Before a Board of Inquiry
Transmission Gully
Notices of Requirement and Consents

---

under:	the Resource Management Act 1991
in the matter of:	Notices of requirement for designations and resource consent applications by the NZ Transport Agency, Porirua City Council and Transpower New Zealand Limited for the Transmission Gully Proposal
between:	**NZ Transport Agency** *Requiring Authority and Applicant*
and:	**Porirua City Council** *Local Authority and Applicant*
and:	Transpower New Zealand Limited *Applicant*

Second statement of rebuttal evidence of Stephen Andrew Fuller (Terrestrial ecology) for the NZ Transport Agency, Porirua City Council and Transpower New Zealand Limited

---

Dated: 16 February 2012

REFERENCE: John Hassan (john.hassan@chapmantripp.com)
Nicky McIndoe (nicky.mcindoe@chapmantripp.com)

Chapman Tripp
T: +64 4 499 5999
F: +64 4 472 7111

10 Customhouse Quay
PO Box 993, Wellington 6140
New Zealand

www.chapmantripp.com
Auckland, Wellington,
Christchurch

SECOND STATEMENT OF REBUTTAL EVIDENCE OF STEPHEN ANDREW FULLER FOR THE NZ TRANSPORT AGENCY, PORIRUA CITY COUNCIL AND TRANSPOWER NEW ZEALAND LIMITED.

INTRODUCTION

1 My full name is Stephen Andrew Fuller.

2 I have the qualifications and experience set out at paragraphs 2 to 6 of my statement of evidence in chief, dated 17 November 2011 (*EIC*).

3 I repeat the confirmation given in my EIC that I have read, and agree to comply with, the Code of Conduct for Expert Witnesses (Consolidated Practice Note 2011)

4 In this statement of rebuttal evidence, I respond to the supplementary evidence of:

4.1 Paula Warren, Expert witness terrestrial ecology, Rational Transport Society;

4.2 Shona Myers, Expert witness terrestrial ecology, Kapiti Coast DC; and

4.3 Emily Thomson, Planner, Kapiti Coast DC.

5 The fact that this rebuttal statement does not respond to every matter raised in the evidence of submitter witnesses within my area of expertise should not be taken as acceptance of the matters raised. Rather, I rely on my EIC, my previous rebuttal statement and this statement to set out my opinion on what I consider to be the key terrestrial ecology matters for this hearing.

6 Consistent with my EIC, in this statement of evidence when referring collectively to the NZ Transport Agency (*the NZTA*) Project[1], the Porirua City Council (*PCC*) Project[2] and the Transpower New Zealand Limited (*Transpower*) Project[3] I will use the term "Transmission Gully Proposal" (and hereafter, *the Proposal*).

7 I will refer to the NZTA Project and the PCC Project collectively as the "Transmission Gully Project" (and hereafter, the TGP or the Project).

---

[1] The 'NZTA Project' refers to the construction, operation and maintenance of the Main Alignment and the Kenepuru Link Road by the NZTA.

[2] The 'PCC Project' refers to the construction, operation and maintenance of the Porirua Link Roads (being the Whitby Link Road and the Waitangirua Link Road) by PCC.

[3] The 'Transpower Project' refers to the relocation of parts of the PKK-TKR A 110kV electricity transmission line between MacKays Crossing and Pauatahanui Substation by Transpower.

SCOPE OF THIS STATEMENT

8 Supplementary statements of evidence were prepared by Ms Warren, Ms Myers and Ms Thomson following a brief site visit in late January. Their understanding of the site is therefore limited to the condition of the site at that time and does not necessarily reflect the conditions that have existed in the past or that are normally experienced.

9 This further rebuttal is to address new issues raised by their supplementary evidence and provide additional context to the site and its values based on the ten years of site visits and investigations that I have made.

10 In addition I respond to recommendations from Ms Thompson for consent conditions for the mitigation of effects identified by Ms Myers.

EVIDENCE IN CHIEF OF PAULA WARREN

Impact of Stock

11 In paragraph 5 of her supplementary evidence, Ms Warren notes that the seeps and wetlands of the Te Puka and Horokiri did not show signs of cattle pugging, trampling, or grazing pressure.

12 Over the past ten years I have viewed these sites on numerous occasions. The condition of each paddock has varied from visit to visit depending on current levels of farm management, grazing intensity and the types of stock present. However, I can confirm that at the time of vegetation mapping and on most subsequent site visits the condition of the small streams and seepages in the Te Puka and Horokiri that were accessible to stock were as described in my assessment, i.e. pugged and grazed.

13 I carried out the majority of my field work in summer and autumn of 2010. At this time the farms were more heavily stocked than they appear to have been recently, with greater associated effects on stream beds and wet pasture. I include in **Annexure 1** a series of photographs taken in the Horokiri valley at the time of my field assessments which clearly show extensive stock trampling and soil pugging.

14 I agree with Ms Warren that there is less pugging in the Te Puka, and can add that this is due in part to a predominance of sheep grazing (rather than cattle) in the Te Puka, and in part due to shallower soils.

Wetlands

15 In paragraphs 5 to 13 Ms Warren discusses, what are in her view, significant ephemeral wetland habitats within grazed pasture of the Te Puka and Horokiri valleys.

16 To put these wetlands into their proper context, historically the Horokiri and Te Puka slopes and valley floors would have been vegetated in coastal forest and all streams would have been incised within stony beds without wetland margins.

17 The wetlands we see today arose with the removal of forest cover in the 1800's, followed by a century and a half of intensive farming. These activities led to colluviation (downslope movement) of surface soils and debris to form deep deposits on toe-slopes and in headwater streams. This material filled the original stony channels and impeded drainage. Fresh water springs pushed through these deposits and seepages formed. Opportunistic wetland species then established on them. These plants included resilient native and exotic wetland plants, all of which are good dispersers, tolerate grazing and trampling, and thrive in the nutrient enriched soils created by stock waste and fertiliser.

18 These wetlands are therefore induced systems that have formed as a result of human occupation. The presence of native plants within them only points to the resilience of these plant species or to their colonising ability in these modified habitats. It does not, in my opinion, tell us that these sites have high indigenous values are representative or remnant, or are of high ecological value.

19 As part of my post graduate thesis I mapped and described these colluvial stony clay loam soil deposits on regenerating farmland on Kapiti Island[4]. I then explored the influence of these often saturated soils loams, on lowland forest successions. I see this pattern of colluviation following forest clearance and grazing on all steep greywacke slopes in farmland throughout the region.

20 From my studies I can also assure the Board that these areas of boggy pasture will only persist with continued grazing. If you look closely at areas within the Te Puka and Horokiri valleys where natural regeneration has been allowed to occur; these seepages and areas of boggy pasture are disappearing. As the scrub canopy closes over the valley floor its shades out the grasses and herbaceous plants that bind the silts and muds. Then winter rains flush the exposed sediments away, exposing or renewing the original stony stream beds. If these valleys are left to regenerate for a further 10 to 20 years this process of stream renewal will be repeated for most or all of the wetlands described by Ms Warren. I attach as **Annexure 2** photographs depicting these processes from the Horokiri Valley.

21 In paragraph 9 Ms Warren states that the wetland habitats she has seen are not common in the Wellington Region. She goes on to say that wetlands are "one of the ecosystem types significantly reduced by land use changes". I cannot agree with this, as spring fed seeps dominated by similar suites of wetland plants, can be seen on toe-slopes of steep greywacke farm country throughout Wellington and I have mapped and described them in assessments at several sites within the region, e.g. Mill Creek. It is my opinion that these seeps in pasture are as much a part of the character of Wellingtons' ecological

---

[4] FULLER, S. A., (1986): Successional Patterns and Forest Dynamics; Taepiro Valley; Kapiti Island 1986-1990. Diploma of applied science investigating impact of pests, climate and soil on lowland forest successions and the development of predictive models.

landscapes as the fractured greywacke slopes that they lie on. In contrast to Ms Warren's opinion, I would argue that this type of wetland is a type of wetland that has been significantly increased by land use changes.

22 Ms Warren, in a number of places, suggests that these areas of boggy pasture are significant, of high indigenous character, and of high value. I would strongly debate this for the reasons described above. I have assessed these areas using accepted criteria for determining significance in terms of the RMA. These sites fail the accepted significance tests due to a clear lack of representativeness, rarity, or distinctiveness. I stand by my assessment.

23 In paragraphs 11 and 12 Ms Warren's view of the value of these sites extends to questions of provision of mitigation for the irreversible net loss of this habitat, genetic diversity, and potentially the loss of species (Paragraph 13). I cannot agree that mitigation is required for loss of these induced habitats or that extinctions will occur.

24 I would also note that it is the NZTA's stated intention to revegetate the slopes, gullies and boggy stream banks and terraces of the Te Puka and Horokiri valleys back to their original form, which is forest. This restoration activity will continue and accelerate the natural processes already occurring that will lead to the restoration of original cobble channels.

J Banks

25 In paragraphs 14 to 24 of her supplementary evidence, Ms Warren has identified a range of habitats containing bryophytes (mosses, liverworts and hornworts) within the Te Puka and Horokiri.

26 In Ms Warrens statement there is an implication that these communities within the road footprint are unique and will be entirely lost to the road construction.

27 I am not a bryophyte expert and cannot speak to the species present, however, I can say that I have explored a number of forested gullies and rocky slopes on the eastern side of the Te Puka and Horokiri valleys that will now be avoided by the TG route, and which will now be protected as part of the mitigation package. I can confirm to the Board that in appropriate habitats mosses and liverworts were commonly seen.

28 As stated in my rebuttal evidence (paragraphs 30 to 36) the landforms Ms Warren has identified that carry these plants, typically steep to very steep greywacke hillsides with Ruahine and Makara steepland soils and their screes, gorges and rocky exposures, occur extensively within the contiguous Akatarawa Whakatikei forests (9,100 ha) which I am familiar with through other studies[5], and within the wider Wellington

[5] FULLER, S. A., (1995): Physical and Biological Resources of the Wellington Regional Council's Forest Lands and Water Collection Areas. In: Draft Interim Management Plan, Wellington Regional Council. Pp. 52-76.

and Tararua Ecological Districts where there are 58,000 ha of these environments. These landforms are not unique to the Te Puka and Horokiri or to the narrow band of these valleys that lie beneath the road footprint.

Forest Remnants

29 In paragraph 28 of her evidence Ms Warren has determined that the kohekohe remnants in the Te Puka are old and not the result of recent regeneration.

30 In my opinion these forest have regenerated since clearance of land in the mid to late 1800's. I base this opinion on four years of study in similar forest on Kapiti Island where I mapped and described the islands vegetation,[6] and investigated the processes of successions of the forests following retirement from farming[7]. Kohekohe is a dominant forest type on Kapiti Island and during these investigations I carried out a large number of vegetation transects and plots in kohekohe forest of varying successional stages. I also cored a large number of trees across the island to age the forests and understand their history.

31 For the Transmission Gully investigations I carried out vegetation transects in two of the larger kohekohe forest fragments in the Te Puka valley K229 (Technical Report page 96; Te Puka A site) and of K224 (Technical Report page 97; Te Puka B site).

32 For K229 there is clearly a predominance of poles and small trees with 70% of kohekohe stems less than 30 cm diameter (dbh). This is a strong indication of recent origins and I can assure the Board that based on these results this stand and the similar smaller fragments downstream are young forests that have regenerated following land clearance, i.e. 120 to 160 years. K229 does however still contain a proportion of old trees that survived land clearance (stems greater than 50 cm dbh). The presence of these trees would have ensured the rapid regeneration of kohekohe within the pioneer shrublands that would have formed following clearance. This would have been assisted by a lower level of pasture management on these very steep lower slopes (greater than 30°). The extent of vegetation clearance (absence of logs, stumps, boulders) and quality of pasture (turf cover, reduction in erosion, absence of shrubs) increases within the Te Puka on the 'relatively' gentle mid and upper slopes (less than 30°).

---

[6] FULLER, S. A., (1985): Kapiti Island Vegetation: Report on a vegetation survey of Kapiti Island 1984-1985. Department of Lands and Survey, District Office, Wellington. Miscellaneous publication. 43p.

FULLER, S. A., (1987): Kapiti Island Vegetation Map. NZ Land Inventory NZMS 290 Part Sheets R25 & 26, Department of Survey and Land Information. Edition 1. V. R. Ward, Government Printer, Wellington.

[7] FULLER, S. A., (1986): Successional Patterns and Forest Dynamics; Taepiro Valley; Kapiti Island 1986-1990. Diploma of Applied science investigating impact of pests, climate and soil on lowland forest successions and the development of predictive models.

33 While this stand is mostly young, and despite the impacts of stock and associated edge effects, it is still clearly of ecological value. My assessment scored it using accepted assessment criteria as being of moderate value against the benchmark which is a mature remnant forest such as is found on the eastern slope. This value has been acknowledged in my approach to migration as described in my rebuttal.

34 Site K224 is slightly different. Stem measurements of this riparian forest, show a greater number of larger and older trees, and more canopy diversity. I surmise that more trees survived land clearance and were protected from fire on the steep slopes within this gorge. This site is largely avoided through bridging, although I have conservatively allowed in my calculation of mitigation for the potential loss of the entire stand, as discussed in my rebuttal evidence.

35 Ms Warren raises the issue of roads being a corridor for weeds.[8] This potential effect is already addressed in the EMMP and consent conditions.

36 Ms Warren seeks conditions to minimise impacts on forest remnants in Te Puka. This is already addressed in the EMMP and consent conditions.

EVIDENCE IN CHIEF OF SHONA MYERS

37 Ms Myers supplementary evidence focuses on the kohekohe forest fragments and regenerating shrublands of the Te Puka. In particular she argues the kohekohe forest is more extensive and ecologically significant than I have mapped in Technical Report 11. In addition she argues that the kohekohe forest fragments are not isolated but are part of semi continuous areas of significant indigenous forest and shrubland habitat.[9]

Significance of kohekohe forest

38 Ms Myers comments on a number of occasions that the kohekohe forest is ecologically significant. I agree that these stands have ecological value and, with good management and the exclusion of stock, would recover.

39 In paragraph 2.4 she comments that the areas of kohekohe forest "comprise pure stands" and "are likely to be remnants of the original forest type". Ecologically the description of these fragments as pure stands (canopy dominance by a single species) is not a good indicator of naturalness or representativeness, but is a strong indicator of succession in the presence of ungulates (sheep, cattle, and goats) after major disturbance.

40 I have discussed my views on the origins of these stands in response to Ms Warren's evidence.

---

[8] Warren, Supplementary evidence, paragraph 33.

[9] Myers, Supplementary evidence, paragraph 2.2.

Extent of kohekohe forest

41 The vegetation survey and mapping I conducted for this Project was completed between November 2009 and February 2010 using the then most current aerial photographs dated between 2006 and 2008. It was then reviewed and revised later in 2010 after receipt of aerials flown in February 2010.

42 I have extensive experience carrying out vegetation surveys and mapping, have used the most accurate photography available and informed my descriptions of key forest communities with vegetation transects. In my opinion my mapping accurately reflects the extent of kohekohe forest, riparian vegetation and scrub within the Te puka valley at the time of the survey. Further the mapping has been done at a scale appropriate for an assessment of effects.

43 Ms Myers directs her comments, that the kohekohe forest is more extensive and ecologically significant that has been mapped,[10] to maps 11.9 in the Technical Report 11. I would note that the vegetation mapping which informed development of the significance maps, can be found in Technical Report #6, Appendix 6.M where my vegetation boundaries overlay the 2010 aerial photographs. This is a much more detailed map than that which she draws her opinions from.

Extent and significance of shrublands

44 In the ten years that I have been visiting these valleys I have seen a continuous slow expansion of pioneer shrublands within the Te Puka and the upper Horokiri valleys. This expansion appears to have increased in recent years due to an apparent reduction in management of the lands in and around the designation.

45 This rural landscape is therefore in a state of relatively rapid regeneration, and pioneer shrublands of gorse, *Olearia solandri*, tauhinu, bracken and ring-fern are likely to turn much of the remaining pasture to shrubland in another 5-10 years if they are not controlled. This incidentally provides good evidence of the likely success of the mitigation programme proposed.

46 On intensively managed farms I would expect to see periodic removal of areas of these pioneer shrubs by herbicide, but over the past ten years I have not seen any broad scale application of brush weed killer in the Te Puka or upper Horokiri. I have recently seen areas where regenerating gorse and tauhinu have been sprayed in the lower Horokiri (outside the proposed mitigation areas) and in parts of Ration and Pauatahanui catchments near the alignment.

47 If there is no further control of these shrubs by the landowner they will continue to spread and merge. This natural regeneration is recognised in the management plan and the intention is to promote and encourage it through enrichment and addition buffer planting.

---

[10] Myers, Supplementary evidence, paragraph 3.1.

SUPPLEMENTARY EVIDENCE OF EMILY THOMSON

48 Ms Thomson briefly comments on the kohekohe stands within the Te Puka and their value. She makes the following recommendation:

Recommendation:

49 This concern could be resolved by the following amendment to condition G.15.G (including the duplication of that condition in the designation conditions as proposed in paragraph 14 of the 3 February 2012 Planner and Ecologist Joint Conferencing Statement):

50 "90 ha of kohekohe forest habitat to be created in the Te Puka catchment to mitigate the loss of this habitat type in this stream catchment".

Calculation of mitigation

51 As discussed in my rebuttal evidence (paragraph 125 to 132) I have used a simple model to determine the appropriate level of mitigation for loss of valued vegetation.

52 Applying this model to just the Te Puka valley produces the following results:

52.1 Mature and maturing forest (predominantly kohekohe forest) beneath the construction footprint is 5.3 ha;

52.2 To allow for uncertainty in final design I have assumed all forest within the designation is potentially at risk which is equivalent to 16 ha (this is 3 x the area of vegetation beneath the footprint); and

52.3 Then I have provided a further 3 for 1 multiplier (16 ha x 3) to cover the issue of time delay, deriving a required mitigation value of 48 ha of revegetation.

53 As a worst case, if all indigenous forest within the designation is cleared (16 ha) the resulting overall mitigation in the Te Puka would be as low as 3 for 1. I would argue that this is highly unlikely but as added comfort have ensured that all stands of regenerating and mature forest in this catchment are listed as valued habitats in the EMMP (Section 3.2) and are covered by consent conditions (NZTA.47.A and NZTA 47.B), to ensure loss is minimised.

54 If, however, the level of vegetation clearance can be restricted to that of the current construction footprint (5.6 ha) the overall mitigation ratio will be 11 for 1. From my experience on other projects it is likely the actual loss will be between the two numbers and a final multiplier of 6 for 1 would be acceptable (e.g. if 10.5 ha was lost).

55 I therefore confirm my opinion that revegetation of 48 ha for loss of forest in the Te Puka is appropriate and conservative.

Identification of Mitigation Areas

56 Having determined the quantum of mitigation we turn to determining the location of mitigation sites and the treatments to be used.

57 Within the Te Puka I have proposed the retirement of the western slopes above the road to the ridgeline, and the slopes and stream bed to the east of the road up to the Akatarawa forest. This gives a total of 115 ha of land to be protected.

58 On this land I have proposed the following (see rebuttal evidence Annexure 10, Map 1):

58.1 Total planting and enrichment - 49.1 ha;

58.2 Retirement and protection of existing mature and seral forest - 11.4 ha;

58.3 Retirement of pasture and natural regeneration - 48.6 ha (upper slopes); and

58.4 Management of 5.9 ha of plantation pine (valley floor).

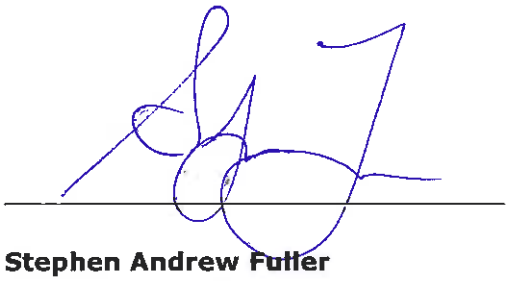
59 This gives a total of 60.5 ha of active revegetation combined with protection of existing indigenous forest (in addition to the retirement of pasture and management of plantation pine). This is more than the 48 ha required for loss of seral and maturing forest, but also includes allowances for loss of indigenous scrub.

60 In conclusion, I remain convinced that the quantity of required mitigation for loss of kohekohe forest (48 ha) is appropriate and that the retirement and revegetation proposed within the Te Puka valley meet these requirements.

61 One final comment on Ms Thomson's recommended condition is that it seeks to create "kohekohe forest habitat". Ecologically speaking pure kohekohe forest is a relatively unnatural community and I had not considered revegetation activities would seek to create systems such as this. In my opinion the revegetation objective for this valley should be to restore coastal podocarp-broadleaf forest.

62 Overall I am comfortable that consent condition (NZTA 47C) will provide protection and restoration of appropriate quantities of land of mitigation for adverse effects of the project. If however, it is agreed that a condition is needed that is specific to the Te Puka valley I would modify Ms Thomson's proposed condition as follows:

"**48 ha** of **lowland podocarp - broadleaf forest** habitat to be created in the Te Puka catchment to mitigate the loss of this habitat type in this stream catchment.



Stephen Andrew Fuller
16 February 2012

LIST OF ANNEXURES

1 Photos of cattle pugged pasture.

2 Photos of blocked (in pasture) and open stream channel (in bush).

ANNEXURE 1

Photo 1 & 2: Horokiri Stream immediately below Wainui Saddle, January 2010.

Photo 3: Horokiri Stream south of Wainui Saddle, January 2010.

Photo 4: Horokiri Stream near rush and sphagnum bog (mid valley) March 2011.

ANNEXURE 2

Photo 5: Mid Horokiri stream showing seepage across colluvial soils (March 2011).

Photo 6: Same tributary as above showing flushing of channel beneath pioneer community of gorse and tauhinu (March 2011).