

ATTACHMENT A

Letter dated 7 February 2019 by counsel for the Transport Agency to all participants wishing to be heard.

(See overleaf)

7 February 2019

To
Submitters and Section 42A reporting officers

From:
David Randal

Tēnā koutou

Te Ahu a Turanga; Manawatū Tararua Highway Project - pre-hearing meetings

I am a lawyer from Buddle Findlay, the firm acting for the New Zealand Transport Agency (“**Transport Agency**”) in relation to the Te Ahu a Turanga; Manawatū Tararua Highway Project (the “**Project**”).

I am writing to you as participants in the upcoming hearing of the notices of requirement lodged in respect of the Project, to ask:

1. whether you intend to call expert witnesses at the hearing and, if so, in which areas; and
2. your availability to attend pre-hearing meeting(s) with Transport Agency representatives on **Monday, 18 February 2019** and/or **Tuesday, 19 February 2019**.

The context for this request is the first Minute of the Hearings Panel dated 28 January 2019, which you will have received from the Hearings Administrator. That Minute records, at paragraph 40:

*“If the participants (the Section 42A reporting officers, the Agency, and submitters) calling expert witnesses, wish to hold prehearing meetings, they are to commence no later than **Monday 18 February 2019** concluding on **Friday 22 February 2019**. A prehearing report is to be prepared and completed by **Friday 1 March 2019** and circulated to all Participants at least **5 working days** prior to the Hearing Date. The Hearings Administrator can assist with the pre hearings.”*

The purpose of pre-hearing meetings is to clarify and/or facilitate resolution of matters or issues. This has the potential benefit of narrowing the scope of the matters to be considered by the Hearings Panel, which can create efficiencies for the hearing process.

As many of you will be aware, the Transport Agency has been actively arranging meetings with participants and their expert advisors to this same end. Those meetings include recent or upcoming discussions with the following parties:

- submitters raising issues regarding walking and cycling, including representatives of Build the Path, Tararua District Council, Palmerston North City Council, the Horizons Regional Transport Committee, Manawatū-Whanganui Regional Council, Manawatū Gorge Governance Group, Manawatū Mountain Bike Club, and Sport Manawatū;
- participants with an interest in ecological issues (including in the context of a workshop regarding ecological mitigation opportunities scheduled for 15 February 2019, to which iwi representatives

are also invited), including representatives of the Department of Conservation, Royal Forest & Bird Protection Society, Manawatū-Whanganui Regional Council, and Manawatū River Source to Sea;

- Section 42A reporting officers, namely an upcoming session between Dr Stephen Chiles and Nigel Lloyd;
- AgResearch Limited, Meridian Energy Limited, and other affected landowners;
- infrastructure providers, including KiwiRail, Transpower Limited, and Powerco Limited;
- Woodville District Vision representatives, Robin Winter, and Bruce Hutton, in respect of the proposed Lindauer Arts Trail; and
- other individual submitters, including Janette McHugh, William Bly, Andrew Watt, Susan Stirling, James Jeffries, Myles Stilwell, Ross Castle, Gerard Hutching (and a number of other submitters who have indicated that they do not wish to be heard).

Nonetheless, the Transport Agency would like to participate in further pre-hearing meetings, as envisaged by the Hearings Panel, to complement those discussions (as necessary).

In order to make necessary arrangements, please could you reply to me (david.randal@buddlefindlay.com), copied to the Hearings Administrators (Kath.Olliver@pncc.govt.nz and Merle.Lavin@pncc.govt.nz), advising:

1. whether you intend to call expert witnesses at the hearing and, if so, in which areas;
2. your availability to attend pre-hearing meeting(s) on **Monday, 18 February 2019** and/or **Tuesday, 19 February 2019**.

Please could you send this information as soon as possible, but no later than **midday on Tuesday, 12 February 2019**, so that any necessary arrangements can be made.

For your information, the Transport Agency intends to call expert evidence in the following areas:

- transport (including active transport modes);
- design and construction;
- noise effects;
- social effects;
- landscape and visual effects;
- archaeology;
- terrestrial ecology (vegetation);
- terrestrial ecology (fauna);
- effects on the Ballantrae Research Farm site; and
- planning.

In addition, we will call evidence from Transport Agency representatives, and ask representatives of Rangitāne o Manawatū, Rangitāne o Tamaki Nui-ā-Rua, Ngāti Kahungunu ki Tāmaki Nui-ā-Rua, and Ngāti Raukawa to provide expert evidence on cultural matters.

I look forward to hearing from you.

Nāku noa, nā

A handwritten signature in blue ink, appearing to be 'DR', with a stylized flourish at the end.

David Randal
Partner

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ATTACHMENT B

Joint witness statement of acoustic experts Dr Stephen Chiles and Nigel Lloyd, dated 13 February 2019.

(See overleaf)

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

JOINT STATEMENT OF ACOUSTICS EXPERTS

13 February 2019

INTRODUCTION

1. This joint witness statement relates to expert conferencing on the topic of acoustics.
2. This joint witness statement relates to the notices of requirement lodged by the New Zealand Transport Agency ("**Transport Agency**") for designations under section 168 of the Resource Management Act 1991 ("**RMA**"), in relation to Te Ahu a Turanga; Manawatū Tararua Highway Project (the "**Project**").
3. The expert conferencing was held on Wednesday, 13 February 2019 in Wellington.
4. Attendees at the conference were:
 - (a) Dr Stephen Chiles (Chiles Ltd) for the Transport Agency; and
 - (b) Nigel Lloyd (Acousafe) for the Manawatū District Council, Tararua District Council, and Palmerston North City Council ("**Councils**").

CODE OF CONDUCT

5. This joint statement is prepared in accordance with section 4.7 of the Environment Court Practice Note 2014.
6. We confirm that we have read the Environment Court Practice Note 2014, and in particular Appendix 3 – Protocol for Expert Witness Conferencing, and agree to abide by it.
7. Dr Chiles' qualifications and experience are set out in paragraph 5 of Technical Assessment 2. Mr Lloyd's qualifications and experience are set out in Annexure A.

PURPOSE AND SCOPE OF CONFERENCING

8. The purpose of conferencing was to identify, discuss, and highlight points of agreement and disagreement on operational and construction noise and vibration issues arising from the notices of requirement relating to the Project, and the submissions received in relation to them.
9. The scope of the conferencing generally has not included development of wording for designation conditions, other than in relation to application of technical standards.

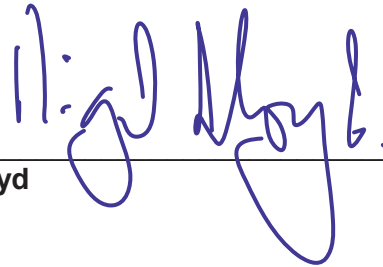
RECORD OF CONFERENCING

10. Annexure B sets out the issues, statements and agreed positions we have discussed. We are generally in agreement on acoustics issues and have not recorded any areas of disagreement.

Date: 13 February 2019



S Chiles



N Lloyd

ANNEXURE A

Qualifications and experience of Nigel Lloyd

1. My full name is Nigel Robert Lloyd. I hold the qualification of a degree in mechanical engineering gained at the University of Wales, University College Cardiff in 1976. I am a Member of the Acoustical Society of New Zealand and the Association of Australasian Acoustical Consultants and I have completed a 'Making Good Decisions' course.
2. I am an acoustical consultant, with 42 years of experience in noise control and acoustical consultancy.
3. I have advised Palmerston North City Council and Manawatu District Council on their District Plan noise reviews respectively.
4. I have undertaken peer reviews for the following roading proposals:
 - i. SH1 Hamilton City Bypass - 2004
 - ii. SH50A Hawkes Bay Expressway – 2006
 - iii. Hastings Northern Arterial – 2008
 - iv. Transmission Gully – 2012
 - v. Christchurch Southern Motorway Stage II - 2016
 - vi. SH3 Mt Messenger - 2018.

ANNEXURE B

In the matter of notices of requirement for designations under section 168 of the Resource Management Act 1991, in relation to Te Ahu a Turanga; Manawatū Tararua Highway Project.

Expert conferencing – Acoustics

Participants: Stephen Chiles (SC), Nigel Lloyd (NL)

Issue	Statements	Agreed Position
Noise and vibration assessment methodology	<p>In Technical Assessment 2 the following primary standards have been applied:</p> <ul style="list-style-type: none"> • Operational noise – NZS 6806 • Operational vibration – NS 8176E • Construction noise – NZS 6803 • Construction vibration – BS 5228-2, DIN 4150 	Technical Assessment 2 provides an appropriate assessment of adverse operational and construction noise and vibration effects, subject to the comments set out in this table.
Existing sound environment	Unlike most road projects, the section of road being replaced by this Project is already closed. This has altered the current noise environment.	The existing sound environment is to be taken as that currently experienced by the community, as opposed to the situation prior to the closure of the Gorge road.
NZS 6806 categorisation of houses near to the proposed roundabouts.	<p>NZS 6806 recommends different noise criteria depending on whether houses are near to a new or altered section of road. The criteria by new roads are more stringent.</p> <p>The main section of the Project is a new road.</p>	Categorisation of the Project near the roundabouts is complicated by parts of the existing designated SH3 which do not currently carry state highway traffic volumes. As such neither the new or altered road definitions should be relied on in isolation. Development of noise mitigation near the roundabouts should be focused on achieving the best practicable option to manage sound characteristics associated with vehicles braking and accelerating.

Assessment locations	<p>NZS 6806 requires assessment of noise at “Protected Premises and Facilities” which does not address future houses, car park/information areas, or farmland.</p> <p>SC – Further information will be provided in evidence in response to the submissions by the Department of Conservation and AgResearch.</p>	<p>Noise effects have not been assessed at locations where future noise sensitive development might occur. To our knowledge there are no unimplemented building consents for future houses in the vicinity of the Project.</p> <p>Noise effects at the Manawatū Gorge Scenic Reserve western car park and information area were only briefly addressed in Technical Assessment 2. Given the function of the car park area this is not a significant issue.</p> <p>Technical Assessment 2 did not explicitly assess noise effects at the Ballantrae Hill Country Research Station.</p>
Design of the road environment at roundabouts.	<p>SC – Based on discussions with Chris Bentley it is expected there will be substantial tree plantings around the two roundabouts to clearly signal the change in speed environment. Other measures may include lighting, road markings and signage.</p>	<p>Roundabouts should be at least 100 metres from houses. Increasing this distance would also provide a benefit.</p> <p>The road environment at roundabouts needs to be designed to result in vehicles braking and accelerating gradually rather than abruptly. The landscape design process needs to integrate and maximise noise mitigation.</p>
Heavy vehicle engine braking noise on the lower eastern slope	<p>Certain types of supplementary braking systems on heavy vehicles generate a loud and distinctive noise. Such engine braking will occur on the lower eastern slope due to the long steep gradient.</p>	<p>The noise of engine braking cannot be fully mitigated. If this noise causes sleep disturbance, consideration could be given to acoustic treatment and ventilation of bedrooms at 49807 State Highway 3 and 75 Hope Road.</p>
Operational road-traffic vibration	<p>Road-traffic vibration normally only causes effects at buildings adjacent to a road, unless the surface or pavement have defects.</p>	<p>There are no dwellings close enough to the new and altered roads such that operational vibration is an issue. This relies on the Transport Agency properly maintaining the roads.</p>

<p>Post-construction review</p>	<p>The assumptions made in Technical Assessment 2 need to be maintained throughout the implementation of the Project.</p>	<p>A post-construction review should be undertaken in accordance with specification NZTA P40:2014. This should include sound level measurements to verify noise modelling at: 49807 Napier Road (SH3), 49846 Napier Road (SH3), 75 Hope Road, and 1213 Fitzherbert East Road</p>
<p>Woodville bypass</p>	<p>The Project connects to the State Highway network to the west of Woodville and most traffic will pass through the town centre on Vogel Street. There are currently adverse noise effects from traffic on Vogel Street and this will be increased with the Project. There are limited ways to mitigate this issue unless traffic is rerouted away from Vogel Street.</p>	<p>A ring road around Woodville has significant potential to reduce noise through parts of the town at least. A low noise asphalt road surface is less effective at low speed and does not reduce heavy vehicle engine noise. However, a low noise road surface on Vogel Street represents the best practicable option for controlling noise in Woodville.</p>
<p>Construction noise limits</p>	<p>The long-term duration noise limits from NZS 6803 have been selected for the Project and are included in proposed designation condition 19.</p>	<p>The construction noise criteria in proposed condition 19 should be amended to remove “(15 min)” from the column heading. The criteria in proposed condition 19 are the long-term values from NZS 6803, but some of the adjoining time periods have been amalgamated. To avoid confusion these should revert to the format and time periods from NZS 6803. The wording in condition 19 should be amended to read “All construction work must be designed and conducted to ensure that, as far as practicable, construction noise does not exceed the limits in the following table. Sound levels must be measured and assessed in accordance with NZS 6803:1999 <i>Acoustics – Construction noise.</i>”</p>

Construction vibration criteria	<p>SC - The Category A and B criteria for construction vibration have been developed to be applied in accordance with the following:</p> <p><i>“The Category A construction vibration criteria in Table [X] must be complied with as far as practicable. If measured or predicted vibration from construction activities exceeds the Category A criteria, a suitably qualified person must assess and manage construction vibration during those activities. If measured or predicted vibration from construction activities exceeds the Category B criteria those activities must only proceed if vibration effects on affected buildings are assessed, monitored and mitigated by a suitably qualified person.”</i></p>	The proposed designation condition 20 for construction vibration criteria should be amended to specify how Category A and B criteria are applied.
Construction Noise and Vibration Management Plan (CNVMP)	Proposed designation condition 21 includes various requirements to be addressed by a CNVMP.	<p>Designation condition 21 should also require:</p> <ul style="list-style-type: none"> • Construction to be conducted in accordance with the CNVMP, • The CNVMP to establish likely construction noise emissions, • The CNVMP to set out alternative mitigation strategies where compliance with the noise/vibration limits may not be achieved.
Construction traffic	<p>While there is already significant heavy traffic through Ashhurst and Woodville on a 24 hour basis, further intense heavy vehicle movements at night would aggravate existing issues.</p> <p>Background (L_{A90}) sound levels measured at 75 Hope Road are in the order of 30 dB L_{A90} at night.</p>	<p>Designation conditions should require that construction traffic be avoided through Ashhurst and Woodville at night, other than essential movements such as continuous concrete pours and over-dimension loads.</p> <p>Hope Road should not be used as an access for bulk haulage or regular heavy construction vehicles.</p>

ATTACHMENT C

Joint witness statement of ecology experts Dr Adam Forbes and Dr Timothy Martin, dated 22 February 2019.

(See overleaf)

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

**JOINT STATEMENT OF DR FORBES AND DR MARTIN (ECOLOGY
EXPERTS)**

22 February 2019

INTRODUCTION

1. This joint witness statement relates to expert conferencing on the topic of ecology.
2. This joint witness statement relates to the notices of requirement lodged by the New Zealand Transport Agency ("**Transport Agency**") for designations under section 168 of the Resource Management Act 1991 ("**RMA**"), in relation to Te Ahu a Turanga; Manawatū Tararua Highway Project (the "**Project**").
3. The expert conferencing was held on Friday, 22 February 2019 at the Auckland office of Wildland Consultants, 12 Nixon Street, Grey Lynn.
4. Attendees at the conference were:
 - (a) Dr Adam Forbes for the Transport Agency; and
 - (b) Dr Timothy Martin for the Department of Conservation.

CODE OF CONDUCT

5. This joint statement is prepared in accordance with section 4.7 of the Environment Court Practice Note 2014.
6. We confirm that we have read the Environment Court Practice Note 2014, and in particular Appendix 3 – Protocol for Expert Witness Conferencing, and agree to abide by it.

PURPOSE AND SCOPE OF CONFERENCING

7. The purpose of conferencing was to identify, discuss, and highlight points of agreement and disagreement on two key ecological issues, as noted below, arising from the notices of requirement relating to the Project, and the submissions received in relation to them.
8. The scope of the issues covered at this conference was limited to:
 - (a) **Definitions and requirements for mitigation, offsetting, and compensation** and
 - (b) **The adequacy of the Environmental Compensation Ratios (ECRs) proposed by the Applicant**
 - (c) **Any requests for additional information.**

AGREED ISSUES

9. Definition of mitigation: Dr Martin and Dr Forbes discussed and agreed with the definitions of mitigation in the Biodiversity Offsetting under the Resource Management Act guidance document (Maseyk et al., 2018) and the Ecological Impact Assessment (EIANZ, 2018) guidance document. In this context, mitigation planting seeks to reduce the severity of impact at the point at which the impact occurs (i.e., minimise effects on the residual habitat). An example for this project would be buffer plantings to minimise microclimate edge effects at a newly-cut forest edge. Using this definition, plantings for this purpose are separate from plantings to address habitat loss due to vegetation clearance. Dr Forbes noted some examples where restoration replacement plantings have been referred to as mitigation (e.g., Transmission Gully) and that the terminology and definitions are evolving over time. However, Dr Martin and Dr Forbes agree that regardless of the terminology used, the quantum of replacement plantings for any particular habitat type needs to consider factors such as value of habitat being lost, time lag for replacement, and the risk of failure.
10. Dr Martin and Dr Forbes agree on the definition for biodiversity offsets provided by Maseyk et al. (2018) with further explanation provided by Horizons One Plan Policy 13-4. Dr Forbes and Dr Martin commented on the package of positive ecological effects set out in Revised Table 6.A.1, as they relate to the offsetting principles described in Table 1 of Maseyk et al., (2018) are as follows:
 - (a) Limits to offsetting – we agree that the proposed effects envelopes have minimised the loss of old-growth alluvial forest and raupo dominated seepage wetland containing swamp maire. We agree that the residual impacts for these ecosystems need to be addressed through compensation.
 - (b) No-net-loss and preferably a net gain – Dr Forbes and Dr Martin both acknowledge that the proposed package does not fully meet the principle of no-net-loss under the Maseyk et al. (2018) biodiversity offsetting framework. The existing condition of the restoration sites has not been confirmed at this stage (as the restoration sites are unconfirmed) and this is an important detail for determining the appropriateness of an offset, and whether no-net-loss is likely to be the outcome. Dr Forbes explained that the ECRs for forests and

shrublands were proposed on the basis that those restoration sites would be in exotic pasture, meaning the additionality was reasonably certain. Dr Martin and Dr Forbes noted that the additionality of any given wetland restoration site was less certain, and that restoration sites would require an assessment of wetland type, wetland extent, and existing values, to determine the suitability of the site, and the level of additionality available. Dr Forbes and Dr Martin agree that the ECRs, and how they apply to a restoration site, will need to be reassessed once the restoration sites are confirmed. This process will need to be undertaken to ensure adequate size, equivalence and additionality. Dr Martin has concerns regarding the low ECRs for some ecosystem types (particularly with regards to time lags, and where restoration cannot increase extent of a habitat type e.g. seepage wetlands).

11. Dr Martin considers that using a compensation approach there may be scope within the potential planting sites, with appropriate ECRs, to address the residual adverse effects on indigenous forest and shrublands. However, Dr Martin notes there is likely to be a shortfall in terms of wetland restoration areas (as the proposed areas may be too small or cannot reasonably demonstrate additionality). Dr Forbes considers there to be good potential for both terrestrial and wetland restoration sites within the potential restoration areas currently identified or at other nearby sites. Dr Martin and Dr Forbes agree on the importance of confirming and securing suitable restoration sites.

DISAGREEMENT AND REASONS

12. Dr Martin disagrees with the low ratios for some of the proposed ECRs. Under a compensation approach, the ratios need to consider the ecological value of habitats to be lost, the time lag to reach an equivalent state at a restoration site, and the risk of failure. The ecological value assigned by the Applicant to indigenous dominated seepage wetlands was 'Moderate', and for manuka, kanuka, shrublands was 'Low'; these should have been assessed as High and Moderate respectively. Dr Martin also disagrees with the ecological significance assessment; in his view all indigenous vegetation within the footprint meets at least one of the criteria for significance.
13. Dr Martin also notes that the ECRs inadequately account for time lag for restoration areas to achieve a similar state to the habitats lost. For example, a ratio of 1:1 does not account for any time lag, where this ratio is used, and some older forest types have ECRs lower than younger forest types (e.g.

advanced secondary broadleaved forests 1:4, compared to younger kanuka forest that is 1:5). The ECR for advanced secondary broadleaved forests should be increased to at least 1:5, and for manuka kanuka shrublands to at least 1:2.

14. Dr Martin notes that a ratio of 1:1 for exotic dominated seepage wetlands does not acknowledge that this is habitat that cannot be replaced; the restoration proposed can only improve condition. The Applicant should increase the ECRs for all wetland types to account for the net loss of wetland extent that will occur.
15. Dr Martin notes that the Applicant needs to reconsider the ECRs to account for ecological value and time lag. These ECRs also need to be acknowledge the higher risk that also results from a compensation approach, and the lack of certainty regarding the location of restoration sites.

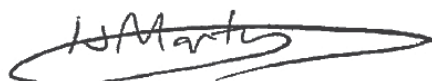
ADDITIONAL INFORMATION REQUESTS

16. Dr Martin requested the following information:
 - (a) A map of vegetation, including exotic types, for CH4000-4500.
 - (b) Description of indigenous dominated seepage wetlands (moderate value).
 - (c) Confirmation of the occurrence of exotic wetlands between CH8200-8800 and CH12000-12400.

Date: 22 February 2019



A Forbes



T Martin

ATTACHMENT D

Response by Dr Forbes to Ecology Review by Wildland Consultants, dated 1 February 2018.

(See overleaf)

1 February 2018
By E-mail

Wildland Consultants
PO Box 46 299
Herne Bay
Auckland 1011

Attn: Tim Martin



Forbes Ecology

Dr. Adam Forbes
PO Box 8740
Havelock North (4157)
Hastings
New Zealand

Dear Tim,

Re: Te Ahu a Turanga; Manawatū Tararua Highway Project - Response to Ecology Review

Thank you for the review comments received on the ecological assessments associated with above project. The Ecology Team has reviewed the comments and provide here a response with the intention of progressing the ecological matters raised through your review.

Our response addresses points raised in the following documents:

1. High-Level Initial Guidance on Ecological Aspects of the Application to Bypass The Manawatu Gorge At SH3, Between Palmerston North and Woodville. Contract Report No. 4860a dated November 2018. Auckland: Wildland Consultants.
2. Department of Conservation's (DOC) submission on publicly notified notices of requirement for a designation for a new State highway corridor to replace the indefinitely closed State Highway 3 route through the Manawatu Gorge. Dated 13 December 2018.

Responses are provided to both of the above documents in the table below. Attachments support the response. We have found the comments received useful and we have aimed to address the comments received in the responses that follow.

We hope that you find this information useful and should you have any questions or wish to discuss technical matters further please contact me. Of the matters that we have addressed below, it would be useful for this process going forward if you could indicate at your earliest convenience whether there are any matters left unresolved.

Yours Sincerely,

Dr Adam Forbes
Principal Ecologist
Forbes Ecology

Wildland Consultants' Comment	NZTA Experts' Reply
Mapping of Habitats and Ecological Values	
<p>Indigenous ecosystems have been identified and mapped by the Applicant with regards to “the designation and the indicative design” (Dr Forbes, Statement of Evidence, Paragraph 16), and “ecosystems within the designation area but not mapped are assumed to be clear of works” (Paragraph 19). The Applicant states that “38.5 hectares (c.10%) of the designation area comprises indigenous terrestrial ecosystems”, and that the balance is mostly exotic pasture and exotic plantation forest (Paragraph 26).</p> <p>Key issues with the mapping and description of ecological areas by the Applicant are:</p> <ul style="list-style-type: none"> • The indicative design may, and is likely to, change, which will result in habitats that have not been identified and assessed as being present within the revised footprint. • As indigenous ecosystems have only been mapped for the indicative design, and not the designation, the Applicant cannot have quantified, as per Paragraph 26, the extent of indigenous vegetation within the designation as a whole. 	<p>The approach to vegetation mapping was to map all indigenous ecosystem types within the designation, the scope of the mapping included the indicative design footprint, fill sites, stormwater treatment ponds or other features mapped within the proposed designation area. As per the Paragraph 19 statement, some vegetation areas within the designation were not mapped on the basis that they would not be disturbed by works (a method of avoidance).</p> <p>On receipt of these review queries, the vegetation mapping has been reviewed with the following conclusions being reached:</p> <ol style="list-style-type: none"> 1. The indigenous vegetation identified in the yellow polygon (see Attachment 1) was unmapped with the intention of achieving avoidance. An overlap is noted between part of this vegetation and the adjacent indicative spoil site. The vegetation also contains a considerable population of Ramarama (<i>Lophomyrtus bullata</i>; Threatened – Nationally Critical¹). Therefore, protection of the vegetation area has now been clarified through the inclusion of a specific Ecozone which will be marked on plans and specified to the construction team as an area within which the indigenous vegetation/ecosystem types (including ramarama; Threatened – Nationally Critical) would be protected from the effects of project activities. 2. Five small areas of mānuka-kānuka shrubland patches identified along the designation fringes (interspersed with patches of wild broom (<i>Cytisus scoparius</i>); Attachment 2) – these areas have now been added to both the map and area measurements of indigenous ecosystem types.
<ul style="list-style-type: none"> • With the exception of two areas of old-growth forest, there is a lack of data for the vegetation types present. 	<p>Regarding quantitative versus qualitative vegetation survey and descriptions, it was explained to Wildland Ecologists during the 23rd November 2018 site visit, that due to the steep slope of some seral sites, quantitative sampling was focused on compositions fitting One Plan Schedule F ecosystem types – and this was essential to determine the representation of species in the canopy tier. Qualitative descriptions have been made for the remaining ecosystem types and these provide an adequate description of</p>

¹ Threat classifications follow de Lange *et al.*, (2018) and were retrieved from <https://www.doc.govt.nz/globalassets/documents/science-and-technical/nztcs22entire.pdf>

Wildland Consultants' Comment	NZTA Experts' Reply
	composition and structure for the purposes of determining ecological values and for effects management purposes.
<ul style="list-style-type: none"> A list of plant species has not been provided for the project site. 	An updated plant species list was tabled during 6 th December 2018 meeting with DOC and the same list is Attachment 3 of this response.
<ul style="list-style-type: none"> The restriction of habitat mapping to indigenous ecosystems has resulted in the assessment not quantifying the extent and effects for the loss of wetlands dominated by exotic plant species. 	The designation area was revisited on the 1 st and 2 nd of December and wetlands comprising exotic wetland indicator species were delineated. The process involved walking potential seepage areas and noting vegetation compositions, coupled with collection of high-resolution aerial imagery from a drone. Seepages were marked on hardcopy maps in the field and the boundaries were later reviewed in conjunction with examination of drone imagery. A new ecosystem type has been added to the project's vegetation mapping called "Exotic-Dominated Seepage Wetlands" to reflect the results of this additional survey work. A description of the typical composition of these exotic-dominated seepage wetlands is given in Attachment 4.
<ul style="list-style-type: none"> The Applicant has not mapped or quantified the extent of terrestrial habitat loss for spoil sites. The only mention of spoil sites in the ecological assessments is a passing reference in relation to fauna in Section 6.B.7.1. Indicative spoil sites occur along the route and include streams, forest, and possibly wetlands (e.g. spoil sites as Chainage 4500–4750), forest and streams (e.g. Chainage 5700–6000), and shrublands, wetlands and streams (e.g. Chainage 9300–9700). Habitat loss due to spoil sites, when mapped and quantified, will substantially add to the quantum of habitat loss due to the project. The implications of spoil sites should also be considered with regards to the location of mitigation planting sites as spoil sites are unlikely to be suitable for the restoration of forest habitats. 	<p>This point has been addressed in the first response above; spoil sites will be within the designated area, all indigenous vegetation within that area has been mapped, and the effects assessment and recommended mitigation and offset measures take into account a potential worst-case scenario of effects on all mapped vegetation. Indigenous vegetation removal for all works within the designation remains confined by the maximum area 'envelope' established by condition 5(e).</p> <p>Regarding replacement planting on spoil sites, the suitability of those areas will certainly be considered as the detailed design of the project is developed. The conditions require all replacement planting to be subject to success monitoring, and this will be addressed at the Ecological Management Plan stage.</p>
<ul style="list-style-type: none"> There are inconsistencies between the Applicant's specialists with regards to the location and extent of indigenous habitats. For example, the mapping by the terrestrial ecologist for Chainage 3800–4800 (NOR Drawing Number D-02) omits areas mapped by the 	The mapping of ecosystem types has been checked against the mapping presented in Figure 2 of the Threatened Flora report. The extent of secondary broadleaved forest on the river side of the railway lines has been extended west by a few metres, the ribbonwood treeland in Figure 2 took in a larger area to the west as the designation area extended further to the west at that time. The extent of treeland at this location within the proposed designation is mapped as old growth treeland in the ecosystem

Wildland Consultants' Comment	NZTA Experts' Reply
<p>threatened plant specialist (Figure 2) as “mixed secondary broadleaved forest”, “ribbonwood treeland”, and “kānuka scrub”.</p>	<p>type mapping. The extent of kānuka forest and broadleaved forest in this area has been checked against high resolution drone photography and the ecosystem type mapping is confirmed as correct. Also note, the large area of advanced secondary broadleaved forest at CH5600 does contain a small area of kānuka however the entire area is mapped as advanced secondary broadleaved forest as that is the dominant ecosystem type in this area.</p>
<ul style="list-style-type: none"> • Areas of divaricating <i>Coprosma</i> shrubland are a distinctly separate vegetation type within the designation, with their own set of ecological values. These have, however, been mapped as part of a broader composite vegetation type called “mānuka-kānuka and divaricating shrublands”. 	<p>Shrublands dominated by mānuka-kānuka have now been distinguished from shrublands comprising divaricating species. This is expressed in the updated ecosystem types mapping and area calculations.</p>
<ul style="list-style-type: none"> • It is not clear whether the estimated stream loss has taken into account the proposed spoil areas. For instance, interpretation of the NZTA plans indicates that the proposed spoil sites will adversely affect a number of intermittent headwater streams, e.g. sub-catchments 6b and 7b. Furthermore, establishment of the proposed spoil sites could adversely affect or modify the hydrology of the sub-catchments to be affected, which may in turn adversely affect downstream freshwater environments. 	<p>The indicative plans identify a range of areas that may be used as spoil sites. These areas are indicative only and provide for a substantially larger area (and volume) for the disposal of excess material that will be required. Once detailed design is completed the location of spoil sites will be confirmed and the subject to a future application for resource consent from Horizons. It is at this time that freshwater ecology considerations will be addressed in detail.</p>
<ul style="list-style-type: none"> • Watercourse 7b has been classified as ‘intermittent’ when it should be ‘permanent’. Inspection of the stream during the site visit on 23 November 2018 revealed flowing water and pools. The catchment area upstream of the inspection point is approximately 15–20 hectares, which is more than enough to support permanent freshwater habitats. 	<p>This comment is noted for future reference. As set out above, freshwater ecology considerations will be dealt with in detail in the regional consenting process.</p>
<p>During the site visit on 23 November 2018, the following errors were identified in the Application:</p>	

Wildland Consultants' Comment	NZTA Experts' Reply
<ul style="list-style-type: none"> At least two further areas of raupō reedland are present within the designation and indicative footprint but have not been mapped by the Applicant (between Chainage 4000 and 4400). 	<p>On inspection of the existing ecosystem types map, these small seepages were mapped in the first instance; they are the two small areas of indigenous dominated seep wetlands of moderate value visible in the existing ecosystem types mapping.</p>
<ul style="list-style-type: none"> A second small population for swamp maire was seen on the eastern edge of the old-growth tawa forest (near Chainage 4200). This species has recently been classified as 'Threatened-Nationally Critical' and the application needs to update the threat status of this species (from 'Regionally Uncommon' in Section 6.A.G), and to consider the effects of the project on this second population. 	<p>Three additional swamp maire occur in the old growth alluvial forest that had already been largely protected through the proposed effects envelope; only 0.1 ha of the old growth alluvial forest can be affected and this must be no more than a moderate magnitude of effect. Given that the swamp maire trees are located in the interior of an old growth alluvial forest patch it is highly unlikely that they would be affected within a 0.1 ha old growth alluvial effects envelope. If the swamp maire were affected within the parameters of the effect envelope, the mitigation planting rates of 1:100 for damage and 1:200 for unforeseen permanent loss would apply.</p> <p>The Threatened Flora report is dated March 2018 at which time the stated threat status of swamp maire was correct. All other references within the terrestrial ecology reports recognise the updated/most recent Nationally Critical threat status of swamp maire and the Nationally Critical threat status has been a major consideration in terms of effects management.</p>
<ul style="list-style-type: none"> Ramarama (<i>Lophomyrtus bullata</i>) has a threat status of "Threatened-Nationally Critical", but has not been mentioned in the Application. This species was seen during the site visit in the forest areas near Chainage 4300, and there is an area of shrubland and forest that is dominated by this species near Chainage 5700–5800. It is uncertain whether this area is within the adjacent spoil site, as this area of vegetation has not been mapped. 	<p>Ramarama was Not Threatened at the time of the threatened plant survey but the current Threatened-Nationally Critical status has now been reflected in the effects management regime.</p> <p>Most of the ramarama exist in an area that was unmapped (protected) and this protection has now been strengthened by inclusion of an ecozone around the main population area (Attachment 1), as described above. This includes the amendment of the boundaries of an adjacent fill site.</p> <p>A lesser number of scattered specimens occur in the north eastern area of Attachment 1, where an alignment is very likely to result in their loss. Where loss of ramarama occurs outside of the ecozone/no-go zone, a replacement planting rate of 1:100 would apply. This replacement planting rate reflects the nationally critical threat status, but also the relatively fast-growing and seral character of ramarama, and that there are good prospects for propagation and establishment success. A row has been added to Table 6.A.1 to capture this replacement planting element.</p>

Wildland Consultants' Comment	NZTA Experts' Reply
	<p>The seed collectors have been briefed to collect seed from the ramarama population in the designation area to further ensure any losses are captured in the replacement planting composition.</p>
Assessment of Ecological Values	
<ul style="list-style-type: none"> • The Applicant notes that “the ecosystem types of most value are the indigenous communities, particularly those that represent pre-human compositions, are threatened, or were rare prior to human occupation” (Paragraph 23). Policy 13-5 of the One Plan provides criteria for the evaluation of significance of effects on areas of habitat, and Schedule F of the same plan provides definitions of habitats that are rare, threatened, or at risk. These appear to have been used in the Application as a filter to either include or exclude areas of ecological value from mapping and assessment. This is not the intent of Schedule F, and Schedule F has been misinterpreted for what it is intended to capture. Examples of the use of Schedule F to incorrectly exclude habitat from this assessment of ecological effects are: 	
<ul style="list-style-type: none"> ○ The exclusion of all exotic-dominated wetlands from the assessment of ecological effects, as they are not considered to comprise Rare, Threatened, or At Risk habitats “for the purposes of this Plan” according to Table F.1, or meet the definition of indigenous as per the One Plan glossary. 	<p>Exotic dominated seepage wetlands have now been included in the ecosystem type mapping.</p>
<ul style="list-style-type: none"> ○ The exclusion of some areas of mature indigenous treeland (e.g. nīkau treeland or ti kōuka treeland) on the basis that these species are not listed in the “further descriptions” of the habitats in Table F.1 of the One Plan. Both of these species are characteristic of broadleaved forest and treeland, and the explanatory notes for Table F.1 note that “other species not listed can also be present” and that the “further description column . . . is not definitive”. 	<p>To the east of the Western QEII (outside of protected vegetation areas) there are estimated to be 20–30 mature nīkau trees and a smaller number of mature ti kōuka trees. Both species have been included on seed collection lists and these species will feature in replacement planting undertaken to address vegetation clearance effects (rather than being given specific ECRs). The reason for taking this approach is based on the very small area of these vegetation types and also their status (based on area and composition) under Schedule F of the One Plan.</p>

Wildland Consultants' Comment	NZTA Experts' Reply
<ul style="list-style-type: none"> Section 6.B.3.2.1 of the Application states that the high-quality invertebrate habitats within the project footprint are mature forest, older secondary forest, and the Manawatu Gorge Scenic Reserve. The Applicant then applies the ecological scoring guide to prioritise “intact forest invertebrate communities”, and fails to consider the high invertebrate values that can be supported by relatively young successional vegetation. In Section 6.B.5.2, the “rest of the designation”, which includes all shrubland areas in the eastern rise area, are described as having “Low-Negligible” value for terrestrial invertebrates. Some of the areas of “divaricating <i>Coprosma</i> shrubland” species, including <i>Coprosma</i>, <i>Melicytus</i>, small-leaved <i>Olearia</i> species, and <i>Muehlenbeckia</i>, <i>Parsonsia</i>, and <i>Rubus</i>. These genera are associated with specialist indigenous insect species including moth and butterfly species (c.f. Allen <i>et al.</i> 2003, Derraik <i>et al.</i> 2003). Many of the insect species associated with these plant genera are local endemics as they are only found in certain parts of New Zealand, and some are classified as nationally ‘Threatened’ or ‘At Risk’. The Application needs to reconsider the assessment of invertebrate habitat values, and this should be undertaken by a terrestrial invertebrate specialist. 	<p>Our terrestrial-fauna Ecologist has considered this review and responds as below:</p> <p>Value of the plant genera <i>Coprosma</i>, <i>Melicytus</i>, <i>Olearia</i>, <i>Muehlenbeckia</i>, <i>Parsonsia</i>, and <i>Rubus</i> in degraded scrublands and successional habitats as invertebrate habitat:</p> <p>We acknowledge that local endemic, “At Risk”, and “Threatened” invertebrate species can be associated with these plant genera; however, this pattern is more prevalent in the South Island and these invertebrate species generally occur in association with similarly range restricted, “At Risk”, and “Threatened” plant species of these genera. The plant species of these genera present on this site are all common and widespread. Research on these genera (predominately <i>Coprosma</i> and <i>Olearia</i>) while rightly concluding that these plant genera should be considered for their conservation value, offers no comparison or provides any conclusion that should be used to give shrublands or successional habitats importance or value over and above other native habitats for terrestrial invertebrates.</p> <p>The assessment of ecological value of terrestrial invertebrate communities on this site considered several factors that are known to influence the health and diversity of terrestrial invertebrate communities. The plant species of the 6 genera identified within the submission are a common component of most native vegetation types present in the alignment area. Additionally, there is a greater abundance of plants of these genera in other identified habitats than in the identified <i>Coprosma rhamnoides</i> shrublands. The identified area represents the smallest, most fragmented, degraded and modified example of a habitat that contains these plant genera across the site. It would be inconsistent and inappropriate to attribute a higher ecological value for terrestrial invertebrates to this area due to the presence of these plant genera while ignoring these plant genera’s abundance in most of the other habitat types. I would also consider it unlikely due to the abundance of these plant genera within the other habitat types assessed and in the wider area (such as large areas of shrubland and regenerating vegetation on the faces above the Manawatu river where these plant genera are a significant component of the habitats) that this small degraded example would have any special significance for any potential high value invertebrate species.</p>

Wildland Consultants' Comment	NZTA Experts' Reply
	<p>It is my opinion that the scoring methodology developed for this site remains appropriate for the purposes of this assessment as, while not explicitly identifying plant genera of potential value, it appropriately attributes value to habitats with characteristics that contribute to them being the most likely to have conservation important invertebrate taxa, will be the hardest to replace/restore, and are rarest within the wider area and the examples identified as high and moderate value include an abundance of plants within the genera <i>Coprosma</i>, <i>Melicytus</i>, <i>Olearia</i>, <i>Muehlenbeckia</i>, <i>Parsonsia</i>, and <i>Rubus</i>.</p> <p>Additionally, it is our opinion that with such high endemism of New Zealand's terrestrial invertebrate fauna (90%+), high rates of host specificity in several orders and lack of research on most plant genera's invertebrate fauna or equally the taxonomy of this fauna that assessments of ecological value, in the absence of known conservation important taxa, should consider but not focus on plant genera/species-specific values.</p> <p>In this regard we do not propose any change to the assessed value of this habitat for terrestrial invertebrates and consider this habitat to be consistent with the scoring guidance for low ecological value provided in the terrestrial fauna report (Table 6.B.1).</p> <p>The overall ecological value of these shrublands which accounts for low terrestrial invertebrate, flora, and avifauna values and high herpetofauna values is considered moderate.</p> <p>In recognition that divaricating shrublands are generally of an older age and more floristically diverse than equivalent areas of kānuka and mānuka we have mapped these divaricate shrublands as a distinct ecosystem type and a 1:3 replacement planting ratio is proposed for mitigation. It is our opinion that this replacement ratio in the context of the sites current degradation would also be effective in mitigating for fauna habitat values.</p> <p>To ensure the potential terrestrial invertebrate habitat values potentially associated with the plant genera <i>Coprosma</i>, <i>Melicytus</i>, <i>Olearia</i>, <i>Muehlenbeckia</i>, <i>Parsonsia</i>, and <i>Rubus</i> beyond the identified divaricate shrublands we recommend that within the ecological management plan to be developed in consultation with the Department of Conservation and tangata whenua that plant lists for offset and</p>

Wildland Consultants' Comment	NZTA Experts' Reply
	replacement plantings have high representation of these genera, reflecting their current abundance across multiple habitat types.
Mitigation and Offset Quantities	
<ul style="list-style-type: none"> • The mitigation and offset quantum proposed by the Applicant need to be revised with regards to the extent of habitat loss, to address: <ul style="list-style-type: none"> ○ All wetlands, including those with a cover of exotic plants. ○ Indigenous wetlands excluded from the assessment. ○ All indigenous vegetation excluded on the basis that is supposedly didn't meet the criteria in Schedule F of the One Plan. ○ All indigenous vegetation and streams within the proposed spoil sites and access roads. 	
<ul style="list-style-type: none"> ○ All wetlands, including those with a cover of exotic plants. 	As above, this has now been addressed.
<ul style="list-style-type: none"> ○ Indigenous wetlands excluded from the assessment. 	As above, this was actually not an issue.
<ul style="list-style-type: none"> ○ All indigenous vegetation excluded on the basis that is supposedly didn't meet the criteria in Schedule F of the One Plan. 	Vegetation was never excluded on this basis. The treatment of unmapped vegetation has now been clarified so that all vegetation is either sought to be cleared or protected.
<ul style="list-style-type: none"> ○ All indigenous vegetation and streams within the proposed spoil sites and access roads. 	All terrestrial indigenous ecosystem types have been mapped for the designation.
<ul style="list-style-type: none"> • Following this revision of mapping and calculation of habitat loss, the proposed replacement plantings need to address all areas of ecological value that are to be lost due to the project. 	This is the approach taken, as per proposed condition 13.
<ul style="list-style-type: none"> • The Applicant refers to biodiversity offsetting, but there is no quantitative data to support the findings of the report. Rather, the report relies on professional judgement to discern the appropriate quantum of mitigation, e.g. plantings to mitigate for vegetation loss, extent of pest control. Mitigation ratios proposed for addressing vegetation loss are very low for mānuka-kānuka divaricating <i>Coprosma</i> shrublands (1:1), which does not acknowledge the time lag to reach a similar state, and are high for kānuka forest or scrub (1:5) relative to advanced secondary broadleaved forest (1:4), which is older and of higher ecological value. The offset replacement plantings presented in Table 6.A.19 use a ratio of 1:12 for old growth forests (alluvial), 1:10 for old growth forests (hill country), and 1:4 or 	<p>Note, updated ecosystem area tabulation, maps, and corresponding ECR replacement planting quantum are in Attachment 5 of this response.</p> <p>Other positive effects proposed to address adverse ecological effects include protection, retirement and gap planting of existing forests and pest control. The specific details are to be worked on. It should be noted that the replacement planting ratios discussed here are only one part of the positive effects package.</p>

Wildland Consultants' Comment	NZTA Experts' Reply
<p>1:2 for wetland loss. No data are provided to support these offsetting ratios.</p> <ul style="list-style-type: none"> Based on the limited botanical data available, and a near absence of associated fauna data (e.g. invertebrates and herpetofauna), appropriate mitigation ratios that consider time lag for restoration plantings could be in the range of: 	
<ul style="list-style-type: none"> 1:1 for early successional shrubland communities than that are dominated by mānuka and or kānuka and have not reached canopy closure (e.g. reverting from pasture and less than 80% canopy cover). 	<p>Mānuka and kānuka shrublands are readily-replaced early-successional communities and are proposed to be replaced at a replacement planting ratio of 1:1. No differentiation is made between shrublands that have or have not attained 80% canopy cover.</p>
<ul style="list-style-type: none"> 1:2 for early successional shrubland communities that have reached canopy closure and are dominated by mānuka or kānuka. 	
<ul style="list-style-type: none"> At least 1:3 for divaricating Coprosma shrubland, but his ratio should be increased to 1:4 or 1:5 if indigenous herpetofauna or Threatened or At Risk invertebrates are confirmed as present. 	<p>The divaricate shrublands are now mapped as a distinct ecosystem type and we propose a replacement planting ratio of 1:3 for loss of this ecosystem type.</p>
<ul style="list-style-type: none"> A minimum of 1:5 for all forest types (e.g. advanced secondary broadleaved forest), due to the high degree of historic loss of forest in the project area. 	<p>The existing forest and scrubland ECRs remain. It should be noted that the higher ECR for kānuka forest compared to advanced secondary broadleaved forest reflects the fact that kānuka is listed in One Plan Schedule F as a threatened ecosystem type regionally, while the advanced secondary broadleaved composition is not.</p>
<ul style="list-style-type: none"> At least 1:2 for exotic wetlands, as even exotic wetlands within the project area have an indigenous component. 	<p>Exotic seepage wetlands will be mitigated at a rate of 1:1. This reflects their existence while remaining proportional to indigenous seepage value and mitigation rate.</p>
<ul style="list-style-type: none"> A minimum of 1:4 for all indigenous dominated seepage wetlands. 	<p>The indigenous seepage ECRs remain as proposed.</p>
<ul style="list-style-type: none"> The proposed mitigation ratios for old growth forest (1:10 or 1:12) may be appropriate. 	<p>The existing old growth forest ECRs remain as proposed.</p>

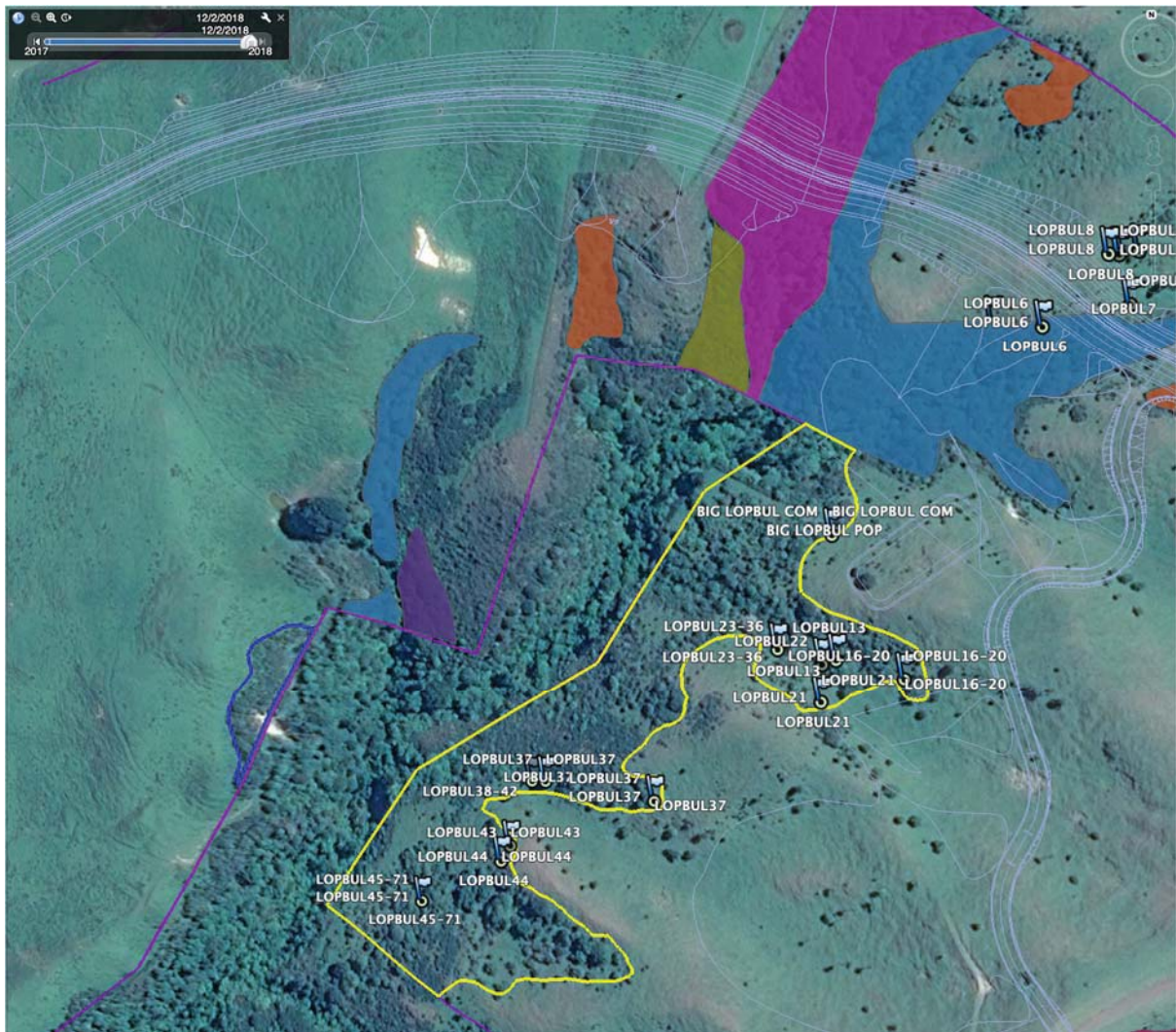
Wildland Consultants' Comment	NZTA Experts' Reply
<ul style="list-style-type: none"> The Applicant estimates that c. 4000 metres of stream loss may occur as a result of the proposed works, although this is likely to be an underestimate if headwater streams within proposed spoil sites are included. While it is acknowledged that environmental compensation ratios for stream loss cannot be provided until potential compensation sites have been identified, the Applicant does not provide any guidance as to where such sites could occur. Even a conservative offset ratio of 1:3 would require some 12,000 metres of stream length to be restored. This amount of stream length is not available within the designation, hence offsite options will need to be investigated. 	<p>Freshwater ecology considerations will be dealt with in detail in the regional consenting process.</p>

Additional points raised in the DOC submission dated 13 th December 2018	
Submission Point	NZTA Experts' Reply
<p>5. a) Mapping and assessment of the ecological values of all vegetation and habitats within the designation area, including ecosystems which are currently assumed to be clear of the alignment. This should not be limited by vegetation and habitats described in Schedule F of the One Plan, but should include all vegetation and habitats that may have ecological value;</p>	<p>Five areas of mānuka-kānuka shrubland were assumed to be avoided but are now mapped for clearance (Attachment 2). The value of these communities is consistent with the ecological assessment of the ecosystem type.</p> <p>As noted above, a mixed community containing ramarama exists along the eastern margin of the Western QEII – this area was unmapped as a means of avoidance. The protection of this area has been clarified through imposition of a No-Go/Ecozone (Attachment 1). The area contains ramarama which has the threat classification of Threatened-Nationally Critical and therefore is of Very High ecological value.</p> <p>The approach was never to limit assessment of value to Schedule F compositions. The One Plan and Schedule F do however provide the regulatory framework for the ecological assessment.</p>

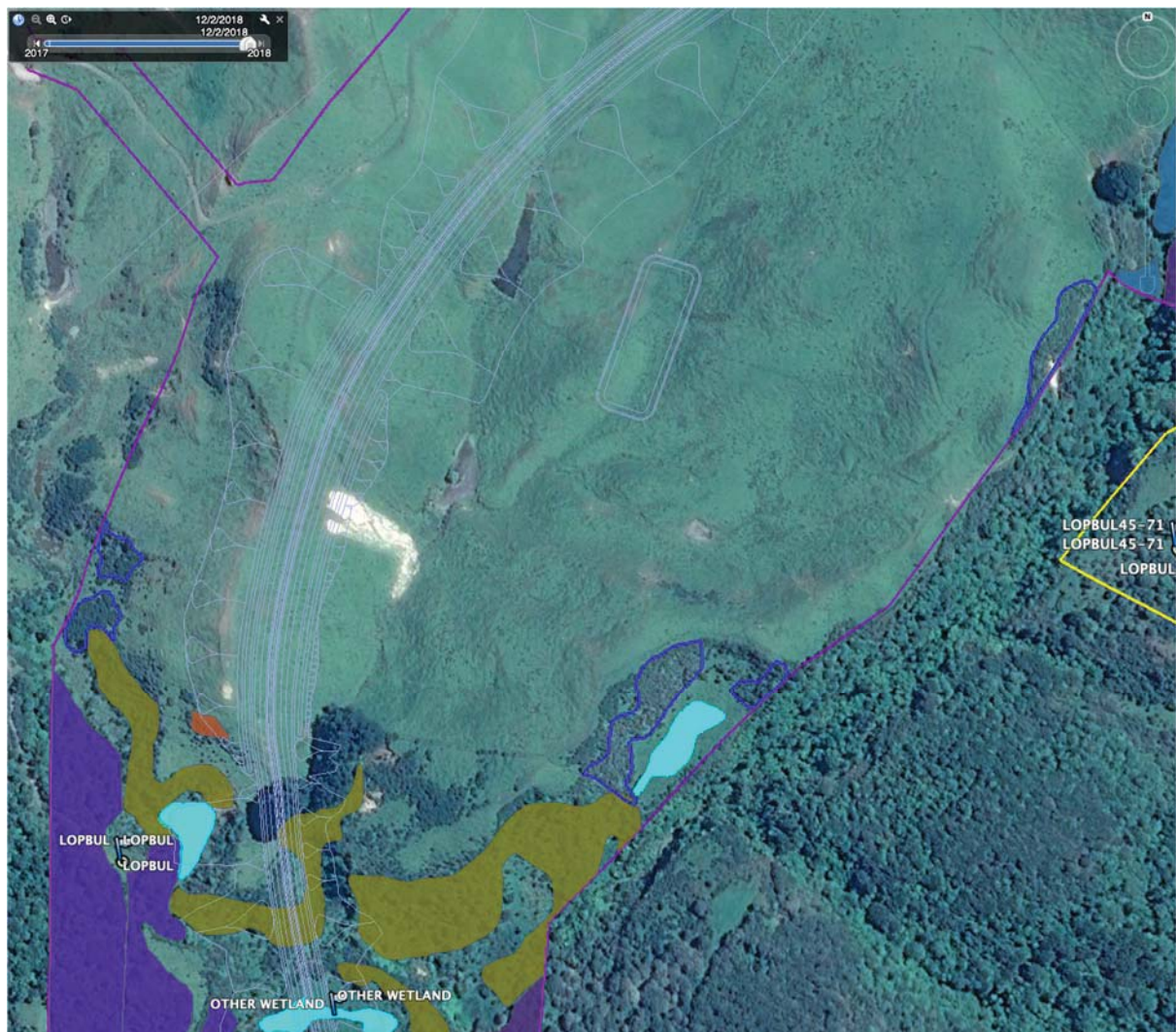
Additional points raised in the DOC submission dated 13 th December 2018	
Submission Point	NZTA Experts' Reply
b) Detailed data (including species) of all vegetation types present within the entire designation footprint, including areas of mature indigenous treeland;	Qualitative descriptions of compositions other than old growth forests are considered to be adequate for the purposes of ecological valuation and effects management. This has been discussed with the Wildland Ecologists while on site.
c) Calculation of the loss of terrestrial and stream habitat as a result of the proposed spoil sites, and assessment of their ecological values, and implications for location of restoration plantings;	Addressed above.
d) Assessment of the loss of wetlands, including wetlands dominated by exotic plant species and their ecological values;	Addressed above.
e) Assessment of the invertebrate values of young successional vegetation;	Addressed above.
f) Assessment of the indigenous invertebrate and herpetofauna values of “divaricating Coprosma shrubland”, as these values can occur outside intact forest communities;	Addressed above.
g) Assessment of the indigenous fauna habitat values of exotic woody vegetation and rank grassland;	The existing fauna report considered both indigenous and exotic communities.
h) Clarification and correction of inconsistencies between the assessments undertaken by the Applicant’s specialists with regards to the location and extent of indigenous habitats;	Addressed above.
i) Any potential implications upon freshwater environments of the location of spoil sites, due to hydrology effects;	To be addressed during the regional consenting stage.
j) The re-classification of some watercourses, for example re-classification of Watercourse 7b from ‘intermittent’ to ‘permanent’.	To be addressed during the regional consenting stage.
6. I seek that the ecological mitigation and offsets approach for vegetation, fauna and their habitats (including for bats, avifauna, herpetofauna and	Some amendments to the effects management and ECRs have been made as outlined against respective points above.

Additional points raised in the DOC submission dated 13 th December 2018	
Submission Point	NZTA Experts' Reply
invertebrates) provide for sufficient certainty of outcome (including net ecological gain), in light of the above further assessments.	
7. I seek the revision of the mitigation and offset quantum's proposed by the Applicant to adequately address the extent of habitat loss in relation to:	
a) All wetlands, including those with a cover of exotic plants;	Addressed above.
b) Indigenous wetlands that are currently excluded from the assessment;	Addressed above.
c) All indigenous vegetation that has been excluded in the Notice of Requirement (NOR) on the basis that the Applicant considers that it does not meet the criteria in Schedule F of the One Plan;	This was not the approach, as explained above. Unmapped vegetation was intended as a method of avoidance.
d) All indigenous vegetation and streams within the proposed spoil sites and access roads; and	Addressed above.
e) The proposed enhancement works, including replacement plantings and/or riparian treatment, need to address all the areas of ecological value that are to be lost, use offset ratios that appropriately recognise time lags and the value of what is to be replaced, and provide for certainty of both implementation and long-term maintenance.	Addressed above.
8. The Applicant should clearly differentiate matters that are to be addressed through environmental compensation from matters that are to be addressed through biodiversity offsets. I seek that all locations that will be subject to offset (or any proposed compensation) measures be clearly identified and appropriately assessed. Any offset must reasonably demonstrate net indigenous biological diversity gain and not rely only on professional judgment or opinion.	We are currently working to define replacement planting and offset locations and this work will be undertaken in conjunction with DOC. We will provide an explanation of environmental compensation versus offsetting as part of this work.

Attachment 1: No-Go/Ecozone proposed at CH5700 to clarify extent of avoidance required



Attachment 2: Five mānuka-kānuka shrublands (open blue polygons) now mapped



Attachment 3: Updated designation area species list

Scientific name	Common/maori name	Threat classification
<i>Adiantum cunninghamii</i>	common maidenhair	NT
<i>Alectryon excelsus</i>	titoki	NT
<i>Asplenium bulbiferum</i>	hen and chicken fern	NT
<i>Asplenium gracillimum</i>	hen and chicken fern	NT
<i>Asplenium hookerianum</i>	Hookers spleenwort	NT
<i>Asplenium oblongifolium</i>	shining spleenwort	NT
<i>Astelia hastata</i>	tank lily	NT
<i>Astelia sp.</i>	–	NT
<i>Austroblechnum chambersii</i>	nini	NT
<i>Austroderia sp.</i>		NT
<i>Beilschmiedia tawa</i>	tawa	NT
<i>Brachyglottis repanda</i>	rangiora	NT
<i>Carex geminata</i>	cutty grass	NT
<i>Carex maorica</i>	Maori sedge	NT
<i>Carex secta</i>	purei	NT
<i>Carpodetus serratus</i>	marble leaf	NT
<i>Clematis forsteri</i>	Forster's clematis	NT
<i>Coprosma areolata</i>	thin-leaved Coprosma	NT
<i>Coprosma lucida</i>	karamu	NT
<i>Coprosma rhamnoides</i>	–	NT
<i>Coprosma robusta</i>	karamu	NT
<i>Coprosma rotundifolia</i>	–	NT
<i>Cordyline australis</i>	cabbage tree	NT
<i>Cyathea dealbata</i>	silver fern	NT
<i>Cyathea medullaris</i>	mamaku	NT
<i>Dacrycarpus dacrydioides</i>	kahikatea	NT
<i>Dacrydium cupressinum</i>	rimu	NT
<i>Dianella nigra</i>	turutu	NT
<i>Dichondra brevifolia</i>	dichondra	NT
<i>Dicksonia squarrosa</i>	rough tree fern	NT
<i>Earina autumnalis</i>	Easter orchid	NT
<i>Elaeocarpus dentatus</i>	hinau	NT
<i>Elatostema rugosum</i>	parataniwha	NT
<i>Erythranthe guttata</i>	monkey musk	Exotic
<i>Freycinetia banksii</i>	kiekie	NT
<i>Galega officinalis</i>	goat's rue	Exotic
<i>Geniostoma ligustrifolium</i>	hangehange	NT
<i>Griselinia littoralis</i>	broadleaf	NT
<i>Griselinia lucida</i>	puka	NT
<i>Hedycarya arborea</i>	pigeonwood	NT
<i>Hoheria sexstylosa</i>	houhere	NT

Te Ahu a Turanga: Manawatū Tararua Highway Project – Analysis and reply to Wildland Consultants November 2018 NoR review

<i>Hydrocotyle moschata</i>	hairy pennywort	NT
<i>Hydrocotyle pterocarpa</i>	–	NT
<i>Juncus acutus</i>	sharp rush	Exotic
<i>Juncus effusus</i>	soft rush	Exotic
<i>Juncus pallidus</i>	leafless rush	NT
<i>Knightia excelsa</i>	rewarewa	NT
<i>Kunzea robusta</i>	kānuka	NV
<i>Laurelia novae-zelandiae</i>	pukatea	NT
<i>Leptospermum scoparium</i>	mānuka	NT
<i>Leucopogon fasciculatus</i>	mingimingi	NT
<i>Lolium arundinaceum</i>	tall fescue	Exotic
<i>Lophomyrtus bullata</i>	ramarama	NC
<i>Lotus pedunculatus</i>	lotus	Exotic
<i>Melicytus ramiflorus</i>	mahoe	NT
<i>Metrosideros colensoi</i>	rata	NV
<i>Metrosideros perforata</i>	akatea	NV
<i>Microsorium pustulatum</i>	hound's tongue	NT
<i>Myoporum laetum</i>	ngaio	NT
<i>Nasturtium</i> sp.	watercress	Exotic
<i>Nestegis lanceolata</i>	white maire	NT
<i>Nestegis</i> sp.	maire	NT
<i>Olearia arborescens</i>	common tree daisy	NT
<i>Olearia virgata</i>	twiggy tree daisy	NT
<i>Paesia scaberula</i>	ring fern	NT
<i>Parablechnum minus</i>	swamp kiokio	NT
<i>Parablechnum novae-zelandiae</i>	kiokio	NT
<i>Parsonsia heterophylla</i>	New Zealand jasmine	NT
<i>Pellaea rotundifolia</i>	button fern	NT
<i>Pennantia corymbosa</i>	kaikomako	NT
<i>Persicaria hydropiper</i>	water pepper	Exotic
<i>Piper excelsum</i>	kawakawa	NT
<i>Pittosporum eugenioides</i>	tarata	NT
<i>Pittosporum tenuifolium</i>	kohukohu	NT
<i>Plagianthus regius</i>	ribbonwood	NT
<i>Pneumatopteris pennigera</i>	gully fern	NT
<i>Poa trivialis</i>	rough-stalked meadow grass	Exotic
<i>Podocarpus totara</i>	totara	NT
<i>Polystichum vestitum</i>	prickly shield fern	NT
<i>Polystichum wawranum</i>	–	NT
<i>Prumnopitys ferruginea</i>	miro	NT
<i>Prumnopitys taxifolia</i>	matai	NT
<i>Pseudopanax crassifolius</i>	lancewood	NT
<i>Pyrosia eleagnifolia</i>	leather-leaf fern	NT

Te Ahu a Turanga: Manawatū Tararua Highway Project – Analysis and reply to Wildland Consultants November 2018 NoR review

<i>Ranunculus</i> spp.	buttercup	Exotic
<i>Rhabdothamnus solandri</i>	taurepo	NT
<i>Rhopalostylis sapida</i>	nikau palm	NT
<i>Ripogonum scandens</i>	supplejack	NT
<i>Rubus cissoides</i>	bush lawyer	NT
<i>Schefflera digitata</i>	pate	NT
<i>Schoenus maschalinus</i>	dwarf bog rush	NT
<i>Solanum aviculare</i>	poroporo	NV
<i>Streblus heterophyllus</i>	small-leaved milk tree	NT
<i>Syzygium maire</i>	swamp maire	NC
<i>Typha orientalis</i>	raupō	NT
<i>Weinmannia racemosa</i>	kamahi	NT

Note: NT= Not Threatened, NV = Threatened – Nationally Vulnerable, NC = Threatened – Nationally Critical. Threat classifications follow de Lange et al., (2018) and were retrieved from <https://www.doc.govt.nz/globalassets/documents/science-and-technical/nztcs22entire.pdf>

Attachment 4: Typical composition of exotic seepage wetlands

Often dominated by exotic *Ranunculus* spp. with localised monkey musk (*Erythranthe guttata*; FAC²), lotus (*Lotus pedunculatus*; FAC), water pepper (*Persicaria hydropiper*; FACW), watercress (*Nasturtium* sp.; OBL) and areas of exotic pasture grass species. Rushes present in patches of varying density include exotic soft rush (*Juncus effusus*; FACW) and sharp rush (*J. Acutus*; FACW), intermixed with the native leafless rush (*J. pallidus*; FACW). The native sedges cutty grass (*Carex geminata*; FACW) and purei (*C. secta*; OBL) are usually infrequent making up a minor component of cover.

² Indicates degree of affinity for wet habitats (wetland indicator status rating; Clarkson et al., 2013): obligate wetland (OBL), facultative wetland (FACW), facultative (FAC). See https://www.landcareresearch.co.nz/_data/assets/pdf_file/0003/71949/vegetation_to_wetland_delineation.pdf

Attachment 5: Revised ecosystem types area, maps, and replacement planting calculation table

Ecosystem type	Value level	RMA s6(c)	Area (ha)
Old-Growth (OG) Forests (Alluvial) [^]	Very High	Yes	4.25
OG Forests (Hill Country)	Very High	Yes	1.78
Secondary Broadleaved Forests with OG Signatures	High	Yes	3.07
OG Treelands	High	Yes	0.41
Advanced Secondary Broadleaved Forests	High	No	2.93
Raupo Dominated Seepage Wetlands (High Value)	High	Yes	0.56
Secondary Broadleaved Forests and Scrublands	Moderate	No	16.58
Kānuka Forests	Moderate	Yes	4.54
Indigenous-Dominated Seepage Wetlands (Mod. Value)	Moderate	Yes	1.12
Exotic Dominated Seepage Wetlands (Low Value)	Low	Yes	2.74
Mānuka, Kānuka Shrublands	Low	No	4.55
Divaricating Shrublands	High	No	0.33
			Sum = 42.88

[^]This area calculation includes 0.05 ha of Very High Value Threatened-Nationally Critical swamp maire forest. Areas are slope corrected using the project LiDAR dataset.

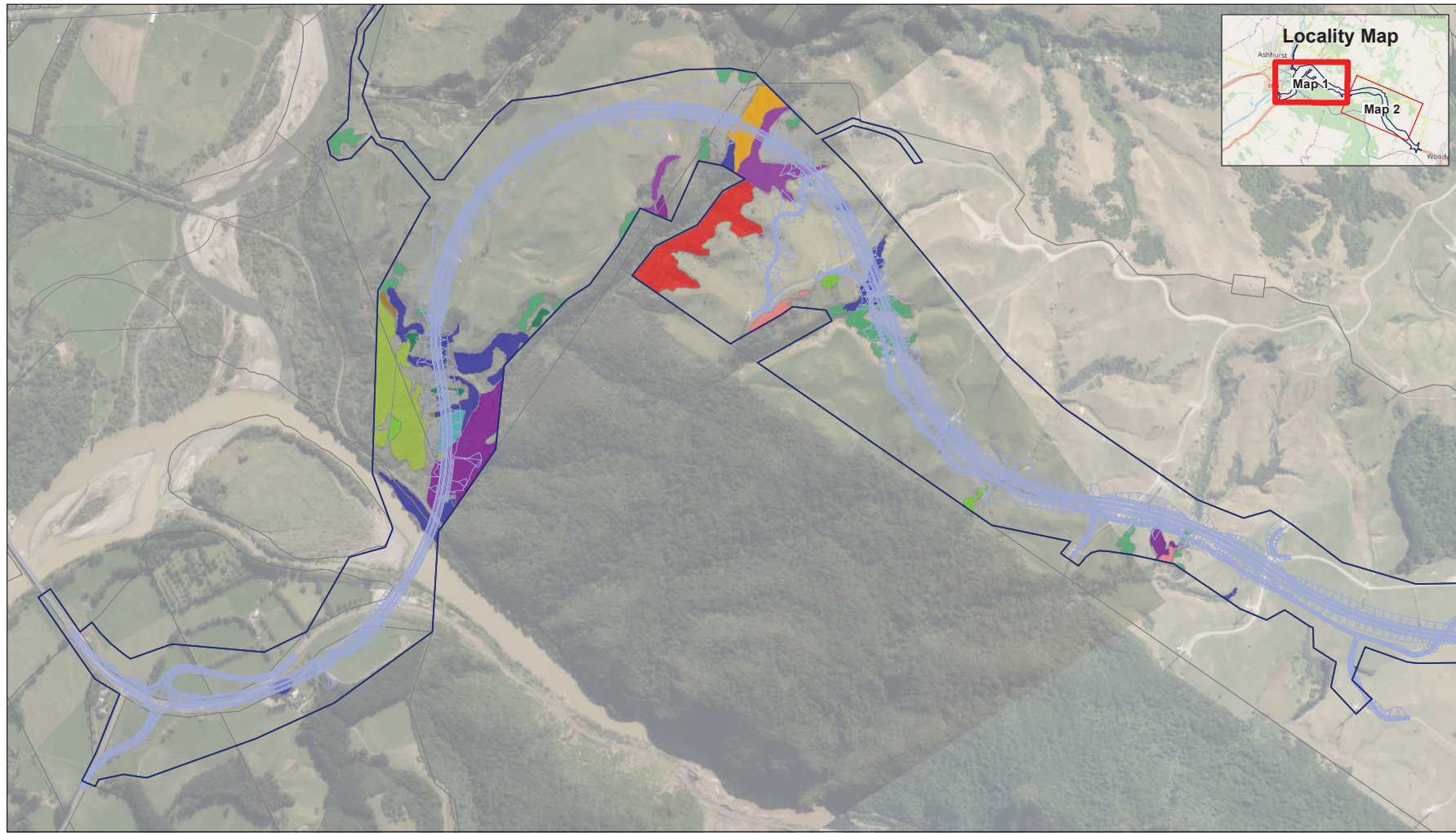
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<p>Paper Size A3</p> <p>0 0.2 0.4 0.6 0.8</p> <p>Kilometers</p> <p>Map Projection: Transverse Mercator Horizontal Datum: NZGD 2000 Grid: NZGD 2000 New Zealand Transverse Mercator</p>		<p>Legend</p> <table border="0"> <tr> <td>■ A - Old Growth Forest Alluvial</td> <td>■ E - Kanuka Forests</td> <td>■ I - Secondary Broadleaved Forests and Scrublands</td> <td>■ NOR Base Option</td> </tr> <tr> <td>■ B - Old-Growth Forest Hill Country</td> <td>■ F - Advanced Secondary Broadleaved Forest</td> <td>■ J - Manuka, Kanuka Shrublands</td> <td>□ Designation Boundary</td> </tr> <tr> <td>■ C - Secondary Broadleaved Forests with Old-Growth Signatures</td> <td>■ G - Indigenous Dominated Seepage Wetlands High Value</td> <td>■ K - Divericating Shrublands</td> <td>□ Property Boundary</td> </tr> <tr> <td>■ D - Old-Growth Treelands</td> <td>■ H - Indigenous Dominated Seep Wetlands Moderate Value</td> <td>■ L - Exotic Wetland</td> <td></td> </tr> <tr> <td></td> <td></td> <td>■ Ecological No-Go Zone</td> <td></td> </tr> </table>	■ A - Old Growth Forest Alluvial	■ E - Kanuka Forests	■ I - Secondary Broadleaved Forests and Scrublands	■ NOR Base Option	■ B - Old-Growth Forest Hill Country	■ F - Advanced Secondary Broadleaved Forest	■ J - Manuka, Kanuka Shrublands	□ Designation Boundary	■ C - Secondary Broadleaved Forests with Old-Growth Signatures	■ G - Indigenous Dominated Seepage Wetlands High Value	■ K - Divericating Shrublands	□ Property Boundary	■ D - Old-Growth Treelands	■ H - Indigenous Dominated Seep Wetlands Moderate Value	■ L - Exotic Wetland				■ Ecological No-Go Zone		<p>NZTA Manawatu Gorge Options</p> <p>Job Number 915001103 Revision 3 Date 21 Dec 2018</p> <p> </p> <p>Ecology - Vegetation</p>
■ A - Old Growth Forest Alluvial	■ E - Kanuka Forests	■ I - Secondary Broadleaved Forests and Scrublands	■ NOR Base Option																				
■ B - Old-Growth Forest Hill Country	■ F - Advanced Secondary Broadleaved Forest	■ J - Manuka, Kanuka Shrublands	□ Designation Boundary																				
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■ D - Old-Growth Treelands	■ H - Indigenous Dominated Seep Wetlands Moderate Value	■ L - Exotic Wetland																					
		■ Ecological No-Go Zone																					

Figure 1

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Data source: ESR: OpenStreetMap - 20180828; LINZ: Property boundaries - 20170928; GHD: Designation Boundary, Alignment - 20181028; Forbes Ecology: Vegetations - 20181219. Created by jhchen



Paper Size A0
 0 0.1 0.2 0.3 0.4 0.5
 Kilometers

Map Projection: Transverse Mercator
 Horizontal Datum: NZGD 2000
 Grid: NZGD 2000 New Zealand Transverse Mercator



Legend

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|--|---|--|----------------------|
| A - Old-Growth Forest Allotial | E - Kanuka Forests | I - Secondary Broadleaved Forests and Scrublands | NOR Base Option |
| B - Old-Growth Forest Hill Country | F - Advanced Secondary Broadleaved Forest | J - Manuka, Kanuka Shrublands | Property Boundary |
| C - Secondary Broadleaved Forests with Old-Growth Signatures | G - Indigenous Dominated Seepage Wetlands High Value | K - Divaricating Shrublands | Designation Boundary |
| D - Old-Growth Treelands | H - Indigenous Dominated Seep Wetlands Moderate Value | L - Exotic Wetland | |
| | | Ecological No-Go Zone | |

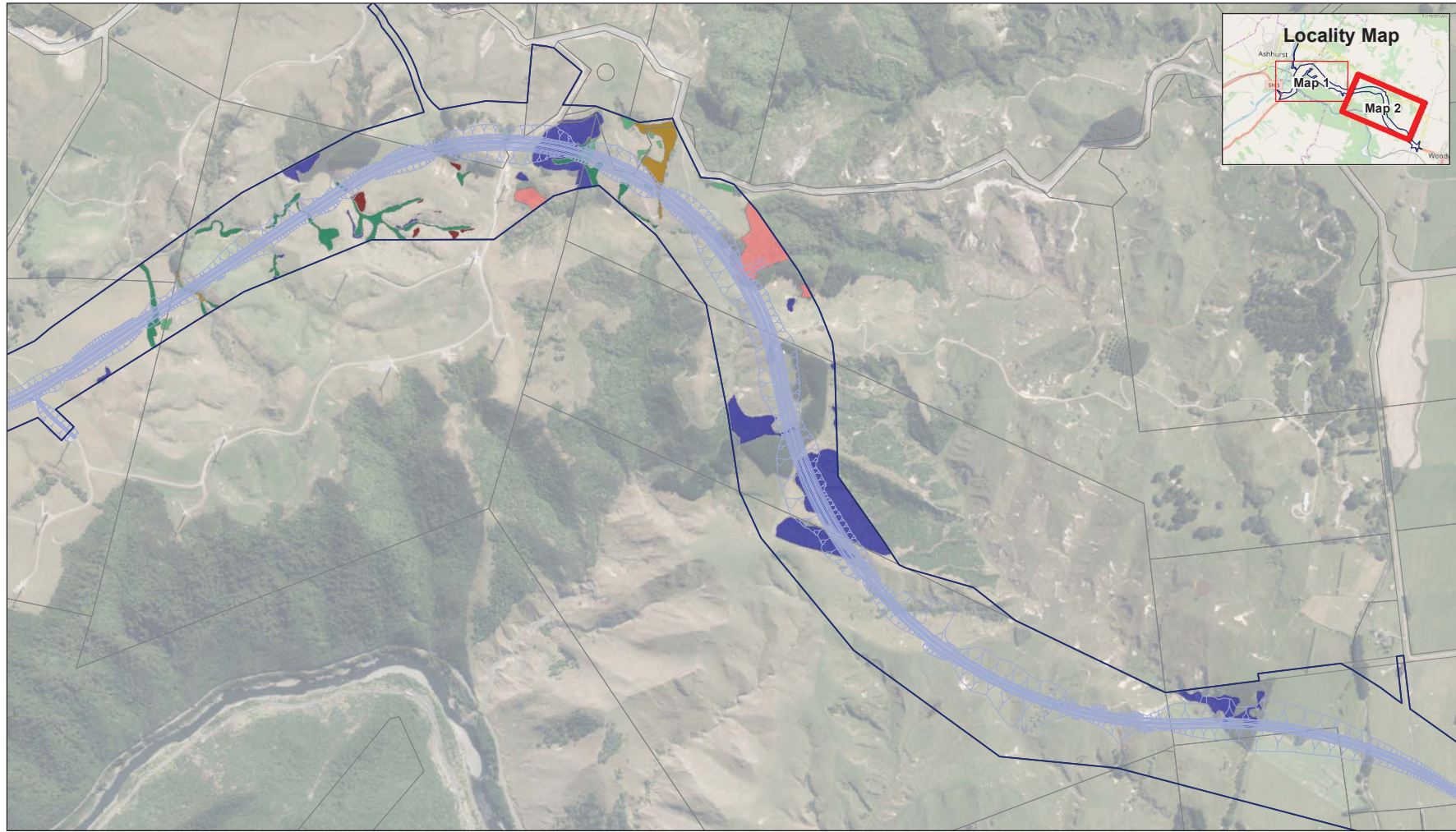


NZTA Job Number 915001103
 Manawatu Gorge Options Revision 3
 Date 21 Dec 2018

Indigenous Ecosystem Types
 Map 1 of 2

Figure 1

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 Data source: ESRI: OpenStreetMap - 20180828; LINZ: Property boundaries - 20170928; GHD: Designation Boundary - 20181026; Forbes Ecology: Vegetations - 20181025. Created by jhchen
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Paper Size A0
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 Kilometers

Map Projection: Transverse Mercator
 Horizontal Datum: NZGD 2000
 Grid: NZGD 2000 New Zealand Transverse Mercator



Legend

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| A - Old Growth Forest Alluvial | E - Kanuka Forests | I - Secondary Broadleaved Forests and Scrublands | NDR Base Option |
| B - Old-Growth Forest Hill Country | F - Advanced Secondary Broadleaved Forest | J - Manuka, Kanuka Shrublands | Property Boundary |
| C - Secondary Broadleaved Forests with Old-Growth Signatures | G - Indigenous Dominated Seepage Wetlands High Value | K - Diverging Shrublands | Designation Boundary |
| D - Old-Growth Treelands | H - Indigenous Dominated Seep Wetlands Moderate Value | L - Exotic Wetland | |
| | | Ecological No-Go Zone | |



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**Indigenous Ecosystem Types
 Map 2 of 2**

Figure 1

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 Data source: ESRI: OpenStreetMap - 20180828; LINZ: Property boundaries - 20170928; GHD: Designation Boundary - 20181026; Forbes Ecology: Vegetations - 20181025; Created by:jhchen

Notes regarding changes made (also highlighted green in revised Table 6.A.1 below) to Table 6.A.1 between NoR lodgement and the DOC review:

- A small additional total area (0.26 ha) of secondary broadleaved forests and scrublands were mapped resulting from finer mapping of the divaricating shrublands and of the vegetation south of the railway lines near CH4000.
- Shrublands dominated by mānuka and kānuka (4.55 ha) are now differentiated from divaricating shrublands (0.33 ha) and an ECR of 1:3 has been allocated to divaricating shrublands.
- The above changes have resulted in an increase of 2.2 ha of replacement planting under the mitigation items (the top section) of Table 6.A.1.
- A row has been added to address replacement planting rate of 1:100 for ramarama.
- Delineation of exotic wetlands also resulted in a 0.56 increase in moderate value indigenous seepage wetlands.
- A total of 2.74 ha of exotic wetlands were delineated and added as a new ecosystem type and an ECR of 1:1 allocated to this ecosystem type.
- The above changes resulted in an increase of 3.87 ha of replacement planting under the offset items.
- The overall treatment area (mitigation + offset + other treatments) increased by 6.07 ha from 135.59 ha to 141.66 ha.

Screenshot of Table 6.A.1 [at NoR Lodgement] Mitigation and offset quantities

Table 6.A.19. Mitigation and offset quantities.

Mitigation quantities				
Ecosystem type	Area actually/ potentially affected (ha)	ECR	Replacement planting requirement (ha) ²⁹	
Secondary Broadleaved Forests with Old-Growth Signatures		3.07	5	15.35
Old-Growth Treelands		0.41	5	2.05
Kānuka Forests		1.59	5	7.95
Advanced Secondary Broadleaved Forests		2.93	4	11.72
Secondary Broadleaved Forests and Scrublands		16.32	3	48.96
Manuka, Kānuka and Divaricating Shrublands		4.12	1	4.12
Mitigation replacement planting total area				90.15
Swamp maire mitigation planting are to be at the rates of 1:100 for damage (but retention); and 1:200 for unforeseen permanent loss				
Offset quantities				
Old-Growth Forests (Alluvial) [^]		0.15	12	1.8
Old-Growth Forests (Hill Country) [^]		1	10	10
Raupō Dominated Seepage Wetlands (High Value)		0.13	4	0.52
Indigenous-Dominated Seepage Wetlands (Moderate Value)		0.56	2	1.12
Offset replacement planting total area				13.44
Other treatments in the offset package		Area required (ha)		
Retirement, protection and canopy gap planting		c. 32 ³⁰		
Integrated pest control ³¹ in perpetuity over the entire replacement planting and retirement, protection and gap planting treatment areas, or a similar suitable alternative pest control project		135.59		

²⁹ As above, these areas assume no further avoidance is achieved at detailed design.

³⁰ This quantity should include all indigenous forest that is unaffected by the project works in the wider vicinity of CH4000–4400. See Figure 6.A.9 for the extent of the retirement, protection and canopy gap treatment area. All of this area that remains post-detailed design should be retired, protected, and gap planted.

³¹ It is my professional opinion that net gain would be achieved through animal pest control over the mitigation areas addressing brushtail possums and rats and maintaining the density of those species below a 5% residual trap catch/tracking index. If this monitoring method or target proves inappropriate for the configuration of control areas, an alternative outcome-related target (e.g., foliar browse) will be specified in the Ecological Management Plan. Plant pest control will target pest species that threaten the regeneration and/or long-term maintenance of forest plants (e.g., shade tolerant species (e.g., barberry) or light demanding vines (e.g., old man's beard); not gorse or broom).

Status: Final

65

Revised Table 6.A.1. Mitigation and offset quantities. For clarity, changes from the NoR lodged version are highlighted green.

Mitigation quantities				
Ecosystem type	Area actually/ potentially affected (ha)	ECR	Replacement planting requirement (ha) ³	
Secondary Broadleaved Forests with Old-Growth Signatures	3.07	5	15.35	
Old-Growth Treelands	0.41	5	2.05	
Kānuka Forests	1.59	5	7.95	
Advanced Secondary Broadleaved Forests	2.93	4	11.72	
Secondary Broadleaved Forests and Scrublands	16.58	3	49.74	
Mānuka, Kānuka Shrublands	4.55	1	4.55	
Divaricating Shrublands	0.33	3	0.99	
Mitigation replacement planting total area			92.35	
Swamp maire mitigation planting are to be at the rates of 1:100 for damage (but retention); and 1:200 for unforeseen permanent loss				
Ramarama mitigation planting is to be at the rate of 1:100 for permanent loss				
Offset quantities				
Old-Growth Forests (Alluvial) ⁴	0.15	12	1.80	
Old-Growth Forests (Hill Country) ⁴	1	10	10.00	
Raupo-Dominated Seepage Wetlands (High Value)	0.13	4	0.52	
Indigenous-Dominated Seepage Wetlands (Moderate Value)	1.12	2	2.25	
Exotic-Dominated Seepage Wetlands (Low Value)	2.74	1	2.74	
Offset replacement planting total area			17.31	
Other treatments in the offset package		Area required (ha)		
Retirement, protection and canopy gap planting		c. 32 ⁴		
Integrated pest control ⁵ in perpetuity over the entire replacement planting and retirement, protection and gap planting treatment areas, or a similar suitable alternative pest control project		141.66		

³ As above, these areas assume no further avoidance is achieved at detailed design.

⁴ This quantity should include all indigenous forest that is unaffected by the project works in the wider vicinity of CH4000–4400. See Figure 6.A.9 for the extent of the retirement, protection and canopy gap treatment area. All of this area that remains post-detailed design should be retired, protected, and gap planted.

⁵ It is my professional opinion that net gain would be achieved through animal pest control over the mitigation areas addressing brushtail possums and rats and maintaining the density of those species below a 5% residual trap catch/tracking index. If this monitoring method or target proves inappropriate for the configuration of control areas, an alternative outcome-related target (e.g., foliar browse) will be specified in the Ecological Management Plan. Plant pest control will target pest species that threaten the regeneration and/or long-term maintenance of forest plants (e.g., shade tolerant species (e.g., barberry) or light demanding vines (e.g., old man's beard); not gorse or broom).