



Wind farm proposal for

Mill Creek



“We have selected Meridian to develop and operate the wind farm on our land because of its reputation for doing this well, and because it shares our commitment to the local community.”

Foreword

Representatives of Wind Corp Ltd.

*From left: Greg Best, Ward Kellahan, Gavin Bruce
and Warren Bryant with former long-term
Ohariu Valley resident Neville Beach (centre).*



The concept of a wind farm to maintain the viability of the Ohariu Valley farms was first identified by landowners about 10 years ago. With farming in the Valley under increasing pressure, we recognised that it was necessary to find an additional source of income from the land.

At the same time, as longstanding residents of the Ohariu Valley, it was important to us to find a way of supporting the farms that would preserve the lifestyle and rural character of the area. For this reason, a wind farm is our preference over other options, such as housing subdivision and forestry.

This booklet outlines a proposal by Meridian to develop a wind farm, Project Mill Creek, on properties owned by the Best, Bruce, Kellahan and Bryant families. It provides information about the benefits and effects of the wind farm, and what its construction would involve.

We have selected Meridian to develop and operate the wind farm on our land because of its reputation for doing this well, and because it shares our commitment to the local community. We were able to observe the construction of the Te Āpiti wind farm and its return to full farming activity afterwards. We are now pleased to be working with Meridian to provide residents of the Ohariu Valley and other interested parties with details of the project.

More information about Project Mill Creek will be available over the coming weeks. Feedback gathered over this period will be considered in shaping the proposal before an application is made for resource consents, and we encourage you to take part in the consultation process.

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Proposed site for Project Mill Creek

KEY

- Mill Creek turbines
- West Wind turbines

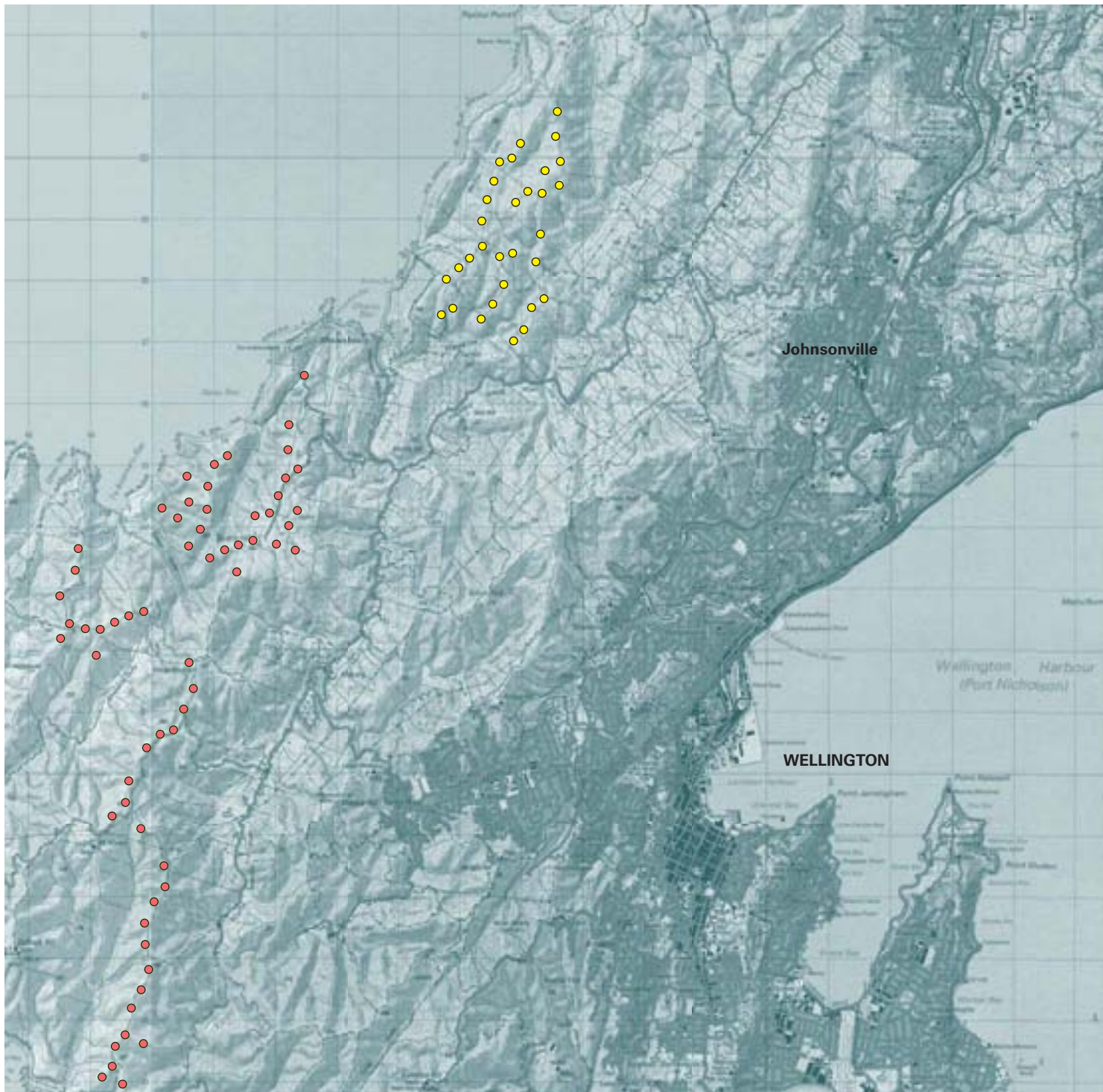
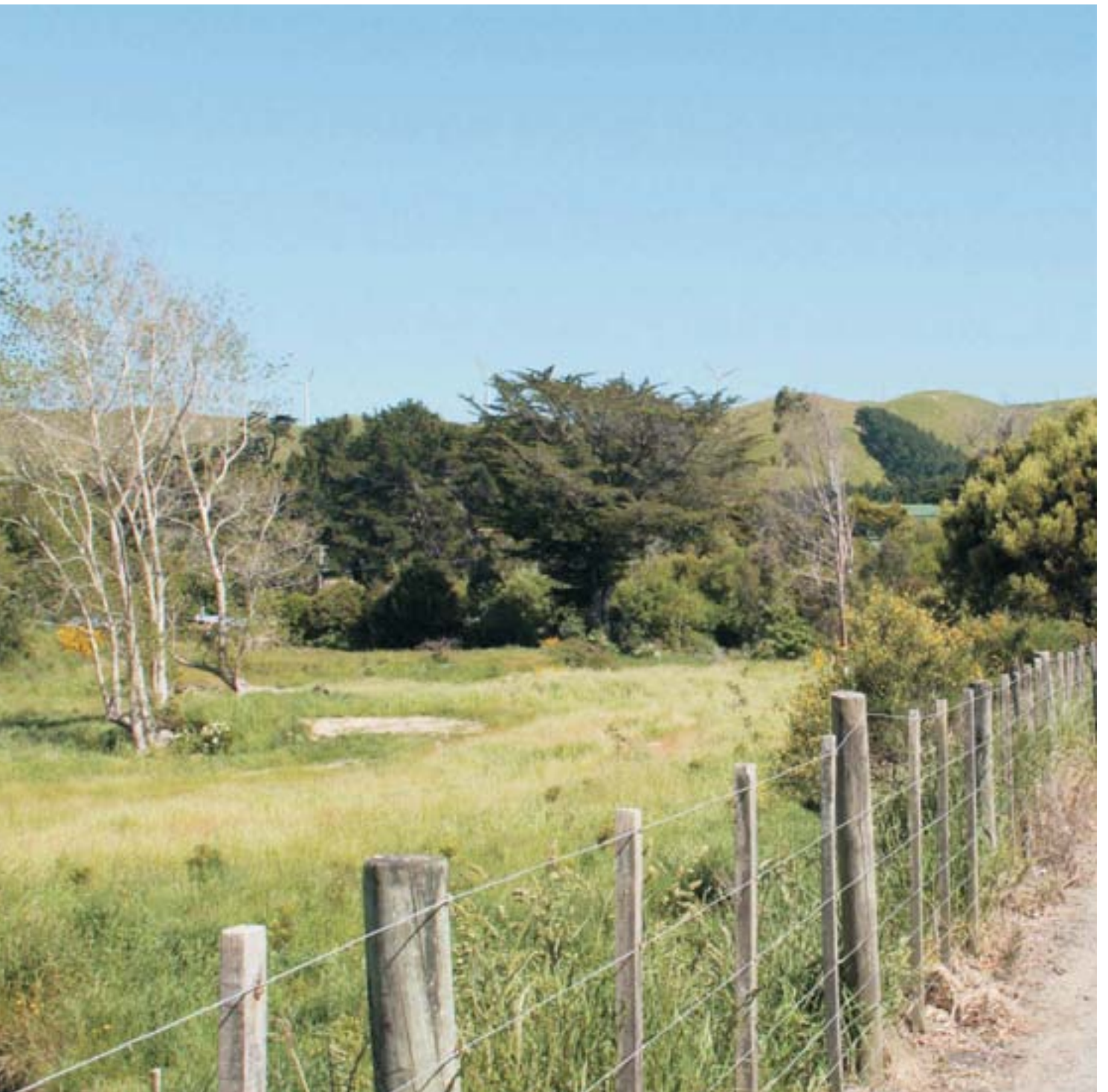


Photo simulation of
Project Mill Creek from
Lower Ohariu Valley Road.



The wind farm proposal

The Mill Creek wind farm site is located between the Ohariu Valley and Wellington's west coast, within the territorial boundaries of the Wellington City Council. It would have 31 wind turbines with a combined capacity of approximately 71 MW and would be spread across six privately owned properties over an area of about 8 square kilometres. The wind farm is completely compatible with existing land use, and these properties would continue to be farmed by landowners.

The project is named for the creek that flows through the properties where totara trees were milled.

Project Mill Creek shares the same strong, consistent wind speeds as Project West Wind located to the south on Makara Farm and Terawhiti Station, which make it ideal for wind power generation. Project Mill Creek would be constructed directly after Project West Wind, so that efficiencies can be achieved in the development process. Because of the consistency of wind speeds at the site proposed for the wind farm, Project Mill Creek would generate electricity over 90% of the time.

The proposed wind turbine sites are generally located on gentle terrain or ridge tops set back from steep slopes, depressions and damp areas. An underground internal cable network would connect the wind turbines and substation on the site.

From the substation, the wind farm would be connected directly to the Wilton/Haywards 220kV transmission circuit which passes through the site.

Turbines

Project Mill Creek would have 31 wind turbines, supplied by Siemens Wind Power, a major wind turbine manufacturer based in Denmark. The turbines are used around the world, and were carefully selected to ensure that they can meet the demands of the site and longer-term operation. These are the same turbines used for Project West Wind.

Each turbine has a capacity of 2.3MW, and would generate electricity in winds between 15 and 90 kilometres per hour. In extreme weather conditions the turbines are designed to shut down to prevent damage.

Including the rotor blades, each of the turbines is 111 metres tall. The two-section tower is 67 metres tall. The 87,100 kilogram nacelle on top of the tower houses the generator and electrics for the turbine. Each of the three blades is 40 metres in length.



How do wind turbines work?

The wind moving over the turbine blades causes the rotor to spin. This rotating effect is transmitted via a turbine shaft into a gearbox which steps up the rotational speed so that the actual generator is able to spin fast enough to begin generating electricity. Depending on the turbine technology, the rotor blade angle is altered to optimise power production.

The turbines used by Meridian are electronically controlled, with microprocessors that automatically start, stop and monitor them. In high winds (over 90 km/h) turbines will be automatically shut down and their blades feathered (pivoted) for minimum wind resistance. The turbines can withstand gusts of up to 250 km/h. In comparison, the wind speeds recorded in the Wahine storm of 1968 were up to 243 km/h.

- | | | |
|---------------------------|--------------------|-------------------|
| 1 Blade | 6 Gearbox | 11 Yaw gears |
| 2 Disc brake | 7 Slip clutch | 12 Hydraulic unit |
| 3 Gear tie rod | 8 Top control unit | 13 Yaw ring |
| 4 Generator, double wound | 9 Blade hub | 14 Yaw control |
| 5 Cast steel root | 10 Main shaft | |



Photo simulation of
Project Mill Creek from
Takarau Gorge Road.



The layout of the wind farm has been carefully designed to ensure that the turbine sites avoid any identified significant sites such as undisturbed watercourses.

Benefits

Local benefits

The Mill Creek wind farm would help to preserve the lifestyle and character of the Ohariu Valley by supporting the viability of the area's large farms. Unlike other types of development, such as housing subdivision and forestry, the wind farm would be compatible with existing land use, enabling the rural environment to be maintained, and would not bring an ongoing increase in local traffic.

The development of the wind farm would also sustain the economic benefits brought to the wider Wellington region by the development of Meridian's wind farm at Makara, Project West Wind, which is currently under construction. This includes opportunities for employment and purchasing of local services during the construction period.

By providing these local social and economic benefits, as well as helping to meet New Zealand's growing demand for electricity, Project Mill Creek would be a positive example of sustainable development in action.

National benefits

Electricity is essential to New Zealand's economy and society. It powers our industries and makes the lifestyle we enjoy possible. As well as playing a key role in our lives today, a reliable electricity supply is becoming even more critical to our future as we come to rely more on information and communications technology.

Population growth, economic growth, and energy-intensive industries mean that New Zealand's demand for electricity is increasing quickly. At current electricity demand growth rates, new capacity is required at around 150MW a year. In other words, we have to add enough electricity year after year to power a city the size of Dunedin or Tauranga. At the same time, an important source of electricity, the Maui gas field, is rapidly depleting and other gas fields are not large enough to fill the gap.

In combination with energy efficiency initiatives and upgrading of existing generation infrastructure, Project Mill Creek would help to make up the electricity generation shortfall. The wind farm would generate enough renewable electricity to power the equivalent of 35,000 average homes.

Environmental benefits

After construction, the Mill Creek wind farm would generate electricity with no harmful greenhouse gas emissions. Its operation prevents emissions that would result from gas or coal power generation, also reducing the environmental and health impacts these emissions can cause.

The development of the Mill Creek wind farm is also consistent with New Zealand Government policy aimed at promoting economic transformation while responding to the global issue of climate change. In particular, the wind farm would directly contribute

to the Government's target for 90% of our electricity to come from renewable sources by 2025, as set out in the New Zealand Energy Strategy and the New Zealand Energy Efficiency and Conservation Strategy.

Effects of the wind farm

Meridian is preparing a set of Assessment of Environmental Effects reports as part of the resource consent process for the wind farm, which will provide information about Project Mill Creek and assist local stakeholders to reach an informed decision. Following is a summary of a few common issues that people raise about wind farms in general, some of which may be relevant to Project Mill Creek.

Visual effects

Although wind farms have a visual effect, whether or not they are a desirable feature of the landscape depends on the point of view of the individual. While some people do not like the way that wind farms look, others find them appealing.

The series of ridgelines in and adjacent to the site are important in determining the visibility of the wind farm. These ridgelines are substantial barriers to viewing the wind farm from much of Wellington's urban area and from at sea. The wind farm will be visible from Wellington City's Outer Green Belt high points and Porirua City's Colonial Knob.

All turbines would be identical and would be light grey in colour, with a low reflectivity finish to reduce

possible blade glint (sunlight reflecting from the turbines). The wind energy industry has established that light grey is the most neutral colour in a landscape given a wide range of backdrops (predominantly silhouetted against the sky and/or clouds), light conditions and seasonal variability.

Landscape modifications

The layout of the wind farm has been carefully designed to ensure that the turbine sites avoid any identified significant sites such as undisturbed watercourses. As far as possible, internal access roads will use the alignment of existing roads and new roads have been planned to avoid undisturbed watercourses, damp or boggy areas.

Even where disturbed land from road and turbine platform construction is not visible from public places, the aim would be to re-establish vegetation on any exposed areas as soon as possible. Once rehabilitation of the sites has taken place, any disturbances would be difficult to detect on the landscape.

Meridian will be using its experience gained on consenting and constructing Project West Wind for Project Mill Creek, particularly relating to sediment control and revegetation of areas.

Noise

Design improvements mean that modern turbines such as those that would be used for Project Mill Creek produce very little noise compared with earlier

models. In particular, rotor blades have been refined to make them more efficient and reduce their aerodynamic noise, especially in low wind conditions. Manufacturers have worked very hard to reduce mechanical noise associated with the drive train, in particular rotor and gearbox noise.

If you stand directly beneath an operating modern wind turbine you can easily have a conversation without raising your voice. Sounds from an operating wind turbine will often be masked by the background sound created by the wind blowing through the vegetation and around nearby buildings and structures.

In 1998 Standards New Zealand produced a standard for the assessment and measurement of sound from wind turbines.

The standard was specifically developed as an aid to planning consent procedures and to provide guidance on the limits of acceptability for sound received at residential and noise sensitive locations. Development of the standard drew on international research and experience.

There has been some discussion about a possible review of this standard more recently. However, Meridian has proposed that the noise conditions in place for Project West Wind, which go further than the standard, would also apply for Project Mill Creek.

This view was supported by a November 2007 Environment Court decision on the appropriateness of the West Wind conditions and stated:

- The conditions agreed by the experts go further than NZS6808:1998 in providing amenity protection to neighbouring residents to the wind farms and are some of the most comprehensive yet developed for the assessment of operation noise from wind turbines.
- The West Wind conditions dealing with noise are workable and conservative when compared with NZS6808:1998 when compared with most other such conditions in international jurisdictions.

This will ensure that the adverse effects from noise will be no more than minor.



Meridian generates electricity from renewable resources, and is New Zealand's only carbon neutral energy provider.

Effect on birds

While any tall structure poses some risk to birds, the impact of wind turbines on bird mortality rates is very small if careful consideration is given to the wind farm location and its relationship to the natural ecology of the area. Properly sited turbines avoid flight paths and significant habitats. A significant study was undertaken over a 12-month period for Project West Wind and this study supports that the effects on the avifauna will be minor. It is also interesting to note that studies of an area also show which species of birds will become accustomed to wind turbines and learn to avoid them. Meridian is investigating what possible effect constructing Project Mill Creek may have on wildlife and will ensure that the wind farm is designed in a way that minimises any impact.

Effects of construction

Access to the site

A comprehensive assessment has been made of how people, turbine components and materials can be transported to the Project Mill Creek site during the construction and operation of the wind farm. Because of the location of the site, all turbine parts and construction materials would need to be delivered by road.

The route for construction traffic travelling to and from Project Mill Creek has been chosen to minimise effects on the community. During construction

of the wind farm, access to the site would be from the north, from State Highway 1 through Porirua, and two kilometres of new road through Spicer Forest from the Porirua Landfill to the end of the Ohariu Valley Road. From there the construction vehicles would travel down to the intersection with Boomrock Road and proceed along it for about 250m before entering the project site.

Investigations have been made to ensure that the route for transporting materials to the site can accommodate the dimensions of the turbines with the least possible effect. Height and weight restrictions on roads have been taken into account, as well as the provisions of district plans for the Wellington and Porirua cities.

Based on these investigations and the selected travel route, the construction and operation of Project Mill Creek is expected to have no more than minor effects on the safe and efficient operation of the road network, and on the Ohariu Valley community.

Managing construction effects

Building Project Mill Creek would involve a range of construction activities including preparation of the foundations of the turbine sites and creating a transmission network, substation and maintenance buildings.

Access roads would need to be developed within the site and areas set aside for storing parts and materials and providing staff facilities.

Meridian proposes that a Construction Environmental Management Plan (CEMP) be a condition of its resource consent for Project Mill Creek. This would set out construction and management processes to ensure compliance with contractual and consent requirements, and Meridian's environmental objectives.

The effects of construction have also been minimised through the design process of the wind farm. For example, strategies have been developed to minimise the amount of earthworks required and to use existing farm tracks on the site. After construction has been finished, areas would also be restored with appropriate vegetation. As a result, most construction effects would be short-term only.

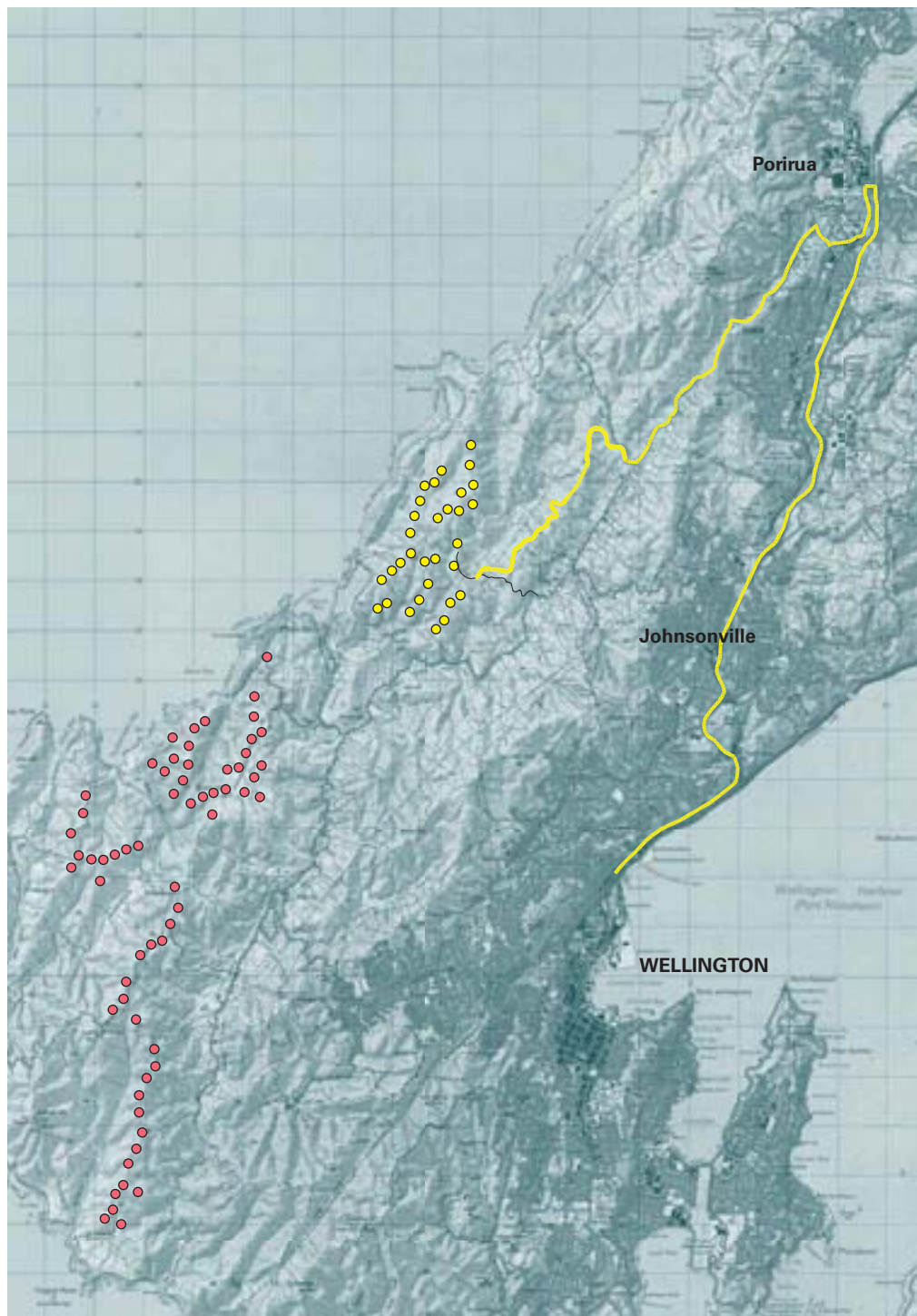
Ongoing consultation with the Tenth's Trust and Ngati Toa, Wellington City Council, Porirua District Council and Greater Wellington Regional Council will ensure that the proposed activities associated with constructing and operating Project Mill Creek are acceptable and include any appropriate changes.

Meridian would expect to continue the top-level occupational health and safety record established for the Te Āpiti wind farm in the Manawatu, which has been considered a model for the wider construction industry to mirror.

Proposed route for construction traffic

KEY

- Mill Creek turbines
- West Wind turbines
- Mill Creek wind farm access roading



The consent process

Meridian believes that consultation with communities and stakeholders is crucial to provide people with the opportunity to express their point of view on energy development projects. Feedback gathered from the consultation process for Project Mill Creek will be considered in shaping the proposal before an application is made for resource consents for the wind farm.

Meridian will hold open days to provide information on the proposed wind farm. The location and timing of these open days will be publicised in local newspapers. All are welcome to attend.

Information will also be provided available through e-mail, an 0800 number, fact sheets, the Internet, a short video on DVD, video cassette and CD format. To ask questions or request information, please use the contact details on this page.

Meridian and wind power generation

Meridian generates electricity from renewable resources, and is New Zealand's only carbon neutral energy provider. It is the country's largest electricity generator, with nine hydro stations producing power for New Zealand homes and businesses. Approximately one-third of New Zealand's electricity is generated by Meridian using renewable energy resources.

With renewable energy at the heart of Meridian business, it is natural for the company to develop wind power generation resources as it has with hydro power. Wind power is now a major and increasingly important part of its business.

Meridian's experience with wind energy goes back over 15 years. It has operated the Brooklyn wind turbine since 1993, is operating the Te Āpiti wind farm north of the Manawatu Gorge, and the White Hill wind farm in Southland. Project West Wind is being constructed west of Wellington city and is expected to be fully commissioned by late 2009. Meridian aims to be the global reference company for renewable energy and is constantly investigating potential sites throughout the country where new generation is feasible and appropriate.

The company has a very good environmental record and is committed to sustainable development. Project Mill Creek will be consistent with Meridian's sustainability policy.

FURTHER INFORMATION

Further information about wind power generation and the proposed Project Mill Creek wind farm is available from the following sources.

Phone:
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E-mail:
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www.meridian.co.nz

About Meridian

Meridian Energy is New Zealand's largest electricity generator and the only retailer of certified carbon neutral electricity. We're committed to operating sustainably and consider social, economic and environmental impacts when making decisions.

We generate using only renewable resources – currently wind and water. We own and operate the Manapouri power station and eight hydro stations on the Waitaki hydro scheme in the South Island.

We also own and operate the Te Āpiti wind farm near Palmerston North and White Hill wind farm in Southland. We have plans for more renewable generation facilities to help meet New Zealand's growing need for electricity.

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