August 2019

granite hills wind farm

CCC Report

Presented by

original proactive flexible

Response to CCC Meeting 8 - Action Items

Water Use for Turbine Foundations

Granite Hills is providing this information in response to the April CCC action item.

A standard 3MW turbine[1] requires approximately 500 m3 of concrete. Assuming 100L of water per cubic meter of concrete, as requested by Kitt Bryce, in his email with questions to the CCC, water usage for a 3MW turbine foundation would be 50kL or 16.7kL/MW for a turbine which will be installed for 25+ years. Note a water truck volume ranges approximately between 6-30kL, therefore water for each foundation could be brought in by 2-9 trucks.

In order to understand this figure, it can be compared to the amount of water used for an equivalent coal fired power station within NSW, in this case AGLs Macquarie power generation group, including Liddell, Bayswater coal generators and 50MW of gas. As per the table below, on average per megawatt of generation AGL Macquarie uses 12,792kL/MW[2] annually or a total of 59,993,100kL of water for all generation per year. Comparatively this means per unit of power water required for the turbine foundations for Granite Hills which will last 25+ years is around 0.1% of the water required annually for AGL Macquarie. Conversely per megawatt per year, power generated AGL Macquarie uses around 255 times as much water every year as will be required for the turbine foundations at Granite Hills which will last the life of the project.

Facility Name	Technology	Water Usage Type	Duration	Water Usage (kL/MW)	Water Usage (% of Coal)
Granite Hills	Wind	Turbine Foundation	25+ Years	16.7	0.1%
AGL Macquarie	Coal & Gas	Annual Usage	Every Year	12792	100%

Note that per information provided to the CCC in April there is virtually no ongoing water usage for a wind farm. As per the table in the section above which was previously provided the lifecycle equivalent the wind farm will use 0.03-0.075% of the water used by a coal fired power station, or per unit, energy produced by coal will use between 1333 to 3333 times as much water when considering its lifecycle water usage. Considering Australias dry nature, and the ongoing severe droughts in the country, in particular in New South Wales, where Granite Hills is based, the significantly lower water usage s considered a strongly positive element of the project and wind energy in general.

Carbon Emissions and Water Use

Operationally wind-farms produce negligible emissions and use next to no water, which is very beneficial in a water scarce country like Australia. While opponents point to the emissions and water used in the manufacture and construction stages, life cycle analyses show that even when these are factored into the calculations, wind still far out-performs current energy generation technologies like coal. With coal still providing 60% of Australia's energy, an increase in the wind energy mix will lead to significantly decreased water use and decreased emissions. The lifecycle of a wind farm produces in the order of 1% of the emissions of the equivalent coal power and consumes less than 0.1% of the water.

Measure	Units	Wind	Coal	Wind as % of coal
Lifecycle CO_2 equivalent emissions	g CO2/kWh	7.6	740-910	0.8 - 1.0%
Lifecycle water use	mL/kWh	62	83000 (surface mining)- 212000 (underground mining)	0.03 - 0.075%

[1] Based on a Vestas 3MW machine.
[1] Based on an average of AGL Macquaries water use figures for 2016 and 2017: http://agl2017.reportonline.com.au/data-centre/environment#tab-166

ABOUT THE PROJECT

Granite Hills Wind Farm is a State Significant Development, situated in Steeple Flat, approximately 12 kilometres South East of Nimmitabel in New South Wales. When complete the project will comprise of up to 32-wind turbines, with approximately 3-5 megawatts capacity and a maximum tip height of 200 metres. The 132MW wind farm would generate enough clean energy for around 50,000 homes.

If you have any questions or would like to know more about the project, please phone 1800 961 761 or send an email to granitehills@akuoenergy.com

Community Engagement Report

Neighbours of the Granite Hills Wind Farm project

Neighbours are residents or owners of the properties neighbouring the host landowner's properties that host, or will host turbines, either in adjoining properties or properties within proximity to turbines of the wind farm. There may also be neighbours that are not in direct proximity to the wind farm that could be affected by other related wind farm infrastructure, such as high voltage power lines and road access to the wind farm.

Granite Hills Wind Farm Neighbour Boundaries

Due to the difference in impact for surrounding landowners we have separated the neighbours into three groups – based on their proximity to the site. The distances selected for identifying neighbour groups were chosen as a result of the distances for impacts defined in the NSW Wind Energy: Visual Assessment Bulletin for structures of up to 200m in height.

1. Involved landowners – accommodate wind turbines
2. Immediate neighbours – located with 2.7km radius
3. Nearby neighbours – located between 2.7km and 4km radius

Granite Hills Wind Farm is committed to best-practice community engagement which empowers local communities to genuinely contribute to and benefit from the development of the wind farm.

At this point the community liaison team for this project have spoken to 40+ neighbours and community stakeholders in Nimmitabel, Bemboka and Cooma. Three newsletter editions have also been distributed, since OPF's involvement in the project, and can be downloaded from the project website,

Neighbours have identified various concerns in the process of facilitation. Granite Hills understands the key concerns are as follows

- General impact by the development, construction and operation phases of the wind farm
- Economic loss and property devaluation
- Visual amenity
- Noise and low frequency noise including infrasound
- Planned transport routes and road degradation
- Vegetation clearance for wind farm infrastructure
- Neighbours have also expressed concern that during construction they may experience abnormal levels of dust, noise, road damage, road blockages and other forms of disruption

Some opponents to this wind farm have particularly focused on their concerns about infrasound, these concerns have been passed on the projects independent specialist. It is important to note, infrasound is a common phenomenon in environments where humans provide. It is produced by everything from the noise in the trees, the ocean, traffic noise, air conditioners, the fridge in your house and your own heart and lungs. With this in mind as a generalisation, it can be inferred infrasound levels in cities often equal or exceed infrasound produced by a wind farm. Various studies have been completed into infrasound including by the Australian Government and the National Wind Farm Commissioner, the outcome was turbines produce no known effects on human health. There is more detail on the Health section in this report.

The concerns expressed by this community are not unusual – particularly during the planning phase of these projects. It can be reassuring to compare these with the lived experience of those who are co-located with similar developments. A report from the National Wind Farm Commissioner's 2018 Report is informative in this regard.

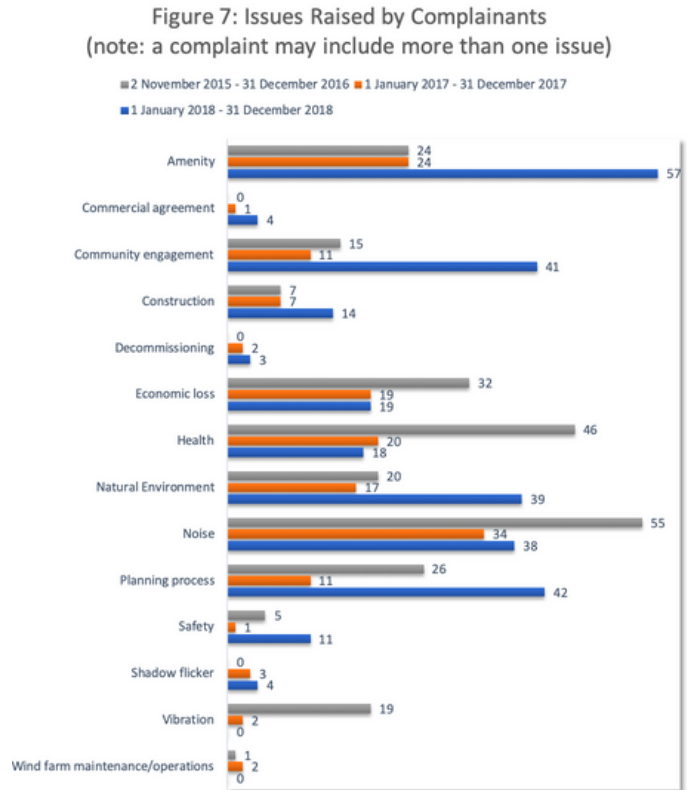
Community benefits

The consultation team also has a role to play in identifying the kinds of benefits communities want to prioritise if these kinds of developments proceed. It wasn't always the case, but nowadays rural places, such as Nimmitabel and Bemboka, are often among those in greatest need of new economic development. Building a wind farm can be a big change for a small town, but a number of benefits come along with those changes. The Granite Hills Wind Farm development will look at how the following benefits could be implemented.

Benefit sharing initiatives could include:

- Neighbour Agreement Program
- Community Enhancement Fund
- Local sponsorships

Community Engagement Report



Industry overview of issues raised with the National Wind Farm Commissioner

About the National Wind Farm Commisioner

The Commissioner is an independent role appointed by the Australian Government, reporting to the Minister for Energy. The Commissioner's role is to receive and refer complaints from concerned community residents about wind farms, large-scale solar farms and energy storage facilities as well as promote best practices for industry and government to adopt in regard to the planning and operation of these projects. The Commissioner will also provide greater transparency on information related to proposed and operating wind farms, large-scale solar farms and energy storage facilities.

If you would like to contact the Office of the National Wind Farm Commissioner please use the contact information below:

Email:

nwfc@environment.gov.au

Mail

National Wind Farm Commissioner
PO Box 24434
Melbourne VIC 3001

Telephone

1800 656 395

Health and Wind Farms

In 2016, the National Health and Medical Research Council announced the funding of two research studies into wind farms and health. One study is focused on the effects of wind farm noise on sleep and is led by Professor Peter Catcheside at Flinders University. The other study is focused on measuring the effects of infrasound and is led by Professor Guy Marks at the University of New South Wales. In addition, in late 2015, the Australian Government established the Independent Scientific Committee on Wind Turbines to provide advice on a range of matters including wind farm noise levels and the relationship to health effects.

A number of complaints about wind farms received by the Office of the Wind Farm Commissioner include references to health impacts as a result of wind farm operations. Health conditions cited in complaints include sleep disturbance, headaches, ear-aches, 'pounding' in the ears, tinnitus, tachycardia, high blood pressure, sight impairment, diabetes, chest-tightening, nausea and general fatigue. The complaints generally state that such conditions are caused by audible noise and low frequency noise, including infrasound, along with vibration sensations attributable to the operation of nearby turbines. In some cases, complaints have stated that some health conditions are persisting even when the turbines are not operating.

Numerous invitations have been extended to complainants to provide evidence of their medical conditions. Complaints regarding health concerns received by the Office have, in the main, provided only anecdotal evidence regarding stated health issues and perceived causality. It has therefore been difficult to the Commissioner to form an opinion on whether or not the stated health conditions reported by complainants are valid and, if valid, whether or not the health conditions are possibly a result of the wind farm's operations or from some other known cause.

Since the Office commenced, 65 complaints about operating wind farms have been received. These complaints relate to 11 operating wind farms out of a total of more than 80 operating wind farms across Australia. Of these 65 complaints, approximately half of the complainants cited concerns about health impacts from the operating wind farms. Of these, a very small number of complainants agreed to work with the Office and provide evidence of the stated health issues. In all of these cases, the root cause of the stated health issue was not attributable to the wind farm.

Further, in 2018, only eight complaints about operating wind farms were received. The clear majority of complaints received have been about proposed wind farms. On the basis that a wind farm has to be built and operating before it could possibly cause a physiological health effect.

Health conditions may also arise as a result of stress, annoyance or anxiety related to the presence of an operating wind farm or concerns about the effects of a proposed wind farm. Further, uncertainties in relation to whether a proposed wind farm will actually proceed (a period which may extend for several years) may also contribute to stress and anxiety. Regardless of previous information, possible health mpacts are continually reviewed by State and Federal institutions and are taken in to consideration by authorities on wind farm applications for development.