



**Title: Kaimai Wind Farm – HDC Section 92  
Radio Interference: Response by Lambda Communications**

**Date: 14 September 2018**

**Extract from Hauraki District Council Submission:**

Report No 15 - Radio Interference

Following review of the Radio Communications Information by AECOM New Zealand Limited it is noted that there are some other communications services that have not been considered by the report and they need to be investigated and analysed to determine if the wind farm will have any impact on them. These services are:

Aviation Radio  
VOR, DME, NDB and SSR  
Weather Radar

Aviation Secondary Surveillance Radar (SSR)

There are secondary surveillance radar sites at Ruaotuhenua (NZAA) and Hamilton (NZHN) that cover the wind farm site. CAA ENR 1.6 shows coverage at least down to 1500ft over the area. More detailed and lower level maps may be available from CAA.

SSR normally has filters to avoid detection of slow moving targets however the speed of blade tips can exceed these thresholds and sites overseas have been known to cause clutter on SSR screens.

Aviation Navigation Beacons

There are VHF omnidirectional range (VOR) beacons in the 112-118MHz band, distance measuring equipment (DME) in the 962-1213MHz band and non-directional beacons (NDB) in the MF band operating in the area. For example Hamilton VOR operates at 114MHz and NDB operates at 390kHz.

Weather Radar

The Bay of Plenty weather radar is located in the vicinity. Wind turbines have been known to cause false rain areas on weather radars.

An assessment in relation to these facilities is required to provide a comprehensive assessment of the potential effects.



## Response by Lambda Communications Limited

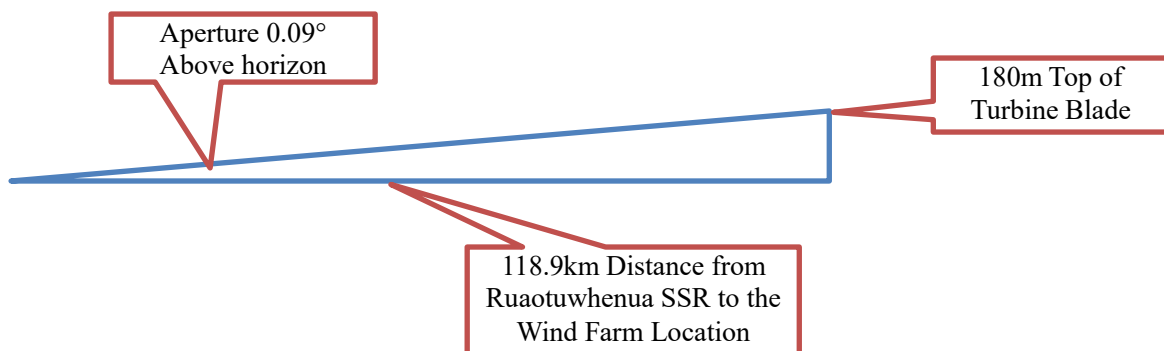
### Aviation Secondary Surveillance Radar (SSR)

The closest Secondary Surveillance Radar Stations to the Wind Farm are located at;

1. Ruaotuwhenua SSR (distance to Wind Farm 119km)
2. Te Weraiti SSR (distance to Wind Farm 44.5km)

Radar systems employ sophisticated filtering to remove clutter noise that may be created by objects (stationary or moving) in their field of view. They are also likely to use directional antennas that restrict their field of view to a few degrees above the horizon, so the further away the wind turbines are the smaller they will appear on the horizon to the radar (hence the term “flying underneath the radar”). Both of these radar systems operate at 1.03GHz which further restricts their coverage to line of sight from the radar station.

The path from the Te Weraiti SSR to the highest of the wind turbines is obstructed by high terrain which effectively shields the Wind Farm from the radar signal. While there is line-of-sight from the Ruaotuwhenua SSR Station to the Wind Farm, the 118.9km distance between the sites means the top of the turbine blade, at 180m above ground level, would only be 0.09° above the horizon as seen from Ruaotuwhenua. The effects of shielding by terrain and the significant distance between these radar sites mean the risk of reflections off the wind turbine blades showing up as noise on these radar systems is considered low.



### Aviation Navigation Beacons

In the case of the aviation beacons, because the aircraft that are receiving the signal from the beacons are moving, if the wind turbines did cause an obstruction or there was a reflected signal, the effect would be only be very temporary, just for a few seconds, so shouldn't be an issue. The risk is further mitigated by the distance of the wind farm from the airport, such that the aperture occupied by the wind turbines as seen from the beacon becomes very small. It would only become an issue if the windfarm was directly in line with the final approach for the airport, which is not the case, where the planes would be at low altitude and maintaining a constant direction.

### Weather Radar

The closest Meteorological (Met) Radar Stations to the Wind Farm are located at;

1. Tamahunga Cape Rodney (distance to Wind Farm 156km)
2. Mamaku (distance to Wind Farm 74.5km)

Both of these radar systems operate at 5.6 GHz which restricts their coverage to line of sight from the radar station. The path from both the Tamahunga and Mamaku Weather Radar



Stations to the highest of the wind turbines are obstructed by high terrain which effectively shields the Wind Farm from the radar signal. In the case of the Tamahunga Station, the terrain in the path is Waiheke Island, which although lower than both the Tamahunga Site and the Wind Farm site due to the curvature of the earth over the 156km distance, effectively acts as a shield to the radar signal.

