

Boomer Green Energy Hub



A photomontage showing what the wind farm would look like from Apis Creek Road, Mount Gardiner, about 9.6 km away.

The Boomer Green Energy Hub is a large-scale renewable energy generation project proposed for a number of cattle grazing properties south-west of Marlborough in central Queensland. It involves land in the Livingstone Shire Council, Rockhampton Regional Council and Central Highlands Regional Council areas.

The project design currently involves a wind farm with about 150 wind turbines, and feasibility studies are underway to add solar and optimise planned new electrical infrastructure. The project is in the early development phase. This involves planning, finalising the design and comprehensive impact assessment work according to statutory guidelines. The planning and assessment phase may take up to two years.

State assessment

The development application for the wind farm will be assessed by the Queensland Government through its State Referral and Assessment Agency (SARA). SARA delivers a co-ordinated, whole-of-government approach to wind farm assessment, with requirements outlined in *State code 23: Wind farm development*.

State code 23 prescribes the assessments required, the methodology for technical assessments, minimum actions and acceptable outcomes to demonstrate compliance. Areas of assessment include aviation, noise, visual impact, ecology and electromagnetic interference. The code also requires preliminary management plans for construction, fauna, sediment control, water and traffic. State code 23 aims to make sure that a wind farm is located, sited, designed, constructed and operated to ensure:

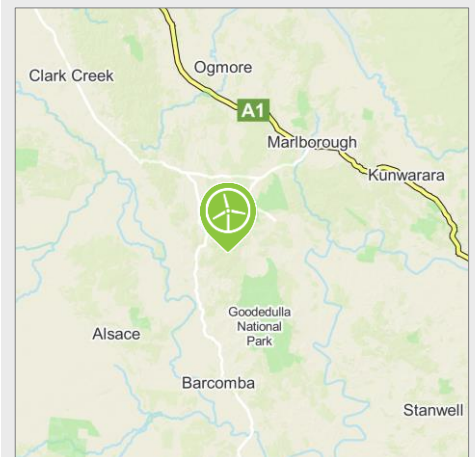
- Safety, operational integrity and efficiency of air services and aircraft operations.
- Risks to human health, wellbeing and quality of life are minimised by ensuring acceptable levels of amenity and acoustic emissions at sensitive locations.
- The development avoids, or minimises and mitigates, adverse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

The development application for any solar component would be assessed by the relevant council under its local planning scheme, through a similarly rigorous process.

Commonwealth assessment

Ark Energy referred the proposal to the Australian Department of Climate Change, Energy, the Environment and Water (DCCEEW) for review under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), which protects Matters of National Environmental Significance (MNES). DCCEEW has deemed the proposal to be a 'controlled action' under the EPBC Act, so it must be assessed and approved by DCCEEW before it can proceed (EPBC Reference No: 2022/09396). DCCEEW has determined that it will assess the proposal through an Environmental Impact Statement (EIS) and is due to issue final guidelines outlining the assessment requirements for the EIS soon.

Location



The project area for the Boomer Green Energy Hub is approximately 100 km north-west of Rockhampton and 30 km south-west of Marlborough in central Queensland. It is in the candidate Central Queensland Renewable Energy Zone, an area identified as optimal for new renewable energy generation.

- Estimated to create 350+ jobs during construction and ~20 full-time jobs for operation.
- Estimated to generate ~\$600 million in local and regional expenditure.
- A community benefit program to share meaningful benefits with nearby communities, funded from start of construction and for the life of the wind farm.
- Start construction (target): Q1 2025
- Completion (target): Q4 2026
- Output capacity of up to 1,100 MW

Ecology

Avoiding, minimising and mitigating impacts to the natural environment is a priority for the project team, and thorough research and assessment into the potential impacts on flora and fauna across the site is required by both the Queensland and Australian Governments.

The ecological assessment work will be done by independent ecologists and site survey teams over multiple seasons and in accordance with comprehensive State and Federal environmental assessment guidelines.

As findings from the ecology work become available the project's design may be refined and modified accordingly to avoid sensitive ecological areas or key habitat for particular species. Often site investigations for new renewable energy projects also provide a deeper and more comprehensive understanding of biodiversity in an area and add to scientific knowledge for key species.

The project team is committed to collaborating with ecology stakeholders, scientists and host landowners to implement responsible strategies to mitigate construction impacts and a key aim of the project will be to achieve net positive outcomes for biodiversity in the area over the longer term.

Aboriginal cultural heritage

Ark Energy recognises the continuing connection that Aboriginal and Torres Strait Islander Peoples have to their land and Traditional Custodians are important project stakeholders. The Boomer Green Energy Hub project area is Barada Kabalbara Yetimarala Peoples country.

The project team is engaging with the Traditional Owners to establish an agreement that will provide meaningful benefits for them, and ensure the protection and maintenance of cultural heritage sites within the project area.

Landscape and visual impact

The development application requires assessment of the wind farm's visual impact on the landscape. As part of this photomontages – such as the image on the cover showing a view from Apis Creek Road, Mount Gardiner – are produced to show what the wind farm would look like from representative public viewpoints where it could be seen.

Photomontages are produced by technical specialists and involve combining location photographs with a technical digital representation of the wind farm called a wireframe. Wireframes are produced using specialist industry software and based on precise locations and dimensions of the proposed wind turbine model to give an accurate and correctly scaled representation.

Wind turbine noise and health

Technological advances over recent years have reduced operational wind turbine noise and current models are much quieter than most people generally expect. For example, wind turbine blades are now upwind of the tower reducing infrasound, which usually refers to very low frequency sounds below 20 Hz, to below the threshold of human perception.

Noise output from a wind farm can be predicted using acoustic modelling, and a technical noise impact assessment by acoustic specialists is required under State code 23.

Predictive acoustic modelling is a technical and complex area of expertise. Wind turbines have special noise characteristics, and many variables influence noise emissions including background noise, turbine layout, land topography, and wind speed and direction. All these factors must be taken into consideration.

Noise impact assessments use data from background noise and wind monitoring, involve applying the unique acoustic characteristics of the candidate wind turbine at all proposed wind turbine locations and determining the noise associated with operation of the full wind farm.

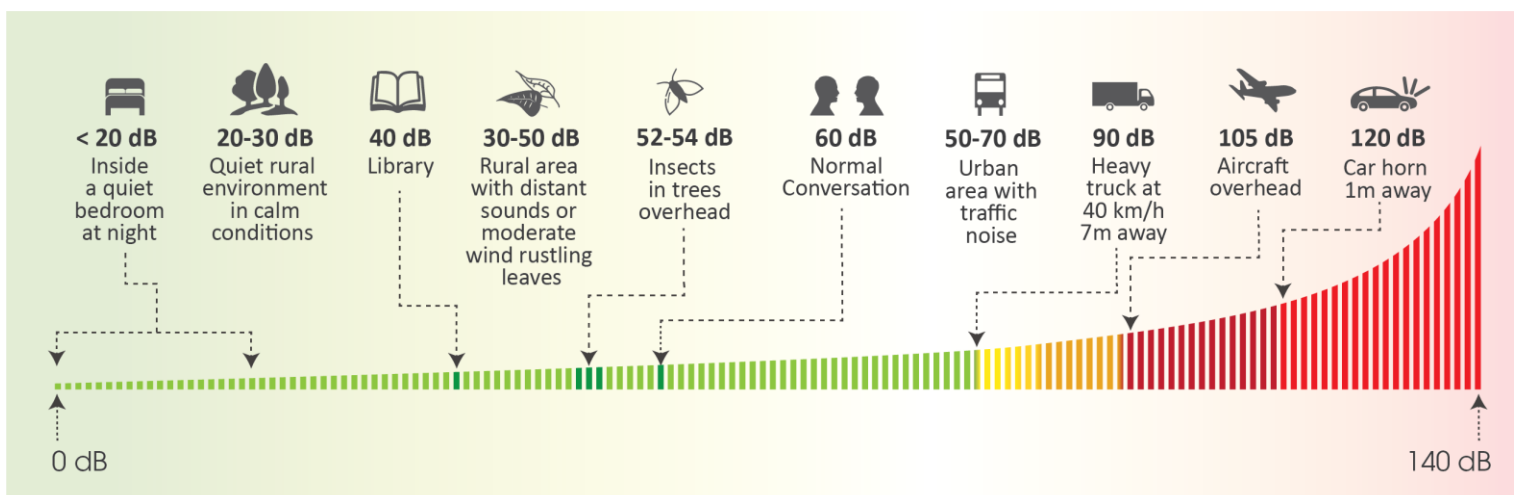
The code prescribes the technical criteria and methodologies for noise assessment of wind farms in Queensland, and the noise limits are amongst the most stringent in Australia and internationally. Noise limits are designed to ensure the health and safety of individuals and preserve peoples' amenity, including the ability to sleep at night when background noise is usually low. The code states: *"The applicable acoustic criteria has been established based on national and international best practice, including a detailed review of the various standards, guidelines and frameworks in place throughout Australia, New Zealand and abroad"*.

At any non-involved residence the noise limit is the greater of 35 decibels (dB) or the background noise plus 5 dB at night (10pm-6am) and 37 dB or the background noise plus 5 dB during the day (6am-10pm). The diagram below provides the noise levels in dB of various familiar sounds for reference.

Compliance with the noise limits must be demonstrated before approval can be granted and again post-construction.

The relationship between operating wind farms and human health has been the subject of extensive review by independent medical and research organisations including Australia's National Health and Medical Research Council and the Australian Medical Association. Both have published statements on wind farms and health that conclude there is no consistent evidence that wind turbine noise causes adverse health effects in humans.

The Australian Energy Infrastructure Commissioner has also published observations on health matters consistent with these statements.





Construction and traffic

The project will involve comprehensive construction management and traffic management plans, compliant with Queensland Occupational Health & Safety legislation and the local government planning scheme, and developed in consultation with all key stakeholders. They will cover all aspects of construction and traffic management including working hours, noise, traffic and dust.

Construction can only commence after the detailed engineering design has been completed. Preparation may require upgrading access roads, which would be the standard width of 5.5 m or wider where required due to topography or for parts, cabling, safety, fire management and erosion and sediment control.

Fire safety and management

Wind turbines and solar panels are constructed with fire resistant materials and designed to mitigate fire risk.

Wind turbines are operated by sophisticated monitoring systems that automatically follow shutdown procedures in response to operational issues and can be remotely shut down in the event of fire in the area. They also provide a safe path to ground for lightning strikes and access tracks serve as natural fire breaks.

A comprehensive bushfire management plan for the site would be developed in consultation with Queensland Fire and Emergency Services (QFES).

QFES would manage firefighting on the site in the same way as any other area, using ground and air-based resources subject to prevailing weather conditions, and avoiding wind turbines in the same manner as other obstructions such as buildings or powerlines.

Electromagnetic interference

Electromagnetic interference (EMI) refers to interference by operating wind turbines with the transmission of magnetic waves emitted from a source such as television, radar or radio signals. A technical EMI assessment is required and it is not anticipated that there will be any issues with EMI impacts.

Shadow flicker

Shadow flicker refers to the appearance of shadows from rotating turbines under certain conditions and times of day. A technical shadow flicker assessment is required and it is not anticipated that there will be any issues with shadow flicker.

Livestock

Hosting renewable energy infrastructure is a complementary land use for agriculture and can provide a reliable supplementary income stream for farmers.

Livestock appear to be unaffected by wind turbines and will often use the towers for shelter or shade. Agrovoltaics is the focus and practice of sustainable development that combines solar photovoltaic energy capture and agriculture. It is used to design solar arrays to optimise the synergy between generating solar energy and the host land's agricultural use.

End of operation

Wind turbines and solar panels have a standard operational life of approximately 25 years. Options at the end of a project's initial operational life include extending the life of the facility via refurbishment, repowering with new infrastructure or decommissioning.

If the decision is made not to extend or refurbish the facility it will be decommissioned, usually within 12 months of ceasing operation. The costs of decommissioning are the responsibility of the asset owner. Decommissioning would involve the establishment of a decommissioning fund by the operator, and the removal of above ground infrastructure including wind turbines, solar panels, electrical infrastructure and maintenance buildings, and returning the site to its former state where practicable.

Wind turbines are predominantly made of recyclable materials and approximately 85-94% of today's wind turbines are recyclable. Research and developments in technology continue to advance recyclability of wind turbine and solar panel components. Most – if not all – of the materials will be reused, repurposed, recycled and recovered.

Key benefits

JOBS - The project is expected to generate 350+ jobs during the construction period and ~20 full time jobs for operation.

ECONOMIC BOOST - Construction would generate significant expenditure within the local, regional and Queensland economy, including work for contractors and increased patronage for surrounding accommodation, retail, service and hospitality businesses. It is estimated that the project would generate >\$600 million in expenditure, value-add and household income.

COMMUNITY BENEFIT PROGRAM - The project will involve a program to provide meaningful benefits to nearby residents and communities. It will be designed with community members and local stakeholders, and provide funding annually from the start of construction and for the life of the project.

CLEAN ENERGY - Renewable energy is the cheapest source of energy and more is urgently needed to reduce carbon emissions, replace fossil fuel sources and meet growing electricity demand. Growth in renewable energy capacity will put downward pressure on electricity prices and deliver more affordable, clean, reliable electricity. A carbon lifecycle analysis for this project estimates that it would reduce greenhouse gas (GHG) emissions by 1,200,000 t CO_{2-e}/year and, taking into consideration generated emissions – including for transport, manufacturing and clearing – the project would achieve net positive after 1.7 years of operation.

NET GAIN FOR BIODIVERSITY - A goal of the project will be to achieve a net gain for biodiversity in the project area over the longer term. This might involve various initiatives including rehabilitation of the construction disturbance and environmental offset with improved land management regimes.

Planning & assessment

Queensland Government (wind)
Local councils (solar - tbc)

1 Site selection, initial concept and preliminary investigations

2 Pre-lodgment meeting

3 Studies and technical assessments (prescribed by planning requirements) **WE ARE HERE**

4 Development application and assessments lodged

5 Requests for further information (if required) and response

6 Assessment

7 Determination



Australian Government

1 Referral to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) for review under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)

2 Decision and advice on assessment pathway: *Determined a controlled action with assessment by Environmental Impact Statement (EIS)*. EBPC no 2022/09396. **WE ARE HERE**

3 Assessment work for preparation of EIS

4 Draft EIS submitted for adequacy review

5 Requests from DCCEEW for further information (if required) and responses

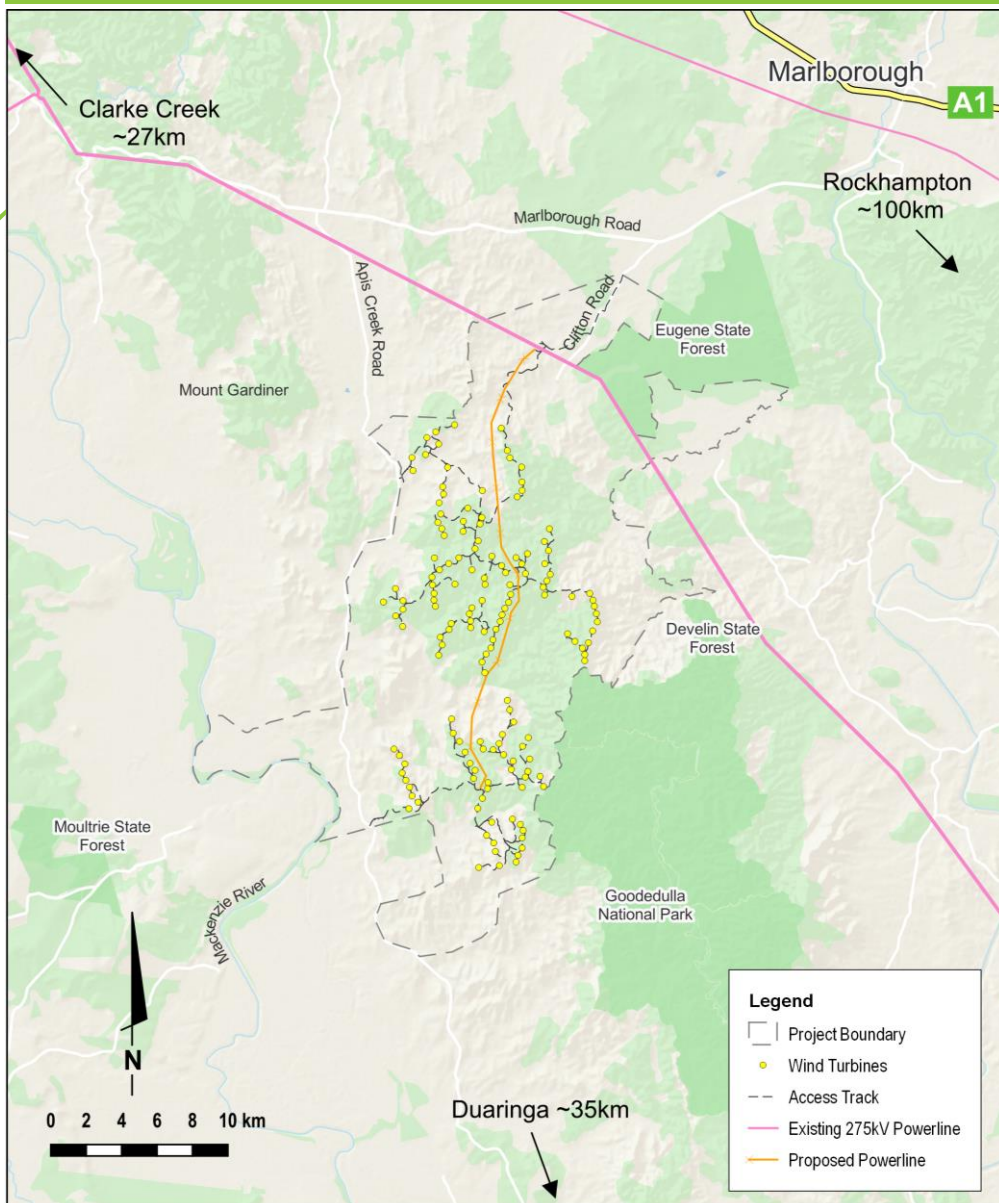
6 EIS accepted by DCCEEW and placed on public exhibition

7 Response to submissions (if required) and lodgment of updated EIS

8 Final EIS submitted

9 Determination

Boomer Green Energy Hub indicative wind turbine layout



The project area is ~100 km north-west of Rockhampton and 30 km south-west of Marlborough. Based on wind data and preliminary site investigations the project has an initial design of ~151 wind turbines. Feasibility studies are also underway for adding solar to optimise planned new electrical infrastructure. The hub would connect to the existing 275 kV powerline.

Questions and feedback

Ark Energy appreciates the importance of engaging, listening to and involving local community members and stakeholders, to ensure local priorities and concerns are considered, and to help develop meaningful and lasting community benefits.

Questions and feedback are welcome at any time, and input is valued. Questions and feedback can be sent directly to the project team via the details below or the feedback form under the 'Feedback' tab on the website. Stay up to date on other opportunities to participate by registering for newsletters – details below.

More information

Tel - 1800 731 296

Email - info@boomerhub.com.au

Newsletters – register at arkenergy.com.au/mailling-list-details for email news, or to receive newsletters by post, email your postal address and a request to be added to the mail (post) list.

Website – boomerhub.com.au or scan QR code right



Scan QR code to visit the project website