Submission to:

Lal Lal Wind Farm

Planning Permit PL-SP/05/0461

Application to amend permit

By

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Introduction

I am a resident of Greendale – located between Ballan & Blackwood – and a volunteer firefighter of more than 35 years' experience, including 12 years as captain of Greendale Rural Fire Brigade. I am currently the Group Officer at the Ballan Group of Fire Brigades, a position I have held since July of 2014. The Group Officer role is mostly one of co-ordination of the nine brigades that comprise the Ballan Group, which includes Wallace, Millbrook, and Mt Egerton Fire brigades which are, or will be, direct or near neighbours of the proposed Lal Lal wind farm.

There are two more aspects of my CFA life:

1. I am an endorsed Level 3 Operations Officer – which is an incident management role for major incidents in Victoria, and potentially elsewhere. The Operations Officer at a major incident is the person responsible for managing the actual response activities of all agencies involved. I have fulfilled this role at fires, floods and the ship fire at the Port of Portland in October of last year.
2. Since March of 2014 I have been an employee of CFA in a non-operational capacity as part of a newly introduced team that supports brigades and volunteerism at a time when both are under significant pressure from outside influences.

As a matter of experience, I worked for 30 years in the field of industrial process control, and so understand that fluid dynamics is a field that is subject to many non-intuitive, and non-linear effects which may be little understood.

The member brigades of the Ballan Group are supportive of my involvement in this process to represent their interests as being affected by the proposed changes to the subject planning permit.

My understanding is that the purpose of the panel is limited to the changes being sought to the original planning permit and that those changes relate most significantly to an increase in height of the proposed towers and a corresponding increase in blade length of the turbines.

Concerns

Aerial fire-fighting operations

This is perhaps the primary concern felt by member brigades, and myself as a fire manager. Any obstacle of uncharacteristic height has the potential to compromise the ability of aircraft to act swiftly and with a minimum of disruption at a fire where their operations may make a significant difference to the effectiveness of the fire attack. Aerial fire attack of the scale we have available to us in this era is a now an integral part of our planning for fire response, and whilst we can never be guaranteed an aircraft at any given fire for numerous reasons, addition of man-made obstacles over and above initial proposals always has the capacity to further compromise aerial fire-fighting.

I note with interest that the Lal Lal wind-farm website FAQ says that aerial firefighting can take place in and around a wind-farm and quotes a South Australian CFS information sheet as the source of that conclusion. Perhaps unsurprisingly they did not quote the very next sentence that says: *"In some circumstances aircraft will not be utilised because risks caused by vertical obstructions exceed safe operating conditions."* (Accessed 24/10/2016 via the link found here - http://www.cfs.sa.gov.au/site/about/aerial_firefighting.jsp). I can understand why they emphasise the earlier statement, but as a fire-fighter and fire manager, I consider the latter statement to be the one worthy of the greater consideration.

> Can you still use aerial bush fighting measures around a wind farm?
>
> Yes, you can.
>
> In South Australian, Country Fire Service (CFS) published a fact sheet entitled Understanding Aerial Firefighting. The CFS approach to wind farms is no different to any other structures such as power lines, weather masts or TV transmission towers. The fact sheet states:
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> *"where vertical obstructions exist in the airspace around a fire, such as power lines, weather masts, radio and television transmission towers, tall trees and wind turbines, a dynamic risk assessment is undertaken prior to the aircraft being committed to fire-bombing operations."*
>
> More specifically in Victoria, in accordance with the Policy and Planning Guidelines for Development of Wind Energy Facilities, wind energy facility operators must develop a Bushfire Prevention and Emergency Response Plan as part of their Environmental Management Plan. The plan must address a variety of measures, but specifically noted in relation to aerial bush fighting measure:
>
> *"2.3. Wind turbines should be located approximately 300 metres apart. This provides adequate distance for aircraft to operate around a Wind Energy Facility given the appropriate weather and terrain conditions. Fire suppression aircraft operate under "Visual Flight Rules". As such, fire suppression aircraft only operate in areas where there is no smoke and during daylight hours. Wind turbines, similar to high voltage transmission lines, are part of the landscape and would be considered in the incident action plan."*
>
> Copied from http://w-wind.com.au/faqs/ 25/10/2016

Whilst CFA is ambivalent about wind farms in a general sense - the second quote in the text box above coming from a CFA publication - as being merely an obstacle, they present a new type of obstacle to aerial firefighting in that they are somewhat of a moving target, with blade tips moving at well over 200 hundred kilometres an hour. This makes them a potentially greater risk than completely static obstacles, which themselves cause accidents in both agricultural and aerial firefighting applications. The greater sweep area of the longer blades that come with the higher towers may increase that danger with a corresponding increase of the zone that pilots avoid for their safety.

Any increase in the size of a no-fly zone obviously concerns our firefighters, with the potential loss of aerial attack in the early or other critical stages of a firefight making their job both more onerous and more dangerous.

The greater height of the turbine towers and extra blade length may also compromise aerial operations in another way. If the source of water for the aircraft is on the opposite side of the wind farm from the fire (it is in quite close proximity to a substantial reservoir) then the turn-around time for the aircraft is extended due to the need to go higher or further around the turbines then there is a corresponding loss of efficiency in aerial operations. Further to this point, is that the Emergency management Victoria have informed us that the main firefighting Helicopter for this area is changing to a one of approximately 1/6th the capacity of what has previously been stationed at Ballarat (1 200litres instead of 7 500 litres), making anything that potentially increases turn-around time for the aircraft of even greater concern, given that a longer turnaround time to deliver significantly less water reduces the 'weight of attack' that is so important in firefighting. This matter is analogous to an old fashioned bucket brigade feeding buckets of water to a fire where the effectiveness of such a line is increased with larger buckets, given that the rate of delivery is the same for a large or small bucket. Anything that compromises the ability of a firefighting aircraft to do its job at a fire, such as skirting a wind farm, or having to climb higher to go over it, or even stopping their operation due to proximity puts on ground firefighters at greater risk.

Whilst I am not a pilot, my understanding of aircraft firefighting operations is that, particularly with helicopters, height costs money, time and wear & tear. Aerial firefighting is generally a very low level activity, with drops occurring from a height of as little low tens of metres for helicopters and smaller fixed wing bombers, to well under the proposed wind tower height for large bombers including the DC10, with helicopters operating barely above treetop height when there are trees and lower when there are not, depending on various operational circumstances. Some helicopters use buckets on a line for their drops, and the line can be as much as 60metres long, adding more height needed to safely clear obstacles. Even larger aircraft operate at a level well below the height of the current permitted towers, let alone the increased height being requested.

The increased height proposed for Lal Lal can affect turn-around times for helicopters, make bombing by fixed wing bombers more difficult to impossible depending on approach and departure directions and angles.

Videos of aircraft operations at fires giving and indication of the flight level.

General aircraft

https://www.youtube.com/watch?v=YJYUMuqCyQc

DC10 in Australia

https://www.youtube.com/watch?v=cWJ_NvzrXdo

BBC story saying a DC 10 needs to be 60m above tree tops for effective operations

http://www.bbc.com/future/story/20150821-the-jaw-dropping-missions-of-fire-fighting-pilots

Ground fire-fighting operations

An argument has been made by wind farm proponents that the infrastructure, particularly roads and access tracks to turbine towers may improve access for fire-fighting operation by ground crews, which on the surface may seem to balance the potential loss of air attack as described above. However, to my mind it seems that the two matters are not equal. The improvement in access is limited to the footprint of any road network, which is likely smaller than the footprint of the whole wind farm, whereas the loss of aerial attack may extend to an area much larger than the entirety of the wind-farm, (due to a number of external factors such as wind direction, topography type of fire and type of aircraft).

To give a remotely comparable ground fire-fight operational or safety gain, a substantial – 6 metre wide, bare earth, perimeter fire break may be required, to help stop the a fire entering or exiting the wind-farm. However, given that the wind-farm is on private land and, I assume, split amongst a number of landowners, how that would be achieved and monitored is problematic

Science and Health Safety & Environmental considerations

My concern is that as a fire manager, I have a duty of care to the fire-fighters and support personnel that I send in to the fireground. Can I be definitively assured that it is impossible for someone to be affected by the turbines if they are still rotating? If not, then I have to consider what is best for the fire-fighters, irrespective of what their personal views may be. *Note: I am not suggesting that I would not send firefighters to operate near a rotating turbine, just that their proximity is another potential safety matter that needs to be considered when assessing the whole scene, and the firefighters themselves may have their own views and may choose to not operate in close proximity.*

It may be that the turbines will be turned off if required, but clearly there is a balance here between the safety of firefighters and the greater public who want electricity. The recent state-wide power outage in South Australia undoubtedly caused a major reassessment of power supply and shutdown arrangements.

At what distance can a turbine have an effect, if indeed it has one at all? In the event of an effect, what circumstances dictate its nature and do those circumstances and/or effects change with height, blade length, blade speed, distance between towers, harmonic effects between blades, towers, the ground, wake effects and a large number of other possible interactions as a result of geography, topography, fluid dynamics, atmospherics and who knows what else?

We are fortunate to live in an era where an extraordinary number of matters can be studied and tested to see what effects can be demonstrated to flow on from particular causes, or what potential causes can be found that may explain particular effects. However, that takes time and money to achieve, and my concern is to what extent we can be confident that these changes in permit conditions that have the capacity to affect the efficiency of a fire-fight in their proximity, or adversely affect the health of firefighters, have scientific rigour behind them.

CFA Policy not keeping up with changes to turbine sizes.

I note with interest a number of reports, available on the internet, done for various wind farms in the state relating to aircraft interactions with the proposed sites.

The following report notes some aspects of limitations wind-farms make for firefighting purposes

http://www.acciona.com.au/media/2324650/volume-25-aviation-assessment.pdf

Section 3.5 on p12 (emphasis added)

> 3.5 Aerial fire fighting activities
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> Aerial fire fighting activities can be separated into two elements – those using helicopters and those using fixed wing aircraft.
>
> Whilst the proposed wind farm is quite small and may very well have little impact on aerial fire fighting activities, the following general comments are made.
>
> HART Aviation is of the opinion that any operations of fixed wing aircraft for fire fighting purposes within the confines of the proposed Berrimal Wind Farm would be hazardous and are not recommended. This is a position held in respect of all wind farms.
>
> The operation of helicopters within the confines of the wind farm is perhaps possible, but not desirable.
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> It is also possible that aerial fire fighting could be undertaken above the level of the wind turbines (i.e. above the highest possible turbine, viz: ~607ft (based on the maximum tip height option of 185m), but dropping water or retardant from this height would reduce the effectiveness and such is considered to be unlikely. However, this is a matter for the expert fire fighting operators to assess.
>
> **The position in respect of the proposed Berrimal Wind Farm is no different from any other wind farm.**
>
> **Helicopter or fixed wing aircraft operations within the confines of any wind farm and below the top of the wind turbines are potentially hazardous and not recommended.**

The following report is considerably more technical, and whilst somewhat dismissive of effects on aerial firefighting (Section 6.9.4 p38) is generous in its praise for the possible advantages to ground fire-fighting operations (Section 6.9.5 p39). However, of greater note is the multiple pages spent showing how low the potential impacts on the Ballarat airport in particular. An airport that is 33 kilometres away (Table 1.1 p 12).

http://www.stockyardhillwindfarm.com.au/sites/default/files/Appendix%20Z_Aircraft%20Saftey%20Assessment.pdf

Matters such as nearby airdromes, proximity to standard flight paths, visibility during the day and at night and various other matters including effect on firefighting operations are considered. I apologise for not knowing the answer to this, but I assume a similar report has been done for Lal Lal, but has it been re-done to account for the greater height, or is it just assumed that either nothing will change or at the worst everything will just scale up linearly, and if either of those are the case, on what scientific basis is that conclusion made?

CFA, in their document available from this link:

www.**cfa**.vic.gov.au/fm_files/.../**CFA_Guidelines**_For_**Wind_Energy**_Facilities.doc

recommend / require as per Clause 2.3 p4 – previously quoted in the text box p2 – an approximate 300 metre separation between towers. No basis for this distance is given, nor any indication that this distance relates to tower height or blade length, nor does it directly say how this distance relates to aircraft safety. If their position that a certain separation is required to allow aircraft to fly between the towers, and this seems to be the implication, then quite clearly the separation needs to increase with blade length.

A compromise between the original heights and the proposed heights may be possible if the perimeter towers were to remain at the current height limit, and only the internal towers being increased in height, which may provide a slightly better approach and departure angle for aircraft, and thereby allowing operations to occur a little closer to the wind-farm, but not being a pilot I cannot say if this would have any effect at all.

I am concerned that the 300metre separation is a figure based on the typical tower heights of the time, and may not take the increased tower heights now common into consideration. If the separation distance is important, and it appears that it is given CFA has made a recommendation, then it may be that the separation distance may have to scale up with the tower height, and possibly it may not scale linearly, but by some other metric that may substantially increase the separation

I understand that some of the separations for the Lal Lal wind-farm are as little as 280 metres, leaving only a 140 metre separation between the 70 metre blade tips, which seems to me to be a drastic reduction in the 210 meter blade tip separation of 45 metre blades, on towers 300 metres apart.

Local matters

The location of the proposed wind-farm, has substantial areas of forest from the East through to the West Southwest, some with substantial numbers of residential properties within and adjacent to them. Such a reasonably heavy population density for rural communities in close proximity means that any further compromise of aircraft operations may increase community risk due to the limitation from the outset of aerial firefighting operations.

No rural firefighter doubts the effectiveness of, and the necessity to have, aerial firefighting at bush and grass fires, and I understand that the Scotsburn fire of last year did burn on to a proposed wind-farm footprint at Elaine. I do not know that if there had been an actual wind-farm there that the result would have been any different than what was achieved, but I do know that aerial firefighting played a large part in bringing the Scotsburn fire under control quite quickly given the circumstances of the day and the manner in which the fire spread. (I was Deputy Incident Controller on the day the fire started and for the next two days). I believe that the Very Large Air Tanker (VLAT) from Sydney made a retardant line drop at the Scotsburn fire along the southern edge, and whilst this is pure speculation (something we have to do in emergency response) that drop may not have been possible if the proposed wind-farm at Elaine had been there.

It is worthy of note that the 2013 Ryans Rd fire at Yendon was burning in an easterly direction, and reached within a kilometre or so of the wind-farm footprint before it was controlled with a mix of ground and aerial crews. See map next page.

Note: Grids are 1 kilometre.