[redacted]

Hills of Gold Wind Farm SSD9679
Submission to the Independent Planning Commission

I managed a grazing enterprise on the eastern fall between Ben Halls Gap Nature Reserve and the Barnard River for 36 years and still have a connection with the area as Senior Deputy Captain of Hanging Rock Rural Fire Brigade. In my time in the district, I gained a good understanding of the natural systems of the Hanging Rock and Ben Halls Gap region. This includes the "big sponge" effect of the mountain in maintaining flows in the upper reaches of the Namoi, Hunter and Manning Valleys.

I am also one of only two people alive today who have lived in the cottage on "Nycooma" near the summit of Mt. Wombramurra.

There are a number of concerns relating to the Hills of Gold Wind Farm that have not been addressed by the proponent in the Development Application or subsequent amendments or reviews.

While the potential for increased carbon free electricity generation is essential the net impact of the Hill of Gold Wind Farm will be a negative environmental contribution as outlined below. While it is recognised that fossil fuel usage has to drop off a cliff and the development of other sources of energy is essential and that every development has an impact, we should not destroy the other natural capital that sustains us.

When considering the sites for of renewable energy projects, it is essential to ensure that negative environmental impacts do not exceed the community benefits of carbon-free energy. In the case of the Hills of Gold Wind Farm it will not be possible to relocate the main source of the water inflow into the Upper Peel River. However, there are more appropriate and less environmentally sensitive locations where renewable energy projects can be located.

My comments on the assessments will be mainly directed towards the things that are not dealt with or are dealt with inadequately.

Location of the project

The development footprint sits on the watershed of three major river systems, the Namoi (Peel River, Hunter (Pages Creek) and Manning (Barnard River). One western flowing system and two eastern flowing systems. The western flowing system, the Namoi, is an integral component of the Murry Darling Basin system. The Namoi is the only western flowing River which flows directly into the Barwon/Darling (Barka) River and does not go through a terminal wetland.

The development is located on the edge of a steep escarpment. On the western fall the development footprint rises 700 metres in 10.5 kilometres from the project entrance to Mt. Wombramurra. On the eastern fall the development footprint rises 1,170 metres from Pages Creek to Mt. Wombramurra. From WTG43 on the western escarpment to the project boundary the rise is approximately 530 metres in 1.8 kilometres. On the southern escarpment WTG2 drops 350 metres in 950 metres to the end of the first order stream.

Information Gaps

The extreme nature of the terrain surrounding the Project Footprint is not evident from the information presented by the applicant.

The proponent does not provide any maps or diagrams that show the contours of the development footprint of surrounding landscape. (See figure 1).

The rainfall on the high ridge has been underestimated. The rainfall in the project footprint ranges from a 35-year average on Morrisons Gap Road of 1,266mm to approximately 1,500mm at Mt. Wombramurra.

The issue of the impact on the hydrology of the proposed development on a site located at the of the top of the catchment of three major river systems has not been addressed.

The importance of underground flows that maintain downstream flows has not been considered.

The hydrological changes to the underground flows that will result from the concrete surfaces, hardstands and compaction have not been addressed.

The geotechnical data essential for understanding the hydrological regime and engineering challenges unique to this site are unknown.

In view of the unique nature of the site necessary detailed civil engineering designs have not been developed. The proposed concept designs do not provide sufficient detail to enable assessment of constructability of the project.

The constructability advice also excludes two vital components of the project, the optional substation complex on the shelf below WTG6, and the Western Connector track, the main access for the majority of OSOM vehicles and the only access for blade delivery. The Departments decision to advance the Project to the recommendation stage is based on the incomplete constructability report.

Proposed erosion and sediment control measures underestimate the extreme nature of the site.

The high rainfall experienced along the top of the ridge and the volume and velocity of the flows generated require detailed engineering for erosion and sediment control measures to be known prior to approval of the project. It is not possible to site these control measures in locations where they will be effective.

This lack of information requires a strict application of the Precautionary Principle to ensure that the project does not proceed until critical information and data are developed and assessed.

The risk profile of the development is unknown and uncertain.

The project is located at the head of the Namoi Catchment which is part or the Murray Darling Basin. The downstream impacts of such a development at the head of the most critical river system in eastern Australia has not been mentioned.

The proposed location on one of the highest ridges on the Great Dividing Range north of Newcastle produces a high degree of turbulence. While the wind resource is abundant it is at times extremely turbulent. The effect of this turbulence on the generation efficiency has not been addressed.

An issue that has not been considered anywhere in the Development Application, EIS or subsequent assessment is the acid soil on the ridge within the development footprint. It might be something that is not apparent without local knowledge. The ridge increases in acidity and aluminium content from the Hanging Rock end to Mt. Wombramurra. Soil test I conducted on "Nycooma" in the early 1980s showed a pH of less than 4. Experience has shown that bottom fence wires closer to the ground than about 75mm start to rot away within five years. Steel fence posts also have a relatively short life. In low pH conditions such as those that exist in the development footprint the threat of concrete cancer to the turbine foundations and concrete structures must be considered. The risk to turbine stability in these conditions needs to be assessed.

Site specific information

The soil, land and water assessments in the EIS, amendments and reviews appear to be based on desk-top reviews.

There has not been another wind farm in New South Wales developed in a similar location. The nature of the site located on the edge of a steep escarpment with a history of mass movement, very high rainfall on the watershed of three major river systems requires site specific data. The potential impacts of the development cannot be adequately assessed until site-specific data is available.

The potential impact of the construction cannot be assessed as the maps or diagrams in the published documentation do not show the extreme nature of the terrain. No contours are shown to enable an

understanding of the unique location. The photographs provided in the EIS and subsequent documentation are not representative of the extreme nature of the terrain. For example, the photograph on page 7 of Appendix L – Constructability Advise (Figure 3-9 Typical Gravity Foundation for a Wind Farm) is not representative of the locations of the majority of WTGs within the Hills of Gold Wind Farm footprint. The majority of WTGs are located close to the edge of both the western and eastern escarpments.

The location of the project on the edge of a steep escarpment prone to mass movement will potentially require engineering not seen at other sites. WTGs 2, 4, 12, 14, 15, 16, 17, 18, 26, 22, 20, 24, 28, 29, 32,33, 40, 42, 43, 48, 49, 50, 51, 52 are proposed to be sighted between 10 to 30 metres from the edge of the escarpment. Site specific engineering and geotechnical data will be required to determine if it is feasible for these towers to be constructed. It appears that some geotechnical drilling has taken place, however the results have not been made public. This data is required prior to approval to enable an assessment of the impact of the project. It is not acceptable that the design details will not be developed until after the project is approved and under construction. Without site-specific data the assumption in Appendix L – Constructability Advise notes "With regards to the WTG's foundations, the cuts are temporary and likely to be in stronger rock." is an assumption that may have catastrophic impacts for mass movement and WTG stability. The sheer nature of the upper escarpment is illustrated by the fall from WTG42 (180 metres in 40 metres) on the western fall and from WTG2 (initial drop of 160 metres in 35 metres) on the eastern fall. WTG18 is proposed on a ridge 10-15 metres wide.

The siting of the majority of towers will require considerable cut and fill to establish the required area for foundations crane pads and work areas, in some cases a cut of up to 30 metres will be required increasing the area of disturbance well in excess of that required for other sites. The concept designs in Appendix L – Constructability Advise are not sufficient. The engineering details required to ensure the stability of the site cannot be left until after the project is approved and construction commenced.

Hydrology

The hydrology and geology of the location is unknown and has not been addressed by the proponent.

A comprehensive geotechnical analysis will be required to assess the structure of the mountain and gain an understanding of the hydrology and contribution to downstream river flows. Somebody with a comprehensive knowledge of hydrology, geology and probably mathematics will be required to adequately assess the hydrology of the mountain.

The importance of the mountains in the head of a catchment does not seem to have been considered in determining the location of the Hill of Gold Wind Farm. The health of the head of a catchment is a vital component of catchment management and catchment health.

In the Murray Darling Basin, the headwater regions generate up to 80% of the runoff to downstream flows. The underground flows are a major contributor to the downstream health of the ecosystems of the river system.

The "big sponge" effect of the mountains at the head of a catchment in maintaining stream flow after rain stops does not seem to have been considered in the sighting, design or approval process of the Hill of Gold Wind Farm. The government strategy which allows these environmentally sensitive and important locations to be considered for such a development is deeply flawed and should be revised.

The location of the project on the watershed will have an unknown impact on flows into both the eastern and western fall systems. This is essential information that must be known before an adequate or effective assessment of the impact of the project can be determined. The Precautionary Principal must be applied.

The proponent appears to have underestimated the volume of rainfall along the ridge top which ranges from 1,250mm at the lower end to 1,500mm at the highest elevation. This volume of rainfall and the extreme slopes involved requires good vegetation cover to slow run-off speed and enable the rain and moisture to permeate through the strata. Vegetation removal from the project area, concrete surfaces

for infrastructure, road works and compaction for hard stands and tower foundations, crane pads and construction areas will reduce the ability of the strata to absorb the moisture which feeds the three river systems. This impact does not appear to have been addressed by the proponent.

Most of the vegetation clearing along the watershed, both authorised and unauthorised, fits neatly with the location of the majority of the project. The preempting of a State Significant Development should be considered in the approval process.

The civil engineering details or plans have not yet been provided by the proponent and are not proposed to be developed until after the project is approved. It is not possible to assess the impact on the hydrology or water flows until the civil engineering details are known. The Precautionary Principal must be applied.

The nature of the proposed location of the development along the watershed of three major river systems, with high rainfall and a history of mass movement (land slips) requires very site-specific information to assess the hydrological and environmental impacts of the development. The western fall (Peel River) is crucial for the quantity and quality of inflows into Chaffey Dam which is the major source of Tamworth water supply.

While the importance of erosion and sediment control has been acknowledged the role and importance of underground flows in maintaining river flows has not been acknowledged or addressed. The nature of the geology and hydrology of the mountain enables the water from the wet tops to permeate through the strata over time and maintains the flow in the Peel River and maintains that flow well into a dry period.

As mentioned above, when the rain stops it is the underground flows that keep the rivers and creek flowing, this does not appear to have been taken into consideration by the proponent or recognised by the Department of Planning and Environment. The Precautionary Principal must be applied.

The water holding ability of the basalt soils is likely to present problems for excavations required during the construction phase. There is more than a high likelihood that dewatering of the site will be required during the construction phase.

Dewatering of batters will also be required and may require permanent dewatering to avoid subsidence, slips and mass movement.

Dewatering will put further pressure on the ability of the mountain to maintain stream flows, particularly in the Peel River which is critical for Tamworth water supply.

The proposal by the developers to source construction water from bores on site will also further reduce the quantity of underground water which is essential for maintaining stream flow.

Erosion and sediment control

Appendix L – Constructability Advise notes that the measures proposed in the EIS for careful design of the erosion and sediment control to be appropriate. However, in view of the sighting of WTGs close to the edge of the escarpment and the extreme slopes involved it is essential that the designs are developed and approved prior to determination of the Development Approval.

The location of the WTGs so close to the edge of the escarpment does not provide sufficient room for collection systems and discharge points including grass swales and level spreaders to be developed to mitigate the effect of the increased runoff from the concrete surfaces and hardstands. The slopes and volumes of rain involved means the first order streams inevitably have to carry high flows of extreme velocity if runoff.

For example, the first order stream on the eastern fall below WTG2 falls 350 metres in 95 metres and on the western fall below WTG42 the first order stream falls 490 metres in 1.4 kilometres. WTG6 is proposed on the top of a narrow ridge approximately 10-15 meters wide which drops 90 meters in 150 metres on the eastern side and 130 metres in 75 metres on the western side.

The culverts for the transverse track where it crosses the deeply incised drainage lines referred to in Inset 9 of Appendix L will be required to deal with very high volumes of high velocity water. In the event of a rain event of 50mm in one hour, which is possible in this location, the culvert for the north arm of Talbots Creek will have to be designed to deal with approximately 5 megaliters in an hour. The drop to the transverse track is approximately 245 metres in 470 metres. It is essential that the design details are known prior to approval to determine the feasibility of constructing a culvert which will not fail and deposit large volumes of siltation and debris into Chaffey Dam. The threat to the village of Nundle of such a failure must also be considered.

The high velocity and flows which occur as a result of the high rainfall experienced along the tops already create rapid rises in stream flows (see Figure 2). The high volume and velocity flows cause severe erosion in disturbed areas. Extreme rainfall events are increasing in severity and frequency. The erosion resulting from a 40-minute rainfall event is evident in Figures 3 and 4. The disturbance required for the construction of the windfarm and the associated erosion control measures will further increase the severity of erosion from the project site. Figure 2

Mass Movement

The mass movement potential of steep basalt ranges, particularly the Liverpool Range, does not appear to have been adequately addressed. The concept designs in Appendix L do not appear to be based on site-specific information. Without that site-specific information, the risks of mass movement to the stability of the WTGs cannot be assessed.

The history of mass movement in the Liverpool Range indicates that the threat of mass movement requires far more detailed design information to be made available to assess the risk of mass movement and high erosion potential of disturbed sites.

The ability and stability of erosion measures and structures high up in unstable terrain to deal with the extreme slopes and high rainfall generating large volumes of high velocity of runoff cannot be assessed until they are designed and assessed. This has not been done at this stage and in view of the magnitude of potential erosion and mass movement may prove to be impractical.

Road construction in steep basalt terrain presents significant engineering challenges. The New England Highway upgrade where it crosses the Liverpool Range at Murrurundi required difficult and expensive engineering to ensure stability. The Willow Tree to Merriwa Road over the Liverpool Range which collapsed in a period of high rainfall has now been repaired at a cost over $38m. The Oxley Highway, Waterfall Way and Armidale to Kempsey Road all suffered mass movement and landslips during high rainfall periods. The transverse track proposed for the Hills of Gold Wing Farm crosses more extreme slopes. It also crosses basalt shelves that were themselves formed by mass movement.

Concrete Cancer

The ridge where the Project Footprint is located is well known for its acid soils. The pH falls from the Hanging Rock end to very low pH at the Mt. Wombramurra end. The soil acidity increases as the volume of rainfall increases. This should be understood by anyone with a basic knowledge of soil science but appears not to have been recognised by the proponents.

Soil test I conducted on “Nycooma” in the 1980s had pH readings as low at 4 in the paddocks where we were trying to establish pasture. (See Figure 5.)

In these conditions the likelihood of concrete cancer to the WTG foundations and concrete structures is extremely high.

The acid soil poses a problem for fencing in the district. Bottom wires placed within 75mm of the ground rot out within 5 to 10 years. When the grass under the fence grows to a height that contacts the wire the constant moisture and acid in the plants quickly starts the wires to deteriorate. Steel posts also have a relatively short life span. It is not unusual to find steel posts rotted off at ground level. (See Figure 6.)

Conclusion

The reliance on desk-top assessments has resulted in a very poor and inaccurate EIS and subsequent assessments. The information that is being relied on to assess the project is inadequate and inaccurate.

The removal of vegetation (both legal and illegal clearing) from the project site has already resulted in a loss of biodiversity and increased in the speed and volume of run off and increased erosion.

The potential for increased silting of the Peel River and Chaffey Dam and a reduction in water quality is increased.

The location of the Hills of Gold Wind Farm is unsuitable for such a project and will have a net negative impact on the environment, the hydrology of three major river systems and reliability of Tamworth's water supply and should not be approved.

The location is most suitable for its potential environmental contribution. The ecosystem function of headwater regions is essential for the health of sensitive and endangered upland freshwater ecosystems which influences the health of the whole catchment. Any further threats to the Murray Darling Basin should trigger a referral to the Federal Minister for the Environment under the EPBC Act. The project should also trigger a referral under the Water Trigger.

The poor quality of the information provided by the applicant and the information not provided which is essential to enable a realistic assessment of the impacts of the Hills of Gold Wind Farm proposal requires a strict application of the Precautionary Principle. On these grounds the Development should not be approved.

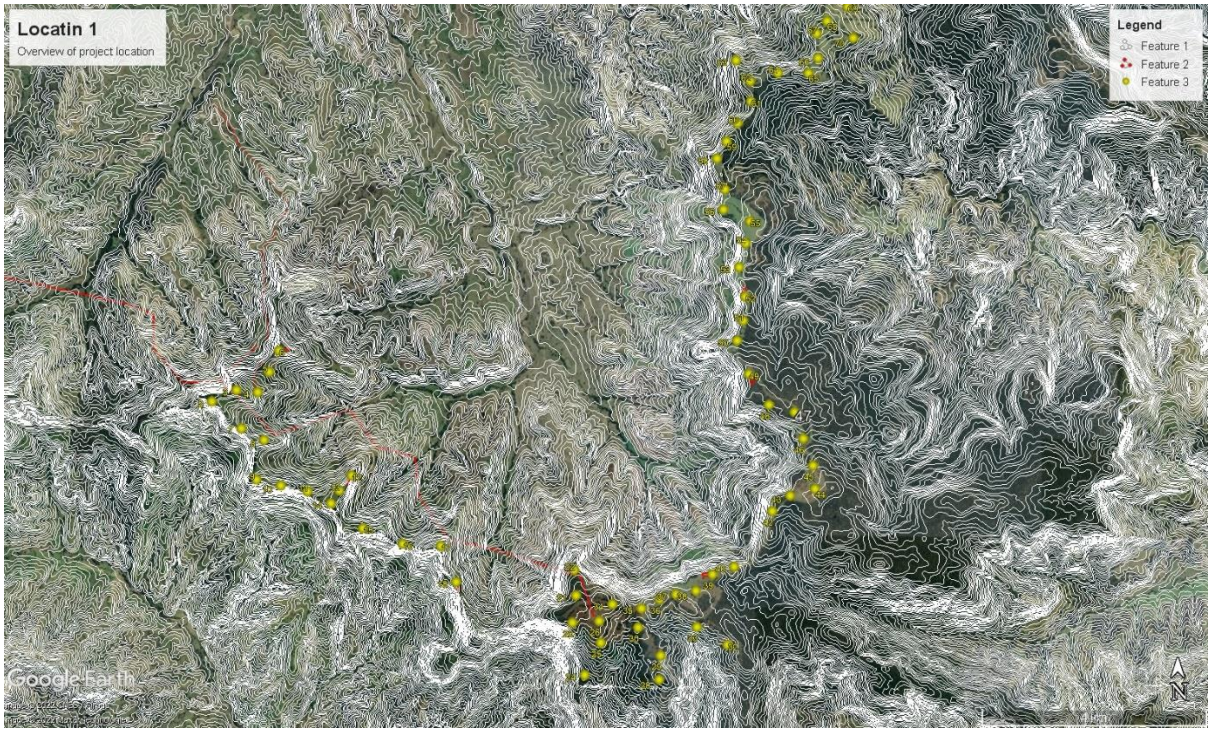


Figure 1: The terrain of the Hills of Gold Wind Farm location. The 10 metre contour lines clearly indicate the steepness of the location and the siting of the WTGs on the edge of a very steep escarpment. The faint red line running to the left (or west) is the approximate route of the transmission line. The faint red line running north/south is the approximate route or the western access track.

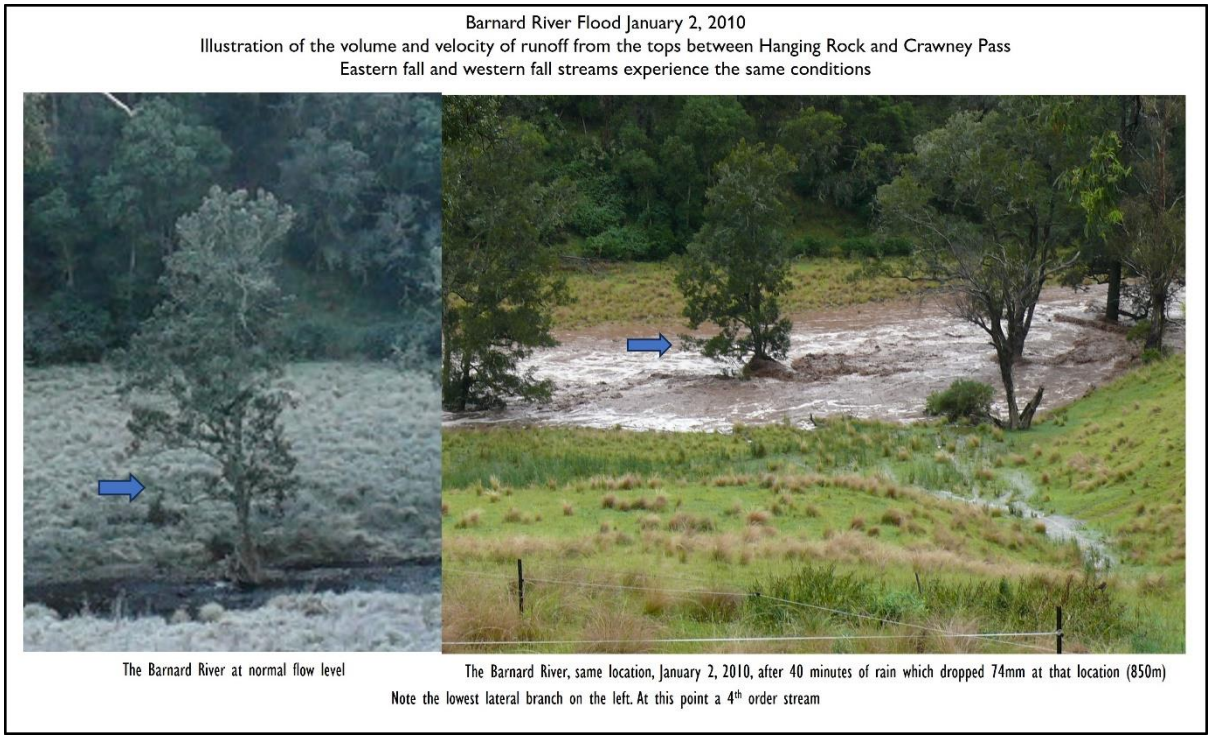


Figure 2: Rapid rise in stream flow experienced following 74mm of rain in 40 minutes in the Barnard River

Figure 3: Flood debris deposited in Stockyard Creek/Shearers Road culvert following a 40-minute rainfall event February 2, 2010.

Figure 4: Debris flow deposited during rainfall event of 74mm in 40 minutes, February 2, 2010.

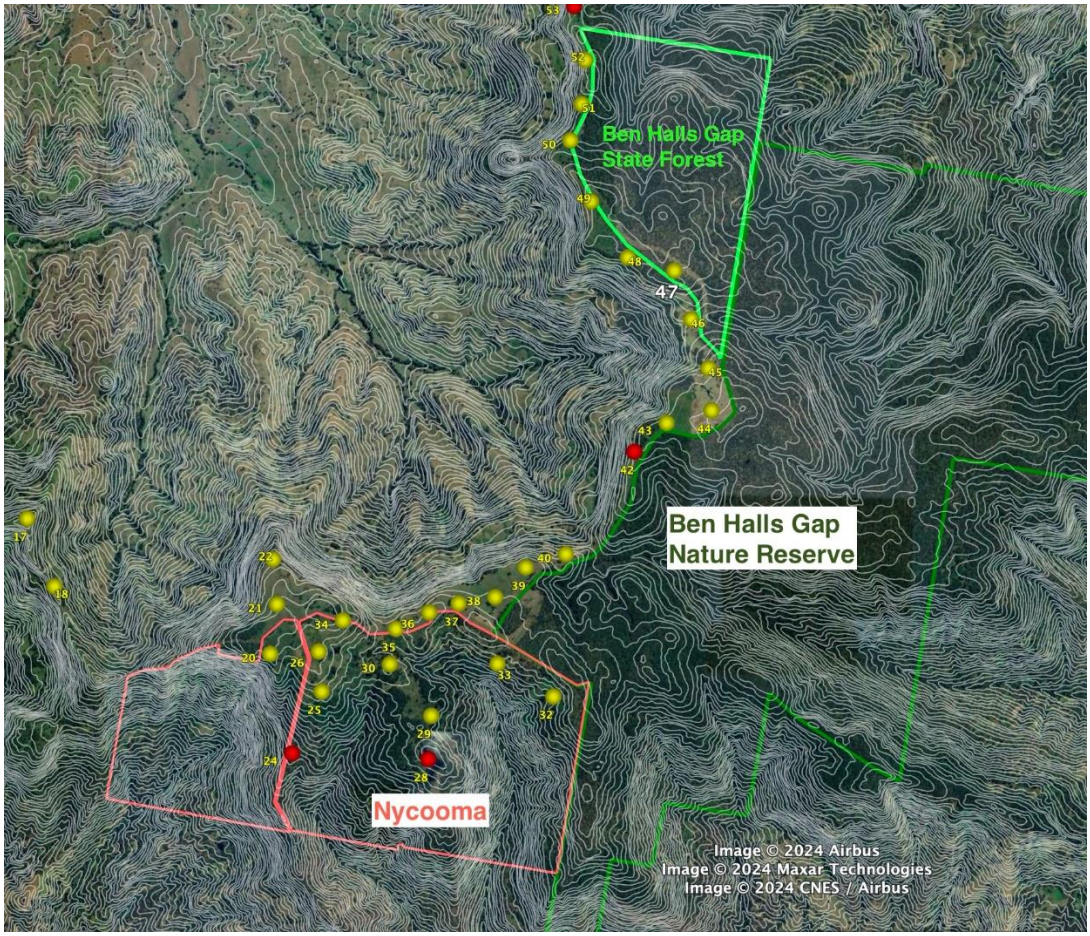


Figure 5: Soil tests were taken on "Nycooma" in the early 1980s. The soil test were in the vicinity of WTGs 20, 25, 26, 29, 30, 32, 33.

Figure 6: Steel strainer posts.

Left a 90mm steel post. Right the same type of post rotted off after 10 years. The fence is located adjacent to the Hills of Gold Wind Farm near Morrisons Gap Road.

Bushfire

During the Public Hearing at Nundle the bushfire risk in the area was raised.

The rate of fire spread in the mountainous terrain should be considered. The difficulty of bushfire control east of Nundle or the Crawney Road is largely influenced by the steepness of the terrain.

The threat of fire to Hanging Rock village from the northwest to the southeast makes it one of the most vulnerable villages in New South Wales.

Quick suppression of the initial fire has a major impact on subsequent firefighting strategy and success.

The location of turbines on the Hanging Rock end of the project could restrict early aircraft operations. Aircraft will not be able to operate in that area until the turbines are shut down and made safe for aircraft operation.

The attached fire modelling clearly demonstrates the potential rapid spread of fire in the district.

It should be noted that the difficulty of the terrain and the response times for RFS volunteers makes it essential that aircraft operations commence immediately. In many cases ground crews simply cannot access the steep and heavily timbered terrain.

The proponents claim that the internal roads within the project area will be a benefit for firefighting or provide alternate escape routes for residents. The rapid uphill spread of fire anywhere below the project will render any road upslope of the fire too dangerous to use.

The suggested availability of the transverse track for an escape route for residents is not practical. It would put residents in a potentially more dangerous situation with nowhere to go even if they can get to the western end. The way down from there is not suitable for most vehicles.

In my 44 years as a member of the Hanging Rock Brigade and 34 years as a Field Officer, I would consider it negligent to send untrained, inexperienced drivers into such dangerous conditions in unsuitable vehicles on tracks that exceed 30% slope in places.

Depending on the conditions, the impact of bushfire can extend many kilometres from the fire front.

The location of WTGs 20, 21, 26 and the substation will make helicopter access to the big dam on "Nycooma" either unavailable or restricted potentially creating further delays in aircraft response times. If helicopters have to lift water from a lower altitude they require more fuel, possibly less water load and longer flight times. Fixed wing aircraft will have to climb higher and probably travel further.

Hanging Rock Bushfire Scenario

(Prepared by Superintendent Steve Prior, NSW Rural Fire Service)

Temperature: 28°C

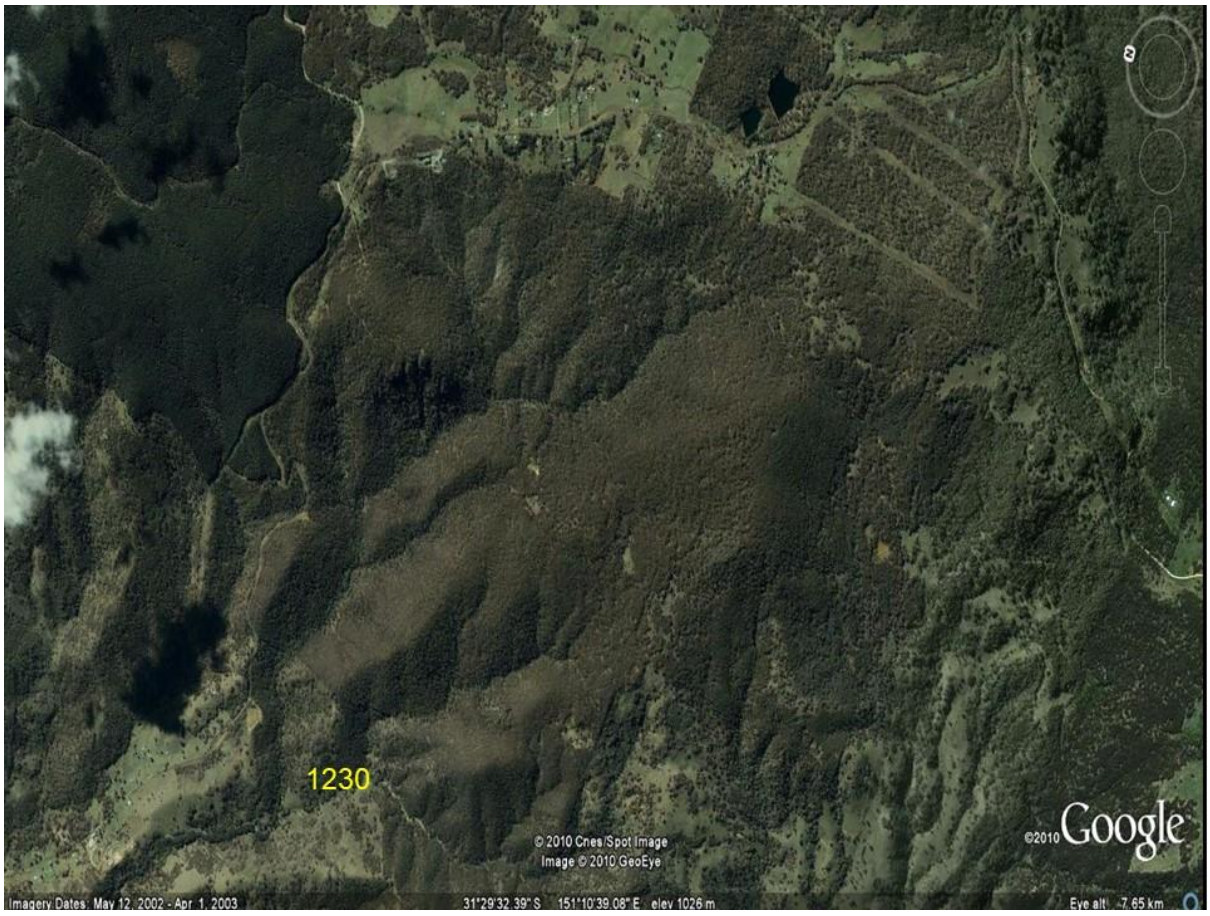
Humidity: 40%

Wind direction: North West

Wind Speed: 15-20kmh

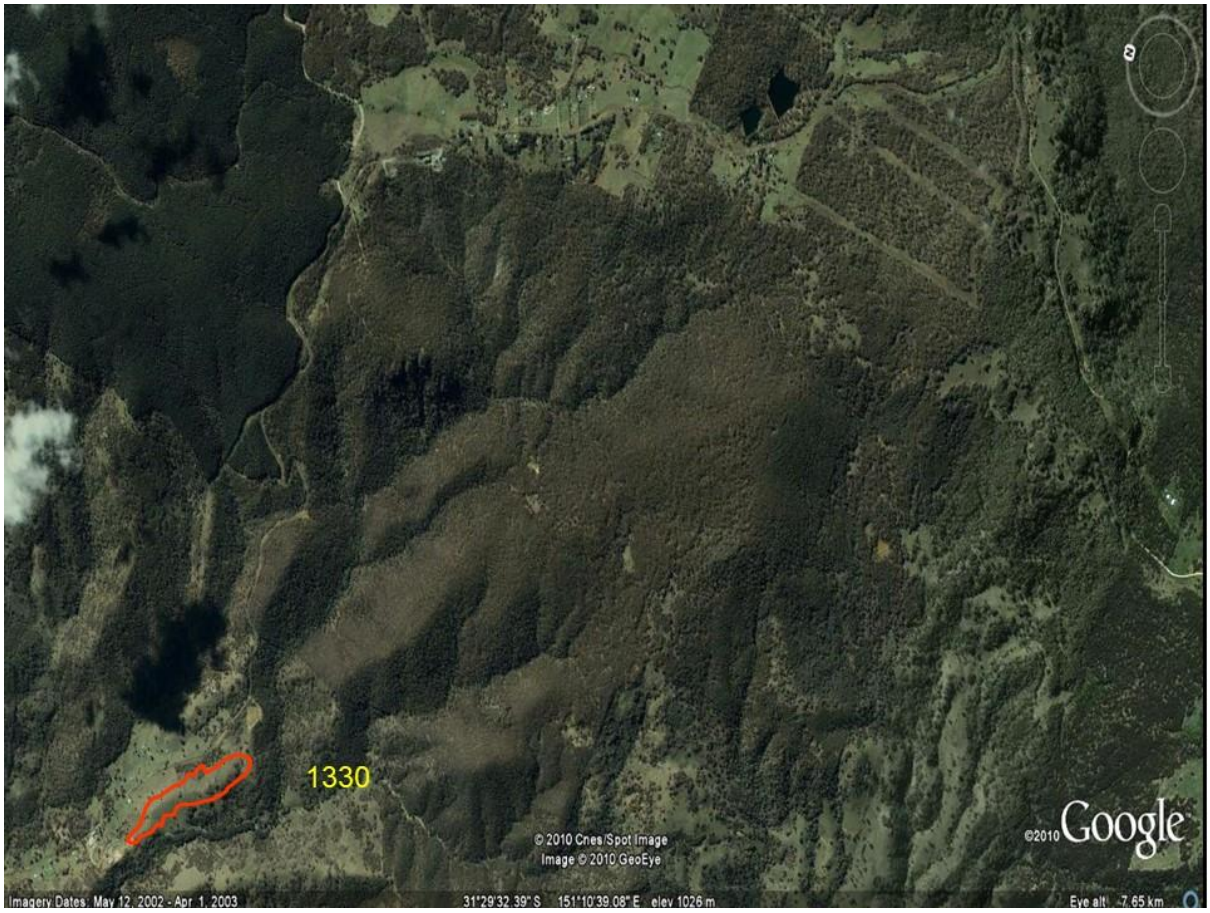
The conditions represent a low fire danger rating day.

The Scenario is based on a fire starting near the Nundle Sawmill on the Barry Road and is a demonstration of the rapid spread of fire in the mountainous terrain.

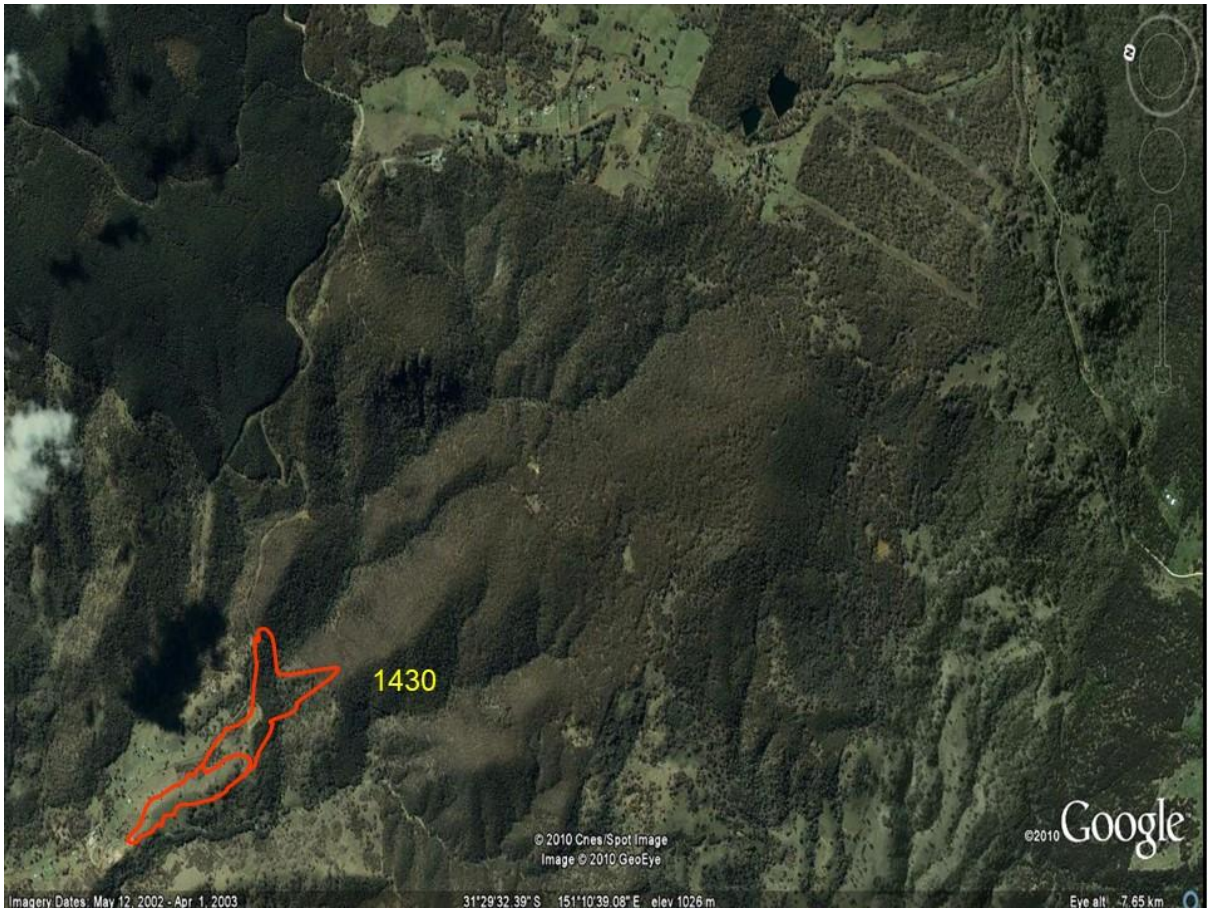


The Nundle Sawmill in the bottom left corner. The Barry Road runs vertically on the left, Forest Way heads to the left top. The Barry Road turns to the right through the Hanging Rock Village.

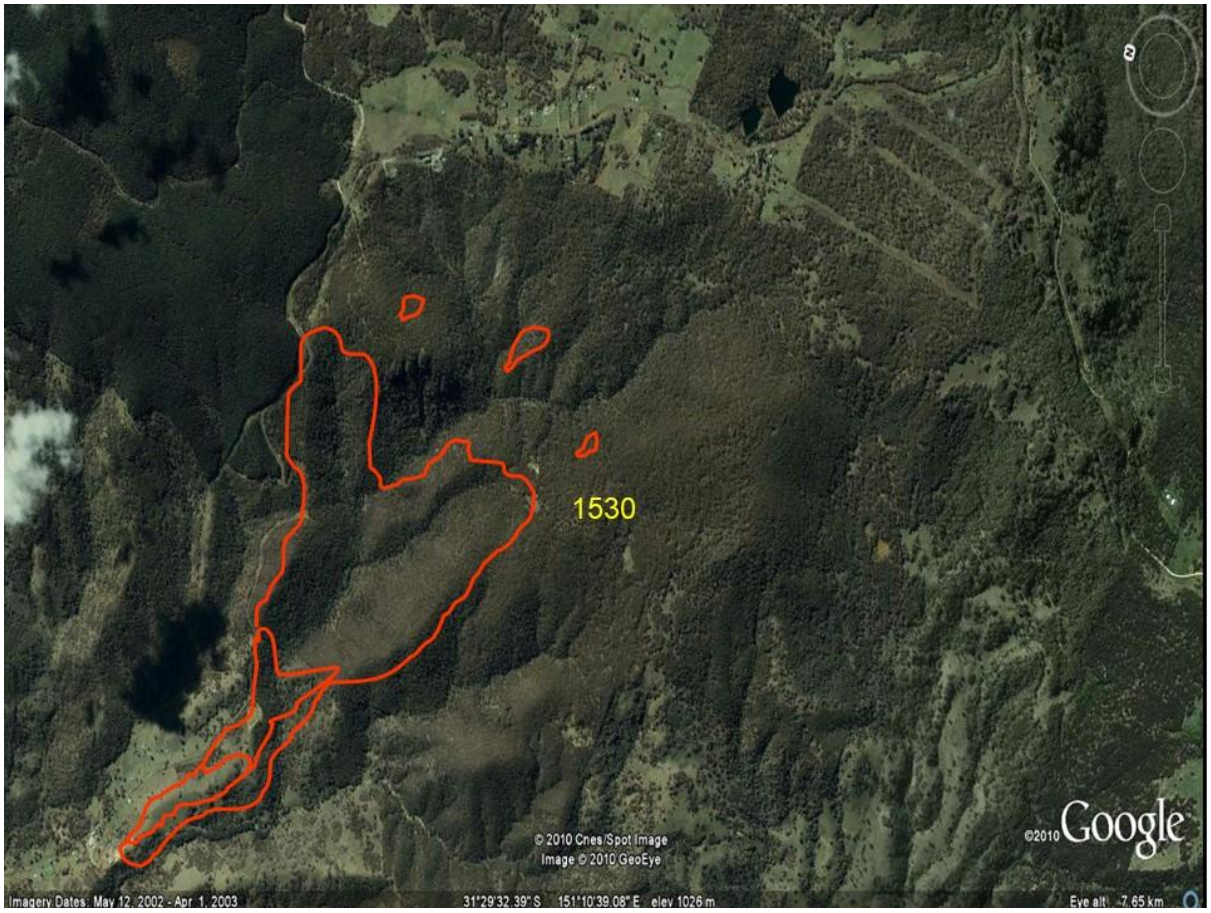
The time stamp shows the source of a fire starting at 1230hrs near Oakenville Creek.



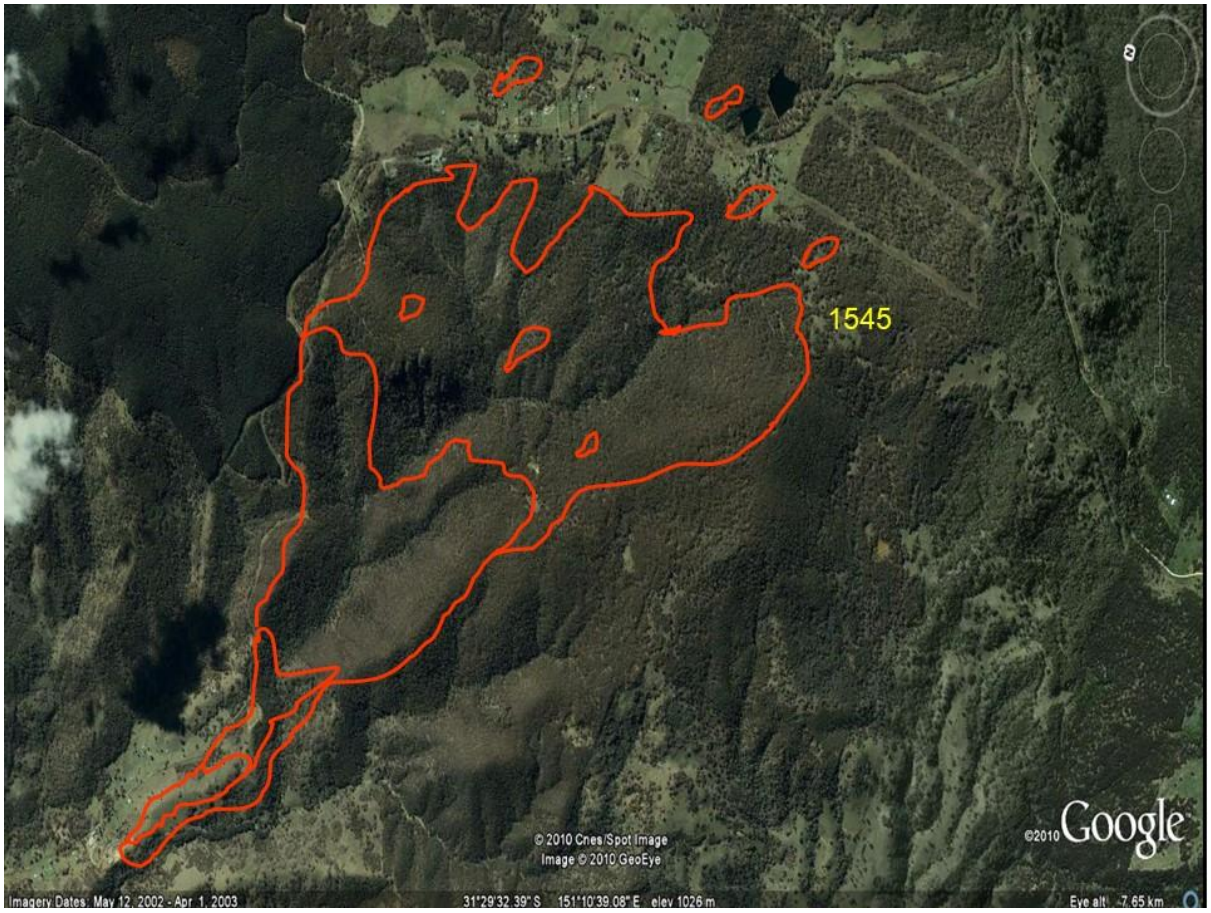
At 1330hrs the fire started to spread and heading up hill.



At 1430hrs the fire starts to spread rapidly as it moves up the slope. The fire is already encroaching on the Barry Road making it unsafe for evacuations or fire crews to access Hanging Rock Village. The alternative routes are limited to narrow forest roads possibly subject to ember attach. The use of Barry Road east of Hanging Rock is steep and winding and considered dangerous for inexperienced drivers. Morrisons Gap Road would also be subject to ember attack. Duncans Creek Road is also very steep, narrow and winding, it is also the only route available to fire crews to reach Hanging Rock Village. It would be dangerous for drivers heading down when they encounter fire crews on their way up.



By 1530hrs the steepness of the terrain is spreading rapidly uphill and starting to throw embers ahead of it. The fire has more than doubled in size in an hour. Note the time 1530hrs.



At 1545hrs (15 minutes later) the rapid spread up the extremely steep slope is evident and the fire is throwing ember showers over Hanging Rock Village.

The climb from the Nundle Sawmill to the top of the hill is 392m. The distance is 2.1km.

A fire approaching from the southwest poses the same scenario.