New Zealand's EnergyScape™

2000 2005 2030 2050

EnergyScape™ summary of resource maps

July 2010

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EnergyScape™ summary of resource maps

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Prepared for

Foundation for Research, Science & Technology (FRST)

Project:

NZES091- New Zealand's EnergyScape

Document number:

AKL-2009-045

Publisher:

NIWA, Auckland

July 2010

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PURPOSE OF THIS DOCUMENT

One of the objectives of the EnergyScape project was to collate data on New Zealand's energy resource potential into a consistent format that enabled comparision between fuel types. In order to provide this data in a visual and accessible format, we have collated the maps of key energy resources produced for the project. Typically each resource map has two forms:

- Resource potential
- Realisable potential

The resource potential maps identify the energy that could be harnessed if there were no technical or economic barriers to energy capture. The energy potentials are defined relative to the performance of 'typical' energy capture devices, for instance photovoltaic cells capture only 10% of insolation, and wind turbines have performance curves which only start to harness energy when wind speeds are greater than 5 m/s.

The realisable resource potential maps depict the energy that could be harnessed when some economic and technical barriers are applied. Some of the barriers depicted include: accessiblity, visual amenity and distance from transmission grid.

To enable readers to readily identify the literature supporting these maps, the figure numbers and titles in this document are the same as those in the EnergyScape Basis Review (NIWA report AKL-2009-034).

All maps have been developed to illustrate the variation in energy resource potential at a national scale, hence printing at A4 page scale is considered sufficient. It should be noted that many of these maps have been rendered based on limited data, hence it is not appropriate to extract regional scale or sub-regional data from these maps.

DISCLAIMER

The data contained in the maps developed as part of the EnergyScape project were created using a wide range of models and assumptions, and should not be used without understanding the basis of the data and data limitations. An explanation of all map development methodologies and assumptions is contained in the relevant sections of the EnergyScape Basis Review document (NIWA report AKL-2009-034).

Every map comes with a disclaimer, which is reproduced below:

> *Data has been sourced from a number of Data Providers including, but not limited to: NIWA, Eagle Technologies Ltd, and Land Information New Zealand (LINZ). The maps are protected under Copyright ©. All rights Reserved.*
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>
> *Data from widely spaced sites were used in research-based spatial models to estimate surfaces intended for use at 1:250,000. Data mapped at this scale will not show variation that occurs at larger scales.*
>
> *The provisions of the Consumer Guarantees Act 1993 will not apply to this data since it has been acquired for the purpose of a business.*

LIST OF ILLUSTRATIONS

2. RENEWABLE RESOURCES

2.1 SOLAR RESOURCES

Figure 2.1.4 – Mean, annual, global, solar insolation (irradiance) on a horizontal surface.

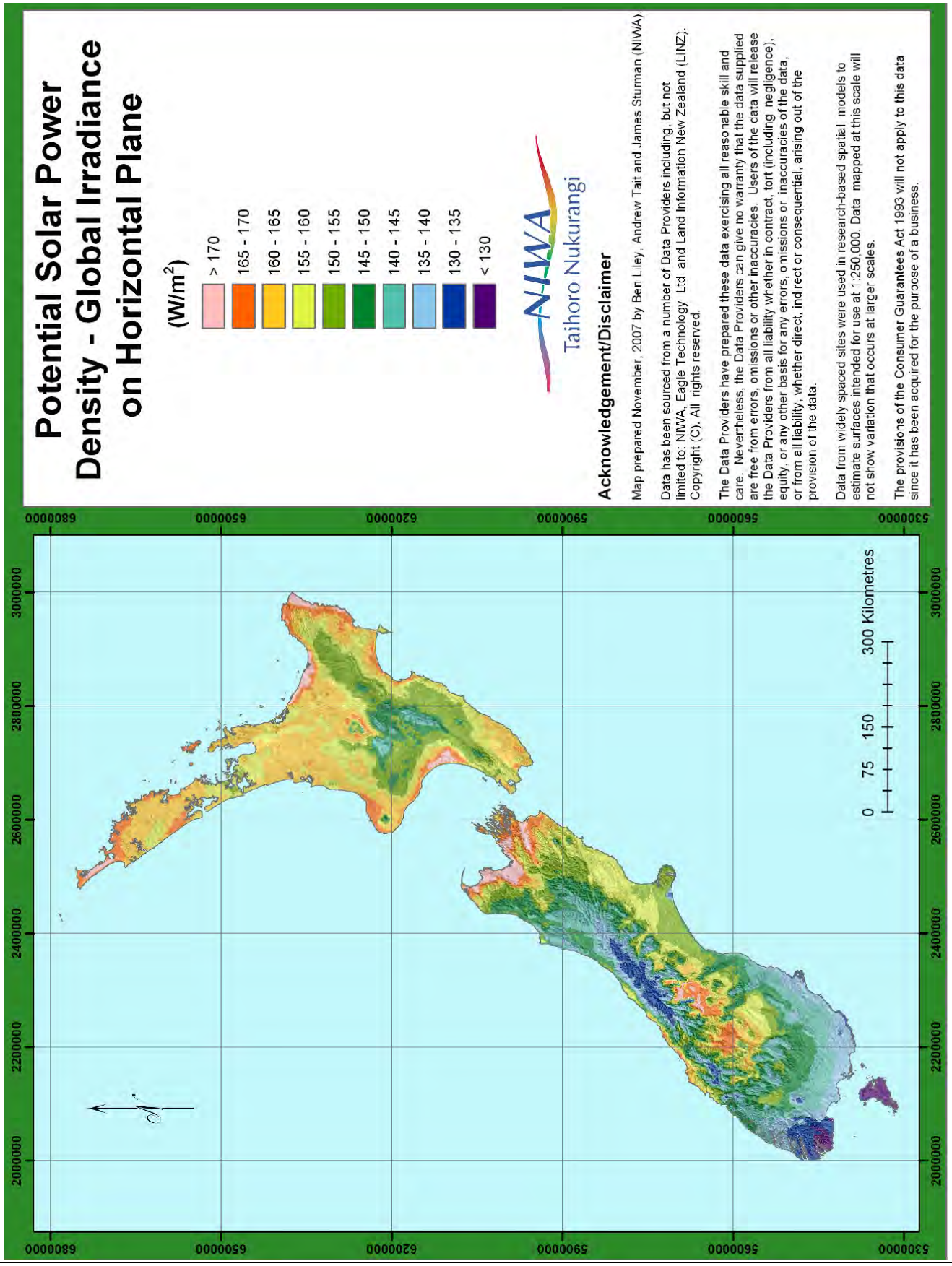


Figure 2.1.5 – Mean, annual, global insolation (irradiance) on surface tilted with respect to its degree of latitude angle.

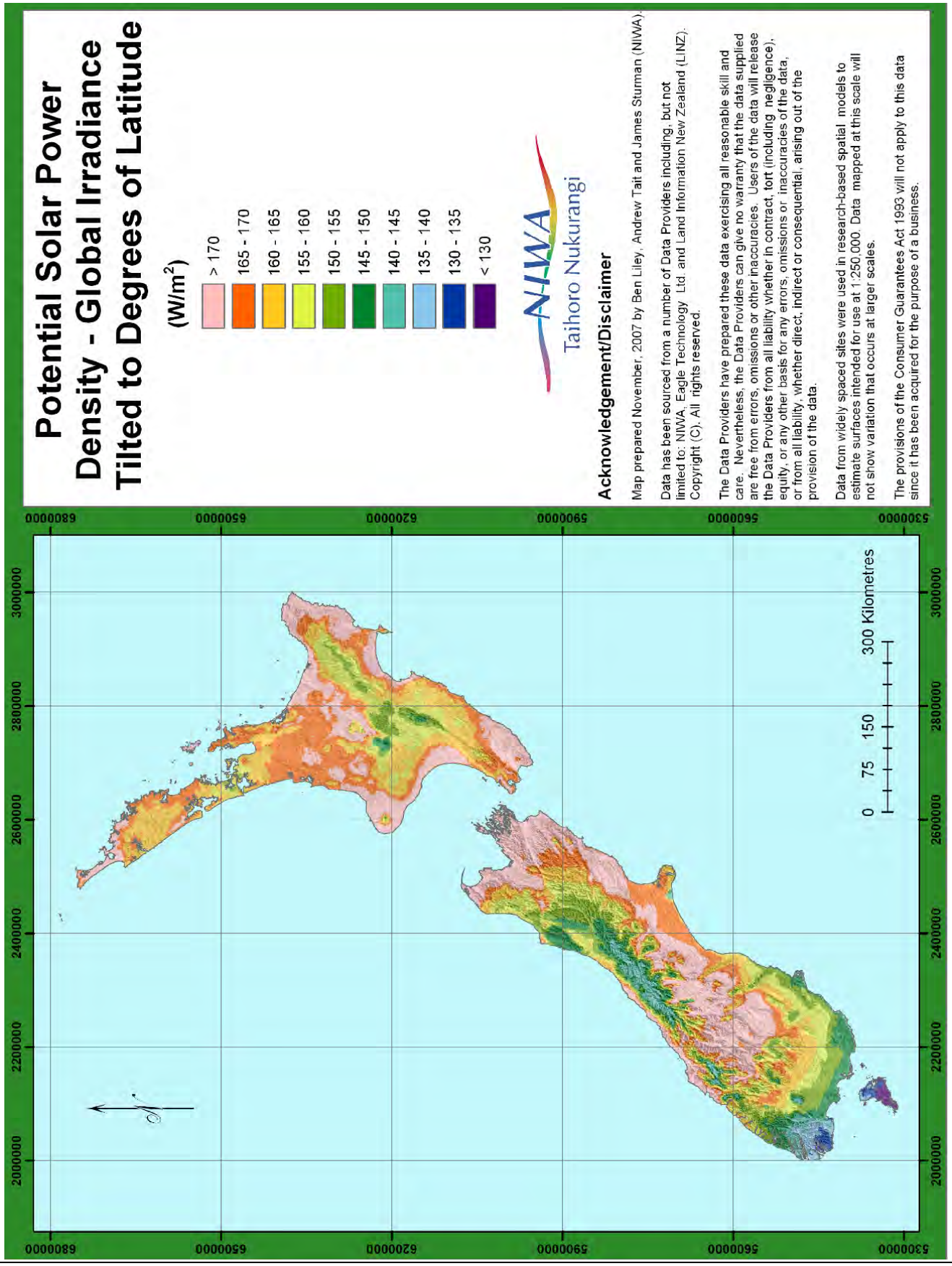


Figure 2.1.6 – Mean, annual, direct, insolation (irradiance) accumulated by a direct-solar-energy collector fitted with a solar-tracking device.

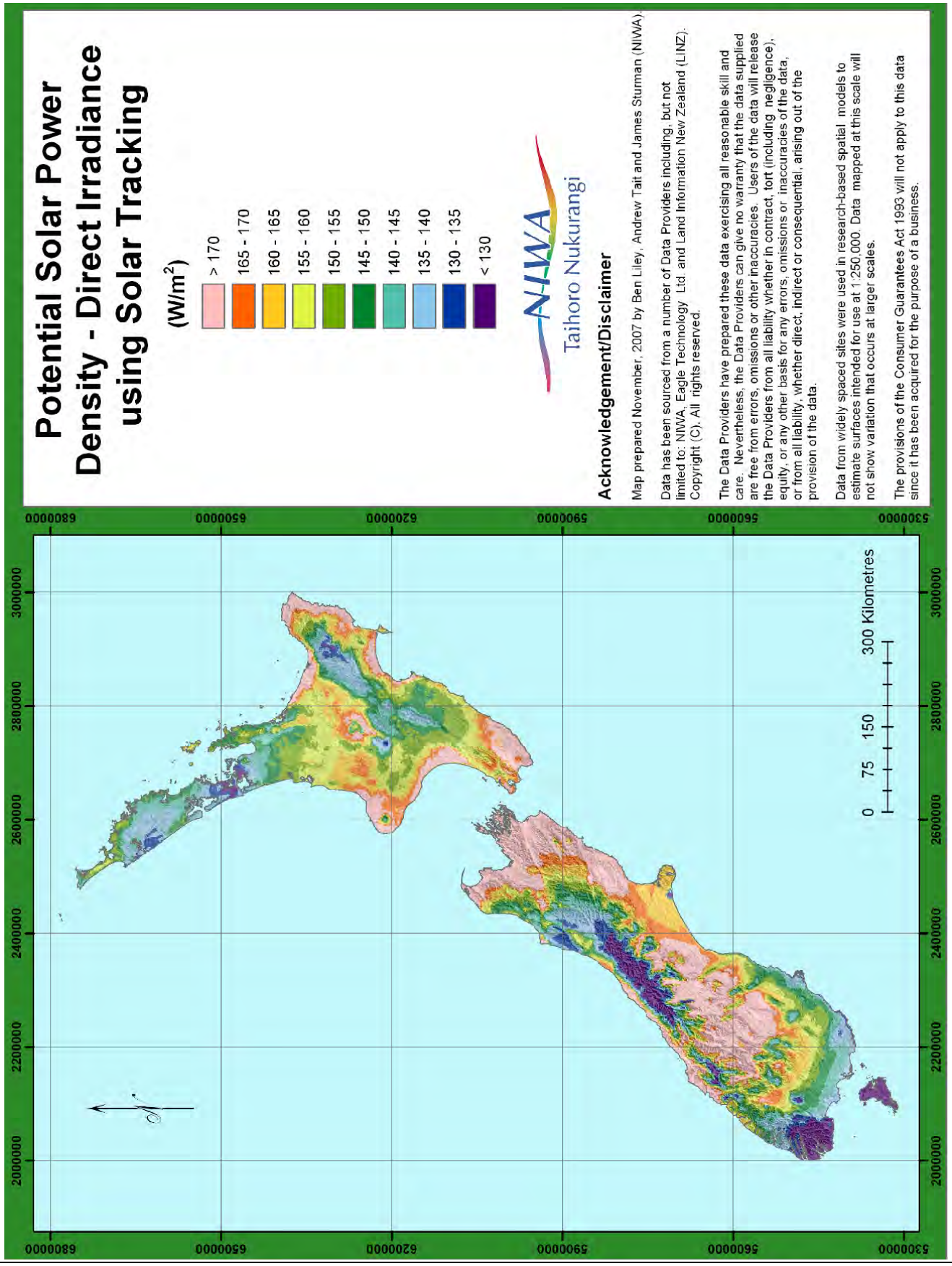
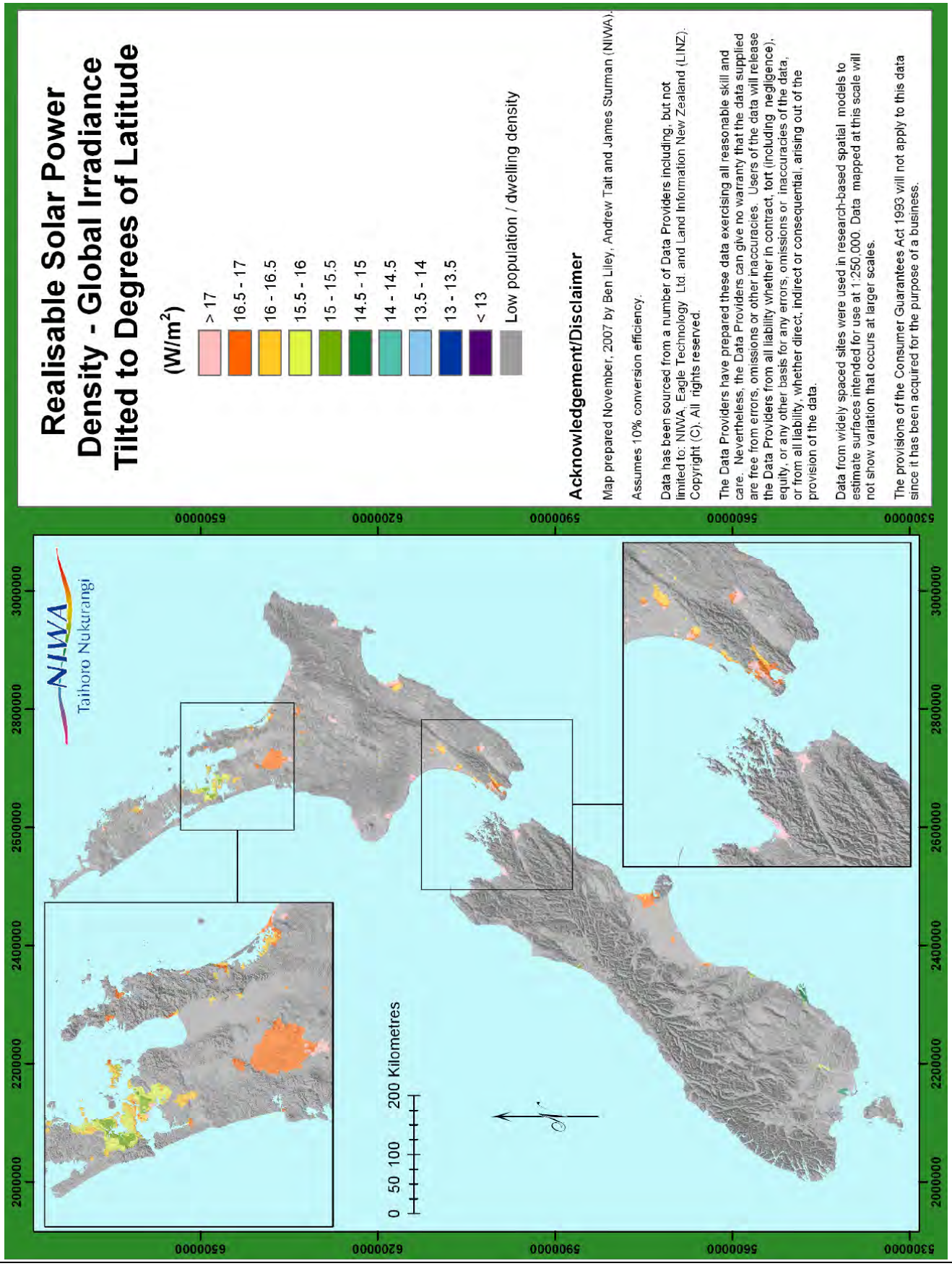


Figure 2.1.9 – The realisable solar energy capture (tilted plate) under restricted urban and agricultural developments.



2.2 WIND RESOURCES

Figure 2.2.5 – Potential wind power density (on-shore).

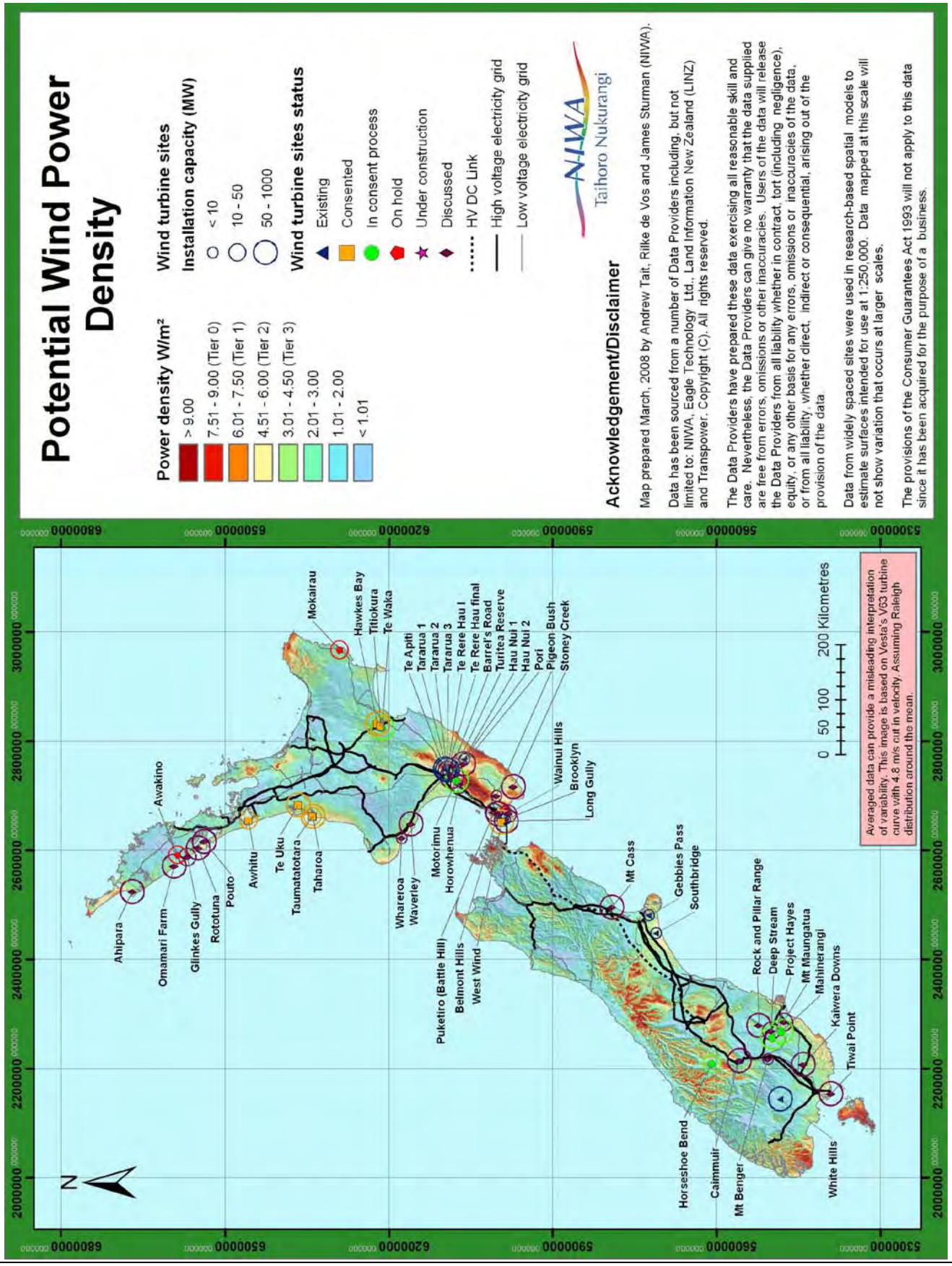


Figure 2.2.6 – Potential wind power density (off-shore).

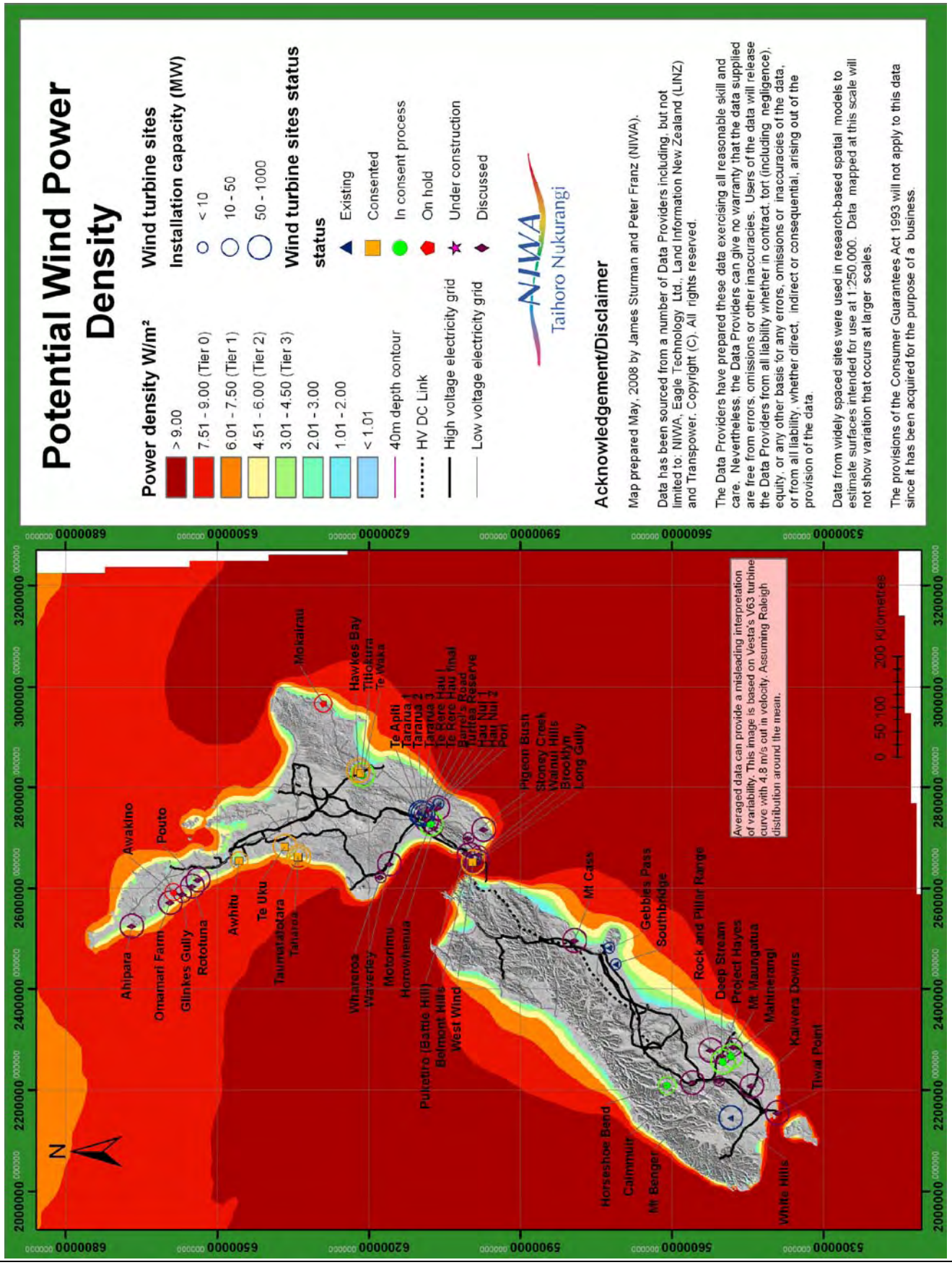


Figure 2.2.7 – Realisable wind power density (on-shore).

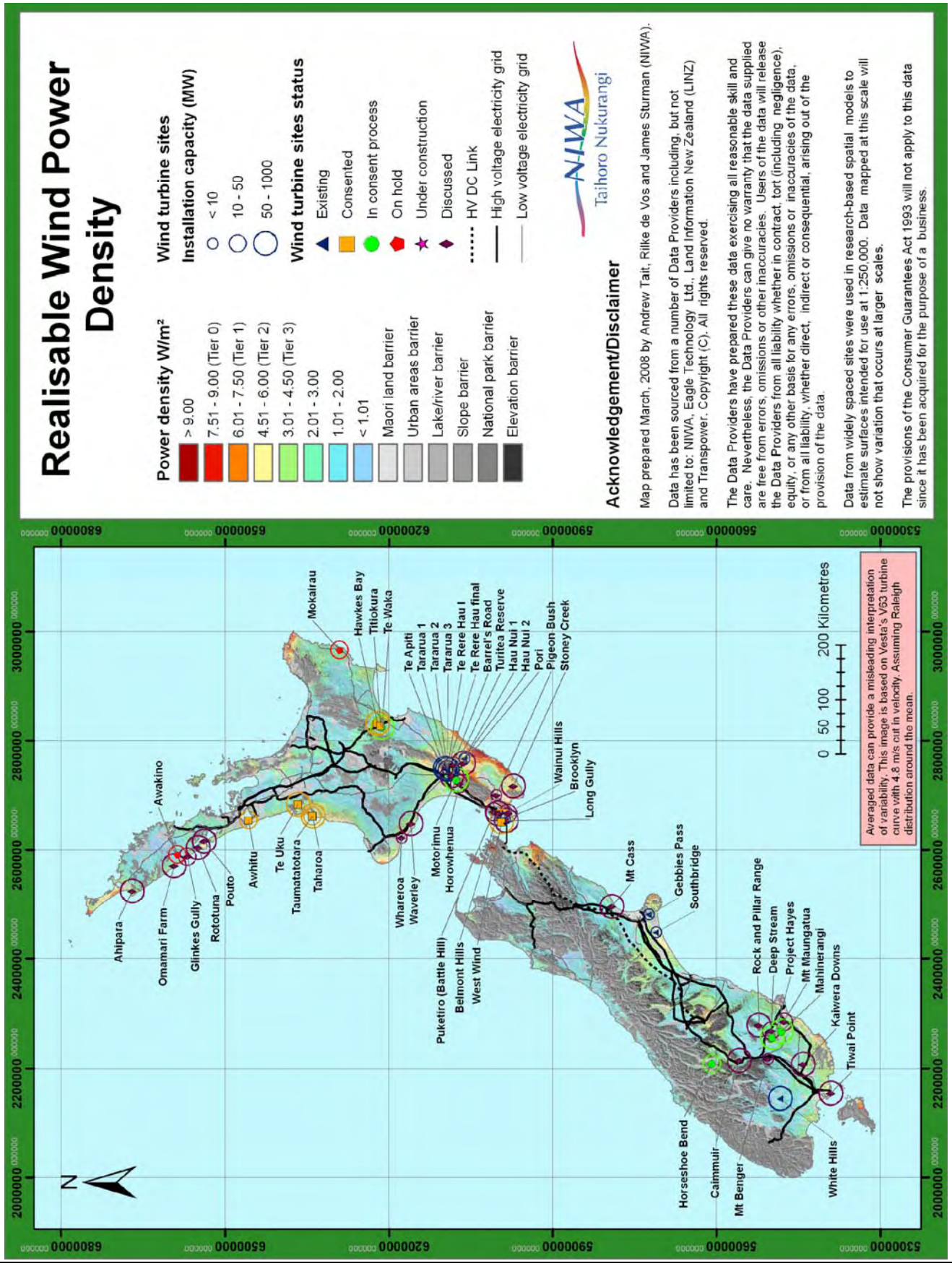
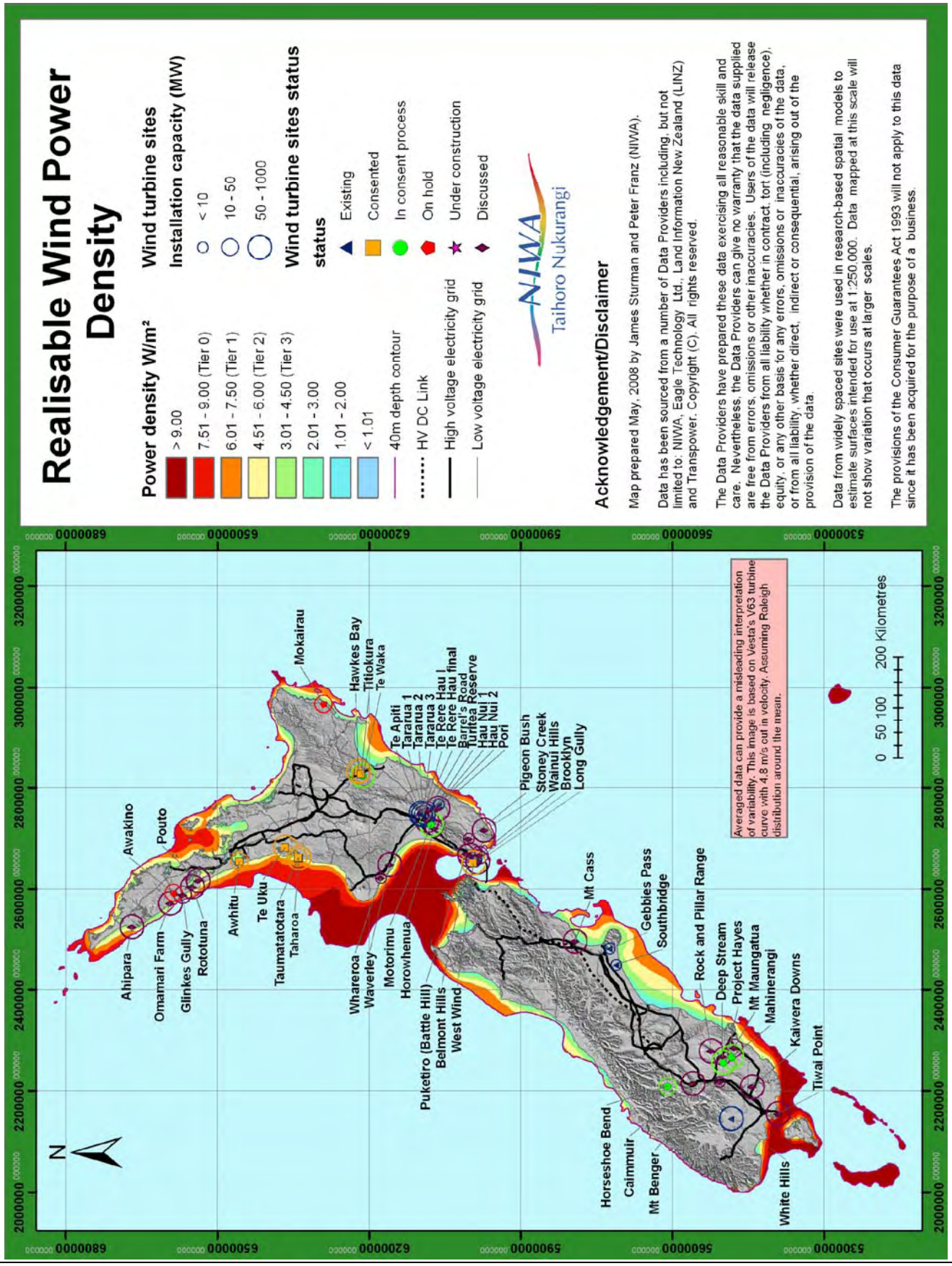


Figure 2.2.8 – Realisable wind power density (off-shore).



2.3 HYDRO RESOURCES

Figure 2.3.2 – Potential hydropower generation.

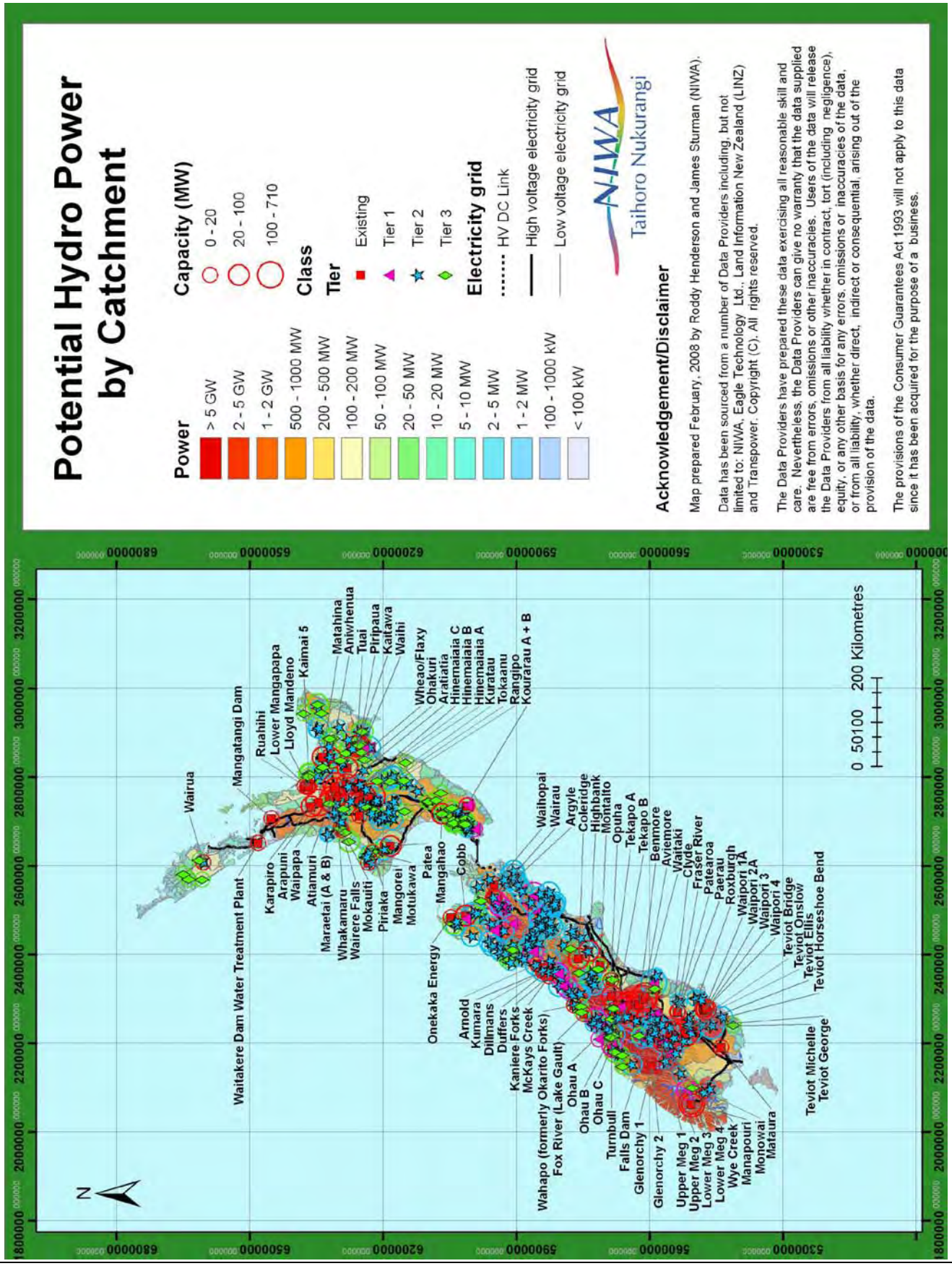
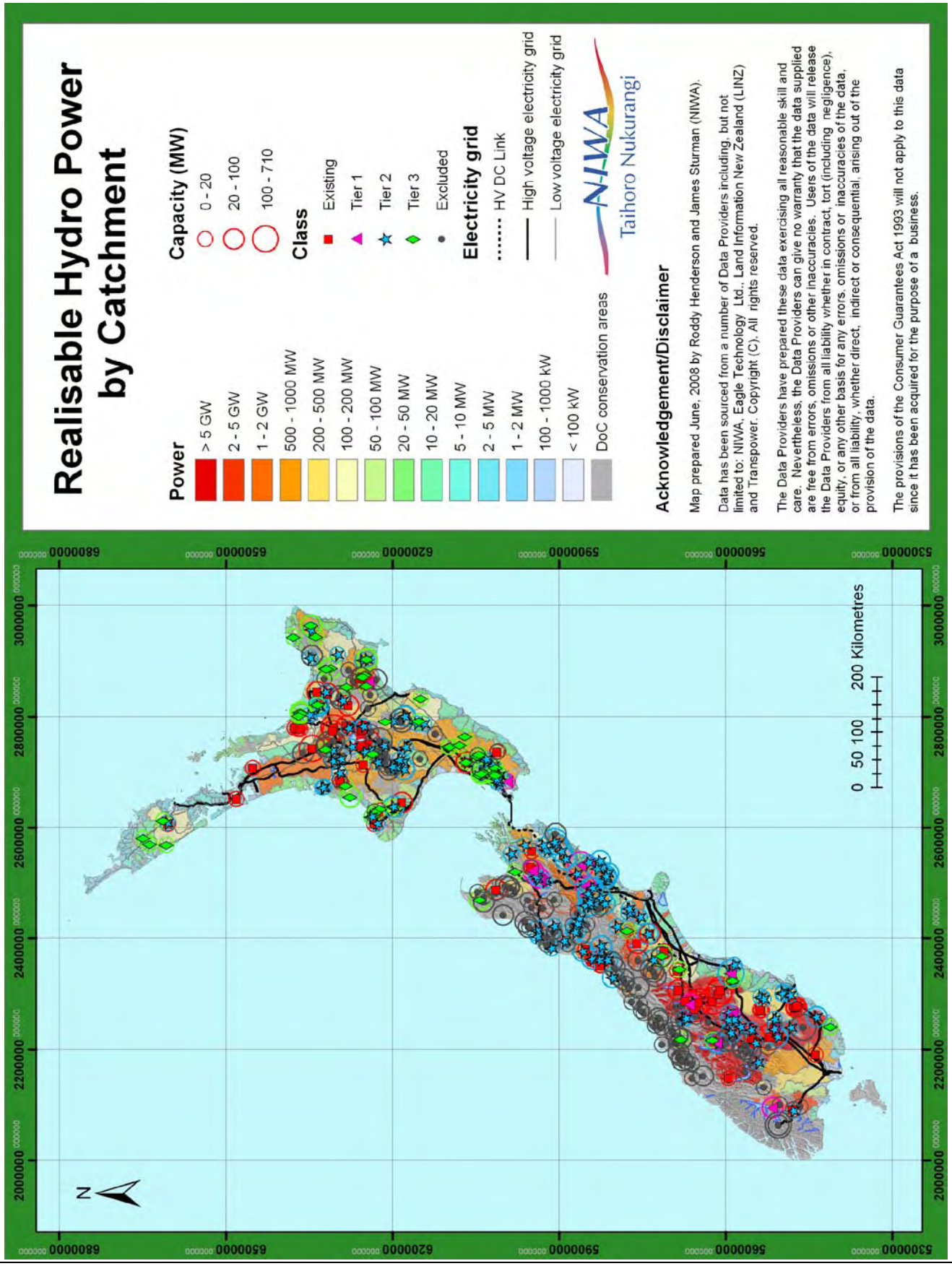


Figure 2.3.5 – Realisable hydropower generation.



2.4 MARINE (WAVE) RESOURCES

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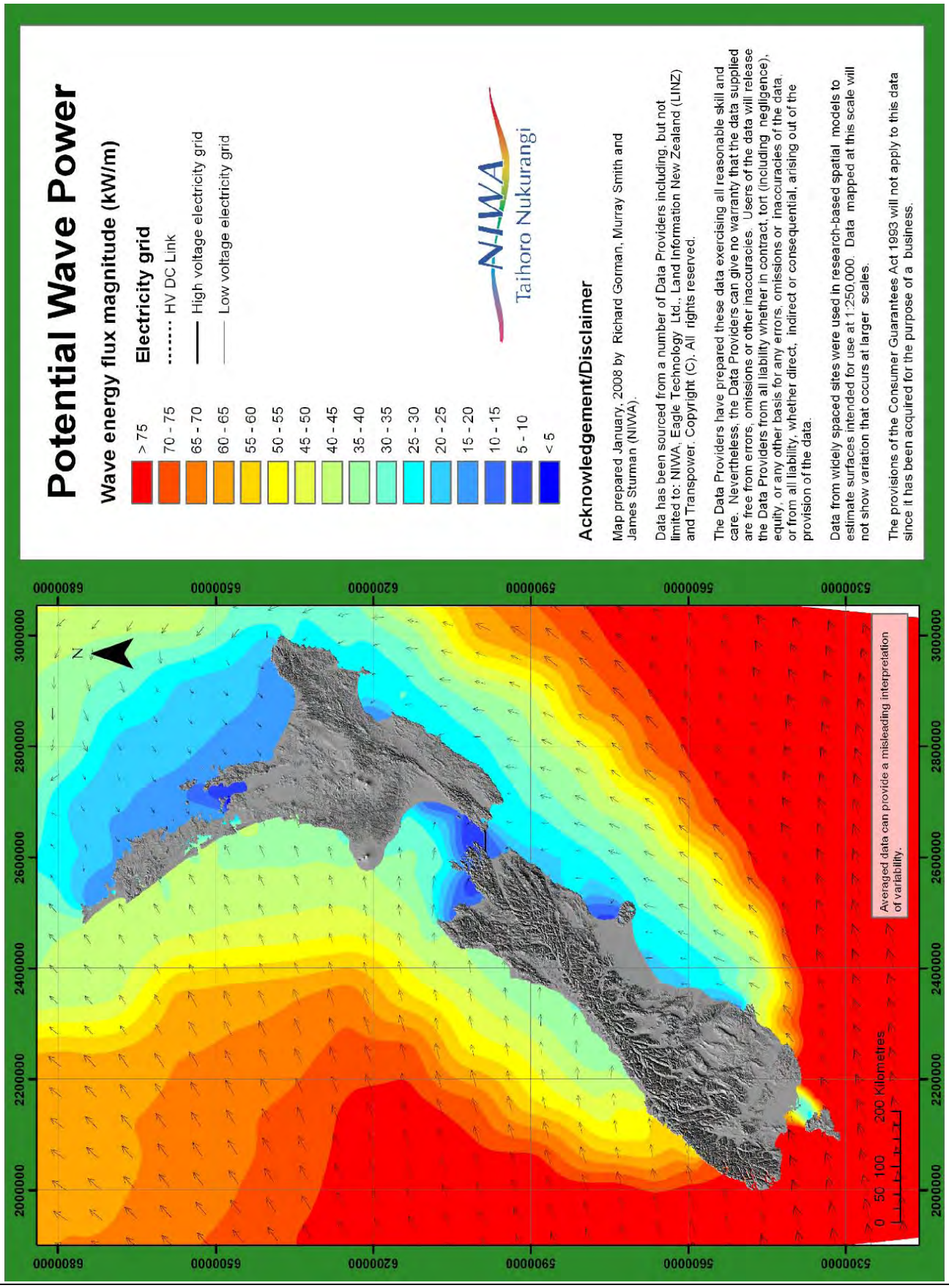

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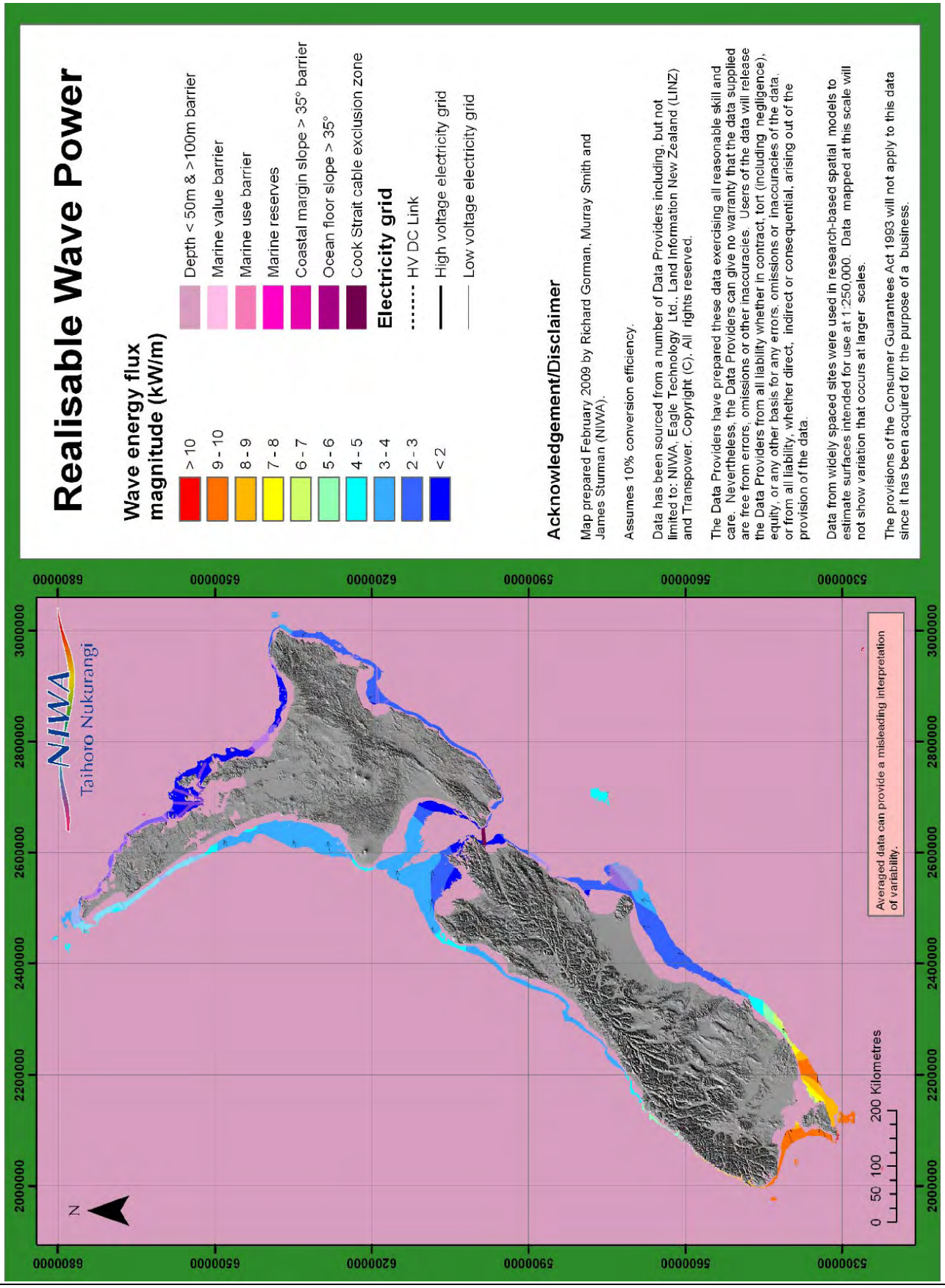


2.5 MARINE (TIDAL) RESOURCES

Figure 2.5.3 - Average tidal speed for Cook Strait from the Tide2D model, as generated for the EnergyScape Project.

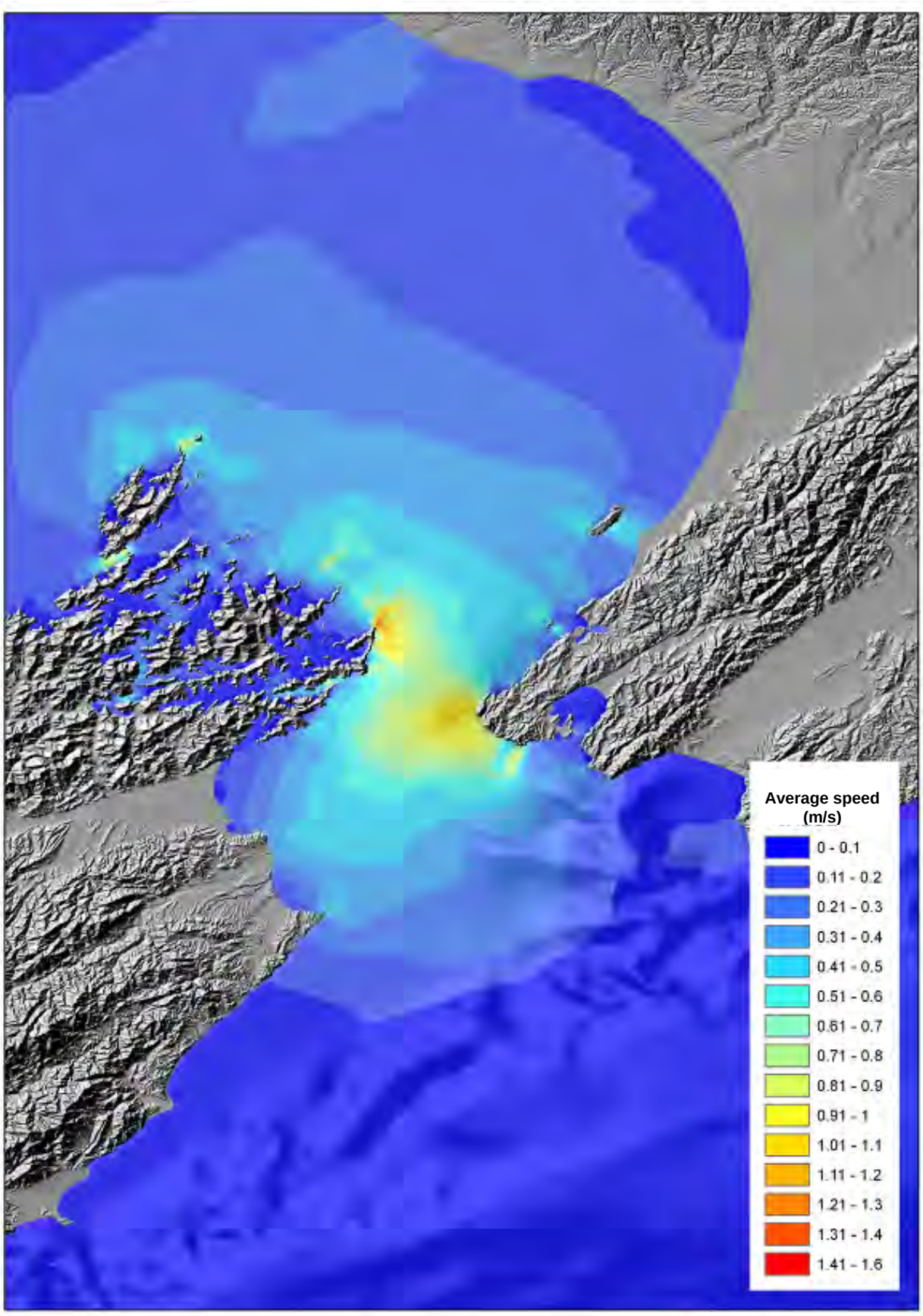


Figure 2.5.5 - Marine (tidal) potential energy resource.

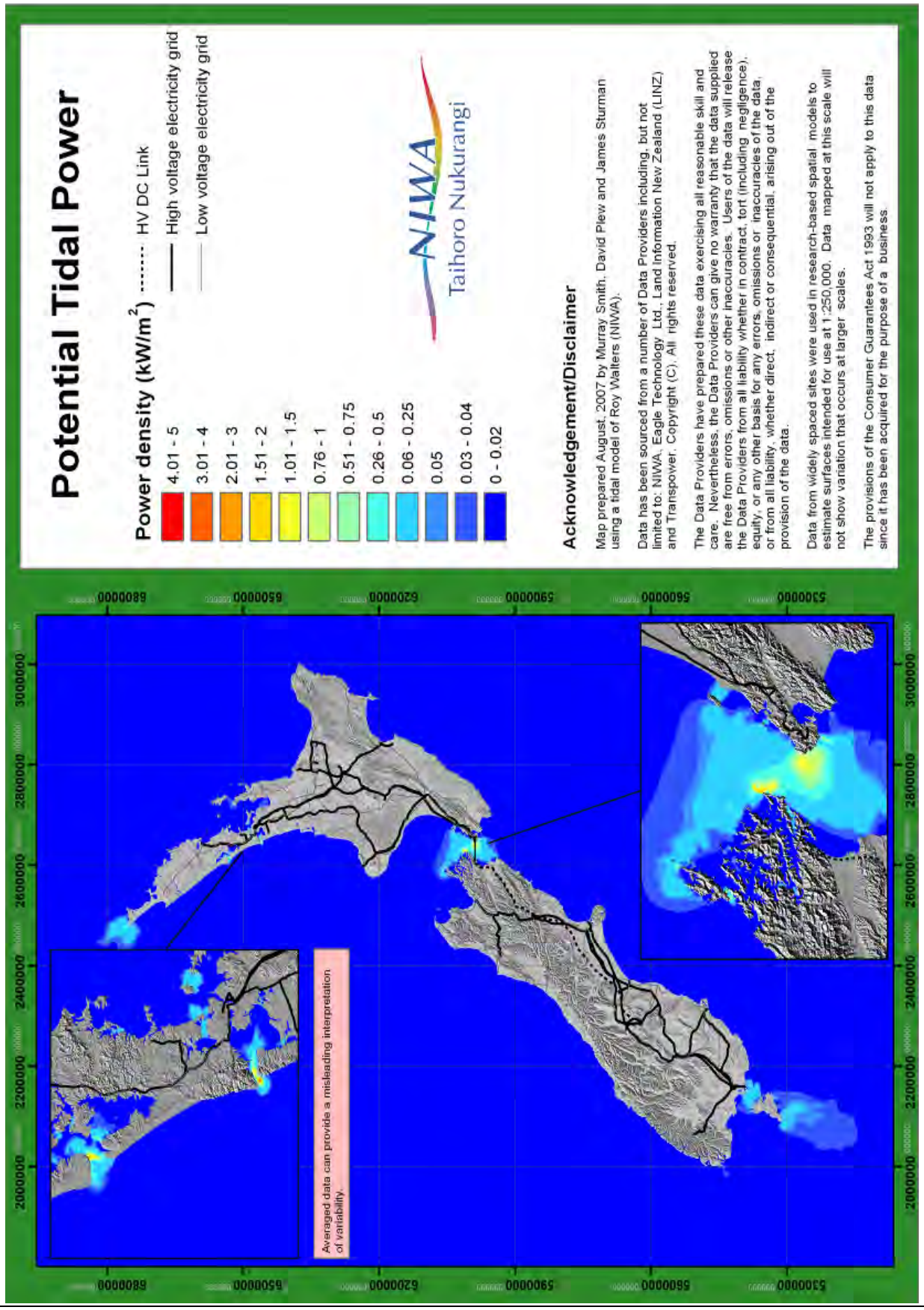
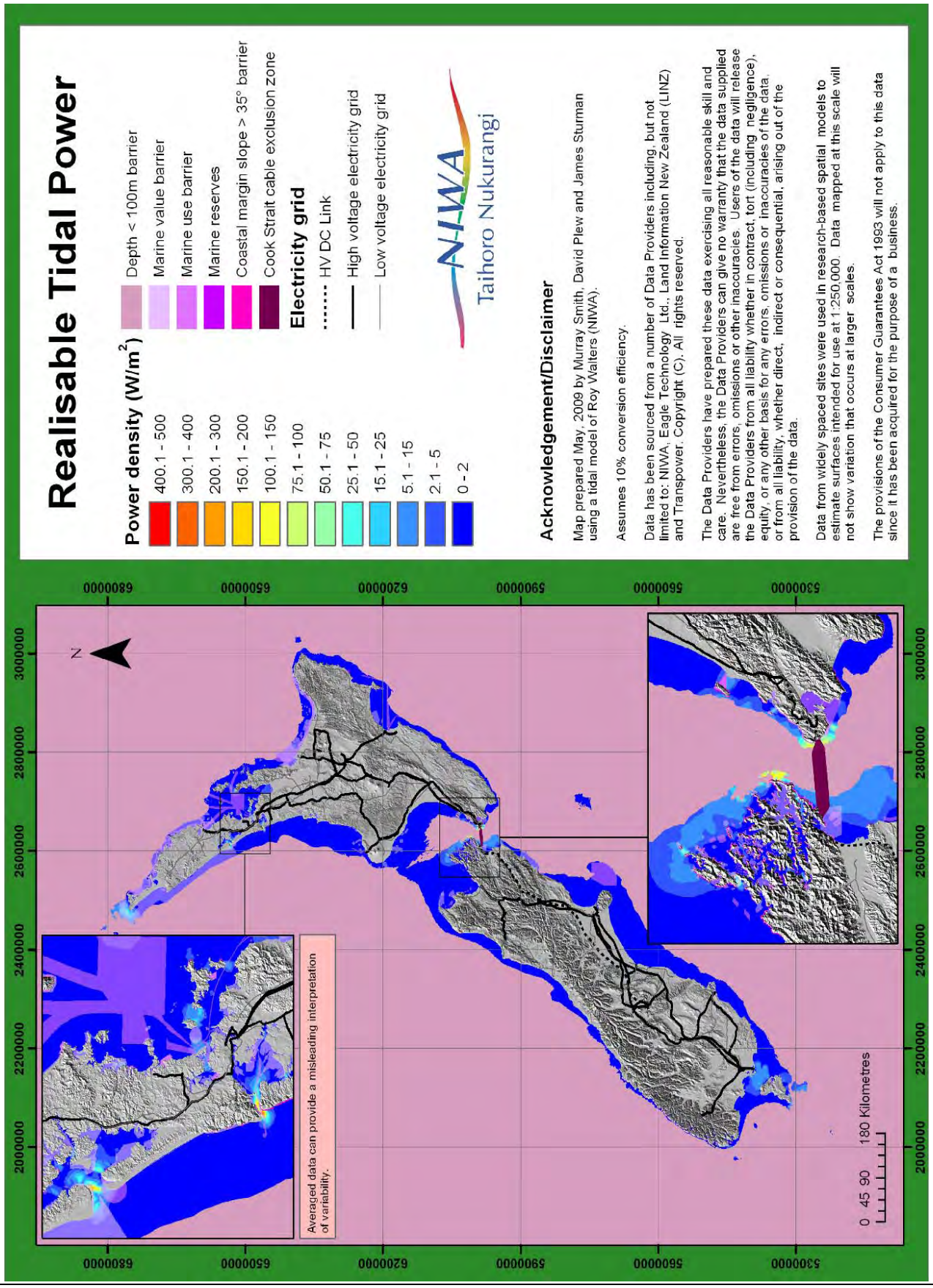


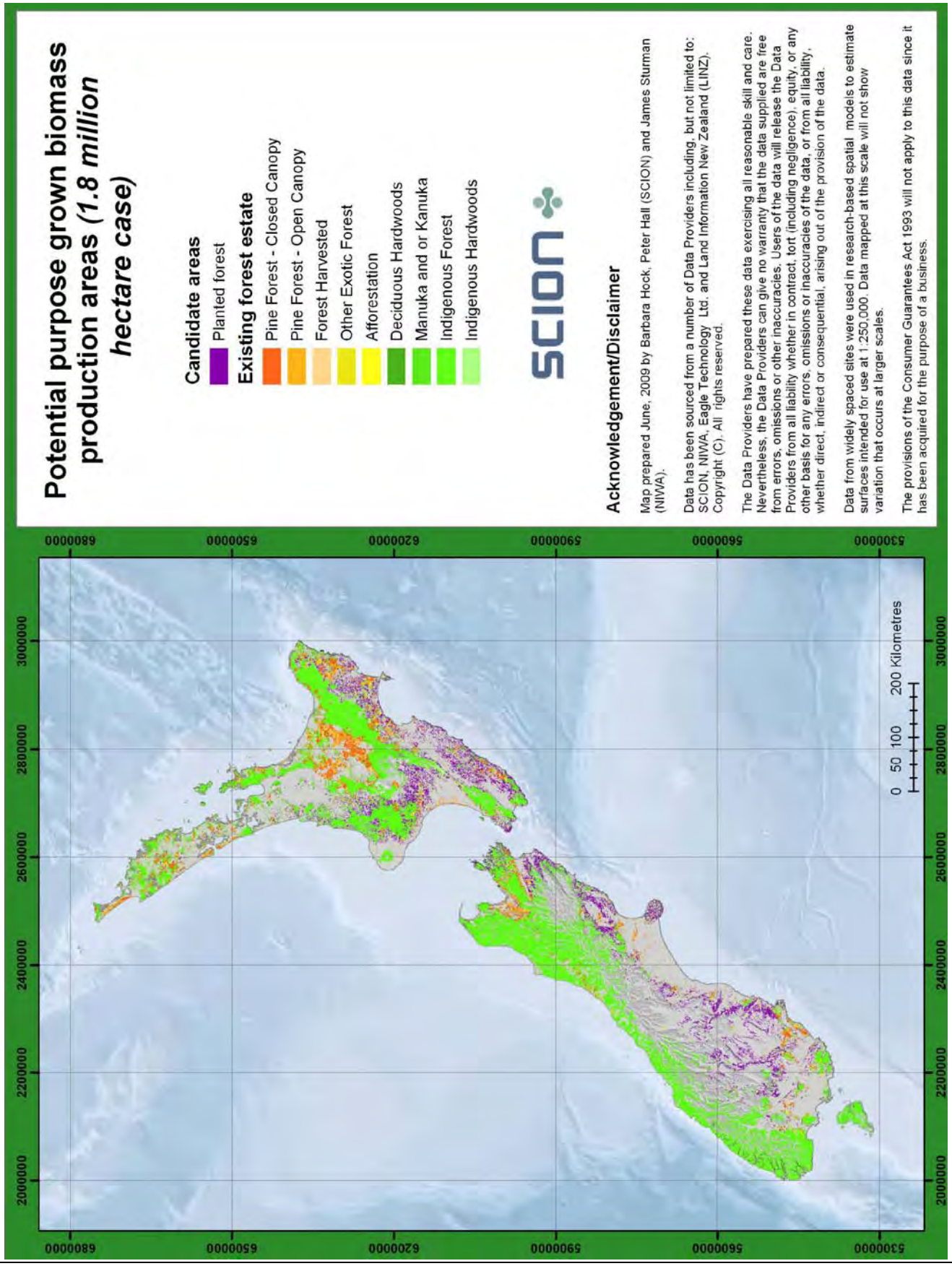
Figure 2.5.13 - Marine (tidal) realisable energy resource.



3. BIOENERGY RESOURCES

3.1 BIOENERGY RESOURCES

Figure 3.1.6 – Potential purpose grown biomass production.



4. EARTH RESOURCES

4.1 GEOTHERMAL RESOURCES

Figure 4.1.9 - Log of New Zealand's geothermal resources.

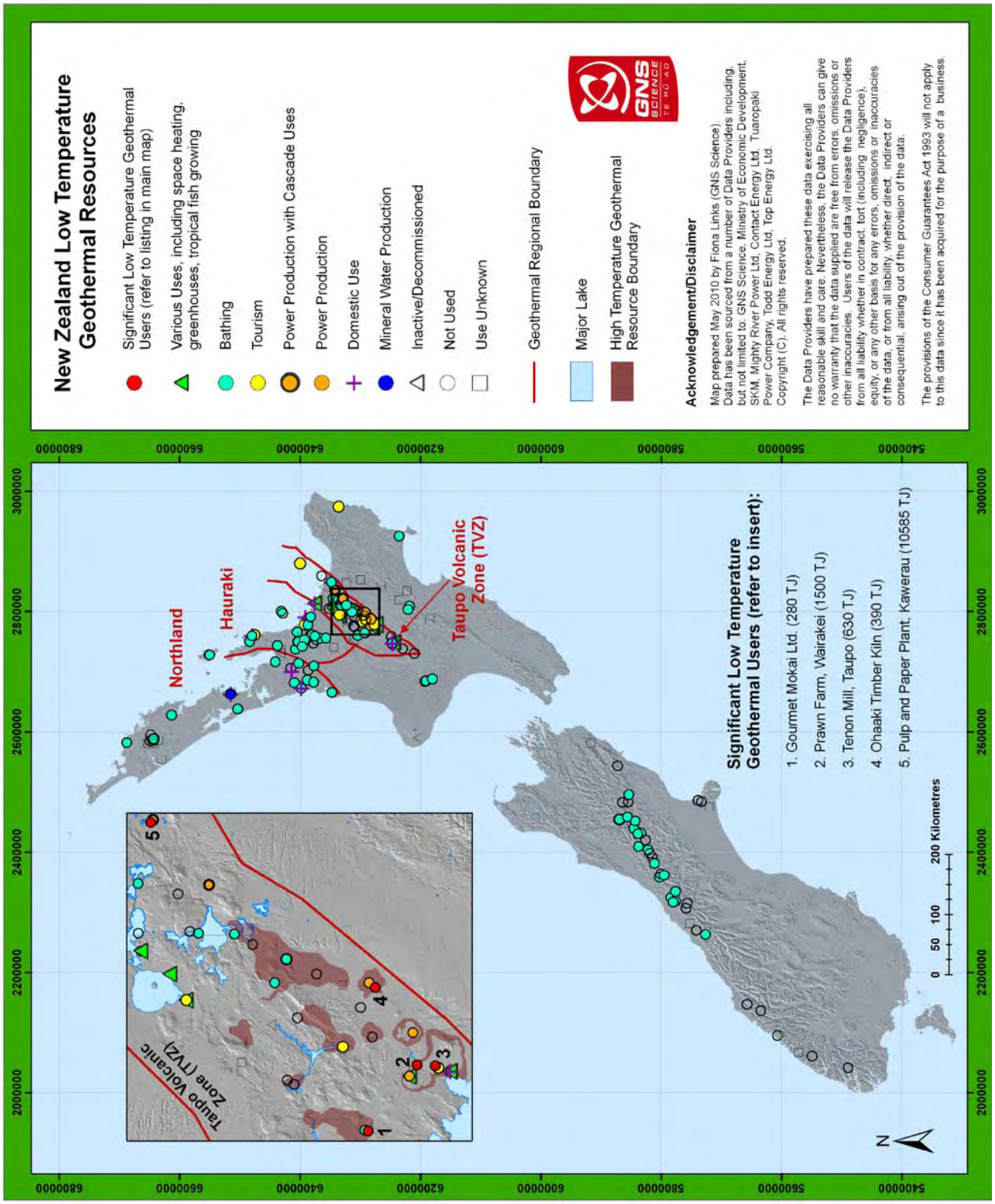
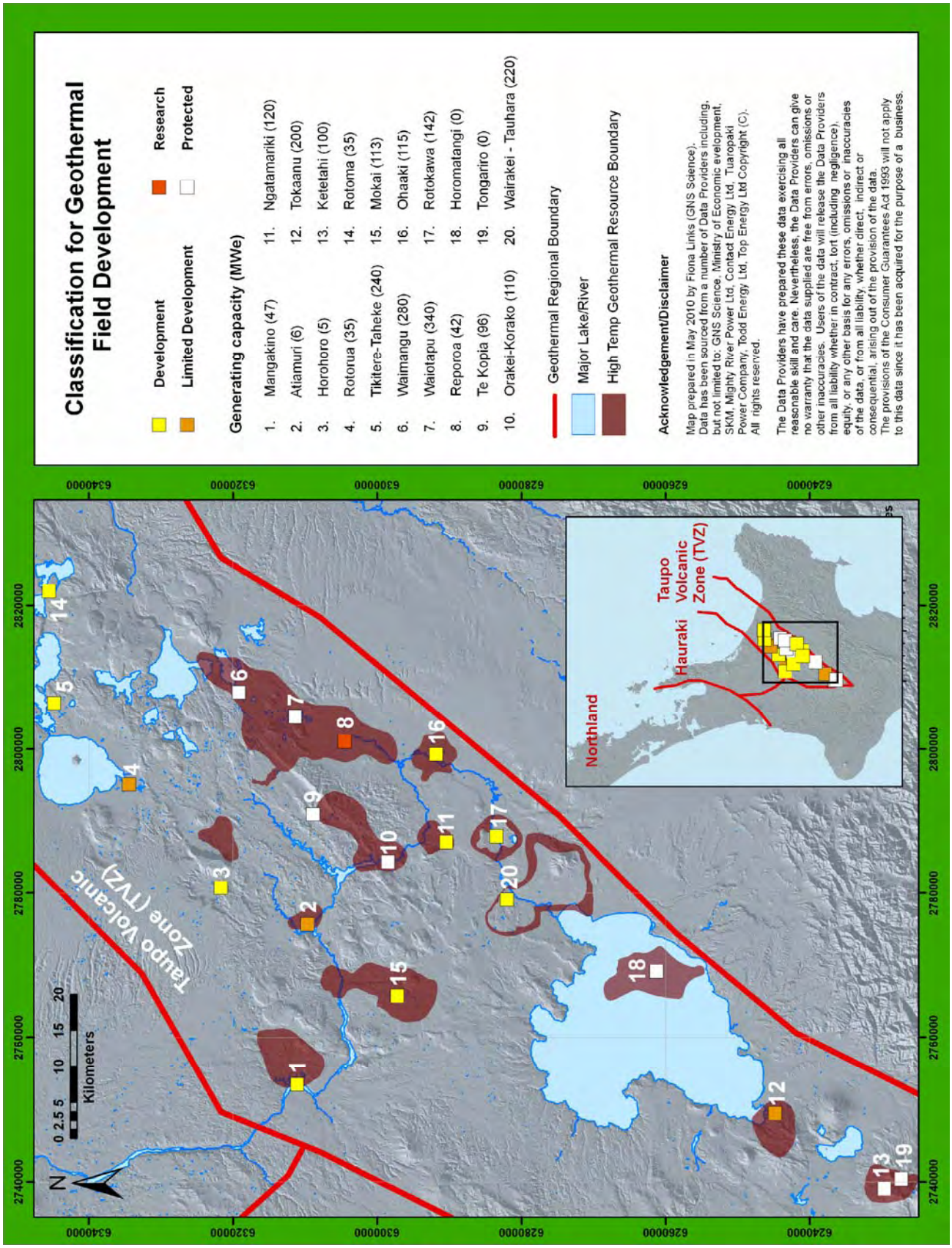


Figure 4.1.10 - Development classification of geothermal fields.



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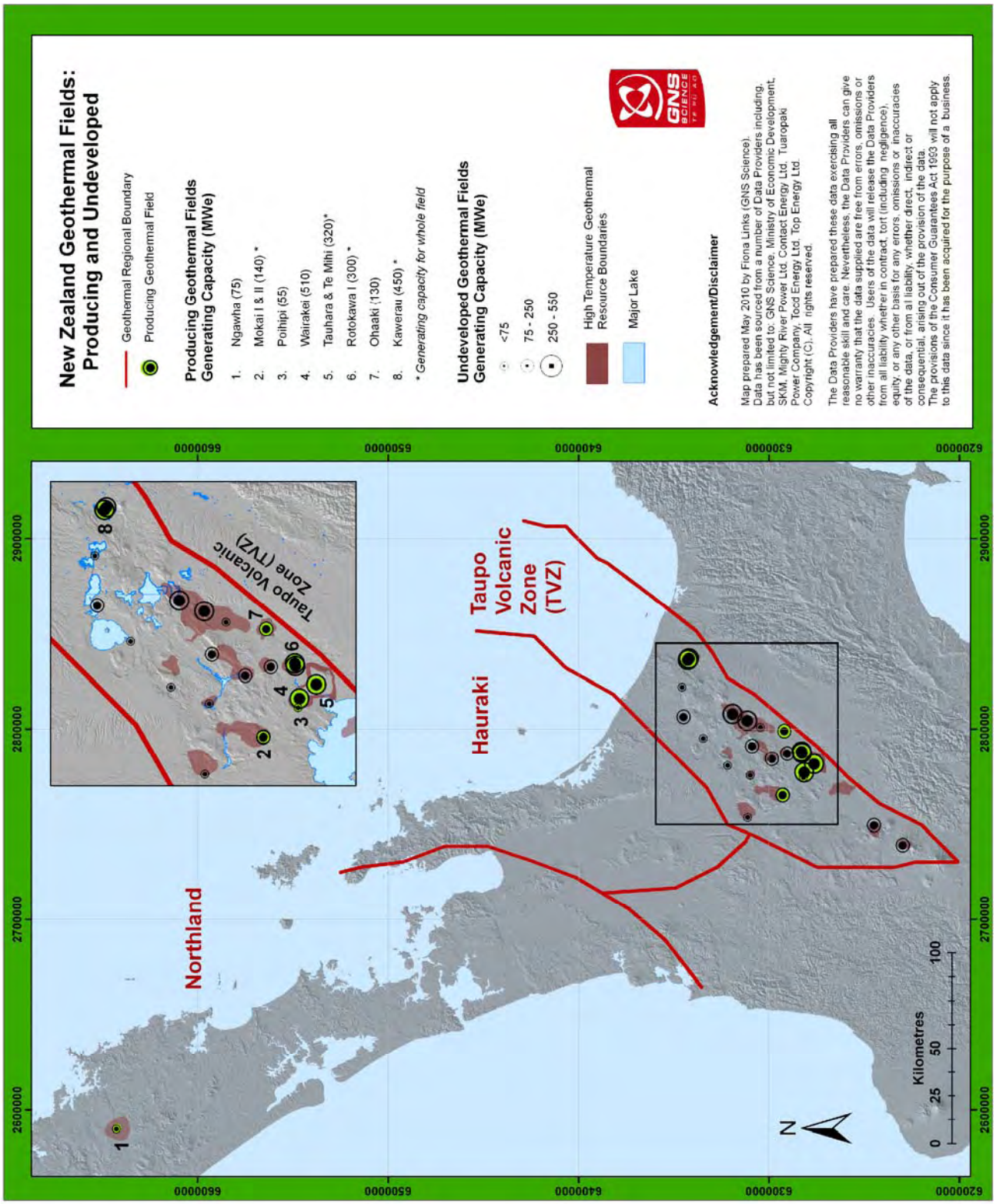


4.2 CONVENTIONAL OIL RESOURCES

Figure 4.2.10 - Existing petroleum infrastructure

The location of significant petroleum infrastructure (oil and gas users and oil / gas pipelines) in the context of discovered fields and frontier exploration basins.

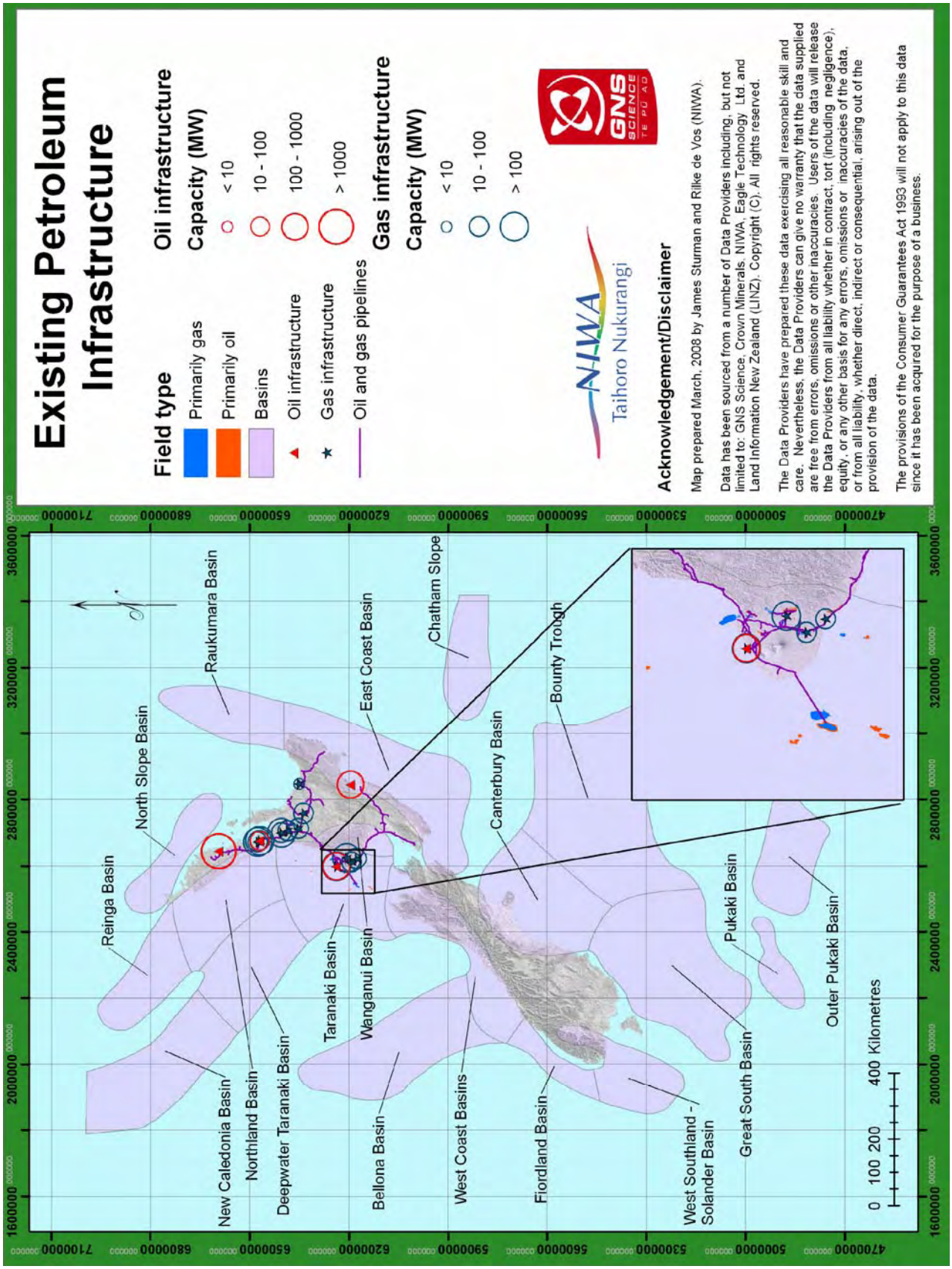
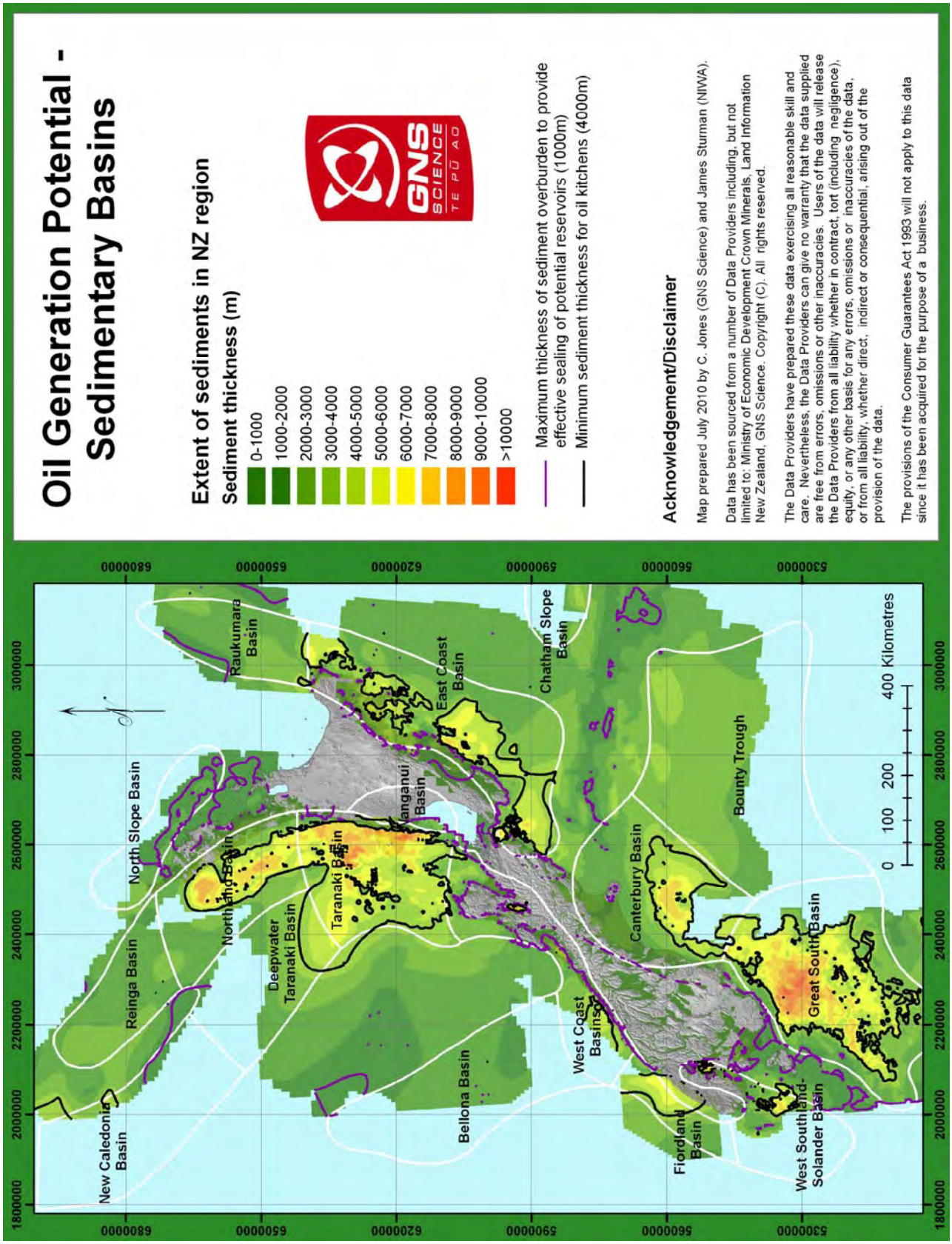


Figure 4.2.11 - Oil generation potential

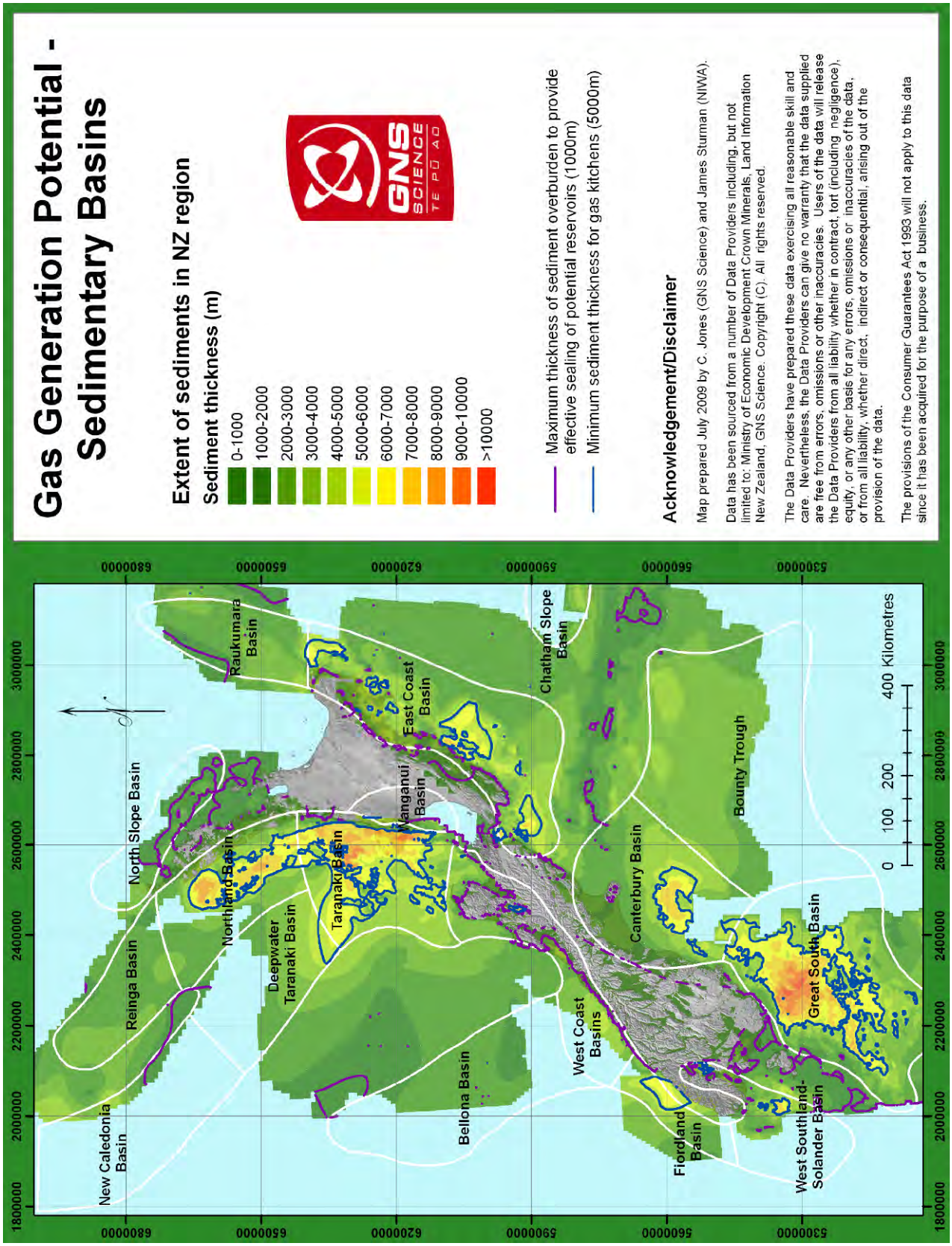
The regions for potential oil generation can be bounded by regions with sediment thickness between 4,000m (black contour) and 5,000m.



4.4 CONVENTIONAL GAS RESOURCES

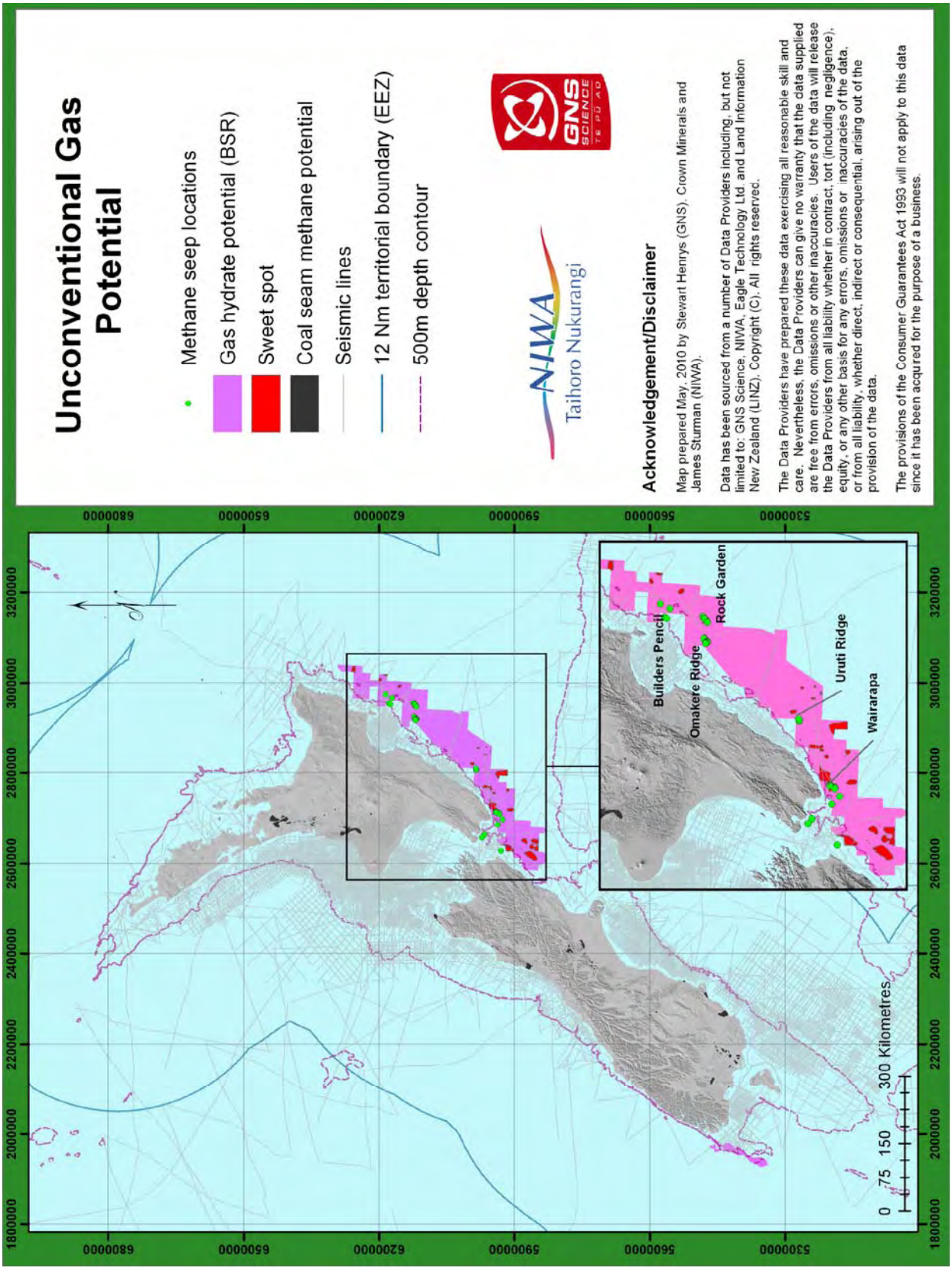
Figure 4.4.15 - Gas generation potential

The regions for potential gas generation can be bounded by regions with sediment thickness between 5,000m (blue contour) and 6,000m.



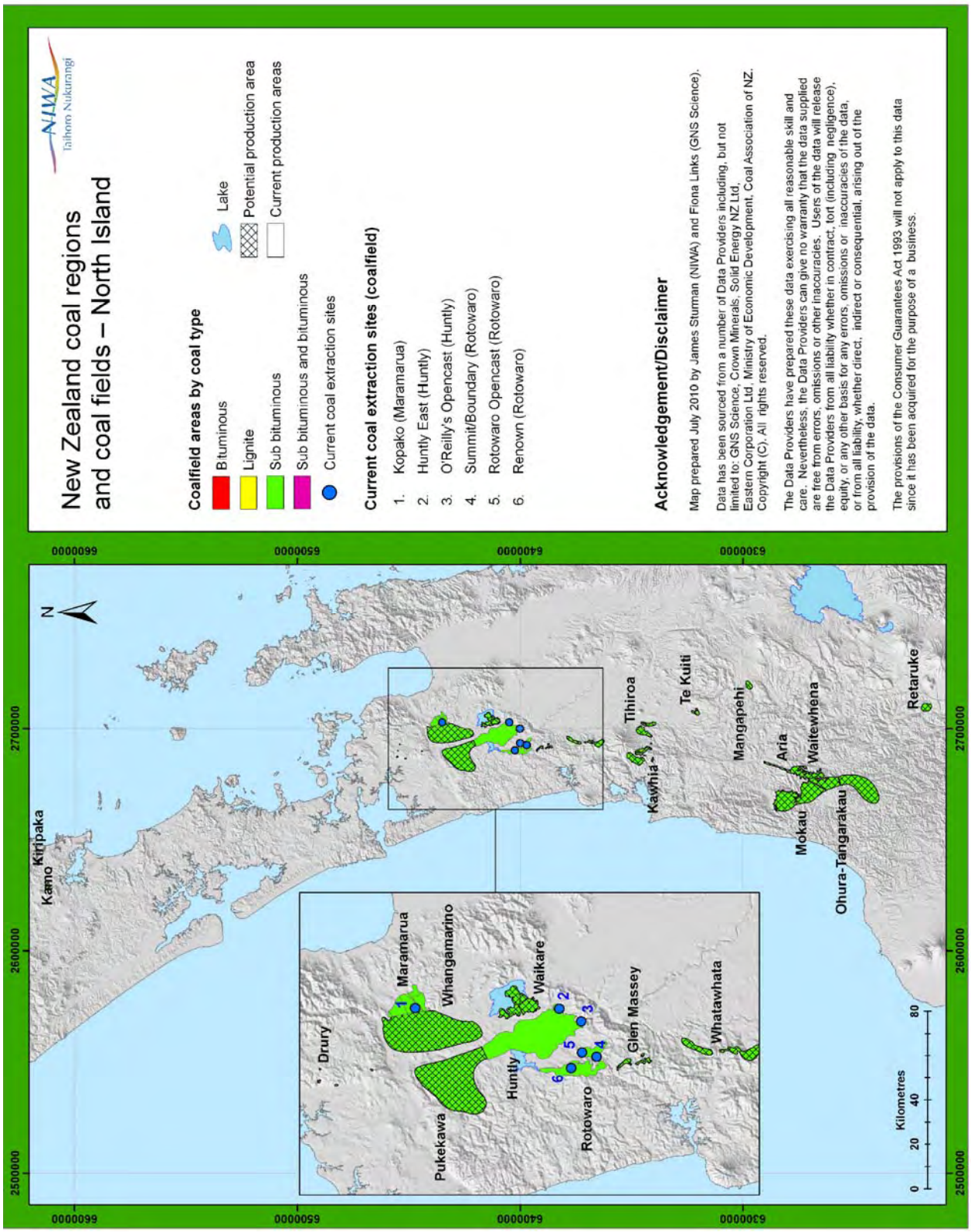
4.5 UNCONVENTIONAL GAS RESOURCES

Figure 4.5.7 – Potential unconventional gas resources



4.6 COAL RESOURCES

Figure 4.6.5 – New Zealand coal regions and coal fields - North Island.



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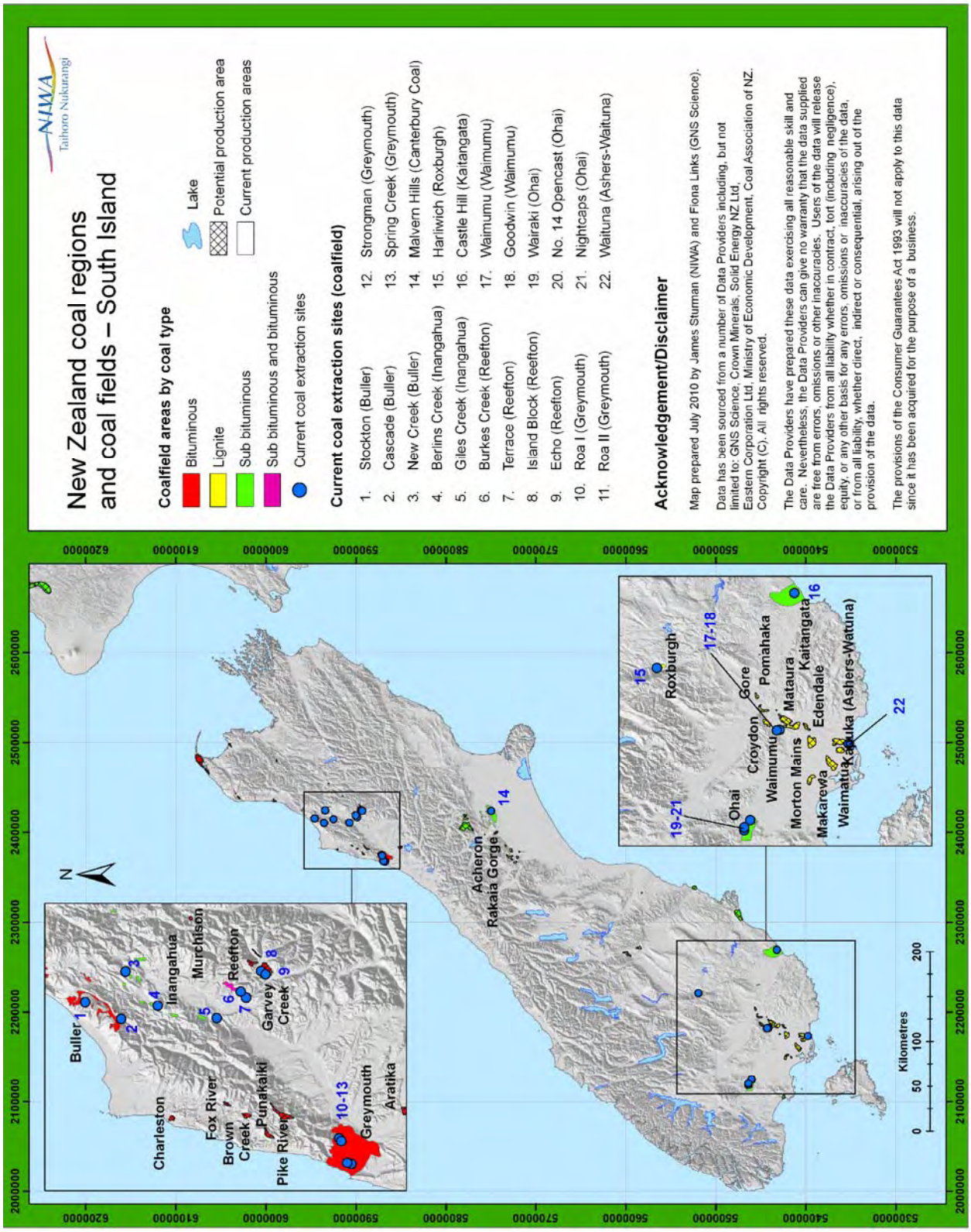


5. FRAMEWORK SYNOPSIS

Figure 3.2.6 - Solar power density above Maori land holdings

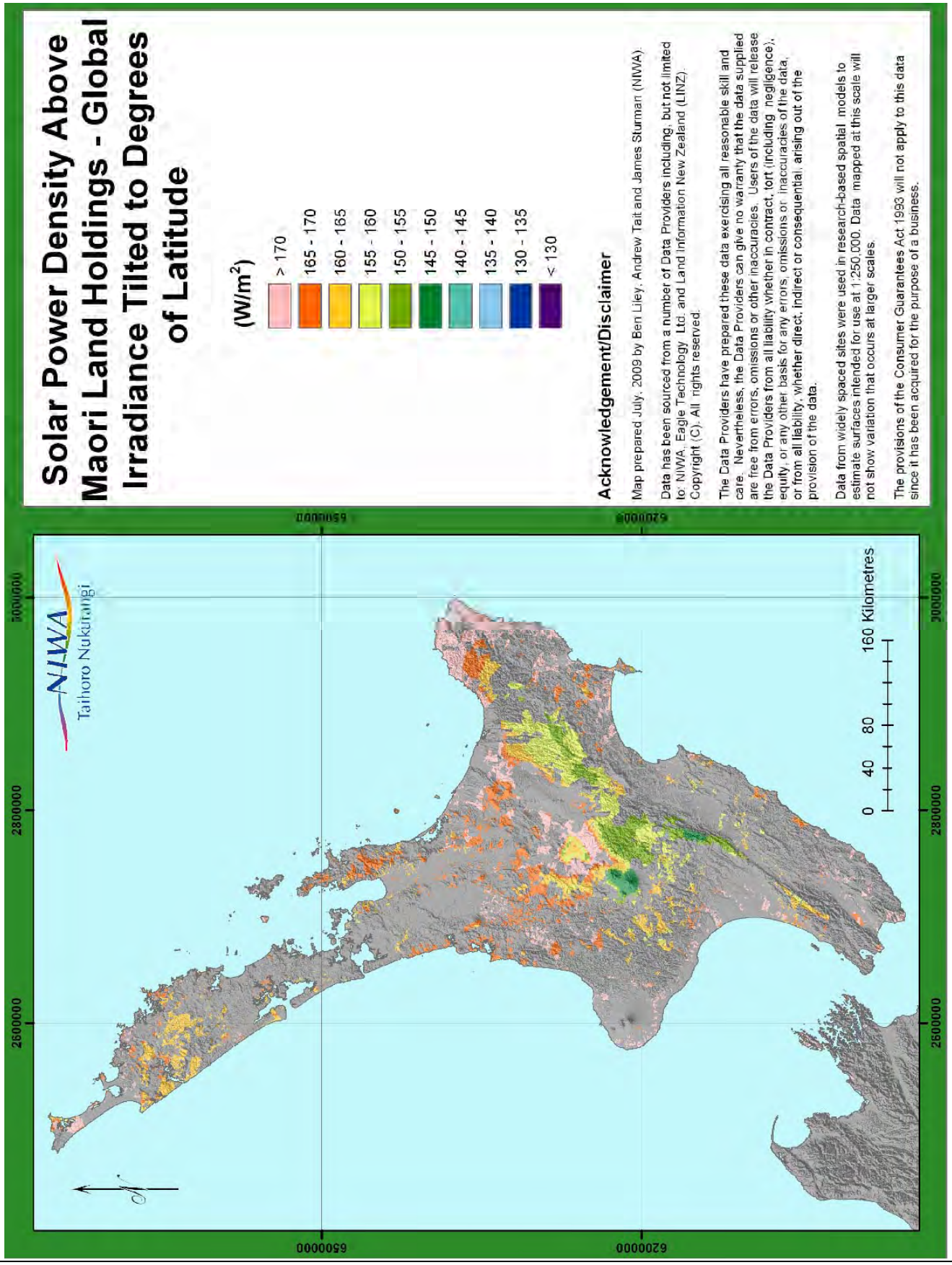
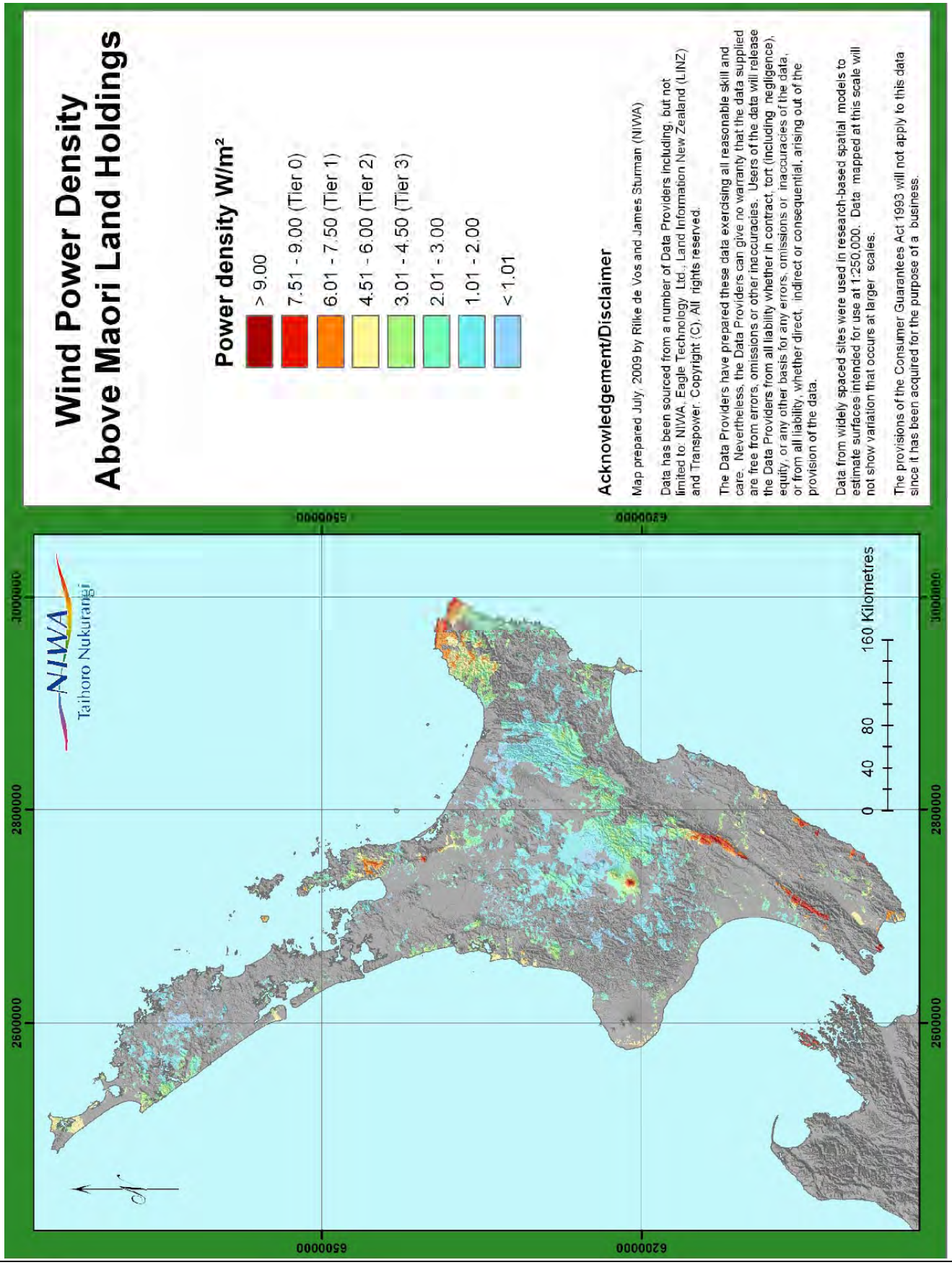


Figure 3.2.7 - Wind power density above Maori land holdings



6. REFERENCES

All maps in this document are provided in either the “EnergyScape Basis Review” document (NIWA report AKL-2009-034) or the “EnergyScape Framework Synopsis” document (NIWA report AKL-2009-046)