

Module 20. Wind farm development

20.1 Wind farm state code

20.1.1 Purpose

This code applies to a material change of use for a new or expanding wind farm.

The purpose of the code is to protect individuals, communities and the environment from adverse impacts as a result of the construction, operation and decommissioning of wind farm development.

Wind farms should be appropriately located, sited, designed and operated to ensure:

- (1) the safety, operational integrity and efficiency of air services and aircraft operations
- (2) risks to human health, wellbeing and quality of life are minimised by ensuring acceptable levels of amenity and acoustic emissions at sensitive land uses
- (3) development avoids, or minimises and mitigates, adverse impacts on the natural environment (fauna and flora) and associated ecological processes
- (4) development does not unreasonably impact on the character, scenic amenity and landscape values of the locality
- (5) the safe and efficient operation of local transport networks and road infrastructure.

Editor’s note: Guidance on how to demonstrate compliance with the performance outcomes and acceptable solutions of this state code are available in the *Wind farm state code planning guideline*.

20.1.2 Criteria for assessment

Development mentioned in column 1 below must be assessed against the assessment criteria in the table mentioned in column 2.

Column 1	Column 2
Material change of use	Table 20.1.1

Table 20.1.1: Material change of use

Performance outcomes	Acceptable outcomes
Aviation safety, integrity & efficiency	
<p>PO1 The safety, operational integrity and efficiency of <u>air services</u> and aircraft operations are not adversely affected by the location, siting, design and operation of the development.</p>	<p>AO1.1 <u>Wind turbines or wind monitoring towers</u> are 150 metres or less in <u>height</u> and do not infringe on the <u>obstacle limitation surfaces (OLS)</u>, <u>procedures for air navigation services – aircraft operations (PANS-OPS)</u> surface, <u>restricted airspace</u> and <u>low flying areas</u> of a <u>certified aerodrome</u>, <u>registered aerodrome</u> or <u>military aerodrome</u>.</p> <p>OR</p> <p>AO1.2 For development involving <u>wind turbines or wind monitoring towers</u> more than 150 metres in <u>height</u>:</p> <ol style="list-style-type: none"> (1) written endorsement by the Civil Aviation Safety Authority (CASA), Airservices Australia and the district aerodrome supervisor is provided stating they have no objection to the proposed development, or (2) where within 30 kilometres of a <u>military aerodrome</u>, or a <u>certified aerodrome</u> or <u>registered aerodrome</u> jointly used as a <u>military aerodrome</u>, written endorsement by the federal Department of Defence, Civil Aviation Safety Authority (CASA), Airservices Australia and the district aerodrome supervisor is provided stating they have no objection to the proposed development.

Performance outcomes	Acceptable outcomes
<p>PO2 Development includes lighting and marking measures to ensure the safety, operational integrity and efficiency of <u>air services</u> and aircraft operations.</p>	<p>AO2.1 Marking of <u>wind turbines</u> is provided so that <u>rotor blades</u>, the <u>nacelle</u> and the upper two thirds of the supporting <u>mast</u> of <u>wind turbines</u> are painted white.</p> <p>AND</p> <p>AO2.2 The top one third of <u>wind monitoring towers</u> is painted in alternating bands of contrasting colour.</p> <p>AND</p> <p>AO2.3 For development involving the lighting of <u>wind turbines</u> or <u>wind monitoring towers</u> more than 150 metres in <u>height</u> or within 30 kilometres of a <u>certified aerodrome</u> or <u>registered aerodrome</u>, written endorsement by the Civil Aviation Safety Authority (CASA) and Airservices Australia is provided stating they have no objection to the proposed development and lighting measures.</p> <p>AND</p> <p>AO2.4 In areas where low flying aircraft occur:</p> <ol style="list-style-type: none"> (1) marker balls or high visibility sleeves are placed on the outside <u>guy wires</u> of <u>wind monitoring towers</u>, (2) the <u>guy wire</u> ground attachment points have contrasting colours to the surrounding ground/vegetation, and (3) a flashing strobe light is installed to operate on <u>wind monitoring towers</u> during daylight hours. <p>AND</p> <p>AO2.5 Where LED obstruction lighting is proposed, the frequency range of the LED light emitted falls within the range of wavelengths 655 to 930 nanometres.</p>
Electromagnetic interference	
<p>PO3 Development is designed, located and sited to avoid, or minimise and mitigate, <u>electromagnetic interference</u> to pre-existing television, radar and radio transmission and reception.</p>	<p>No acceptable outcome is provided.</p>
Shadow flicker	
<p>PO4 Development avoids or minimises <u>shadow flicker</u> impacts on existing or approved <u>sensitive land uses</u>.</p>	<p>AO4.1 The modelled blade <u>shadow flicker</u> impact on any existing or approved <u>sensitive land use(s)</u> does not exceed 30 hours per annum and 30 minutes per day.</p> <p>AND</p> <p>AO4.2 <u>Wind turbine</u> blades have a <u>low reflectivity</u> finish/treatment.</p>
Flora and fauna	
<p>PO5 Development ensures that impacts on flora, fauna and associated ecological processes are avoided, or minimised and mitigated, through effective siting, design and operation of the development.</p>	<p>No acceptable outcome is provided.</p>
Traffic and access	
<p>PO6 Development provides suitable vehicular access, manoeuvring areas and parking for the ongoing operation and maintenance activities associated with the <u>wind farm</u>.</p>	<p>No acceptable outcome is provided.</p>
Stormwater management	
<p>PO7 Development avoids, or minimises and mitigates, adverse impacts on <u>water quality</u></p>	<p>No acceptable outcome is provided.</p>

Performance outcomes	Acceptable outcomes
<p><u>objectives</u> to achieve no worsening to receiving waters during the operation of the wind farm.</p>	
<p>Watercourses and drainage features</p>	
<p>PO8 Development avoids or minimises the clearing of vegetation within any <u>watercourse</u> or <u>drainage feature</u> to protect:</p> <ol style="list-style-type: none"> (1) bank stability by protecting against bank erosion (2) <u>water quality objectives</u> by filtering sediments, nutrients and other pollutants (3) aquatic habitat (4) terrestrial habitat. 	<p>No acceptable outcome is provided.</p>
<p>Character, scenic amenity and landscape values</p>	
<p>PO9 Development avoids, or minimises and mitigates, adverse impacts on the character, <u>scenic amenity and landscape values</u> of the locality and region through effective siting and design.</p>	<p>No acceptable outcome is provided.</p>
<p>Separation distances</p>	
<p>PO10 Wind turbines are adequately separated from existing or approved <u>sensitive land uses</u> on <u>non-host lots</u>.</p>	<p>AO10.1 Wind turbines are setback at least 1,500 metres from existing or approved <u>sensitive land uses</u> on <u>non-host lots</u>.</p> <p>OR</p> <p>AO10.2 Where wind turbines are proposed within 1,500 metres of existing or approved <u>sensitive land uses</u> on <u>non-host lots</u>, written agreements (<u>deed of releases</u>) from all affected <u>non-host lot</u> owners are provided accepting the reduced setback.</p>
<p>Acoustic amenity – host lots</p>	
<p>PO11 The predicted acoustic level at all noise affected existing or approved <u>sensitive land uses</u> does not exceed the criteria stated in Table 1.</p>	<p>No acceptable outcome is provided.</p>
<p>Acoustic amenity – non-host lots</p>	
<p>PO12 The predicted acoustic levels at all noise affected existing or approved <u>sensitive land uses</u> does not exceed the criteria stated in Table 2.</p> <p>OR</p> <p>Where the acoustic levels stated in Table 2 cannot be achieved at noise affected existing or approved <u>sensitive land uses</u>:</p> <ol style="list-style-type: none"> (1) individual written agreements (<u>deed of releases</u>) from <u>non-host lot</u> owners are provided, and (2) the predicted acoustic level at all noise affected existing or approved <u>sensitive land uses</u> does not exceed the criteria stated in Table 1. 	<p>No acceptable outcome is provided.</p>
<p>Construction management</p>	
<p>PO13 Construction activities associated with the development avoid, or minimise and</p>	<p>No acceptable outcome is provided.</p>

Performance outcomes	Acceptable outcomes
mitigate, adverse impacts on <u>environmental values</u> , <u>water quality objectives</u> , amenity, local transport networks and road infrastructure.	

20.1.3 Reference tables

Table 1

Acoustic criteria	
Noise description	Acoustic level does not exceed
The outdoor (free-field) night-time (10pm to 6am) A-weighted equivalent acoustic level (L_{Aeq}), assessed at all noise affected existing or approved <u>sensitive land uses</u> .	(1) 45dB(A), or (2) the background noise (L_{A90}) by more than 5dB(A), whichever is the greater, for wind speed from <u>cut-in</u> to rated power of the <u>wind turbine</u> and each integer wind speed in between referenced to <u>hub height</u> .

Table 2

Acoustic criteria	
Noise description	Acoustic level does not exceed
The outdoor (free-field) night-time (10pm to 6am) A-weighted equivalent acoustic level (L_{Aeq}), assessed at all noise affected existing or approved <u>sensitive land uses</u> .	(1) 35dB(A), or (2) the background noise (L_{A90}) by more than 5dB(A), whichever is the greater, for wind speed from <u>cut-in</u> to rated power of the <u>wind turbine</u> and each integer wind speed in between referenced to <u>hub height</u> .
The outdoor (free-field) day-time (6am to 10pm) A-weighted equivalent acoustic level (L_{Aeq}), assessed at all noise affected existing or approved <u>sensitive land uses</u> .	(1) 37dB(A), or (2) the background noise (L_{A90}) by more than 5dB(A), whichever is the greater, for wind speed from <u>cut-in</u> to rated power of the <u>wind turbine</u> and each integer wind speed in between referenced to <u>hub height</u> .

20.2 Reference documents

Department of Infrastructure, Local Government and Planning 2016 [Wind farm state code planning guideline](#)

20.3 Glossary of terms

Air services means the premises used for any of the following:

- (1) the arrival and departure of aircraft
- (2) the housing, servicing, refuelling, maintenance and repair of aircraft
- (3) the assembly and dispersal of passengers or goods on or from an aircraft
- (4) any ancillary activities directly serving the needs of passengers and visitors to the use
- (5) associated training and education facilities
- (6) aviation facilities.

Anemometers means a device used for measuring wind speed.

Certified aerodrome means a certified aerodrome as specified under the Civil Aviation Safety Regulations 1998 (CASR) part 139.

Cut-in means the wind speed at which a wind turbine starts power production.

Decommissioning means that the wind turbines, site office and any other above-ground infrastructure is removed from the site, and roads, parking areas and foundation pads are covered and revegetated to return the ground to its former state.

Deed of release means a written agreement between proponent and landowner accepting the following:

- (1) a reduced setback between wind turbines and the landowner’s existing or approved sensitive land use(s), and/or

(2) an increased acoustic level at the landowner's existing or approved noise affected sensitive land use(s).

Editor's note: See the *Property Law Act 1974*, section 45 for the formal requirements for deeds executed by individuals.

Drainage feature means a natural landscape feature, including a gully, drain, drainage depression or other erosion feature that—

- (1) is formed by the concentration of, or operates to confine or concentrate, overland flow water during and immediately after rainfall events,
- (2) flows for only a short duration after a rainfall event, regardless of the frequency of flow events,
- (3) commonly, does not have enough continuing flow to create a riverine environment.

Electromagnetic interference means disturbance or degradation of telecommunications signals currently in operation over the land use area. Includes signals transmitted via microwave, very high frequency and ultra-high frequency systems.

Environmental value see *Environmental Protection Act 1994*.

Editor's note: Environmental value is:

- (1) a quality or physical characteristic of the environment that is conducive to ecological health or public amenity or safety, or
- (2) another quality of the environment identified and declared to be an environmental value under an environmental protection policy or regulation.

Ground level means the level of the natural ground, or, where the level of the natural ground has been changed, the level as lawfully changed.

Guy wire means a tensioned cable designed to add stability to a free-standing structure, such as wind turbines and wind monitoring towers. One end of the guy wire is attached to the structure, and the other is anchored to the ground at some distance from the mast or tower base.

Height of a wind turbine means the maximum height reached by the tip of the turbine blades at their highest point above ground level.

Host lot means a parcel of land (lot(s)) that accommodates any part of a wind farm development.

Hub height of a wind turbine means the height of the hub measured from ground level (i.e. the height of the wind turbine without blades).

Landscape values means areas protected under a regional plan and/or local government planning scheme, such as biodiversity networks, natural economic resource areas (including rural production), scenic amenity areas and landscape heritage areas.

Low flying areas means a designated area where an aircraft can fly over:

- (1) any city, town or populous area at an elevation lower than 1,000 feet, or
- (2) any other area at an elevation lower than 500 feet.

Low reflectivity means a surface treatment that minimises glint.

Mast means the tower on which the wind turbine sits.

Military aerodrome means an aerodrome under the control of any part of the Defence Force.

Nacelle means the housing that sits on top of the tower and contains the main shaft and generator of the wind turbine.

Non-host lot see the Sustainable Planning Regulation 2009, schedule 26.

Editor's note: Non-host lot means a lot no part of which is used for wind farm or part of a wind farm.

Obstacle limitation surfaces (OLS) means a series of surfaces that set the height limits of objects around an aerodrome, and is designed to provide protection for visual flying (when the pilot is flying by sight).

Procedures for air navigation services – aircraft operations (PANS-OPS) means a set of invisible surfaces above the ground around an airport. The PANS-OPS surface is generally above the OLS and is designed to safeguard an aircraft from collision with obstacles when the aircraft's flight may be guided solely by instruments, in conditions of poor visibility.

Restricted airspace means the airspace where aircraft movements are reduced to those with certain specified permissions. The Civil Aviation Safety Authority's Office of Airspace Regulation is responsible for restricted airspace.

Registered aerodrome means a registered aerodrome as specified under the Civil Aviation Safety Regulations 1998 (CASR) part 139.

Rotor blades means the blades and hub of the wind turbine together.

Scenic amenity means a measure of the relative contribution of each place in the landscape to the collective appreciation of open space as viewed from places that are important to the public.

Sensitive land use see the State Planning Policy 2016.

Editor's note: Sensitive land use means any of the following as defined in the standard planning scheme provisions:

- (1) caretakers accommodation
- (2) child care centre
- (3) community care centre
- (4) community residence
- (5) detention facility
- (6) dual occupancy
- (7) dwelling house
- (8) dwelling unit
- (9) educational establishment
- (10) health care services
- (11) hospital
- (12) hotel
- (13) multiple dwelling
- (14) non-resident workforce accommodation
- (15) relocatable home park
- (16) residential care facility
- (17) resort complex
- (18) retirement facility
- (19) rooming accommodation
- (20) rural workers' accommodation
- (21) short-term accommodation
- (22) tourist park.

Shadow flicker means a shadow that is cast under certain combinations of geographical position and time of day, when the sun passes behind the blades of a wind turbine and as the blades rotate, the shadow flicks on and off. The duration of this effect, which varies according to the time of the year, can be calculated from the machine geometry and the latitude of the site.

Watercourse see the *Water Act 2000*, schedule 4.

Editor's note: A watercourse

- (1) is a river, creek or other stream, including a stream in the form of an anabranch or a tributary, in which water flows permanently or intermittently, regardless of the frequency of flow events –
 - (a) in a natural channel, whether artificially modified or not, or
 - (b) in an artificial channel that has changed the course of the stream
- (2) a watercourse includes any of the following located in it –
 - (a) in-stream islands
 - (b) benches
 - (c) bars
- (3) however, a watercourse does not include a drainage feature
- (4) further –
 - (a) unless there is a contrary intention, a reference to a watercourse in the *Water Act 2000*, other than in section 5 or in the definitions in schedule 4 to the extent they support the operation of section 5, is a reference to anywhere that is—

- (i) upstream of the downstream limit of the watercourse
- (ii) between the lateral limits of the water course
- (b) a reference to the *Water Act 2000* to, or to a circumstance that involves, land adjoining a watercourse, is a reference to, or a circumstance that involves, and effectively adjoining a watercourse.

Water quality objectives means the numerical concentration limits, mass or volume limits per unit of time or narrative statements of indicators established for waters to enhance or protect the environmental values for those waters set out in:

- (1) the Environmental Protection (Water) Policy 2009, schedule 1 for water mentioned in the policy, or
- (2) otherwise—the Queensland Water Quality Guidelines 2009.

Wind farm see the Sustainable Planning Regulation 2009, schedule 26.

Editor's note: Wind farm:

- (1) means to the use of premises for generating electricity by wind force, and
- (2) includes any of the following that are used in connection with, or are ancillary to, the use of the premises or the construction of works relating to the use—
 - (a) wind turbines, wind monitoring towers and anemometers
 - (b) buildings, storage areas, maintenance facilities and other structures
 - (c) infrastructure and works, including, for example, site access, foundations, electrical works and landscaping, and
- (3) does not include the use of premises for generating electricity that is to be used mainly on the premises for a domestic or rural use.

Development involving wind turbines that is not a material change of use for a wind farm may otherwise be assessable development under a planning instrument.

Wind monitoring tower means a mast that incorporates wind speed and direction measuring and recording equipment.

Wind turbine see the Sustainable Planning Regulation 2009, schedule 26.

Editor's note: Wind turbine means a machine or generator that uses wind force to generate electricity, and includes the blades of the machine or generator.

20.4 Abbreviations

CASA – Civil Aviation Safety Authority

dB(A) – decibels measured on the 'A' frequency weighting network.

Free-field – a region in space where sound may propagate free from any form of obstruction, usually greater than 5m from any significant vertical reflecting surface.

L_{Aeq} – The equivalent continuous (time-averaged) A-weighted sound level.

L_{A90} – The A-weighted noise level equalled or exceeded for 90% of the measurement period. This is commonly referred to as the background noise level.

LED – Light emitting diode