

Department of Planning, Housing and Infrastructure


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Wind Energy Guideline

November 2024



Guidance for State significant wind
energy development



Acknowledgement of Country

The Department of Planning, Housing and Infrastructure acknowledges that it stands on Aboriginal land. We acknowledge the Traditional Custodians of the land, and we show our respect for Elders past, present and emerging through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.

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Contents

| | |
|---|-----------|
| Glossary of terms | 4 |
| 1 Introduction | 7 |
| 1.1 Objectives | 9 |
| 1.2 Wind energy | 9 |
| 1.3 Strategic context..... | 10 |
| 1.4 Application and scope of this guideline..... | 11 |
| 2 Planning framework | 12 |
| 2.1 Wind energy projects as ‘State significant development’ | 13 |
| 2.2 Areas where wind energy development may be allowed | 14 |
| 2.3 Process for assessing wind energy projects..... | 16 |
| 2.4 Other approvals that may be needed..... | 18 |
| 2.5 Regulation of approved wind energy projects | 20 |
| 2.6 Critical State significant infrastructure..... | 21 |
| 3 Community and stakeholder engagement | 22 |
| 4 Site selection and project design | 25 |
| 4.1 Importance of site selection | 26 |
| 4.2 Process of site selection and project design | 26 |
| 4.3 Micro-siting and environmental envelopes | 28 |
| 5 Assessment issues and requirements | 30 |
| 5.1 Landscape and visual impacts..... | 31 |
| 5.2 Noise and health | 35 |
| 5.3 Aviation safety and lighting | 36 |
| 5.4 Bird and bat impact assessment..... | 38 |
| 5.5 Traffic and transport..... | 40 |
| 5.6 Infrastructure contributions, benefit sharing and private agreements..... | 43 |
| 5.7 Decommissioning and rehabilitation..... | 45 |
| 5.8 Waste management and circular design..... | 47 |
| 6 Other assessment issues | 49 |
| Appendix A Aviation and lighting impact assessment | 54 |
| Appendix B Example development rights impact assessment | 58 |

Glossary of terms

| Term | Explanation |
|--|---|
| Applicant | A person seeking consent for a development or modification application for a State significant development project under the <i>Environmental Planning and Assessment Act 1979</i> , or any person who seeks to carry out the development |
| Associated residence | A residence on privately owned land in respect of which the owner has reached an agreement with the applicant about the development and management of impacts |
| Benefit sharing | Approaches and mechanisms that aim to distribute the financial and other benefits of a project between the applicant and the host community |
| Blade throw | A structural failure that results in either the full blade or a segment of the blade detaching and being thrown from a wind turbine |
| Candela | The luminous intensity of a light source |
| Consent authority | The authority responsible for granting or refusing consent for a development or modification application |
| Critical State Significant Infrastructure | Development that the Minister for Planning has declared to be essential for the State for economic, environmental or social reasons |
| Decommissioning | The removal of wind turbines and ancillary infrastructure such as substations and monitoring masts |
| Department | Department of Planning, Housing and Infrastructure |
| Development application | An application seeking consent for State significant development under part 4 of the <i>NSW Environmental Planning and Assessment Act 1979</i> |
| Dwelling | A room or suite of rooms occupied or used as a separate domicile as well as a building that meets the criteria outlined in section 1.3 of <i>Wind Energy Guideline – Technical Supplement for Landscape and Visual Impact Assessment</i> |
| Environmental impact statement | A document prepared by or on behalf of the applicant to accompany a development application that includes a comprehensive assessment of the environmental, social and economic impacts of the project |

| Term | Explanation |
|---|---|
| Landholder agreement | An agreement negotiated between an applicant and landholder to manage the impacts of hosting infrastructure on the land and any exceedances of relevant environmental impact assessment criteria. It also governs the type of tenure an applicant will have over the land hosting the project infrastructure and sets out a detailed set of terms for which both parties will be governed by for the life of the project |
| Landscape | A holistic area comprised of landform, vegetation, buildings, villages, towns, cities and infrastructure |
| Landscape character | An area or sense of place definable by the quality of its built, natural and cultural elements |
| Modification application | An application seeking to modify a development consent, which may include revoking or varying a condition of consent – modification requires consent under the <i>NSW Environmental Planning and Assessment Act 1979</i> |
| Non-associated residence | A residence on privately-owned land in respect of which the owner has not reached an agreement with the applicant in relation to the development or A residence on privately-owned land in respect of which the owner has reached an agreement with the applicant in relation to the development, but the agreement does not cover the relevant impact or the performance measure under the agreement has been exceeded |
| Planning Secretary | The Secretary of the Department of Planning, Housing and Infrastructure |
| Planning Secretary's environmental assessment requirements | Requirements that set out the matters that must be addressed in an environmental impact statement |
| Protected area | Lands reserved or otherwise protected for conserving biodiversity or Aboriginal cultural heritage – this includes lands reserved under the <i>National Parks and Wildlife Act 1974</i> , flora reserves under the <i>Forestry Act 2012</i> , declared wilderness under the <i>Wilderness Act 1987</i> , Indigenous protected areas, world heritage areas and Ramsar wetlands |
| Rehabilitation | The restoration of land disturbed by the development to a good condition to ensure it is safe, stable and non-polluting |
| Renewable energy zone | A designated area to support renewable energy development as declared in the <i>Electricity Infrastructure Investment Act 2020</i> |

| Term | Explanation |
|--------------------------------------|--|
| Sensitivity | A measure of the capacity of an element of the landscape to absorb the impacts from a proposed land use change and/or built form |
| State significant development | A development declared to have state significance due to its size, economic value or potential impacts |
| Vacant land | Any lot that does not contain an existing dwelling |
| Viewpoint | A location within the private or public domain with a potential view of a wind energy project |
| Wind energy development | Works, infrastructure and buildings for generating electricity using wind turbines |

1

Introduction



Australia has world-class wind energy resources and an established wind energy industry. Wind energy is the second largest contributor to the clean energy transition after rooftop and large-scale solar. The Australian Energy Market Operator estimates that twice the current amount of wind capacity will be needed by 2030 to support household energy consumption and industry needs.

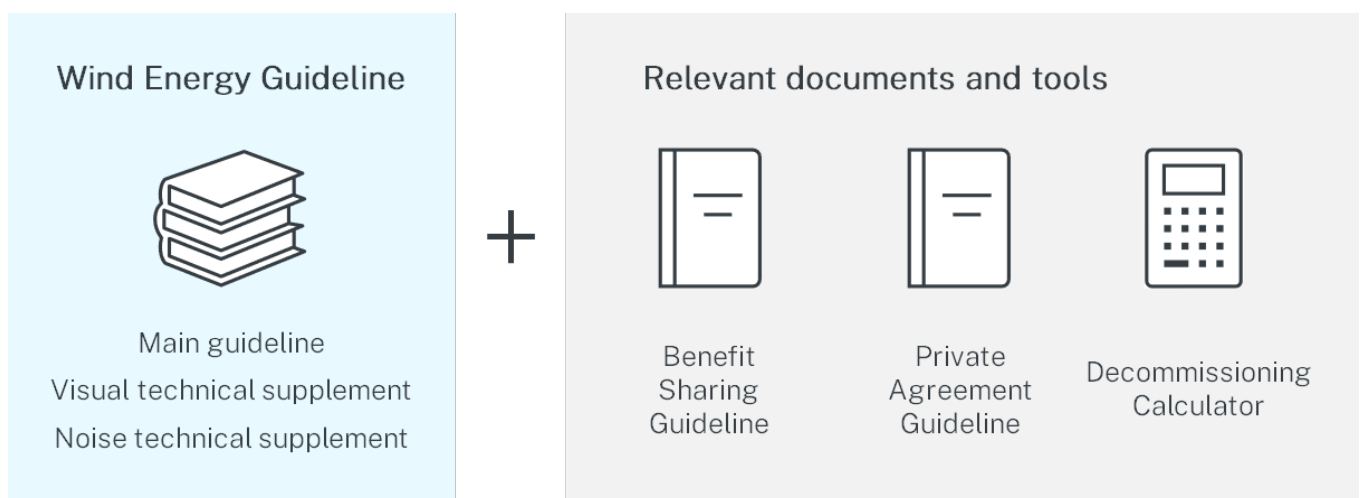
The NSW Government strongly supports the ongoing development of a sustainable wind energy industry in NSW. Wind energy supports our transition away from fossil fuels and helps deliver a safe, stable and reliable energy supply. This transition will help us meet our legislated emission reduction targets by driving down carbon emissions and increasing our resilience in the face of climate change.

This Wind Energy Guideline will help the community, industry, applicants and regulators navigate the planning framework under which we assess wind energy. This guideline identifies key planning considerations relevant to wind energy development and provides policy and technical guidance on key issues of the technology.

The guideline is supported by 2 technical supplements, one for landscape and visual impact assessment and another for noise impact assessment. These provide detailed guidance and tools for assessing, evaluating and mitigating the impacts of wind energy development.

This guideline and its supplements are part of the Renewable Energy Planning Framework and should be read in conjunction with the other documents making up this framework (where relevant), including the [Benefit Sharing Guideline](#) and [Private Agreement Guideline](#).

We will regularly review and update this guideline to ensure it reflects any changes in knowledge and technology as the wind energy industry continues to develop and evolve.



1.1 Objectives

The objectives of this guideline are to:

- support the development of a sustainable wind energy industry in NSW
- encourage the industry to select suitable sites and locations for turbines to avoid or reduce the likelihood of land use conflicts, environmental impacts and impacts on the community
- provide clear and consistent guidance on how to measure and assess the key environmental and social impacts of wind energy projects in NSW
- provide clear and consistent expectations to improve the quality of development applications and reduce delays in assessments
- promote meaningful, respectful, effective and best-practice community and stakeholder engagement throughout the development assessment process.

1.2 Wind energy

Wind turbines convert the kinetic energy in the wind into mechanical power that is then converted into electricity. With advancements in technology, wind turbines are getting larger (bigger blades), taller and more efficient. Utility-scale wind turbines in NSW are now typically around 200 m to 250 m high (measured from ground to tip height), with some proposals up to 300 m (subject to future available technology and construction methods). New turbines can have a generating capacity of around 7 MW of electricity, enough to power up to 4,000 homes over the course of a year.

Wind energy development involves installing wind turbines in large groups (see Figure 1). It also includes a range of associated infrastructure, works and buildings such as:

- internal access roads
- hardstand areas
- underground and overhead cabling and transmission infrastructure
- electrical operations and maintenance facilities
- connections to the transmission network.

Wind monitoring masts are also installed to gather data on meteorological conditions. Some wind energy developments also include battery energy storage systems that can distribute energy when it's needed, including when electricity demand is at its highest.

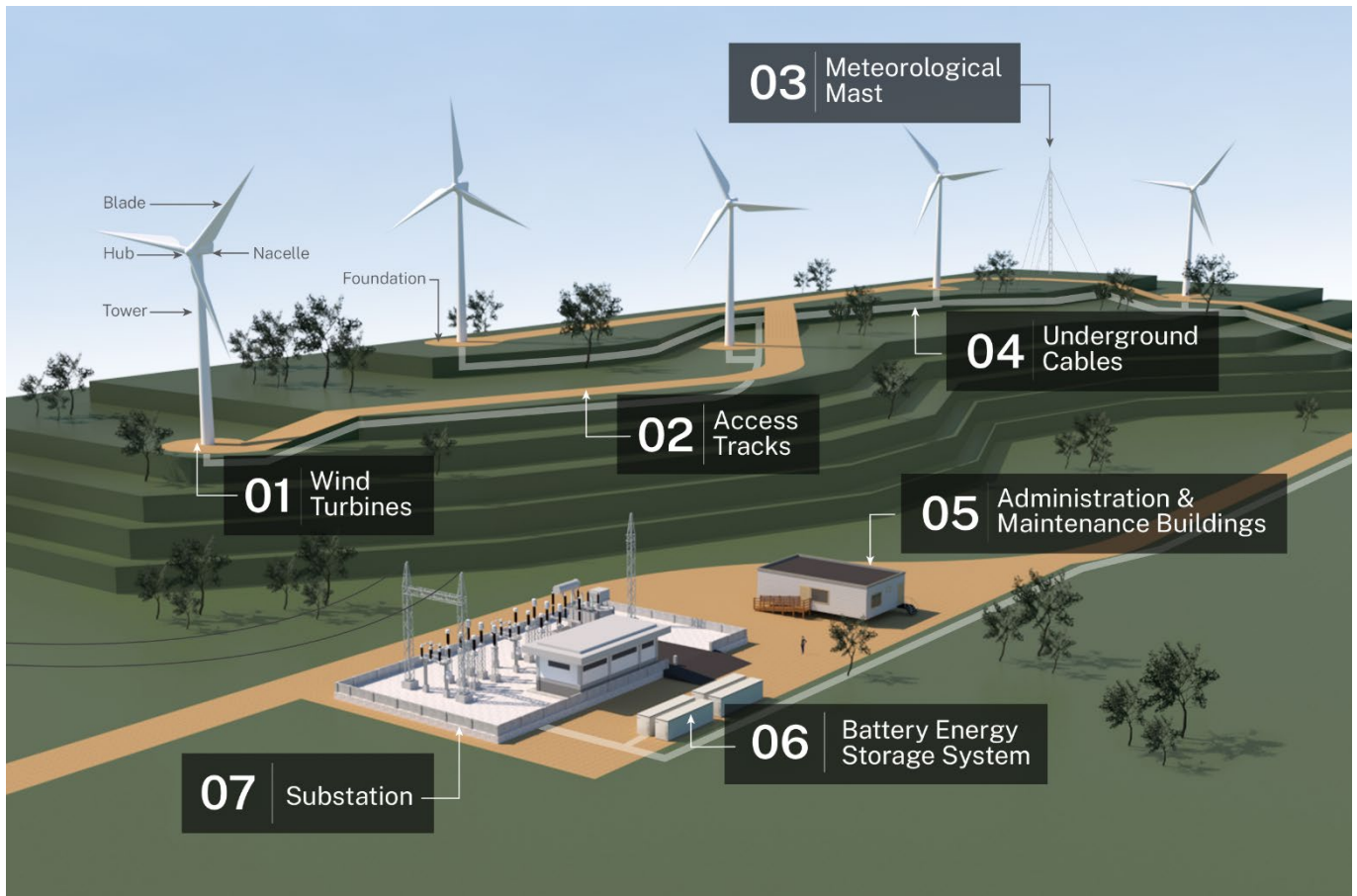


Figure 1. Components of a typical wind energy project

1.3 Strategic context

Our state’s coal-fired power stations, which have been a reliable source of electricity for our community and businesses for generations, are aging and scheduled to close in the next 15 years. As they reach the end of operations, they become more expensive to maintain. The cheapest form of energy generation to replace these stations is renewable energy.

Urgent investment in renewable energy infrastructure, including in wind energy, is needed to transition our energy system away from coal and to ensure NSW has continued access to cheap, clean and reliable energy. It will also help us meet our legislated emission reduction targets under the *Climate Change (Net Zero Future) Act 2023*.

The NSW Government’s *Electricity Infrastructure Roadmap* (the Roadmap) sets out a 20-year plan to ensure that the transition happens in an orderly way and benefits everyone. The move will bring new investment to regional NSW, boosting funding and creating new local jobs. There will be demand for workers in local manufacturing, agriculture, retail and transport in the construction phase, as well as ongoing roles in operating and maintaining the facilities. We estimate the Roadmap will attract up to \$32 billion of private-sector investment in electricity infrastructure by 2030, supporting 6,300 construction jobs and 2,800 ongoing jobs.

1.3.1 Renewable energy zones

As part of the Electricity Infrastructure Roadmap, the NSW Government has committed to deliver at least 5 renewable energy zones (REZs). The planned zones are in the Central-West Orana, New England, South-West, Hunter Central Coast and Illawarra regions of NSW. The Energy Corporation of NSW is leading the delivery of these REZs.

REZs are modern-day power stations. They combine renewable energy generation such as wind and solar, storage such as batteries and network infrastructure such as high-voltage poles and wires in dedicated areas in NSW. The NSW Government will encourage development in REZs to support a transition to renewable energy. This will ensure that development occurs in appropriate areas close to existing transmission infrastructure and has fewer environmental and land-use constraints than in other parts of NSW.

While most development will be concentrated in the REZs, there is development potential outside the zones that will further support the transition. This guideline applies to wind energy projects both inside and outside REZs.

1.4 Application and scope of this guideline

This guideline applies to onshore wind energy development declared as State significant development or critical State significant infrastructure under the *Environmental Planning & Assessment Act 1979* (EP&A Act). The criteria for a wind energy project to be in one of these categories is described in sections 2.1 and 2.6 of this guideline respectively.

This guideline does not apply to offshore wind energy developments. The Australian Government assesses and manages offshore wind projects because the key infrastructure would be located outside the jurisdictional boundaries of NSW.

Applicants¹ of wind energy projects must prepare their environmental impact statements according to the Planning Secretary's environmental assessment requirements and this guideline.

This guideline and technical supplements must also be considered when preparing and assessing applications to modify a State significant development consent for wind energy development. We encourage applicants to consult with us to determine the level of assessment needed. The level of detail should be proportionate to the scale of the modification and the likely additional impacts.

¹ If the development is declared to be Critical state significant infrastructure, the 'applicant' is referred to as the 'proponent'

2

Planning framework



The EP&A Act sets out the environmental planning and assessment framework for all development in NSW. This framework identifies where wind energy development may be permitted and the process by which it must be assessed and determined.

2.1 Wind energy projects as ‘State significant development’

A wind energy project is State significant development² if it requires development consent and has:

- a capital investment value of more than \$30 million
- or
- a capital investment value of more than \$10 million and is in an environmentally sensitive area of state significance³.

Most wind energy projects in NSW are considered State significant development.

The Minister for Planning and Public Spaces may also, by way of an order, declare specified development on specified land to be State significant development. The minister is generally the consent authority for State significant development. The minister may delegate a senior departmental officer to exercise the consent authority functions.

In cases where the application to carry out the development is not made by or on behalf of a public authority or the development is not related to State significant infrastructure, the Independent Planning Commission is the consent authority for State significant development applications when:

- there are 50 or more submissions of objection (other than from council) made during the exhibition of the application
- and/or
- the local council objects to the State significant development application
- and/or
- the applicant has disclosed a reportable political donation.

² Section 4.36, EP&A Act; section 2.6 and schedule 1, section 20, State Environmental Planning Policy (Planning Systems) 2021

³ ‘Environmentally sensitive area of state significance’ is defined in section 2.2 of the State Environmental Planning Policy (Planning Systems) 2021

2.2 Areas where wind energy development may be allowed

The EP&A Act and relevant environmental planning instruments, including local environmental plans and state environmental planning policies, determine where wind energy development is permitted. Key considerations include:

- the zoning and land use provisions of the relevant local environmental plans
- part 2.3, division 4 of the State Environmental Planning Policy (Transport and Infrastructure) 2021 (the Transport and Infrastructure SEPP) for electricity generating works.

In general, wind energy development can be permitted with consent on any land zoned for rural (RU1, RU2, RU3 and RU4), industrial (IN1, IN2, IN3 and IN4) or special-purpose (SP1 and SP2) uses in the relevant local environmental plans⁴. In effect, this means that wind energy development is permitted across large parts of NSW to ensure flexibility about where this development can occur. Where wind energy development is permitted with consent (or partly permitted), the applicant can lodge a development application for determination by the relevant consent authority if it has the consent of the owner of the land.

Not all aspects of a wind energy proposal will need development consent. For example, wind monitoring towers may be installed without planning approval (as ‘exempt development’) under the Transport and Infrastructure SEPP if they comply with specific requirements and would be used to investigate the feasibility of a wind resource.

For electricity transmission and network connection works, we encourage applicants to consult with the relevant transmission or distribution network service provider early in the project planning process to identify the scope of works required to enable connection and to determine the planning assessment pathway for those works (see section 2.4 of this guideline).

2.2.1 Landowner’s consent

If the applicant is not the owner of the land to which the development application relates (or is not the only owner), an application can only be made with the consent of all owners of the land⁵ (subject to the exceptions in s 23(2) of the NSW Environmental Planning and Assessment Regulation 2021).

The consent of the owner of the land is not required for a development application made by a public authority or if application is designated as public notification development⁶ provided the applicant gives notice in accordance with sections 23(3) and (4) of the Environmental Planning and Assessment Regulation.

⁴ Section 2.36(1)(b), State Environmental Planning Policy (Transport and Infrastructure) 2021

⁵ Section 23(1)(b), Environmental Planning and Assessment Regulation 2021

⁶ Section 23(2), Environmental Planning and Assessment Regulation 2021

Once approved, the applicant has a set time within which to begin constructing the project. Consent will lapse after this time. The landowner is not required to carry out the approved development.

If a project proposes changes to an existing substation as part of the project, the applicant must get consent from the transmission network operator or the relevant distributor.

If an applicant is seeking to modify an existing development consent (see section 2.3.2 of this guideline), a modification application can only be made if all owners of the land provide written consent⁷.

2.2.2 Regional cities

The NSW Government's regional plans identify cities that are strategically important to the ongoing growth and development of regional NSW.

We expect significant population growth in regional cities over the next few decades. Investing in these cities is important. They represent major centres for housing, employment, commerce, tourism, education, health and other regional infrastructure and services.

To approve wind energy developments near certain regional cities, the consent authority must be satisfied that any urban land conflicts, impacts on urban growth potential and important scenic values are not significant⁸. This applies to State significant wind energy generation projects located on mapped land for the regional cities of Albury, Armidale, Bathurst, Dubbo, Goulburn, Griffith, Goulburn, Mudgee, Orange, Tamworth and Wagga Wagga.

While these provisions do not prohibit wind development in these areas, a consent authority must not grant development consent unless it is satisfied that the development:

- is located to avoid significant conflict with existing or approved residential or commercial uses of land surrounding the development
- is unlikely to have a significant adverse impact on the regional city's capacity for growth, scenic quality or landscape character.

The consent authority must factor in any proposed measures to avoid or mitigate those conflicts and adverse impacts.

⁷ Landowner's consent is required from all owners of land to which the approval the subject of the modification applies (i.e., the owners of land specified in the approval).

⁸ Section 2.42, Transport and Infrastructure SEPP

2.3 Process for assessing wind energy projects

All development applications for wind energy projects will be subject to a rigorous, merit-based assessment. The assessment includes extensive community consultation and a detailed consideration of any environmental, social and economic impacts.

The main steps in the assessment process are shown in Figure 2 and summarised below. The process is explained in more detail in our [State Significant Development Guidelines](#).

2.3.1 Development applications

All development applications for State significant development projects must be accompanied by an environmental impact statement. The purpose of the environmental impact statement is to help the community, councils, government agencies and the consent authority understand the impacts of a project so they can make informed submissions or a decision about a project's merits.

Applicants must prepare the environmental impact statement in accordance with the Planning Secretary's environmental assessment requirements. The requirements identify the information the applicant must provide in the environmental impact statement and the community engagement they must conduct.

To enable us to issue the Planning Secretary's environmental assessment requirements, the applicant must submit a scoping report that provides a clear overview of the project and identifies the key environmental assessment issues. The overview should include information such as the project's location, proposed layout and proximity to important features, protected areas and neighbours.

The applicant must also outline in the scoping report how it has engaged with the local community about the project and how it intends to undertake meaningful consultation with affected stakeholders during the assessment process (refer to section 3 of this guideline). The applicant must prepare the scoping report to a high standard and in line with our [State Significant Development Guidelines](#).

While the length of an environmental impact statement will vary depending on the scale and nature of the project, the main report should be as succinct as possible. Applicants should prepare the environmental impact statement according to the general structure and length requirements outlined in our [State Significant Development Guidelines](#).

Once we receive the environmental impact statement, we will exhibit the development application for at least 28 days – we may extend the exhibition if it runs over the Christmas and New Year

period⁹. This gives the community an opportunity to have a say on the merits of a project before any final decision is made. Other government agencies may also provide advice during this stage.

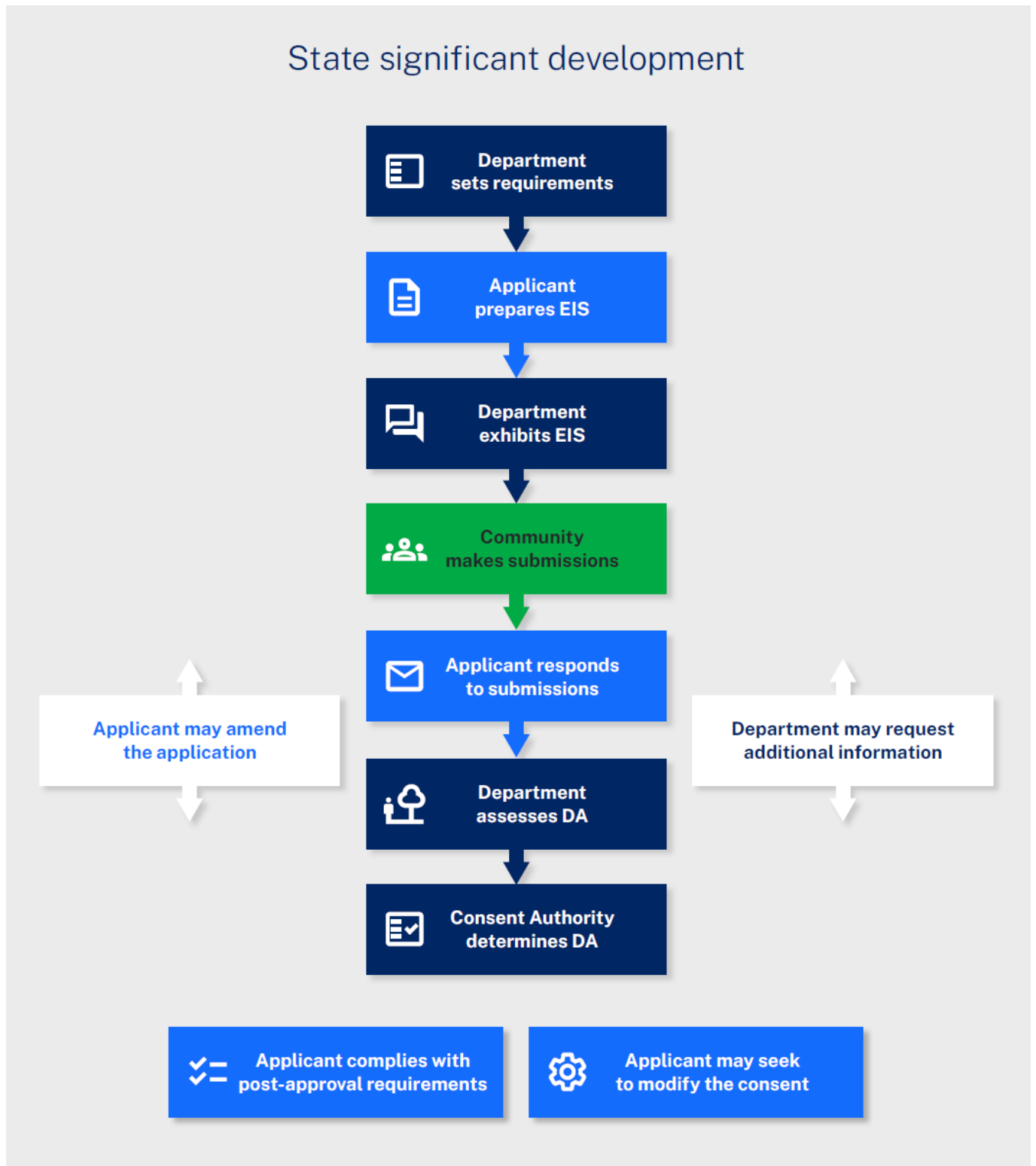


Figure 2. State significant development assessment process

⁹ Schedule 1, clause 16, EP&A Act

After the exhibition, the applicant must respond to submissions. The consent authority will then assess the overall significance of any impacts by reviewing the environmental assessment, submissions, and the applicant's response to submissions. It will also consider the broader public interest. Any development consent granted will be subject to certain conditions (see section 2.5 of this guideline).

We are committed to assessing projects in a timely manner to support a rapid transition to renewable energy.

We will make every effort to assess applications within 100 days. We may need or request additional information from the applicant to support our assessment. The time taken for an applicant to respond to any material matters is not counted in our assessment timeframes. However, we will use our best endeavours to limit major information requests (meaning requests that are material to the assessment of the project) to once per stage of the assessment process.

2.3.2 Modifying an approved project

An applicant may apply to amend a State significant development consent. A consent authority may modify the consent provided that, among other matters, the modified development will be substantially the same as the development for which the consent was originally granted.

Modifications may be needed to change or improve the design of the project (for example, by increasing the size and height of the turbines) or to change the conditions of the development consent.

We will assess the modification under the EP&A Act and according to the process described in our [State Significant Development Guidelines](#).

2.4 Other approvals that may be needed

This section outlines some approvals that may be required in addition to the development consent. If in doubt about what approvals are needed, consult the department or relevant government agency.

2.4.1 Australian Government approval

Under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (the EPBC Act), the Australian Government may need to give approval if a development is likely to have a significant impact on matters of national environmental significance or other protected matters. This includes, but is not limited to, impacts on listed threatened species and ecological communities.

In such cases, an applicant must refer their project to the Australian Department of Climate Change, Energy, the Environment and Water.

The Australian Government's *Significant Impact Guidelines* will help applicants determine whether an impact is likely to be significant. You can make a referral through the Australian Government's EPBC Act Business Portal.

The NSW assessment process for State significant development under the EP&A Act has been accredited under a bilateral agreement with the Australian Government. The assessment of both state and federal matters can be integrated into a single assessment process. This means that as well as the Planning Secretary's environmental assessment requirements, the environmental impact statement will need to consider any additional matters identified by the Australian Government.

After we determine a project under the EP&A Act, the Australian Government makes its decision under the EPBC Act by reviewing the department's report and issuing any additional conditions of consent as part of its approval.

2.4.2 Subdivisions

Some sites may require land subdivision to support the proposed development. For example, subdivisions may be needed to accommodate substations or for land that will be leased for longer than 5 years¹⁰.

If an applicant wants to include a subdivision in the scope of its State significant development application, it should first discuss subdivision options with the relevant council. This will allow applicants to make an informed decision regarding whether to include the subdivision in its application.

2.4.3 Network connections and transmission lines

Wind energy developments need connections to the electricity transmission network or distribution grid. This may require associated infrastructure such as substations, converter stations, transmission lines and access roads.

Applicants should include network connection works as part of their State significant development application to streamline stakeholder engagement and to ensure that we can consider all aspects of the development during the assessment process.

Applicants should include the potential environmental impacts of network connections in the environmental impact statement. This includes the impacts associated with the construction of substations and above ground and underground infrastructure. You may need additional approvals for transmission lines.

¹⁰ Section 7A, *Conveyancing Act 1919* (NSW)

The applicant can refer to our [Transmission Guideline](#) for guidance on assessment issues and considerations associated with major transmission infrastructure. However, the [Transmission Guideline](#) will only apply to a project if expressly stated in the Planning Secretary's environmental assessment requirements.

2.4.4 Environment protection licence

An environment protection licence regulated under the NSW *Protection of the Environment Operations Act 1997* is required for wind energy projects. The Act aims to prevent the degradation of the environment by preventing pollution, eliminating harmful wastes and promoting the reuse, recovery or recycling of materials.

An environment protection licence is issued by the [NSW Environment Protection Authority](#) after development consent has been granted for a project. The licence regulates issues such as noise, air quality and water management. The requirements of the licence are informed by and must be consistent with the development consent conditions, which form part of the regulatory framework for wind energy developments.

2.5 Regulation of approved wind energy projects

When a wind energy project is approved, the development consent will include conditions for things like:

- visual impact mitigation, such as landscaped screening at affected dwellings
- road upgrades, site access and maintenance requirements
- stormwater management, erosion and sediment control and flood mitigation work
- biodiversity management and mitigation measures
- heritage protection measures
- obligations to manage risks associated with bushfire and dangerous goods
- decommissioning and rehabilitation of the site
- the requirements for minimising and managing waste.

These conditions continue to apply to the project and related land throughout its construction and operational life, as well as during the decommissioning and rehabilitation phases.

2.5.1 Compliance

Applicants are responsible for complying with the conditions of consent under the EP&A Act. Our compliance teams are responsible for monitoring compliance with the conditions of consent, including following up any suspected breaches reported by the public.

Compliance-related complaints regarding wind energy development consents can be made using the Make a complaint form on the [NSW Planning Portal](#). Our compliance team will contact the complainant within 14 days to seek further information or provide a progress update.

All wind energy development must comply with the environment protection licence for the project. The NSW Environment Protection Authority is the regulatory authority for the purpose of the *Protection of the Environment Operations Act 1997*.

2.6 Critical State significant infrastructure

The minister may declare development to be critical State significant infrastructure under section 5.13 of the EP&A Act. Critical State significant infrastructure is infrastructure considered essential to the state for economic, environmental or social reasons. The [Declaration of SSI and CSSI – State Significant Infrastructure Guide](#) sets out the general principles and reasons for the minister to declare development as critical State significant infrastructure.

The minister will consider requests to declare wind energy development as critical State significant infrastructure if it includes a significant energy storage system (for example, a battery with a power capacity of 750 MW and a useable energy storage capacity of 1,500 MWh or more).

While the assessment process is generally the same as for State significant development, there are few key differences. The minister is the determining authority for all critical State significant infrastructure decisions and cannot delegate this function. Additionally, applicants do not need the landowners' consent to lodge an application, and a decision is not subject to judicial review (a review of the administrative decisions and conduct) by the Land and Environment Court unless approved by the minister.

A critical State significant infrastructure application or approval does not allow the applicant to compulsorily acquire land. Compulsory acquisition is a process undertaken only by an authority of the state under the *NSW Land Acquisition (Just Terms Compensation) Act 1991*. It also does not allow the applicant to construct or operate a project without the consent of the landowner.

The critical State significant infrastructure process is explained in more detail in the [Critical State Significant Infrastructure Guideline](#).

3

Community and stakeholder engagement



Effective community and stakeholder engagement is essential for the development of the wind energy industry and the environmental assessment process. Applicants should consider a diverse range of views to achieve positive planning outcomes.

Applicants must undertake meaningful engagement with stakeholders throughout the environmental impact assessment process and during the construction, operation and decommissioning phases of the project. They must consult the community according to the [Undertaking Engagement Guidelines for State Significant Projects](#).

These guidelines include requirements for applicants to:

- provide clear and concise information to the community and stakeholders about projects and their impacts
- implement activities that encourage and facilitate public participation
- report on what was heard and what changes were made in response to feedback and why.

The Planning Secretary's environmental assessment requirements and consent conditions may include additional consultation requirements that applicants must also comply with.

Applicants should engage with the community as early as possible to identify potential opportunities and constraints associated with the proposed development. The applicant should identify the elements of the project and the environmental assessment that can be influenced or shaped by the community. These could relate to the project design, the characterisation of the area and/or the management and mitigation measures proposed. Examples include:

- the positioning and siting of the project including any setbacks
- characterisation of the scenic quality and sensitivity of the landscape and viewpoints (see the supporting [Wind Energy Guideline - Technical Supplement for Landscape and Visual Impact Assessment](#))
- visual impacts including mitigation measures.

Applicants must also ensure that stakeholders are given the opportunity to participate in the engagement process in a meaningful way. The environmental impact statement should include details of consultation with surrounding residents, community members, relevant authorities and councils. This includes the key matters raised and how feedback was considered and incorporated into the project.

Where an applicant is proposing multiple projects close to each other, they should consider combining engagement activities to reduce consultation fatigue and provide greater transparency for the community.

The applicant must also consult with the holders of any mining tenements on the subject land to identify potential conflicts.

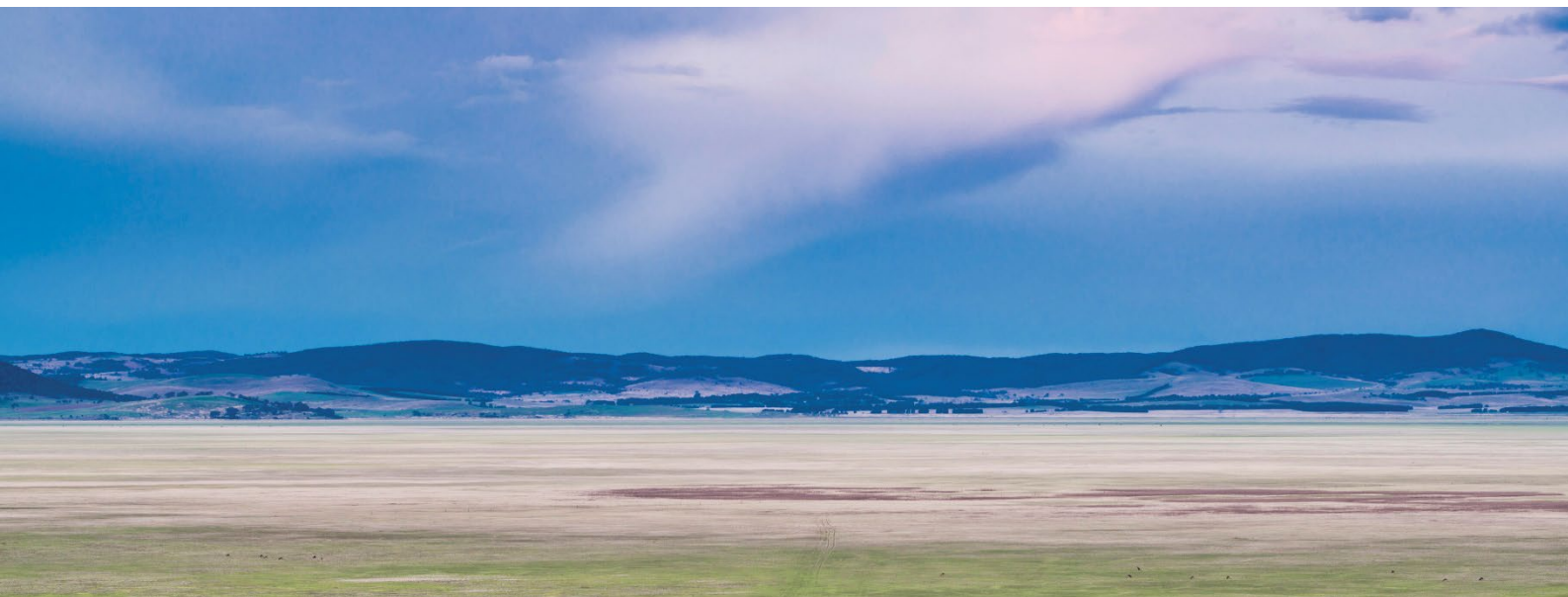
It is common for an applicant to have private agreements with landholders to either host infrastructure from the development or to manage the impacts. The applicant should properly inform landholders about the implications of such an agreement and make sure that consultation and negotiations are undertaken in a fair and reasonable manner. Our [Private Agreement Guideline](#) provides further advice for applicants and landholders who are considering such an agreement.

Applicants should continue to engage with stakeholders after any development consent has been granted. They must have an effective complaint handling system that addresses community concerns in a timely manner. However, if such concerns relate to compliance with the project's development consent, concerned community members are encouraged to lodge a complaint with us for investigation (see section 2.5.1).

If there are other complaints that cannot be resolved through the applicant's complaint handling system, concerned community members are encouraged to lodge a complaint with the [Office of the Australian Energy Infrastructure Commissioner](#).

The Department of Planning, Housing and Infrastructure plays a role in consulting with stakeholders and the community. We must:

- consult with relevant government agencies and councils to ensure that issues are fully considered in the assessment process
- exhibit the environmental impact statement for public comment for a minimum of 28 days
- publish documents and submissions relating to the project on the NSW Planning Portal
- ask the applicant to respond to issues raised in submissions and agency advice to help the community and stakeholders understand how issues have been addressed and considered
- outline our decision or recommendation, including how community feedback was considered.



4

Site selection and project design



Good site selection and project design helps to avoid or minimise negative impacts at the outset, allowing the assessment of a project to focus on mitigating and managing unavoidable impacts.

4.1 Importance of site selection

Well-sited wind energy projects can have minimal impacts on the environment, surrounding land uses and the community. A good site can result in greater social licence to operate, shorter assessment timeframes, reduced offset obligations and fewer conditions of consent needed to manage residual impacts.

Sites with multiple environmental and planning constraints may still be capable of being developed in a suitable manner with good design and appropriate siting of turbines. The consent authority is obliged to consider each application on its merits.

If the applicant is not proposing to avoid impacts on the site's constraints, they must outline a clear justification for site selection and the layout of the development in the environmental impact statement.

4.2 Process of site selection and project design

There are many technical and commercial factors that applicants need to consider when selecting a site for a wind energy development. The primary driver will be the availability of good wind resources.

However, there are other significant environmental, technical and commercial factors that need to be considered, including:

- proximity to existing and planned transmission infrastructure
- availability of land
- available network capacity
- development restrictions including land use zoning
- areas of high biodiversity value, including threatened species, native vegetation and endangered ecological communities
- proximity to major roads and transport infrastructure
- proximity to sensitive viewpoints such as residences and public viewpoints and the potential for noise and landscape and visual impacts
- distance to major towns and regional cities
- proximity to airports and regional aircraft flight paths
- proximity to protected area boundaries

- Indigenous and non-Indigenous heritage items and places of significance
- watercourses and other important wetlands
- flood-prone and bushfire-prone land.

Nevertheless, site selection factors are complex and often compete. The large scale of wind energy developments adds to the challenge of finding sites that do not have some conflicts. Projects also need to be cost-effective and designed to provide benefits to energy consumers by reducing electricity costs.

Projects should strike an appropriate balance between competing environmental, commercial and social factors.

Overall, the site selection process should follow the mitigation hierarchy by first avoiding impacts as far as possible and then minimising and mitigating residual impacts.

Constraints mapping

As part of the site selection process, applicants should do a ‘constraints mapping’ exercise that is informed by early engagement with local communities and councils. This should provide an overview of the project and map:

- administrative boundaries, including REZs, local government areas and the extent of the project
- turbine locations, including identification of the individual turbine numbers
- nearby residences, including identifying numbers for each and whether they are subject to any private agreements (see our [*Private Agreement Guideline*](#))
- current, approved and proposed infrastructure, including transmission infrastructure, airports and roads
- current, approved and proposed renewable energy projects (where Planning Secretary’s environmental assessment requirements have been issued)
- any mining tenements, including exploration licenses
- vegetation, including potential visual screening
- areas of high biodiversity value
- relevant environmental and land use constraints on and around the project site, including national parks, large waterways and waterbodies.

Applicants should include a constraints map like that shown in Figure 3 in their scoping report.

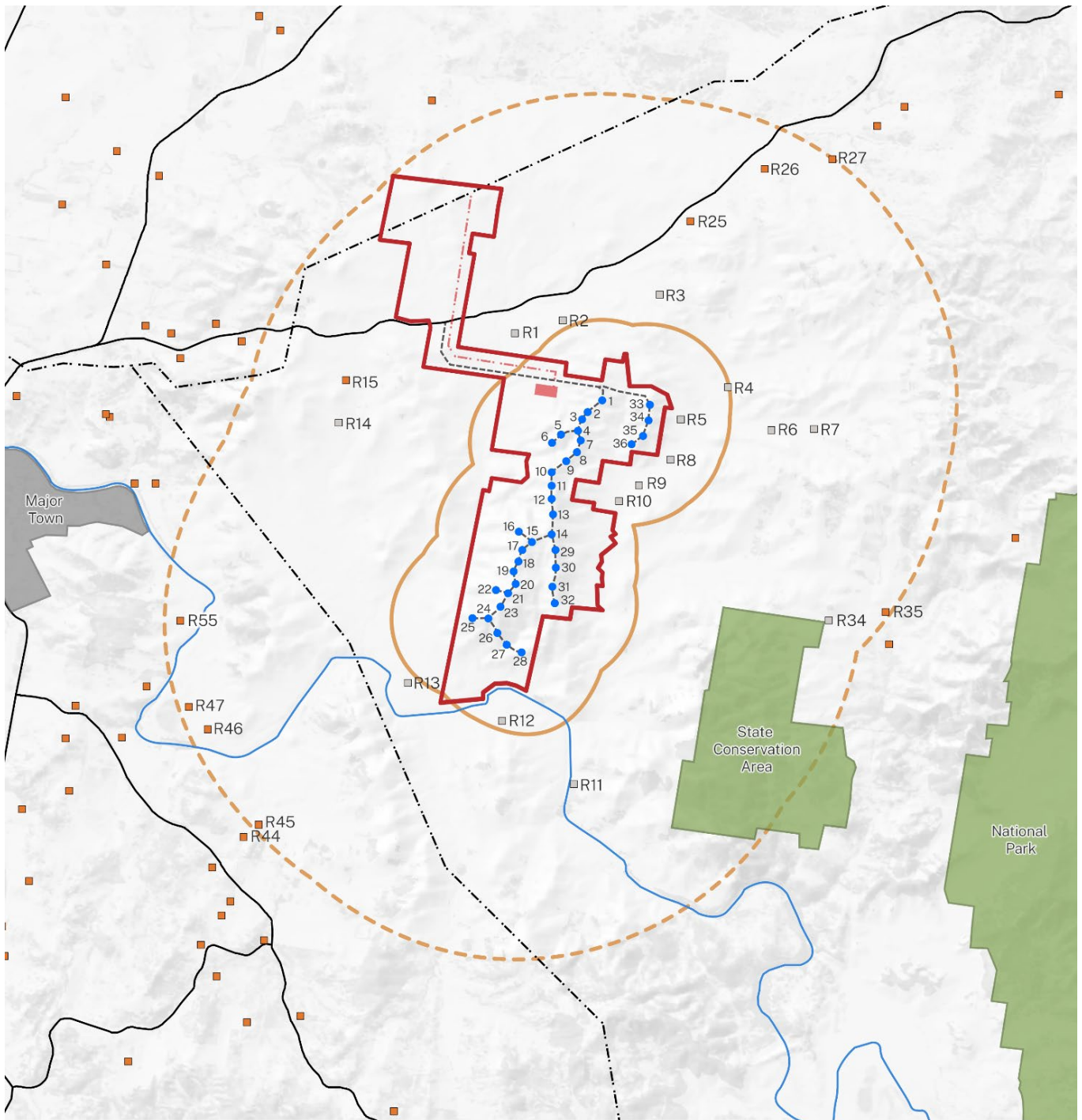
4.3 Micro-siting and environmental envelopes

There may be a need to relocate individual turbines during the detailed design process. This could be for unforeseen geotechnical or access issues or to avoid areas of biodiversity, historic or Aboriginal cultural heritage importance. This relocation is known as ‘micro-siting’. Applicants must account for in the environmental impact statement any variability in siting turbines.

Micro-siting may be permitted, provided it does not materially increase environmental impacts. Any revised layout of turbines or ancillary infrastructure must be consistent with the conditions of the development consent. If it isn’t, the applicant will need to request a modification to the consent.

To enable micro-siting on specific sites, we may grant consent that allows siting turbines within a ‘development envelope’. The applicant must assess the full effect of the highest impact scenarios within the development envelope and include these impacts in the environmental impact statement.





Legend

- | | | | |
|---|-------------------|--|-------------------------|
| Project | | Features | |
| — | Project area | — | Roads |
| ● | Wind turbine | - · - · | Transmission line |
| - - - | Access road | — | Waterway |
| ■ | Substation | ■ | Non associated dwelling |
| - · - · | Transmission line | ■ | Associated dwelling |
| Visual Impact Assessment | | ■ | Township |
| — | Setback | ■ | Conservation area |
| - - - | Study area | | |

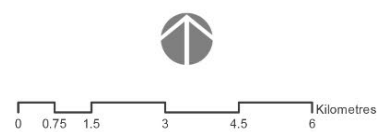


Figure 3. Sample constraints map

5

Assessment issues and requirements



This section outlines the assessment requirements for some of the common issues found with wind energy developments. This includes amenity impacts (visual and noise), aviation safety and lighting, bird and bat strike and rehabilitation and decommissioning. This section also includes the key principles involved in site selection and design and the detailed assessment of projects.

5.1 Landscape and visual impacts

Changes to our rural and natural landscapes will be necessary to facilitate a transition to renewable energy. This guideline and its supporting *Wind Energy Guideline – Technical Supplement for Landscape and Visual Impact Assessment* (visual impact assessment technical supplement) aim to achieve balanced outcomes that support the development of the wind energy industry while avoiding and managing major impacts on the landscape and private views.

The visual impacts from wind energy projects vary depending on the size of the turbines, the distance they are located from the viewpoint and the number of turbines visible. For example, a single 250 m turbine will generally have a dominant appearance to someone within 1.5 km. Turbines remain a prominent feature up to 8 km away, after which they become less noticeable (see Figure 4).

The visual impact assessment technical supplement outlines thresholds for a range of turbine sizes (see section 3.1 of the supplement). Visual impacts can largely be managed through turbine siting, using mitigation measures such as vegetation screening and agreements with affected landowners.

Wind turbines are not static structures. The spinning blades cause intermittent shading of the sun (known as shadow flicker) at close distances (typically no more than 1 to 1.5 km). The duration of impact depends on a range of variables including the turbine layout and height, wind direction, surrounding topography, angle of the sun, cloud cover, viewpoint height and any existing intervening vegetation. Shadow flicker is generally not an issue because of the need to set back turbines for visual amenity and noise reasons.

Aviation safety lighting (see section 5.3 of this guideline) and blade glint can also impact on visual amenity. Blade glint is the direct reflection of the sun from wind turbines and can be effectively minimised with low-sheen and matt finishes.

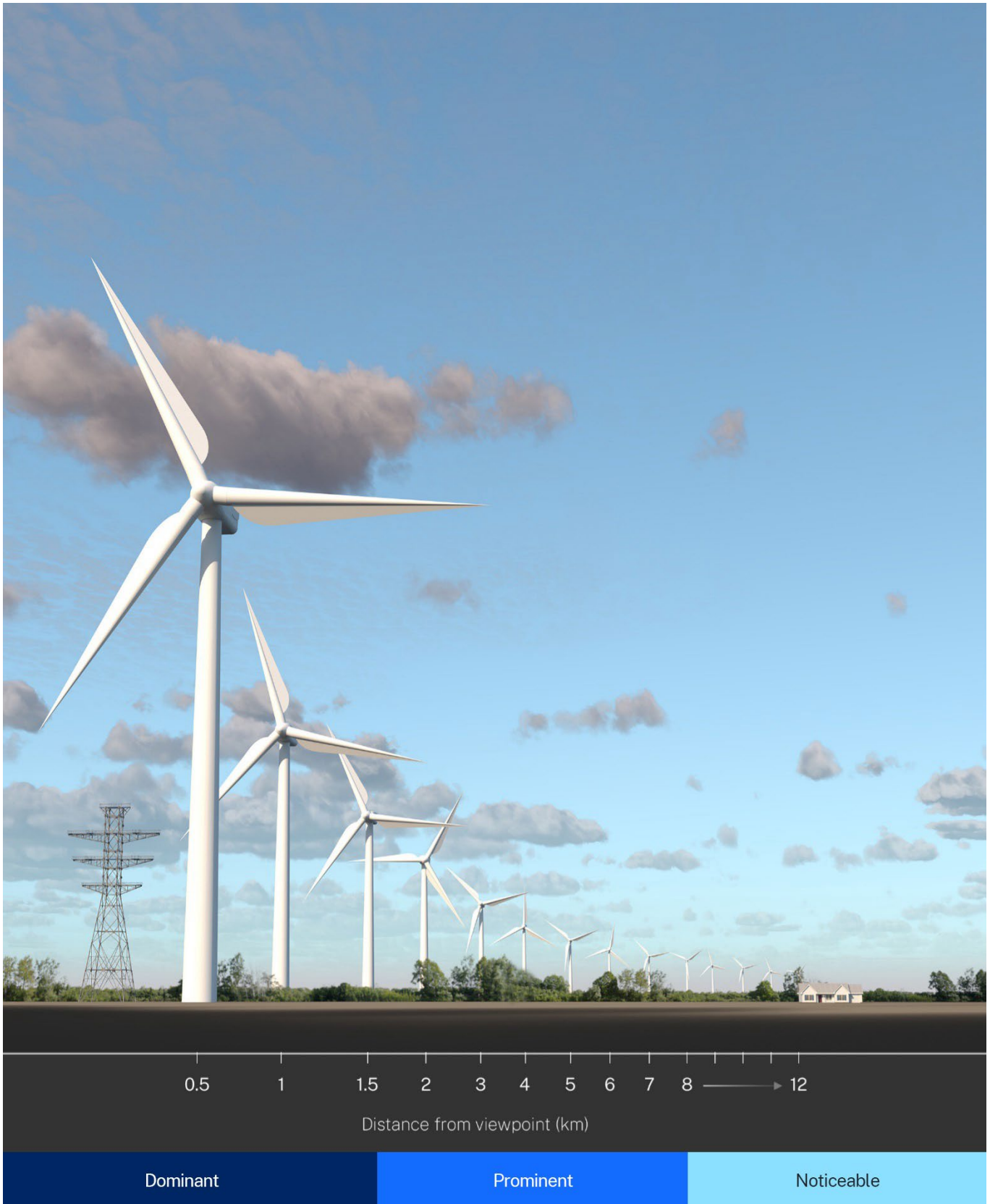


Figure 4. Visual prominence of 250 m turbines at varying distances¹¹

¹¹ The dwelling, transmission tower and tree line are approximately 500 m from the viewpoint

5.1.1 Key principles

Visual amenity principles

- Applicants must consider landscape character and visual impacts early in the site selection and design process to minimise impacts and conflicts, including cumulative impacts.
- Projects should be designed to avoid visually dominant turbines and shadow flicker of more than 30 hours per year (unless a private agreement addresses the impact).
- Applicants must adopt strategies to reduce or manage moderate or high visual impacts.
- Turbines should be constructed and treated to minimise visual impacts and blade glint.

5.1.2 Landscape and visual impact assessment

The applicant must prepare a landscape and visual impact assessment according to the visual impact assessment technical supplement. The supplement provides a methodology for assessing, evaluating and mitigating potential impacts on landscape character and individual viewpoints.

The purpose of a landscape character assessment is to understand the sensitivities of the landscape and to determine a project's impact on the character of the area and sense of place. It should also determine any impacts on private locations such as residential dwellings (also known as 'private receivers') and viewpoints in the public domain.

The supplement includes tools to determine the viewpoints that need to be assessed, the level of assessment required and the extent of the impact. These tools consider factors such as:

- a distant wind energy project generally has a smaller impact than one closer to a viewpoint.
- views from some viewpoints are more sensitive than others (for example, a residence is more sensitive than a local road, where views are more intermittent and less frequent).
- a view is more sensitive to change if it has higher scenic qualities and more valued features.

Impacts are assigned a rating from 'very low' to 'high' based on these considerations. Applicants must avoid high impacts (unless they can be justified, or the applicant has an agreement with the affected landowner) and provide mitigation (such as vegetation screening) to reduce moderate impacts. Appendix C of the visual impact assessment technical supplement provides a range of visual impact examples.

The visual impact assessment should consider the worst-case view of a project during the day. Whether or not the turbines have lighting is unlikely to change the impact assessment rating. Consequently, a separate night-lighting assessment is not required for individual viewpoints. Figure 5 gives an example of the effects of lighting during the evening and night.

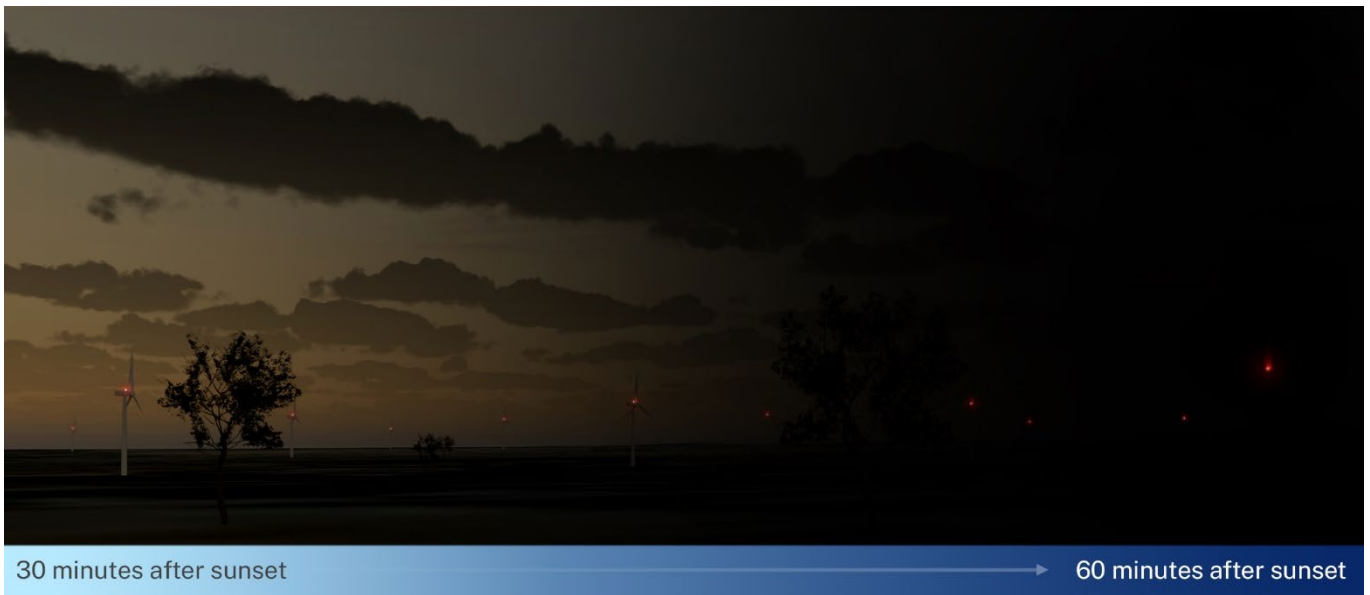


Figure 5. The visual effects of turbine lighting

Shadow flicker assessment

While shadow flicker can cause annoyance, most of the effects are limited in duration and occur over relatively short distances. The applicant must prepare an assessment that models the number of hours of potential shadow flicker at or within 50 metres of an affected dwelling or at other sensitive land use (unless they have reached an agreement with an affected landowner). Shadow flicker must not exceed 30 hours per year. Applicants must mitigate the impacts to comply with this limit. Mitigation could include revising the project layout, using vegetation as a screen or implementing brief periods of turbine curtailment if other measures are not suitable.

The shadow flicker assessment must:

- determine the extent of shadows from the turbines based on 265 m x maximum blade chord length (the distance from the front edge of the blade to the back edge of the blade)¹²
- use modelling software to calculate the theoretical annual shadow flicker duration at each sensitive receiver, having regard to the effects of topography and using the following assumptions¹³:
 - a minimum angle to the sun of 3 degrees
 - modelling over one full year
 - orientation of the rotor plane perpendicular to the line from the turbine to the sun
 - receiver height of between 1.5 and 2 m (as well as second storey height if applicable).

¹² State code 23: Wind farm development, Planning Guideline, Department of Infrastructure, Planning and Local Government, February 2022 – Appendix 2 Shadow Flicker Assessment.

¹³ Appendix E of the Draft National Wind Farm Development Guidelines (Section E.7.2) (2010)

An assessment of cloud cover and vegetation screening effects may be used to reduce the theoretical modelled annual exposure.

5.2 Noise and health

When operating, a wind energy development can cause noise that is intermittently heard above the ambient noise of the environment. Wind turbines also emit very low-frequency sound known as infrasound.

The NSW Government is aware that the potential health impacts of low-frequency noise are a concern for some people. The government's position on infrasound is informed by the scientific findings of the National Health and Medical Research Council and the advice of NSW Health. The council has found no consistent evidence of adverse health effects associated with wind energy and low-frequency noise.

Studies have also found that wind turbines do not generate significantly more low-frequency noise than other sources. Noise levels near wind energy projects are no greater than in urban areas or other comparable rural areas¹⁴. Consequently, applicants do not need to conduct a health impact assessment.

The supporting *Wind Energy Guideline - Technical Supplement for Noise Impact Assessment* sets stringent noise levels. This ensures projects do not significantly impact the amenity of surrounding residences and passive recreation areas in national parks, where visitors are expecting a quiet, nature-based experience.

5.2.1 Key principles

Noise principles

- Noise levels from wind energy projects should be minimised and must not exceed the higher of 35 dB(A) or the existing background noise level (LA90 (10 minute)) plus 5 dB(A).
- Noise levels must not exceed L_{eq} 50 dB(A) at designated passive recreation areas within national parks when in use.
- The noise assessment must consider any cumulative effects, including noise from existing or proposed wind energy projects.
- Where exceedances of the noise criteria are predicted, applicants must adopt mitigation strategies to meet the criteria or enter into an agreement with the affected landowner.

¹⁴ Low frequency noise near wind farms and in other environments (2013), [EPA South Australia](#)

5.2.2 Assessment

Applicants must prepare a noise impact assessment in accordance with the Wind Energy Guideline - Technical Supplement for Noise Impact Assessment. The supplement provides a methodology for assessing, evaluating and mitigating potential noise impacts. It also sets criteria to ensure that noise remains at acceptable levels at surrounding residences. In the unlikely event that excessive or repeated low frequency noise is a characteristic of the project, a 5 dB(A) penalty should be added to the predicted or measured noise level. A noise impact assessment is not required if there is an agreement with the landholder to accept the noise impacts of the project.

Applicants must monitor noise levels during the construction, operation and decommissioning of a project to ensure that noise levels do not exceed the set limits.

5.3 Aviation safety and lighting

Wind turbines and wind monitoring masts may present a risk to aviation safety when they are proposed near airports and aircraft landing areas or would intersect air traffic routes, aircraft operating heights or navigable airspace.

Under the Civil Aviation Safety Regulations 1998 (Cth), aircraft are permitted to fly as low as 152 m above ground level. Any tall structures, such as wind turbines, that are 150 m or more above ground are generally considered a hazard. Wind turbines may also create turbulence that may affect aircraft behaviour and performance. To manage these risks, aviation regulations require the location of wind turbines and monitoring masts to be reported to relevant aviation authorities. This enables their locations to be mapped so that pilots are aware of their locations. The Civil Aviation Safety Authority (CASA) expects some level of safety lighting if turbines are 150 m or more above ground.

5.3.1 Key principles

Aviation safety and lighting principles

- Wind energy projects should be designed to reduce aviation safety risk.
- If turbines are 150 m or more above ground, lighting is required for the most critical turbines (e.g. turbines at highest elevations and/or around the project perimeter).
- Lighting of turbines and ancillary infrastructure should be designed to minimise potential amenity impacts by using the lowest intensity lighting suitable for the site.
- An aviation impact assessment must include a full assessment of the risks to aviation safety in the context of existing flight patterns and airport approach routes.

5.3.2 Assessment

An aviation impact assessment is required for all wind energy projects. Appendix A of this guideline will help applicants determine the extent and content of the assessment. The purpose of the assessment is to ensure that applicants, aviation authorities, the aviation industry, aircraft users, communities and the consent authority have a detailed understanding of:

- the type and location of any nearby aerodromes and aircraft landing areas or flight paths
- aerial activities such as helicopter use and low-flight operations for fire and pest control, mustering, asset maintenance, search and rescue and recreational activities in agricultural, forestry and conservation settings around the project area
- the potential impacts of the project on aviation activities
- the ways in which potential impacts and risks may be mitigated.

If a wind energy development is located near a certified or registered aerodrome used by the community or an aerodrome used by the military, the applicant must consult with the aerodrome operators and aircraft operators known to fly in the area. Applicants must also consult with Airservices Australia and the Australian Department of Defence to determine any potential effects on operating procedures and/or nearby communications, navigation or surveillance equipment.

Aerial firefighting

Wind turbines do not pose a significant risk to firefighting activities and are no different to structures such as communications towers and overhead powerlines. Aerial firefighting can be undertaken around wind turbines¹⁵ if appropriate strategies, emergency management systems and communications protocols are in place¹⁶.

Applicants must detail the operational procedures they will implement in a bushfire in the project's emergency plan. This should include measures such as shutting down turbines and positioning blades in a manner to minimise interference with aerial firefighting operations.

As part of the assessment process, we will consult with the Rural Fire Service, who will coordinate advice from local branch districts. We will also seek advice from NSW National Parks and Wildlife Service in relation to their operations and protocols for bushfire management in protected areas.

If turbines and other tall structures are equipped with aviation obstacle lighting, the applicant must ensure there are procedures in place to quickly activate the lights during a bushfire or fog event to increase the visibility of these obstacles to pilots. The applicant must also consult with the Rural

¹⁵ Australasian Fire and Emergency Service Authorities Council Limited - [AFAC \(2018\) Wind Farms and Bushfire Operations](#)

¹⁶ [Clean Energy Council \(2017\) In Case of Fire: a real-life experience at a wind farm site](#)

Fire Service to develop any other appropriate procedures to minimise impacts to firefighting efforts and to communicate the final turbine coordinates and heights.

Any fire incidents near wind turbines will be managed by the Rural Fire Service using a combination of firefighting personnel, tankers and heavy plant integrated with aircraft. The Rural Fire Service will conduct a risk assessment of local conditions to inform its response, including the use of aerial firefighting activities.

5.4 Bird and bat impact assessment

Wind energy developments have the potential to affect birds and bats through vegetation clearing and habitat loss. The animals can also be struck by the turbine blades (referred to as a strike) and affected by low air-pressure zones caused by the blades rotating (known as barotrauma, which is specific to bat species).

The magnitude of turbine strike on bird and bat populations is hard to quantify and predict. This is because carcasses are often removed by scavengers before they can be counted.

While there are data limitations to understanding this issue, the estimated mortality rates are considerably less than other sources such as collisions with buildings, vehicles and power lines as well as predation by feral and domestic cats.

Notwithstanding, turbine strike has the potential to cause negative impacts for some species (including raptors), and cumulatively there may be impacts on some populations. Consequently, there is a need to assess the potential impacts to at-risk species and carefully design wind energy projects to avoid and minimise potential strike risk. This should be informed by up-to-date data and consider the risks in context of other impacts to bird and bat populations.

The likelihood of strike mortality is highly dependent on the siting of individual turbines and the characteristics of the relevant bird and bat species. Locating turbines away from important habitat can reduce the likelihood of strike. Adaptive management techniques may also be required in some cases to reduce the risk of mortality.¹⁷

¹⁷ Bennett et al (2022) Austral Ecology – [Curtailment as a successful method for reducing bat mortality at a southern Australian wind farm.](#)

5.4.1 Key principles

Bird and bat principles

- Applicants must use desktop analysis and baseline survey data to identify at-risk species (i.e. species most likely to be impacted by turbine strike), known habitats, known flight paths and baseline population levels and use this to inform site selection, project design and turbine layouts.
- Turbines should be sited at least 100 m (from blade tip to nearest canopy height) away from the mapped boundary of national parks, state conservation areas and nature reserves.
- Applicants must adopt the hierarchy of impact management to avoid and minimise impacts on threatened bird and bat populations.
- Applicants must implement mitigation and management measures to reduce the likelihood of collisions.

5.4.2 Assessment

Applicants must include a biodiversity assessment in the environmental impact statement that considers all the biodiversity impacts of the proposal, including clearing native vegetation and indirect or prescribed species impacts. That includes potential bird and bat strike.

Applicants must make the assessment according to the *NSW Biodiversity Conservation Act 2016* and the Biodiversity Assessment Method 2020 (BAM 2020). The BAM 2020 gives guidance on how to apply the hierarchy of ‘avoid, minimise and offset’. Where bird and bat strike impacts cannot be avoided, minimised or mitigated, offsets or other measures that benefit threatened species and their habitats may be considered.

The environmental impact statement should include the results of baseline bird and bat monitoring and risk assessments. This can be used to support predictions of impacts and to identify appropriate mitigation and management measures, including informing the siting of turbines.

Impact avoidance and minimisation

Potential impacts on birds and bats can often be effectively managed by ensuring that wind energy developments are carefully sited to avoid and minimise strike risk. Residual risks are managed through an adaptive management process during construction and operation.

Applicants are required to avoid and minimise the potential impacts of wind turbine strike on birds and bats and must demonstrate how they have considered impact avoidance. This could include:

- selecting sites with limited or minimal biodiversity values (e.g., previously cleared land or land mapped as category 1-exempt land on the native vegetation regulatory map)
- locating turbines at least 100 m (from blade tip to nearest canopy height) away from the mapped boundary of national parks, state conservation areas and nature reserves
- siting turbines away from key habitat and habitat features likely to be used by at-risk species (for example, hollow-bearing trees, wetlands and riparian corridors)
- siting turbines to create buffers to known flight paths for nomadic or migratory species
- maintaining turbine-free movement corridors between key landscape and habitat features such as known roosting or breeding sites and foraging areas.

Due to the inherent difficulties in predicting impacts for highly mobile bird and bat species (such as accounting for seasonal or climatic fluctuations that may change movements patterns), it is important to monitor and adaptively manage impacts when they occur. Impacts can be further avoided and minimised by:

- establishing livestock exclusion zones and ensuring that rabbit burrows are ripped or treated to minimise rabbit numbers and the consequent attraction of raptors to the area
- relocating habitat features to adjacent retained remnant vegetation (e.g. hollow logs)
- projecting acoustic signals from wind turbines to alert and deter avian species
- adopting a smart curtailment approach that uses sensor technology to curtail turbine movements at certain wind speeds known to correlate with increased avian activity levels
- considering other novel or experimental approaches.

Turbine shut-downs may also be considered as a last-resort where other mitigation measures are not likely to be suitable or effective and the resulting impacts are significant. Avoidance and mitigation strategies should be proportionate to the impact and risk. There is no expectation that these measures will eliminate collisions entirely.

5.5 Traffic and transport

Constructing and decommissioning wind energy projects can cause impacts on traffic and transportation routes. These typically occur when moving large wind turbine components via public roads and across private land. Transporting large components from ports or manufacturing points through regional NSW requires heavy and over-dimensional vehicles. Enabling these vehicles to move through the road network may need road upgrades, temporary hard stand areas and/or traffic sign relocations.

On-site access routes should be designed considering environmental features and minimise impacts where possible. For example, access routes should be designed to follow the landform where

possible to reduce cut and fill. Developers should use existing farm access tracks and avoid crossing waterways or drainage features in low-lying areas where possible.

5.5.1 Key principles

Traffic and transport principles

- Applicants must assess both the project and cumulative impacts (where relevant) of other major developments on the local and classified road network.
- If the network cannot accommodate the traffic generated by the project, applicants must propose upgrades to facilitate the development.
- Applicants must ensure that local councils and communities are informed about potential traffic disruptions and manage and address traffic safety concerns.

5.5.2 Assessment

Applicants must identify and address all relevant issues for traffic and transport in the project's environmental impact statement. The assessment must account for all traffic associated with the project, including the transport of construction materials (for example, aggregate from local quarries). The assessment should be conducted over the entire length of the transport route (such as from port to site) and consider the requirements listed in Table 1.

Applicants should agree with the relevant roads authority, Transport for NSW and any affected landowners about the nature and timing of upgrades before lodging the environmental impact statement.

The consent authority should consider whether to impose requirements for:

- road upgrades (not required for state roads), unless alternative staging is proposed
- a dilapidation survey for local roads and roads on the haulage route before and within 1 month of completion of both construction and decommissioning
- rehabilitation of the haulage route where any development-related damage has occurred
- development and implementation of a traffic management plan that includes measures to address any community concerns around potential conflicts with other traffic-generating developments or other road users.

Table 1. Requirements for traffic and transport impact assessment

| Key issue | Assessment considerations |
|-------------------------------------|--|
| Transport route options | <ul style="list-style-type: none"> • Include a detailed analysis of available haulage options and justification for the final route selection. • Identify impacts on private property or public lands. • Identify impacts on road users for the final route selection. |
| Capacity of road network | <ul style="list-style-type: none"> • Consider the structural capacity of road networks to handle heavy vehicles. • Consider the width of roads, bridge capacities and clearance of bends to accommodate over-dimensional vehicles. • Consider the likely impacts of increased truck movements on road networks. |
| Road upgrades | <ul style="list-style-type: none"> • Identify all road upgrades required to facilitate the development in consultation with the relevant roads authority, Transport for NSW, local communities and affected landowners/managers. • Identify any upgrades requiring separate landowners' consent. • Identify the staging of any upgrades (for example, upgrades needed to service a workforce accommodation camp or certain clusters of turbines). |
| Traffic movements | <ul style="list-style-type: none"> • Identify the number of vehicle movements to and from the project site (including light, heavy and over-mass and over-dimensional vehicles) during construction, operation and decommissioning, including those required to deliver construction materials and project components as well as workforce traffic. • Avoid traffic movements through townships where reasonable and feasible. • Propose mitigation strategies for road impacts. |
| Environmental impacts | <ul style="list-style-type: none"> • Identify heritage, biodiversity and other environmental impacts from increased traffic, such as increased dust and the disturbance of environmentally sensitive areas as well as the direct impacts associated with road upgrades or temporary traffic controls that disturb the land. |
| Traffic safety | <ul style="list-style-type: none"> • Consider any disturbance to and safety impacts on the local community. • Identify safety concerns raised during consultation and outline measures that would be implemented to minimise impacts during construction, upgrading or decommissioning works. • Assess cumulative traffic impacts with other major developments, including other wind energy development, according to our <i>Cumulative Impact Assessment Guidelines for State Significant Projects</i>. |
| Unconstructed or Crown roads | <ul style="list-style-type: none"> • Identify any existing Crown or 'paper' roads (unconstructed) and whether they are proposed to be closed. |

5.6 Infrastructure contributions, benefit sharing and private agreements

5.6.1 Infrastructure contributions

Councils collect local infrastructure contributions to help fund infrastructure needs resulting from development, including managing increased traffic and providing community facilities.

Wind energy projects typically have limited impacts on local infrastructure, except for traffic and transport infrastructure.

Generally, local infrastructure contributions therefore have little or no application to wind energy projects as:

- These projects often do not create sufficient demand for public amenities or services to warrant s7.11 contributions
- For s7.12 contributions to be charged, a council must have a contributions plan in place. Contributions plans require that councils have a sense of the type and volume of development they should expect in an area. This is often not the case for wind energy development.

Roads will generally need to be improved to accommodate the movement of over-dimensional vehicles and increased traffic during construction. Issues like this should be addressed through conditions of development consent rather than through local contribution mechanisms or planning agreements. If a benefit-sharing rate will be paid, the consent authority should not require local contributions unless they are needed to address specific direct impacts on infrastructure services and development (which as mentioned above, are likely to be low to nil).

There may be limited circumstances where it is reasonable for Councils to collect local infrastructure contributions to help fund infrastructure needs resulting from a wind energy project. For example, a project which includes a workforce accommodation camp may affect local infrastructure, public amenities, and services due to the increase in the local population. Whether local infrastructure contributions are required will depend on factors such as the size of the camp and the expected impacts to local infrastructure and services.

5.6.2 Benefit sharing

Benefit sharing is a term used to describe different approaches and mechanisms that aim to distribute the proceeds of a project (financial and other benefits) between the applicant and the community through mutually agreed opportunities.

Benefit sharing can help build community support by ensuring that projects deliver an overall positive outcome for local and regional communities, including tangible and long-term social and economic benefits.

The NSW Government strongly supports benefit sharing programs. Applicants should develop the details of a benefit sharing program according to our [Benefit Sharing Guideline](#), which contains best-practice guidance for applicants to coordinate benefit sharing programs in their communities. The guideline includes detailed information on how applicants can work with councils and communities to fund community programs and projects. Applicants should detail the benefit sharing program in the environmental impact statement.

5.6.3 Private agreements

It is common for applicants to enter into private agreements with landholders to either host infrastructure or to manage the impacts resulting from development. The 2 most common forms of private commercial agreements for wind energy projects are landholder agreements and neighbour agreements. Our [Private Agreement Guideline](#) gives more details.

Landholder and neighbour agreements

Landholder agreements are where applicants enter into agreements with 'host' landholders who are willing to have project infrastructure located on their land. These agreements are essentially commercial leases and should set out the terms that let the applicant or project owner install, operate and maintain the project infrastructure, as well as the arrangements for decommissioning and rehabilitating the project infrastructure and land.

Neighbour agreements are agreements executed between the applicant and neighbour of a development. These agreements are typically made to manage and mitigate significant impacts on the neighbour or their land. For example, neighbour agreements are commonly used to mitigate high visual impacts from projects.

Agreement assessment requirements

Where an applicant and landholders have an agreement, the affected residence is taken to be 'associated' with the development for the purpose of the assessment (if the agreement relates to the relevant impacts). This means that any impacts accepted in an agreement do not need to be assessed in the environmental impact statement.

Where an applicant and landholders do not have an agreement, the affected residence should be identified as 'non-associated' in the environmental impact statement (see the map in Figure 3 in section 4.3 of this guideline for an example) as it relates to the assessment of relevant impacts.

Separately to the environmental impact statement, the applicant should provide the department with a register of agreements. The register should clearly identify the landholder and the type, extent and duration of any impacts covered by an agreement. This register should be provided with the environmental impact statement. Further requirements are outlined in the *Private Agreement Guideline*.

5.7 Decommissioning and rehabilitation

Once installed, wind turbines typically have an expected operating life of around 25 to 30 years. However, some turbines may be decommissioned or refurbished/repowered earlier. At the end of the operating life, the main options for decommissioning are to:

- replace the wind turbines with new technology (subject to landholder agreements, planning approvals and the condition of the equipment), or
- decommission the project and remove wind turbines and associated infrastructure.

In most circumstances, refurbishing wind turbines and infrastructure will not require a new development application or a modification of the existing consent. The terms of the existing consent may authorise refurbishment.

The applicant may choose to stop the operation of the wind project, or some of the project turbines, and decommission and rehabilitate some (or all) of the project at any time. Decommissioning typically follows the reverse order of installation. This involves dismantling and removing the turbine components and the above-ground and ancillary infrastructure. Pending the final agreed land use and conditions of consent (including requirements to rehabilitate ecologically sensitive areas), below-ground cabling and conduits may be left in-situ and access tracks retained to support the ongoing use of land for agricultural use.

Applicants must remove materials and waste products from the site for recycling, reuse or disposal in approved waste facilities (see section 5.8 of this guideline). This also involves disconnecting the project from the electricity network.



5.7.1 Key principles

Decommissioning and rehabilitation principles

- The land on which a wind energy project and supporting infrastructure has been developed must be returned to its pre-existing or an agreed use (by the Planning Secretary) if the project is decommissioned.
- If operations cease, redundant above-ground infrastructure should be removed within 18 months unless there is justification for retaining it or extending this time frame.
- The applicant of a wind energy project should be responsible for decommissioning, and this should be reflected in the agreement with the landholder hosting the project infrastructure.
- Applicants should ensure landholders hosting project infrastructure are informed about the proposed decommissioning plan for the project.

5.7.2 Responsibilities and financial assurances

We expect the applicant for a wind energy project to be responsible for decommissioning and rehabilitation. This should be reflected in an agreement with the landholder (see our [Private Agreement Guideline](#) for specific guidance).

However, there are some situations where this obligation may fall to the landholder, such as when the owner or operator of the project becomes insolvent. This is because the conditions of development consent apply to the land and not to a particular party or company.

Consequently, the landholder should have a clear understanding of how the project owner or operator will manage the decommissioning phase. The landowner may also request assurances to fund decommissioning, including providing ongoing evidence that the applicant has the capacity to fund decommissioning activities.

Applicants and landholders may estimate the potential costs of decommissioning for the development using our decommissioning cost calculator tool. The cost of decommissioning is estimated to be around \$480,000 per turbine (inclusive of recovery costs). This rate can vary substantially depending on factors such as whether the access roads and underground cables are removed, the location of local waste facilities and haulage requirements, the decommissioning process and methods adopted at the time of decommissioning, and the value of the scrap metal. If they are not removed, the value of steel and iron recovery from the turbine components is estimated to mostly offset the cost of decommissioning (based on 2023 estimates).

If an applicant fails to meet the decommissioning and rehabilitation obligations of the project's development consent, we can use our enforcement powers under the EP&A Act to address any breaches.

5.7.3 Assessment

Applicants must identify the decommissioning and rehabilitation activities that will take place and address all relevant issues for decommissioning and rehabilitation in the project's environmental impact statement.

Issues may include dust and noise generation from earthwork activities and vehicles, increased traffic generation and/or traffic disruptions and risks to biosecurity, particularly related to pests, diseases and weeds. We recognise that decommissioning and rehabilitation impacts are likely to be short-term and of a similar or lesser magnitude than the construction impacts.

The consent authority should impose conditions to ensure that the key principles are met. Conditions of consent should generally include performance objectives that are outcomes-based and not post-approval requirements such as management plans. It is the NSW Government's policy that financial assurances should not be required by conditions of consent and any financial assurances should be dealt with in agreements negotiated between the applicant and landowner.

5.8 Waste management and circular design

Wind energy projects can generate different waste streams throughout the phases of their development, operation and decommissioning. Waste is typically minimal during construction, generally consisting of solid material classified as non-putrescible and that has the potential for recovery through reuse and/or recycling.

Project operation typically produces a negligible amount of waste. The waste produced is mainly generated from repair and maintenance activities, administration and maintenance buildings, and any workforce accommodation (general waste, food waste and co-mingled recycling).

When projects are decommissioned, large amounts of waste materials are generated. While 85% to 95% of a wind turbine can be recycled (including steel, copper and aluminium), some residual materials may need to go to landfill. Wind turbine blades are generally made of composite materials such as epoxy resin and glass fibre or carbon fibre, which are currently more difficult to recycle in Australia and need to be disposed of at special facilities. These elements make up a very small portion of the overall waste.

5.8.1 Key principles

Waste management key principles

- Construction waste must be minimised, and this waste should comprise as much reusable and recyclable material as possible.
- Impacts on local waste management facilities must be minimised as far as practicable during construction, operation and decommissioning.
- Recycling wind turbines should be prioritised and maximised as far as possible to avoid landfill.
- Applicants should monitor technological and industry advancements over the life of the project and give preference to the most efficient and cost-effective recycling and recovery methods.

5.8.2 Assessment

Applicants should clearly demonstrate how waste will be minimised at all stages of the project and how reuse and recycling will be optimised.

The environmental impact statement must:

- identify waste types (including the appropriate waste classification)
- estimate waste that will be generated at each stage of the project (construction, operation and decommissioning)
- identify potential end markets for waste materials, noting that some end-of-life market options will be subject to technological advances and the development of markets over time
- consider how the applicant will ensure all recyclable materials are sent to appropriate recovery facilities to minimise waste sent to landfill at each stage of the project
- consider circular design principles¹⁸ and strategies to mitigate impacts and reduce waste throughout all stages of the project (such as minimising product packaging prior to transport to the site and using recycled, reusable, low-emissions and low-impact raw materials)
- consider end-of-life reuse, refurbishment and recycling strategies for wind turbine components to maximise recovery rates, having regard to industry best practice.

¹⁸ NSW Circular Economy Policy Statement: Too Good To Waste (2019) - Chapter 1: Circular economy definition and principles

6

Other assessment issues



Table 2 gives an overview of other matters relevant to wind energy developments that require careful consideration and assessment.

Table 2. Summary of assessment issues not covered in the body of this guideline

| Issue | Assessment |
|---------------------------|---|
| Batteries | If the project includes battery energy storage that has a capacity of more than 30 MW, the applicant must do a preliminary hazard analysis in accordance with <u>Hazardous Industry Planning Advisory Paper No 4 – Risk Criteria for Land Use Safety Planning</u> , <u>Hazardous Industry Planning Advisory Paper No 6 – Hazard Analysis and Assessment Guideline –Multi-level Risk Assessment</u> . |
| Biodiversity | If clearing is proposed on sites containing native vegetation or the habitat of threatened species or threatened ecological communities, the applicant must prepare a biodiversity development assessment report in accordance with the <i>Biodiversity Conservation Act 2016</i> and the Biodiversity Assessment Method 2020. We expect applicants to demonstrate that they have applied the principles of avoiding, minimising and mitigating impacts. |
| Cumulative impacts | Any cumulative impacts from other developments (proposed, approved and operative), especially on biodiversity, social and economic wellbeing and construction, must be assessed according to the latest version of <u>Cumulative Impact Assessment Guidelines for State Significant Projects</u> . For example, multiple wind energy projects near each other may have a cumulative impact on dwellings or neighbouring land uses. |



Development rights

The applicant may need to consider whether the proposed development would impact the right for neighbouring landholders to develop their land for the purpose of any of the following permitted land uses:

- residential accommodation
- tourist and visitor accommodation
- eco-tourist facility.

In considering the impacts, applicants and consent authorities should only assess impacts on vacant land. That is, land in which there is a development right that has not been acted upon and is vacant of buildings and structures.

Additionally, an assessment should only be undertaken if the land is vacant at the time the Planning Secretary's environmental assessment requirements are issued, and would:

- be partly or wholly within the visual impact setback in the *Wind Energy Guideline - Technical Supplement for Landscape and Visual Impact Assessment*,
- experience exceedances of the relevant noise criteria, or
- be subject to significant risk from blade throw, ice throw or other risks.

The assessment should consider whether the proposed development would unduly impact the development potential of the vacant land. In determining the impact, it may be relevant to consider:

- whether the vacant land is part of a broader contiguous property holding with an existing dwelling, building or structures,
- if a future development could be designed, sited and oriented to avoid or reduce significant impact from the project, and
- any mitigating effects including topography and vegetation.

An example assessment is provided in Appendix B.

If, at the time the Planning Secretary's environmental assessment requirements are issued, the vacant land is subject to:

- a development application that has been lodged but is yet to be determined, and/or
- a development application or complying development certificate has been determined/granted but the development is yet to physically commenced¹⁹,

the applicant should consider measures to mitigate the impacts on these rights.

Measures may include:

- helping affected landholders modify the existing consent
- seeking a new development consent that would minimise impacts
- screening or landscaping treatments.

For the avoidance of doubt, these approvals should not be treated as existing dwellings, or other receivers for the purpose of conducting a visual impact assessment or noise impact assessment.

| Issue | Assessment |
|-------------------------------------|---|
| | Any consents or approvals that have physically commenced at the time the Planning Secretary's environmental assessment requirements should be treated as existing dwellings, or other receivers for the purpose of conducting a visual impact assessment or noise impact assessment. |
| Erosion and sediment control | Surface water-related impacts such as erosion, discharge/runoff and sediment control need to be identified and appropriate measures proposed where warranted. Applicants are required to minimise any soil erosion associated with construction and decommissioning by implementing the relevant mitigation measures in the latest version of <u>Managing Urban Stormwater: Soils and Construction</u> (commonly referred to as the 'Blue Book'). |
| Hazards | <p>Wind energy infrastructure should avoid land subject to identified natural hazards (such as bushfires, flooding or land instability) and should not increase natural hazard risks.</p> <p>Any natural hazards or risks associated with the construction, operation and decommissioning of the wind energy project must be assessed. These include those associated with hazardous materials (such as battery storage) and the threat of fire spreading to a wind energy development or being caused by blade throw or associated infrastructure such as cables or transmission lines.</p> <p>If the project is located in a bushfire-prone area, applicants must prepare a strategic bushfire study according to the latest version of <u>NSW Rural Fire Service's Planning for Bush Fire Protection</u>.</p> <p>Applicants should assess operational risks from potential blade throw and incorporate appropriate setback distances from residences, national parks, roads and battery storage facilities as a risk-management measure.</p> |
| Heritage | <p>An Aboriginal cultural heritage assessment report is required for all State significant projects. Proponents must also consult with the Aboriginal community according to <u>Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010</u>.</p> <p>Applicants should also assess the likely impacts on European historical and archaeological objects and places.</p> |
| Proximity to protected areas | Projects proposed within 500 m of a protected area boundary must consider potential interference with park management activities such as feral animal, weed and fire control and search and rescue operations reliant on low-flight operations and radio communications. |
| Public interest | Assess the public interest in the project, including the public interest in renewable energy, the objects of the EP&A Act and the principles of ecologically sustainable development. |

¹⁹ 'Physically commenced' has the same meaning as that in section 96 of the Environmental Planning and Assessment Regulation 2021.

| Issue | Assessment |
|--------------------------|--|
| Regional cities | <p>Where an applicant proposes a large-scale solar development within a mapped area in proximity to a regional city, they should comprehensively address the provisions within the Transport and Infrastructure SEPP.</p> <p>Residential and commercial developments that have been approved (but not yet commenced) should be included when identifying the surrounding urban environment.</p> <p>The applicant should consult with the relevant council and identify any land identified for future growth in strategic planning documents, including in local strategic planning statements and housing strategies.</p> |
| Social impacts | <p>A social impact assessment is required for all State significant projects and must be undertaken according to the latest version of our <i>Social Impact Assessment Guideline</i>. This will include an assessment of the positive and negative impacts of the proposed development on people and groups, including how the impacts are distributed.</p> <p>The assessment should consider any increase in demand for community infrastructure and services, the need for temporary construction workforce accommodation, job opportunities and the flow-on economic impacts to local communities.</p> |
| Strategic context | <p>Assess whether the project is consistent with local or state planning strategies and government climate change and energy policies. Look at the capability of the project to contribute to energy security and reliability²⁰.</p> |
| Water supply | <p>If there is any water take associated with the project, the applicant should identify the source of water (both potable and non-potable), and they may need to acquire water access licences if the project is approved.</p> <p>The applicant should detail the volume of water needed during construction and operation and the assumptions used to estimate water consumption. If water will be trucked to site, evidence must be provided that potential water suppliers for the project can meet demand, and truck movements must be accounted for in the traffic assessment.</p> <p>The applicant should outline the proposed wastewater management plan as well as the potential impacts of the project on downstream flows and flooding, including measures to mitigate and manage surface water runoff.</p> |

²⁰ For guidance on addressing electricity system security and reliability, see *Electricity System Security and Reliability Environmental Assessment Requirement* on NSW Climate and Energy Action's [Electricity system security and reliability requirement web page](#).

Appendix

A

Aviation and lighting impact assessment



In Australia, all wind energy projects must include an assessment of potential impacts under the Australian Government’s National Airports Safeguarding Framework Guideline D to determine potential risks to aviation safety.

Assessment requirements

Applicants must consider aircraft flightpaths and ensure that the final turbine layout does not pose an unacceptable risk to air safety, including in areas where low-flying operations are likely to be conducted. Applicants must also identify and assess any potential impacts of the project on nearby airfields and propose reasonable and appropriate measures to mitigate risk.

If a proposed wind turbine or monitoring tower is greater than 150 m high or infringes on the obstacle limitation surface of a certified aerodrome, applicants must do an aviation impact assessment in accordance with Guideline D and the requirements in Table 3.

Table 3. Requirements for aviation impact assessment

| Requirement | Content and form |
|--------------------------|--|
| Consultation | Undertake and outline consultation with: <ul style="list-style-type: none"> • nearby aerodromes (certified and un-certified) and aircraft operators known to fly in the area (low-flying activities that may include fire spotting and control) • Airservices Australia to determine if any nearby aerodrome operating procedures may be affected by the project (prior to consulting with CASA) and whether any aeronautical communications, navigation or surveillance equipment may be affected • Department of Defence to determine whether any aeronautical communications, navigation or surveillance equipment may be affected • CASA about the proposed lighting plan for the project prior to submitting the environmental impact statement but only after receiving in-principal support from Airservices Australia and any relevant aerodrome operators that the project would not adversely impact any local airport operating procedures • National Parks and Wildlife Service and other land management operators to identify the potential impacts to low-flight operations (e.g. aerial pest/weed control and firefighting activities) and to develop procedures to reduce the risk of collisions with turbines and other infrastructure. |
| Impacts and risks | <ul style="list-style-type: none"> • Assess the potential impacts of the project on any aviation activity including the cumulative effects of other wind energy projects in the vicinity and potential wake/turbulence issues. • Conduct a risk analysis using AS/NZS ISO 31000:2018 Risk Management – Guidelines. • Identify the necessary aviation obstacle lighting requirements by considering the defined air traffic routes, aircraft operating heights, approach/departure procedures, radar interference, communication systems and navigation aids. |

| Requirement | Content and form |
|----------------------------------|--|
| Lighting | <ul style="list-style-type: none"> • Consider measures to minimise the amenity impacts of lighting. • Identify the type of lighting management system proposed (e.g. permanent fixtures or motion sensor/radar detection systems) and include a detailed lighting plan. • Assess any impacts on the Siding Spring Observatory and the Dark Sky Region in accordance with the Dark Sky Planning Guideline, if the project is located within 200 km of the observatory. • Identify measures to ensure obstacle lights always remain lit as indicated in the lighting management system in a fail-safe mode, and any disruption or outages are minimised to the extent practicable through documented contingency arrangements. |
| Other forms of mitigation | <p>Describe other measures to mitigate potential risks, including:</p> <ul style="list-style-type: none"> • providing as-constructed details (including the specific location coordinates and elevations) of turbines and monitoring masts to Airservices Australia so they are registered on the national databases. • marking monitoring towers according to the requirements of National Airports Safeguarding Framework Guideline D. • marking overhead transmission lines according to Australian Standards AS 3891.1 with visual identification tools such as marker balls and in consultation with the transmission network provider. |

Lighting

While important from a safety perspective, aviation obstacle lighting has the potential to impact regional and rural areas where other light sources are minimal. Applicants should seek to minimise the effects of lighting on visual amenity while still having regard to the aviation safety risk assessment. The visibility and impact of any lighting depends on the nature and intensity of the lighting required and the potential cumulative effects with other developments.

NSW adopts a risk-based approach assessing the potential risk of wind energy projects to aviation safety. We acknowledge CASA’s expectation to recommend some level of aviation obstacle lighting for tall structures, including wind turbines.

For tall structures (including turbines) that are greater than 150 metres above ground level, the most critical structures (turbines at the highest elevations and/or around the project’s perimeter) will require lighting.

Lighting turbines and tall structures is intended to improve safety outcomes and alert pilots to the presence of potential obstacles in low-altitude flight paths. Aircraft detection systems can be used to trigger lights only when an approaching aircraft is identified. CASA has also advised that using

management systems to regulate obstacle lights and their intensity (such as visibility meters or radar detection systems) is an acceptable option in Australia.

Australia aviation authorities have generally adopted international standards²¹ for lighting intensity, which recommend 2,000 candela medium intensity obstacle lights for structures greater than 150 metres above ground level. However, CASA has accepted the use of 200 candela lighting in circumstances where a lack of back lighting, such as in rural and remote areas, means the lower intensity light is still visible to pilots at an acceptable distance to avoid the obstacle²²

To mitigate negative impacts on visual amenity, consider:

- minimising the number of turbines that need to be lit to clearly indicate the general height and extent of the development – high-risk turbines at high elevations must be lit
- using the lowest intensity turbine light suitable for the site
- where fixed lighting is proposed (instead of being controlled through detection systems), turning on all turbine lighting simultaneously, using a steady medium-intensity red light, and to not have flashing lights
- directing ancillary lighting below the horizontal to avoid unnecessary impact on residences.



²¹ ICAO (International Civil Aviation Organization) Annex 14, Volume 1, Chapter 6.2

²² CASA Advisory Circular AC 139.E-05v1.1 Obstacles (including wind farms) outside the vicinity of a CASA certified aerodrome, October 2022

Appendix

B

Example development rights impact assessment



The applicant may need to consider whether the proposed development would impact the right for neighbouring landholders to develop their land for a permitted use. This assessment should be prepared in accordance with the guidance in section 6. An example assessment is provided below.

Table 4. Example impact assessment for development rights

| Receiver number | Impacts | Evaluation |
|-----------------|---|--|
| DE-1 | <ul style="list-style-type: none"> • The subject lot is approximately 640 ha. It is relatively flat pastoral land and predominately cleared of vegetation. It is largely unconstrained and could support development over much of its extent. • A small portion of the lot (approximately 9 ha) would be within the visual impact setback and/or impacted by noise of more than 35 dB(A). • There is a negligible risk of blade throw as the lot boundary is located at least 1,100 m from the nearest turbine. | <ul style="list-style-type: none"> • There would be visual and noise impacts on a relatively small amount of the lot and any future development could be located to avoid these impacts. • There is also dense vegetation between the nearest turbines and the subject lot, which would mitigate any visual impacts. <p>The project is not expected to significantly impact the ability of the land to be developed in the future.</p> |
| DE-2 | <ul style="list-style-type: none"> • The subject lot is approximately 430 ha. It is highly constrained by vegetation and steep slopes, which are likely to limit any future development to a small area in the northeast corner of the lot (approximately 20 ha). • The suitable area is near 3 turbines (no. 43, 44 and 51), which are between 100 m and 1.3 km away. • Consequently, the developable area of the lot is likely to experience high visual impacts and exceedances of the noise criteria. Parts of this area would also be at risk of blade throw. | <ul style="list-style-type: none"> • The project may cause visual or noise impacts that would unreasonably hinder the ability of the landholder to develop the land. • The applicant is negotiating an agreement with the landholder to mitigate the impacts of the project. |