

# Castle Hill Wind Farm

## “Project Description”

Genesis Energy is proposing to build a new wind farm in the northern Wairarapa. The project, known as Castle Hill Wind Farm, will further increase New Zealand’s electricity generation from renewable energy resources and will provide diversity in generation capacity to meet the increasing demand for electricity in the North Island.

The purpose of this information sheet is to provide a general overview of the proposed Castle Hill Wind Farm (CHWF), including its location, why a wind farm is being proposed here, specific wind farm details, and the process for obtaining the necessary resource consents.

### Location

The proposed CHWF site is located 20km east of Eketahuna and Pahiatua, 20km north-east of Masterton and 15km west of the Wairarapa Coast. The site covers an area of approximately 30,000ha which is characterised by undulating hills of predominantly pastoral grass, with some stands of native vegetation, and several small forestry blocks. The topography is varied, ranging from 200m to 500m above sea level. Figure 1 provides a plan identifying the location of the CHWF.

The surrounding area is sparsely populated, with the closest settlements being Pongaroa, Tiraumea, Makuri, Mauriceville, Alfredton, Bideford and Tinui. In the 2006 census, these settlements had populations of between 10 and 30 people, with the exception of Tinui, which had a population of 147 and Pongaroa which had a population of 100 people.

### Why a wind farm and why located here?

Wind energy is one of the world’s fastest growing energy sources with global generating capacity increasing on average by 27% annually over the last five years. New Zealand’s wind resource is one of the

best in the world, so wind farms can play a key role in meeting our future energy needs by diversifying our electricity generation resources.

Genesis Energy is committed to developing renewable energy in New Zealand. We strive to make a positive impact on the environment and to contribute to New Zealand’s long-term energy supply and international and national climate change obligations.

In recent years Genesis Energy has used both traditional methods and advanced modelling techniques to identify potential wind farm sites around New Zealand. This work revealed an area to the east of Pahiatua and Eketahuna as being suitable for further investigation. Following agreements with landowners, wind monitoring and engineering and environmental assessments, Genesis Energy confirmed in July 2010 that it would seek resource consents for the CHWF.

**WIND ENERGY IS ONE OF THE WORLD'S FASTEST GROWING ENERGY SOURCES WITH GLOBAL GENERATING CAPACITY INCREASING ON AVERAGE BY 27% ANNUALLY OVER THE LAST FIVE YEARS.**



Figure 1: Location Plan for the proposed Castle Hill Wind Farm

## The proposal

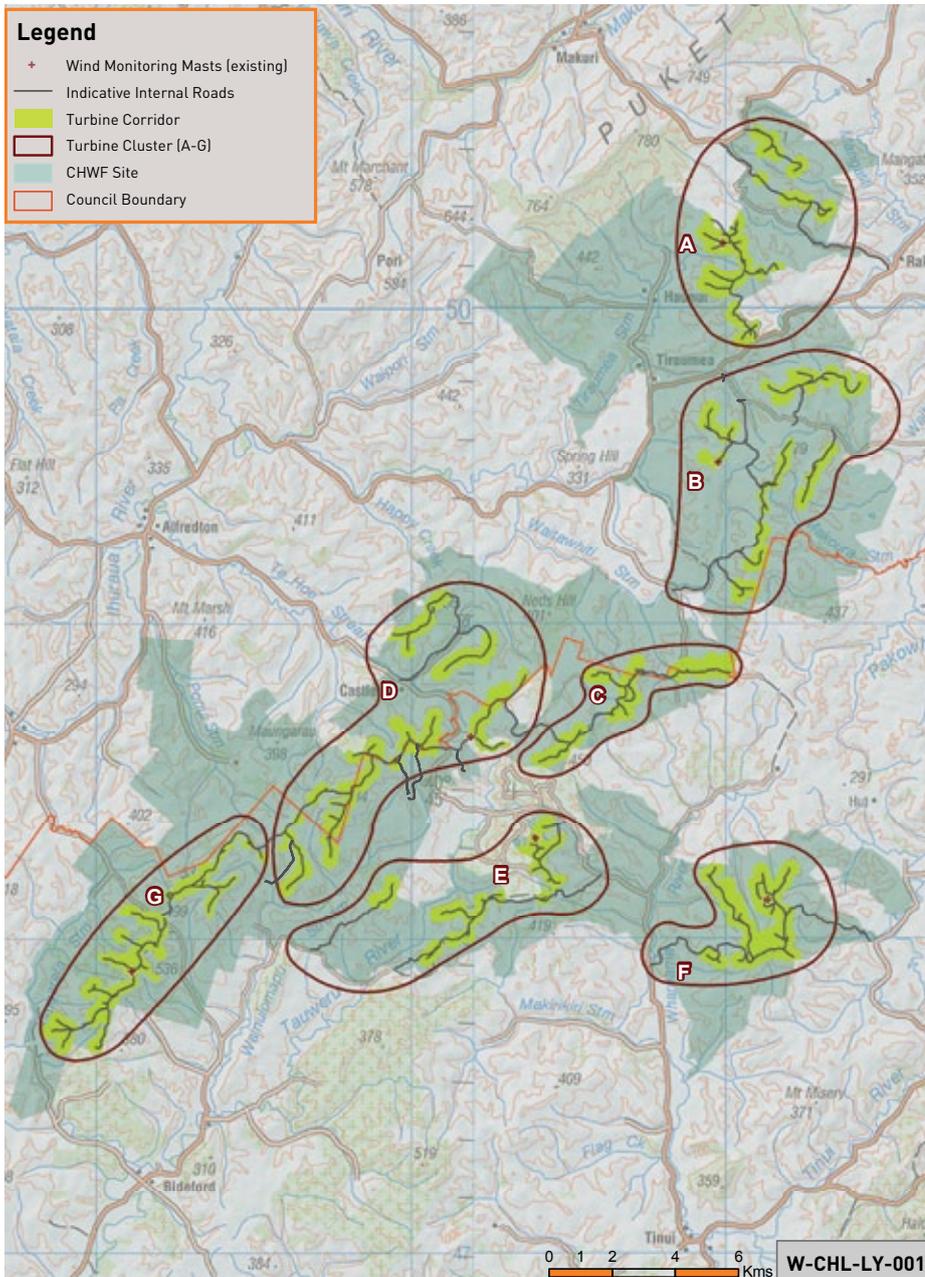
Genesis Energy is seeking resource consent to establish a wind farm containing up to 286 wind turbines. The generation capacity could range from 429MW to 858MW, subject to the type and number of wind turbine selected. The maximum blade tip height being considered is 155m.

Genesis Energy anticipates that several different wind turbine models will be commercially available at the time of tendering for the CHWF, with each model requiring a different layout because of the size and characteristics of the turbine. In order to allow for flexibility in turbine placement (for commercial, environmental and constructability reasons),

Genesis Energy is seeking resource consents for a turbine corridor enabling a range of turbines to be considered. The turbine corridor covers an area of 3,161ha and incorporates all areas within the CHWF site identified as being most suitable for turbine placement.

Regardless of the turbine model selected, all turbines will be located within the turbine corridor. Figure 2 shows the proposed wind farm layout, including the turbine corridor.

Development of the CHWF may progress in stages, with the first stage being in the order of 300MW. This capacity depends on the turbine selected, but will also depend on other commercial and technical factors.



## Wind farm components

The CHWF project comprises a number of components and activities associated with the construction and operation of the wind farm, including the following:

### Wind turbines

All wind turbines at the CHWF will comprise a three-bladed design, erected on a steel or concrete tower. The housing on top of the tower (the nacelle) contains the generator and other important components such as the gearbox and control equipment.

Figure 3 provides a diagram of wind turbine components. Wind turbines generate electricity by using the natural power of the wind, with the turbine rotor blades functioning like an aeroplane wing to create a turning force. The rotating blades turn a shaft inside the nacelle, which drives a generator that uses magnetic fields to convert the rotational energy into electrical energy.

The electricity generated is then directed into a transformer, which converts the electricity to the required voltage for transmission. The electricity is then transmitted via cables or lines to the grid or a local network, where it is made available for use by consumers.

### Internal roads

Wind farm access points and internal roads will be constructed to provide for the delivery of all

Figure 2: Proposed Castle Hill Wind Farm layout plan

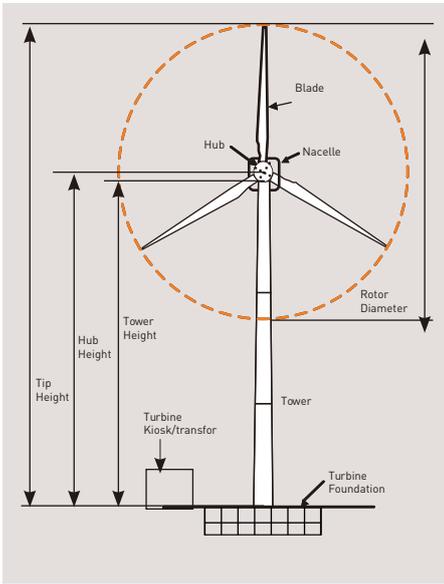


Figure 3: Typical Wind Turbine Design

wind farm components to and around the site. Where possible, the internal road alignments will follow existing farm tracks and ridgelines to minimise the volume of earthworks required to construct these roads. Internal roads will provide access to all wind turbine locations and other wind farm infrastructure such as overhead transmission lines and substations.

### Electrical balance of plant

Electricity generated by the wind turbines will be collected by a number of 33kV electrical circuits that will comprise both underground cables and overhead lines. These circuits will then connect to one of two substations (the main and satellite substations, located in the south and north of the site respectively). The substations will convert the output from 33kV to 220kV so that it can be exported to the national grid.

The two substations will be connected by a 220kV overhead internal transmission line.

### External road upgrades

All infrastructure and components associated with the project will be delivered by public road. Given the size and weight of the various components (particularly those relating to the wind turbines) some public roads near the site will need to be upgraded including realignment and widening and some bridges may need strengthening or even replacement.

### Temporary construction facilities and earthworks

A number of temporary facilities will need to be established for the construction of the CHWF, including: water abstraction/detention structures, quarry and crushing areas, concrete batching plants, contractor compounds and laydown areas.

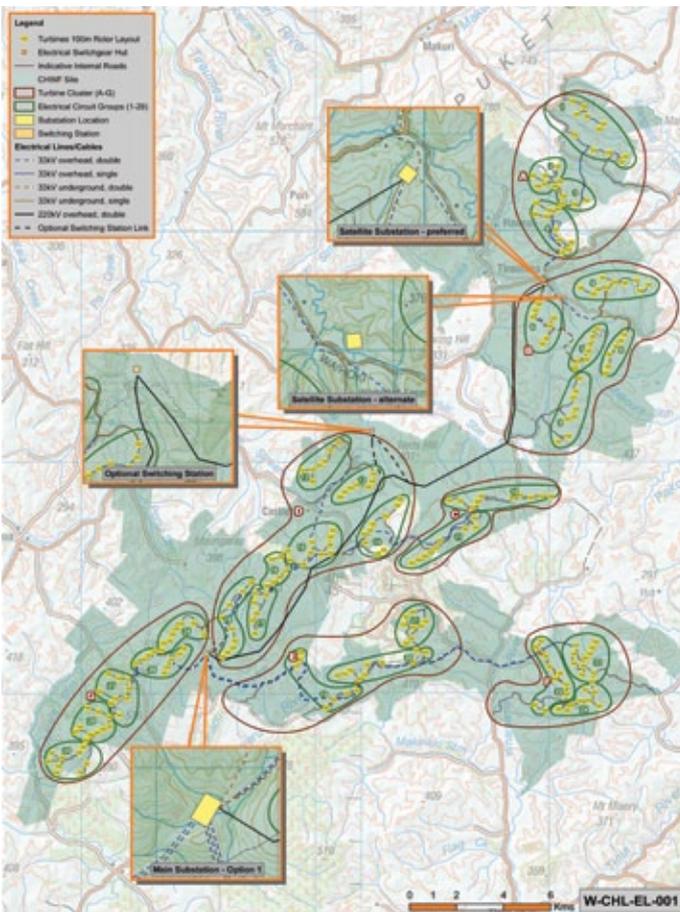


Figure 4: Electrical balance of plant option 1

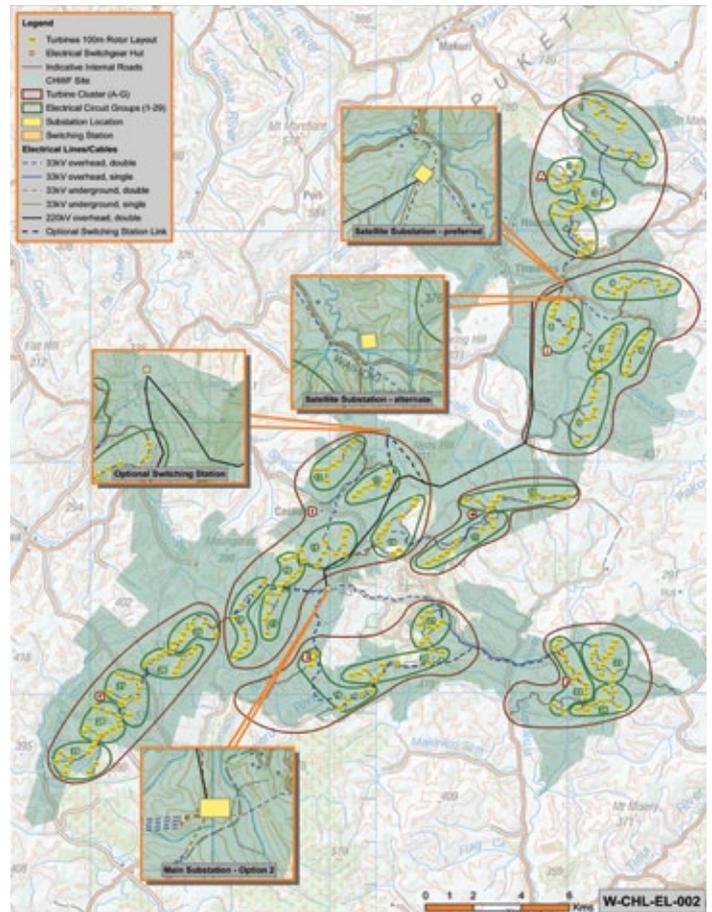


Figure 5: Electrical balance of plant option 2

As construction progresses across the site these facilities will be established where necessary, and once they are no longer required they will be removed and the site reinstated.

Construction of the wind farm will require a range of earthworks activities across the site. Earthworks cut material will be used for Engineered Fill where practicable, with any surplus being placed in excess fill areas within the site.

### Permanent operations and maintenance facilities

There will be a main operations and maintenance (O&M) facility, along with a maximum of five O&M support facilities at other locations within the site. The O&M facilities will be utilised during construction and operation of the CHWF. The main site office will include several buildings including workshops, amenities and a small wastewater treatment system.



Castle Hill Wind Farm Open Day 1 (September 2010)

## Consultation

Genesis Energy has a long history of consultation, community relationships and acknowledgement of local communities' interests in new projects. The company values the input of stakeholders in the consultation process and provides access to information about the project to stakeholders. Genesis Energy has provided a number of opportunities for consultation, including individual phone calls and meetings, open days, newsletters, a dedicated free-phone number and email contact address and an internet website providing project information. Consultation with stakeholders will continue throughout the consenting process.

## Resource Consents

Genesis Energy will be seeking resource consents from the Greater Wellington and Horizons Regional Councils, and the Tararua and Masterton District Councils. Resource consents are required for a variety of activities including land use consents for establishing the wind farm, and undertaking various construction and earthworks related activities. Discharge permits will be required for the discharge of stormwater, sediment associated with earthworks, and water permits for the diversion and taking of water.

The resource consent applications are likely to be considered by a joint hearing, where all parties can make their views known. The public and stakeholders will have an opportunity to make submissions on the



Proposed Castle Hill Wind Farm area

proposal prior to the hearing, and speak in support of their submission at the hearing.

Genesis Energy is seeking to lodge the resource consent applications by mid 2011.

## External transmission line

An external transmission line will be required from the site to the national grid near Linton and Bunnythorpe to export the electricity generated. The external transmission line will either connect to the main substation, or a switching station located along the internal transmission line. RMA approval for the external transmission line will be sought via a separate process by a transmission line provider.

## Further information

More details will be available in the Assessment of Environmental Effects and associated technical reports that are currently being prepared for the resource consent applications for the project.

} *“Talk to us about the project...”*

### Main point of contact:

For more information about the assessments outlined in this project information sheet and the Castle Hill Wind Farm project, please contact:

Amy Rennell  
Environmental Co-ordinator  
FREEPOST 232530  
P O Box 17188, Greenlane  
Auckland 1546

 0800 GEN WIND (0800 436 946)  
 09 580 4884  
 castle.hill@genesisenergy.co.nz  
 genesisenergy.co.nz