

**BEFORE THE TARANAKI REGIONAL COUNCIL AND NEW PLYMOUTH
DISTRICT COUNCIL**

MT MESSENGER BYPASS PROJECT

In the matter of the Resource Management Act 1991

and

In the matter of applications for resource consents, and a notice of requirement by the NZ Transport Agency for an alteration to the State Highway 3 designation in the New Plymouth District Plan, to carry out the Mt Messenger Bypass Project

**SUPPLEMENTARY STATEMENT OF EVIDENCE OF NICHOLAS JAMES
DRYSDALE SINGERS (VEGETATION AND OFFSET AREA CALCULATIONS)
ON BEHALF OF THE NZ TRANSPORT AGENCY**

17 July 2018

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INTRODUCTION

1. My full name is Nicholas James Drysdale Singers.
2. My supplementary evidence is given in relation to applications for resource consents, and a notice of requirement by the NZ Transport Agency ("the **Transport Agency**") for an alteration to the State Highway 3 designation in the New Plymouth District Plan, to carry out the Mt Messenger Bypass Project ("the **Project**").
3. I have the qualifications and experience set out in my statement of evidence in chief ("**EIC**") dated 25 May 2018.
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 evidence I use the same defined terms as in my EIC.

SCOPE OF EVIDENCE

6. This supplementary statement of evidence addresses the updated set of measures proposed by the Transport Agency to avoid, remedy, mitigate, offset and compensate for the Project's actual and potential effects on ecological values (the "**Restoration Package**"), and to comment on the implications of the changes proposed in respect of effects on vegetation.
7. I also comment on what the updates to the Restoration Package mean in terms of the application of the Biodiversity Offsets Model.

UPDATED RESTORATION PACKAGE

8. Mr MacGibbon sets out the updated restoration package in detail in his supplementary statement of evidence.
9. The primary change to the Restoration Package that has implications for effects on vegetation, and the conclusions I reached in my EIC, is the significant increase in the size of the proposed Pest Management Area ("**PMA**") from 1085ha to 3650ha. This area is shown in Figures 1 and 2 in the Appendix to this evidence. It covers the Mt Messenger Conservation Area, land owned by Ngāti Tama and areas of private land.
10. The intended PMA covers all of the land that was included in the 1085ha PMA shown at Figure 10 in the Appendix to my EIC. It also includes large additional forest areas covering a range of vegetation communities classified as the same as those being lost.¹

¹ Including in particular large additional areas of tawa, kamahi rewarewa forest; Tawa, kamahi hard beech forest; Tawa, nikau, treefern forest; and Kahikatea swamp forest.

11. The pest management programme for the PMA will control possums, rats and other predators, as well as feral goats and pigs, and domestic stock.

Control of possums, rats and other predators in the PMA

12. Vegetation and flora conservation outcomes from integrated pest control are primarily attributed to control of browsers, especially ungulates (including the exclusion of domestic stock) and possums.
13. Pest control for possums (and rats and predators) will involve application of aerial 1080 within the PMA. It is expected that this will result in a rapid reduction in possums (and rats) over most of the 3650ha management area - within a week after the first aerial 1080 control operation.
14. This management is proposed to be repeated every three years. It is expected to maintain possum abundance at a very low abundance in perpetuity and result in improvements in canopy cover, flowering and seeding of palatable plant species.

Control of feral ungulates in the PMA

15. Ungulates have a much greater detrimental impact on vegetation and flora compared to possums,² and so their control and exclusion is essential to offset the loss of habitat associated with the Project.
16. It will take longer to achieve control targets for feral ungulates because of the scale of the area managed, the terrain and time required to search and control feral ungulates present. Feral ungulate control will primarily involve ground and helicopter aerial hunting. The intention is to undertake intensive control in the first three years to rapidly reduce feral ungulates to low levels, resulting in a higher chance of success in keeping populations low thereafter.
17. The target of a 'very low' abundance of feral ungulates, required to achieve regeneration of palatable flora, is expected to be achieved within 1 year within a 750 ha area, comprising:
 - (a) the 230ha modelled core area which 'on the ground' was physically located at the site within a 250 ha actual area (Figure 1 in Appendix 1). This is the area required to achieve 'no net loss' within 10 years, as per the application of the Biodiversity Offset Accounting Model (referred to in this supplementary evidence as the "**Biodiversity Model**") described in my EIC.³ At year 5 the core 250 ha is likely to be at or very close to zero-density;⁴ and
 - (b) a 500 ha buffer area surrounding that 250 ha core area.

² Nugent, G., Fraser, W., & Sweetapple, P. (2001). Top down or bottom up? Comparing the impacts of introduced arboreal possums and 'terrestrial' ruminants on native forests in New Zealand. *Biological Conservation*, 99(1), 65-79.

³ See paragraphs 198 – 202 in particular.

⁴ Zero-density in this context means that no recruitment will occur in this area though on occasion animals may be present.

18. This 750 ha area is situated on the western side of the PMA. It adjoins the Parininihi Kokako Protection Area (see Figure 1), where goats are currently controlled at a very low abundance. This means that re-invasion from the west will not occur.
19. Over time feral ungulate control will progressively reduce goat and pig densities eastwards, southwards and northwards away from this 750ha area. It is expected that a 'very low' feral ungulate abundance will be achieved in a minimum of just over 900ha area by year 3, if not earlier. This area is shown in green on Figure 1. For the purposes of this evidence and my assessment (and in particular the Biodiversity Model) I refer to this area as the updated 'core' component of the PMA.
20. With ongoing annual feral ungulate control, the area within the PMA where feral ungulates are maintained at a very low abundance is expected to progressively increase.
21. A 'very low' abundance of feral ungulates and possums is expected to allow recovery and regeneration of sensitive palatable species present, including canopy, sub-canopy trees, understory shrubs and ferns as described in my EIC and the Ecology and Landscape Management Plan.
22. The area identified for managing ungulates includes a private open space QEII covenant, which is outside of the PMA, but has been recommended for possible additional ungulate control (Figure 1). This management is intended to reduce the risk of re-invasion into the core area and provide greater confidence that the biodiversity offset will be successful.

Control of domestic stock in the PMA

23. Domestic stock, particularly cattle are also currently having a significant but local effect within the Mimi Valley floor, browsing a wide range of vegetation, trampling and damaging ground cover vegetation and causing localised erosion.
24. Domestic stock will also be excluded from both tributaries of the Mimi Stream in the core area, as a result of new riparian protection fencing and repairs to existing fencing. This will ensure no stock trespass into the highly ecological significant areas of kahikatea dominant swamp forest and valley floor communities.
25. Domestic stock will additionally be excluded from other areas, including the riparian protection and restoration planting areas.

IMPACT ON THE APPLICATION OF THE BIODIVERSITY MODEL

The portion of the PMA used to re-run the Biodiversity Model

26. I have re-run the Biodiversity Model to take into account the updated PMA. In doing so, I have used a conservative PMA offset input of 903.5ha in the offset calculator. This is the part of the PMA where both possums and feral ungulates are expected to be controlled to a very low abundance within three years, allowing vegetation recovery towards high ecological integrity (ie, the area shown green in Figure 1). This is the updated core area, where outcomes are expected to be identical to what was expected in the 230 ha core area under the PMA as described in the Transport Agency's EIC.
27. It is expected that vegetation recovery will also occur in the ungulate browse tier outside of this 903.5ha area. However, moving away from this area, recovery is likely to be less pronounced, due to reinvasion of feral ungulates from surrounding land. It is also expected that canopy recovery of palatable trees will also occur outside of the 903.5ha area, though similarly some reinvasion from surrounding properties will occur. For this reason, I have taken a conservative approach of not specifically measuring vegetation outcomes through the biodiversity offset calculator in the remaining 2445ha of the PMA.
28. In re-running the Biodiversity Model, a broad vegetation map was created of the revised pest management area using a combination of the Taranaki Forest Class map⁵, the Taranaki Region Potential Ecosystem map,⁶ and the original vegetation map produced during the North Taranaki Protected Natural Areas Survey⁷. Some minor alterations detected on recent aerial imagery were also made. The broad vegetation map is included as Figure 2 in Appendix 1 to this evidence. While I have not specifically cross-checked this map in the field, I am comfortable that it is sufficiently accurate for the purposes of this exercise.
29. The vegetation communities within the 903.5ha area included in the biodiversity offset accounting model are:
- (a) Vegetation communities within WF8 potential ecosystem type:
 - (i) 27.1ha of kahikatea (locally with swamp maire) forest and regenerating secondary alluvial forest/ treefern communities;
 - (b) Vegetation communities within WF13 potential ecosystem type:
 - (i) 450.7ha of Tawa, kamahi, rewarewa forest;
 - (ii) 159.3ha of Tawa, nikau, treefern forest;

⁵ Forest Service Mapping Series 6 (NZFSMS6).

⁶ Singers, N. J. D. unpublished. Potential Vegetation of the Taranaki Region (2016) based upon N J D Singers & G M Rogers (2014), A classification of New Zealand's terrestrial ecosystems, Science for Conservation 325, Department of Conservation, Wellington.

⁷ Bayfield et al. 1991. North Taranaki Ecological District. Survey report for the Protected Natural Area Programme. Department of Conservation, Wanganui, New Zealand.

- (iii) 94.5ha of Pukatea, nikau forest;
- (c) Vegetation communities within WF14 potential ecosystem type:
 - (i) 150.8ha of Kamahi, tawa, podocarp, hard beech forest; and
 - (ii) 21.1ha of Hard beech forest.

Updated results

30. As set out in my EIC, the Biodiversity Model was applied to identify the offset actions that are necessary to result in a 'no net loss' position within a 10 year period.
31. The biodiversity offset calculator identified that to offset the loss of vegetation associated with the Project the following conservation management is required:
 - (a) 230ha of integrated pest management intended to achieve a high level of ecological integrity is required to achieve 'no net loss' by year 10; and
 - (b) A further 6ha of restoration planting targeting kahikatea, designed to achieve a 65% canopy cover of kahikatea by year 35.
32. I explained in my EIC that from the point at which no net loss is achieved, net gains begin to accrue for all ecosystem types between years 10 – 15, and that significant biodiversity benefits are expected by year 35.
33. The proposed 6ha of restoration planting has not changed in the updated Restoration Package.
34. To measure additional biodiversity gains from integrated pest management over the updated core 903.5ha area, hectares for each community type (above) were entered into the Biodiversity Model. All other values, such as the difference made in ecological integrity over time, were kept identical.
35. The biodiversity offset calculator uses a unit of measure called 'net present biodiversity' to compare the area of impact and offset required. Net present biodiversity ("**NPB**") is a suitable unit to compare the amount of biodiversity gained from different management approaches. It allows for a comparison of the benefits associated with the core 230ha area modelled as necessary (in conjunction with the 6ha of restoration planting) to achieve 'no net loss' within 10 years, as against the core 903.5ha of PMA that will see possums and ungulates controlled to 'very low' levels within 3 years under the updated PMA.
36. It is important to recognise that the former PMA proposal was 1085ha and surrounded the core area. Outside of the core area additional benefits for vegetation and flora were expected, but were not measured in the biodiversity offset calculator.

37. No net loss equates to a zero (0) figure of NPB.
38. Within the previously modelled integrated pest management area (230ha), by year 15 NPB was assessed as +7.74, rising to +33.44 at year 35.
39. The loss of vegetation associated with the Project was calculated as - 25.81 NPB within the impact model part of the Biodiversity Model.
40. By comparison, at year 10 the calculated NPB was +39.36 from 903.5ha of integrated pest management intended to achieve a high level of ecological integrity. This means that by year 10 under the updated PMA, there will be significant biodiversity gains expected as a result of the Project. This is approximately 1.5 times the initial loss associated with the Project and more than the modelled 230 ha core area set out in my EIC would deliver in 35 years.

VEGETATION EFFECTS IN LIGHT OF UPDATED RESTORATION PACKAGE

41. The pest management proposal will deliver an area of 903.5 ha of native vegetation where a 'very low' abundance of feral ungulates and possums will be achieved within 3 years. This management is expected to allow recovery and regeneration of sensitive palatable species present, including canopy, sub-canopy trees, understory shrubs and ferns.
42. Even when only considering the benefits obtained within this 903.5 ha area, the anticipated conservation outcomes will occur within an area that is just under four times the area determined by the Biodiversity Model to be necessary to achieve 'no net loss' by year 10. This area is over 28 times the area of habitat lost in the Project. The benefits to a wide range of palatable vegetation by year 10, within the 903.5ha, are considerable.
43. While not measured using the Biodiversity Model, recovery and improvements in canopy condition and productivity (flowering and fruiting) will occur within most of the 3650ha for possum palatable canopy trees, such as northern rata, thin-barked totara and kamahi. These improvements in condition will flow through the wider ecosystem by providing a greater amount of resources for native wildlife.
44. Benefits to vegetation within the Parininihi Kokako Protection Area Reserve are also likely. The PMA will effectively become a large goat control buffer to the east of the Parininihi Kokako Protection Area. With current management of feral goats continuing in Parininihi, local eradication is likely to occur throughout most of the Parininihi Kokako Protection Area, allowing the most goat palatable species, such as the 'At risk declining' king fern, to recover.
45. For these reasons it is my opinion that the updated pest management component of the Restoration Package will result in significant positive

benefits for vegetation and flora within the wider Mt Messenger – Parininhi Area, within a 10 year time-frame.

Nicholas J. D. Singers

17 July 2018

APPENDIX 1

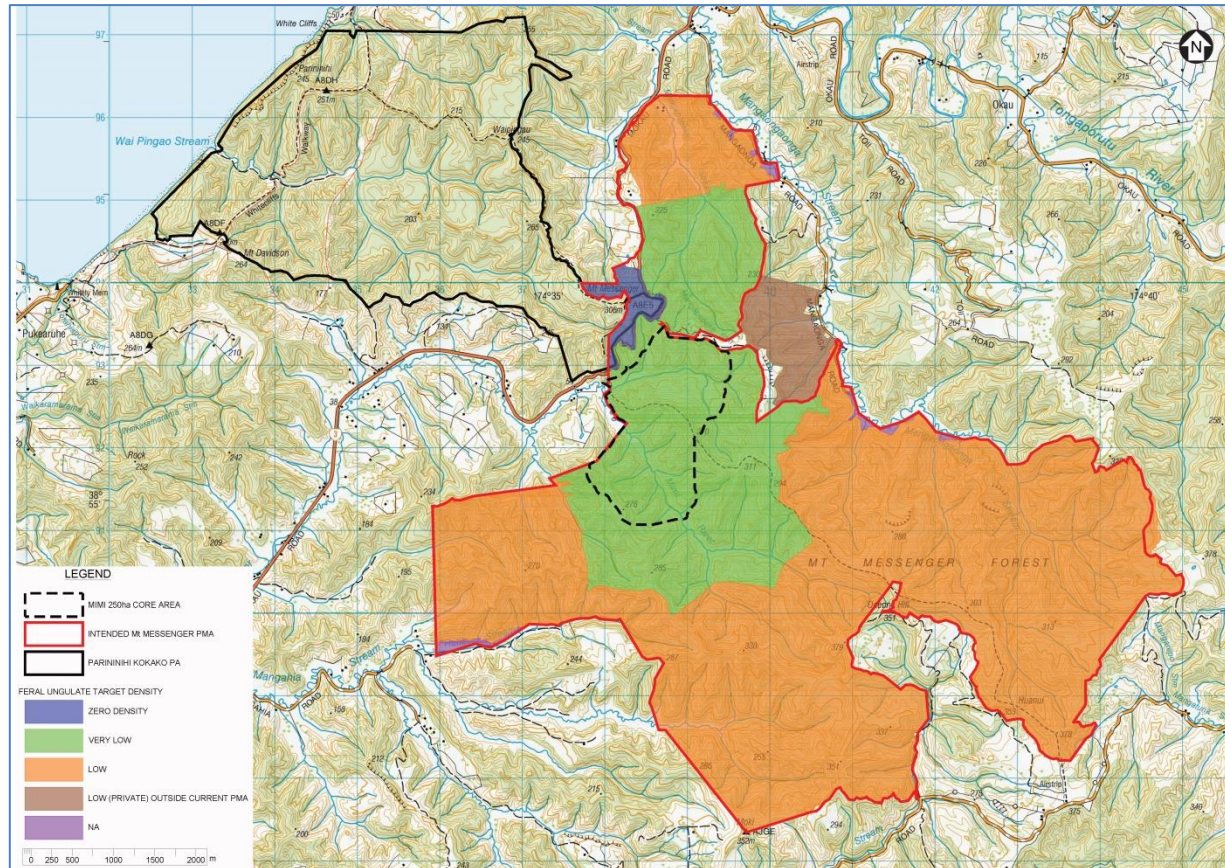


Figure 1: Expected ungulate abundance within 3 years of commencement of integrated pest management. Note: The area shown as ‘Low (Private Land)’ is not part of the 3650ha PMA, but the intention is that some ungulate control will be carried out here. This area is an open space QEII covenant.

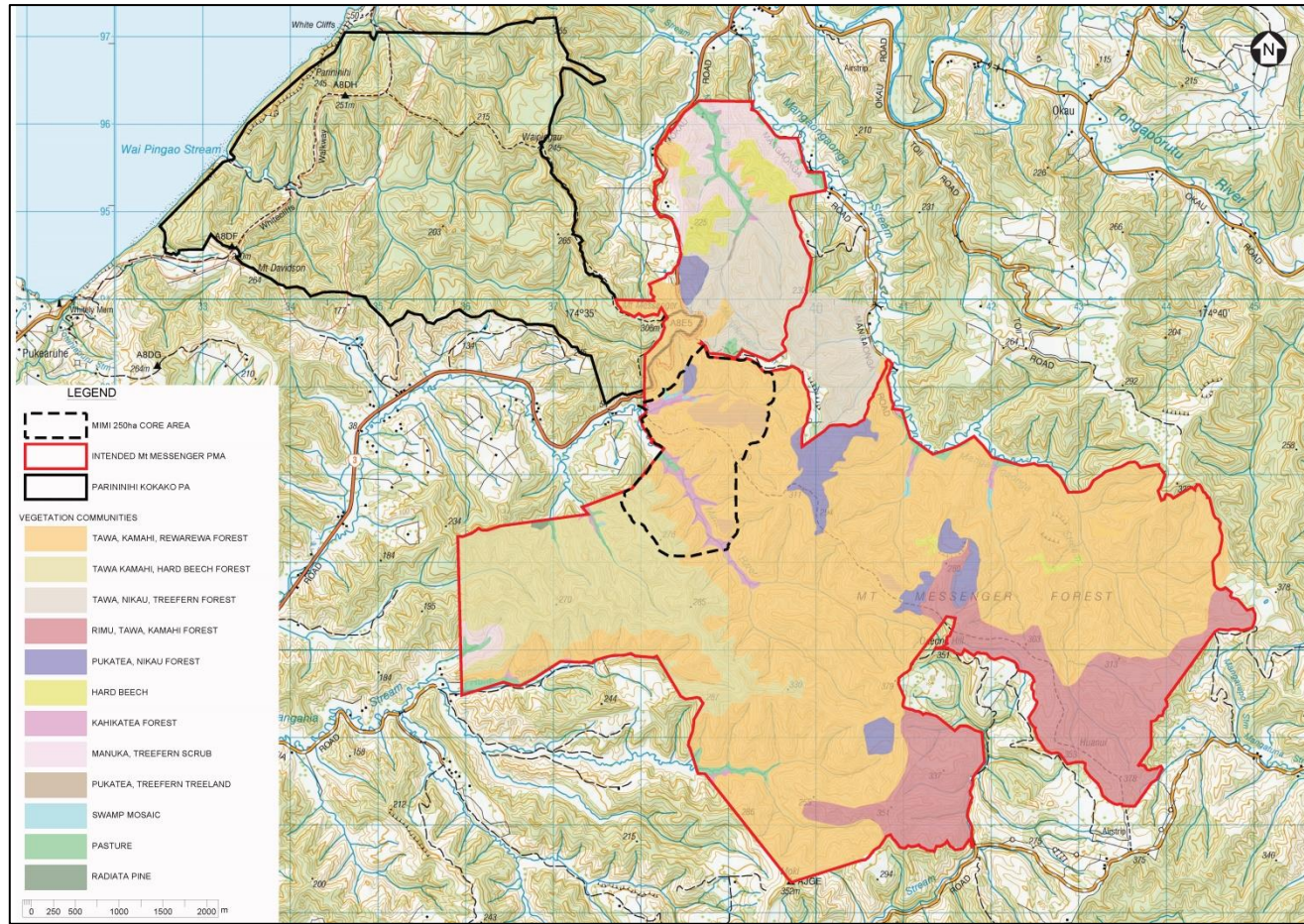


Figure 2: Vegetation communities within the proposed Mt Messenger Pest Management Area and the Parininihi Kokako Protection Area