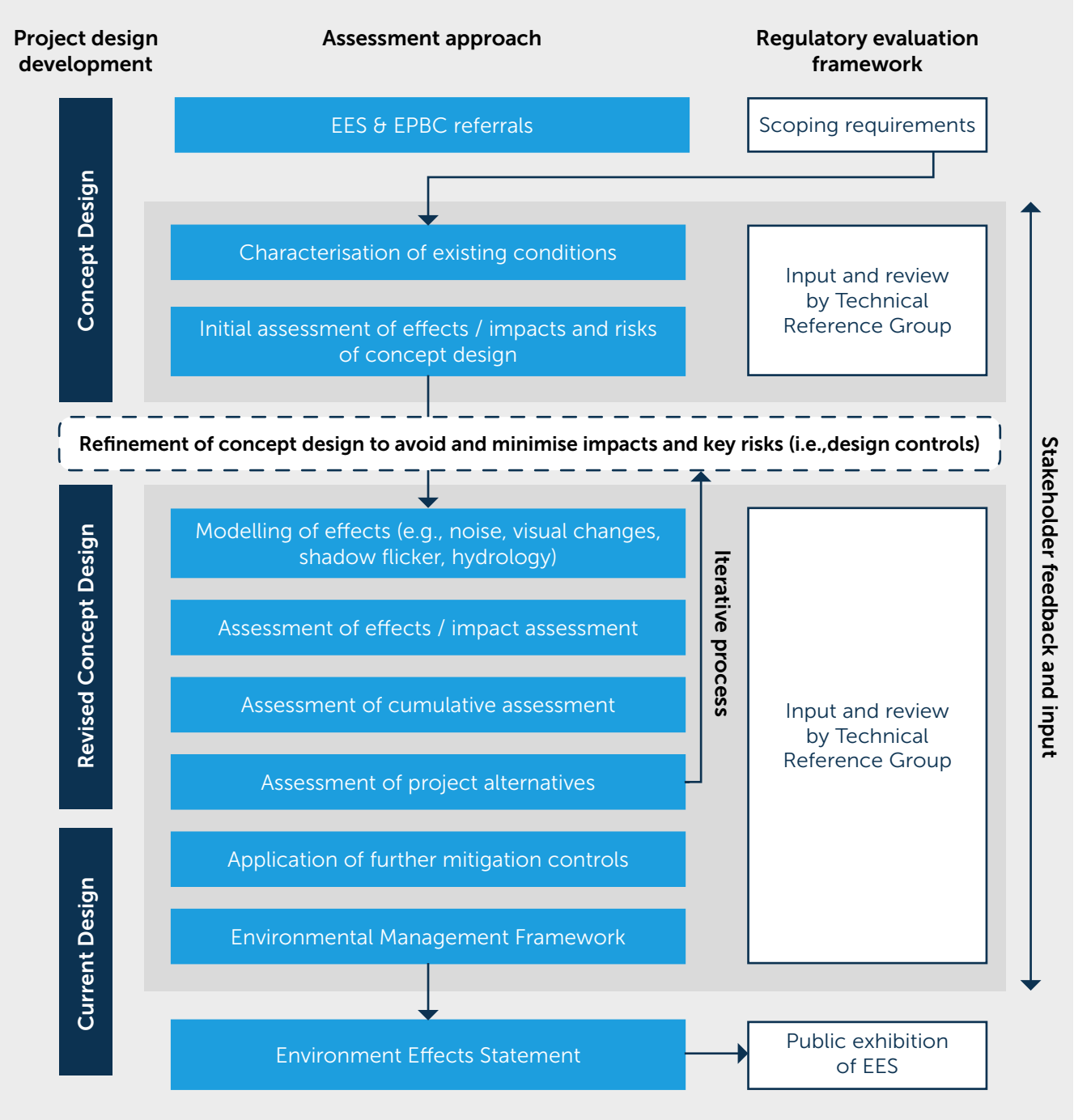

Figure 4.1 EES assessment framework

Note that during the impact identification process, some disciplines used the risk assessment framework to identify key risks and potential impacts/effects. The variability of risk assessment methodology between technical disciplines is described in Section 4.4.3.

Additionally, the assessment of project alternatives was limited to alternatives that were reasonably practicable. Section 4.4.6 (Assessment of alternatives) provides an explanation of how a change to the concept design or construction/decommissioning process was deemed to be 'reasonably practicable' and relates closely to the project objectives stated in Chapter 1 - ***Introduction***.

4.3 Evaluation framework

The evaluation framework details the desired outcomes for the project in the context of key legislative and statutory policies, as well as the principles and objectives of ecologically sustainable development and the protection of human health and the environment. Details of the overarching regulatory framework (i.e., the laws, regulations and policies) and how these interact are provided in Chapter 3 – ***Legislation and policy framework***.

The final EES scoping requirements, issued in September 2024, outline the evaluation objectives for the project. They also guide the integrated assessment of environmental effects in accordance with the Ministerial Guidelines and evaluation of the overall implications of the project. The integrated assessment involved ensuring that interdependencies between specialist studies were understood and that assessment outcomes from one study are passed on to other studies, where relevant. For example, project impacts relating to water quality or flow paths may impact ecological or social values.

There are seven evaluation objectives for the project (see Table 4.1). The table includes an overview of the corresponding key legislation and statutory guidelines, the focus topics of assessments, and the location of where each evaluation objective is addressed within the EES.

The project must also address the requirements, as applicable, of the Planning Policy Framework, which is incorporated into local planning schemes. The use and development of land in Victoria is guided by the Planning Policy Framework, as well as local planning policy.

Table 4.1 EES evaluation objectives and relevant EES chapters

Aspect	Evaluation objective from EES scoping requirements	Assessment focus	Relevant EES chapter(s)	Relevant specialist study
Biodiversity and habitat	To avoid, and where avoidance is not possible, minimise potential adverse effects on biodiversity values within and near the site including native vegetation, listed threatened species and ecological communities, and habitat for these species. Where relevant, offset requirements are to be addressed consistent with state and Commonwealth policies.	• Remnant native vegetation and flora surveys • Brolga breeding, flocking and habitat surveys • Bat echo-location surveys • Bird utilisation surveys • Migratory bird surveys • Terrestrial and aquatic habitat surveys • Targeted threatened species surveys • Assessment of potential impacts on species and communities.	Chapter 8 – *Biodiversity and habitat* Chapter 9 – *Bats* Chapter 10 – *Brolga* Chapter 26 – *Cumulative effects* Chapter 27 – *Matters of National Environmental Significance*	Appendix C1 – *Brolga Impact Assessment* Appendix C2 – *Bat Assessment* Appendix D – *Flora and Fauna Assessment*
Catchment values and hydrology	To maintain the functions and values of aquatic environments, surface water and groundwater quality and stream flows and avoid adverse effects on protected environmental values.	• Hydrological modelling to determine wetland habitat (for Brolga) • Characterisation of surface water and groundwater based on a review of existing data comprising of desktop assessment and water quality sampling undertaken in June 2019, April 2023 • Groundwater drawdown and water management from the on-site quarry • Assessment of effects on the environment.	Chapter 11 – *Groundwater* Chapter 12 – *Surface water* Chapter 13 – *Landform and soils*	Appendix A – *Soil and Landform Assessment* Appendix B – *Surface Water and Groundwater Impact Assessment*
Landscape and visual	Avoid and, where avoidance is not possible, minimise and manage potential adverse effects on landscape and visual amenity.	• Geospatial and 3D-modelling of visual changes • Creation of visual photomontages of the project from key locations • Assessment of visual impacts from representative locations based on relevant guidelines • Modelling of shadow flicker effects from rotating wind turbine blades.	Chapter 14 – *Landscape and visual* Chapter 15 – *Shadow flicker and blade glint* Chapter 26 – *Cumulative effects*	Appendix F1 – *Landscape and Visual Impact Assessment* Appendix F2 – *Landscape and visual independent peer review* Appendix M – *Shadow Flicker and Blade Glint Impact Assessment*

Aspect	Evaluation objective from EES scoping requirements	Assessment focus	Relevant EES chapter(s)	Relevant specialist study
Amenity	To minimise and manage adverse air quality and noise and vibration effects on residents and local communities as far as practicable during construction, operation and decommissioning having regard to applicable limits, targets or standards.	• Mapping of sensitive receptors (e.g., dwellings) • Predictive modelling of project-generated noise, vibration and air quality, based on the current design • Verification by an EPA Victoria accredited environmental auditor that the pre-construction (predictive) noise assessment has been conducted in accordance with the New Zealand Standard NZS6808:2010.	Chapter 16 – ***Air quality and greenhouse gas*** Chapter 17 – ***Noise and vibration*** Chapter 26 – ***Cumulative effects***	Appendix E1 – ***Noise and Vibration Impact Assessment*** Appendix E2 – ***Pre-construction noise assessment report verification*** Appendix E3 – ***Noise and vibration independent peer review*** Appendix L1 – ***Air Quality Impact Assessment*** Appendix L2 – ***Greenhouse Gas Impact Assessment*** Attachment II – ***Draft Quarry Workplan***
Cultural heritage	Protect, avoid, or minimise where avoidance is not possible, adverse effects on historic heritage values, and tangible and intangible Aboriginal cultural heritage values, in partnership with Traditional Owners.	• Desktop review of previous studies and registers • Field investigations of the project site including both standard visual field surveys and complex surveys for Aboriginal cultural heritage involving subsurface excavation.	Chapter 18 – ***Aboriginal cultural heritage*** Chapter 19 – ***Historical cultural heritage***	Appendix J – ***Aboriginal Cultural Heritage Impact Assessment*** Appendix K – ***Historical Heritage Impact Assessment***

Aspect	Evaluation objective from EES scoping requirements	Assessment focus	Relevant EES chapter(s)	Relevant specialist study
Land use and socioeconomic	To avoid and minimise adverse effects on land use (including agricultural and residential), social fabric of the community (with regard to wellbeing and community cohesion), local infrastructure, electromagnetic interference, aviation safety and to neighbouring landowners during construction, operation and decommissioning of the project.	• Desktop data collection and analysis of stakeholder consultation • Economic modelling • Qualitative study of effects on socio-economic values • Specialist study of aviation safety • Specialist study of electromagnetic interference • Specialist study on land use and planning.	Chapter 20 – ***Land use and planning*** Chapter 21 – ***Socio-economic*** Chapter 22 – ***Aviation*** Chapter 23 – ***Fire Risk*** Chapter 24 – ***Electromagnetic interference*** Chapter 26 – ***Cumulative effects***	Appendix H – ***Land Use and Planning Report*** Appendix I – ***Social and Economic Impact Assessment*** Appendix N – ***Electromagnetic Interference Impact Assessment*** Appendix O – ***Aviation Impact Assessment*** Appendix P – ***Fire Risk Impact Assessment***
Traffic and roads	To avoid and minimise adverse effects on roads and road users during construction, operation and decommissioning of the project.	• Quantitative study of project-generated traffic with and without the on-site quarry • Assessment of project access points • Assessment of route planned for over-size and over-mass loads.	Chapter 25 – ***Traffic and transport***	Appendix G – ***Traffic and Transport Impact Assessment***

4.4 Assessment approach

An assessment framework was developed for the project to ensure a consistent and transparent approach to the evaluation of potential impacts on people and the environment. The assessment approach has been applied consistently across each of the EES specialist studies.

The overarching assessment approach is shown in Figure 4.2.

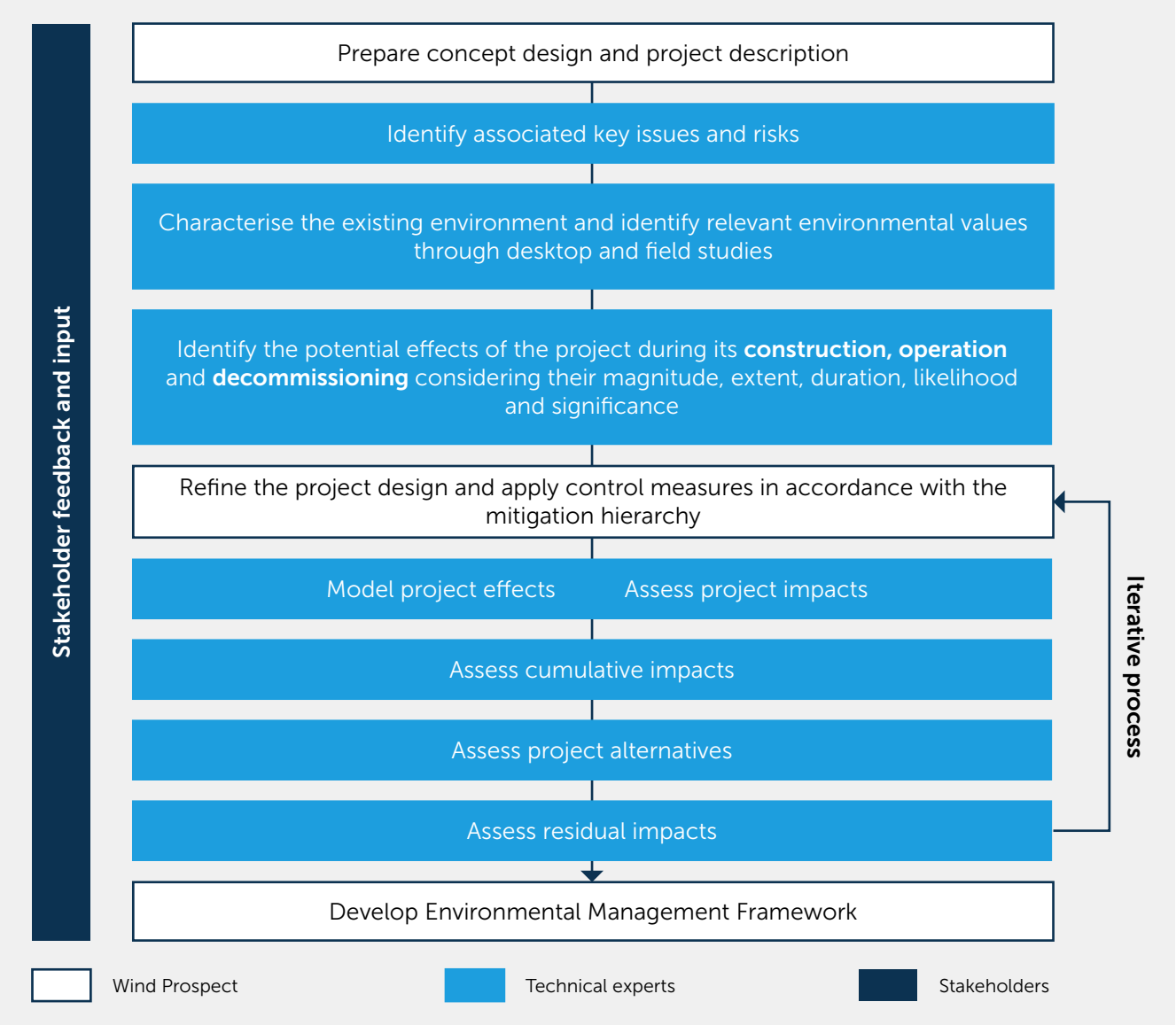

Figure 4.2 Assessment approach

The assessment approach commenced with an initial concept design and project description, which enabled the scoping of specialist studies to assess potential impacts of the project. Updated project designs have been a result of findings from these studies, further feasibility investigations and input from stakeholders. Once the project design had undergone an iterative process of assessing alternative design elements and/or construction/decommissioning approaches to reduce potential impacts (including cumulative impacts), it was confirmed as the 'current design', which is described in Chapter 6 – ***Project description***. The current design is the design for which planning approval is sought via the Planning Applications.

Where there is potential for the project to give rise to risks of harm to human health or the environment from pollution or waste, those risks have been minimised so far as reasonably practicable at this stage of the project. This is required by the general environmental duty within the *Environment Protection Act 2017* to meet the environmental protection duties and manage environmental risks. See Chapter 28 – ***Environmental management framework*** for details on how these risks would be managed.

4.4.1 Preparing the concept design

The project concept design was developed based on a preliminary understanding of the environment, early stakeholder consultation, and experience developing comparable projects in similar environments.

The concept design within the EES and EPBC Act referrals was based on a total of 108 wind turbines with a nominal capacity of 6 megawatts (MW) with a maximum blade tip height of 250 metres[1]. Both referrals identified key potential impacts and risks that required further investigation.

The concept design was the culmination of a significant amount of work over several years. With the project objectives driving the design process (see Chapter 1 – ***Introduction***), numerous design iterations were developed to arrive at the current design. Key factors for changes to the design over time included:

- changes of landowner involvement and/or changes to the parcels of land included in the project site
- evolutions in technology resulting in larger wind turbines with greater energy generation potential
- changes to the energy market through other technological drivers (e.g., improvements in large-scale battery reliability and pricing)
- changes to the energy market due to changes in government policies
- an increase in the understanding of the environmental, social and heritage values in and around the project site and the potential for these values to be impacted
- observations from other wind farm project approvals processes, particularly those in south-west Victoria.

Design iterations were continually reviewed against all the above factors (and others) throughout the development process. Once the project was publicly announced consultation began with a range of stakeholders, including project neighbours and broader community members, Moyne Shire Council, State Government departments, and electricity network agencies (Australian Energy Market Operator (AEMO) and AusNet Services). That initial consultation resulted in changes to the concept design, leading to a design that could be more formally tested and scrutinised through the EES process. A detailed description of the site selection process and concept design development is presented in Section 4.4.6 (Assessment of alternatives) and Chapter 5 – ***Project alternatives and design development***.

1 Since making those referrals, and in response to advances in wind turbine technology, the maximum blade tip has been increased to 260 metres (see Chapter 5 – ***Project alternatives and design development***)

4.4.2 Undertaking a preliminary risk assessment

A preliminary risk assessment was undertaken by the proponent in consultation with key technical specialists as part of the preparation of impact assessments. The objective of the preliminary risk assessment was to identify potential hazards associated with the project during the construction, operation and decommissioning phases, and to assess the risk of significant impacts on the environment and people. This helped refine the concept design through the investigation of alternatives in order to avoid impacts and minimise risks.

The risk assessment was used to prioritise and focus the proposed investigations, assessments and approaches to avoid, and/or minimise potential impacts in accordance with the requirements outlined in the Ministerial Guidelines (DTP, 2023b).

A risk assessment framework uses a combination of 'likelihood' and 'consequence' of environmental harm (or damage) to determine the level of overall risk, where:

- **likelihood** is the probability that an environmental, social or heritage value will be impacted by a project activity (creating a hazard)
- **consequence** is the magnitude or severity of the impact on the identified value, which is usually a factor of the geographic extent and/or duration of the predicted change to the value.

Hazards with the potential to result in a significant impact were assessed in terms of their likelihood (Table 4.2) and consequence (Table 4.3), to produce an initial risk rating as defined in Table 4.4. This assessment is based on consideration of the existing design measures implemented to avoid or minimise potential impacts.

Table 4.2 Likelihood criteria

Descriptor	Criteria
Almost Certain	The event is expected to occur in most circumstances
Likely	The event will probably occur in most circumstances
Possible	The event could occur
Unlikely	The event could occur but is not expected
Rare	The event may occur only in exceptional circumstances

Table 4.3 Consequence descriptors

Rating	Qualitative description of biophysical / environmental consequence	Quantitative description of socio-economic consequence
Negligible	No detectable change in local environmental setting.	No detectable impact on economic, cultural, recreational, aesthetic or social values
Minor	Short-term, reversible changes, within natural variability range, in a local environmental setting.	Short-term, localised impact on economic, cultural, recreational, aesthetic or social values.
Moderate	Long-term but limited changes to local environmental setting that are able to be managed.	Long-term, localised changes in quality of economic, cultural, recreational, aesthetic or social values. Limited change at regional level.
High	Long-term, significant changes resulting in risks to human health and/or the environment at a local or broader scale.	Long-term, significant changes in quality of economic, cultural, recreational, aesthetic or social values at local, regional and state levels. Limited change at national level.
Very High	Irreversible, significant changes resulting in widespread risks to human health and/or the environment at a regional scale or broader.	Significant, permanent impact on regional economy, and/or irreversible changes to cultural, recreational, aesthetic or social values at regional, state and national levels.

Table 4.4 Risk matrix

Likelihood	Consequence				
	Negligible	Minor	Moderate	High	Very High
Almost certain	Low	Medium	High	Very High	Very High
Likely	Low	Medium	Medium	High	Very High
Possible	Low	Low	Medium	High	High
Unlikely	Negligible	Low	Low	Medium	High
Rare	Negligible	Negligible	Low	Medium	Medium

Key technical specialists participated in the risk assessment process as part of the concept design refinement. The purpose was to identify any risks requiring further detailed assessment, and to develop project-specific design controls and management measures to minimise the likelihood and consequences of identified hazards.

The results of the preliminary risk assessment were used to identify potential impacts requiring the greatest attention in this EES. Outcomes of the preliminary risk assessment were provided to the DTP – Impact Assessment Unit and Technical Reference Group as part of the development of the proposed study program for the EES. These outcomes formed one input to the development of the EES scoping requirements issued by the Minister.

The preliminary risk assessments are described briefly in relevant specialist reports (refer to appendices).

4.4.3 Characterising the existing conditions

The character of the existing environment and the social and heritage context of the project site and surrounding areas was established via desktop and field-based investigations, undertaken by subject matter experts (referred to as 'technical specialists'). During the field-based investigations, desktop information was verified, and new information was gathered. The study areas for technical studies and the environmental, social and heritage values within them varied. These areas have been defined as the 'investigation area' within each specialist study, along with methods for assessing existing conditions.

Specialist studies identified environmental values, sensitivities and land uses that may have the potential to be impacted by the project, with a focus on sensitive receptors. These receptors included people, assets, values, or uses that are protected by legislation and related policies and procedures, are important to the local community (or broader community), and/or are likely to be susceptible to potential impacts resulting from the project.

The Technical Reference Group were engaged in the existing conditions identification process, providing feedback on the existing conditions investigation findings. These investigations and feedback from the Technical Reference Group informed the design of the project and provided a baseline against which the potential impacts of the project could be assessed. They also allow any residual impacts or positive effects to be predicted, following the implementation of management measures, against the baseline (existing) conditions.

The existing conditions for each specialist study are outlined in Chapters 8 to 25 and detailed in EES specialist studies.

4.4.4 Modelling project effects and assessing impacts

This EES has adopted two main methods to assess the impacts of project construction, operation and decommissioning activities on identified values. These are:

1. Quantitative predictions against standards involving the assessment of compliance with regulatory limits or standards from modelled outputs, with the aim of meeting or achieving outcomes better than compliance requirements.
2. Direct assessment of effects and impacts, with the aim of avoiding or minimising impacts, and maximising positive effects (i.e., project benefits).

The overarching assessment methods to address each evaluation objective are outlined in Table 4.5.

Table 4.5 Assessment methods used by each technical discipline

Disciplines	Assessment of residual effects and impacts	Quantitative predictions against standards*
Landforms and soils	✓	
Groundwater	✓	✓
Surface water	✓	✓
Biodiversity, Bats and Brolga	✓	
Noise and vibration	✓	✓
Landscape and visual	✓	
Traffic and transport	✓	
Land use and planning	✓	
Socio-economic	✓	
Aboriginal cultural heritage	✓	
Historic heritage	✓	
Air quality	✓	✓
Shadow flicker	✓	✓
Electromagnetic interference	✓	
Aviation	✓	✓

* Disciplines that have quantitative predictions against standards are still required to meet the general environmental duty, where applicable (e.g., air quality, noise and vibration)

This EES needs to describe in detail the effects on the environment and particular defined values in terms of severity, extent and duration of change, assuming that design, mitigation and management measures have been applied.

The EES provides a detailed analysis of potential project effects and impacts including:

- direct and indirect impact pathways (see info box)
- community expectations around benefits and impacts
- severity, extent and duration of impact on assets, values and uses to ensure project effects are maintained within permissible limits
- how changes to one environmental, social or heritage value might affect another value
- how effective measures are to avoid or limit potential adverse effects
- uncertainty associated with each assessment
- benchmarks and requirements set by statutory processes.

Impacts have the potential to occur both directly and indirectly because of the project, whereby:

1. **direct impacts** are those resulting from direct interaction between the project and the biophysical environment, and there is an immediate cause-and-effect relationship (e.g., land disturbance and removing habitat)
2. **indirect impacts** are those that are at least one step removed from project activities in terms of cause-and-effect links (e.g., upgrade of existing roads has the potential to indirectly increase traffic due to more favourable driving conditions for local road users).

The assessment of residual effects and impacts focuses on understanding and describing the unavoidable changes to the environment and the positive effects brought about by the construction, operation and eventual decommissioning of the project.

The impact assessment process adopted for the EES involved:

- undertaking a risk assessment to identify key issues and focus of the impact assessment investigations
- establishing the environmental context (i.e., baseline conditions), specifically the sensitivity of the defined assets or values
- reviewing impact pathways for the identified assets or values, focusing on the source of the impact, the pathway medium (i.e., land, water, air) and the receiving environment
- assessing all likely impacts in terms of severity, geographic extent and duration
- assessing the likelihood and significance of the impact using defined criteria
- investigating potential alternatives to the project design or construction/decommissioning method, or identifying mitigation measures that could avoid, minimise or manage likely impacts on a particular asset, value or receptor
- re-assessing the likelihood and significance of residual impacts that could not be avoided or minimised further (see Section 4.4.6)
- developing measures to manage residual impacts during project construction, operation and decommissioning based on specialist experience with proven feasible control measures for other similar projects, industry best-practice measures, and measures defined by regulatory agencies.

To ensure a consistent assessment approach, an impact assessment table was adopted for most specialist studies (see Table 4.6 for example). An impact pathway is where a project component or activity (i.e., impact source) may have an effect on a defined environmental asset, value or receptor. When an impact pathway was confirmed, an assessment of the significance of the impact was performed. A potential impact is avoided where a robust and well-proven design control has been applied. Modelling, in accordance with best practice methods, was used to determine whether potential noise, shadow flicker and air quality impacts resulting from the project would be within the relevant guideline criteria or levels.

Table 4.6 Impact assessment template

Impact pathway	Asset, value or receptor	Project phase	Likely impact (considering severity, extent and duration)	Impact rating and justification
Example only Shadow flicker caused by rotating wind turbine generators, particularly in the early morning and late afternoon.	Nearby dwellings and surrounding enjoyment areas (within 50 metres of dwelling)	Operation	Shadow flicker experienced from wind turbines at neighbouring dwellings (within 10 rotor diameters) will be no greater than 30 hours per year (theoretical)	Low – The impact of shadow flicker is typically only significant up to a distance of 10 rotor diameters from a wind turbine. Beyond this distance the shadow is diffused such that the variation in light levels is not likely to be sufficient to cause annoyance.

Key to assessing impacts is determining the magnitude of impact in terms of severity, extent and duration. General criteria used for severity, extent and duration are set out in Table 4.7. These criteria were modified for each technical discipline, where appropriate, to account for intrinsic differences between aspects. For example, social impacts (positive or negative) have the potential to occur over a wider area, as opposed to hydrological impacts that are likely to be experienced within the construction disturbance area. Similarly, the duration of impacts during construction would occur over a shorter timeframe than impacts during operation, but their severity may also differ.

Table 4.7 General criteria for magnitude – severity, extent and duration

Magnitude	Severity	Extent	Duration
Minor	Impact does not reduce the viability/capacity of the value	Highly localised effect	Temporary or transient effect
Moderate	Impact reduces the viability (or sustainability) of the value, but recovery is expected. Specific management measures may be required to effectively manage the impact	Effect may extend beyond the construction disturbance area and operational footprint	Short-term effect
High	Impact affecting the future viability or sustainability of the value	Effect has the potential to extend beyond the project site boundary	Medium- to long-term effect

Determining the severity, extent or duration of impacts alone does not necessarily provide an assessment of the significance of the impact. As outlined in the EPBC Act Significant Impact Guidelines 1.2 (DoE, 2013):

> *"impacts of the action [project] must be considered in the context of the environment in which the action will take place, particularly if the action is likely to impact upon sensitive or valuable components of the environment"*

In other words, impacts that occur within more sensitive environments or near vulnerable receptors should be considered more significant.

Specialists applied their own methods (defined by relevant legislation, policies, standards and guidelines, and their professional judgement and experience) to assess the impact significance, taking into consideration proposed (or mandated) management and mitigation measures where appropriate. Discipline-specific impact criteria (from very low to very high) were defined by each specialist. The impact assessments for each of the specialist study are summarised in Chapters 8 - 25 and detailed in specialist studies provided as Appendices A - P.

The impact assessments also identified potential benefits associated with the project during its construction, operation and decommissioning. Ratings were not applied to potential benefits; however, benefits are described in specialist studies where relevant.

The EES has considered the existing conditions and potential impacts relevant to each aspect of the environment both in isolation and together. Some studies have relied on data or results from another study to inform their own assessment. For example, the assessment of wetlands and Brolga habitat has relied on the surface water modelling undertaken as part of the surface water impact assessment. Similarly, the noise impact assessment has informed the social impact assessment report.

4.4.5 Peer review

The landscape and visual, and noise and vibration studies have been independently peer reviewed to verify that the work is technically sound, conclusions are supported, and the specialist study clearly covers the EES scoping requirements. The landscape and visual impact assessment peer review is a requirement of the Moyne Planning Scheme, but the noise peer review was commissioned based on this being technically complex assessment of interest to the public and regulators. These peer reviews were instigated by the proponent, and the Technical Reference Group was consulted and provided guidance.

The Pre-Construction Noise Assessment, undertaken as part of the Environmental Noise and Vibration Impact Assessment (Appendix E1), was also verified by an EPA Victoria Environmental Auditor in accordance with the Environment Protection Regulations 2021.

4.4.6 Assessment of alternatives

Identification and assessment of alternatives is a key part of the EES process to ensure that the project layout and design is optimised to avoid and minimise significant potential adverse environmental effects where practicable, while also maximising project benefits. This also applies to project construction and decommissioning methods.

The EES scoping requirements identify key aspects of the project design where feasible alternatives should be considered within the EES (see Chapter 5 – ***Project alternatives and design development*** for further detail). In accordance with the EES scoping requirements and using a systematic and risk-based approach, the following aspects were considered in the assessment of alternatives:

- type of infrastructure (e.g., turbine models and configurations)
- location of infrastructure (i.e., project layout)
- scale of the project (i.e., number of wind turbines)
- energy storage options
- construction method(s), including the crossing location and design options for access over Mustons Creek
- timing of construction activities, including any proposed staging
- materials selection, including alternatives for sourcing raw construction materials
- options for transport of equipment and materials to site.

Chapter 2 – **Project rationale and benefits describes** the key reasons why this project is located where it is and the rationale for its configuration (i.e., size and main project components). In short, the project is as big as possible to help meet the objective of supporting the Government's greenhouse gas emission reduction targets, whilst minimising negative effects on the environment and communities. As such, potential changes to the project design which resulted in less energy production (i.e., the loss of one or more wind turbines or curtailment of wind turbines) were considered very carefully in the context of those objectives. Every wind turbine proposed in the current design, representing approximately 25 gigawatt-hours per year of emissions-free power, has undergone such careful consideration.

The process for assessing alternatives involved the following steps:

1. Providing specialists with a base case concept design and project description upon commencement of their studies (for the EES).
2. Instructing specialists to consider and compare alternatives, particularly where the base case presented the potential for impacts above a medium level of significance.
3. If a change in the design or construction method is proposed, this change would be assessed against the project objectives.
4. Upon a change to the design (e.g., type or location of infrastructure, construction methods, transport route, etc), all specialists would be provided with an updated project description and maps or plans and instructed to consider whether such changes could affect their assessments.
5. If the change did not result in greater impacts to other assets, values or receptors (i.e., increase their significance rating), then the alternative design or approach would be adopted, and all relevant assessments and related reports updated.

Project alternatives were considered periodically throughout the EES process in response to specialist studies, and in response to Technical Reference Group and community feedback. The rationale for the assessment of any alternatives proposed by specialists, the Technical Reference Group or community was explained via public information sessions, newsletters and Technical Reference Group meetings, are described in Chapter 7 – ***Stakeholder consultation***. The approach to the assessment of alternatives is outlined in Chapter 5 – ***Project alternatives and design development***.

4.4.7 Assessing cumulative effects

As outlined in the NSW Government Department of Planning and Environment (2022) Cumulative Impact Assessment Guidelines for State Significant Projects (NSW Guideline), *"managing cumulative impacts is a shared responsibility – involving all three levels of government working closely with industry and the community – and is a major factor in all government decision-making"*. Wind Prospect and the project's technical specialists have collected and collated as much information as possible via publicly available sources and assessed the significance of impacts on assets, values and receptors taking into account surrounding activities (existing and planned).

Although the effects of individual actions may be small or insignificant by themselves, a combination of the effects may be significant. The combination of effects on the existing environment from multiple activities occurring in the same area and over similar timeframes are called 'cumulative impacts'. The project has the potential to contribute to cumulative impacts, particularly from other wind farms in operation, undergoing development, or those that have already received approval in the region. Activities that are yet to receive approval have also been considered and assessed where information and data could be obtained.

The relationship between the project and nearby wind farm projects and other activities was assessed by technical specialists, where relevant to their discipline, to determine the cumulative impacts on the existing environment. The assessment of cumulative impacts was guided by the NSW Guideline, and was based on publicly available information on other activities. Activities and other projects that were considered in the specialist studies as potentially resulting in cumulative impacts included those that are progressing through planning approvals, are approved, under construction, in the process of being commissioned or are operational. These were identified by Wind Prospect and the technical specialists based on publicly available information, such as the Victorian Government's Renewables Summary Map (DTP, 2025) which provides information on the spatial extent and status of renewable energy projects across the state.

The scoping of the cumulative impact assessment followed the NSW Guideline process outlined in Figure 4.3 Note that the NSW Guideline is tailored to the NSW state significant projects approvals process, therefore the approach developed for the Hexham Wind Farm project follows the general principles only within that guideline.

Scoping cumulative impact assessment

Figure 4.3 Key questions that informed the scoping of the cumulative impact assessment

A scoping summary table was used to identify projects that may create cumulative impacts when combined with the Hexham Wind Farm project. Once identified and the degree of cumulative impact assessment required had been established for specific environmental and social aspects of the project, the process involved:

- assessing the scale and nature of the cumulative impacts and undertaking an assessment on each of the assessment matters or issues
- identifying and undertaking more detailed assessment of cumulative impacts on key matters (issue-specific Cumulative Impact Assessment and combined Cumulative Impact Assessment)
- developing strategies to minimise the project's contribution to any cumulative impacts
- evaluating the project as a whole, having regard to the:
  - findings of the assessment on each of the assessment matters or issues
  - findings of the detailed cumulative impact assessment on each of the key matters (issue-specific Cumulative Impact Assessment)
  - combined effect of these cumulative impacts on key matters (combined Cumulative Impact Assessment).

Further detail on the method used and the findings are summarised in Chapter 26 – ***Cumulative effects***.

4.5 Stakeholder engagement

Consultation activities commenced following public announcement of the project in March 2019, with key community stakeholders and has continued throughout the EES process. Community and stakeholder consultation is a key element of the EES assessment framework and has occurred at various stages of project development.

Wind Prospect recognises the value of open and high-quality engagement from the outset of any project. In accordance with the requirements of the EES scoping requirements, the project has developed a Stakeholder Engagement Plan (provided as Attachment I) that identifies key stakeholders, the engagement program, and methods and tools that will be delivered to inform the public, consult with key stakeholders, and provide opportunity for input into the preparation of the EES and planning permit applications. The Stakeholder Engagement Plan was made publicly available on the Department of Transport and Planning (DTP) website and can be accessed at:

https://www.planning.vic.gov.au/__data/assets/pdf_file/0028/723583/revised-consultation-plan.pdf

Throughout the project development, stakeholder feedback was collected, recorded and considered as part of the ongoing refinement of the project design and implementation. Communications with project stakeholders are recorded in a consultation management database.

Community consultation provided an understanding of the concerns and preferred outcomes of local residents, businesses and other interested parties, and these were considered in the design and assessment process. Ongoing engagement with Moyne Shire Council and relevant State and Commonwealth Government agencies through the participation in the project's Technical Reference Group has enabled key issues and policy priorities of state and local government, as well as community concerns, to be comprehensively addressed in this EES and the project design. The Technical Reference Group provided advice about statutory approvals, policy provisions, methodologies of key specialist technical assessments, and key issues and concerns from their respective areas of responsibility, interest, experience and expertise.

The Technical Reference Group were included in the discussion of alternatives via scheduled and ad-hoc meetings once they had been investigated to a sufficient level of detail by the proponent and relevant specialists (as described in Section 4.4.6) and found to be reasonable options for consideration.

Details of community and stakeholder consultation undertaken during preparation of this EES, key issues raised and the responses to these issues (in the context of the EES studies) are provided in Chapter 7 – ***Stakeholder consultation***.

4.6 Environmental management framework

The design approach adopted a hierarchy of controls of firstly avoiding an impact if feasible and practical, then minimising the severity of the impact over space and time, followed by rehabilitation or restoration (e.g., to stabilise or restore a disturbed area), and finally offsetting to compensate for residual impacts (e.g., for a loss of biodiversity by protecting similar values elsewhere). The aim of management measures is to protect identified values and meet the evaluation objectives. The hierarchy of controls adopted by the project is presented in Figure 4.4.

Elimination by design has been used across the project, including avoiding areas of native vegetation where possible and applying buffers along waterways to minimise the risk of impact to waterways and the values they support. Abatement or attenuation controls have been applied by increasing separation distances between dwellings and wind turbine locations, minimising potential amenity impacts.

Management measures are those measures that would be implemented during pre-construction, construction, operation and decommissioning of the project with the purpose of reducing the likelihood and/or consequence of an identified impact or the severity, extent and/or duration of a known adverse effect.

Design controls are robust measures developed during the project design stage with the intent of avoiding or minimising impacts on defined environmental values or sensitive receptors.

Management measures are administrative or procedural controls that will reduce the likelihood and/or consequence of an identified risk event.

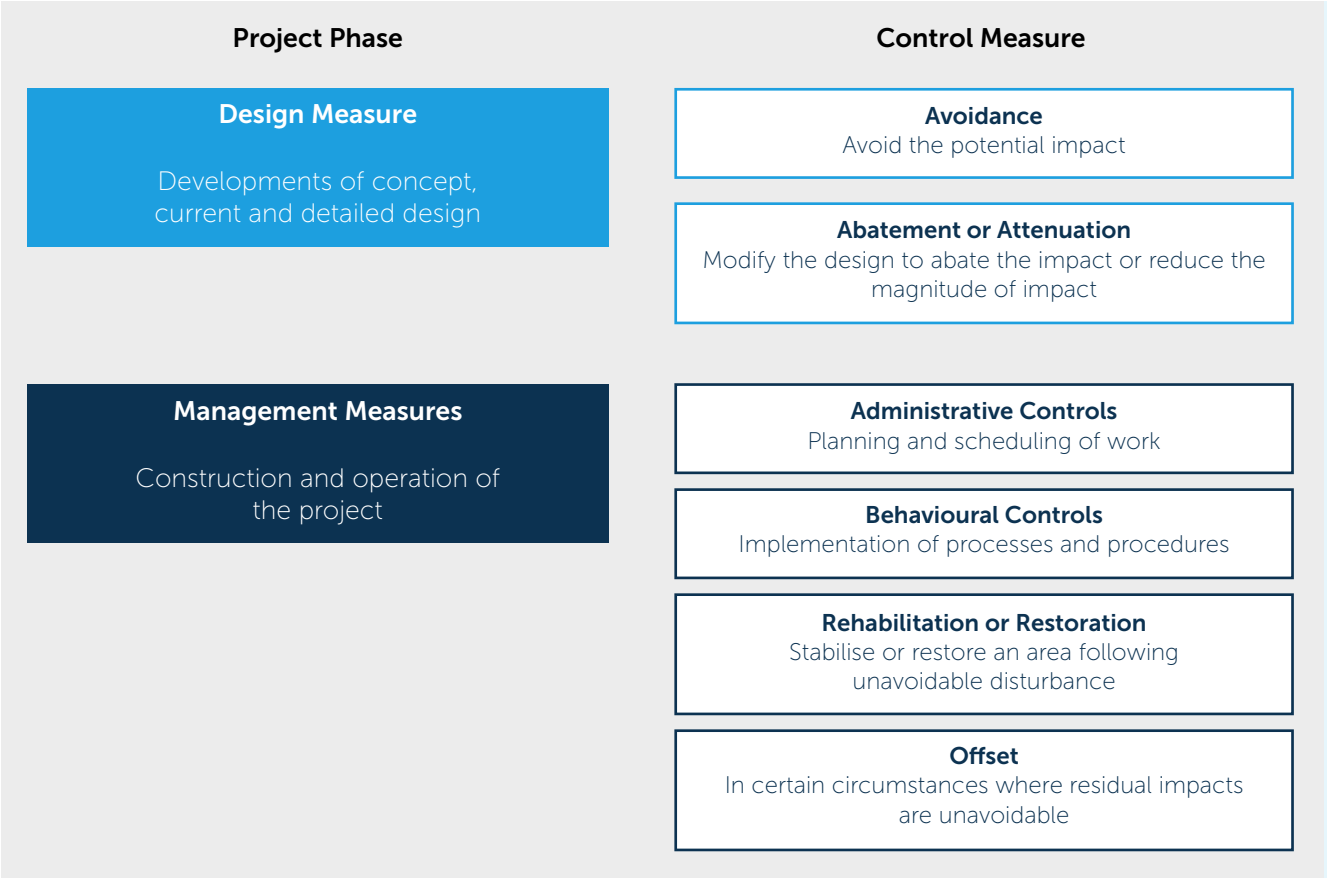

Figure 4.4 Project hierarchy of mitigation controls

A full description of the assessment of project alternatives and the changes that have been made to avoid and minimise environmental, social and heritage impacts is provided in Chapter 5 – ***Project alternatives and design development***. The current design for assessing project impacts and construction methods, developed from the iterative process, is detailed in Chapter 6 – ***Project description***.

Chapter 28 – ***Environmental management framework*** includes a list of environmental management measures (i.e., mitigation measures), developed with subject matter experts during the preparation of this EES, with clear accountabilities for managing environmental effects and hazards associated with construction, operation and decommissioning phases of the project. These management measures assume design measures have already been applied during the current design phase in response to regulations, guidelines and standards, and through an iterative impact assessment process.

Management measures are required to limit the severity, extent and duration of any potential negative impacts and enhance the potential positive effects of the project. While management measures typically respond to relevant legislation, policies and guidelines, these would be integrated into statutory approvals for the project. Various measures are also proposed in response to stakeholder discussions and commitments.

The Environmental Management Framework also guides the preparation, review, approval and implementation of environmental management plans and procedures (e.g., Construction Environmental Management Plan, Operations Environmental Management Plan and Decommissioning Plan). Development of these plans will be informed by, and capture the requirements of, the management measures nominated for the project, detailed in Chapter 28 – ***Environmental management framework***. The Environmental Management Framework provides for the regular review and updating of these plans and procedures, as well as independent monitoring, auditing and reporting of compliance to ensure management measures are working as designed. The Environmental Management Framework would be endorsed by the Minister prior to project construction commencing.

The environmental management plans and procedures would also include appropriate contingency measures to address identified environmental, social and business risks during project construction, operation and decommissioning. These contingency measures would be implemented in the event that monitoring or auditing (or any other means) identifies issues that were not anticipated or impacts that prove greater than anticipated.

4.7 Assurance

The assessment for this EES is consistent with the Ministerial Guidelines (DTP, 2023b) and Significant Impact Guidelines 1.1 – Matters of National Environmental Significance (DoE, 2013). The contents of the EES have been cross-checked against the EES scoping requirements.

To provide confirmation that the assessment methodology is robust and consistent with legislated requirements, key specialist studies have been prepared by suitably qualified and independent consultants. An independent peer review by recognised specialists was undertaken for noise, vibration, and visual amenity impact assessments, the results of which were provided to the Technical Reference Group. This also included verification of the Pre-Construction Noise Assessment prepared for the project by an EPA Victoria appointed Environmental Auditor. These reviews informed the development of Chapter 17 – ***Noise and vibration*** and Chapter 14 – ***Landscape and visual,*** and are provided in Appendix E2 – ***Preconstruction noise assessment report verification***, Appendix E3 – ***Noise and vibration independent peer review*** and Appendix F2 – ***Landscape and visual independent peer review***.