

# Brooklyn Re-Powering

*Paul Botha – Wind Technical Strategy Manager,  
Meridian Energy*



16 April 2014 | Brooklyn Re-Powering



# Brief History

- Turbine installed in March 1993
- 15 year consent
- Consent extended in February 2008
- Original Council land lease limited turbine size
- During 2010, the turbine required some major work. Opinion poll suggested that the turbine should stay
- Meridian gained a new lease agreement which allows for an increase in the turbine size
- Meridian lodged a consent for a larger turbine with WCC in October 2013



# Existing turbine

- Turbine operational for 21 years
- Vestas V27 s/n 3889
- 27 m rotor diameter
- 31.5 m hub height
- Tip height of 45m
- Rotor speed 43.4 rpm (high)
- Rotor speed 32.5 rpm (low)



## Interesting Fact 1

- In the 21 years of generating power, to March 2014, the turbine has completed:
- 305 million rotor revolutions
- 84% at high speed and 16% at low speed

## Interesting Fact 2

- While completing all those revolutions each blade tip has travelled:
- The equivalent of 25.9 million km
- Or 33.6 return trips to the moon



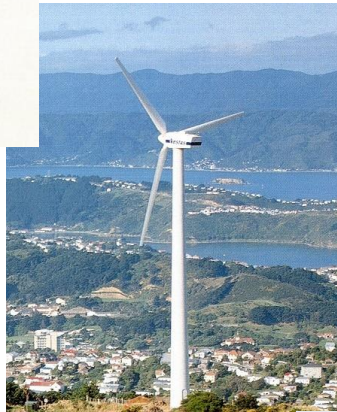
## Interesting Fact 3

- During the 21 years of operation a lot of air has passed through the rotor:
- The weight of that air is over 200 million tonnes per year
- 4500 million tonnes of air in the 21 years



# Interesting Fact 4

- During the 21 years of operation the turbine has had different outfits. There have been at least 6 different logos on the turbine.



## Performance – more significant repairs

- Turbine installed in March 1993
- Slip clutch issues on high speed shaft
- 13 Nov 1994, One anemometer cup and half of nacelle cover blown off
- Shut down wind speed reduced
- 2003 / 2004 – gearbox replacement
- Yaw drives replaced
- Oct 2009, turbine shut down because of yaw gear, restarted in June 2010
- Tower bolts replaced periodically



# Historic Performance

- Capacity factor for 21 years 42%
- Capacity factor taking out 12 months: 44%
- Availability 96% (not including long outages)
- Turbine run hours: 158887 hrs (86% of time)
- Small generator hours 18752 hrs (10% of time or 2 years)
- Large generator hours 131362 hrs (71% of time or 15 years)

# Proposal

- Rotor diameter approximately 44m to 52m
- Hub height maximum of 55m
- Maximum tip height of 77m (3 section tower + 44m rotor)
- Variable speed turbine
- Consent notified on 26 November 2013
- Submissions closed on Tuesday 14<sup>th</sup> January 2014
- Pre-hearing meeting held 12<sup>th</sup> February 2014
- Hearing scheduled for May 2014

## BROOKLYN WIND TURBINE – APPLICATION FOR RESOURCE CONSENT

In accordance with section 95A of the Resource Management Act 1991, and the Wellington City District Plan, Wellington City Council publicly notifies the following application for resource consent:

**Site address:** 50A Landfill Road, Owhiro Bay and 17 Forsyth Grove, Brooklyn

**Legal description:** Part Section 4–6 Upper Kaiwharawhara District, Part Section 17, Owhiro District, Lot 197 Deposited Plan 86200

**Applicant:** Meridian Energy Ltd, PO Box 10840, The Terrace, Wellington 6143  
Attention: Lynley Fletcher

**Type of consent sought:** Land Use

**Description of proposal:** To construct, operate and maintain a replacement wind energy facility (the Brooklyn wind turbine) and associated facilities, including an interpretive centre, access and landscaped areas and a temporary construction building.

**SR number:** 295035

**District Plan area:** Open Space B

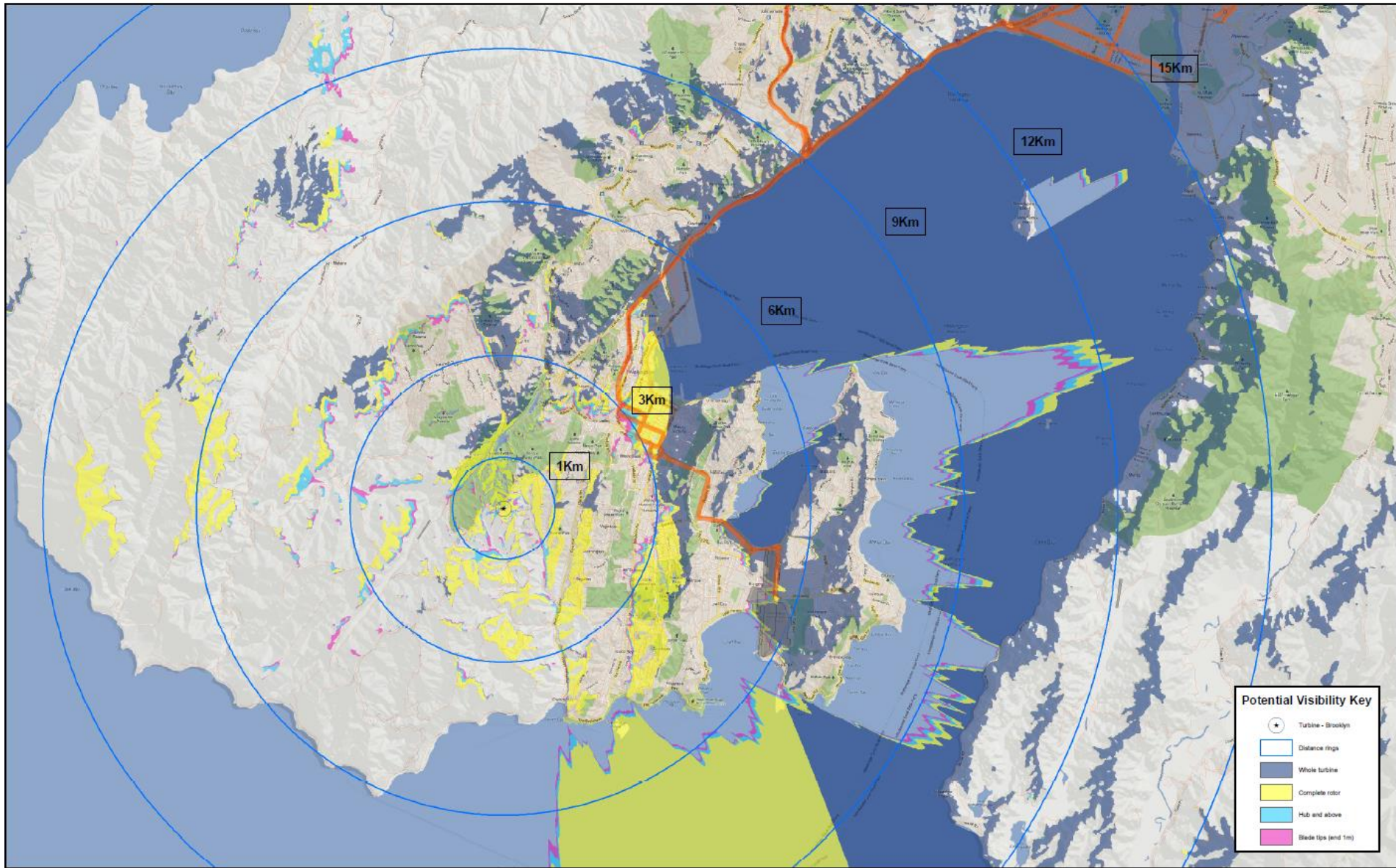
**Notations in District Plan:** Ridgelines and Hilltops Overlay

**Activity status:** Discretionary Activity (Unrestricted)

The replacement of the Brooklyn wind turbine will require the following activities:

- the construction of a new turbine with a height of up to 77m (from ground to blade tip)
- earthworks of 220 cubic metres to create a foundation for the replacement turbine
- the continued use of the existing interpretive

# ZTV - Brooklyn Existing 45m Turbine



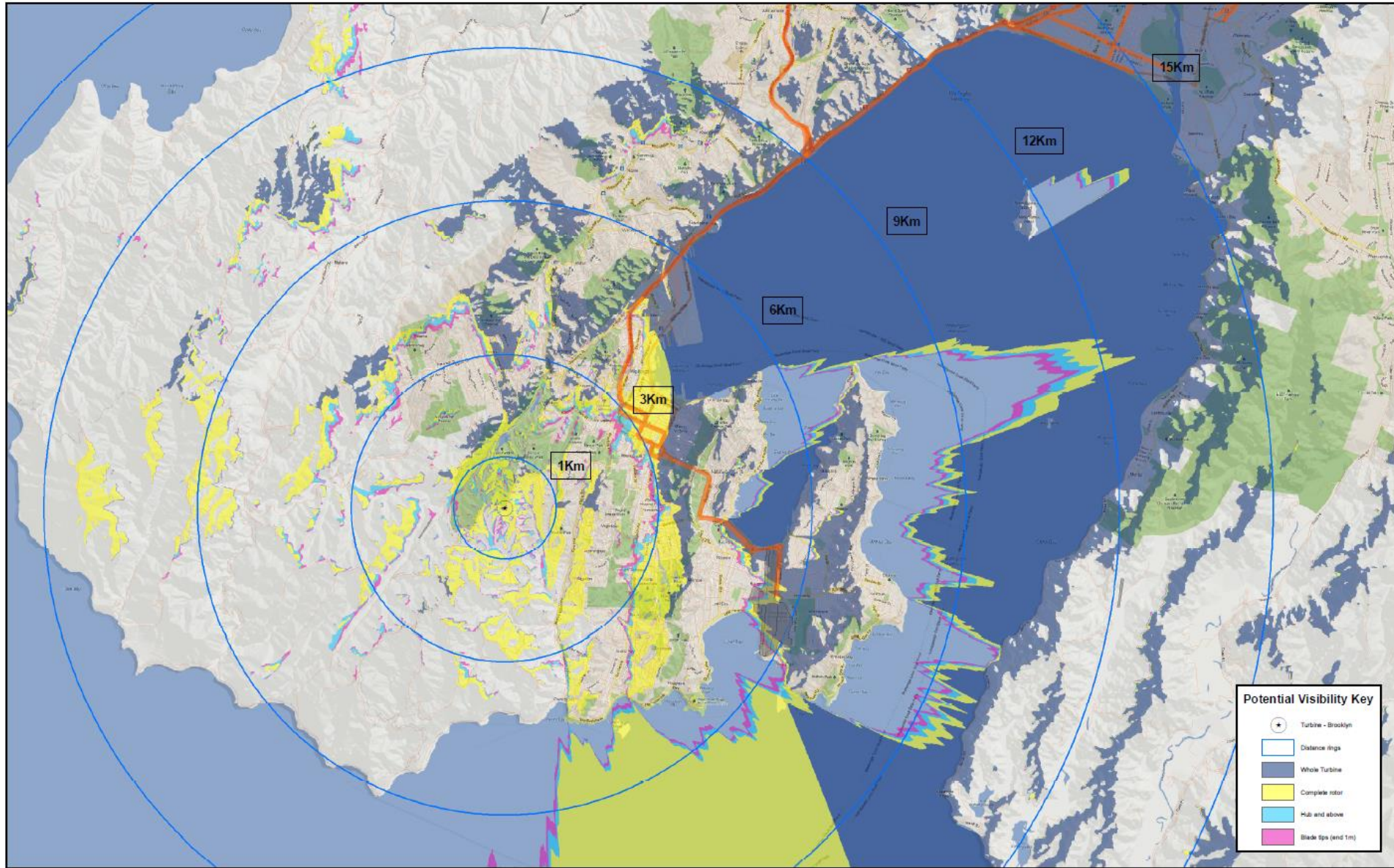
**Potential Visibility Key**

- Turbine - Brooklyn
- Distance rings
- Whole turbine
- Complete rotor
- Hub and above
- Blade tips (and 1m)

This ZTV map shows the potential visibility of Existing Brooklyn Turbine that will be experienced at 1.65m above the ground.  
 The ZTV Map does not take into account existing vegetation or any structures and is constructed using 2m contours (site), 5m and 20m contours (extended area).



# ZTV - Brooklyn Proposed 77m Turbine

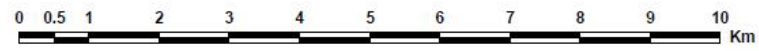


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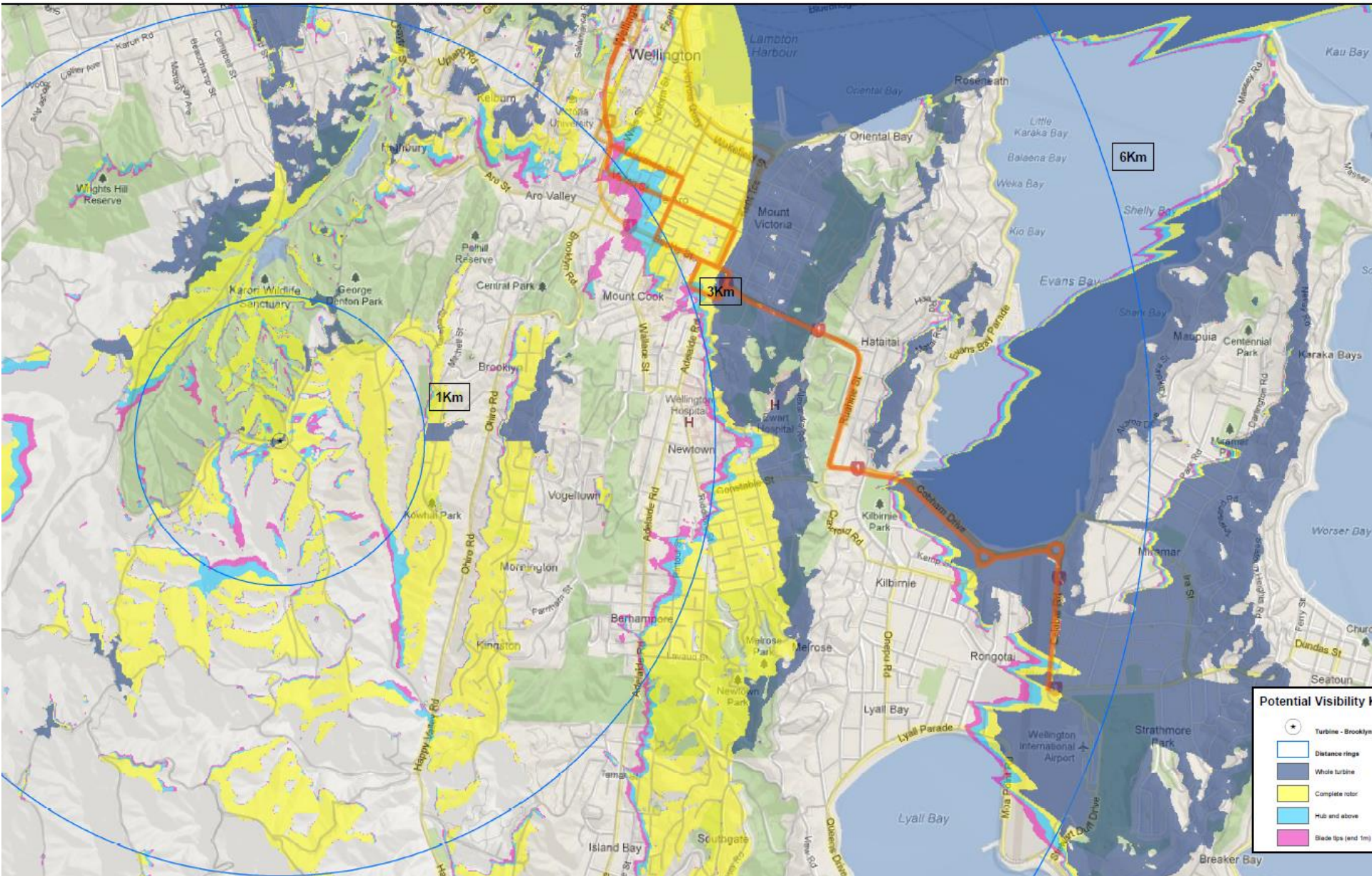
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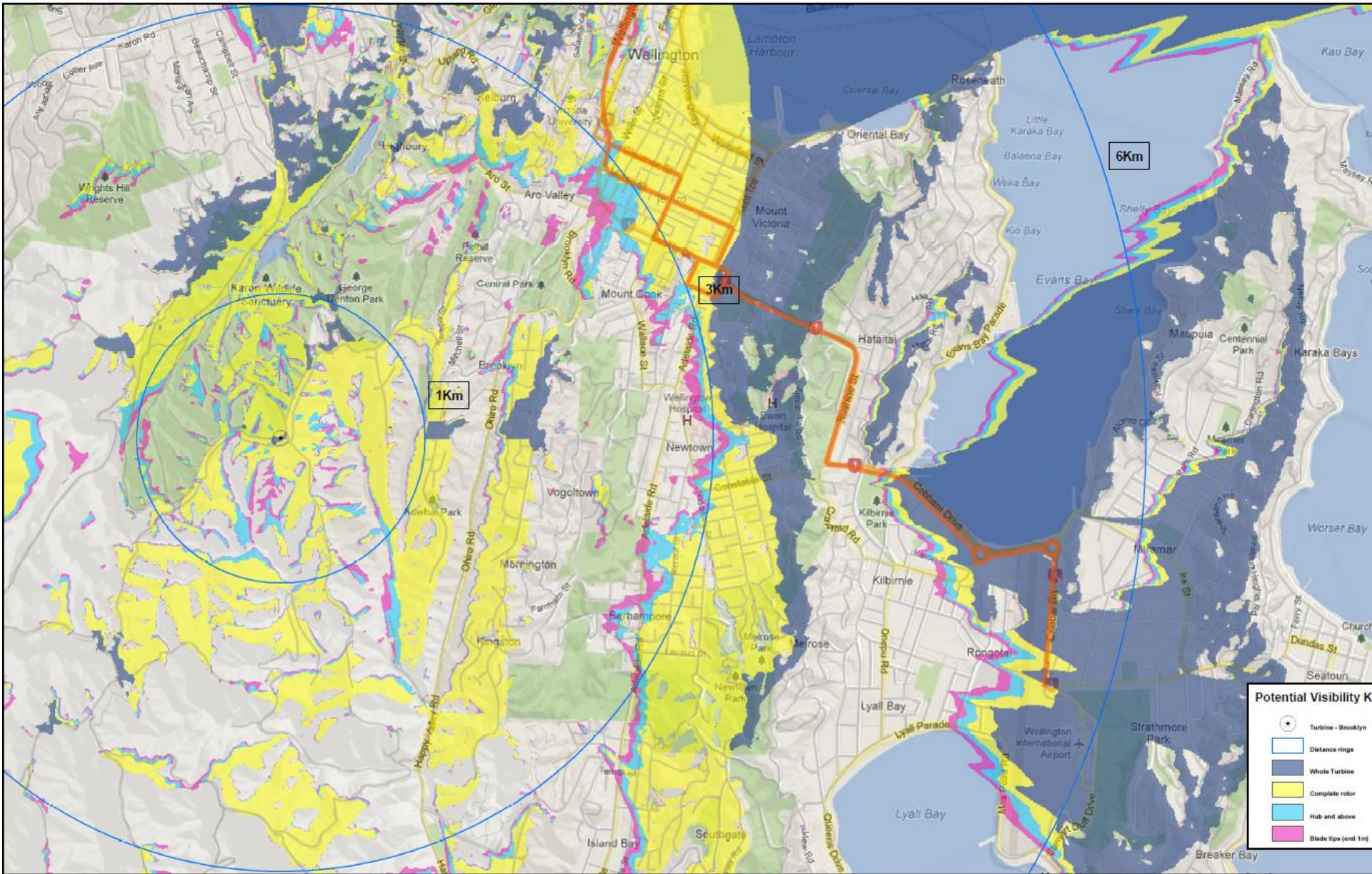
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**Viewpoint 01** - Waterhouse Drive, Looking South West - Existing View



**Viewpoint 01** - Waterhouse Drive, Looking South West - Proposed View



**Meridian Brooklyn Turbine**

**Viewpoint 01**

Waterhouse Drive  
Looking South West

● Viewpoint Location  
● Turbine Location



Existing Position (NZTM000):	1746546.8
Northing Position (NZTM000):	5423659.5
Elevation of Viewpoint Position (NZTM000 / m):	268.8
Height of Camera Above Ground (m):	5.65
Date of Photograph:	20 July 2012 at 11:46am
Orientation of View:	300
Horizontal Field of View:	1.28
Vertical Field of View:	35
Distance to Brooklyn Turbine (m):	689
Turbine Orientation:	N

**Emerson E44 Turbine Data**



**NOTES:**  
Viewpoint locations have been precision surveyed by  
**OPUS**  
Level 6, Huxley Centre  
100 Willis Street  
PO Box 12 000  
Wellington  
New Zealand  
No part of this photosimulation shall be altered in any way.  
Visual Assessments should be made from the full size TrueView™ only.

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Viewpoint 01- Waterhouse Drive, Looking South West - Existing View - cropped portion of full size TrueView

**TRUESCAPE**  
CONSULTING & VISUAL FACILITATION



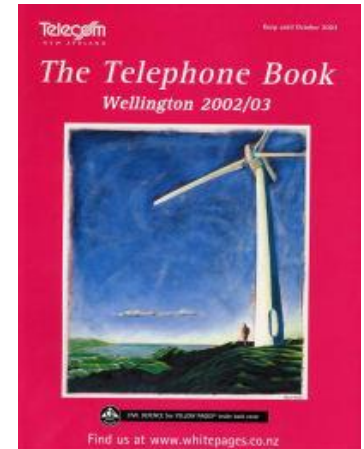


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**TRUESCAPE**  
CONSULTING & VISUAL FACILITATION

# Submissions

- 26 submissions
- 20 in support
- 4 in opposition
- 2 neutral
- 6 parties wanting to be heard at a hearing
- The primary issue from those wanting to be heard relates to the right of way over WCC land and recreation reserve



# Next Steps

- Complete consenting process
- If successful
  - Turbine procurement process
  - Foundation design including dealing with existing foundation
  - Finalise transport route improvements
  - Prepare business case
  - The re-powering project will not proceed unless it gives a commercial return. It is no longer a 'research project'.

Thank You

