

BEFORE THE HEARING PANEL

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of Proposed Plan Change 5 to the Operative Hamilton
City District Plan

**REBUTTAL STATEMENT OF EVIDENCE OF GERARDUS HENRICUS ANTHONIUS
KESSELS
(ECOLOGY)**

Dated 22 September 2022

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INTRODUCTION

1. My full name is Gerardus (Gerry) Henricus Anthonius Kessels.
2. My qualifications and experience are as set out in paragraphs 1 and 2 of my primary statement of evidence dated 1 September 2022
3. I reconfirm that I have read and am familiar with the Code of Conduct for Expert Witnesses in the Environment Court Practice Note 2014 and I agree to comply with it. My evidence is presented on behalf of Hamilton City Council (**HCC**).

PURPOSE AND SCOPE OF EVIDENCE

4. The purpose of this rebuttal statement of evidence is to respond to several bat ecology points raised in submitter evidence, notably by evidence presented for the Director-General for Conservation (**DGC**).
5. I will address matters of bat corridors, how Southern Links relates to Plan Change 5 (PC5 in terms of ecological effects on habitats and corridors for bats, and clarify the reason why a compensation model (**BCM**) is preferred to a Biodiversity Offset Model (**BOM**) when determining the residual adverse effects of urbanisation on bats.

Bat Corridors

6. Ms Pryde in paragraph 9.1 of her evidence in chief contends that a 100 m width would be prudent for the proposed bat corridors. As justification for her opinion she uses the distance of known (in this case) artificial roosts installed by a community group at Standford Park from existing houses. As I stated in paragraph 29 of my primary evidence, without bespoke design of the structural elements an optimum width for bats to retain use of gully systems in Hamilton by long-tailed bats appears to be 100 m.

7. However, the PSPA Long-tailed Bat report - Appendix J (LTBR) recommended a buffer width of 20 m on the margins of all identified high value bat habitat (see Figure in the supplementary evidence of Dr Mueller). In terms of the high value habitat within the Mangakōtukutuku Gully, by including the 20 m buffers on the margins of the gully they are mostly 100 m or more in width through the main arms of the gully system and as such will provide suitable buffers for roosts and are likely to maintain foraging and commuting habitats for long-tailed bats. I also note the main arm of the gully within the Peacocke Structure Plan Area (**PSPA**) connects directly to Sandford Park to the north, which in turn connects to the Waikato River.
8. As opposed to the bat buffer areas, the primary purpose of the bat corridor areas are to facilitate movement of long-tailed bats through the PSPA between the high value bat habitats associated with the Waikato River and the Mangakōtukutuku Gully as it becomes urbanised (see Figure 1 below).

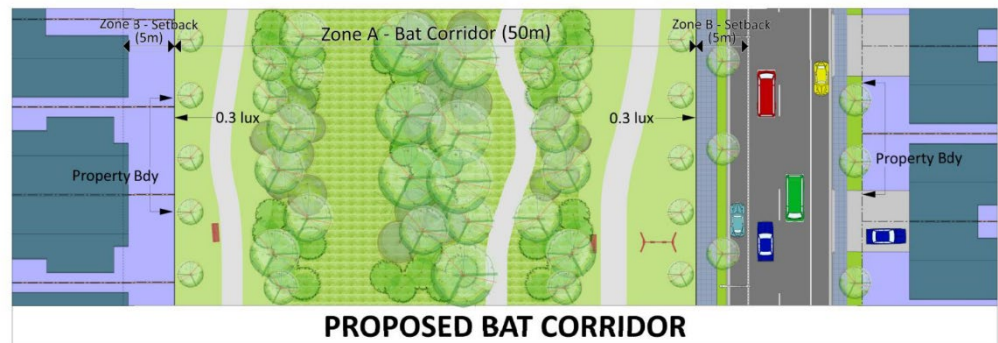


Figure 1: Proposed Bat Corridor Design for PC5

9. In preparing the LTBR, Dr Mueller, Dr Davidson-Watts, and myself, with the assistance of Mr McKensey, reviewed relevant research from overseas, and drawing upon our collective professional experience determined that a 50 m width for the bat corridors would be adequate if bespoke design of the natural structural elements of the corridors were created to give best effect to providing the functional requirements of bats as they move through this changing landscape. Critical to this is ensuring that artificial light intrusion is kept to a minimum in line with the relevant performance standards of PC5. The edge planting, in tandem with the 5 m setback recommendation, will assist in reducing this lighting effect.
10. The bat corridor design is such that it will provide multiple fly-ways and foraging habitat for bats through the creation of multiple edge habitats. In addition, the multiple lines of trees will provide shelter from wind, thus reducing the energetic cost of movement for bats commuting through the site.
11. As such I am satisfied that a 50 m width for the bat corridors is sufficient to achieve its primary purpose in the PCSPA.

Southern Links

12. In Paragraph 9.8 of her evidence, Ms Pryde contends that the loss of the habitat from the Southern Links Roding footprint will result in a lack of connectivity for the corridor which may or may not be alleviated by planted 'hop-overs' along the margins of the roads and that there is a reasonable risk that the hop-overs will not work.
13. In my experience, suitable vegetation (native or exotic) of a height higher than traffic either side of the road, or bridge if present, acts as a 'hop-over', facilitating movement of long-tailed bats in their home range in highly modified landscapes. Research shows that long-tailed bats tend to fly at

canopy height, commuting and foraging along forest edges and stream corridors (Borkin & Parsons, 2009;¹ O'Donnell et al., 2006²). Thus, where tree canopies on the edges of roads are maintained and/or created to a height of at least 4.3 m they will utilise this vegetation and fly safely across a road close to the canopy height. This is the maximum allowable height for standard vehicles³, so long-tailed bats appear to be more likely to maintain a safe height from moving traffic and therefore be at less risk of collision.

14. In a study of long-tailed bats Dr Mueller and I undertook in 2014 at the intersection of the Mangaone Gully and Tauwhare Road, about 5 km south west of the PSPA (Mueller & Kessels 2014⁴), we observed bats flying across the Tauwhare Road causeway at the canopy height of the pine trees on the upstream side of the causeway, well above the height of traffic. Some 2 km south of our observations at this site, Connolly (2013)⁵ also observed long-tailed bats crossing State Highway 1 several times in close proximity to the canopy of tall oak trees that were at right angles to the road.
15. The observations of the above two studies are also consistent with a study using thermal imaging for the Southern Links Roding project, Hamilton, in the summers of 2017 and 2018 (Borkin 2019)⁶ showing flight heights of bats over existing roads and bridges with vegetation on either site.

¹ Borkin K.M. and Parsons S. (2009). Long-tailed bats' use of a *Pinus radiata* stand in Kinleith Forest: recommendations for monitoring. *New Zealand Journal of Forestry* 53(4): 38-43; O'Donnell C.F.J., Christie J.E., and Simpson W. 2006: Habitat use and nocturnal activity of lesser short-tailed bats (*Mystacina tuberculata*) in comparison with long-tailed bats

² O'Donnell C.F.J., Christie J.E., and Simpson W. (2006). Habitat use and nocturnal activity of lesser short-tailed bats (*Mystacina tuberculata*) in comparison with long-tailed bats.

³ NZ Transport Agency (2019). Land Transport Rule Vehicle Dimensions and Mass Amendment Rule 41001/2016/1

⁴ Mueller, H & Kessels G. (2014). Tamahere East-West Link Road Assessment of Ecological Effects on Long-tailed Bats - Survey of Tauwhare Road. Kessels Ecology Prepared for Bloxam Burnett & Olliver (BBO) Ltd pp13

⁵ Connolly, T (2013) Waikato Expressway: Cambridge section long-tailed bat surveys summer 2012–13: Lloyd Property, Mellow Manor, Karapiro Gully. Report prepared by Opus International Consultants Ltd, Hamilton, New Zealand for NZ Transport Agency.

⁶ Borkin, K. (2019). Thermal image monitoring of long-tailed bats for the Southern Links Roding Project in Hamilton: 2017 and 2018. Wildland Consultants Ltd Contract Report No. 4192c A report prepared for Aecom NZ Ltd. 70pp.

16. I have reviewed the 251 page Environmental Management and Monitoring Plan (**EMMP**) for the Hamilton section of the Southern Links Project (Smith 2019)⁷. In my view the bat hop-over designs detailed in the EMMP proposed for Southern Links are line with best practice and supported by sound evidence in relation to their likely efficacy. Section 6.5.1 of the EMMP provides detail on bat hop-overs and bridge underpass design, supported by a summary of the radio tracking and thermal imaging data on bat movements in relation to canopy and existing road and bridge heights collected for this project in southern Hamilton (as detailed in section 5.2 of the EMMP).
17. Figure 6 of Ms Pryde's evidence (incorrectly shown as 5 in her evidence), gives the impression that the Southern Links designation is in effect land lost to habitat for bats. In my view this is not entirely the case. As stated in section 6 of the EMMP a number of ecological avoidance, remediation and mitigation methods are required to be implemented as part of the consent conditions for the Southern Links projects. The EMMP gives effect to these consent condition requirements through appropriate artificial light controls, roost protection, tree felling protocols of potential bat roost trees and creation of bat hop-overs.
18. In addition, the EMMP, in section 6.3, details the restoration requirements of 15.25 ha of habitat within Mangakōtukutuku Gully, including measures such as plant and animal pest control, planting of cavity bearing trees suitable for bat roosts, as well as enhancement of habitats suitable for insects (long-tailed bats are insectivorous). This restoration is within and adjacent to the Southern Links designation. Figure 2 illustrates an example

⁷ Smith, L. (2019). Environmental Management and Monitoring Plan (EMMP) Southern Links Project - Hamilton City Council Section, AECOM for Hamilton City Council: https://storage.googleapis.com/hccproduction-web-assets/public/Uploads/Documents/Content-Documents/Strategies-Plans-and-Projects/Projects/Southern-Links/Southern_Links-EMMP-Environmental_Monitoring_and_Management_Plan-Certified_version-20190925.pdf (accessed 20 September 2022)

of the proposed ecological restoration work within the Southern Links designation, much of which is targeted to facilitating enhancement and connectivity of bat habitats for long-tailed bats. These enhancement measures will compliment and help maintain connectivity with the PC5 Significant Bat Habitat Areas (SBHAs) and bat corridors and not land lost to utilisation by bats.

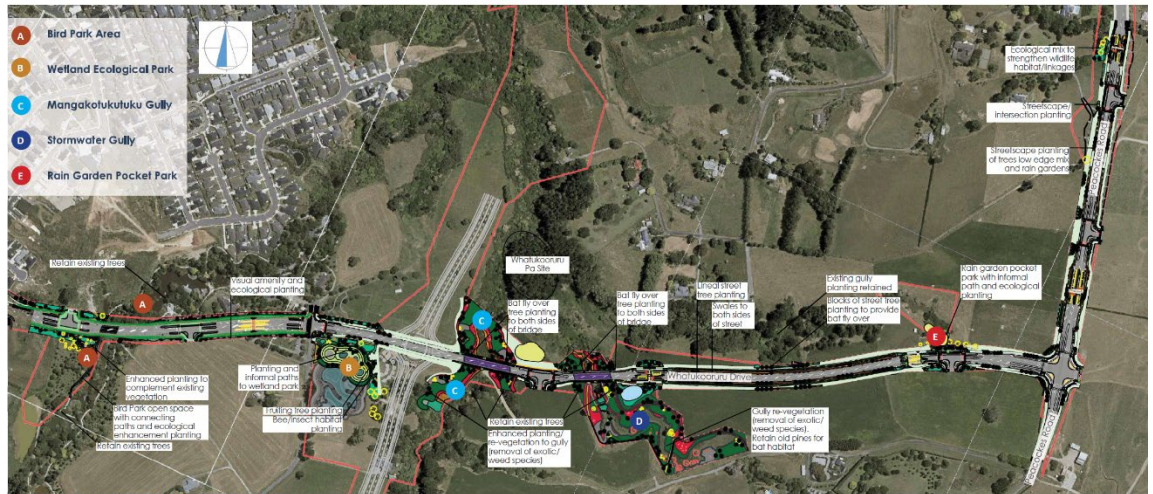


Figure 2: Example of road layout and ecological restoration features within the Southern Links designation – Peacocke – Whatukooruru Section (Adrian Morton Landscape Architects Ltd and Bloxam Burnett & Olliver, 2022)⁸.

- Ms Pryde's evidence has drawn my attention to an area where the edge of the Southern Links Designation abuts the edge of an identified SBHA at the southern end of the PSPA. In this locality the width of the SBHA is 15 m. I note that it is also the indicative locality for a constructed wetland. Because this edge of the designation footprint is unlikely to be directly connected to restoration works associated with the Southern Links Project, I recommend that 50 m wide bat corridor be located here and the Natural

⁸ Peacocks Whatukooruru Drive Project Landscape Management Plan, Adrian Morton Landscape Architects Ltd (AML) and Bloxam Burnett & Olliver: <https://storage.googleapis.com/hccproduction-web-assets/public/Uploads/Documents/Content-Documents/Strategies-Plans-and-Projects/Projects/Southern-Links/CON-1298-2022-Peacocke-Whatukooruru-Drive-Peacocks-Road-Outline-Plan-of-Works-Appendix-B-Whatukooruru-Dr-Landscape-Management-Plan-FINAL.PDF> accessed 20 September 2022

Open Space Zone extended to 50 m from the edge of the designation to accommodate this corridor (refer to Figure 3).



Figure 3: Location of recommended extension of the bat corridor area (yellow circle). Light green with red boundary = SBHA and Natural Open Space Zone; Purple = Southern Links Designation; Blue = indicative location of constructed wetland.

Compensation versus Offsetting

20. Dr Corkery questions the validity of the BCM (for example her paragraph 12.5), as presented in the Preliminary Assessment of Ecological Effects report – Appendix K (**PAEER**), the Technical Ecology Report (**TER**) and supported by the evidence of Dr Baber.
21. In her paragraph 14.9 Dr Corkery states, using the evidence of Dr Borkin, that monitoring of bats, as long as a sufficient sample size is acquired, can yield sufficient data to be able to detect changes in population numbers. That may be so, but studies designed to show statistically robust changes in the population of long-tailed bats in this locality will not necessarily be able to quantify the extent or differentiate between the specific parameters of a population change given the multitude adverse effects on this species

aside from those associated with PC5. Moreover, the timeframes required to obtain this information will be a disbenefit to commencement of habitat creation and enhancement.

22. I have been involved in a number of projects where compensation and offsetting packages have been developed to address adverse residual effects on ecological matters. While obtaining data for BOMs are relatively straightforward for areas of indigenous forest or wetlands, obtaining data for determining causal effects of a land use change or an activity on their habitats, especially species which are highly mobile and have very complex life cycles and habitat requirements, such as long-tailed bats, is problematic.
23. The BCM allows for an approach where professional judgment on habitat quality, degradation of habitat quality and area over space and time, and likely gains through restoration and habitation enhancement for fauna over space and time are inputted into a model. This in my view is a much more practical and rapid approach to addressing residual adverse ecological effects on long-tailed bats in relation to the landuse effects of PC5, and a robust and equitable approach to determine residual adverse effects on long-tailed bats and their habitats.
24. The BCM is preferable to approaches where, as is often the case in New Zealand, ecologists apply multipliers through what appears to me to be a 'horse-trading' approach, with no robust ecological process to account for what the multiplier should be, how to deal with the complex spatial and temporal matters in terms of habitat loss and habitat gain, or uncertainty of successful outcomes. These are all attributes and parameters largely addressed in a biodiversity accounting model. In this regard the evidence presented by Dr Flynn (her paragraphs 27 to 33) is not an approach I prefer. Her evidence provides no solution to how the quantum of residual adverse effects on bats and their habitats will be addressed with any sense of scientific robustness, repeatability or transparency across PC5, nor does it

address varying habitat bat usage of habitats or habitat attributes across the PSPA, and does not allow bespoke solutions or innovation by developers in terms of designing avoidance, remediation, or mitigation measures to reduce the extent of residual adverse effects on bat habitat before applying any type of 'horse-trading' agreement, multipliers or biodiversity accounting model.

25. The BCM is a significant set up from these 'horse-trading' or multiplier approaches because:
 - a) It is transparent and repeatable in regard to the inputs and output metrics and the mathematical calculations behind it being based on a BOM (which Dr Corkery agrees within in her paragraphs 12.1 and 12.6);
 - b) As detailed in the PAEER, the TER and further in the evidence of Dr Baber, a conservative approach has been undertaken in application of the model to allow for uncertainty associated with the lack of quantitative data and success of the habitat gain outcomes; and
 - c) It can be applied instantly so as not to wait many years for analysis of data from long-term radio tracking or bioacoustic studies. This is a critical point because the landuse changes resulting from PC5 will require the application of habitat creation, restoration, maintenance and protection as soon as possible so that the gains from these measures are having positive effects on this population of bats. These measures are ideally implemented in advance, or at least in tandem, with the adverse effects on bat habitat arising from urbanisation.
26. I do however support the monitoring approaches for bats as outlined in the LTBR and as supported by the evidence of Dr Mueller and Dr Borkin. It will be important to check the efficacy of the mitigation and compensation measures over time and address these wherever possible if the predicted

outcomes are not achieved, as well as providing vital scientific evidence to guide further urbanisation of landscapes which long-tailed bats, and other mobile indigenous fauna species, inhabit.

27. In paragraph 14.9 of her evidence Dr Corkery considered it a 'big assumption' that habitat creation will achieve a value of 3 in the BCM within 25 years. I disagree. As illustrated in my primary evidence, bats are living in this exotic stand of trees and artificial roosts where the artificial roost have been in place for less than 25 years. In my years of surveying bats throughout the Waikato, I have found numerous locations where bats have been utilising habitat for roosting, commuting and foraging where the vegetation is less than 25 years old. This need not be old growth indigenous vegetation as Dr Corkery uses to support her position on this matter, but also exotic as well as recently planted native habitats. I consider that in terms of the bat corridors they could be used in less than 20 years from planting for commuting and foraging given the right mix of plant species used and an appropriate artificial light control and maintenance regime. For example, in a recent survey for bats on the outskirts of Cambridge, I detected use of a planted garden and stand of pines for both commuting and foraging which Google Earth imagery indicates is less than twenty years old (refer to Figures 4a and 4b).

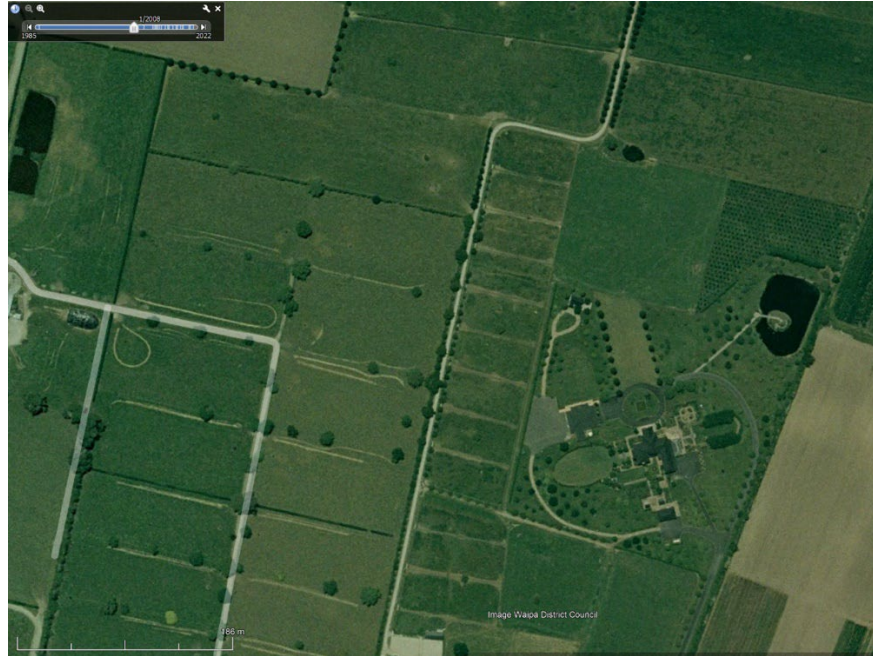


Figure 4a: Area of garden and small pine plantation using 2008 Google Earth showing that the trees are estimated to be in the vicinity of 2-5 years old at the time this photo was taken.



Figure 4b: Same area showing the extent and growth of the garden and plantation vegetation cover in 2022, which bioacoustic surveys I conducted in 2022 shows the area being used by bats for commuting and foraging.

CONCLUSION

28. Accordingly, apart from the amendment to the mapping which I recommend at paragraph 19 above, I do not recommend any other changes to the PC5 provisions as set out in the section 42A report.

GHA (Gerry) Kessels

22 September 2022