MT MESSENGER BYPASS PROJECT: SUMMARY OF EVIDENCE OF KEITH HAMILL (FRESHWATER ECOLOGY) FOR THE NZ TRANSPORT AGENCY

1. My role in the Mt Messenger Project has been assessing the potential effects of the Project on freshwater ecology and advising on measures to address those effects.

Effects Assessment

2. In my EIC I discuss potential effects on streams that might occur as a result of the Project. In my view, the main potential effects relate to:

   (a) Direct loss of stream habitat and functions. These effects will be offset as part of the proposed Restoration Package. I discuss this further below.

   (b) Restricting fish passage through culverts. This will be avoided and minimised by use of bridges and, more commonly, by appropriate design of culverts. The exception is three culverts conveying ephemeral streams which will not allow for fish passage (culverts 2, 10 and 13), however the effect is small because there is insufficient water to provide fish habitat upstream of these culverts.

   (c) Sedimentation from earthworks during construction. This will be minimised and mitigated by implementing appropriate erosion and sediment control. The potential effects will be monitored as described in the ELMP and CWDMP.

   (d) Direct harm to fish resulting from their removal from streams. This will be minimised by implementing the Fish Rescue and Recovery Protocols.

   (e) Potential effects of road stormwater on stream hydrology and water quality.

Offset for effects on stream habitat

3. As set out in my supplementary evidence, the piping and diversion of streams required by the Project will affect 3,705m (3,376 m^2) of streams and, even after applying mitigations, will cause considerable loss of stream values. This residual effect will be offset by implementing the proposed Restoration Package.

4. The SEV method was used to calculate the amount of offset required for the loss of stream habitat. The calculations were updated in my supplementary evidence following refinements to the Project design and to incorporate Dr Neale's review comments. If there are further substantive changes to designs that affect streams or to the proposed restoration area, then the offsets should be updated again using the same method. Currently, to achieve 'no net loss', restoration will be required along 8,153m^2 of stream.

5. As explained in my supplementary evidence, the Project is proposing to offset the loss of stream habitat by restoration along 8,455m of stream length. The proposed Restoration

Package integrates with existing areas of native bush, and this provides a high level of certainty that it will be successful in improving ecological values. In my view, the stream offset provided by the Restoration Package will ensure no-net-loss of stream values and probably provide a net gain in the medium to long term. The net gain is likely because:

(a) The proposed Restoration Package would restore 8,455m of stream length plus remediating 1,050m of stream diversions back to at least their current state. This equates to restoring 10,738m^2 of stream area plus 798m^2 from remediating stream diversions, which is about 32% more restoration than would be required by a strict application of the SEV method. This is a particularly good outcome for native fish.

(b) The restoration will extend across the Mangapepeke valley and not just be limited to a 10m buffer and it includes restoring kahikatea swamp forest. In the long term this should provide very high aquatic values, beyond what was assumed for the purpose of ECR calculations.

(c) Pest management may also provide additional benefits to streams. Removing undulates may reduce stream bank erosion, while reducing rat numbers may reduce predation on kākahi.

The main issues in contention

6. There are a number of issues raised by submitters and in the section 42A report with respect to freshwater. I have addressed these issues in my EIC, Supplementary Evidence and Rebuttal Evidence, but provide a brief summary (below) of what I consider to be the main outstanding issues with respect to freshwater ecology:

Calculating offset using the SEV

7. Dr Drinan considers that more offset should be provided for the direct effects on streams. The main reasons that his calculations resulted in more offset were because:

(a) he focused on biodiversity values and assumed culverts would have no biodiversity values;

(b) ECR scores applied to stream diversion were expressed in a different way; and

(c) an additional weighting was applied to 'headwater streams'.

8. These issues are addressed in rebuttal evidence submitted by Dr Neale and myself. In brief:

(a) culverts do retain some values including biodiversity values for fish and macroinvertebrates. The values I have used are consistent with what is commonly measured and applied to culverts.

(b) The alternative ways to express ECR scores for stream diversions make no difference to the overall offset package, it just affects whether the remediation of stream diversions is counted as part of the offset package or not.

(c) An additional weighting for headwater streams is not justified because headwater streams do not have intrinsically higher biodiversity values, and the standard SEV method already calculates high ECR scores for pristine sites with mature forest cover.

9. Finally, the proposed Restoration Package results in considerably more stream area restoration than would be required by a strict application of the SEV method.

Fish Passage through culverts

10. There is general agreement over the importance of maintaining fish passage. Measures to ensure fish passage are built into the design of stream crossings. Larger streams/ catchments have bridges or stream simulation design.

11. Dr Drinan and I disagree regarding details on how best to achieve this for steep culverts, nuances of consent wording requiring fish passage, and the magnitude of effects for the small number of culverts where fish passage will likely be restricted. The few waterways for which fish passage is not provided are small and have little or no fish habitat upstream, thus the overall effect is small.

12. NPDC's section 42A report proposes retrofitting existing perched or broken culverts to facilitate fish passage. This will be occurring at site Ea23 and will considerably improve fish passage to about 25ha of stream.

13. Post-construction monitoring is proposed for the culverts conveying the largest upstream catchments. No monitoring is proposed for steep culverts because they are too small to have reliable upstream fish populations.

Invertebrate passage through culverts

14. I acknowledge Dr Drinan's point that road culverts can potentially restrict the passage of aquatic invertebrates. However, in my view the impact of culverts on the movement of adult macroinvertebrates is comparably minor outside of the urban setting and the culverts installed for the Project will have little effect on the aquatic macroinvertebrate community in the upstream catchments.

Sediment effects

15. There remain disagreements over the likely magnitude of any sediment effects on streams and how this is monitored and managed. In assessing the potential effects, it is important to keep in mind the current stream environment. Most of the streams at risk

from sediment are soft-bottomed and all streams have naturally high suspended sediment concentration/deposition. Landslides and bank slumping is common.

16. There are restrictions proposed on the timing of in-stream works to minimise potential effects on the spawning of giant kōkopu spawning and redfin bully. Also, the CWDMP and ELMP provide a comprehensive water quality and ecological monitoring programme to assess and manage any sediment effects. I have recommended some changes to the ELMP to better link the annual/biannual ecological monitoring to appropriate responses.

Water take for dust suppression

17. The proposed water takes are small takes for a short duration from a stream that is relatively insensitive to water abstraction due to the numerous deep pools. TRC and the Applicant propose different conditions. My preference is the Applicant's approach because it is more protective than the TRC approach under most flow conditions, is easy to ensure compliance and, importantly, does not require the construction of a weir so would cause fewer direct environmental effects.

Fish Recovery and Rescue Protocols

18. DOC proposed a number of changes to the Fish Rescue and Recovery Protocols. These changes will result in considerably more effort, however more fishing effort does not always equate to better outcomes. In my view, the changes proposed by DOC would provide negligible benefits but instead result in overall more fish mortality and injury.

TRC Supplementary 42A Report

19. TRC propose a condition relating to the channel capacity of stream diversions (page 14). I recommend that this condition is rejected because it is likely to compromise our ability to ensure good ecological outcomes from stream diversions, and will likely result in baseflow channels that are too large. It is common to design and modify rivers that compromise aquatic ecology in order to reduce flood risk, but in this situation it is unnecessary because the stream diversions are located upstream of uses sensitive to flooding.

20. The issue results from ambiguity in defining a channel, ambiguity in defining a flood, and putting this wording as a condition which gives it more weight than the ecological criteria described in the LEDF.

21. Overall, I consider that the effects of the Project on freshwater ecology can be appropriately managed and mitigated.