

**IN THE MATTER OF
AND**

The Resource Management Act 1991

IN THE MATTER OF

**Applications by Transpower New Zealand
Limited for resource consents and notices
of requirement for the Upper North Island
Grid Upgrade between Whakamaru and
South Auckland**

**STATEMENT OF EVIDENCE OF DOUG PARKER ON BEHALF OF HUNUA AND
PAPARIMU VALLEY RESIDENTS' ASSOCIATION INCORPORATED**

Introduction

1. My name is Douglas Arthur Parker (Doug), of 26 McGregor Road, Clevedon, R.D.2 Papakura 2582. The Proposal is intended to follow a route reasonably close to my property, with the original 500 m wide corridor encompassing a portion of this land. The final alignment has the nearest tower some 425 m from our dwelling, which is listed in Mr Lister's evidence as dwelling number 4007.
2. I have been a member of the Hunua and Paparimu Valley Resident's Association, Incorporated (the Society) since late 2004, joining shortly after the announcement of the Grid Upgrade Plan when I discovered that my technical questions were going unanswered by either Transpower or those local community members that first joined the Society. I have a role as a technical advisor on the committee, and I have been authorised by the committee to present this evidence on behalf of the Society.
3. I hold University qualifications in Science (BSc, Chemistry) and Engineering (BE Chem & Mats, Hons 1) and also Forensic Science (COP), all obtained from the University of Auckland. I have worked for 23 years as a Materials Engineer in a major New Zealand industry and am in charge of a laboratory which employs four professional staff. I do not have, nor claim to have, directly relevant experience in the field of high voltage electrical engineering but have endeavoured to use my background and experience and engineering contacts in order to understand and test fairly the claims made by the applicant and its consultants in their evidence.

4. This statement of evidence generally follows the format of the Society's earlier NoR submission dated 4th October 2007, a copy of which is included herein under Appendix 1. Extracts are included as headings in *italics*. Some more detailed discussion of points raised is included in additional appendices as referenced in the body of this document. Those sections of the October 2007 submission not specifically addressed herein are assumed to stand on their own merits or will be dealt with in legal submissions at the hearing. The Society's objective, given the very tight timetable afforded submitters with regard to responding to the recent Transpower evidence, has been to draw the Board's attention to critical areas of concern which have largely arisen from this recent evidence.

The Society

5. The Hunua and Paparimu Valley Resident's Society Incorporated was formed in late 2004 as a direct response to the proposed Grid Upgrade plan, as there was until that time no equivalent local group which could assist the community with their concerns. Many people were frustrated and worried about how they could have meaningful input into the associated processes, and early attempts to engage directly with Transpower seemed fruitless. Formation of the Society enabled people to direct their questions to a group who were guaranteed to listen carefully and try to have these issues answered. Members of the Society live within the northernmost section of the Franklin District, from Paparimu to the northern end of Skyhigh Road. A committee of volunteers was quickly established, and this turned out to have some very useful skills in the fields of accounting, business, media, and engineering amongst others. This committee established the Incorporated Society following advice from similar community groups nearby, some of which were already in existence prior to the Grid Upgrade Plan announcement. Presently, paid up membership stands at about 70. We have lost several members as many of those most severely impacted have taken the understandable route of selling to Transpower, apparently their only option, and moving elsewhere. The committee meets generally one evening every fortnight in Hunua, discusses topics and allocates tasks by consensus. All of the rules of Incorporation are followed, and information is fed back to the membership and community at large in a number of ways (newsletters, emails and infrequent public meetings as necessary). The Society has proven to be a useful format for dealing with public bodies such as the Electricity Commission and local councils, where interaction with large numbers of people is impractical.

6. The anticipated impact of the Proposal on Society members ranges from quite low (those who are concerned about general effects on the area) to very high, as in the case of people for whom the location of pylons is so close to their dwellings they see their only option as selling to Transpower. This range is reflected in the makeup of the committee itself, where we have members who would be more than 1.5 km from the centreline and not looking directly at it, to our Chairman who has been devastated by the impact on his property in Nairns Road. The committee recognise that many local people do not feel capable of dealing with the effects of the Proposal on their lives, and they greatly appreciate being able to approach local people they know for advice and information. There is a genuine community spirit involved in the work we have undertaken and I do not have any sense of “NIMBY” in the approach we have taken, which has endeavoured to be thoroughly professional and has sought to develop sensible information on alternatives. The direct effect on me was initially unknown but apparently quite high, as I had at that stage already commenced plans to build a new house on an alternate part of my land, and discovered that the building site would be severely impacted. I have since sold that portion of land to a person who seems unconcerned about the potential impact. I have continued with the work on behalf of the community from a sense of camaraderie with the community and in particular the committee members, but largely because as an Engineer who has learned a great deal about the Proposal, I believe it to be technically unjustified and far from optimal.

Procedural and Practical Concerns

7. There are a number of process and preparation related matters that I wish to address before turning to the detailed evidence. The Society has been disappointed that the RMA / Board of Inquiry process has not allowed for any input by affected communities in developing the timetable for exchange of evidence. This has been most apparent since 5 February when the applicant’s evidence was first (partially) made available and turned out to be so large as to be almost impossible to deal with in the time allocated. This was exacerbated by the format, in which documents could not be keyword searched. Some of the CD’s described on the MfE website were not made available until after February 18, and subsequently turned out to be difficult to access. Specialist IT expertise was required to “unlock” one CD. The Society has maintained contact with local bodies such as the Franklin District Council (FDC), the Auckland Regional Council (ARC) and the Manukau City Council (MCC), and also with

similarly affected local community groups from Whitford and Waikato. All such groups felt that the quantity and type of evidence was overwhelming, and the available time frame unworkable. We note that the Board has allocated fewer working days for consideration of Transpower's evidence than are allocated for review of the draft report expected to come from the Hearings. This seems odd, as at that stage there is little that can be added to the process. We have found that access to potential expert witnesses has been all but impossible to obtain. All attempts at working with specialist Engineering consultants has been ignored or rebuffed, and Landscape expertise seems equally difficult to find. Hence we have had to work within our own abilities, and we feel that this burden is enormous when compared with the resources Transpower have been able to apply. Comments I have received from the MCC and ARC indicate that even these relatively well resourced bodies are struggling to make a professional response. This has meant that it will be very difficult for any submitter, let alone our Society, to test Transpower's evidence fully. Our attempts to seek ELAF funding have been frustrated by the need to obtain expert witnesses first, and we have even been asked to provide their evidence for scrutiny. This is impossible to achieve when the experts are either unavailable or unwilling to engage with us until we have the necessary funds.

8. This statement will now discuss matters raised in the Society's submission in opposition to Transpower's proposals.

In summary the Submitter:

(b) Considers that Transpower has sought designations for an unnecessarily and unjustifiably large upgrade in the capacity of the relevant section of the national grid;

9. Transpower's design evidence to the Board (Boyle, Noble, Khot) claims to develop the Proposal in a logical procedure based on agreed inputs, with the final outcome being optimal from their perspective. In my opinion, however, the proposed line structure is the worst possible from an environmental perspective and I will seek to demonstrate that Transpower has misused or ignored key input data. It is necessary to review some of these inputs as they are directly related to Transpower's justification of the tower design used in the overhead section of the Proposal, which all parties agree has significant environmental effect (at least Visual Amenity, in many segments of the route there are other concerns).

REQUIRED CAPACITY:

10. In Transpower's original 400 kV Proposal (September 2005 GUP), power transfer requirements suitable for UNI load growth up to **2040** were claimed to be achieved with 2 X 1050 MVA circuits [Reference: Transpower Response to EC Request for Information (EC Letter dated 12 October 2005), 10 November 2005, page 3. Available from: www.electricitycommission.govt.nz]. This information is recognised to be based on a higher demand growth projection – the 2005 Statement of Opportunities (SoO) than has been developed since. Thus Transpower were at that stage designing a line with an aim of supplying just over 2000 MVA of capacity, which they shortly refined to 2400 MVA with conductor selection.
11. I draw the Board's attention to the following more recent information now widely available: The Electricity Commission's Regional peak demand forecast [Brian Bull, Electricity Commission, 19 October 2006, available from www.electricitycommission.govt.nz] and Transpower's "Option 1" 220 kV proposal from 2006. Mr Bull's figures show a "Prudent peak" (high demand case) of **4574.8 MW** for the Upper North Island in the year 2037-2038. That is the total, high end forecast, and it is less than Transpower's selected capacity for their Proposal at that timeframe (5400 MVA, on one line). Contrast this with Transpower's own "Option 1" reference analysis which discusses a 220 kV-only line with either 2368 MVA transfer capacity using their suggested ACSR twin Chukar conductor or **2904 MVA** with the use of the same conductor they have selected for the Proposal. That is some **45% greater** than the capacity of a line they were satisfied with in September 2005, and we note that more recent demand forecasts based upon more accurate data (quoting EC Commissioner Graham Pinnell, Minority Opinion 5 July 2007, page 6 section 4.1 , available from the EC) are lower than the figures used by Transpower.
12. The design capacity of the Proposal is simply too big, which carries its own set of risks to future security of supply, along with the immediate and ongoing Visual and Amenity impact.
13. A further and just as pertinent point is the input data used by Mr Khot in defining electrical parameters which inevitably lead (in his opinion) to structural design details and the resulting large scale towers. Specifically, Mr Khot [refer Appendix 2, analysis of Khot evidence] tells the Board that Transpower have selected an ICNIRP guideline of a maximum 5 kV/m electrical field strength, which is used to calculate minimum ground clearance for the lowest conductor bundle [Khot, page 5 para. 15]. This results in an increase of 3.7 m in the tower heights as compared with that used at the same 400 kV design voltage, by other countries. In

fact Mr Khot / Transpower have apparently misunderstood the ICNIRP guidelines as evidenced by an independent report to the Electricity Commission, by Engineering consultants Connell Wagner. That Connell Wagner report states:

“However, in applying the guidelines, it appears that Transpower has used the “Reference Value” of 5 kV/m rather than the actual “Basic Restriction”, which has been shown to approach 9 kV/m”. “...clearly, the greater the minimum ground clearance specified, the higher the cost of the line and *the greater its visual impact*” (emphasis added) [Connell Wagner Limited, Review of Transpower’s Amended Proposal NIGUP, Electricity Commission, 12 December 2006, reference 24919/Revision 1, page 14 section 6.4. Available from www.electricitycommission.govt.nz].

14. In my opinion this is such an important factor in Transpower’s design rationale, which leads to larger, taller structures, that this one discrepancy needs to be addressed before all other considerations can be evaluated.

15. To summarise, I understand from the documentation that the Proposal is over-engineered. By that I mean that the level of infrastructure proposed goes beyond that needed. I have nothing against over-engineering in general – it typically raises costs issues for the developer but need not impact on other parties. In this case, however, my concern is that the additional level of engineering will generate significant additional adverse effects on the environment.

16. For another example of concern being expressed about over engineering I refer to current Transpower Chair Mr Wayne Brown as quoted in the New Zealand Herald Monday January 14 2008 page A8. Mr Brown used the term when describing a waterfront redevelopment close to his Northland home, quote: “Mr Brown, a civil engineer, has described the project being built just metres from his home, as ‘grossly over-engineered’ ”. Transpower’s Proposal is in my opinion far more widespread and affects many communities and landscapes, and will certainly do so out to a distance of more than “a few metres”.

(c) Considers that Transpower has failed to give adequate consideration to alternative sites, routes or methods of undertaking the work and of implementing its reasonable objectives;

Transpower has acknowledged, in communication with the Electricity Commission, the possibility of relocating the line further from Hunua Village and stated this was “one mitigation measure that

it was considering, and that this matter could be addressed in the RMA process if raised” [Electricity Commission, Final Decision on NIGUP, July 2007, page 27, section 6.4.4]. The Submitter therefore raises it now and requests further information be sought on this matter. Transpower in the same communication also mentioned the possible use of steel monopoles to mitigate visual effects [Transpower, Final decision, Answers to Questions 8 May & 5 June, 11 June 2007, page 3. Available from www.electricitycommission.govt.nz]. They have also indicated that monopoles could specifically be viable through the Hunua area as noted here:

“6.4.5 Transpower has indicated that monopoles could be viable, and that it anticipates giving active consideration to the use of monopoles through the Hunua area, if this is raised through the RMA process.

6.4.6 Transpower has indicated that the contingencies allowed for in the project costs for which approval is sought does allow, up to a point, for the further design refinement referred to above to occur during the RMA process”.

[Electricity Commission, Final Decision on NIGUP, July 2007, page 28]

However, there is no comprehensive independent evaluation of these and other alternatives present in the evidence published 5 February 2008. As an example of poor route selection, I draw the attention of the Board to the proposed location of towers 54A and 55 in the Ararimu valley, on Haven Farm. These towers, if permitted to be placed where Transpower desire, will result in the total destruction of a stand of mature Kahikatea trees (there are very few in view in this area), when there is clearly open farmland just to the east, taking the centreline away from these native trees and also the very closely sited 220 kV Whakamaru-Otahuhu A line (which runs just to the west of these trees). [Refer Figures 1, 2, 3]. In my opinion this is an example of unnecessary environmental damage and one which can be easily rectified without encroaching on any more ecologically sensitive sites.

(d) Considers that the Proposal in its current form gives rise to unacceptable and unnecessary adverse effects on the environment, in particular adverse visual and amenity impacts;

Evidence supplied by Allan, Lister, and Steven acknowledges adverse visual and amenity impacts but seems to consider these cannot be Avoided, Remedied or Mitigated; or that such has been achieved by the Proposal. In my opinion this is incorrect because Transpower has failed to properly investigate less intrusive designs, such as the use of steel monopoles and compact line design, and the further extension of cable underground sections or the use of 220 kV-only design. Many of these technical solutions would have a dramatic effect on tower height and appearance

(reducing same). I call upon the Board to urgently seek truly independent technical advice on these matters which Transpower has failed to evaluate. Such technical data, when available, should be subjected to proper Visual Impact Assessments (in selected sensitive areas if not the whole of the overhead line designation), alongside a similarly thorough Visual Impact Assessment (VIA) for the current Proposal. Given the acknowledged scale of the Proposal, the largest such construction in New Zealand, I consider that anything less than this would allow environmental degradation in the absence of any adequate assessment of alternative means of carrying out Transpower's objectives and appears to me to be contrary to the intent of the Resource Management Act (RMA).

Where Transpower does briefly discuss some of these options in its recent evidence, the material is lacking in references and reports and in my opinion dismisses the possibility with insufficient analysis. As an example I refer the Board to comments made by Mr Khot concerning compact design, which I understand are incorrect. In my view those comments are demonstrative of an urgent need for expert consultants not associated with Transpower to review this evidence (refer Appendix 2). In my understanding Mr Khot has made an error in his understanding of physics – one which leads to an erroneous conclusion concerning structural design.

I also note from the Landscape/Visual peer review by Dr Steven, the acknowledged lack of information concerning the use of steel monopoles (Refer Appendix 3 for further analysis of this evidence). Dr Steven notes in paragraph 89 of his evidence the lack of data, but nevertheless describes monopoles thus: "I agree that they appear more elegant – '*simpler and cleaner in appearance*', as Mr Lister observes in his evidence" [Steven, page 22 para 89]. In my opinion, where an option for a less intrusive technology exists, it ought to be fully and independently evaluated under the RMA processes in order to decide if there truly is an opportunity to *Avoid, Remedy or Mitigate* the effects of a proposal. In the absence of such information in Transpower's evidence I consider that it falls to the Board to seek and disseminate such important material, which is understandably beyond the resources of community based organisations and possibly even large submitting bodies like the councils.

That Messrs Lister and Steven do suggest the use of steel monopoles in the Karapiro area – an environment Dr Steven states is NOT an outstanding natural landscape [Steven, page 15 para. 55/59] – suggests strongly that this potential needs further consideration in other areas, and also suggests that alluding to prohibitive costs associated with such structures is unreasonable given their obvious potential and acceptance in this instance.

In my opinion the Hunua Ranges ARE an outstanding natural landscape. Entry to the Hunua Ranges Park will require visitors and locals alike to drive past the Proposal in places where their views will be through the new line (e.g.: Whites and Falls roads). Neither Mr Lister nor Dr Steven seem to be aware that there is also further potential associated with monopoles to reduce tower height (by the simple expedient of placing poles closer together), and Mr Lister briefly mentions compact design but dismisses it based entirely upon what in my opinion is misinformation from Transpower that height reduction would be limited to about 5 m per tower (or pole, as these technologies can be readily combined). [Lister, page 128 para. 517 and see also Appendix 5, review of Lister evidence]. Our information rather suggest that elimination of the three downward hanging 4.4 m insulation strings will in fact, reduce compact designed (“Akimbo”) tower heights by approximately this total (13.2 m). Such significant disparity warrants independent analysis as we have also requested for Mr Khot’s evidence on the same design potential.

I ask that the Board consider the following analogy from recent infrastructure development plans in Auckland by Watercare Services Limited, which serves to demonstrate the difference between cases where technology is limited in availability, and where (as in this case) modern solutions are available for inclusion in a project with significant environmental impact. Hobson Bay has been bisected by a concrete sewer pipe for some 90 years; Watercare now plan to replace this unsightly and physically intrusive construction with a tunnel, restoring the bay whilst also upgrading needed infrastructure for the community. Details of the project may be found in Watercare’s magazine “Interflow”, July 2007 (available from Watercare services or a copy can be supplied by the Submitter). At issue here is the fact that, 90 years ago Engineers had little technical choice, and far less environmental awareness than is general today. Thus the Auckland community has been forced to live with this concrete sewer and its consequent restriction on activities in Hobson bay, for 90 years. Now, 21st Century technology is available to restore the environment and quite sensibly is being selected although a newer, above ground concrete or similar construction would no doubt be technically feasible – and cheaper.

Transpower’s Proposal is analogous to this situation, in that, if built, its structure will be of significant visual and amenity impact, and in place for several generations. It also demonstrates a preference for older technology (the large scale lattice towers, which are essentially unchanged since the first half of the 20th century). However, unlike the sewer engineers of 90 years ago today’s transmission line designers have alternative technologies in hand. New Zealand should not be forced to accept an oversized construction because of a failure of the relevant authorities to

properly examine design parameters that are well known and which could be implemented for this project. Comments from Connell Wagner and Transpower themselves are pertinent:

- Connell Wagner states: **Development of Technology**. “We believe that....extensive research and development is progressing with new technologies such as....Compact Transmission Lines. We understand that some of this new technology has advanced to a stage where installations using the same are operating commercially. It is recommended that, in considering the Amended Proposal, EC have due regard to the possibilities offered by such options....before locking in to an option which may be overtaken by events or technology” [Connell Wagner Review, op.cit]
- Transpower states: “7.4 Technology. The new towers would be....of a compact design *to minimize visual impact. This is well known technology*” (emphasis added) [Transpower, North Auckland and Northland Grid Upgrade Investment Proposal, Assessment of Options, June 2007, page 20. Available from www.electricitycommission.govt.nz]. If well known, why has it not been thoroughly canvassed for this application? The Submitter does not have access to the resources available to these Engineering organisations, but we suggest the Board examine the design in Figure 4 attached for one possible use of modern compact transmission line design (Refer Fig. 4, Netherlands design). A detail of a similar, well-known construction type used in Europe is shown in Figure 5 (insulating cross arm, 420 kV double circuit line). Smaller construction elements reduce the visual and amenity impact, and have been ignored by Transpower.

Given the above, we believe it is necessary for independent expert technical sources to review the possible solutions dismissed or ignored by Transpower, and for this information to be made available to all parties associated with this Board of Inquiry at the earliest possible opportunity and subsequently used in the decision making process, so as to give effect to the requirements of the RMA.

In particular, but without derogating from the generality of the above:

(d) The scale of the proposed lattice towers (having regard to the various dimensions of the towers including a maximum height of 70m) is significantly greater than that of existing pylons and lines. That scale, in conjunction with the decision to implement a design with capacity for 400kV lines, will generate significantly greater adverse visual effects over a significantly larger area than would otherwise be the case.

The evidence presented by Mr Noble (refer Appendix 4) and Mr Khot (refer Appendix 2) suggests that the design of the Proposal is somehow optimal. Whilst it would no doubt function electrically, there is little if any mention of alternatives that would serve to meet the requirements of the RMA to Avoid, Remedy or Mitigate its effects. Where such alternatives have been summarily dismissed, there is no reference to supporting evidence: example from Mr Noble [Noble, page 8 para. 31]. This refers only to steel monopoles and does not even consider compact design, which as we noted above Transpower have publicly called “well known technology”.

Prudent examination of suitable design options would be able to reduce tower heights by very significant amounts – well over 10 m, and possibly 20-25 m if combined with the use of a 220 kV-only design. It is worth noting that as lattice towers are reduced in height, they also simultaneously reduce in bulk and width. The visual impact of such towers is clearly directly associated with their height (which is the major problem with Transpower’s design), but the effect is certainly non-linear. Thus, the improvement achieved by selection of towers say 2/3 of the height may well be an order of magnitude as opposed to simply offering 2/3 of the visual amenity impact. This is a point that seems lost on the Landscape / Visual reviewer Mr Lister, who quoting Mr Noble says that use of 220 kV technology quote: “..would be likely to have an average height of approximately 50m compared with 60m for the 400 kV capable line....the difference between 400 kV and such large 220 kV towers is incremental rather than of a different order” [Lister, page 128 para. 516].

In my opinion Mr Lister is wrong on both counts. Taking 10 m from lattice towers is significant not least because it alters line of sight effects for great distances and allows more reasonable opportunity for screening: but such towers are also of necessity narrower, which has a multiplying effect. The opinions of a representative selection of those people directly affected by the Proposal on such matters have, to the best of the Submitter’s knowledge, never been sought by Transpower or its associated consultants at any stage of this process (not least the portion called “consultation” starting in 2004 when we were presented with a fait accompli and no information on any alternatives). In my opinion every metre taken from the design height of any proposal put forward by Transpower would be greeted with a resounding cheer by affected communities. And there are many such metres going begging for lack of proper analysis.

Mr Lister and his adviser Mr Noble are also very likely wrong concerning the scale of this height reduction, as evidenced by independent evidence from PB Power in a report to the Electricity Commission. In this report, PB Power state that average tower heights for such a 220 kV design

would be **45 m**, some 15 m less than the equivalent 400 kV line (and I remind the Board this would be before the application of any compact design techniques to a line of identical capacity) [P.B. Power, Review of 400 kV and 220 kV Transpower Proposal, Confidential, Prepared for the Electricity Commission. Document ID 156258A-REPT-003.doc, 12.12.06, page 6. Available from www.electricitycommission.govt.nz]

(e) The adverse visual and amenity related impacts associated with the overhead line sections of the Proposal are significant and unnecessary, particularly through the Hunua and Paparimu Valley settlements and surrounding areas where:

In places the Proposal is as close as 50-60 m from the nearest 220 kV transmission line (the WKM-OTA A line). Given the scale of the Proposal, the cumulative effect is dramatic and very damaging. This effect is particularly so through the Hunua valley.

Some of the evidence prepared by Transpower asserts that the new line is largely replacing an existing line (the very small scale Ari-Pak line) and that somehow this makes it less intrusive. The enormity of the new line makes this comparison odious. While the Ari-Pak line disappears behind extant vegetation, this would not happen with towers of the size proposed. I therefore respectfully submit that far more effort and investigation of these effects through the Hunua community needs to be undertaken to assure residents that all possible measures to Avoid, remedy or Mitigate have been exhaustively explored. Sylvia Allan in her Statement of Evidence (2) states: *I acknowledge that amenity values are not able to be maintained in visual terms in the vicinity of the overhead line*" (Allan (2), page 105 para. 397). In my opinion this is entirely due to a failure on Transpower's part to properly examine and demonstrate alternatives which would significantly address this point. I hope to show in this evidence that such alternatives do exist, and Ms Allan's ignorance of them is no reason to proceed with the Proposal. Quoting from Attachment SJA 2.1 (Allan (2), page 139) Manukau District Plan: Objectives and Policies; Chapter 7: Network Utility Services; Policy 7.4.1: "*Network utility services should be sited and **designed** in such a way that (a) minimises adverse effects on the quality of the visual and other amenity values of the environment as much as practicable*" (emphasis added). Ms Allan's response is: "*The proposed line is in accordance with this policy*".

I respectfully point the Board toward contrary evidence in the form of alternative design features which are well known in the high voltage transmission industry. Their application results in

shorter, and/or less visually intrusive structures for equivalent transfer capacity. Transpower have failed to take advantage of such techniques, so the above assertion is in my opinion incorrect.

(f) The Proposal incorporates easement areas alongside the proposed new towers and lines that are of inconsistent and unjustifiable width and are in any event of inadequate extent given the adverse effects on the environment that the Proposal may generate

I refer the Board to the submission made by the Franklin District Council in October 2007, in which reference was made to the possibility of mature trees that are outside Transpower's selected easement width striking the conductors of the Proposal should they fall towards the line. Transpower's evidence confirms this possibility. Their response indicates that they would seek to remove such trees, by negotiation with the landowner, under terms agreed within their easement conditions [Lake, para. 115 and Miles, paras. 60-62]. This is wholly unsatisfactory as there are clearly many instances where such trees may exist on titles not crossed by Transpower's easement, especially where they have elected to use their stated minimum distance of 65m (32.5 m either side of the centreline). This means that not only are Transpower asserting property rights for which they have no claim, they also appear lackadaisical about the importance of securing their Proposal from external harm that may arise on neighbouring property – over which they do not have rights and for which the described compensation seems not to apply.

This situation would not arise if Transpower properly considered the need to protect their line and selected an easement width that ensured such danger was always within their own control, without the need to resort to removing vegetation owned by third parties who may well plant such vegetation for the very purpose of screening out effects of the line (note that Mr Lister recommends screening by plants as the best means of mitigation [Lister page 151 para. 615], which completely ignores practical technical options to reduce the scale of the line). The necessary distance is readily calculated and Transpower's acknowledgement that such danger is possible, in my view demonstrates that their selection of easement width for a 400 kV line is inadequate and based entirely on a desire to avoid paying the true environmental costs of their Proposal.

The Society asks that the Board seek further analysis of this concern from Carter Holt Harvey Forests, who have also been submitters to this and the earlier Electricity Commission process.

Where there is extant production forestry, over which the Notices of Requirement have to date selected a 100 m wide easement, there is very real potential for a significant number of trees beyond this limit (particularly in the centre of the line spans where sag is at maximum) to be required to be removed.

The situation is exacerbated by the effect of opening up a stand of trees through creation of the easement, after which new “edge trees” that are more susceptible to wind-throw, will be exposed. This is described by Mr Colley in his evidence [Colley, page 12 para. 63]. Most of Mr Colley’s evidence sets out possible risks of the Proposal to forests, but he seems to have ignored potential risks of the forest to the line. Our point here is that deeper analysis of this situation demonstrates that Transpower’s easement is not sufficiently wide to encompass and minimise these risks. On the topic of easement width, we note that Mr Colley makes reference to the equivalent Australian situation but fails to define the term “wide” [Colley, page 10 para. 55]. So-called “wide, fuel-reduced easements”, also described here as “highly effective fire breaks” need to be quantified, so that they can sensibly be compared with Transpower’s selection of 100 m. Risks to the line are a significant concern to the communities who are being told just how vital this Proposal is to future security of supply; where they have a role to play in defining a sensible easement width more accurate explanations are required. On the subject of fire, Mr Colley does briefly mention the risk of fire to the line [Colley, page 10, para. 59] however I believe this risk is understated given that . Transpower requires restriction of “controlled burnoff” [Colley, page 6 para. 34] within a span of some 500m either side of such high voltage transmission lines, as smoke may short out the circuits. There needs to be an analysis of the possible effects of uncontrolled burnoff, i.e. forest fires. (Refer Appendix 6 for review of Colley evidence).

On the issue of potential EMF effects, which has largely been dismissed by the medical and scientific community despite some recently emerging understanding of possible mechanisms, the Submitter notes that adoption of compact designs automatically reduces such field strengths. This is an additional benefit above and beyond the reduction of physical scale which will have a measurable mitigating effect on the visual and amenity impacts. It can be considered a prudent “insurance policy” against the likelihood of future scientific study confirming actual harm from the magnetic fields associated with overhead, high voltage AC transmission.

(g) The details provided in the Proposal and associated assessment of effects are inadequate and do not allow affected and potentially affected parties to fully consider and appreciate the nature and scale of effects. In particular, but without limiting this ground of the submission in

any way, the height, design and location of the pylons and the potential maximum width of the designation are insufficiently certain. The envelope of effects which have been assessed is too narrowly defined.

The submitter is deeply concerned at the lack of adequate Visual Impact Assessments, including graphics and photographs. These are believed to be an absolute requirement to allow all parties to evaluate the potential harmful impacts of the Proposal, and to allow comparisons with the effects of alternate means of achieving the aims of the Applicant. The Submitter notes a similar call for this information by the Auckland Regional Council in earlier submissions, and we compare this with the request by the Applicant Transpower to be exempt from a requirement for outline plans as normally required under section 176a of the RMA. What little has been provided is enough to raise intense concerns that the actual harm will be far in excess of that indicated by Transpower's own expert evidence (Allan, Lister and Steven). We ask the Board to examine in particular the graphic image supplied by Transpower in the Notice of Requirement, Part 10 section 8, Appendix 2 Visual Simulations, figure 7 of 15 (Whites Road, Hunua). This image is very large and we have not incorporated it into this evidence in case of difficulties with electronic submission.

Assessment of effects should take into consideration the consequences of tower heights and bulk, and note that these have a direct relationship to the processes used in assessing "injurious affection" for landowners considered to be directly affected by the Proposal. We refer the board to a paper by Mr Graeme Horsley on this topic, prepared for the Electricity Commission [Report for the ELECTRICITY COMMISSION, Prepared by Graeme Horsley Limited, June 2007, available from www.electricitycommission.govt.nz]. On page 23, paragraph 64 Mr Horsley notes:

In terms of the injurious affection due to the visual impacts and loss of aesthetic value, the approach taken by the easement fee approach is intuitive. It makes sense that the corridors of affection should be directly related to the height of the towers i.e.:

- a. the higher the tower,*
- b. the greater the area of land within the corridor,*
- c. the greater the value of land within the corridor, and*
- d. the greater the injurious affection.*

We believe this has implications for the wider community, landscape and environment, not just those property owners with whom Transpower had decided to negotiate easements and

compensation. We remind the Board that the Proposal incorporates the LARGEST towers, in both height and bulk, to be constructed in this country. The Proposal will no doubt also set a precedent for future proposals, and thus a full, independent Visual Impact Assessment is certainly called for. The fact that Transpower appear to have made little, if any, effort to minimise tower heights, is pertinent to this request.

(h) The adverse effects of the Proposal which can be ascertained from the documentation are capable of being, and ought to be, avoided, remedied or mitigated by employing a range of alternative options including but not limited to:

(i) Under-grounding the line further south along the transmission route especially through sensitive areas;

Transpower's evidence on underground sections of the Proposal (Mr Wildash, refer Appendix 7) contains a confusion of references to earlier work on 400 kV-only cable, which is technically far more complex and expensive than the now accepted use of 220 kV-only cable for the Proposal. There are no up-to-date analyses of the potential use of extended undergrounding at 220 kV, merely reference to assumed costs. The submitter calls for such analysis, for the northern terminus of the Proposal from a point north of State Highway 2 and refers the Board to earlier calls by the ARC for similar work. Simplistic dismissals by Transpower, who have since the development of the Proposal decided that some 37 km of 220 kV cable is practical within the Auckland Isthmus, are insufficient. The decision here relates to the (effectively) permanent harm to the landscapes affected, as opposed to the possible permanent protection of same by means of extended undergrounding.

(ii) Replacing the lattice towers (in whole or in part) with less intrusive monopole and / or compact design structures;

I have discussed this in more detail elsewhere, but reiterate that these designs are well known technology, and that there is a lack of proper analysis by Transpower, and an apparent lack of understanding by the Landscape specialists used in the Applicant's evidence of the potential beneficial effects of these designs. This should be addressed by procurement of independent technical expertise by the Board. I ask the Board to review the Truescape simulation file of the Karapiro region and consider the opinion of communities affected by the Proposal to this type of structure. The Submitter favours this type of structure and disputes its rejection within

Transpower's evidence. We believe these have a more modern, slender appearance and could be of value in places other than the highly modified though attractive landscape at Karapiro.

- (iii) *Using a 220 kV line design capacity in place of a 400kV line design capacity.*

The suitability of 220 kV-only technology is hinted at throughout various parts of Transpower's evidence. Specifically we note that the initial design power transfer criteria for 2 x 1050 MVA circuits is easily achieved and indeed greatly exceeded with 220 kV design [P.B. Power, Review of 400 kV and 220 kV Transpower Proposal, op cit.]

It is worth addressing a concern raised in Transpower evidence that, should a 220 kV-only line be constructed, there would be a need for a second such line in future, with the associated environmental impacts. We note that this does not have any relevance to the Inquiry at hand as no such proposal exists (it refers to a "modelled project"); Transpower have said as much themselves: Quote "*if the Proposal proceeds, the modelled projects, and their timing, reflect just one path for how future development of the grid might unfold*" "*Similarly, for the 220 KV new line alternative, the second new 220 kV line assumed is a modelled project*". [Transpower, NIGUP Amended Proposal, Further Information in Response to Electricity Commission's Questions, 17 January 2007, available from www.electricitycommission.govt.nz].

Mr Lister even states that, in his opinion, the impacts of two 220 kV lines would be worse than that for one 400 kV line (as designed by Transpower presently) [Lister, page 145, para. 578]. In my opinion this speculation is not relevant, and fails to take account of :

- Future technology improvements, or acceptance by Transpower or their successors to use less harmful technology (which is already available now), thus obviating such impacts;
- Security of supply concerns, which logically would dictate that construction of any second large capacity line would not place it in the same landscape(s) where it would generate such cumulative visual effects (due to the potential for common mode failure);
- The fact that Mr Lister's view of the size and appearance of large 220 kV lines may be misplaced by over reliance on Transpower data (such as the claim that they would be "only 10m shorter", addressed earlier)

- Electricity Commission high-growth scenario demand data out to 2038 that indicates no such need, especially as existing assets do not maximise use of their corridors [Regional peak demand forecast, Brian Bull, Electricity Commission, 19 October 2006, available from www.electricitycommission.govt.nz]
- Any additional new 220 kV line into Auckland will more likely than not replace an existing 220 kV line, all of which are larger in scale than the Ari-Pak 110 kV which means incremental impact would be less than with the current Proposal
- What we do know from the NIGUP Notice of Requirement and the accumulated evidence, is that we are assured of significant visual and amenity impacts created by a 400 kV capable line of the design chosen by Transpower, amongst other effects, if the Proposal is approved.

Being aware that Transpower claims the selected 400 kV design is to “maximise the use of the corridor”, I note that Mr Boyle in his evidence claims that Transpower selected conductors to achieve this in their 220 kV alternative “Option 1” from their Amended Proposal 20 October 2006 [Boyle, page 38, para. 131] Quote: *AS with the 400kV line, the conductor capacity for the 220kV options was chosen that would maximise the use of the transmission corridors.*

I understand that this statement is incorrect, as Transpower’s Option 1 called for the use of ACSR conductor in the form of Twin Chukar, with a maximum capacity of 1184 MVA per circuit. It was in fact PB Power and the Electricity Commission along with independent submitters that pointed out the advantages of using the same Triplex Sulphur AAAC conductor with its capacity of 1452 MVA per circuit, an improvement of 22.5% per circuit. [Transpower, NIGUP Amended Proposal, Further Information in Response to Electricity Commission’s Questions, 17 January 2007, page 31, section 3.6 para. 127, op cit].

As noted earlier, such a design provides 45% more transfer capacity than Transpower’s original 2005 GUP 400 kV plan. Also we note that remaining 220 kV circuits feeding Auckland are also able to have their capacities enhanced, a process Transpower are very happy to promote in the South Island and south of Whakamaru, and this is of course standard practise overseas [Transpower 2007 Annual Planning Report, Chapter 7 page 75, available from www.transpower.co.nz]. My understanding is that the total capacity into Auckland in about 2040

will be more than enough for a high demand growth scenario with a 220 kV only plan but very simply enhanced by such a standard process.

Finally I note that the move to renewable sources of electricity generation, especially wind generation, requires provision of some back-up capacity which it is widely expected will be thermal (gas fired CCGT). Two such plants have already been announced (Contact Energy, Stratford, 2 X Fast start 100 MW), and Genesis Energy are publicly speaking of converting their plans for a 240 MW CCGT in Rodney District to run as a peaking plant for just this application. Transpower seem happy to promote the building of this plant (in its original base load configuration) in one document – their North Auckland and Northland GUP [Transpower, North Auckland and Northland Grid Upgrade Investment Proposal, Assessment of Options, June 2007, op cit. Page 15 section 6.3]. Transpower also seem to note this implies an economic risk to the Proposal in other documents: Quote “*There are several potential generation sources available to provide this backup of which only demand side response and/or **thermal load-following capacity** within the UNI region will affect the economics of the Proposal*” (emphasis added) [Transpower, NIGUP Amended Proposal, Submission in Response to Electricity Commission’s Notice of Intention to Approve on 31 January 2007, March 2007, Page 21, section 4.3 para. 84, available from www.electricitycommission.govt.nz]. While the Submitter cannot as yet find reference to figures which would quantify this asserted risk, I can state that provision of such plant provides a form of security of supply which lessens the justification for the scale of the Proposal and so benefits consideration of a 220 kV-only alternative with its consequently lower environmental impact.

(i) A 400kV design will not be needed within the context of New Zealand’s transmission infrastructure over the lifetime of the relevant planning instruments or the lifetime of the Proposal and will provide no benefit as an on-off, point-to-point transmission line. The unnecessary nature of the Proposal is emphasised by the extensive duration of the time period sought by Transpower in order to implement the works.

In my opinion, Transpower’s call for an extension of several decades to the normal 5 year time period for implementing a designation used in the RMA calls into question the validity of its claim that the line capacity is needed. The real risk is in my view that use at 400 kV will never be justified – or will be prevented on Good Electricity Industry Practise considerations. Those are matters that I ask the Board to consider and explore. Such a large scale construction requires the

utmost scrutiny, particularly given that there is clear argument from within the Electricity Commission that this risk has not been properly addressed. In that regard I refer the Board to statements by former Commissioner Graham Pinnell [NIGUP – Final Decision, Minority Opinion of Commissioner Pinnell, 5 July 2007, page 15 section 6-6.1, available from www.electricitycommission.govt.nz]. Quoting Commissioner Pinnell:

“I invited Transpower to obtain assurance to that effect [international GEIP being met by the Proposal] from a recognised international expert. No such assurance was forthcoming”.

In my view the only thing that can be guaranteed if this Proposal is allowed, is that it will generate significant adverse effects.

(k) There are preferable alternative methods of undertaking the work and meeting Transpower’s reasonable objectives that will generate significantly less adverse effects on the environment and that would more appropriately be approved pursuant to the Act.

This subject has been addressed in this submission to the best of my ability with limited resources. I would reiterate that independent technical appraisal of such options is necessary in order for them to be properly and fairly evaluated by the Board.

The submitter seeks the following relief:

- (a) That the Proposal be declined.***
- (b) That, in the event the relief sought in paragraph 5(a) above is not granted, the Proposal be approved only if it is amended to or is made subject to conditions that require Transpower to:***
 - (i) Adopt a maximum design capacity based upon 220kV lines rather than 400 kV lines;***
 - (ii) Replace the proposed lattice towers with shorter and less visually intrusive monopole and / or compact design structures with a maximum capacity of 220kV lines; and***

- (iii) *Underground a greater extent of the line than is currently proposed including in particular the line along that part of the route between its northern terminus and State Highway 2 to the south.*
- (c) *Such further or other relief as is appropriate or desirable in order to take account of and respond to the concerns expressed in this submission.*

SUMMARY OF SUBMISSION:

1. Transpower's input assumptions which lead to their requested Proposal utilising design of a 400 kV capable line comprising steel latticework towers, are flawed and must be reviewed. In particular their selection of a limiting electrical field figure of 5 kV/m supposedly based on ICNIRP guidelines is in error and results in taller than necessary structures.
2. Transpower have provided insufficient evidence to allow proper consideration of technical alternative designs such as more widespread use of steel monopoles and compact design techniques, yet they are clearly aware of them and have considered them for other plans / routes. The Board should acquire the necessary evidence urgently from sources independent of Transpower in order to allow proper consideration to their potential to Avoid, Remedy or Mitigate effects of the Proposal.
3. Preparation of professional, independent Visual Impact Assessments is required for all of the overhead sections of the NoR. In particular, professional simulation files such as the "Truescape Karapiro Crossing – Monopoles" is required for other sections in order for proper evaluation of the potential for mitigation from such designs. This should be extended to include "Compact design" (Akimbo insulators) for both latticework and monopole configurations. I specifically request this be addressed in relation to the Hunua area (from Highridge Road through to Paparimu).
4. Given the lack of evaluation of practical and well known technical alternatives which could address some of the visual and amenity concerns, I request that the application be declined.

DATED this 26th of February 2008

—

D.A.Parker for Hunua & Paparimu Valley Residents' Association Incorporated