

## Noise and Shadow Flicker Assessment

### Introduction

The Moorabool Wind Farm project was approved in 2010 and a Planning Permit was issued at that time for a maximum of 107 wind turbines. The project is being implemented in accordance with that permit.

Developments plans for Moorabool North Wind Farm were endorsed by the Minister for Planning in September 2017.

Development Plans for Moorabool South Wind were endorsed by the Minister for Planning in April 2018.



### Noise Compliance Process

The noise compliance process, as required by the Planning Permit, is as follows:

1. Background noise monitoring to be undertaken at locations surrounding the wind farm to provide a baseline of sound levels over a range of environmental conditions.
2. A Pre-development Noise Assessment to be undertaken using the model of turbine proposed at the wind farm to predict noise levels and compliance during operations.
3. Approval and endorsement of a noise compliance testing plan (i.e. a plan for how noise emissions from the wind farm will be assessed once the turbines are operational, to ensure compliance with Planning Permit requirements).
4. Construction of the project.
5. Compliance testing – a report will be made public to illustrate compliance once the wind farm is operational and sufficient noise emission data has been collected.

### Background Noise Monitoring

The purpose of background noise monitoring is to obtain reference background noise data around the wind farm which could be used to:

- Determine operational noise limits in accordance with the planning permit.
- Assist the analysis of noise data obtained from compliance monitoring after the wind farm commences operating.

The results of the background noise monitoring, along with the derived noise limits will be used to assess the wind farm's compliance with operational noise conditions contained in the Planning Permit.

### Noise Assessment

A noise assessment has been undertaken for the proposed turbine for Moorabool Wind Farm. The assessment was undertaken by independent acoustics experts Marshall Day Acoustics. Operational wind farm noise levels have been predicted on the basis of:

- The sound emissions of the for the proposed turbine for Moorabool Wind Farm.
- A 3D digital model of the terrain at the project site and the surrounding region.
- International standards used for the calculation of environmental sound propagation, with input settings and adjustments specifically suited to wind farm noise assessment.

Independent cumulative predictions were undertaken to include both the northern north and south sections of the Moorabool Wind Farm and Yaloak South Wind Farm.

The prediction method is consistent with the guidance provided by NZS 6808:2010, as referenced in the Planning Permit.

The assessment undertaken by Marshall Day Acoustics was then peer reviewed by a separate independent expert Resonate Acoustics. Their conclusion is, *“Overall, we consider that the adopted noise assessment criteria, noise prediction methodology and conclusions are appropriate, and are consistent with the requirements of NZS 6808:2010 and the Planning Permit issued for the development”*.

#### **Permitted Noise Levels at Dwellings**

The background noise assessment and the noise prediction are reported in the Management Plans submitted to the Minister for Planning.

#### **Noise Compliance Testing**

A compliance testing plan has been approved and endorsed for both Moorabool North and Moorabool South Wind Farm.

#### **Shadow Flicker Compliance Process**

##### **Shadow Flicker Assessment**

A shadow flicker assessment was undertaken by the independent consultancy WSP. The model used for the calculation of shadow flicker effects contains a mathematical model of the sun’s position in the sky for a given location and time of year. Also contained in the model is information relating to the three-dimensional positions and sizes of the turbines, details of local topography on the wind farm and the surrounding region, and the locations where the flicker is to be calculated (i.e. dwellings).

This information is combined to calculate the times for which the turbine rotors will cast shadows over the locations of interest. WSP has modelled the expected shadow flicker based on a realistic case where turbine operational hours and orientation are based on wind data at the closest monitoring mast. Cloud cover has been based on Bureau of Meteorology data from the Ballarat Aerodrome weather station.

The results are illustrated by a number of hours that shadow flicker will occur at each receptor. This assessment considers the permitted levels at each receptor to illustrate compliance with the requirements of the Planning Permit.

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