

BEFORE THE BOARD OF INQUIRY

IN THE MATTER

of the Resource Management
Act 1991

AND

IN THE MATTER

of Applications by Transpower
New Zealand Limited for
resource consents and Notices
of Requirement for the Upper
North Island Grid Upgrade
Project between Whakamaru
and South Auckland.

**STATEMENT OF EVIDENCE OF GARY EDWARD ORBELL
(M.Sc (Hons), M.N.Z.I.A.H.S., M.R.S.N.Z., M.N.Z.S.S.S.)
Impact on High Quality Soils – Matamata-Piako District**

1.0 INTRODUCTION.

- 1.1 My name is Gary Edward Orbell. I hold the degree of Master of Science (with Honours) from Victoria University College (University of New Zealand). I am a Member of the Royal Society of New Zealand, a member of the New Zealand Institute of Agricultural and Horticultural Science and the New Zealand Society of Soil Science. I am an earth sciences consultant in private practice in Hamilton. From 1960 until the end of February 1992, I was employed as a Pedologist by the Department of Scientific and Industrial Research (D.S.I.R.). Immediately prior to my retirement from the D.S.I.R., I was the Waikato site manager for D.S.I.R. Land Resources.

From February 1992 to present I have worked as a Private Consultant specialising in Site Specific Land Evaluations (Land Use Capability Mapping and land-use interpretation) for land development schemes. I have been in the Waikato for 40 years. I have given advice on land restoration programmes following land disturbance, general land evaluation advice and presented technical data at Council hearings and Environment Court proceedings. I have published some 65 scientific papers and reports and conducted around 1,000 consultant reports.

- 1.2 In January 2008, I was engaged by Matamata-Piako District Council to advise on the effects of the Transpower New Zealand's ("Transpower's") Notice of Requirement ("NoR") for the Upper North Island Grid Upgrade Project.
- 1.3 My evidence concentrates on what I see as the effects of this project on the soils of the Matamata Piako District.

2.0 EFFECTS ON HIGH QUALITY SOILS

- 2.1 Transpower New Zealand Ltd. have indicated that they intend to build a new 400 kV transmission line through the western side of Matamata-Piako District.
- 2.2 Analysis of the designated route indicates that the line traverses major lengths of "high quality" soils/land as designated in the District Plan. This "high quality" land forms part of the Nation's limited resource of such land and efforts must be made to preserve this land for future intensive land use. Though the land is currently in mainly grassland farming systems it is under pressure for intensive cropping and maize growing is currently one such alternative land use. Future needs of the Nation, especially with Climate Change effects, include a raft of horticultural crops, ranging from salad crops to permanent vine and orchard crops.
- 2.3 My reading of the Transpower Notices of Requirement Documentation, as supplied to me by MPDC, shows Transpower to concentrate on the present grassland regime. Only passing comment is made regarding cropping and then mainly in the context of supplementary feed for the existing land holder.

- 2.4 There should be a comprehensive analysis of the possible effects of the powerline on future potential diversification of land use with emphasis on the effect of possible climate change. The District is at the upper end of the generally temperate climate range of New Zealand and only a small change in average temperatures could see the area become part of the sub-tropical regime as presently enjoyed by Northland. Changes in rainfall patterns could also see major changes in the agricultural output of the District.
- 2.5 Using existing soil Databases, I have measured the route of the proposed transmission line and find that the total length of the line within the District is of the order of 24 km with some 17 km of that length crossing "high quality" land as defined in the District Plan using the Land Use Capability Class found on the published worksheets of the New Zealand Land Inventory as produced in the 1970's to 1980's by the National Water and Soil Conservation Organization, of the N.Z. Ministry of Works.

The proposed powerline traverses across and fragments many farm titles in the Matamata-Piako District, with a varying impact on the usability of the land. In addition to the obvious impact that fragmentation (by virtue of the location of the alignment across a farm) has on the usability of the land, there are a number of other potential effects on productive use such as limitations on the land application of fertilisers, restrictions on aerial topdressing, location of access tracks and fences, etc. These impacts are discussed in the evidence of Mr Michael O'Connor.

A number of the titles affected, are large farms covering land up to 1.5 km to 2.5 km from the centre of the powerline. Using a 2.5 km zone from the centre of the powerline and directly measuring the extent of the various parcels of "high quality" land, (as defined on the Land Inventory Maps) within this zone there is an area of some 10,550 ha of "high quality" land potentially affected. Using a 1.5 km zone, there is an area of some 4,025 ha of "high quality" land potentially affected.

- 2.6 It can be deduced that all Class I and Class II land, together with most Class III land, can be considered versatile and/or high producing land which forms part of New Zealand's limited resource of productive/ versatile land. According to the published Land Resource Worksheets over the whole country only 1,398,000 ha (5.4%) is classified as Class I or Class II. Of this 546,000 ha (2.1%) lies in the South Island with the remaining 852,000 ha (3.3%) in the North Island.
- 2.7 Within the Matamata-Piako District, land classified as Class I and Class II occupies 23,965 ha and 61,586 ha respectively of the District, and represents some 6.12% of the versatile land of New Zealand. There are also some 29,571 ha of Class III land, most of which (mainly Class IIIe with well drained or moderately well drained soils), has a high potential for a wide range of land uses and should be considered as part of the overall National soil bank of high producing soils. These include the excellent Allophanic soils, (previously known as Yellow brown loams), on rolling land developed from Late

Quaternary volcanic ash showers, as well as many of the rolling, better drained, Granular soils (previously known as Brown Granular loams) which are capable of growing excellent horticultural crops.

Some areas with soil limitations of low plant available water, very poor drainage or a cultivation limitation could be excluded from the idea of high producing soils.

3.0 SOIL POTENTIAL OF THE DISTRICT

3.1 A different Soil Data Base has also been used to re-analyse the soil potential of the District. Wilson (Soils of Piako County, North Island New Zealand. N.Z. Soil Survey Report 39 1980) carried out an intensive investigation of the soils of the old Piako County area (now incorporated in the present Matamata-Piako District) on a scale of 1:63,360 (old 1 mile to the inch topographic survey scale).

3.2 This study included a detailed interpretation of the limitations of the soils for a range of possible land uses. Using the "Soil Limitations for Horticultural Use Map", I have calculated the areas of Wilson's Classes 1, 2 and 3 land on the 2.5 km zone (referred to before) and find that there is some 1,983 ha of Horticultural Class 1 land (17% of the zone), some 5,000 ha of Horticultural Class 2 land (43% of the zone) and some 2,500 ha of Horticultural Class 3 land (21% of the zone) suitable for horticultural use, though the Class 3 land is only considered as marginal for horticultural use.

These figures are not directly comparable with the LUC "high quality" areas, as the degree of on-site investigation was considerably more intensive than that used in the compilation of the Land Inventory maps, and as the Land Resource Inventory maps' interpretations concentrated on pastoral land use. With the possible advent of climate change the natural properties of most of the "high quality" soils of the District have to be kept to the fore.

3.3 Wilson also classifies the soils for pastoral use and an inspection of his "Pastoral Suitability Map" reveals that nearly all of the land within the 2.5 km zone is Class 1, 2, or 4 for pastoral use. Class 1 being "Flat to Rolling with Slight Limitations", Class 2 being "Flat to Rolling with Moderate Limitations" and Class 4 being "Hilly with Slight to Moderate Limitations" for pastoral use. Minor areas, mainly in the very north west of the zone, are shown to be Class 5 being "Hill to Steep Land with Moderate to Severe Limitations".

3.4 Wilson also classifies the soils for cropping use and forestry use with similar results showing the majority of the 2.5 km zone as suitable for these uses.

4.0 FUTURE LAND-USE OPTIONS

- 4.1 Most of the soils of the district have excellent soil water properties being conducive to easy infiltration of rainwater, good soil moisture retention and easy plant utilisation of that soil water.
- 4.2 As there is a foreseeable shortage of irrigation water in the nation, the efficient use of such soils is essential for the good of the country. If such soils can be used without, or with only minimal, high cost irrigation then it has to be seen as a positive value.
- 4.3 It is therefore obvious that the kinds of restrictions outlined in Transpower's evidence will severely compromise future land use option choices on the affected land.
- 4.4 No analysis of the total production of this land under either the existing land-use pattern or any possible diversified land-use system appears to have been undertaken to date. My opinion is that such an analysis should have been conducted before now.

5.0 "PRECISION AGRICULTURAL SYSTEMS"

- 5.1 In this age of rapidly changing technology no comment has been made of the effect of the induced electromagnetic field on external, uncontrollable, high frequency transmissions.
- 5.2 A recent innovation has been the establishment of "precision agricultural" systems controlled entirely by GPS and computer assisted systems. Such systems, though not currently in general use in the District are available locally in the greater Waikato, and may well become a requirement of efficient production in the near future. These systems allow the almost complete control of intensive farming methods by way of recording actual crop return on an area basis and plotting this data on farm maps and then subsequently allowing variable rates of fertilization and guidance of cultivation machinery over a field when next sowing a return crop. Such systems will finally allow for "driver free" operation of farming equipment. The system relies heavily on accurate, real-time, GPS control. If the GPS signal is at all affected by the electromagnetic field then such records are rendered useless and the whole system will not be available for the affected area.
- 5.3 Enquiries have been made from a number of experts in this field and to date I have not been able to locate any reliable definitive data on this possible effect. Most are of the opinion that the system should be immune to such interference but that the possibility should be followed up. It is apparent that some low wattage signals can effectively scramble the GPS signal and in fact the Russians are known to have exported such equipment to control/negate GPS guided military hardware within a 100 km radius. The design of such equipment is understandably highly sensitive and not readily available for common usage. If in fact the electromagnetic field has such an effect then it would not only compromise the possible future precision agricultural systems in the path below the transmission line but also the use of "on board" GPS navigation systems currently becoming a necessity for

efficient vehicle routing in rural areas. Also I would question the effect on the navigation equipment of low flying aircraft in the vicinity of the line (including topdressing aircraft). The use of Cell phones within the area is apparently controlled by current legislation which limits the band width of microwaves allowed to be broadcast but I can find no such legislation covering GPS systems in New Zealand.

- 5.4 As the GPS system relies on highly accurate atomic clock data it may well be that there is no detrimental effect on the signal but part of the precision agriculture system also relies on accurate Geographic Information System mapping using the input from plotted farm plans and fertilizer/production records. If these are translated onboard the agricultural machinery (tractor or fertilizer truck) there should be some checking of whether or not this data (or the enabling computer) could be affected by the electromagnetic field.
- 5.5 For follow-up on this area of concern it would appear that Dr. Lex Chalmers of the University of Waikato's Geography Department would be a good starting point. He also has contact with electronic experts who apparently have experience in electronic interference.
- 5.5 Some comment is made on the effects on electric and standard, fences and the possible realignment of such structures. If there was a desire for a future landholder to build substantial wire support structures over the land (e.g. Kiwifruit vine, or grape vine support structures) would they be compromised? Likewise the effect of induced current on metal milk lines in dairy sheds and elsewhere should be addressed. Induced current of this kind can have a marked effect on the milk production of cows as well as a nasty effect on the workers in the shed. Any buried farm water supply system incorporating metal pipes may also be subject to induced current though the insulating properties of the soil cover may well guard such systems from this possible effect.
- 5.6 In our ever more sensitive, environmentally conscious society, will there be any questions raised as to the effect of electromagnetic radiation on the "quality" of produce from the affected area? Has any investigation been made as to the possible exclusion of such produce from markets especially the "Organic" system of farming? If it is recognised that the question of electromagnetic waves on human and animal welfare is of concern then it may be a question that the increasingly popular environmental lobby may become interested in. Irradiated produce is, I believe, specifically controlled in the New Zealand market. Does, or should, the legislation cover electromagnetic radiation as well?

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