Before the Fast-track Panel

Under: Fast-track Approvals Act 2024

In the matter of: FTAA-2603-1178 – Alternative to the Brynderwyn Hills Project (Brynderwyn Hills section)

Statement of advice: Tertia Thurley

Bats

DOC staff

20 October 2026

Department of Conservation
Te Papa Atawhai

Te Kāwanatanga o Aotearoa
New Zealand Government

Introduction

1. My full name is Tertia Thurley.

Instruction

2. I have been requested to provide expert advice to the Director-General of Conservation (DOC/the Department) for the purposes of his comments on the Alternative to the Brynderwyn Hills Project (Brynderwyn Hills section) Fast-track application.

Qualification and Experience

3. I am employed by the Department of Conservation (DOC) as a Technical Advisor Ecology. My current role involves providing bat advice to DOC internal staff and external agencies.
4. My qualifications are a BSc (1987) and Master of Arts (Environmental Studies)(1996) from Victoria University of Wellington.
5. I have worked for DOC since 1996. Most of my work during this time has involved monitoring and management of threatened species.
6. I have 15 years' experience working with bats in New Zealand. I have extensive direct experience of surveying, radio-tracking, roost finding, catching and handling bats.
7. My work has included establishing a short-tailed bat conservation project at Pureora Forest, which I continue to lead. This project involves catching, radio tracking, PIT tagging and monitoring long-term survival of short-tailed bats, thus measuring responses to pest control regimes at Pureora.
8. I am certified as a "Trainer" for most bat competencies by DOC's Bat Recovery Group, which means that I am considered highly competent to catch, handle and mark bats as well as undertake survey and monitoring, and to train others in these skills.

9. I led the New Zealand DOC Bat Recovery Group from 2019 to 2022, and I am a current Recovery Group member. As such, I have oversight of much of the research and management that involves bats in New Zealand.
10. I established, participated in and had oversight over a long-tailed bat project at Pureora, which ran from 2011 to 2017. This project involved catching and tagging long-tailed bats, radio tracking bats to their roosts, assessing tree roosts and capturing bats at roosts, again to measure their long-term responses to predator control.
11. I have led a long-tailed bat mark-recapture project in the King Country and have advised on various bat projects in Northland.
12. I have been involved in the development of the DOC Protocols for minimising the risk of felling occupied bat roosts, and DOC guidance for community groups on surveying for bats.

Code of conduct

13. Whilst it is acknowledged this is not an Environment Court Proceeding, I confirm that I have read the Code of Conduct for expert witnesses contained in the Environment Court Practice Note 2023. I have complied with the Code of Conduct in the preparation of this advice. Unless I state otherwise, this advice is within my area of expertise, and I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

Scope of advice and expert opinion

14. My expert advice relates to the following:

    i. Adequacy of the Applicant's assessment of bats, including identification of any values that have not been assessed or have been insufficiently characterised.

    ii. Adequacy of the Applicant's assessment of effects on bats with specific reference to any effects that are incomplete, understated, or not addressed.

iii. Adequacy of the Applicant's proposed mitigation, rehabilitation and management measures.

iv. Alternative mitigation or management approaches, where appropriate, including clarification of my recommended or preferred measures including where these differ from those proposed by the Applicant.

v. Comments on conditions.

Material Considered

15. In preparing this advice I have reviewed the following documents that form part of the substantive application:

    i. Volume B, Appendix D06 - Assessment of Effects on Terrestrial Ecology 10722-PTA-2B0-PE-RPT-0011. 2 April 2026.

    ii. Volume B, Appendix E -Resource Consent Conditions (13 July 2026)

16. I have also reviewed the following documents received from NZTA over the period during which the application was suspended; noting that they do not propose any additional measures specific to bats:

    i. A2BH – Ecological Effects Mitigation Table 28 August 2026

    ii. Brynderwyns Hills Alternative Project – Indicative Compensation Approach dated 7 October 2026, and

    iii. Proposed Amendments to Mitigation Package Since Lodgement (9 October 2026)

17. I have not visited the site, though have driven through the general area multiple times.

Key Issues

18. Long-tailed bats are present through much of the Project area. Survey has been adequate to identify their presence, but not adequate to understand how bats are using the landscape. This limits the certainty of effectiveness of the proposed

mitigation measures. If further monitoring is not done, then a precautionary aproach is warranted.

19. While the effects of the Project on bats have been adequately assessed, mitigation measures for habitat loss, habitat fragmention and bats colliding with vehicles are inadequate, and the assessment of the effectiveness of proposed mitigation actions is optimistic.

20. Mitigation for habitat loss does not allow for the many decades time lag between felling roost trees and when new plantings might be mature enough to form suitable cavities for roosting. Loss of foraging and commuting habitat has been regarded by the Applicant's expert as unimportant because there is an abundance of similar habitat in the wider landscape. However, the location of important roosting, foraging and commuting areas for bats cannot be determined without further study of the bat population.

21. The proposed planting does not address habitat fragmentation, as it is located in areas where bats can already forage and move through freely. As a result, it is unlikely to improve habitat connectivity for bats. Bat 'hop-overs' are also proposed to reduce habitat fragmentation and vehicle collision. These are highly likely to be ineffectual.

22. Lighting and noise, which also contribute to habitat fragmentation, are not adequately minimised and mitigated for.

23. Further consideration should be given to avoiding and mitigating for these effects, and how residual effects will be addressed. Once developed these should be written into conditions, alongside a Bat Management Plan.

Long-tailed bat values

24. Long-tailed bats have a threat ranking of Threatened - Nationally Critical, meaning that the species is undergoing a "very high ongoing or predicted decline (>70%)". This is the highest threat ranking before extinction. They are particularly vulnerable given populations are small and declining, and reproductive rates are low.

25. Bats operate on a landscape scale with individual home ranges often covering hundreds of hectares and collectively bat colonies cover many square kilometres. Their roosting ranges cover a much smaller area.[1]

26. Two bat surveys were done along the length of the designation. Low levels of bat activity were found along most of the designation, though not in Zone 1 at the northern end of the designation. This limited survey effort does not mean that bats are not present in the north of the designation. Nor do low levels of activity mean that the area is not important for bats. The reasons for low levels of activity could be because:

    i. the bat population in the area is small, due to ongoing threats posed by habitat destruction, fragmentation and degradation; and predation by rats, cats, mustelids and possums.

    ii. bat activity is very variable over time, and two surveys are not enough to say that bat activity at any one point is low all the time.

    iii. bat activity is very variable over space, so areas of high activity could easily have been missed. Each bat recorder samples within a 50 m radius of the recorder, and 48 sample locations (or 40 in the second survey) were used. Although placement of recorders will have been targeted to vegetation most likely to have bat activity, the survey still only covers a proportion of these areas.

27. The survey data provides very limited insight into how bats are using this landscape, where important foraging areas and commuting routes are; and no information on where bats are roosting. This information can be time consuming to collect, but the lack of this information makes it difficult to avoid and mitigate for the effects of the road.

28. The proposed designation was divided into four Earthworks Zones for assessment of the ecological value of habitats for bats. These were assessed as

[1] O'Donnell CFJ, Borkin KM 2021. *Chalinolobus tuberculatus.* In *The Handbook of New Zealand Mammals.* 3rd edn. (Eds CM King and DM Forsyth) Families Vespertilionidae and Mystacinidae, pp 95-130. CSIRO Publishing, Melbourne.

either high or very high based on having “high potential bat habitat”, including foraging, commuting and roosting habitat.

29. There is mature forest and stands of mature trees which may be important roosting habitat. Roosting cavities used by bats have very specific thermal properties and are generally very rare in the landscape even when in large tracts of indigenous forest.[2] In the wider area surrounding the proposed project, the landscape is now fragmented, and therefore suitable roosts even more rare.

30. In addition, the proposed Project area currently provides dark and quiet areas for bats.

Assessment of effects

31. The Assessment of Effects on Terrestrial Ecology (the AEE) identifies effects from habitat loss, habitat fragmentation, mortality by vehicle collision, operational disturbance, injury or death during vegetation removal and indirect construction disturbance. These are assessed as having an unmitigated level of effect ranging from moderate to very high. While I am in general agreement, I would like to draw attention to the following:

<u>Habitat loss</u>

32. The AEE identifies that 163 ha of “high potential bat habitat (roosting, foraging and commuting) will be lost, of which 49 ha is commercial pine forestry”. Some of this has been identified as proposed ‘Avoid Areas’ on maps in Appendix A of the Designation Conditions, so the impacted hectarage is unclear.

33. There will be additional loss of bat habitat which is used by bats that falls outside of the definition of “high potential bat habitat" (defined as areas “within 25 m of High-potential bat roosting habitat or tall stature vegetation that may provide

[2] Sedgeley JA, O'Donnell CFJ 1999. Roost selection by the long-tailed bat, *Chalinolobus tuberculatus*, in temperate New Zealand rainforest and its implications for the conservation of bats in managed forests. Biological Conservation 88:261–276.

commuting and foraging habitat"). Long-tailed bats regularly use areas further away from tall stature vegetation than 25 m.[3]

34. The unmitigated effect of habitat loss has been evaluated as low because there is an abundance of similar habitat within the wider landscape that will not be impacted by the Project, to give a Moderate level of unmitigated effect.

35. However, bats are habitual and may not just move if their habitat is destroyed or their movement restricted. Borkin and Parsons found that the home ranges of long-tailed bats living in forestry simply got smaller once part of the forest within their home range was felled, rather than the bats moving their home range to somewhere else that might be more suitable[4].

36. Roosting habitat in the surrounding habitat is limited, and the loss of further roosting habitat may affect the viability of the bat population. This is because bats have very specific roosting requirements, selecting the oldest and largest trees, with stable thermal properties, to raise their young. Suitable trees for roosting are rare even in mature indigenous forest[5]. In the modified landscape including the Project area, trees suitable for roosting are even more rare, potentially forcing bats to select trees with sub-optimal thermal qualities.

37. When bats use sub-optimal roosts to raise young, survival is lower[6]. Therefore, all mature forest and trees should be avoided. It is difficult to tell from the AEE how much area this represents. I have used Table 16 of the AEE (Vegetation loss (ha)(by type) within the Proposed Designation) to estimate that this loss could be approx. 18.5 ha, plus 49 ha of exotic pine; though this could be less with

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[3] Bennett RS 2019. Understanding movement and habitat selection of the lesser short-tailed bat to infer potential encounters with nearby anticoagulant bait. MSc thesis, Massey University

[4] Borkin KM, Parsons S (2014) Effects of Clear-Fell Harvest on Bat Home Range. PLoS ONE 9(1): e86163. doi:10.1371/journal.pone.0086163

[5] Sedgeley JA; O'Donnell CFJ 1999. Factors influencing the selection of roost cavities by a temperate rainforest bat (Vespertilionidae: *Chalinolobus tuberculatus*) in New Zealand. Journal of Zoology (London) 249:437–446.

[6] O'Donnell CFJ, Sedgeley JA 2006. Causes and consequences of tree-cavity roosting in a temperate bat, *Chalinolobus tuberculatus*, from New Zealand. In: Functional and Evolutionary Biology of Bats (Ed. By Zubald A, McCraken GF, Kunz TH), pp 308-328. New York: Oxford University Press.

proposed Avoid Areas. This effect can be classified as permanent[7], because at a minimum it takes many decades for newly planted trees to develop features suitable for roosting, if they ever do; and new plantings at a different location may not benefit the bats at the location from where the trees were felled. This cannot be known without understanding the roosting ranges of the bat colonies that utilise the designation corridor. The magnitude of effect for habitat loss may therefore have been underestimated.

Habitat fragmentation

38. The AEE has identified that the Project will lead to habitat fragmentation and spatial isolation via bats avoiding the road and its associated noise and light, particularly where the Proposed Alignment intersects indigenous and non-commercial exotic blocks.

39. The creation of a four-lane road and its associated traffic, noise and lighting represent a major shift away from what is now a quiet and dark habitat. Bats, being nocturnal, are extremely sensitive to artificial light at night.[8] Several studies have found that noise has a negative effect on bats.[9] The unmitigated level of effect is assessed as High.

[7] Table 9 of Roper-Lindsay, J., Fuller S.A., Hooson, S., Sanders, M.D., Ussher, G.T. 2018. Ecological impact assessment. EIANZ guidelines for use in New Zealand: terrestrial and freshwater ecosystems. 2nd edition.

[8] Voigt, C.C, C. Azam, J. Dekker, J. Ferguson, M. Fritze, S. Gazaryan, F. Hölker, G. Jones, N. Leader, D. Lewanzik, H.J.G.A. Limpens, F. Mathews, J. Rydell, H. Schofield, K. Spoelstra, M. Zagmajster (2018): Guidelines for consideration of bats in lighting projects. EUROBATS Publication Series No. 8. UNEP/EUROBATS Secretariat, Bonn, Germany, 62 pp.

Schamhart, T., Browne, C., Borkin, K. M., Ling, N., Pattemore, D. E and Tempero, G. W. (2024) 'Detection rates of long-tailed bats (*Chalinolobus tuberculatus*) decline in the presence of artificial light'. *New Zealand Journal of Zoology* 51(2): 200–210.

[9] Smith, D, K Borkin, C Jones, S Lindberg, F Davies and G Eccles (2017) Effects of land transport activities on New Zealand's endemic bat populations: reviews of ecological and regulatory literature. NZ Transport Agency research report 623. 249pp.

Bat mortality by vehicle collision

40. The Applicant has assessed this effect as Low, based on evidence that bat activity is lower near roads than in areas away from roads, and because local bat populations are likely to be small, reducing the likelihood of vehicle collisions. However, as the Applicant acknowledges, the loss of even a single breeding individual could adversely affect the viability of the local bat population.

Cumulative effects

41. Bats in this area are already exposed to similar effects from the nearby State Highway 1. They are also affected by forestry operations, where the felling of roost trees during harvest can kill or injure bats, reduce the availability of roost sites and foraging habitat, and contribute to habitat fragmentation. The AEE considers that "further fragmentation effects in this area may have significant impacts on the local bat population." I agree with this conclusion.

Mitigation of effects

Habitat loss

42. The AEE suggests that there will be minimisation of loss where practicable, however there is no detail provided so there is uncertainty what this will entail and how effective this will be.

43. Mitigation planting and enhancement of existing vegetation at the three potential "Mitigation and Release Sites" is suggested to mitigate for habitat loss, plus replacement of pine forestry with indigenous planting (up to 103.6 hectares at the Central site). However, because of limited survey effort, there is no knowledge of where the important bat commuting and foraging areas are, creating uncertainty whether important habitat is being lost, and whether planting at the mitigation sites is in the right places to benefit bats. Mitigation sites appear to have been designed for other values, and bats tagged on without serious consideration as to the benefits of the sites for bats.

44. Mitigation planting by replacement of existing mature roost trees which are proposed to be felled is not a complete solution. Trees take many decades to

mature enough to develop roost features[10], if they ever do, so there is a time lag which is not addressed. Also, roosting ranges of colonies of bats appear to be fixed over time[11]. Therefore, if trees are felled within the roosting range of a colony of bats, and new trees planted outside of their roosting range, it seems unlikely that affected bats could use these trees.

45. There is, therefore, high uncertainty whether the mitigated overall effect of habitat loss will be low, as assessed in the AEE, and without further information on measures to minimise, and further information on how bats are using the landscape, I suggest that the mitigated overall effect of habitat loss remains Moderate. There is a lack of avoidance and mitigation measures targeted at bats.

Habitat fragmentation and collision with vehicles

46. It is proposed that fragmentation is addressed through infill and remediation planting at the North and South Mitigation sites. This does not reduce habitat fragmentation because there is currently already enough vegetation, darkness and quiet at these sites for bats to readily move through them.

47. 'Hop-overs' are also proposed to be retained or installed. Hop-overs are defined in the AEE Glossary of Terms as "Tall vegetation planted on both sides of a road/railway with overhanging branches that create continuous canopy over the gap. The aim is to guide bats across roads/railways at a safe height above the traffic." However, there does not appear to be any information in the AEE showing how a continuous canopy will be able to be achieved over the four-lane road.

48. Hop-overs are sometimes used and referred to overseas in the context of vegetation or structures intended to encourage bats to maintain or increase their height to cross the road at a safe level above the traffic. European guidelines consider these suitable for narrow roads, but not for wide roads because bats

[10] Bergin DO, Kimberly MO 2003. Growth and yield of totara in planted stands. New Zealand Journal of Forestry Science 33(2):244-264

[11] O'Donnell CFJ, Sedgeley JA 2006. Causes and consequences of tree-cavity roosting in a temperate bat, *Chalinolobus tuberculatus*, from New Zealand. In: Functional and Evolutionary Biology of Bats (Ed. By Zubald A, McCraken GF, Kunz TH), pp 308-328. New York: Oxford University Press.

descend between the vegetation or structures on either side of the road, which puts bats at danger of collision with vehicles.[12]

49. If hop-overs are installed, 'best practice principles' for mitigating mortality from roads include that crossing structures be placed on the exact location of existing bat commuting routes, that they should not require bats to alter flight height or direction, and that they should maintain connectivity with existing bat commuting routes[13]. Survey effort has been inadequate to determine existing bat commuting routes.

50. Lighting and noise are contributors to habitat fragmentation. The NZTA bat management guide[14] includes strategies for avoiding and minimising the effects of light. These include "avoiding or minimising artificial light near potential bat features (in particular hop-overs and areas of potential habitat in proximity to the road)" and the use of warm colour light temperatures (<2700 K). However, the AEE only considers restrictions on lighting in proximity to bat roosting habitat, not where the AEE has classified areas as 'high potential bat habitat'.

51. The NZTA bat management guide also suggests consideration of the use of low-noise road surfaces and noise walls, though notes that they are costly.

52. Avoiding and mitigating habitat fragmentation and bats colliding with vehicles is difficult for major roading projects. However, the measures proposed are very likely to be ineffectual (hop-overs) or insufficient (lighting and noise). Therefore, in my opinion, the mitigated overall level of residual effect remains High, not Low as it was assessed in the AEE.

<u>Felling of occupied bat roosts</u>

53. Protocols to minimise death/injury to bats when felling trees are proposed. While these are best practice, it should be noted that protocols do not eliminate the risk of death/injury, they only minimise it, and that killing/injuring bats is an offence

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[12] Elmeros, M., Møller, J., Dekker, J., Garin, I., Christensen, M. & Baagøe, H. (2016) Bat mitigation measures on roads - a guideline.

[13] Reason, P.F. and Wray, S. (2025). UK Bat Mitigation Guidelines: a guide to impact assessment, mitigation and compensation for developments affecting bats. Version 1.2. Chartered Institute of Ecology and Environmental Management, Ampfield.

[14] NZ Transport Agency Waka Kotahi (2025) Bat management guide. October 2025 v1

under the Wildlife Act. My understanding is that NZTA has not applied for a wildlife approval to kill or injure bats as part of its substantive application.

Comments on consent conditions

54. Protocols to reduce the chance of killing/injuring bats during tree-felling are the only proposed bat-related conditions. While supported, there is a need for conditions requiring a Bat Management Plan to address:

    i. The loss of roosting, foraging and commuting habitat

    ii. How lighting requirements will meet international best practice

    iii. How noise will be limited

    iv. How fragmentation will be addressed

    v. How the location of bat hop-overs will be determined, detailing what additional monitoring and survey will be done to identify where these should be placed.

    vi. How residual effects will be managed as part of a Residual Effects Management Package.

55. In addition to a Bat Management Plan, greater certainty is required that effective mitigation measures will be applied and that residual effects will be addressed. These should be developed and added to conditions.

56. Lighting conditions are required to ensure the project meets international light pollution guidelines such as those produced in Australia (National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds, Commonwealth of Australia 2020). This will help minimise not only the effects of lighting on bats, but also on other wildlife such as birds.

Conclusions / Recommendation

57. The proposed Project is located in important bat habitat, including roosting, foraging and commuting routes.

58. The loss of roost trees is an effect which is difficult to compensate or offset for because of the long lag time between planting trees and when the trees are mature

enough to develop roost features. Therefore, avoiding felling mature trees is recommended.

59. Effects from the loss of roosting, foraging and commuting habitat, from fragmentation, and from bat mortality through vehicle collision, has not been adequately addressed.

60. I recommend that further consideration be given to avoidance and mitigation, including retention of mature trees, following Australian light pollution guidelines[15], minimising road surface noise, and meaningful restoration planting to enhance foraging and commuting habitat.

61. In my opinion, residual effects will remain because of the difficulties in addressing fragmentation and mortality as the result of a busy and wide road bisecting bat habitat; and difficulties addressing the loss of bat roosting habitat if it cannot be avoided. Therefore, I recommend a residual effects management package is developed and included in a Bat management plan once avoidance and mitigation measures have been more fully explored by the Applicant.

[15] National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds, Commonwealth of Australia 2020