IN THE MATTER OF	the Resource Management Act 1991
AND	
IN THE MATTER OF	Notices of requirement for designations under section 168 of the Act, in relation to Te Ahu a Turanga; Manawatū Tararua Highway Project
BY	**NEW ZEALAND TRANSPORT AGENCY** Requiring Authority

ADDENDUM TO STATEMENT OF EVIDENCE OF DR ADAM FORBES (TERRESTRIAL ECOLOGY) ON BEHALF OF THE NEW ZEALAND TRANSPORT AGENCY

25 March 2019

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INTRODUCTION

1. My name is **Dr Adam Forbes.**

2. I submitted a statement of expert evidence on **Terrestrial Ecology** ("**EIC**") on behalf of the New Zealand Transport Agency ("**Transport Agency**") dated 8 March 2019.

3. I have the qualifications and experience set out in my EIC.

4. I repeat the confirmation given in my EIC that I have read the 'Code of Conduct' for expert witnesses and that my evidence has been prepared in compliance with that Code.

5. In this addendum I use the same defined terms as in my EIC.

6. In this addendum to my EIC, I respond to points made in the expert evidence of:

   (a) Dr Tim Martin on behalf of DOC; and

   (b) Dr Kelvin Lloyd on behalf of DOC.

7. I also use this opportunity to provide a brief further outline of the rationale behind the development of ECRs, which I agreed to do during the 18 March 2019 terrestrial ecology conferencing with Mr Lambie (for Councils) and Mr Blayney (for NZTA).

8. I attended expert witness conferencing with Dr Martin on initial matters on 22 February 2019. Neither Dr Martin or Dr Lloyd attended the 18 March conferencing session (despite being encouraged to do so). This means I have not been able to discuss the matters they raise in their evidence, or my responses, with them. I consider it likely that a number of relevant issues could have been resolved through conferencing.

9. I note that Mr Blayney responds to specific comments made by Dr Martin in respect of terrestrial fauna.

RESPONSE TO EVIDENCE OF DR MARTIN

Terminology Used to Describe the Package of Positive Effects

10. At paragraph 3.7 Dr Martin states that I have retained reference to the package of positive effects as an offset, despite the discussions had during

conferencing on 22 February 2019. In an effort to avoid further disputes about terminology, I can confirm I do not intend to conclusively describe the package of positive effects as either offset or compensation. An example of my use of terminology is revised Table 6.A.1 titled "Positive Effects Package" (Appendix B of my EIC).

Environmental Compensation Ratios

11. In a similar manner to what I noted within my EIC in relation to Forest and Bird's submission, on one hand Dr Martin (and now also Dr Lloyd) criticise the approach taken in developing ECRs,[1] as the approach has not followed the DOC-endorsed Biodiversity Offsets Accounting Model (Maseyk et al). Then on the other hand, based on Dr Martin's site visit and the information provided through the NoR process, Dr Martin recommends precise increases to the recommended ECRs that he maintains are essential to achieve adequate levels of habitat replacement.

12. This is to the extent that, in one case, Dr Martin argues that ECRs recommended to be within 0.5 of his recommended value are insufficient (i.e. ECR 1.5 versus ECR 2). My point here is that there is a contradiction between the criticisms by DOC's experts over the opinion-based development of ECRs and the rigid demands those same experts then pose in specifying required ECR values.

Identification and Mapping of Features and Assessment of Values

13. At paragraph 6.3, Dr Martin refers to issues he has previously raised in respect of the identification and mapping of ecological features and values. I note that paragraphs 6.3 a. and d. have already been addressed with Dr Martin.

14. Paragraph 6.3 b. of Dr Martin's evidence contains an incorrect statement regarding future quantification of spoil sites increasing the quantum of predicted habitat loss. As I have clarified with Dr Martin on several occasions, the mapping and assessment of effects to ecosystems has been carried out for all 12 ecosystem types within the entire designation area – minus the portions of ecosystem types protected by effects envelopes or the Ramarama Protection Area. Therefore, in relation to the 6.3 b. statement, complete loss is already assumed in the proposed effects management. This approach adopts a worst-case scenario (assumes complete loss), and

[1] Refer to paragraphs 10.18 – 10.31 of Dr Martin's evidence, and my response to Dr Lloyd's evidence below.

means that the quantum of replacement plantings contain an inherent additional margin (as in reality not all areas of ecosystem types would be cleared).

15. Regarding paragraph 6.3 c. of Dr Martin's evidence, I have previously (at his request) cross-checked the ecosystem type mapping with that of the map produced for the Detailed Business Case stage by Mr Singers. I provided that response on pages 3 and 4 of my 1 February 2019 letter to Wildland Consultants (which was Attachment D to the Pre-Hearing Meetings Report filed by the Transport Agency's lawyers on 1 March 2019). In addition, following discussion during the 22 February 2019 conferencing with Dr Martin, I have provided further mapping (dated 3 March 2019) which also includes exotic ecosystems for the CH4000-4500 area and is supported with a number of high-resolution drone images that I took during the DBC and NoR field visits. The mapping is **Attachment A** to this addendum evidence. Therefore, to my knowledge, this point has been addressed with Dr Martin.

16. Paragraph 6.4 concludes that in light of the points covered in paragraph 6.3, the extent of ecosystem loss has been underestimated in the NoR documentation. As I say, I consider that those points have since been addressed. I am unsure (as a result of Dr Martin's choice of wording) whether Dr Martin is of the view that the extent of loss is still (as of now, rather than as of lodgement of the NoRs) underestimated.

17. Regarding paragraph 7.5 of Dr Martin's evidence, and in particular footnote 20, Dr Martin specifically requested (during a meeting on 15 February 2019) further information on the composition and structure of a number of specific ecosystem types. That request did not include further information regarding ecological condition for each ecosystem type. I provided the information requested (**Attachment A** here) in full on 3 March 2019. To my knowledge, that information has addressed Dr Martin's request. It is not clear to me what he refers to regarding "*significant information deficiencies*" regarding some wetland types and shrublands as I have provided further information to Dr Martin on the vegetation attributes of these relatively simple ecosystem types.

Matters Relating to the Ecological Significance Assessment

18. At paragraph 8.7, Dr Martin describes a situation where Threatened or At Risk species are discovered in ecosystem types not currently regarded as being significant, and the implication of that for the rating of ecological value

and statutory significance. The ecology experts who attended conferencing on 18 March 2019 agreed that, if rare or threatened species were to be discovered in ecosystem types not currently assessed as ecologically significant, the ecosystem type would trigger statutory ecological significance under the rarity criterion of One Plan Policy 13-5 (a) (ii) (A). Experts also agreed, however, a trigger of ecological significance would not require a revision of proposed ECRs, given that:

(a) ECRs are already proposed for non-significant ecosystem types;

(b) the existing ECRs already make provision for time-lag and risk; and

(c) statutory significance does not change these ecological factors.

19. In response to Dr Martin's paragraph 8.9, regarding the assessment of landscape context, it could be that finer-scaled assessment of individual ecosystem areas would show individual sites as serving connecting or buffering functions at a site scale. At the ecosystem type scale (the scale assessed), I am comfortable with the rankings assigned regarding ecological context. I have not excluded effects management in ecosystems currently scored as not significant – I have instead recognised both significant and non-significant ecological values and have recommended positive effects to address adverse effects to those ecosystems (and irrespective of whether the effects will actually occur).

20. Paragraph 9.5 incorrectly states that:

> "*Regardless of the final quantum of vegetation loss, the Project will result in the loss of over 30 ha of indigenous vegetation and wetlands*."

21. The correct interpretation would be that the Transport Agency has assumed the worst-case scenario (i.e. complete loss aside from areas protected through effects envelopes/protection boundaries) and has proposed positive effects for the loss of all identified ecosystem types. An accurate account would also note that, in reality, not all areas of each ecosystem type would be lost.

22. Regarding paragraph 9.7, to alleviate Dr Martin's concern, I have previously agreed to include exotic-dominated wetlands in the effects assessment and effects management proposal. This had the effect of increasing the total wetland area within the designation area.

23. I have considerable experience with the identification of exotic-seepage wetlands from other large-scale roading projects and know from experience that it is inappropriate to attempt to demarcate wetland boundaries from aerial imagery. A site visit is essential to confirm the dominance (>50% cover) of wetland indicator species. During conferencing on 22 February 2019, Dr Martin produced marked up Google Earth printouts and suggested additional areas needed to be included as exotic dominated wetlands. To accommodate Dr Martin's request, I have recommended that at the time of subsequent RMA approvals, field visits be undertaken to determine the actual extent of exotic wetlands within the chainages Dr Martin has specified. If I was to follow Dr Martin's approach of demarcating wetlands based on Google Earth imagery alone, I would run the risk of classing areas of damp exotic pasture as wetland.

24. The final sentence of Dr Martin's paragraph 9.7 states: "*The total extent of wetland loss is therefore not currently known*". To clarify, the total extent of indigenous wetland is known. It is the extent of several areas of exotic wetland that have not yet been validated in the field.

Closure of Existing State Highway 3

25. Regarding comments made in paragraphs 9.9 – 9.12, I confirm that no assessment related to the now-closed section of State Highway 3 through the Manawatū Gorge has been carried out. I defer to the evidence of Ms Downs for further clarification on this matter.

Further Comments Regarding Mitigation and Positive Effects Measures

26. Regarding paragraph 10.1 of Dr Martin's evidence, it was indeed agreed during 22 February 2019 conferencing that the replacement plantings derived from ECRs were a separate quantum to forest-edge buffer plantings. There is, however, no need to revise the restoration package to specify the quantum of forest edge buffer plantings (as requested by Dr Martin). The locations and areas of forest buffer plantings are a matter to be detailed through the Ecological Management Plan process. A detailed design would be required to confirm much of this detail (how works interact with forests) and factors such as species lists and planting management are not a matter to be resolved at this time. Instead, this is an important purpose of the management plan process.

27. Regarding paragraph 10.5, as I have discussed with Dr Martin (on 15 and 22 February 2019), the additionality associated with terrestrial replacement plantings is quite clear on the assumption that these replacement plantings would be into retired exotic grasslands. The potential additionality of wetland restoration sites is less clear as the existing value of restoration sites are unknown and would likely differ between sites. I have already addressed this uncertainty by recommending that the wetland ECRs be confirmed once impact and restoration sites are confirmed. I have previously discussed this distinction and recommendation with Dr Martin (and he acknowledges this point in his evidence).

28. My comment that the proposed gains will be greater than the losses is based on the logic that quality habitat replacements will be scaled using multipliers, resulting in larger, more compact and better functioning configurations. For example, 1 ha of old-growth hill country forest would result in 10 ha of replacement planting. Clearly the replacement is greater than the loss – there is no uncertainty over this matter. This would be further backed by other recommended positive effects such as retirement and protection of existing forests and pest control (including a pest control buffer around the northern half of the Manawatū Gorge Scenic Reserve).

29. Regarding paragraph 10.11, the current condition and existing management of terrestrial replacement planting sites are assumed to be grazed exotic pasture. This makes the assessment of ecological condition and existing management simple. Wetland sites are in a somewhat different category; as already discussed and acknowledged by Dr Martin, wetland ECRs will be reviewed once restoration sites are known.

30. In my opinion, if we refer to the package of positive effects as compensation it does not automatically mean more uncertainty and more positive effects are required. I was conservative in developing the package of positive effects in the first place and have since amended the ECR component of the package in an attempt to respond to comments received from Dr Martin.

ECRs

31. As an overall response to Dr Martin's evidence on ECRs (from paragraph 10.18), I am comfortable with the ECRs I have proposed. I updated a number of ECRs in my EIC in response to discussions with Dr Martin, including at conferencing on 22 February.

32. In my EIC (paragraphs 73 and 74) I provided a rationale to support an ECR of 1.5:1 for mānuka and kānuka replacement plantings. In paragraph 10.25 Dr Martin does not acknowledge the rationale I provide and instead focuses on a minor comment I made regarding stem density. I would also note that mānuka shrubland would not take 10 - 20 years to regain the existing stand structural parameters. Within the designation area I would expect canopy closure and equivalent stature to be attained for these species within around 3 - 5 years.

33. In terms of achieving a net gain, Mr Blayney and I have developed a proposal to provide more certainty around demonstrating a net biodiversity gain. We propose an addition to condition 17 b) that requires the development of an appropriate baseline, progress, and outcome monitoring plan which includes a requirement to undertake adaptive management as appropriate if progress or outcome monitoring does not achieve, or is not progressing towards, the outcome of net-benefit for biodiversity. This process should be implemented in areas confirmed to be planted, retired, and/or restored to ensure the positive effects package is able to be assessed against its adequacy in achieving a net positive for biodiversity outcome. Wording for this addition to condition 17 b) is to be developed.

RESPONSE TO EVIDENCE OF DR LLOYD

Approach to mitigation and offsetting

34. Dr Lloyd states that the scope of his evidence is limited to the principles of offsetting and compensation. Dr Lloyd is also critical of my choice not to use the Biodiversity Offsets Accounting Model (which is a Microsoft Excel-based calculator) to derive the package of positive effects. I do not intend to provide a point by point response to that criticism, but do make a number of specific points below.

35. While somewhat beyond the scope of the principles of offsetting and compensation, in paragraphs 4.4 - 4.8, comments made by Dr Lloyd demonstrate that he does not have a complete understanding of the effects envelopes that he is critiquing, and how they relate to my assessment of offsetability. In Technical Assessment #6A, I explained that for species and ecosystems of High/Very High conservation concern effects envelopes were prescribed to limit effects to maximum allowable levels and durations of adverse effects (as assessed by EIANZ (2018) criteria) and a maximum

physical extent of effect. This provides for a measured level of effect to species and ecosystems of High/Very High conservation concern.

36. I note specifically, at paragraph 4.6, Dr Lloyd refers to *clearance* of 0.1 ha of alluvial old-growth forest; whereas the effects envelope I have recommended (page 46 of Technical Report #6A) requires:

> *"… no more than 0.1 ha of Moderate effect magnitude/High level of effect, AND of no more than long-term duration. In practice, this would cover the limited loss of canopy or emergent tiers, or loss of forest vegetation. Crucially, the effect would not be permanent in overall character. The effects duration would be long-term or less in overall character and would be addressed through remediation plus restoration …"*

37. By default, following the recommended EIANZ (2018) approach to impact assessment, this rules out an effect that results in permanent loss such as what Dr Lloyd refers to with the use of the word clearance.

38. Regarding the effects of pruning swamp maire, at paragraph 4.8 Dr Lloyd raises concern over disease should pruning occur to swamp maire and that the level of pruning is not defined, and therefore describes this as an unacceptable effect. I confirm that the relevant effects envelope retains all trees and limits effects of canopy pruning to result in Low or Negligible magnitude of effect, and Moderate level of effect, and no permanent adverse effects. I consider this to be a more measured approach to that of Dr Lloyd, which does not use existing frameworks such as EIANZ (2018) to guide his conclusion over levels and acceptability of effects.

39. I also note that effects to swamp maire are to be managed in that any pruning (should it be necessary) would be undertaken and assessed by a suitably qualified arborist. I believe this measure adequately addresses risks around infection of cut limbs.

40. Further, I refer Dr Lloyd to recommended Condition 13 b) i A and B which state that replacement planting would be required where >10% of live growth is pruned from a swamp maire tree. This provides a practical effect threshold where replacement is required, as is clearly stated in conditions.

Offsetting principles

41. In paragraphs 4.18 – 4.28, Dr Lloyd offers his opinion over the recommended package of positive effects against offsetting principles. Remarkably, according to Dr Lloyd, the package of positive effects fails to meet all ten offset principles. I note that this conclusion is at stark odds with my appraisal (and the findings of my peer reviewer Dr Blaschke) of the proposed package against offset principles, as I have already outlined in my EIC. I consider the detail of Dr Lloyd's critique to be overly negative and unwarranted.

42. I also note the agreement of the experts who attended conferencing on 18 March 2019 that the revised ECRs appear reasonable. I have considerable experience in peer reviews of ecological assessments and I would note there are often different ways of achieving the same outcome.

Offsetting v Compensation

43. In Section 6 of his evidence, Dr Lloyd addresses the difference between offsetting and compensation. I note this material, while perhaps providing helpful reference material, has been made somewhat unnecessary due to the outcomes of conferencing between Dr Martin and myself on 22 February 2019. As noted above, I refer to the recommended positive effects as just that – a package of positive ecology effects recommended to address adverse ecological effects arising from the project. I am not claiming that the package satisfies all offset principles (at least at this preliminary stage), so the arguments put forward by Dr Lloyd in this regard are moot.

Statutory Policy

44. At paragraph 7.3 Dr Lloyd comments that effects to the Western QEII should have been preferentially avoided. During conferencing on 18 March 2019 the experts who attended agreed that the effects to the Western QEII are unavoidable for reasons outside of the brief of the ecologists' consideration. This agreement was in the context of the EIANZ (2018) guidance regarding the ecologist's role in responding to Very High adverse ecological effects.

45. At Paragraph 7.4 Dr Lloyd concludes that the proposed ECRs are a poor substitute for best practice offsetting. I note that Dr Lloyd's conclusion only considers the positive effects associated with ECRs, and does not consider the recommended package of positive effects in its entirety, which would provide a more balanced view of the proposal.

RESPONSE TO UNDERTAKING MADE DURING CONFERENCING ON 18 MARCH 2019

46. During the 18 March terrestrial ecology conferencing session, regarding the adequacy of ECRs, experts agreed that the revised ECRs appear reasonable. At the same time, it was agreed that I would provide further brief rationale underpinning the ECRs, which I provide here. This is a compilation of explanations I have given elsewhere in the NoR process (for example, paragraph 82 of Technical Report #6) and is kept to an outline of key points as requested.

47. The ECRs aim to replace lost habitats at rates (multipliers) that reflect the time required to replace lost attributes (time lag) and allow for a component of risk that the replacements might not thrive immediately (risk). Specific ECRs were formulated taking into account ecological scarcity, regional and natural threat status, structural and temporal attributes and overall ecological value. The ECRs were reviewed by my peer reviewer Dr Blaschke and have since been further shaped through comments received from stakeholders and submitters. I note that Dr Martin has proposed ECRs based on the same (or less) information than I have used, and I have adopted his views to the extent I feel it is reasonable and appropriate to do so.

48. Dr Martin and I agreed during our conferencing on 22 February 2019 that regardless of the terminology used (offset, compensation or other), the quantum of replacement plantings for any particular habitat types needs to consider factors such as value of habitat being lost, time lag for replacement, and risk of failure. I have considered these factors and more. The experts who attended the 18 March conferencing agreed that the revised ECRs seemed reasonable.

49. Dr Lloyd states at his paragraph 4.12 that "*These ECRs are based on subjective judgement and have no objective data to support them*". I consider this statement to be unjust – the composition, stature and value ecosystem types have been surveyed, the regional and national threat status considered. Based on this logic a set of ECRs has been recommended, and subsequently revised in response to feedback.

50. I do not believe that the use of a Microsoft Excel-based calculator would have been preferable. I also note that populating aspects of the model that Dr Lloyd advocates for inevitably requires subjective expert judgement, and that the guidance relating to offset models explicitly states they are intended as a

decision support tool, not a decision-making tool. Ultimately decisions based on offset models rely on expert judgement. It is my opinion that the DOC experts should have acknowledged these aspects in their reviews.

51. Finally, with my extensive experience in the implementation phases of Roads of National Significance projects in the Wellington and Manawatū Regions, I am aware of the utility of ECRs where subsequent reviews or consents are required after the main project approval process. In simple terms, the ECR set provides a means of checking and extending the effects management regime to additional consents if they are required, and this helps achieve a consistent approach across projects that span periods of five or more years.

Dr Adam Forbes

25 March 2019

Attachment A: Further Description of Ecosystem Types Prepared for DOC

[separate document]

Ecosystem type	Typical composition	Typical structure	Representative photograph
Secondary broadleaved forests with old-growth (OG) signatures	Species present include: mahoe, black tree fern, five finger, hangehange, rangiora, ribbonwood, karamu, koromiko, lancewood and lemonwood. Mānuka or kānuka may also be present and locally dominant. Traces of exotic pioneers such as gorse might remain on slower regenerating sites such as spurs. Within this regenerating secondary forest are conspicuous mature forest canopy species representative of pre-human compositions, such as tawa, hinau, kamahi. Rewarewa also occurs.	Structurally the mature forest canopy species are a minor component of the ecosystem type, but the ecological and statutory significance of the species is such that a distinct ecosystem type is warranted. Secondary-forest canopy heights are estimated to range up to approximately 5 m. Specimens of mature forest canopy species are estimated to range up to approximately 20 m. Hinau of 49.8 cm DBH occurs at CH7300.	 Above: Example of this ecosystem type at CH10500. A small number of mature tawa, rewarewa, and pukatea emerge above an indigenous broadleaved and gorse secondary-forest canopy. Radiata pine shelterbelt boarders to the west and south.

OG treelands	Occurs in two localities within the designation area. At CH4150 a ribbonwood dominated treeland also containing canopy trees represented in the surrounding OG alluvial forest (e.g. matai, kahikatea, mahoe). At CH6100 are a small number of mature ngaio with kānuka. Both treelands have a grazed exotic-grassland understorey.	The ribbonwood dominated treeland at CH4150 has an estimated canopy height of approximately 6 m. Stem density is variable but canopy cover is estimated to be 20-30%. The ngaio dominated treeland at CH6100 has an estimated canopy height of approximately 10 m and canopy cover is estimated to be 20-30%.	 Above: example of OG treeland near CH4150. Ribbonwood dominant stand surrounded by OG forest and pasture clearing immediately to the west. Grazed pasture understorey.  Above: example of OG treeland near CH6100. Mature ngaio with sole kānuka. Grazed pasture understorey.

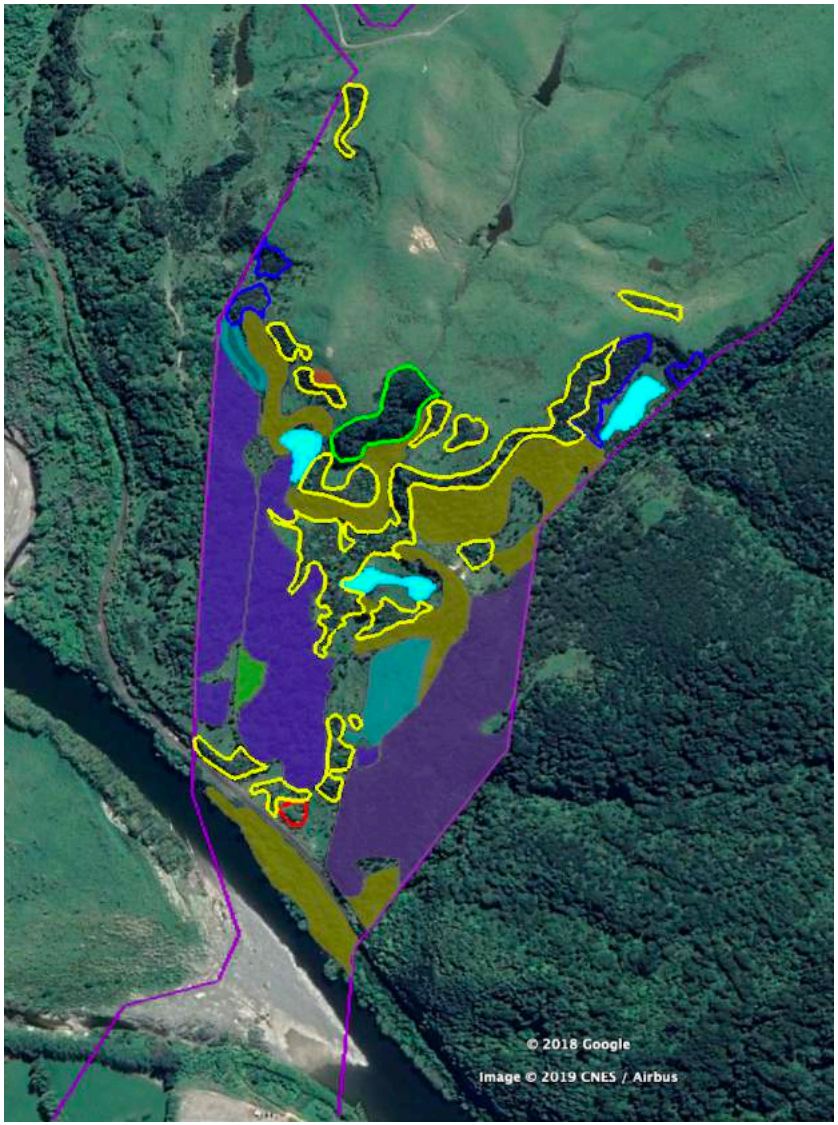
Kānuka forest	The largest area of kānuka forest occurs on hill slopes to the east of the designation area CH3900–4200. Other small areas occur at CH5300 and CH7300. All forest areas have canopies dominated by kānuka. Forest condition and understorey composition is impacted by stock grazing.	Estimated canopy cover ranges from approximately 80-100%. Estimated canopy heights range from approximately 5-8 m.	 Above: largest and most mature kānuka forest located at CH3900-4200. Grazed with pasture understorey and occasional pasture-dominated clearings. 

			Above: example of younger kānuka forest. Closed canopy heavily grazed understorey resulting in bare earth or light exotic-herb ground cover.
Advanced secondary broadleaved forests and scrublands	Occurs around CH5400 and CH5700. Forest canopies are composed of lancewood, mahoe, nikau, rewarewa, black tree fern, puka, and five finger. Kānuka may also be present and locally dominant.	Estimated canopy cover 100%. Estimated canopy height approximately 6-8 m.	 Above: example of advanced secondary broadleaved forest. Note lancewood, rewarewa and nikau are conspicuous in the canopy.
Mānuka/kānuka shrublands	Early stage mānuka/kānuka regeneration within exotic pasture. Often unprotected from stock.	Ranging in height from young seedlings up to approximately 2 m. Areas with canopy cover >*c*.30% were demarcated. Stands of >80% canopy cover (such as photographed to the right at the Eastern QEII) could be referred to as mānuka/kānuka scrub,	

		but shrubland is used to describe both shrubland and scrub structures for simplicity.	Above: example of mānuka/kānuka regenerating in pasture, in this case within the retired Eastern QEII covenant.
Divaricating shrublands	*Coprosma rhamnoides* dominant shrubland on hillslopes, located predominantly between Chainage (CH) 9300–9700. Mānuka (*Leptospermum scoparium*; At Risk–Declining) and kānuka (*Kunzea robusta*; Threatened–Nationally Vulnerable) shrubs were scarce. The lianes Forster's clematis (*Clematis forsteri*), New Zealand jasmine (*Parsonsia heterophylla*), and bush lawyer (*Rubus cissoides*) scramble over shrubs. Stunted ribbonwood (*Plagianthus regius*), hangehange (*Geniostoma ligustrifolium*), and mahoe (*Melicytus*	This shrubland is heavily impacted by stock access and past herbicide application. Areas with canopy cover >*c*.30% were demarcated. Canopy height is typically 0.5–1.0 m.	 Above: example of the densest area of *C. rhamnoides* shrubland located at CH9350.

	ramiflorus) saplings were occassionally emergent above the shrubland canopy. Beneath denser areas of *C. rhamnoides* occurred seedlings of the forest tree marble leaf (*Carpodetus serratus*) along with the ferns prickly shield fern (*Polystichum* vestitum), hen and chicken fern (*Asplenium bulbiferum*), leather-leaf fern (*Pyrrosia eleagnifolia*), hound's tongue (*Microsorum pustulatum*), and button fern (*Pellaea rotundifolia*). Dead standing stems of rough tree fern (*Dicksonia squarrosa*) and black tree fern (*Cyathea medullaris*) indicate an ealier dieback event.		

Indigenous dominated seepage wetlands (moderate value)	The most predominant native wetland species is *Carex geminata*. Also present are *Juncus effusus*, *Juncus acutus* and exotic buttercup. Several manuka saplings occur as does localised patches of ring fern and exotic herbs such as foxglove.	Predominantly Sedgeland. <1.5 m tall.	 Above: Example of this wetland type located at CH10300.



Above: CH4000–45000 ecosystem type layer with wild broom (yellow) and willow (red) and radiata pine (green) areas outlined. Areas remaining unmarked are exotic pasture/herbfield (e.g. goats rue). Over page are photos taken 25.10.2017 of the same area.