

**BEFORE THE BOARD OF INQUIRY**

**IN THE MATTER** of the Resource  
Management Act 1991

**AND**

**IN THE MATTER** of applications for  
resource consent and  
notices of requirement  
by Transpower  
New Zealand Limited  
for the North Island Grid  
Upgrade Project

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**STATEMENT OF EVIDENCE OF MICHAEL GEORGE COLLEY IN REBUTTAL  
FOR TRANSPOWER NEW ZEALAND LIMITED  
(Forestry management issues / risks)**

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## Introduction

1. **MY** name is Michael George Colley. I wish to present rebuttal evidence to the statements of evidence of:
  - (a) Mr Murray Parrish, on behalf of Carter Holt Harvey Limited (**CHH**);
  - (b) Mr Doug Parker on behalf of Hunua and Paparimu Valley Residents' Association Incorporated; and
  - (c) Sally Barker Strang on behalf of Hancock Forest Management (NZ) Ltd (**HFM**).
  
2. I address the evidence of each submitter below.

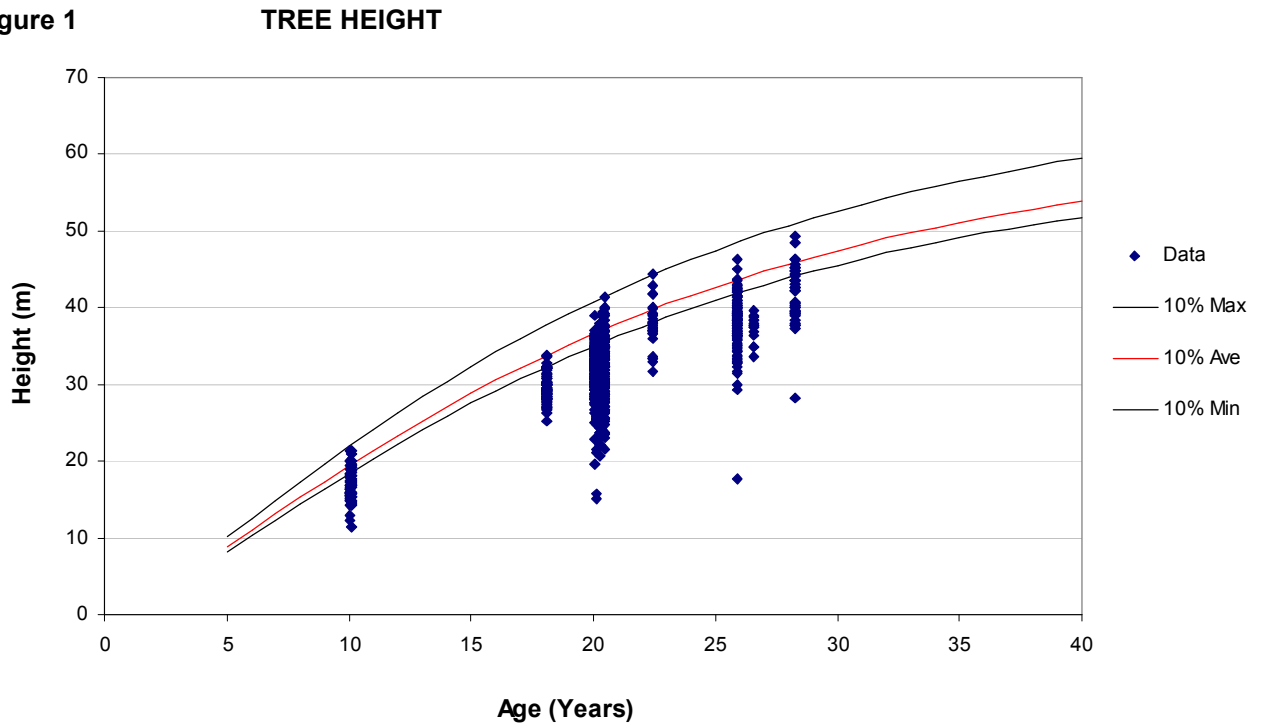
### **Mr Murray Parrish on behalf of Carter Holt Harvey Limited (Submission number 0558)**

#### ***Tree growth rates***

3. **AT** his paragraph 3.8, Mr Parrish notes that *Pinus radiata* grow to an average height of 40 metres over a 30-year rotation, and that height may vary depending on a number of factors. He states that defining a corridor (through forest) is not as simplistic as nominating a single width.
  
4. I generally agree with Mr Parrish's statements. I note that if trees are allowed to grow to more than 30 years in age, which is quite possible, then there is a reasonable probability that heights greater than 40 metres could be achieved.
  
5. **IN** order to explore tree heights in detail, I have obtained and analysed information on tree heights from HFM. The information comprises 1,177 individual tree height measurements taken during the course of routine forest inventory in stands alongside and in the general vicinity of the proposed designation. The ages of the inventoried stands vary from 10 years to a number of ages between 15 and 30 years.

6. I have superimposed height growth curves (height on age) on the individual tree data as shown in Figure 1.

Figure 1



7. **THESE** curves have come from national research data (the "300 Index" radiata pine calculator) taken from many plots throughout New Zealand. The HFM data at different ages align fairly closely with the curves, indicating that the corridor trees are following a typical growth trajectory for radiata pine in New Zealand. The curves have been calibrated to represent:

- (a) the tallest trees ("10% Max") in the tallest 10% of trees in the stand;
- (b) the average trees ("10% Ave") in the tallest 10% of trees in the stand;  
and
- (c) the shortest trees ("10% Min") of the tallest 10% of trees in the stand.

8. **FROM** this analysis, and reading off the height curves, I have produced the following table of tree heights. The first column lists tree age (shown at five-year intervals for the purpose of illustration); the second column shows the average height of the tallest 10% of trees; and the third column shows the maximum individual tree height; all drawn from the 1,177 trees analysed.

Tree Age (years)	Average Height of tallest 10% of Trees (metres)	Maximum Tree Height (metres)
25	42.7	47.5
30	47.5	52.6
35	51.1	56.5
40	53.8	59.5

9. **TREE** height growth varies in a forest depending on site factors (soils, exposure, etc.) and other factors such as altitude. In my view, the site conditions along the designation area are unlikely to vary significantly from those where the inventoried stands grow and the 1,177 trees are therefore likely to provide a good representation of tree height along the designation.
  
10. **TREE** height clearly depends not just on the rate of growth, but also on the age of the tree.
  
11. **HARVEST** age is established by individual organisations, after considering the potentially competing objectives of short-term cash requirement (tending to drive one to a lower harvest age) and long-term profitability (tending to drive one to a higher harvest age).
  
12. **HFM** advises that its current intentions in Kinleith forest (in the part of the forest where the proposed corridor lies) are to harvest radiata pine at a minimum age of 27 years and a maximum age of 29 years.
  
13. **THESE** ages are generally in line with industry practice, but I am aware that a number of large forest owners are aiming to harvest at ages of around 30 to 32 years of age.
  
14. **DIFFERENT** forest owners thus employ different harvest strategies, depending on a number of factors. The strategy for a particular owner will continue to be reviewed and may change over time. However, forest owners in New Zealand

have been harvesting radiata pine at around 26 to 32 years of age since the final harvesting in the late 1980s of the original crops planted in New Zealand. There is no indication that this is likely to change markedly in the foreseeable future.

15. **BASED** upon HFM's current harvest intentions, a maximum tree height of 51.6 metres is indicated for a 29 year old stand.
16. **BASED** upon an older harvest age – 32 years – seen elsewhere in the industry, a maximum tree height of 54.2 metres is indicated.
17. I have based the tree height analysis on the main plantation species radiata pine. I note that eucalypts, which are also grown in Kinleith forest, have the ability to grow to greater heights. However, they have been grown primarily for pulp wood and have been felled at comparatively young ages and lower heights.

#### ***Designation/Easement Width***

18. **IN** my view, a single-width designated corridor is feasible through the forest area. Alternatively, the corridor could be adjusted in places through the forest to address specific areas where topography and line design combine to require a greater width. It is my understanding that easement agreements could in any event apply beyond the designation area, and could address the residual risk associated with tree fall, which would arise only infrequently – in any case – ie. every 30 or more years. Tree growth would need to be monitored. Mr Miles' evidence describes how such arrangements would work.
19. **THE** matter of corridor width also arises at Section 4 of Mr Parrish's evidence where he addresses liability for an outage. He notes the width of the corridor occupied by the high-voltage lines, and the consequent risk of trees falling onto the conductors or towers. Mr Parrish refers to this risk at paragraphs 4.1 and 4.22 in his evidence. I consider that the risk of trees falling on the conductors or towers can be minimised provided that the appropriate width of corridor is identified. As discussed above, through a forest area, the width may vary depending on terrain and other factors. I note that Mr Robert Lake in his rebuttal evidence addresses corridor width in relation to tree height.
20. **SINCE** preparing my evidence in chief, and as a result of discussions between Transpower and HFM, I understand that Transpower would be prepared to agree

to a designation of approximately 130m wide within the forestry area in order to accommodate the concerns raised by CHH and HFM. This is described in the rebuttal evidence of Mr Miles.

21. I would support an increase in the designation width to approximately 130m, as I consider that it would address much of the risk of tree fall and associated liability that have been raised by CHH and HFM. As noted above, the residual tree fall risks could be addressed through easement arrangements. A wider corridor would also assist in dealing with some other risks referred to by CHH.

### ***Cost of operations***

22. **AT** his paragraph 4.4, Mr Parrish states that installing a high voltage electricity cable through, or alongside, a forest increases the risk and cost of silvicultural operations.
23. I address the effects of the Upgrade Project on forest operations in my evidence in chief and note that access, controlled burns, aerial operations, and harvest operations could be affected. These are all “silvicultural” operations involved with the growing of trees.
24. **MR** Parrish at paragraph 4.4, states that the Upgrade Project “... *creates an impediment to the movement of people and equipment* ...”. I accept that this will be correct in some cases. However, the Upgrade Project could also facilitate the movement of people and equipment in certain parts of the forest, as it will create access tracks to and within the designation corridor that would not otherwise be present.

### ***Weather risks***

25. **AT** his paragraph 4.5, Mr Parrish describes weather risks in relation to the lines and forestry: paragraph 4.5 (a) corridor maintenance; paragraph 4.5 (b) windthrow; paragraph (c) dust; paragraph (d) forest fire risk; paragraph (e) risk and cost of fighting fires; and paragraph (f) increased recreational use in warm dry weather.
26. **CORRIDOR** maintenance is under human control and I do not see it directly as a factor in weather risk. The risk of windthrow can in my view be managed through

establishing a corridor of suitable width. Dust in forests is usually associated with roads and harvest landings, which have been present for many years, sometimes near the existing high-voltage lines, in Kinleith forest. I have no knowledge of the risk that dust poses to such lines, but I understand that it is a matter that Transpower is aware of, and which can be addressed.

27. I note in my evidence in chief (paragraph 60) that the towers and conductors are significant hazards in fire-fighting and I agree in this respect with Mr Parrish. Finally, there is always a fire risk arising from the presence of the public in forests. However, it can be managed through existing procedures such as the closing of forests in periods of extreme fire danger.

### ***Liability***

28. **AT** his paragraph 7.2, Mr Parrish notes that I do not address increased liability and the potential impact and cost of this on forestry management and operations. I have not addressed liability as it is a property compensation issue, not an RMA issue, and thus outside the scope of my evidence.

### ***Windthrow***

29. **AT** his paragraph 7.3, Mr Parrish describes windthrow and that the lines could be damaged from it. In my view, this risk is adequately managed through having a designated corridor of adequate width, and associated easements to manage residual risk as discussed earlier in this rebuttal evidence.

### ***Controlled burns and fire risk***

30. **AT** his paragraph 7.4, Mr Parish quotes part of paragraph 35 of my evidence in chief. He says " ... *in his (Colley's) view the project "would have no significant effect on the practice of controlled burning" because of the "rarity of controlled burns today" ...* ".
31. **MY** paragraph 35 in full stated: "*In view of the rarity of controlled burns today, and that they would be an issue only within 500 metres of the conductors, it is my view that the Upgrade Project would have no significant effect on the practice of controlled burning*". I made this statement in the knowledge that controlled burning would be affected only within 500 metres of the conductors and thus over

only a relatively small proportion of the forest estate. In paragraph 34 of my evidence in chief, I noted that the distance may be less than 500 metres in suitable wind conditions.

32. **AT** his paragraph 7.5, Mr Parrish notes my evidence from Australia in relation to the fire risk posed by high-voltage lines. He is correct in surmising that the vegetation under these lines is well controlled. It is controlled to the extent that the line corridors are regarded as fire breaks (paragraph 55 of my evidence in chief).
33. **AT** his paragraph 7.6, Mr Parrish continues to quote my evidence in chief, in particular that high-voltage line corridors in New Zealand forests tend to carry scrub and small trees that will carry a fire in suitable conditions. He notes that ... *"the risk of fire damage is higher than [in Australia]"*. I agree with this conclusion but note that, going by experience, the risk of a fire starting from the conductors is low (paragraph 59 of my evidence in chief). The risk lies more with a corridor in New Zealand providing a conduit for fire that has started through other causes (eg by the public) as noted in paragraph 59 of my evidence in chief. I note mitigation measures in paragraph 79 of my evidence in chief.

### ***Weed control***

34. **AT** his paragraphs 7.7 to 7.9, Mr Parrish addresses weed control and refers to paragraphs 77 and 78 of my evidence in chief, where I stated that *"I understand that Transpower would be responsible for managing the vegetation (but not to pay for the cost of weed control). There is thus no effect on the forest owner through it having to extend its management and operations into the easement area. The forest manager is, however, exposed to the cost of any weed control. I consider that any risk of additional cost would be low"*.
35. **MY** comments in paragraphs 77 and 78 of my evidence in chief, were based on my understanding of the situation at the time of finalising my evidence in chief.
36. **HOWEVER**, I now understand that Transpower and HFM have undertaken further negotiation and have agreed that Transpower will be responsible for the cost of weed control at least within the designated area.

## **Overplanting**

37. **AT** his paragraph 7.12, Mr Parrish refers to the risk of planting trees over the boundary of the designation and within the designated area itself. I do not see this as a significant issue in the case at hand where the lines are being erected through an existing forest. A corridor will be cleared of trees. The remaining trees adjacent to the corridor will continue to grow to maturity and then be harvested. The stumps of the trees alongside the corridor edge will then indicate the line up to which the next crop can be planted. In the case where part of the corridor and an entire adjacent stand are cleared and harvested at the same time, there will be no “edge stumps” to indicate the corridor boundary. In this case, the forest manager will need to liaise with Transpower.

## **Mr Doug Parker on behalf of Hunua and Paparimu Valley Residents' Association Incorporated (Submission number 0748)**

### ***Scope of evidence***

38. **AT** paragraph 41 of Section (f) of his revised evidence, Mr Parker notes that “*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”.*
39. I discussed the effects of the Upgrade Project **on** forest operations and management in my evidence in chief (see paragraphs 11(b) and (e)). My evidence did not set out to address the risk posed by forests and trees **to** the towers and conductors. However, the main risk that I can identify in forest areas is the risk of trees falling on to the conductors. I consider that this risk can be addressed through the width of the designation within forest areas and other measures as described in paragraphs 18 to 21 above. In other areas, I would agree with Mr Miles that the risk of an isolated tree falling on the line can be best dealt with in terms of an easement agreement.

### ***Australian experience***

40. **AT** paragraph 41 of Section (f) (page 21) of his revised evidence, Mr Parker notes that

*"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 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".*

41. **MR** Parker also raises this issue at paragraph 3 of Appendix 6 of his revised evidence.
42. **PARAGRAPH** 55 of my evidence in chief was part of a section of my evidence addressing the risk of fire posed by high-voltage lines. It was not addressing the width of corridors. I did, however, provide Mr Mayers' quote in full to reinforce the point I was making. In particular, that high-voltage lines do not appear to represent an increased risk factor for fire.

#### ***Fire risk***

43. **AT** paragraph 41 of Section (f) (page 21) of his revised evidence, Mr Parker notes that

*"On the subject of fire, Mr Colley does briefly mention the risk of fire to the line [Colley, para. 59] however I believe this risk is understated given that Transpower requires restriction of "controlled burn-off" [Colley para. 34] within a span of some 500 m 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 burn-off, i.e. forest fires".*

44. **MR** Parker also refers to the same issue at paragraph 5 of Appendix 6 to his revised evidence.
45. **IN** paragraph 59 of my evidence in chief, I refer only to the risk of fire posed by the high-voltage lines to the forest. I do not refer to the risk of fire posed by the forest to the lines as it was outside the scope of my evidence.

#### ***Corridor width***

46. **AT** paragraph 2 of Appendix 6 to his revised evidence, Mr Parker notes that there is no description of "easement width" in my evidence. That is correct. However, I

understand that the designation width is defined in the NOR documentation (Part I).

47. **AFTER** examining the logging plan diagram in Appendix 2 of my evidence in chief, he goes on to conclude that the corridor is approximately 100 m wide in Kinleith forest. The logging plan diagram in my Appendix 2 does not purport to show the corridor accurately, or to scale, for that part of the forest. It shows a corridor of approximately 100 m wide for the purpose of the diagram, which was to illustrate the effect of the presence of the corridor. The approximate width of 100 m was sufficient for the purpose for which I used that diagram.

### ***Windthrow***

48. **AT** paragraph 4 of Appendix 6 to his revised evidence, Mr Parker refers to windthrow (trees being blown over by wind). He notes that I address this issue only in relation to the harm that this does to the forest asset, and that I ignore the potential for trees to fall and strike the conductors. I have commented on this issue in relation to forestry at paragraph 29 above. Mr Miles' rebuttal evidence covers the situation with regard to individual trees outside forest areas.
49. **MR** Parker also quotes my paragraph 84: "*Mr Colley states that the maximum width of easement in the NOR, through forestry areas, is 100 m ...*". He overlooked the last sentence in paragraph 84 where I go on to say: "*The required width of the easement through forestry areas will depend on several factors including topography and the location of landings*". It is in turn useful to distinguish between the width of the designation corridor and controls which can be achieved through easement documentation.

### **Sally Barker Strang on behalf of Hancock Forest Management (NZ) Ltd (Submission Number 1014)**

#### ***Logging plans***

50. **IN** her Paragraph 3.3, Ms Strang notes that in Appendix 2 of my evidence in chief, I show two logging plans of the same area, one with and one without the designation corridor. Where the designation corridor is present, I show that some

steep land has to be harvested using ground-based equipment instead of the preferred cable equipment.

51. **MS** Strang goes on to say that ground-based harvesting is not acceptable on this particular tract of steep land owing to safety and environmental considerations.
52. **THE** logging plans attached to my evidence were based on the best available knowledge at the time of finalising my evidence in chief. In the event that ground-based harvesting could not be carried out on any areas near to the designation, that would be a matter for compensation, and I would expect it would be the subject of negotiations and agreements between Transpower and HFM.

### ***Area affected***

53. **IN** her paragraph 3.4, Ms Strang states that the area of forest required to be retired from forestry will be "*substantially greater than the 188 ha indicated in Mr Colley's evidence*".
54. **IN** paragraph 15 of my evidence in chief I state that "*HFM has provided me with an estimate of the area of trees within the easement .... It amounts to 188 ha. The 188 ha figure relates to the total easement area, including that area that has been, and will be, converted to pasture*".
55. **MS** Strang and I are thus talking about two different classifications of area. She refers to area inside the designation plus affected area the outside the designation. I am referring only to the area within the designation.
56. I acknowledge that, in addition, some areas outside the designated corridor will also be affected, such as the area occupied by Transpower's new roads as described by Ms Strang. As I understand the position these will however be the subject of easement agreements and compensation.

### ***Use of designated land***

57. **MS** Strang in her paragraph 3.5 notes that much of the land in the designated area will become wasteland. I agree with this statement but again, as I understand the position, compensation will be paid for the necessary property easement.

58. **IN** her paragraph 3.8, Ms Strang notes that I did not address the impact of Transpower vehicles on forestry roads. I do not consider this to be a significant factor as most of the Transpower vehicles will generally be light vehicles and there will be relatively few movements of heavy vehicles (compared with forestry traffic).
59. **HOWEVER**, should Transpower vehicles be found to impact on road maintenance, then I would expect Transpower and the forest owner to agree on cost sharing. This sort of arrangement is not uncommon in the forest industry.

### ***Aerial operations***

60. **IN** her paragraph 3.10, Ms Strang states that I have "*discounted*" the impact of the transmission lines on aerial operations in the forest. It was not my intention to convey this message; rather, to state that there are already transmission lines within the forest and that aerial operators and forest managers have adapted to their presence, albeit with some cost, difficulty, and risk.
61. I therefore do not see the proposed transmission line as introducing a new hazard, but it does increase an existing hazard by adding a new line.
62. I do not therefore agree with Ms Strang's assertion that they will "*...impose a significant new constraint ...*" to aerial operations.

### ***Harvesting operations***

63. **IN** her paragraph 3.13, Ms Strang quotes my opinion that the potential effects of the designation corridor on harvesting are "*relatively modest*" (paragraph 47 of my evidence in chief). My comment was made in relation to the six cable harvesting areas along the designation. They were identified for me by HFM. I did not look outside the designation except for the logging settings immediately adjacent to these six areas.
64. **MS** Strang states that "*the full assessment of harvesting options is still being undertaken by staff, however as described, it is HFM NZ's view that in addition to the impacts listed in Mr Colley's evidence [para 46] approximately 100ha of cable logging land outside of the increased 130m width corridor will become un-harvestable*". I understand that Transpower and HFM have investigated this area

and have agreed that the trees will be removed before the line is built. I further understand that any areas that would be un-harvestable would be compensated.

### ***Fire risk***

65. **MS** Strang addresses fire risk in her paragraph 3.14. I note her statement that Mr Bernie Mayers' assessment of the risk of fire posed by high-voltage lines, based upon the Australian experience, is not applicable to the New Zealand situation. The situations *are* different: easements in Australia are subject to fuel-reduction measures whereas in New Zealand they are not.
66. **HOWEVER**, I consider that the Australian experience is useful, given the particularly extreme and sometimes prolonged fire conditions that prevail there from time to time. It shows that high-voltage lines appear to be safe in an extreme environment. Even if the fuel is reduced in the easements, I note that even short grass will carry a fire in those extreme conditions. I note that I have been unable to find any instances in New Zealand of fires caused by high-voltage lines.
67. **IN** her paragraph 3.17, Ms Strang states that I did not address the difficulty of fighting fires where transmission lines are present. I addressed this issue in paragraph 60 of my evidence in chief.

### ***Windthrow risk***

68. **IN** her paragraph 3.18, Ms Strang states that moderate windthrow risk in a stand of trees can occur as early as 7 years, rather than my 10 years. In paragraph 63 of my evidence in chief, I state that "... *trees ... would be susceptible to occasional wind damage, particularly where the trees are around 10 years or older*". I do not rule out windthrow at ages under 10 years.

**Weed control**

69. IN her paragraph 3.20, Ms Strang refers to paragraph 77 in my evidence in chief which addressed management of the vegetation in the corridor. I have addressed this issue above in response to Mr Parrish.

A handwritten signature in black ink that reads "M. Colley". The signature is written in a cursive, flowing style.

**Michael George Colley**

**12 June 2008**