

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

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

Dated: 20 January 2012

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

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 evidence of:
 - Lynn Adams, Expert witness terrestrial fauna, DOC
 - Paula Warren, Expert witness terrestrial ecology, Rational Transport Society.
 - Shona Myers, Expert witness terrestrial ecology, Kapiti Coast DC
 - Dr Matt Baber, Expert witness terrestrial ecology, DOC
 - Ms Emily Thompson, Senior Planner for KCDC.
- 5 This evidence also draws on the results of witness conferencing for terrestrial ecology that were carried out on 8 and 16 December. I attended both sessions and participated in the preparation of a joint statement as a result of those meetings.
- 6 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 and this rebuttal statement to set out my opinion on what I consider to be the key terrestrial ecology matters for this hearing.
- 7 Consistent with my EIC, in this statement of evidence when referring collectively to the NZ Transport Agency (*the NZTA*) Project¹, the Porirua City Council (*PCC*) Project² and the Transpower New Zealand

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.

Limited (*Transpower*) Project³ I will use the term "Transmission Gully Proposal" (and hereafter, *the Proposal*).

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

SUMMARY OF EVIDENCE

- 9 The main points of my evidence are:

- 9.1 The submitters' evidence, which I respond to in this rebuttal, has not caused me to depart from the opinions and conclusions expressed in my evidence in chief.
- 9.2 A number of points of clarification and refinement of consent conditions and management plan actions have been agreed as part of the Joint Caucusing Statements. These meet a number of the issues raised by submitters. I also agree with some other matters of detail recommended by submitters for inclusion in conditions, the EMMP and SSEMP.
- 9.3 I understand that the submitters' experts consider there is uncertainty as to whether the assessment has adequately accounted for potential adverse effects, including potential extinctions, and has provided for sufficient mitigation with regard to small and microscopic organisms.

It is my view that my assessment was carried out according to accepted practice with a focus on the protection, minimisation of loss, or restoration of habitats upon which organisms, large and small, are reliant. I do not believe that extinctions of small organisms are likely.

- 9.4 Another outstanding matter for submitters is whether I should have used a biodiversity offsetting model to calculate the necessary quantum of mitigation. I believe the simple tool I have used to determine mitigation requirements for loss of terrestrial habitat is appropriate and the quantum of mitigation it has produced is consistent with other projects.
- 9.5 A further outstanding issue for submitters is whether the quantum of mitigation proposed is sufficient.

Overall I believe the 250 ha of land retirement and revegetation that I calculated to mitigate for adverse effects on terrestrial ecology, is appropriate and sufficient.

However, I would note that when combined with the additional

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.

land retirement that is needed to protect streams as part of freshwater mitigation, a total of 426 ha of land is identified for retirement and management. Of this, 271 ha is earmarked for enrichment and revegetation, and 155 ha will be left to regenerate naturally, or is already in regenerating forest (See Annexure 6).

In addition, a further 92 ha of indigenous planting is proposed as part of landscape mitigation. This planting will also have ecological value and contribute to the total quantity of habitat that will be restored by this Project.

Overall, it is my view that the combined total of 518 ha of land retirement and revegetation that is proposed, significantly exceeds the 250 ha needed solely to mitigate for effects on terrestrial ecology, and will lead to long term ecological benefits for the Porirua Harbour Catchment.

- 9.6 A key outstanding issue raised by submitters is the recommendation for ongoing predator and pest control in adjacent forest land by way of biodiversity offsetting.

I do not agree that significant residual effects will occur following mitigation that would require offset mitigation. Further, I believe that predator and pest control has been appropriately identified for specific mitigation activities with appropriate durations and review clauses.

- 9.7 Further to the discussion on revegetation, I have been involved in recent discussions between NZTA and GWRC regarding the possible transfer of a portion of mitigation planting from the Horokiri Valley to Duck Creek, combined with the retirement of a large proportion of the upper catchment and main stream channel in Duck Creek. I understand that agreement has now been reached on this proposal.

I confirm that this proposal will not materially affect restoration within the Horokiri Valley which will still be retired and protected, but will lead to a range of long term benefits within Duck Creek including reduced slope erosion and will increase the total area of land retired for ecological mitigation from 426 ha to 501 ha.

I note that if mitigation for terrestrial, freshwater, landscape and stormwater treatment wetlands is combined, the total area of land set aside for mitigation will be 627ha. I recommend this change to the Board.

EVIDENCE IN CHIEF OF MISS LYNN ADAMS

- 10 In her statement of evidence in chief, Ms Adams discusses two aspects of my assessment of ecological effects; native bats, and herpetofauna (lizards).

Bats

- 11 In paragraphs 11 and 12 Ms Adams identifies the need for further monitoring and describes the methods that might be used. I accept that the assessment of potential effects on bats is incomplete. When I completed my assessment (Technical Report 8) I expected that I would be able to carry out sufficient additional sampling prior to this hearing to at least confirm the presence of bats within the Project area. However, access to the site has continued to be problematic, and additional sampling has not been possible.
- 12 In paragraphs 13 to 15 Ms Adams highlights the importance of roost trees and I agree that protection of roosts trees is vital for protection of populations of bats. As discussed in my ecological impact assessment (Section; Project Shaping), a fundamental design change that has occurred between the preferred alignment and the existing designation is movement of the alignment from the eastern slopes of the Te Puka and Horokiri valley's to the western slopes. This avoids all remnant forest including the mature emergent podocarps that are a preferred tree for bat roosts (among their other values). It is my view that this design change has avoided all obvious roost trees. However, it is possible that a roost may be present within the kohekohe fragment (K229) a large portion of which will be lost beneath the Project footprint. While this fragment is dominated by young trees, it contains a small number of mature trees that may have cavities suitable for bats. This remains a risk that needs to be resolved through additional investigations and conditions that ensure that, if bats are present and adverse effects are observed, a process for consideration of appropriate mitigation is required.
- 13 In paragraph 16 to 18 Ms Adams describes the issues around successful mitigation for bat species including trialling of artificial roost boxes, and capture and relocation successes and failures. I agree with her discussion and the issues she raises.
- 14 In her paragraph 18 she recommends three conditions to address the potential effects on bats by way of additional survey work and planning. I support inclusion of these proposed conditions.

Lizards

- 15 In paragraphs 19 to 21 Ms Adams discusses the limitations of current methods for detection of our indigenous lizards, and confirms that I have acknowledged these limitations in my assessment.
- 16 In paragraph 22 she supports my suggested approach to management and mitigation for lizards, but seeks more detail in the management plans, and additional consent conditions. Mr Kyle

makes a similar comment in his Section 42 report (Page 76, paragraph 5).

- 17 I would note that in our assessment and in the draft EMMP we have identified the need for permits from the Department of Conservation for the capture and transfer of any species including lizards, land-snails and fish. The Department's permits will require detailed management plans. Because of this I did not feel that additional detail needed to be provided at this stage of the assessment as the matters of concern to Ms Adams will be picked up during the Department's permitting process. Therefore, while I am comfortable with the conditions that Ms Adams has proposed (in paragraphs 23 and 24 of her evidence) they are likely to result in a repetition of the conditions that will apply to any permit imposed by the Department.

EVIDENCE IN CHIEF OF PAULA WARREN

- 18 In her statement of evidence in chief, Ms Warren raises concerns regarding small organisms, plants, fungi, invertebrates, and micro-organisms such as bacteria that were not sampled or discussed in my ecological impact assessment.
- 19 From paragraphs 18 to 42 Ms Warren discusses a range of mechanisms involved in speciation and population survival in fragmented landscapes. Her discussion encompasses classic island bio-geographical theory and I agree with the range of mechanisms she describes. In paragraphs 51 to 58 she discusses genetic variability and biodiversity and I also have no issue with the mechanisms she describes.
- 20 Ms Warren acknowledges that for most of the groups she has listed we cannot know what is present as for many groups most species have not been described, and we know little or nothing about their habitat requirements or distributions (paragraph 43 & 44).
- 21 Because of this lack of knowledge and the limited ability of many of these organisms to disperse Ms Warren believes there is a risk of local or global extinctions of species in the short or long term (paragraph 45) and that we will have no way of knowing how significant the impacts of these extinctions will be.
- 22 Because of the difficulty of studying these organisms, the normal focus of conservation management and ecological assessment efforts are on vascular plants, vertebrates and larger invertebrates for which there is a good body of research and usually some understanding of their roles in the local ecology. This is a logical and pragmatic approach and is standard and accepted practice.
- 23 I agree with Ms Warren that in the absence of acceptable tools for the study of small organisms, habitat diversity has been used as a proxy (paragraph 45). That is, if we can protect, restore or re-create

appropriate habitat the range of species that occur or are obligate to it will also be protected or restored.

- 24 For example in our assessment we identified that the boulderfields of the Te Puka and Horokiri are potentially important habitats for lizards and *Peripatus* and have recommended a number of actions for the protection of boulderfields where possible, and creation of replacement habitat where loss cannot be avoided. If the creation of new habitat is carried out with care so that it contains all the components necessary for colonisation and the maintenance of viable populations of lizards, then the micro-organisms that also live in this type of habitat can also colonise it.
- 25 However, the key issue for Ms Warren remains, which is, will the initial destruction of habitat such as boulderfields lead to the local, national or global extinction of micro-organisms which are unique to each boulderfield, due to isolation which has led to speciation (paragraphs 48 and 49). Further, she argues that it is impossible to recreate the environments upon which these micro-organisms are reliant, because these habitats are too diverse and reliant on a range of factors that cannot be recreated.
- 26 Ms Warren concludes⁴ that destruction of some habitats could result in local or global extinctions. She notes that:⁵

"How likely this is will probably mostly depend on whether all of a particular habitat type in an area is affected, or whether only part of that type will be affected."

- 27 I address this point below.

Rarity of Habitat

- 28 At the commencement of caucusing I was requested to provide additional information on the extent of lowland forest such as that found in the Te Puka valley, and boulderfield habitats within the ecological district. These were identified by the caucusing team as the ecological hotspots on the route.
- 29 A first question is whether the habitats found within the Te Puka and Upper Horokiri, rare, uncommon, or unique.
- Extent of Boulderfield Habitat:***
- 30 All scree and boulderfields in Duck creek catchment, and the western slopes of the Te Puka and Horokiri are on Class 7e1 land with Makara Steepland soils, and all boulderfields on the eastern slopes of the Te Puka and Horokiri are on Class 7e2 land with Ruahine Steepland soils.
- 31 In my experience Makara and Ruahine Steepland soils and the boulderfields that form on them are ubiquitous features of the

⁴ At paragraphs 49 and 64 of her evidence in chief.

⁵ At paragraph 49 of her evidence in chief.

Wellington Region wherever slopes over 35° occur. Further they are abundant within all catchments surrounding the TGP route.

- 32 The areas of these soil types within the designation, study area, and ecological district (ED) are as follows:

Class	Ecological District	Area of soil type within Designation	Area of soil type within Study Area	Area of soil type within ED ⁶
7e1	Western slopes of Duck and upper Te Puka and Horokiri (Wellington ED) Makara steep-land soil	92	4,095	11,709
7e2	Eastern slopes of upper Te Puka and Horokiri (Tararua ED) Ruahine steep-land soil	12	788	46,920

- 33 So, within the designation are 104 ha of slope likely to contain boulderfield and scree habitat. The actual area of scree and boulderfield within the designation may be in the order of 10% to 20% of this amount; assuming boulderfields are mostly found on the lower 25 to 50 m of a slope multiplied by the measured slope length).
- 34 Within the adjacent Akatarawa forest 9,100 ha of this soil type is present and within the Wellington and Tararua Ecological Districts Ruahine and Makara steep-land soils cover 58,000 ha.
- 35 In my experience anywhere these steep-land soils are found you will also find scree and boulderfields on their lower slopes. My conclusion is therefore that the boulderfields found along the TG designation are not rare, uncommon or unique and are well represented within these and adjacent catchments and regionally.
- 36 Examples of scree habitat on these soils within the Te Puka are provided as Photos 1 to 4 in **Annexure 1**.

Extent of Coastal/Lowland Kohekohe Forest & Tawa Podocarp Forest:

- 37 Coastal kohekohe forest is an under-represented forest type in the Wellington, Tararua and Foxton Ecological Districts which the designation intersects. For this reason we assessed the small fragments within the Te Puka valley higher than the earlier Wildland SNA survey⁷.

⁶ Areas derived from NZ Land Resource Inventory. See also PAGE, M. J. 1990: New Zealand Land Resource Inventory, land use capability extended legend of the Wellington Region. Technical Report 26 DSIR Land Resources.

⁷ Wildland Consultants 2003; Kapiti Coast District Council 2002-2003 Ecological Sites Survey. Contract Report 662.

- 38 Past surveys record approximately 1,250 ha of coastal kohekohe and tawa-kohekohe forest protected in 42 reserves, covenanted sites or on Council land within the Wellington, Tararua and Foxton Ecological Districts⁸. In addition they record a further 60 unprotected sites of coastal kohekohe and kohekohe-tawa forest totalling 575 ha. Combined this gives a total of 1,820 ha of this forest type locally including approximately 130 ha of mixed tawa-kohekohe forest on the eastern slopes of the Te Puka Valley and in the adjacent Wainui Catchment.
- 39 Therefore while this forest type is under-represented and fragmented regionally the loss of in the order of 3.5 ha of this vegetation type within the Te Puka valley equates to less than 0.2% of the remaining forest within the relevant ecological districts. I do not believe this relatively small loss is significant at the scale of these Ecological Districts. Notwithstanding this, I consider mitigation for this loss is necessary and my recommendation has been accepted by NZTA.
- 40 Photos 5 to 12 in **Annexure 2** show each of the kohekohe fragments located on the western slopes of the Te Puka.

Habitat Continuity and Dispersal

- 41 Ms Warren concludes⁹ that our assessment of significance and of potential adverse effects to flora and fauna is inadequate, while acknowledging that the current state of scientific knowledge is not sufficient to allow us to carry out this work.
- 42 I cannot prove that extinctions will not occur as there is no method currently available that can determine whether a mite, collembola, bacteria or fungus found in a patch of soil or amongst the roots of a tree is genetically unique to its location, to the bush fragment, to the ecological district or to New Zealand.
- 43 However, we are not discussing an isolated forest remnant located in a hundred hectares of improved pasture. The fragments of forest, boulderfields, and soils that will be lost beneath the road footprint lie in close proximity to the 15,500 ha Akatarawa Forest; typically no more than 40 m distant, and usually closer than 20 m.
- 44 These habitats are therefore in my view nearly contiguous; even for poorly dispersed species, and in my opinion the likelihood of unique species of micro-fauna occurring only metres from this forest, yet being entirely unique and at risk of local or global extinction from this project, is extremely remote.
- 45 Photo 13 in **Annexure 3** shows the valley floor of the upper Te Puka and the relationship between regenerating vegetation on the western

⁸ The following sources are referenced in full in Technical Report #6: Fuller 1985, Wassilieff et al 1986, Biological Resources of the Wellington Region 1984, Wildland Consultants 2003, Boffa Miskell Limited 2004.

⁹ Paragraph 60.

slopes and the forest remnants of the Akatarawa forest on the eastern slopes which demonstrates this point.

Recommendations

- 46 While I believe that the risk of local or global extinctions of species as a result of the Project is extremely remote, I agree with a number of Ms Warren's recommendations, which are extensions of the agreements reached during caucusing.
- 47 In particular, the assemblages of native species in the soils and on the plants within the footprint can be preserved through the reinstatement of boulderfields on these slopes and careful use of forest floor humus and debris, and the use of mulch from cleared native vegetation, for revegetation of retired slopes (Joint Statement Paragraph 23).
- 48 Reinstatement of boulderfield habitat was a recommendation of Technical Report 11 and required in the EMMP, and is one of the objectives set out in condition E.22 of the proposed resource consent conditions. In addition the caucusing group agreed that design principles are needed to ensure reinstatement of boulderfields achieves this objective (Joint Statement Paragraph 24 & 25).

Conclusion

- 49 In summary I believe I have followed accepted practice in carrying out my assessment of effects; that is I have identified important habitats by the distribution of indigenous vertebrates and vascular plants for which a good body of knowledge exists. I have then focused on habitat protection, restoration and if necessary reinstatement, to ensure persistence of communities of flora and fauna that rely on those habitat including small organisms for which there is little or no body of knowledge.
- 50 Ms Warren is concerned that accepted practice is not sufficient to assess the risk of extinction or loss of genetic diversity of small and very small organisms, but accepts that there are currently no methods available that would satisfy her concerns.
- 51 I cannot prove that loss of genetic diversity will not occur, but neither can Ms Warren prove that it will. However, in my opinion the risk of extinctions is remote. I base this opinion on the extensive areas of equivalent habitats that lie in close proximity to those areas that will be affected.
- 52 I am, however, happy for consent conditions and management plans to be made more explicit regarding the manner and objectives of restoration of boulderfields, and revegetation of barren hill slopes. The caucusing group has agreed to this (Joint Statement Paragraphs 23 to 25).

EVIDENCE IN CHIEF OF SHONA MYERS

53 Ms Myers primary concern is that the mitigation currently proposed is inadequate and she makes a number of recommendations for additional mitigation. They include

- Additional mitigation for loss of kohekohe fragments in the Te Puka.
- Mitigation for impacts on MacKays Crossing wetland.
- Mitigation for effects on birds and bats.
- Mitigation to include ongoing animal and plant pest control, not just within the Project area but in adjacent habitats.
- Changes to consent conditions to ensure certainty of outcomes and long term monitoring.

MacKays Crossing Wetland

54 Ms Myers discusses her concerns for this wetland in paragraphs 6.5 to 6.7. In particular she argues that mitigation should be provided for loss of wetland habitat.

55 MacKays Crossing wetland is largely contained within the Mackay's Crossing Wildlife Reserve (6 ha) (DOC Conservation Unit R26050), however a portion of this wetland (3.2 ha) extends south beyond the boundary of the reserve and into land owned by NZTA. The proposed designation boundary at this location follows the property boundary and therefore includes a portion of wetland.

56 Within the designation the wetland is essentially in two parts, raupo rushland to the north, which is contiguous with the main body of the wetland, and crack willow, swampy pasture, rushland and weedland to the south.

57 There is currently no intention to carry out any work within the Raupo wetland. It is only included in the designation as it was expedient to align the designation boundary with the property boundary. Avoidance of this wetland was one of the desired outcomes of the preferred alignment and this has been achieved.

58 However, it is proposed to create a stormwater treatment pond within the willow and swampy pasture to the south of the wetland proper. This pond will collect runoff from the new road formation and provide treatment prior to discharge to the Whareroa Stream which runs through the wetland. The maximum area of earthworks, and therefore clearance of willow and swampy pasture, is 1.2 ha.

59 I would note that the treatment pond has not been designed and so the full extent is not known. This was deliberate as the technology for these treatment systems continues to evolve, with greater

treatment efficiencies now being achieved with smaller ponds. It was our expectation that the final design of treatment ponds along the route would follow evolving best practice. It may provide additional comfort if this were specified in conditions and I am happy to recommend this.

- 60 With regard to mitigation for wetland loss, wetlands will be restored at two sites along the route;
- 60.1 a large swampy terrace in mid Horokiri Valley where approximately 1 ha of heavily grazed rush land and sphagnum bog will be protected and revegetated; and
- 60.2 at Lanes flats where a combination of riparian, wetland and landscape planting will revegetate an area of approximately 7.9 ha of these swampy flats.
- 61 In addition a total of about 1 ha of stormwater treatment wetland will be formed at a number of locations along the route which will provide additional benefit.
- 62 Combined I believe that any potential effects on MacKays crossing wetland proper, or on the swampy pasture and weedland is adequately mitigated.
- 63 A map and photograph of MacKays Crossing wetland are provided as **Annexure 4**.
- Loss of remnant kohekohe forest in Te Puka Stream**
- 64 In paragraphs 6.8 and 6.9 of her evidence, Ms Myers supports the efforts taken to avoid or minimise effects on forests within the Te Puka.
- 65 In paragraph 6.9 and 6.10 she supports the restoration of slopes within the Te Puka and recognition of kohekohe fragments as valued habitats for which the management plan should seek to further avoid or minimise effects.
- 66 In her paragraph 6.11 Ms Myers agrees that the proposed replanting and retirement of land will be substantial and supports the quantum of mitigation proposed. However, she comments that the mitigation will be primarily in the Horokiri Valley. This is incorrect. Map 11.11a of my EIA (attached for ease of reference as **Annexure 5**) shows the areas proposed to be retired and revegetated within the Te Puka. A total of 115 ha will be retired and fenced, essentially the western slopes from the ridgeline down to the upper road footprint and the valley floor from the lower road footprint across to the forests on the eastern slopes.
- 67 Of this 115 ha the EIA proposed that 54 ha would be retired and allowed to regenerate naturally, 45 ha would be enriched where shrublands currently exist, and 15 ha of pasture would be

revegetated. Revegetation sites were selected to buffer and extend the affected kohekohe forest fragments and heal earthworks within the valley floor.

- 68 The areas of the various proposed treatments, divided into terrestrial and riparian, are as follows. Note that retirement sites include areas of pasture, scrub and forest.

TERRESTRIAL MITIGATION TREATMENTS	Area (ha)
Retire and natural regeneration.	
• Currently in pasture	34.1
• Currently in scrub and seral forest	2.3
• Currently in mature forest	9.2
• Currently in plantation pine	5.9
Enrichment planting	44.8
Revegetation	13.3

RIPARIAN MITIGATION TREATMENTS	Area (ha)
• Retire and natural regeneration	3.2
• Enrichment planting	0.4
• Revegetation	1.8

- 69 Within the Te Puka valley 4.5 ha of kohekohe forest lies beneath the road footprint, and a combined total of 11 ha lies within the proposed designation (Table 11-13 EIA). The combined total for the areas of revegetation, enrichment on the slopes and within the valley floor is 60 ha, six times the area of potential loss within the designation, and 13 times the area that lies beneath the Project footprint. I believe this level of mitigation is more than appropriate.
- 70 In her paragraph 6.12 Ms Myers recommends protection of other kohekohe fragments on land purchased by NZTA in the Te Puka Catchment. NZTA has made a commitment to do this and the area of proposed retirement and protection is shown in Figure 11.11a of the EIA.
- 71 In paragraph 6.13 Ms Myers recommends ongoing (in perpetuity) animal pest control and suggests that I do not believe control of animal pests is required. In fact my EIA and the EMMP clearly require consideration of appropriate browser management with regard to revegetation, and predator control where it is required to provide specific benefits for key species. What I disagree with is predator or pest control that persists in perpetuity which I do not believe can be justified as mitigation for actual effects of the Project. I discuss this further in the following sections (Paragraphs 72 & 73).
- Loss of habitat for lizards**
- 72 In paragraph 6.15 Ms Myers again recommends “ongoing” pest control in regard to restoration of lizard habitat, and again states that

I oppose this. Again, I have no problem with pest or predator control where it can be shown to provide a clear benefit that is required as mitigation for an effect of the Project. For example the draft EMMP (Section B5.12) requires pest control for lizard transfers. Further section C. 3.4 provides monitoring objectives and requires pest control to continue until these objectives have been met.

Potential impacts on birds and bats

73 In paragraphs 6.20 and 6.21 Ms Myers again recommends “ongoing” pest control in regard to achieving “wider ecosystem benefits”, and again states that I oppose this. She goes further to recommend that predator and pest control extend into the Akatarawa Forest. In my opinion, all adverse effects on terrestrial ecology can be mitigated within the Project area (with the possible exception of bats), therefore carrying out activities in perpetuity at other locations, which are targeted at providing “wider ecosystem benefits” cannot be justified by the effects of the Project.

74 Again, I have no issue with carrying out predator control for avifauna or bats and predator control may in fact be an outcome of the ongoing bat study that has been recommended. But if it is required it will be targeted to the mitigation of that effect and should continue only for as long as the effect occurs.

Potential impacts on Site K139

75 In paragraph 6.22 Ms Myers recommends consent conditions to ensure protection of K139. This site is listed as a valued habitat in the EMMP (See EMMP, page 13) and these valued habitats are identified in Consent Condition E.22 (g). The caucusing group recommended a change to this condition to clarify the intent of this list (Joint Statement paragraph 29).

Loss of Wetland (K230)

76 There is some confusion here. Wetland K230 will be lost beneath the footprint and mitigation has been determined for this loss. The area that Ms Myers is referring to in her paragraphs 6.23 and 6.24 is an area of sphagnum wetland located and described by BML during this assessment (Technical Report #6, Section 6.3 & 6.4.) and it does not have an SNA designation.

77 However, I agree with the intent of her 6.24, that we agreed this sphagnum wetland should be listed in the EMMP.

Operational Effects

78 I am confused by Ms Myers discussion in paragraph 6.25. My assessment confirms the need for mitigation of vegetation that is lost during construction. Ms Myers appears to also believe mitigation is required for loss of vegetation and habitats during operation.

79 Ms Myers goes on to say that she does not agree with me that the operation of the road will not have adverse effects on vegetation and habitats but does not provide any further information to support this.

The permanent loss of vegetation and habitat she refers to is an effect of construction and is already mitigated.

80 As far as I am aware there will be no additional vegetation or habitat loss that will occur during the operation of the road and no further mitigation is therefore required.

81 Ms Myers also raises the issues of noise, air quality and vehicle mortality. I address noise and air quality later in my rebuttal (paragraphs 137 to 139) and have addressed potential vehicle mortality for bats above (paragraphs 11 to 16).

Adaptive Management Approach

82 In this section Ms Myers puts the case for both independent review of management plans and monitoring results, and also for consultation with TAs, not just the Regional Council.

83 I have no issue with independent review, but consider that the process of developing these plans and gaining approvals from GWRC provides this opportunity.

84 I have no problem with inclusion of TAs in this process and the caucusing group has agreed to this (Joint Statement Paragraph 22).

Transpower Consents

85 In paragraph 6.28 Ms Myers comments that she has not seen an assessment of ecological effects for this work. An assessment was completed¹⁰ and was included within the application documents but appears to have been overlooked by Ms Myers.

Ecological Monitoring

86 Ms Myers feels that the EMMP on proposed terrestrial ecological monitoring is "lightweight and inadequate". I would point out first that the document was prepared as a draft for discussion. Rather than being inadequate, it is incomplete, which is appropriate as it needs to be completed in consultation with the Department of Conservation and approved by the Regional Council. There was also the intention of including, where appropriate, feedback from the caucusing and a number of suggestions have already been made by the caucusing group which will be included. Finally, a number of actions require preparation of more detailed plans in order to obtain permits from the Department of conservation and these are identified in the EMMP. I do not see any value in pre-empting this process.

87 Ms Myers states that monitoring needs to be carried out over a much longer term than the three years that is currently proposed

¹⁰ Boffa Miskell, 2011: Transmission Gully Project: Addendum to Technical Report # 11 (Appendix 11.N). Transmission Line Relocation Project, Prepared for NZ Transport Agency and Transpower by Boffa Miskell Limited. Report No: W09034F_007. 34 pp.

(paragraph 6.32). I agree with this but point out that this is already required. In particular:

- 87.1 Monitoring of revegetation (EMMP Section C.2.3) is recommended to occur annually for three years with recommendations each year for additional work if necessary. It is then to be repeated after ten years to measure the success against revegetation objectives and to make recommendations for additional work if necessary.
- 87.2 Monitoring for lizards (EMMP Section C.3.4) is recommended to occur annually for five years post release. If at the end of five years the restoration criteria are not met the relocation will be deemed unsuccessful and recommendations made for further work or mitigation.
- 87.3 Avifauna monitoring at Wainui Saddle and Porirua Bush is required to occur through construction period and if no effects are observed it can stop.
- 87.4 A monitoring plan for bats (EEMP Section 3.7) is still subject to confirmation of their presence as discussed above (paragraphs 20-23), however, the EMMP currently recommends mortality monitoring for two years post construction and if mortalities are observed additional study or mitigation is required.

- 88 I consider that the review clauses will ensure monitoring occurs for as long as is necessary to ensure restoration objectives are met.
- 89 I have no problem with the development of more detailed trigger thresholds for measuring adverse effects (paragraph 6.32) and the success of any mitigation, and was expecting these to be developed as part of specific restoration plans. I also have no problem with the results being reported to the TAs and this has been agreed in caucusing (Joint Statement Paragraph 22).

Avoidance and mitigation of terrestrial effects

- 90 Ms Myer's conclusion is that the mitigation proposed is inadequate and the approach used in the AEE is simplistic and does not address biodiversity offsets for the Project. She lists BBOP¹¹ principles.
- 91 I disagree with this opinion. I believe the assessment has followed best practice in identifying those values at risk, considering the potential effects without mitigation on the valued components, determining appropriate mitigation and then assessing any residual effects that have not been mitigated.
- 92 Ms Myers states (paragraph 7.2) that national and international standards should be used for calculating biodiversity offsets.

¹¹ Business and Biodiversity Offsets Programme.

However there are currently no accepted national standards and available internationally developed tools are not appropriate to NZ ecology. I also disagree with Ms Myers that there is a need for biodiversity offsetting. I believe all adverse effects on terrestrial ecology that have been identified can be mitigated within the designation and adjacent land owned by NZTA. Additional mitigation measures (or Biodiversity "offsets" as they are described by Ms Myers) are therefore not required.

- 93 Ms Myers lists the BBOP principles and states that we should have used these in our assessment of effects. While I disagree that offsetting mitigation is required I contend that we, via different words, meet the BBOP principles in any case. Specifically:
- 93.1 I consider the mitigation proposed will result in no net loss.
- 93.2 I consider that, in the long term, the land retirement and revegetation proposed for ecological mitigation, a total of 426 ha¹², exceeds the area calculated to mitigate adverse effects on terrestrial ecology, and will lead to ecological gains or benefits within the Porirua Harbour watershed.
- 93.3 I do not consider compensation is required for residual effects on biodiversity as I consider those effects that have not been avoided can be and are proposed to be adequately mitigated.
- 93.4 I consider the mitigation proposed for terrestrial habitat loss is like for like.
- 93.5 I consider my approach to identifying appropriate mitigation sites has taken into account both localised needs and the wider landscape context.
- 93.6 The process of developing the SAR and my assessment has involved numerous workshops and presentations where mitigation was discussed on many occasions. The process for finalising management plans and consent conditions will involve further stakeholder involvement.
- 93.7 All the mitigation proposed considers long term outcomes.
- 93.8 I consider the manner in which we have calculated mitigation requirements is transparent.
- 94 Ms Myers suggests that our approach to developing our AEE has been simplistic (Para 7.3). I would argue that added complexity and the introduction of a range of additional tools do not necessarily produce better or more defensible results and that simplicity is not necessarily a negative. I believe my methods are transparent and produce

¹² Refer Annexure 6.

results that are consistent and appropriate to address the effects of the Project.

- 95 Ms Myers goes on to suggest that mitigation which concentrates only on restoration planting is not sufficient and a broader approach is needed based on "actual adverse effects of the project". Ms Myers does not specify what actual adverse effects will occur that are not currently addressed in our mitigation package. But in any case the mitigation that is proposed is as much about changing land management as it is about putting trees in the ground.
- 96 Ms Myers suggests that calculations of the scale of mitigation should be based on soundly based offsetting model (paragraph 7.4). There is a debate as to the existence of such a model which I discuss later in response to Dr Baber's evidence.
- 97 In 7.5 Ms Myers goes on to list what she feels is needed to reduce and mitigate adverse ecological effects. My comments in relation to each of her matters are provided below:
- 97.1 **Minimising loss of vegetation:** This is already dealt with in the EMMP and consent conditions through identification of valued habitats.
- 97.2 **Minimising effects on MacKays Crossing wetland:** This has been dealt with in caucusing and agreed (Joint Statement, paragraph 28).
- 97.3 **Legal protection:** This was dealt with in caucusing and agreed (Joint Statement, paragraph 13).
- 97.4 **Control of pests and predators:** This has been covered above. I agree that pest and predator control is required for some activities up to the point that mitigation has been successfully achieved. I do not believe it should continue in perpetuity in order to achieve "additional biodiversity gains".
- 97.5 **Protection, Fencing and Buffer planting of kohekohe forest remnants:** This is already proposed EMMP, Section B.4, page 16.
- 97.6 **Standards for restoration planting:** This was dealt with in caucusing and agreed (Joint Statement Paragraph 23).
- 97.7 **The need for consent conditions for revegetation and habitat enrichment:** This was dealt with in caucusing and agreed (Joint Statement Paragraph 23).
- 97.8 **Maintenance and monitoring for more than three years (at least 5-10 years):** This is already recommended in the EMMP, Section C.2.3, page 30.

97.9 **Protection of indigenous lizard bird and bat habitat though pest control:** This is already required for lizards for the duration necessary to achieve the desired mitigation as described in our EMMP, and may be required for bats subject to confirmation of adverse effects, again for the duration necessary to achieve the desired mitigation.

98 In my opinion, with the exception of the issue regarding ongoing pest control beyond what is necessary to achieve mitigation for the Project, all of these recommendations are either already proposed or were discussed and agreed during caucusing.

Proposed Consent Conditions

99 In section 8 of her evidence, Ms Myers lists a number of recommendations for changes to proposed conditions.

- NZTA12: with regard to additional matters to be contained within the CEMP – Agreed.
- NZTA 46: with regard to referencing of the Landscape Management Plan to the plans in Technical Report #11. I do not agree that consent conditions should refer to this Technical Report as I anticipate a number of agreed changes will be made to location, extent and method of revegetation as a result of caucusing and the hearing. I agree, however, that Consent conditions should refer to a final agreed set of plans.
- NZTA 47-50: with regard to additional detail in revegetation plans and Council Consultation - Agreed.
- E1-E19: With regard to requirements for involvement of qualified ecologists in development of EMMP - Agreed.
- E20: With regard to requirements for involvement of qualified ecologists in development of SSEMP - Agreed.

With regard to the need for independent peer reviewers, there are already requirements for consultation with the Department of Conservation, TAs and final signoff by Regional Council. To my mind this means the Regional Council is the report reviewer and so I question why an additional independent peer review is necessary.

I would suggest that appointment of an "independent" peer reviewer is a decision for the Regional Council in the event that their own staff does not have sufficient expertise to assess some or all of the proposed plan for signoff.

- E20 a): With regard detail to be contained with SSEMPs - Agreed (with the caveat that it should not refer the SSEMPs to the plans in Technical Report 11, but to agreed plans).

- E20 c)(iii): With regard to maintenance period and pest control for revegetation - Agreed (and I note this is already required by way of review under the EMMP Section C 2.3).
- E22 a): With regard to pest control in lizard habitat elsewhere on the alignment. I am comfortable for pest control to be carried out as part of browser management at proposed revegetation sites for the period that browser management is required. This will have the benefits for lizards and sought by Ms Myers.
- E22 c): With regard to minimising disturbance to other non-threatened fauna (tui, bellbird, kereru). I disagree with this. I do not believe this condition is workable. Firstly it will be highly problematic whether you can determine quantitatively that construction is affecting birds such as tui given the site is contiguous with 11,000 ha of native forest. If you are able to show there has been an effect, to then require construction be modified to minimise effects on these species could easily lead to perverse outcomes such as extending construction timeframes and the duration of impacts. This is in my view an extraordinary requirement that is not justified. I am comfortable that the construction monitoring focus should be on threatened species as I have required.
- E22 g): With regard to avoiding indigenous vegetation generally, not just "high value vegetation" I note that the definition of Valued Vegetation in the EMMP effectively achieves this, not just focusing of specific sites, but also including indigenous scrub and seral forest.
- E22: With regard to a requirement for ongoing (in perpetuity) control and animal and pest plants in retirement and revegetation areas. I disagree as discussed earlier.

And with regard to long term protection of retirement areas through covenanting I support this, and it was agreed by the caucus group.

- E24: With regard to consultation and peer review. Consultation with TA's is already covered in caucus notes and is agreed.

With regard to the need for independent peer review I disagree as discussed above under E.20.

With regard to expanding ecological monitoring time frames, this is already provided for in the EMMP as discussed above in paragraphs 87 and 88.

- S5: With regard to additional detail for revegetation - Agreed (with the caveat that it should not refer the SSEMPs to the plans in Technical Report 11, but to agreed plans).

100 Other recommended conditions are (paragraph references are to Ms Myers evidence):

- Paragraph 8.15: Again I question the need for independent assessment and peer review of all plans for the reasons discussed above;
- Paragraph 8.16: NZTA has agreed to permanent legal protection for all retirement and revegetation sites.

I disagree with an open ended condition requiring pest animal and plant control.

- Paragraph 8.17: I would note that all planting carried out to date has operated to a set of objectives and guidelines contained within an overarching "Retirement and Revegetation Management Plan"¹³. This is described in Technical Report #11, Appendix 11.A: 'Advance' Ecological Mitigation. I do, however, agree that these guidelines, developed eleven years ago, require review and updating as discussed in the Agreed Caucusing statement (Paragraph 23) and this should be carried out as part of finalising the EMMP.
- Paragraph 8.18: I agree that monitoring is required during and post construction for a duration necessary for achievement of the required level of mitigation, and this is already required in the EMMP.

I also agree that trigger levels should be included in the final EMMP and have already been allowed for in the draft freshwater and marine monitoring plans.

- Paragraph 8.19: I agree that mitigation plans will be required for each of the areas shown in Technical report 11, Appendix 11.11 a-j and would note that this is currently the case for all early retirement sites as per the example provided in Section D the draft EMMP.

101 I note from my review of Ms Myers evidence that while she feels our assessment and the calculation of mitigation has been inadequate and simplistic, she does not recommend any specific additional mitigation that she believes is necessary other than her recommendation for ongoing pest and predator control, which I disagree is necessary.

EVIDENCE IN CHIEF OF DR MATT BABER

102 Dr Baber raised a number of issues which in summary are that:

¹³ Beca Carter Hollings & Ferner Ltd. 2001: Transmission Gully Motorway Management Plan for Ecological Mitigation Land Retirement and Planting. Prepared for Transit NZ.

102.1 My assessment of potential adverse effects on coastal birds is inadequate;

102.2 I have underestimated potential adverse effects on lizards and keystone species;

102.3 I have not considered ongoing edge effects;

102.4 I have not used a "biodiversity offsetting model" to assist in the development of proposed mitigation, but have taken an ad hoc approach;

102.5 Overall, the mitigation is inadequate to address adverse effects and is highly unlikely to achieve the stated aim of no net loss.

103 As a general comment on Dr Baber's evidence I would note that it is almost totally focused on biodiversity, and by extension biodiversity offsetting. However, I note that I did not carry out an assessment of the site's biodiversity, but of the site's ecology. Biodiversity, despite the recent increase in its focus, is a subset of ecology. Ecology looks beyond species and diversity to also consider physical habitat aspects of ecological process and functions. I believe that a number of Dr Baber's criticisms of my assessment stem from his focus on biodiversity and his lack of consideration of wider ecological issues and mitigation benefits.

Terrestrial Biodiversity Values

104 Like Ms Warren, Dr Baber notes that there are a number of groups of organisms for which there is no effective sampling methods. Because of this he argues that there is uncertainty in my assessment that has not been addressed. If this were true and relevant, then this criticism must be levelled at every resource consent application throughout the country.

105 I believe that this is a pointless argument. If the full range of organisms that inhabit a site cannot be known, then focus must turn to the habitat itself. If the habitat is common and contiguous, it is reasonable to assume that the species that inhabit it are similarly common and contiguous unless there is good reason to assume otherwise. If the habitat is uncommon and isolated the converse will be true. In paragraphs 30 to 39 above, I have shown that the boulderfields and forest remnants found within the Te Puka and upper Horokiri are neither uncommon nor remote in this area. I do not believe uncertainty exists.

106 I concede that I have not been able to complete the assessment on bats because of access issues. This was discussed during caucusing and it was agreed that conditions were needed to ensure any impacts are identified and mitigation actions required if necessary. (Joint Statement Paragraph 18-21).

Coastal Bird Values

- 107 In paragraphs 24, 32 to 36 and 39, 52 to 59 Dr Baber raised issues regarding coastal birds. I leave these matters to be addressed by Dr Bull in rebuttal evidence. Dr Bull carried out the avifauna fieldwork and assessment.

Assessment of Effects – Baber Evidence

Terrestrial biodiversity- Lizards

- 108 In paragraphs 42 to 45 Dr Baber believes our assessment of risk to lizards is inadequate and that additional mitigation is warranted. We have required that the key habitat where lizards were found along the route, the boulderfields of the Te Puka and Horokiri be protected where possible and reinstated where necessary. I have recommended capture and recovery prior to construction and monitoring and site management until recovery is proven. I disagree with Dr Baber that this mitigation is inadequate.
- 109 During ecological caucusing we reached agreement on the consent conditions that would provide additional certainty around lizard translocation and boulderfield protection and restoration (Joint Statement Paragraph 26).

Terrestrial biodiversity- Keystone Species

- 110 In paragraphs 46 to 49 Dr Baber argues that keystone species should have been specifically addressed in our evidence and that the mitigation provided is inadequate to address effects on them.
- 111 The approach of our assessment has not been to focus on each individual species unless they have a threat status. A species threat status is the de-facto assessment of biodiversity risk for each species which tells us not only the risk of extinction of that species but the risk to the species of loss of genetic diversity. For species that are locally common and do not have a threat status we have confirmed their presence and distribution, determined their habitat requirement, and dealt with effects on them by assessing their habitat needs and losses and mitigating appropriately.
- 112 What Dr Baber has overlooked is that the revegetation planned is not intended to replace trees lost, but to restore habitat. The planting that is proposed, including that which has already been carried out, has been designed to mirror the types of successions and habitats that would have originally been present. The species selected include plants that are appropriate to the site, and include species that are important food sources for fruit feeding native birds. The intention is that keystone species will be attracted to the revegetation sites, depositing seed from other areas and helping to drive the successions of these areas.
- 113 This is also true of the enrichment planting, which is targeted at “failed successions” that lead, for various reasons, to monocultures of mahoe. The mahoe forests in my opinion are only slightly better habitat than the pioneer shrublands they replace and they persist for

many decades. The enrichment is intended to break this succession stagnation and support increased diversity to each area. Again species are chosen that mirror the original species diversity and which encourage the return of native birds along with their payload of seed.

114 I would also make the point that the fragments of regenerating forest that will be lost within the Te Puka valley lie immediately adjacent to 11,000 ha of remnant native forest of the Akatarawa Forest. The loss of approximately 3.5 ha of secondary forest on the western slopes of Te Puka is, in my view unlikely to result in a measureable change in abundance of key stone species within the wider landscape, although it may result in a minor redistribution of activity.

115 Given that our assessment recommended 84 ha of revegetation, enrichment of 187 ha of pioneer shrublands and retirement of 155 ha of land including over 80 ha of seral and mature forest, I would argue that a significant amount of habitat will be protected, or restored for the benefit of keystone and other forest species, bird, lizard, invertebrate and plant.

Terrestrial biodiversity- Edge Effects

116 In paragraphs 50 to 52 of his evidence, Dr Baber discusses edge effects suggesting that I have not assessed their effect either during construction or during road operation.

117 I consider that I have addressed the issue of edge effects as a component of my scale up calculations for mitigation areas. I discuss this in more detail in my discussion of mitigation multipliers in paragraph 126.

118 With regard to edge effects during road operation, once cut forest edges have been buffered and healed, physical edge effects (temperature, wind, frost, desiccation, weeds) will be limited to the road berms and the bush edge facing the road.

119 The only edge effect that is likely to persist during road operation is one of traffic noise which may reduce bird abundance for some species for a short distance into each bush area. This will not be uniform for all species and some species, particularly generalists, may have higher abundances at the bush margins. Given the extent of proposed land retirement and revegetation, any reduction in bird numbers along forest margins as a result of traffic noise will in my opinion be fully mitigated.

120 Overall I disagree with Dr Baber that operation of the road will result in edge effects that compromise biodiversity values in close proximity to the road and which are not mitigated.

Mitigation

121 In paragraphs 61 to 68 Dr Baber presents a background to biodiversity offsets. By focusing this section on offsetting Dr Baber is clearly of the view that "significant residual adverse biodiversity

impacts arising from [the Project will persist] after [...] mitigation measures have been implemented.”¹⁴

The Habitat Hectare model

- 122 Dr Baber argues strongly (Paragraphs 69-72) for the use of the Habitat Hectare model currently in development. I have seen a number of iterations of this model and other staff within BML have been involved in its application on projects.
- 123 Habitat Hectare is still very much in development, it is not an industry standard, and has not been accepted by ecological practitioners as such.
- 124 I have a number of major concerns with this model despite Dr Baber’s assurances in Paragraph 68. The model has not been standardised and so requires unique manipulations for each site. I believe it is overly complicated, it bases its results on a large number of assumptions that are highly subjective, and because of its various multipliers it can produce perverse results. I predict that if two ecologists of similar ability applied it to a site they would obtain quite different results. I consider that repeatability is a fundamental requirement of any model and I consider that currently the Habitat Hectare model is likely to fail this test. I therefore do not have confidence in this model, and have not used it for this or any other Project.

My determination of mitigation multipliers for the Project

- 125 A multiplier for mitigation of vegetation loss is required for a number of reasons which I discuss below, and I have applied a simple method to its calculation.
- 126 In my assessment I have effectively applied two scale ups. The first centres on my decision to require mitigation not just for the vegetation lost beneath the Project footprint, but for all vegetation within the wider Project designation, at least some of which can be expected to be unaffected. This conservative approach takes into account three things:
- 126.1 There is still some uncertainty over the footprint extent which could arise as a result of, for example, unexpected ground conditions that may require some cut faces to be higher, or fill batters to be gentler.
- 126.2 The likelihood that some activities such as temporary access roads and stormwater treatment will result in land clearance beyond the Project footprint.
- 126.3 Recognition that some vegetation will suffer from ‘edge effects’ where damage extends beyond the area of vegetation removal

¹⁴ Refer Biodiversity Offsets definition, paragraph 61 of Mr Baber’s evidence.

due to wind, frost, desiccation, weed encroachment and so on. Edge effects differ between vegetation types. They can be extensive for podocarp tawa forest (say 40 m), or kanuka forest (say 20 m), less so for kohekohe forest and mahoe forest (5-10 m) and non-existent for shrublands and scrub.

- 127 So for example, taking mature native forest; 6 ha lies beneath the engineered footprint, but we have required mitigation for all 20 hectares of native forest that lies within the designation, an initial scale up of up of 3 times depending on uncertainties with detailed design.
- 128 In addition, replacement of each vegetation type will occur over different time periods resulting in periods of loss of habitat function which is different for each community type.
- 128.1 For indigenous shrublands (e.g. the pioneer tauhinu-olearia shrublands of the upper Horokiri) a canopy can form in five to seven years, a short term loss that is rapidly replaced and so a ratio of 1 for 1 is used. I note that the decision for Project West Wind¹⁵ required a 1 for 1 replacement of tauhinu dominated shrublands as like for like re-establishment of vegetation.
- 128.2 For seral (regenerating) mahoe broadleaf forest twenty to forty years will be needed for a mahoe dominated canopy to form and so a scale up of 2 for 1 is applied.
- 128.3 For maturing secondary native forest (e.g., the kohekohe forest of K229) 40 to 80 years will be required to restore a kohekohe canopy and some emergent species will take 80 to 120 years to emerge, so a scale up of 3 for 1 is applied.
- 128.4 If we were affecting remnant tawa podocarp forest (e.g. the Akatarawa-Whakatikei forest) several centuries would be required for recovery and a larger scale up would have been applied, perhaps in the order of five or six.
- 129 Taking these two scale ups into account: for mature or maturing forest we have an initial scale up from the 6 ha beneath the Project footprint to 20 ha within the designation, and a further multiplier of 3:1 for loss of habitat function. Combined these require 63 ha of mitigation. The best case is that loss of mature forest can be contained to the 6 ha that currently lies beneath the Project footprint in which case the combined scale up will be 10 to 1. However, I anticipate that edge effects and changes during detailed design will increase the loss of vegetation in some areas, and the final scale up may be more in the order of 5 or 6 to 1. I cannot foresee a situation where all mature forest within the designation is lost reducing the

¹⁵ Decision No. W031/2007; paragraph 384.

multiplier to 3 to 1, particularly given consent condition E.22 (g) which requires minimisation of vegetation clearance of valued habitats.

- 130 I believe that the model I have used is simple, and the multipliers are consistent with other projects where multipliers have been used. The tables from Technical Report 11 that relate to this process are presented in **Annexure 6**.
- 131 I would note that the Habitat Hectare model was used for HMR windfarm and produced a multiplier of 7:1 for the replacement of 13 ha of mixed forest, although some iterations of the model that was developed for that project had a multiplier as low as 3:1 for the same forest when different "discount rates" were applied (Dr Keesing pers.com). Further Dr Baber suggests (paragraph 75 c) that a ratio of six times has been proposed at other sites for loss of indigenous forest using the Habitat Hectare model. I believe the multipliers I have derived are consistent with these results.
- 132 I would also note that my calculations require the revegetation of 250 ha of land as mitigation for loss of 120 ha of terrestrial vegetation. However, when the retirement and revegetation that is proposed for terrestrial mitigation, freshwater mitigation, and landscape mitigation are combined, the total quantity of protected land exceeds 518 ha which will include the retirement and protection of 82 ha of mature and regenerating native forest, and the revegetation or enrichment of over 362 ha of pasture and shrubland. For this reason my assessment concluded that the Project will result in net benefits to the local ecology. Dr Baber's arguments do not sway me from this conclusion.

Enrichment Planting

- 133 In paragraphs 73 to 75 Dr Baber discussed the extent of proposed revegetation which I generally cover above. Some specific comments follow.
- 134 In paragraphs 75a & 75c Dr Baber downplays the benefits of enrichment planting. Enrichment is a recognised means of achieving ecological benefit. My experience of successions in Wellington is that where gorse is the pioneer species the successions progresses to a near mono-culture of mahoe and this is clearly occurring along most of the TG alignment.
- 135 Mahoe is browse tolerant and has abundant small fruit which do not need native birds for transport. The monocultures that form are able to persist for decades due to mahoe ability to coppice and invade any canopy gaps that form. Their closed and dense canopy discourages the regeneration of species such as tawa, hinau, pigeonwood, ngaio, and rewarewa that would normally be part of these lowland successions. In my view successful enrichment of these successions can achieve a similar ecological benefit to planting within pasture.

- 136 Examples of gorse to mahoe successions within the Horokiri, Ration and Kenepuru are provided as Photos 15 to 18 in **Annexure 7**.

Edge Effects

- 137 In paragraph 75.d Dr Baber comments that much of the revegetation enrichment and retirement will occur in close proximity to the road, again citing edge effects as an issue.
- 138 This is not correct; the bulk of ecological mitigation is to be found in the retirement of entire catchments of the Te Puka and eastern Horokiri. This was done expressly to avoid creating a large number of piecemeal revegetation sites within the designation and to achieve greatest ecological benefit.
- 139 Where planting will occur in patches along the road alignment to heal forest edges, or stabilise exposed earthworks, or provide landscape benefits, the ecological benefits will not be as great as could be achieved at a larger, more contiguous site, however, these sites will still provide habitat for native fauna tolerant of more urban environments, and will provide linkages (green corridors) for a variety of birds, lizards, invertebrates and the spread of plants. I believe these are real benefits that should be accounted for.

Lizard mitigation

- 140 In paragraphs 76 to 77 Dr Baber discusses Project effects on lizards. I believe this issue was generally addressed by the caucusing group by way of additional detail in consent conditions (Joint Statement Paragraph 26).

Mammalian Pest Control

- 141 In paragraphs 78 to 81 Dr Baber describes the benefits of pest control for mitigation of adverse effects on biodiversity values. I have discussed my views on this above in paragraphs 71 to 74. In short, I do not believe that significant residual effects will occur following mitigation that require offsetting by way of ongoing (in perpetuity) pest control.
- 142 In paragraph 82 Dr Baber recommends widening control of browsers at revegetation sites to cover mammalian predators. I am happy to agree to extending control within revegetation sites to mammalian predators for the duration of the proposed browser management.

Wetlands

- 143 In paragraph 83 Dr Baber argues that I have not proven stormwater treatment ponds will mitigate for loss of natural wetlands. I do not believe I have suggested this in my assessment, but have noted that stormwater wetlands can provide ecological benefits. The degree of wetland mitigation proposed is identified earlier in my rebuttal, paragraphs 60 to 63.

Consent Conditions

144 In paragraph 85 and 86 Dr Baber comments that many issues with consent conditions have been resolved by the caucusing session with the following exceptions:

144.1 He recommends that management, monitoring, and mitigation plans require the written approval of TLAs. I am happy that TLAs are one of the stakeholders consulted but I feel strongly that the final responsibility for approval of these plans must fall to a single agency; in the case of the EMMP that agency should be the Regional Council.

144.2 He recommends coastal bird surveys are carried out. Dr Bull addresses this.

144.3 He recommends a multi-species pest control programme be implemented within the Akatarawa forest over an undefined area and for an undefined time, but presumably in perpetuity as per his original submission (paragraph 82, 86c, 90c). I do not support this for the reasons set out in the preceding sections

144.4 He recommends ongoing pest control be secured through consent conditions. Again I do not support this.

EVIDENCE IN CHIEF OF EMILY THOMPSON

145 Ms Thompson (KCDC's planning witness) promotes a condition on the Transpower consent to require additional planting adjacent to Towers 9A – 11A (see 9.8 – 9.9 of her EIC).

146 Mr Gavin Lister responds in his rebuttal that these towers are on windswept spurs on pasture-covered hills, and if anything, planting would draw attention to the towers, particularly in long-distance views

147 I would further comment that successfully establishing native plants on these sites would be challenging as they are extremely windy, and suffer severe soil moisture deficits in summer. It was for this reason that our mitigation plan for the Te Puka Valley recommended the upper slopes of the Te Puka be allowed to regenerate naturally.

REGIONAL COUNCIL CONSULTATION

148 Following lodgement of the application, discussions were instigated by the Regional Council over the possibility of moving some of the mitigation planting from the Horokiri Valley to Duck Creek. This was seen as providing a number of benefits including protection of erosion prone slopes within this critical stream, and it would support the Regional Council's own plans for Belmont Regional Park.

- 149 These negotiations have progressed and agreement has been reached whereby NZTA will provide additional fencing, retirement and revegetation within Duck Creek, which once complete will be protected by way of a covenant and managed by the Regional Council. Certainty of outcome would be provided by covenanting the land.
- 150 Before I agreed to support this change I first satisfied myself that moving revegetation from the Horokiri would not reduce the overall benefits being sought for terrestrial ecology. My conclusion was that as long as revegetation of the valley floor and lower slopes within the Horokiri continued as proposed and only enrichment planting was reduced, the majority of benefits in the Horokiri would still accrue, and a range of additional benefit would result in the Duck.
- 151 Those areas in the Horokiri that do not receive enrichment planting will still be retired and protected, but will be left to regenerate naturally.
- 152 The possibility of additional retirement and transferring revegetation from the Horokiri to the Duck Creek catchment was discussed generally during the expert conferencing session and the participants were supportive (Agreed Statement Paragraph 16).
- 153 As a result of these discussions we have reviewed our revegetation plans, converting 65 ha of enrichment planting in the Horokiri to 38 ha of enrichment planting and 19 ha of revegetation in Duck Creek.
- 154 **Annexure 6** presents the original EcIA calculations of mitigation areas. **Annexures 8** and **9** present the tabulated changes in area of mitigation and **Annexure 10** presents updated mitigation maps for each site affected. In short these changes result in the following quantum of terrestrial mitigation:
- 306 ha of land retirement;
 - 100 ha of enrichment of pioneer shrublands;
 - 64 ha of revegetation of pasture.
- 155 The land that is being retired, but left to regenerate naturally, currently carries a range of vegetation types. These are highlighted in **Annexure 8**. In short the following areas will be retired and protected:
- 140 ha that is currently in pasture, predominantly the upper slopes of the Te Puka and Duck Creek Valleys;
 - 92 ha that is in pioneer shrubland, predominantly within the Horokiri Valley;

- 23 ha that is in seral forest, predominantly in the Horokiri Valley and where the route sidles across the slope above Cannons Creek and Ranui Heights;
- 11 ha that is in mature native forest, predominantly in the Te Puka;
- 39 ha that is in plantation pine or exotic treeland, predominantly in the Horokiri with some areas within the Te Puka.

156 In addition to the required terrestrial mitigation, large areas will also undergo revegetation to meet mitigation needs for freshwater (28 ha of riparian planting), landscape (92 ha), or as part of development of stormwater treatment wetlands (1 ha). These are detailed in Attachment 8. In short the combined mitigation for the Project will result in:

- 319 ha of land that will be retired from farming and protected;
- 106 ha of pioneer shrubland that will be retired, protected and undergo enrichment planting;
- 201 ha of land that will be revegetated for terrestrial, freshwater, landscape or stormwater purposes.
- This will provide a combined total of 627 ha of active or passive restoration management, an amount that far exceeds the calculated requirements for terrestrial mitigation alone.

157 I am confident that these changes will meet the mitigation requirements for vegetation and habitat loss, and that the support of the Regional Council for this revegetation within Duck Creek, will further strengthen the long term 'green' and 'blue' corridors that in my view will result in long term benefits from the Project.

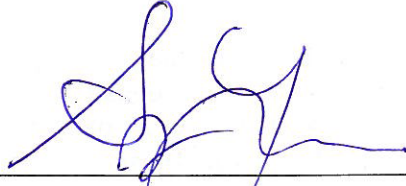
158 I recommend these changes, as presented in the attached tables and maps, to the Board.

SECTION 42A REPORT

159 I have reviewed the Section 42A report and comment on three points. I believe most issues raised in this report with regard to terrestrial ecology, are dealt with in the various discussions above and by way of the agreed caucusing statement.

160 The only matter not discussed above relates to the presence of the (At Risk) wetland plant *Leptinella tenella* which is potentially adversely affected (page 39 s42A report). This wetland is identified as a site for wetland restoration following land retirement. It is not known whether this opportunistic plant will persist once stock have been removed and the wetland recovers, however, this can be

monitored and the plant transferred to other sites if this is considered necessary.

A handwritten signature in blue ink, consisting of several loops and a long horizontal stroke at the end.

Stephen Andrew Fuller
20 January 2012

LIST OF ANNEXURES

- 1 Photos of Boulderfield habitat in the Te Puka
- 2 Photos of Kohekohe forest fragments in the Te Puka
- 3 Context photo of Te Puka Valley
- 4 Map and photos of MacKays Crossing Wetland
- 5 Map 11.11a Technical Report 11 – Areas to be retired and revegetated within the Te Puka catchment
- 6 Original Calculations of Mitigation Areas; Technical Report 11 (August 2011)
- 7 Photos of Gorse – Mahoe successions in the Horokiri, Ration and Kenepuru catchments
- 8 Revised Retirement Areas – Current Vegetation (January 2012)
- 9 Combined Mitigation Planting – Terrestrial, Freshwater, Landscape, Stormwater (Prepared January 2012)
- 10 Revised Terrestrial Mitigation Maps (January 2012)

ANNEXURE 1: Boulderfields & scree slopes

Photo 1 Boulderfield on the western slopes of Te Puka valley in pasture.



Photo 2 As above



Photo 3 Boulderfield on the western toe slopes of Duck Creek.



Photo 4 Boulderfield on the eastern slopes of Te Puka valley under mature forest.



ANNEXURE 2: Kohekohe Fragments within Te Puka Valley

Photo 5 Site K223 (1.2 ha) not affected by the Project.



Photo 6 Site K224. (1.5 ha) This gully forest will be bridged. There may be some construction effects where bridge foundations are formed.



Photo 7 Site K225, (0.7 ha). This stand will be largely unaffected.



Photo 8 Site K226, (0.6 ha) this cluster of trees will be largely lost beneath the road footprint.



Photo 9 Site K227. (0.2 ha) This small stand will be entirely lost beneath the footprint.



Photo 10 Site K228: (1.0 ha) This stand will be entirely lost beneath the Project footprint.



Photo 11 Site K229: (4.1 ha) approximately half of this site will be lost beneath the Project footprint.



Photo 12 Akatarawa Forest on the eastern slopes of Te Puka. This forest will be avoided.



ANNEXURE 3: Te Puka Valley Floor

Photo 13 Te Puka Stream with Kohekohe fragments (K 223 to K 229) on the left (western) slopes, and the start of the Akatarawa Forest on the right (eastern) slopes.



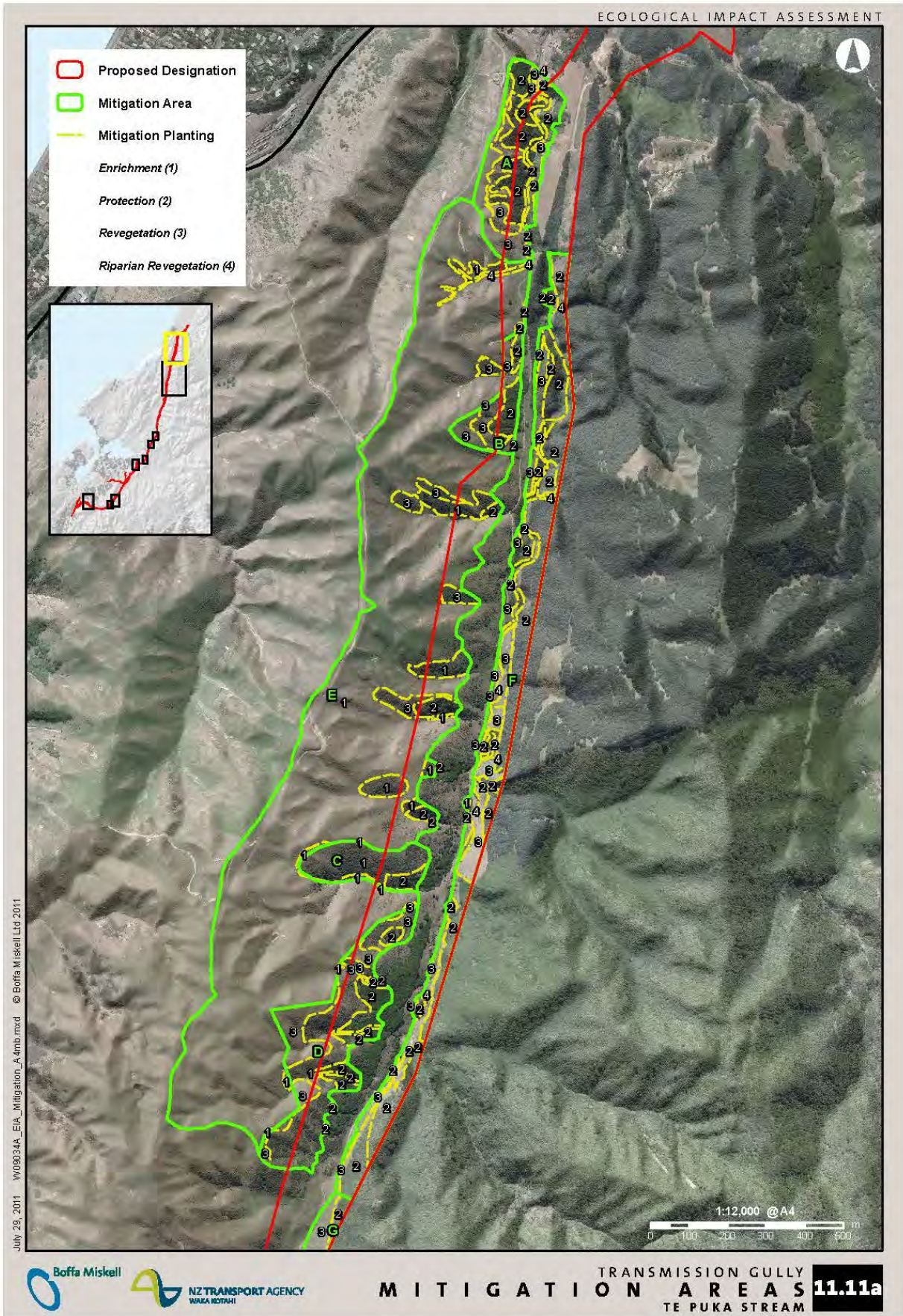
ANNEXURE 4: Map and photos of MacKays Crossing Wetland



Photo 14 MacKays Crossing wetland with Raupo swamp centre and to the right (north), crack willow, swampy pasture and weedland to the left (south). Existing stormwater treatment pond in the foreground that will be incorporated into the new treatment pond structure.



ANNEXURE 5: Map 11.11a Technical Report 11 – Areas to be retired and revegetated within the Te Puka catchment



ANNEXURE 6: Original Calculations of Mitigation Areas

The following tables are taken from Section 10, Technical Report 11; Proposed Mitigation.

Table 11-49: Magnitude of Terrestrial Vegetation Loss and Modification (by feature)

DESCRIPTION (listed North to South)	Ecological Value	Area within study area (ha)	Area beneath footprint (ha)	Area within Designation (ha)
Wetlands	H	34	2	2
Shrublands & Scrub	L	1,202	16	50
Manuka or Kanuka	M	590	4	10
Regenerating broadleaf forest	H	1,527	12	37
Mature or maturing indigenous forest	H	225	6	21
Total		3,578	40	120

Table 11-50: Mitigation Calculation for Vegetation Loss

Habitat Type	Potential Loss (ha)	ECR Ratio	Mitigation Area (ha)
Wetlands	2	x 3	6
Shrublands in pasture dominated by tauhinu	50	x 1	50
Kanuka scrub and low forest	10	x 2	20
Regenerating native forest (Mahoe)	37	x 3	111
Mature native forest (tawa, kohekohe)	21	x 3	63
TOTALS	120	-	250

Table 11-51: Area of terrestrial mitigation

Type of Mitigation	Retirement Area (ha)
Existing revegetation	31
Revegetation	53
Enrichment	187
Retirement and natural regeneration	155
TOTAL	426

ANNEXURE 7: Gorse Mahoe Successions

Photo 15 Gorse-Mahoe Succession in Horokiri Valley



Photo 16 Gorse-Mahoe Succession in Kenepuru



Photo 17 Understorey of early seral mahoe scrub in Kenepuru (15 yrs – 25 yrs) with dead gorse stems visible.



Photo 18 Persistent seral mahoe forest monoculture (20 - 40 yrs old) in side gully of Cannons Creek with no successional species represented in the understorey.



ANNEXURE 8: Revised Areas for Retirement

The land that is being retired currently has the following vegetation Updated 9 Jan 2012 to include extension into Duck Creek). Note this table combines 488 ha for terrestrial mitigation, 31 ha for freshwater mitigation, and 31 ha of advanced ecological mitigation.

CODE	Description	Area (ha)
Grassland, scattered shrublands, rushland and wetlands		
1.01	Improved pasture	187
1.02	Rough pasture and shrublands	44
1.03	Cropland	0
1.04	Stony streambed in pasture (occasional shrubs)	5
1.05	Riparian margins in rushland	9
1.06	Indigenous wetland	1
Pioneer shrublands and low scrub		
2.01	Gorse dominated scrub (closed canopy)	70
2.02	Tauhinu scrub (closed canopy)	32
2.03	Riparian margins with low scrub	3
Regenerating kanuka scrub & forest		
3.01	Secondary native forest (kanuka)	3
Regenerating broadleaved scrub & forest		
4.01	Transmission Gully restoration planting	31
4.02	Secondary native forest (broadleaf)	86
4.03	Riparian margins with secondary native forest	11
Mature or maturing indigenous forest		
5.01	Lowland tawa forest	2
5.02	Coastal kohekohe forest	8
5.03	Remnant sub-montane hardwood forest	1
5.04	Riparian margins with indigenous forest	2
Exotic vegetation		
6.01	Plantation pine	37
6.02	Plantation pine - harvested	0
6.03	Exotic trees (shelterbelts, gardens)	1
6.04	Riparian margins with exotic trees	1
Undefined		
7.01	Built-up area	0
		534

- With the exception of the dry upper slopes of the Te Puka and Duck Creek all pasture and shrublands (1.01, 1.02) will be revegetated;
- All riparian margins in pasture (1.04, 1.05) will be revegetated;
- With the exception of upper slopes in the Horokiri Valley, all shrubland communities (2.01, 2.02, 2.03) will undergo enrichment planting;
- All seral forest (3.01, 4.02, 4.03) and mature forest (5.01, 5.02, 5.03, 5.04) not affected by construction will be legally protected.
- A variety of treatments are recommended for plantation pine, and exotic tree-lands.

ANNEXURE 9: Combined Mitigation - Retirement and Revegetation

Updated 9 Jan 2012 to include extension into Duck Creek

Treatment (ha) DETAIL	Existing (Early Retire)	Terrestrial Ecology	Freshwater Mitigation	Landscape Mitigation	Stormwater Treatment Wetlands	TOTAL
Retirement / natural regeneration						
• Currently in pasture (E)		141.6				142
• In tauhinu & gorse shrubland (E) ¹		92.3				92
• In scrub and seral forest (E) ²		22.7	13.1			36
• In maturing native forest (E)		11.0				11
• In pine and exotic treeland (E)		38.6				39
Enrichment planting						
• Currently in indigenous shrubland ³	4.4	100.3	1.6			106
Terrestrial Revegetation						
• Cut/Fill sites vegetated (L)				50.0		50
• Kanuka Corridor (L)				24.0		24
• Broadleaf planting (E)	16.2	63.7				80
Freshwater & Wetland Revegetation						
• Riparian planting (E & L)	10.4		18.1	11.0		39
• Stormwater treatment ponds (WQ)					0.9	1
• Lanes Marsh (L)				5.0		5
• Tree grid kahikatea (L)				2.0		2
TOTAL AREA	31	470	33	92	1	627
Treatment area (ha) SUMMARY						
Retirement / natural regeneration		306.1	13.1			319
Enrichment planting	4.4	100.3	1.6			106
Revegetation	26.6	63.7	18.1	92.0	0.9	201
TOTAL	31	470	33	92	1	627

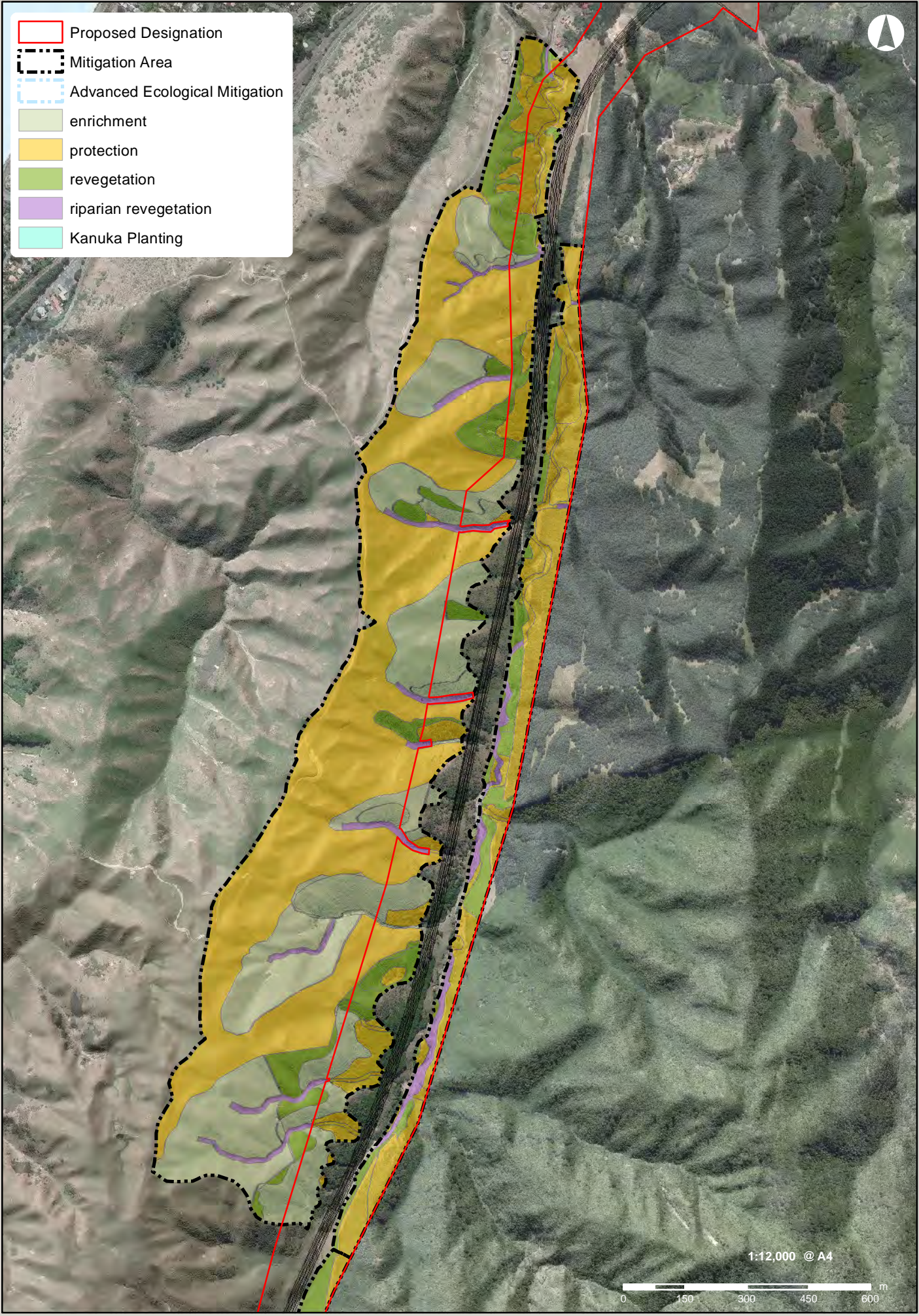
ANNEXURE 10: Revised Mitigation Maps

1. Te Puka
2. Horokiri
3. Early retirement site 9
4. Early retirement site 8
5. Early retirement site 7
6. Lanes Flats
7. Duck Creek
8. Cannons Creek – Ranui Heights

- Proposed Designation
- Mitigation Area
- Advanced Ecological Mitigation
- enrichment
- protection
- revegetation
- riparian revegetation
- Kanuka Planting



January 19, 2012 W09034G_Mitigation_A4mb.mxd © Bofa Miskell Ltd 2012

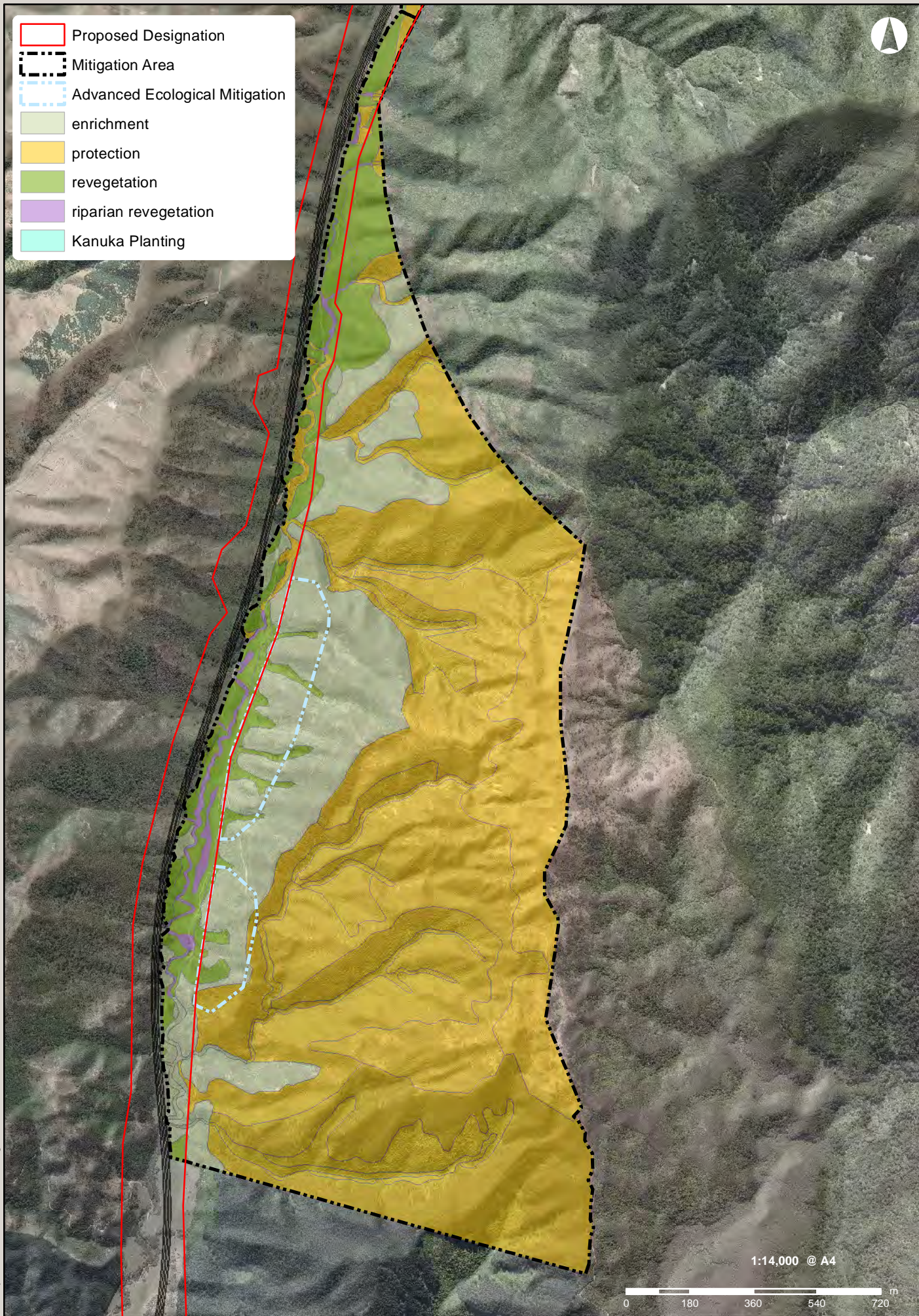


1:12,000 @ A4



**TRANSMISSION GULLY
PROPOSED MITIGATION SITES AND TREATMENTS
TE PUKA STREAM**

- Proposed Designation
- Mitigation Area
- Advanced Ecological Mitigation
- enrichment
- protection
- revegetation
- riparian revegetation
- Kanuka Planting



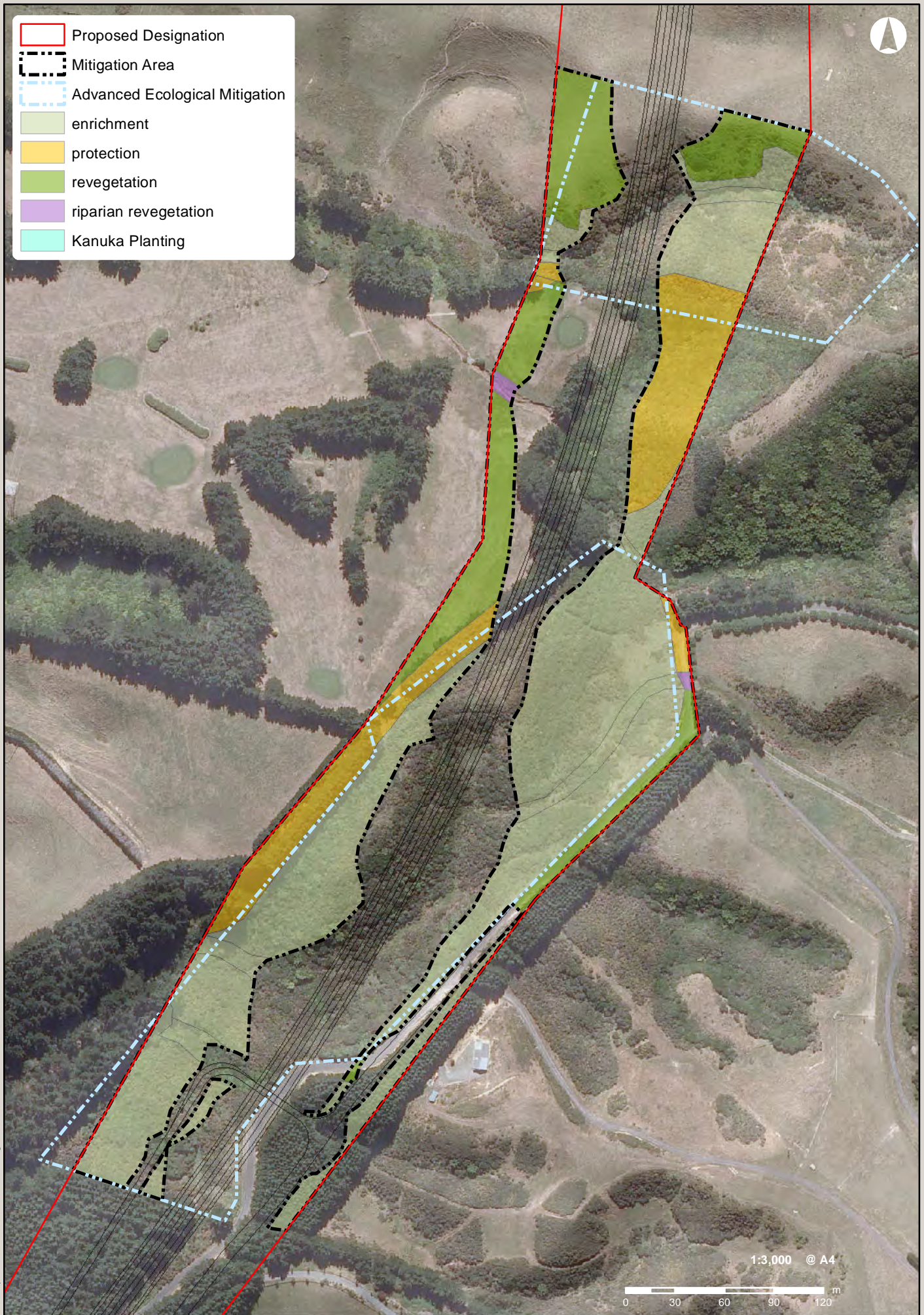
January 19, 2012 W09034G_Mitigation_A4mb.mxd © Boffa Miskell Ltd 2012

1:14,000 @ A4



**TRANSMISSION GULLY
PROPOSED MITIGATION SITES AND TREATMENTS
HOROKIRI STREAM (AEM 9,10)**

- Proposed Designation
- Mitigation Area
- Advanced Ecological Mitigation
- enrichment
- protection
- revegetation
- riparian revegetation
- Kanuka Planting



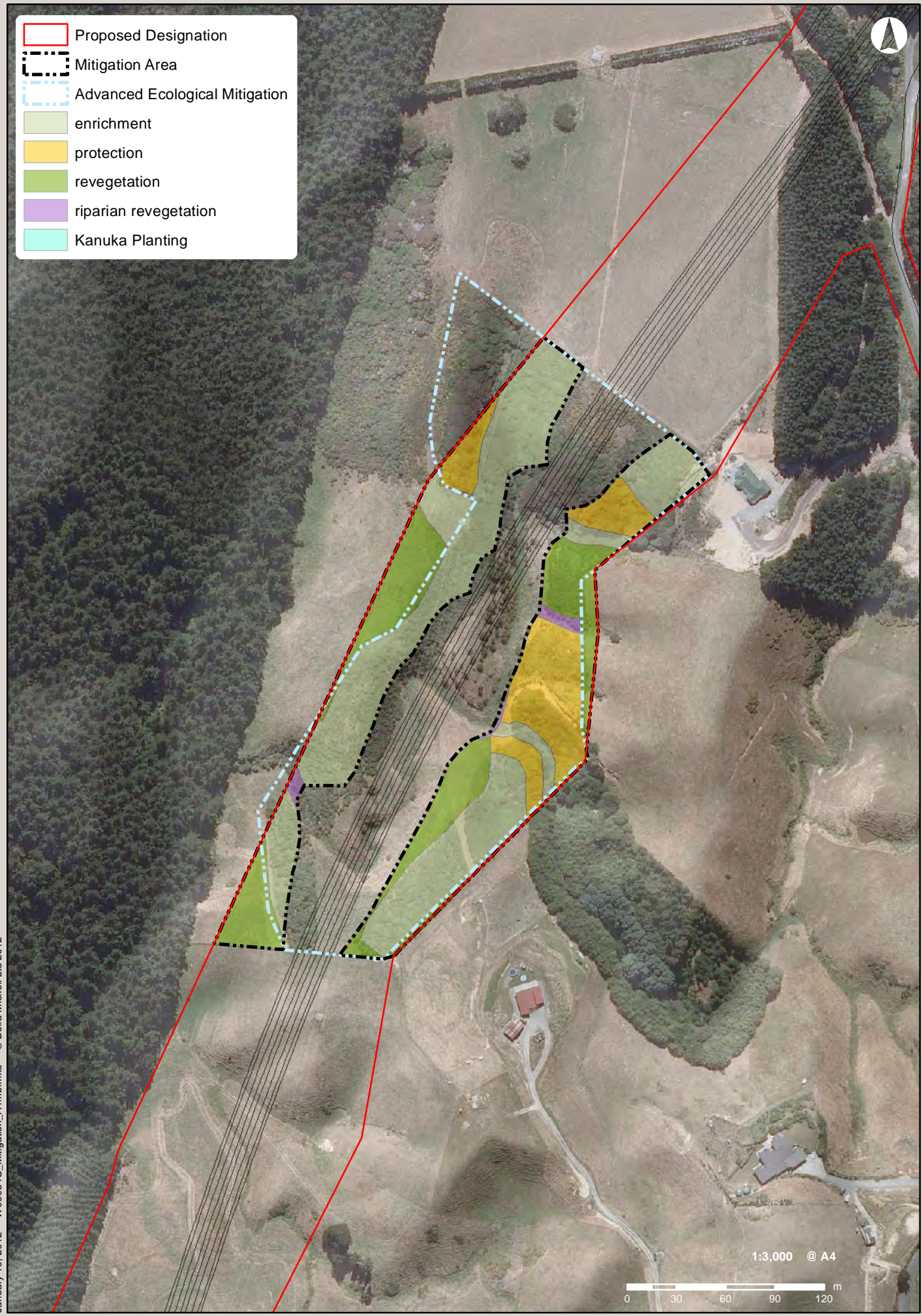
January 19, 2012 W09034G_Mitigation_A4mb.mxd © Boffa Miskell Ltd 2012

1:3,000 @ A4



**TRANSMISSION GULLY
PROPOSED MITIGATION SITES AND TREATMENTS
RATION CREEK AEM 7, 8)**

- Proposed Designation
- Mitigation Area
- Advanced Ecological Mitigation
- enrichment
- protection
- revegetation
- riparian revegetation
- Kanuka Planting



January 19, 2012 W09034G_Mitigation_A4mb.mxd © Boffa Miskell Ltd 2012

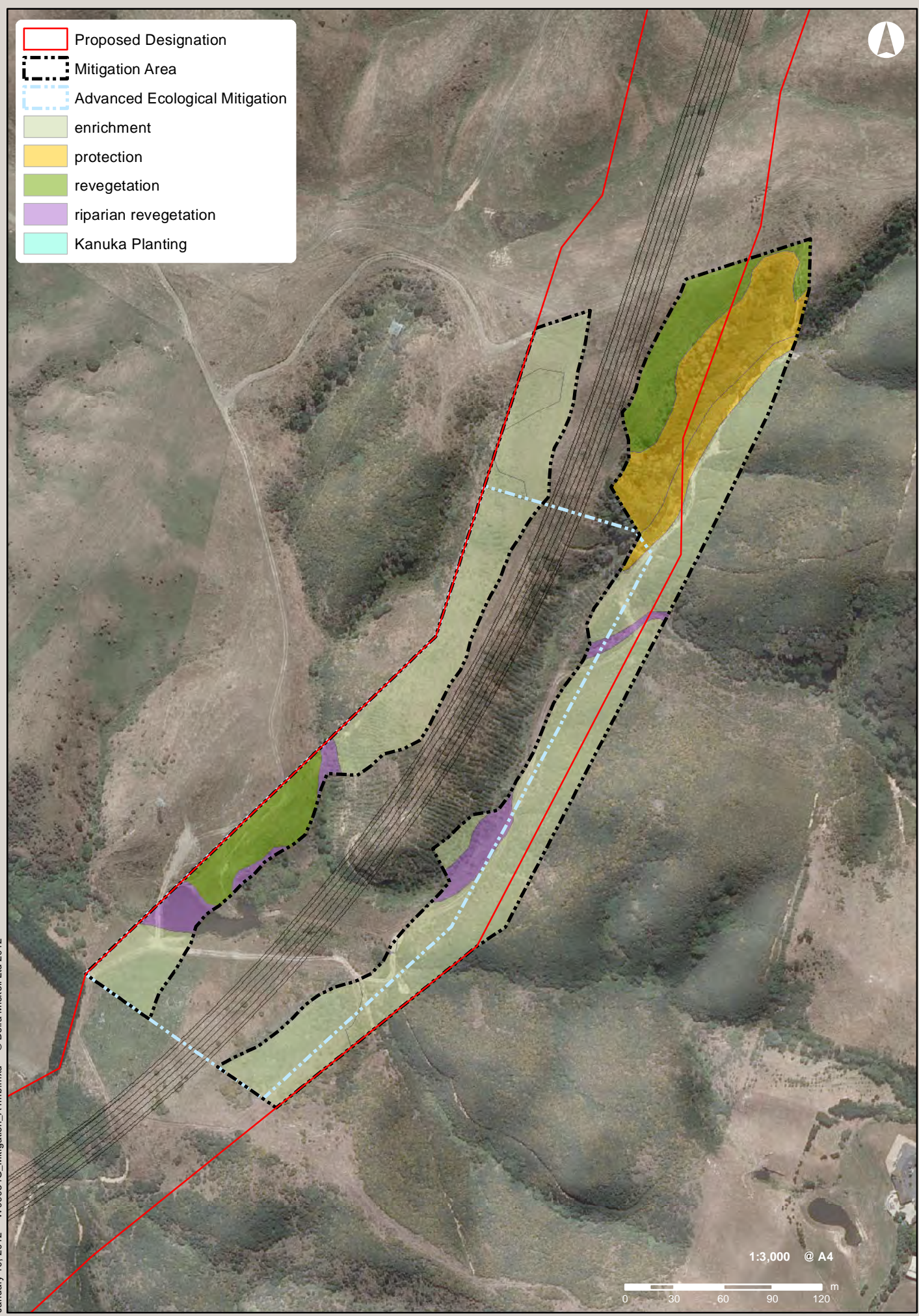
1:3,000 @ A4



- Proposed Designation
- Mitigation Area
- Advanced Ecological Mitigation
- enrichment
- protection
- revegetation
- riparian revegetation
- Kanuka Planting

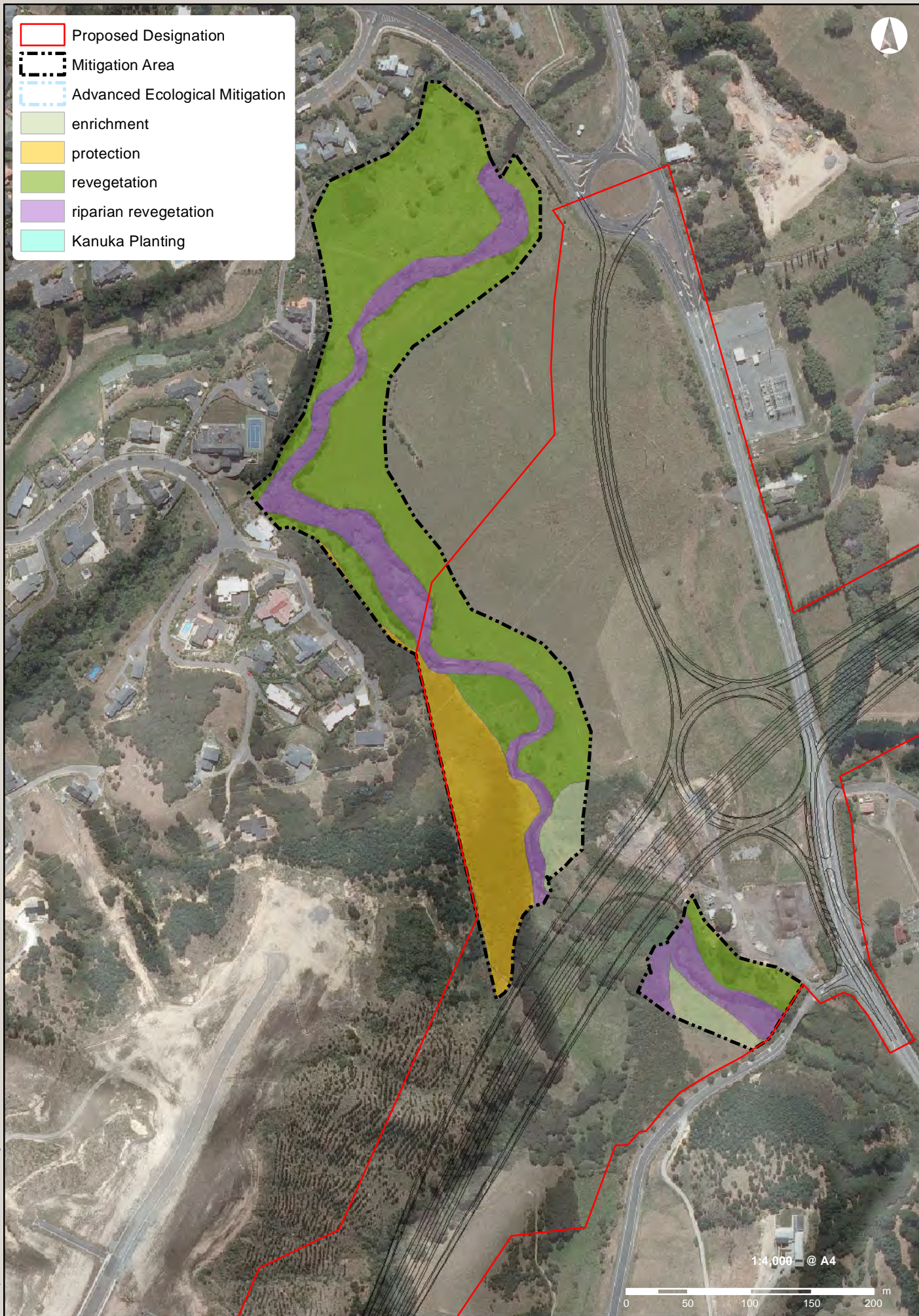


January 19, 2012 W09034G_Mitigation_A4mb.mxd © Boffa Miskell Ltd 2012



1:3,000 @ A4

- Proposed Designation
- Mitigation Area
- Advanced Ecological Mitigation
- enrichment
- protection
- revegetation
- riparian revegetation
- Kanuka Planting

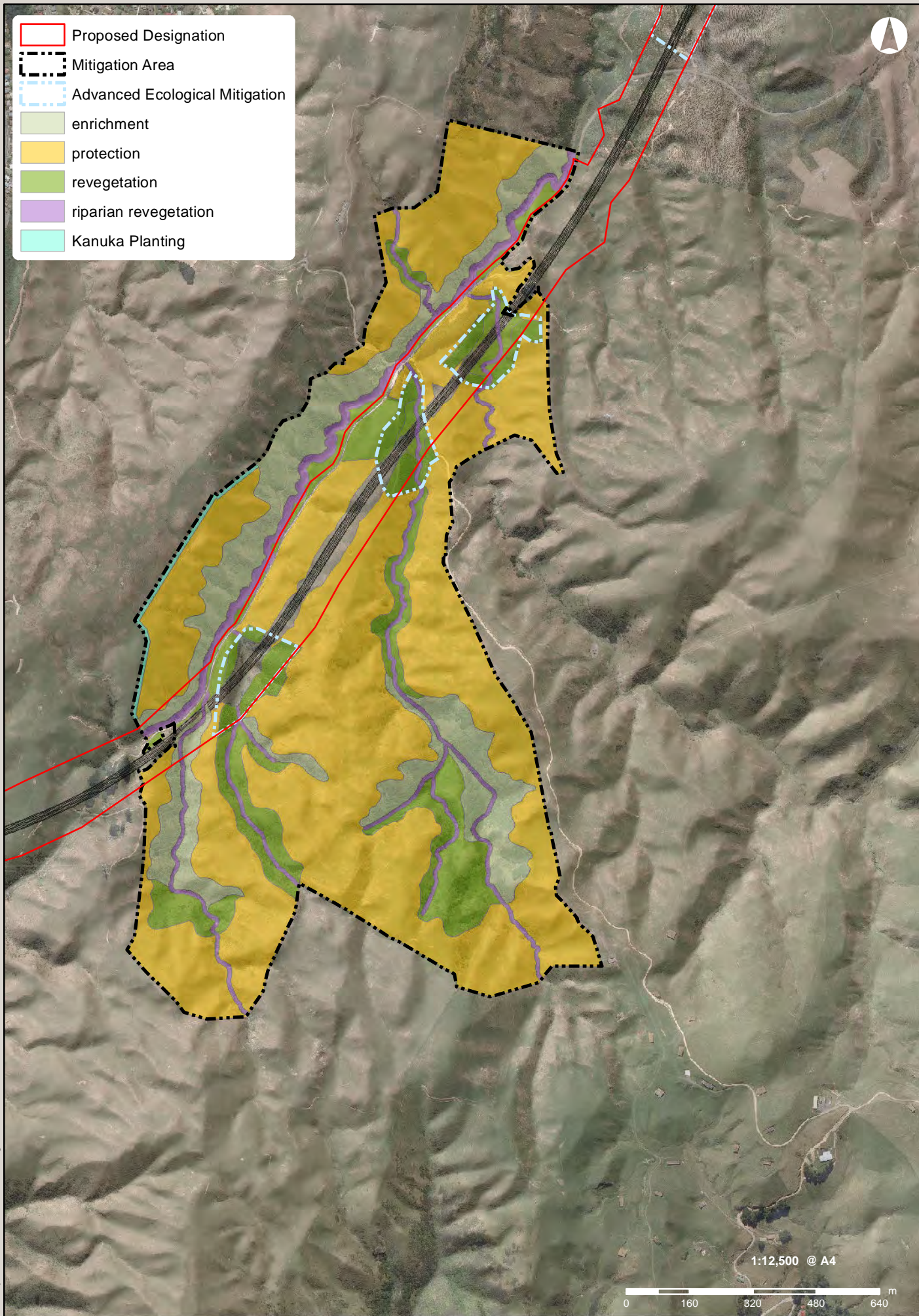


January 19, 2012 W09034G_Mitigation_A4mb.mxd © Bofa Miskell Ltd 2012

1:4,000 @ A4



- Proposed Designation
- Mitigation Area
- Advanced Ecological Mitigation
- enrichment
- protection
- revegetation
- riparian revegetation
- Kanuka Planting



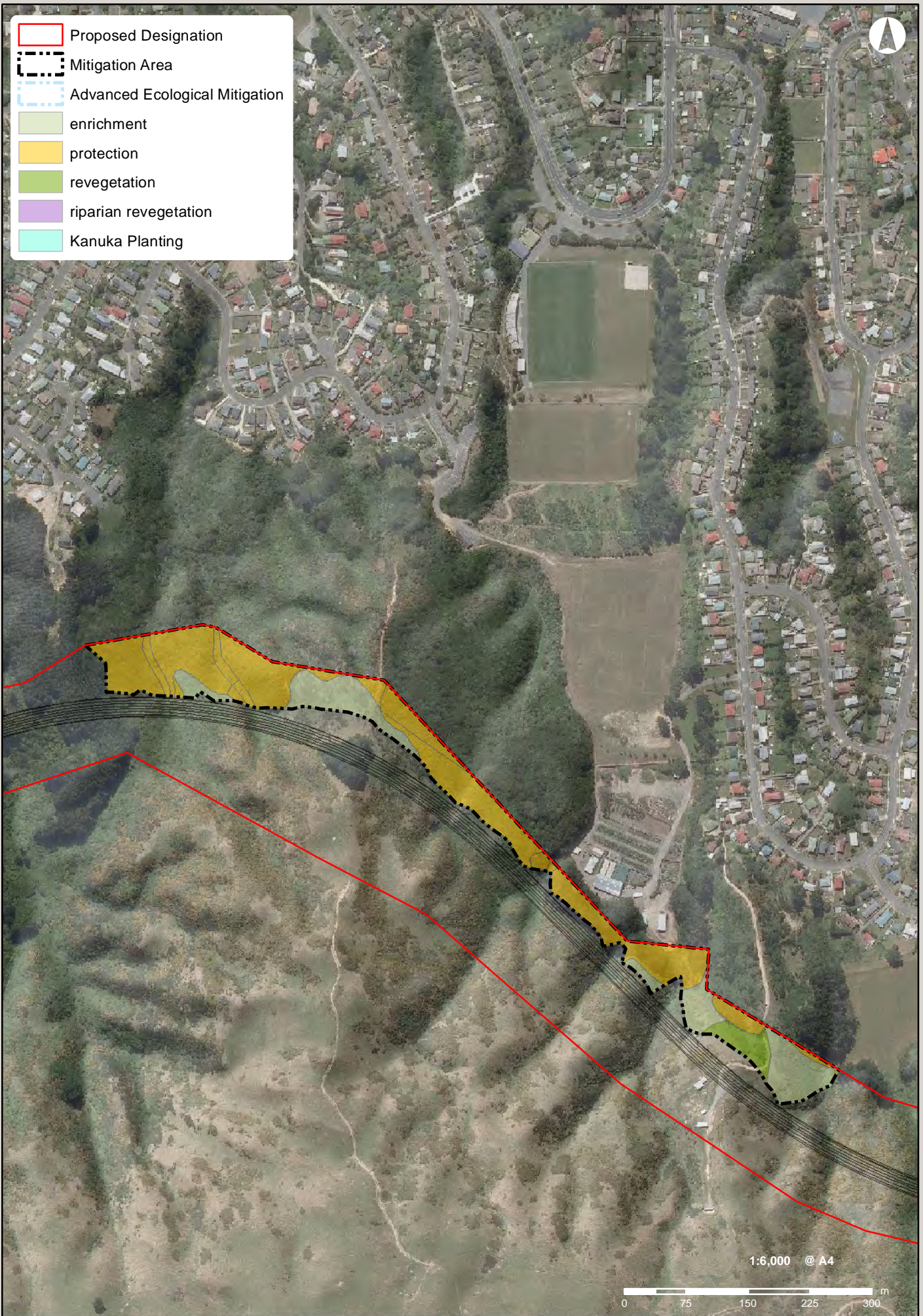
January 19, 2012 W09034G_Mitigation_A4mb.mxd © Boffa Miskell Ltd 2012

1:12,500 @ A4



**TRANSMISSION GULLY
PROPOSED MITIGATION SITES AND TREATMENTS
DUCK CREEK (AEM 1, 2, 3)**

- Proposed Designation
- Mitigation Area
- Advanced Ecological Mitigation
- enrichment
- protection
- revegetation
- riparian revegetation
- Kanuka Planting



January 19, 2012 W09034G_Mitigation_A4mb.mxd © Boffa Miskell Ltd 2012

1:6,000 @ A4



**TRANSMISSION GULLY
PROPOSED MITIGATION SITES AND TREATMENTS
CANNONS CREEK**