Memo

To:	Laura Galt – Hamilton City Council		
From:	Emily Lion-Cachet – Beca	**Date:**	1 December 2025
Subject:	Ruakiwi Reservoir Requirement – Technical Specialist Report for Section 42A Reporting		
Technical Area:	Ecology		
Version:	Final		

Qualifications and Experience

1. My name is Emily Faye Lion-Cachet. I am a consultant ecologist at Beca Ltd and have provided specialist advice on behalf of Hamilton City Council Consenting Authority on the ecological matters related to the NoR. I hold a Master of Science degree (1st class hons) in Ecology and Biodiversity and Bachelor of Science degree in Environmental Science with a minor in Environmental Planning from the University of Waikato. I am a full member of the Environmental Institute of Australia and New Zealand.

2. I have five and half years of professional work experience within the ecology and environmental science field. Two years were spent as a general environmental scientist while the last three years have been spent as a professional ecologist in my role at Beca. Prior to Beca I worked for six months at the Waikato Regional Council in the Environmental Monitoring team.

3. I don't have any known conflicts of interest.

Code of Conduct

4. I have read the Environment Court Code of Conduct for expert witnesses contained in the Environment Court Practice Note 2023 and agree to comply with it. I confirm that the opinions expressed in this memorandum are within my area of expertise except where I state that I have relied on the advice of other persons. I have not omitted to consider materials or facts known to me that might alter or detract from the opinions I have expressed.

Scope and Purpose of technical review

5. This memorandum has been prepared to provide technical assessment under section 42A of the Resource Management Act 1991 (RMA), in respect of terrestrial ecology in relation to the Ruakiwi Reservoir Alteration to Designation (the Requirement).

6. This memorandum covers the following:

a. The environmental effects on ecology of allowing the Requirement and whether any such adverse effects will be acceptable.

b. Relevant matters raised, and relief sought, in submissions.

c. Relevant statutory considerations.

d. Recommended amendments and/or additions to the Requiring Authority's proposed designation conditions.

Executive Summary

7. This memorandum provides a technical assessment under section 42A of the Resource Management Act (RMA), focusing on ecological aspects related to the Ruakiwi Reservoir Alteration to Designation (the Requirement).

8. A review of relevant application documents, site visit, and analysis of specific issues raised in submissions, was undertaken as part of this assessment.

9. The Ecological Impact Assessment Report (EcIA) prepared by Tonkin & Taylor relates to ecological effects of the proposed designation change and development of the Ruakiwi Reservoir site. The EcIA applied best-practice methodologies consistent with the Environment Institute of Australia and New Zealand (EIANZ) guidelines. Habitat classification, acoustic bat monitoring, and surveys for birds and lizards were undertaken using appropriate protocols, and survey effort was considered sufficient to provide confidence in the results.

10. Ecological matters relevant to the proposal include direct and indirect impacts on significant native fauna habitat for long-tailed bats and native birds.

11. I note inconsistencies within the EcIA regarding the ecological value of the 0.58 ha of treeland habitat within the site which is considered a part of a wider significant natural area (SNA) C31. I consider the treeland within the site to have a low contribution to the overall ecological values of the 65 ha Significant Natural Area (SNA).

12. I agree that the site provides foraging and potential roosting habitat for long-tailed bats (LTB). I agree that the site has moderate ecological value for bat roosting however clarification of the ecological value of foraging habitat within the site is needed. This is a matter raised in the Director General's (DG) submission (#002). I agree with the DG's position that grassland provides foraging habitat for LTB and should be considered in the effects assessment.

13. I agree that habitat for native birds is low value and effects of habitat loss are low–very low. I agree that the proposed avifauna management plan (AMP) will minimise potential injury/ mortality of nesting birds.

14. I agree with the values provided for native lizards and the low – very low potential effects on lizards from vegetation clearance. I recommend the preparation of an Incidental Discovery Protocol (IDP) to further minimise adverse effects on lizards.

15. The proposed effects management hierarchy—avoidance, minimisation, and compensation—is correctly applied and proposed minimisation measures will effectively reduce impacts on fauna within the site. I agree that residual effects on bats are moderate and necessitate compensation.

16. I support using artificial bat roost boxes and artificial bat roost features to compensate for the loss of 14 potential roost trees.

17. I support the proposed compensation measures for loss of foraging habitat but agree with the DG's position that suitable foraging grassland habitat should be included in the Biodiversity Compensation Model (BCM) which may necessitate an increase in planting and/or pest mammal control area, intensity or management duration.

18. I conclude that the effects can be managed to overall low – very low levels by appropriate designation conditions, including the new or modified conditions that I recommend below[1], or similar conditions.

Documents considered

19. A full description of the proposal, as it relates to terrestrial ecological effects is provided in the following documents which have been considered in the preparation of this assessment:

    a. *Central City Reservoir – Ruakiwi: Notice of Requirement for an Alteration to an existing designation: Final Report 22 August 2025: Prepared by Bloxam Burnett & Oliver Limited (BBO) for Hamilton City Council.*

    b. *Ecological Impact Assessment Report: Central City Reservoir Project: Final Report 22 July 2025: Prepared by Tonkin & Taylor Limited for Hamilton City Council*.

    c. *Draft NOR Conditions – Ruakiwi Reservoir: 17 November 2025.*

    d. *Ruakiwi Road Reservoir Hamilton City: Landscape and Visual Impact Assessment: Final Report 11 August 2025: Prepared by Adrian Morton Landscape Architects Limited for Hamilton City Council.*

    e. The Submissions listed in Table 1.

Table 1 Submissions that raise ecological matters

Number	Submitter
002	Department of Conservation

20. Onsite discussions with the Requiring Authority's Ecologist included details of an Ecological Management Plan, incidental discovery protocols for lizards, and planting and pest control programming. It was noted that plans are to be prepared in accordance with best practice methodologies.

[1] See paragraph 64.

Site Description and Proposal overview

21. This memorandum is limited to matters relating to ecological effects on terrestrial ecology and note the following key elements of the proposal related to ecological effects described in Section 1.0 of the EcIA.

22. The proposed alteration to the existing Ruakiwi Reservoir includes:

    a. The construction of two 25 mega litre water reservoirs and ancillary infrastructure undertaken in a two-stage programme with Stage One delivered by 2028.

    b. Vegetation clearance within a Significant Natural Area (SNA) providing corridor and steppingstone habitat for threatened long-tailed bats. This includes 32 trees scheduled for translocation and the removal of 23 trees (of which 14 contain suitable bat roosting features).

    c. Site establishment occurring over a two-week duration including vegetation removal across the entire designation.

    d. Total earthworks volumes of 13,650 m^3 for Stage One and 7,040 m^3 for Stage Two will be required.

    e. Construction of each reservoir will be undertaken over a span of approximately 10 months.

    f. Landscaping and design will include the planting of 144 replacement trees including 35 large-grade specimens and approximately 500 m^2 of garden and stormwater planting.

    g. Replanting of 0.58 ha of native vegetation within the wider Lake Domain, installation of artificial bat roost boxes and features and predator control within a 7.4 ha area undertaken for a total of one year.

Site visit

23. A description of the subject site and surrounding environment was provided in Section 3.0 of the Ecological Impact Assessment (EcIA) entitled: *Ecological Impact Assessment Report: Central City Reservoir Project: Final Report 22 July 2025: Prepared by Tonkin & Taylor Limited for Hamilton City Council.*

24. Having undertaken a site visit on 4 August 2025, I concur with the description of the site and surrounding environment and adopt that description for the purposes of this assessment.

Review of Ecological Impact Assessment

Applicant's assessment methodology

25. Habitat assessment

Terrestrial vegetation within the proposed designation has been identified and appropriately categorised into "Treeland", "Grassland", and "Agapanthus" habitat types which are dominated by exotic species with recently planted natives.

26. Field data for fauna species presence and habitat use

A desktop review of terrestrial species presence and abundance was undertaken as part of the EcIA. Subsequent field surveys for LTB, birds and lizards were completed using standard survey protocols suitable for the type of habitat present. Survey efforts are considered sufficient to provide confidence in the results and determine values and effects.

Fifteen acoustic bat monitors (ABMs) were deployed for approximately one month during the summer season across the site and adjacent forest. ABMs captured sufficient data to provide an understanding of how LTBs utilise the site which is important for determining species-specific adverse effects. Data analysis provided evidence to support the conclusion that bats frequently use the site as a flyway with numerous LTB passes detected across the survey area. Additionally, feeding buzzes recorded at ABM (R7) located within the footprint of Tank 1 indicates the utilization of the site for foraging.

Manual searches for lizards and deployment of tracking cards within suitable habitat did not detect any native lizards. Not Threatened avifauna species were observed within the site and surroundings during incidental observations.

27. Ecological values

The Requiring Authority's ecologist assessed effects using a species-led approach in accordance with Ecological Impact Assessment guidelines (Roper-Lindsay et al., 2018). The nature and level of effects on species populations were determined as a combination of ecological value based on the conservation status of individual species, in conjunction with habitat use and behaviour. The EIANZ Guidelines use a five-point scale (Negligible to Very High) to describe the magnitude of effect.

28. Effects Assessment

In my opinion, ecological effects were assessed in accordance with the Ecological Impact Assessment Guidelines 2018 (EIANZ), which is considered standard practice method for the preparation of Ecological Impact Assessments.

The proposed effects management recommendations are considered standard and best-practice approaches for addressing adverse effects. These are discussed in further detail in the sections below.

Ecological value assessment

29. I noted that an assessment of the ecological value and function of the treeland in relation to the encompassing SNA C31 has not been included in the EcIA.

30. The EcIA has assessed the botanical value of the treeland as negligible due to the dominance of exotic species. However, it states that the vegetation provides habitat for native fauna and therefore, its ecological value is considered low.

31. I note there is an inconsistency within the EcIA regarding the ecological value of the treeland which is stated as low within Section 3.1.1 and Section 4.2 where it is stated as negligible. For the purposes of my assessment, I adopt the overall low ecological value to the treeland as related to the habitat values of treeland in the EcIA.

32. For the purposes of my assessment, I consider the 0.58 ha of treeland to have a low contribution to the overall ecological values of the 65 ha SNA. This evaluation reflects its relatively small proportional extent (0.009% of the SNA) and is informed by ABM survey data indicating habitat use by Threatened long-tailed bats (LTB).

33. I agree with the ecological values provided for native birds, lizards and LTB as these align with their respective threat classification status.

Ecological Effects Assessment

Permanent loss of significant vegetation

34. The proposed works will remove approximately 0.58 ha of treeland within a Significant Natural Area C31 (SNA). The treeland within the site is recognised for providing significant habitat for indigenous fauna, including corridor or stepping-stone habitats regularly used by nationally At Risk or Threatened species. This meets criteria 3 provided in the Waikato Regional Policy Statement (Waikato Regional Council, 2016).

35. The EcIA states that the negligible value and the moderate degree of change results in a moderate magnitude of adverse effect on the SNA values and values of the treeland itself. This results in an overall very low effect. While I agree with the overall very low of effect, I consider the treeland to have low ecological value and its removal to result in a low magnitude of effect. This is because the 0.58 ha proposed for removal represents only 0.009% of the wider SNA, and therefore the loss is expected to cause minimal change to the overall ecological function of the site.

36. Opportunities to avoid and minimise potential adverse effects—such as reducing the number of trees requiring removal during the design phase and demarcating the physical works area to prevent accidental tree removal—are outlined in the EcIA. However, it is anticipated that some tree removal will still be necessary.

37. Although no further effects management is required due to the low level of effects, I support the applicant's recommendation that trees should be replaced within the Lake Domain at a minimum ratio of 1:1 as well as potential transplantation of young native specimens to another location within the domain. At a minimum, maintenance of new plantings should be undertaken for a duration of five years to achieve at least 90% plant survival.

Permanent loss of habitat for Long-tailed bats

38. I agree that the site, and in particular, 14 trees and grassland, provide foraging and potential roosting habitat for the long-tailed bat (LTB) (*Chalinolobus tuberculatus*) as confirmed through site surveys.

39. I also agree that the habitat is of moderate ecological value because of the confirmed utilisation of the site for commuting and foraging by LTB and potential roosting habitat.

40. The loss of LTB habitat results in residual effects that require effects management. I agree that there are residual adverse effects that must be addressed through offsetting or compensation.

41. The EcIA concludes that biodiversity offsetting is not appropriate due to the highly mobile and cryptic nature of long-tailed bats (LTB), which prevents accurate quantification of adverse effects under the Biodiversity Offset Accounting Model (BOAM). I concur with this position and consider biodiversity compensation to provide greater certainty in achieving a net biodiversity gain.

42. Recommended compensation measures adhere to the effects management hierarchy and proposed compensation measures are considered appropriate.

43. The applicant proposes a suite of compensation measures that include 0.58 ha planting and 7.4 ha of pest mammal control within the Lake Domain which will result in an overall net gain by reducing pest pressure and increasing dominance of native vegetation.

44. Furthermore, the applicant proposes the installation of 21 artificial bat roost boxes and 21 artificial bat roost features with predator-proof banding above and below to provide interim roost features until the native plantings are mature.

45. The applicant has used a Biodiversity Compensation Model to quantify the ecological benefits of the proposed measures. I reviewed the model inputs and noted the exclusion of grassland as LTB habitat. In my view, the grassland area should be included in this assessment because AMB survey evidence and research suggest that grassland associated with forest edges, linear habitats and in open areas are utilised for foraging by LTB (O'Donnell, 2000).

46. The proposed compensation for moderate residual effects on 0.58 ha of foraging habitat includes native planting and predator control. This is generally accepted although the scale of impacted suitable bat habitat may need to be reconsidered to ensure a 20% net gain is achieved. Further commentary is provided in discussion point 56 below relating to the Director General's Submission (#002).

47. The proposed compensation for moderate residual effects on potential bat roost habitat includes providing 21 artificial bat boxes and 21 artificial bat roost features. This is accepted although further commentary is provided in discussion point 57 below relating to the Director General's Submission (#002).

Permanent Loss of habitat for Avifauna

48. It is agreed that 0.58 ha of habitat provides potential foraging and nesting habitat for native Not Threatened birds. The EcIA considers the ecological value of habitat within the proposed designation to be low for native avifauna and because the habitat type is well represented within the surrounding area, overall effects of habitat loss are considered low – very low. This assessment is sufficient.

Injury or mortality of indigenous fauna during vegetation clearance

49. I agree that both threatened and non-threatened native fauna including bats, birds and lizards are present within the vegetation clearance area and that the risk of injury and/or mortality must be avoided.

50. I acknowledge that the magnitude of effect on long-tailed bats (LTB) is very high. To manage these effects to a low level, a Bat Management Plan (BMP), including Vegetation Removal Protocols (VRP), must be prepared in accordance with the NZ DOC Bat Recovery Group protocols. The BMP should include measures such as pre-felling roost inspection methods and AMB survey, roost watching protocols, incidental discovery protocols, and monitoring and reporting requirements.

51. I agree that if vegetation clearance cannot avoid the peak bird breeding season (September to January inclusive), an Avifauna Management Plan (AMP) will be required to reduce overall effects to low or very low levels. The AMP should include pre-clearance nest survey protocols, accidental kill and harm minimisation and monitoring and reporting requirements.

52. I consider the overall level of effect on lizards to be low to very low, given the small area of suitable, low-quality habitat (~27 m² of agapanthus) and the absence of positive lizard

detections during site surveys. The EcIA outlines vegetation clearance methodologies—specifically the use of hand tools— and I agree this will help minimise the risk of injury or mortality to lizards, resulting in a low to very low level of effect.

53. I recommend that an Incidental Discovery Protocol (IDP) for lizards be included in the Ecological Management Plan to further reduce the risk of injury or mortality should lizards be encountered during vegetation clearance activities. This protocol should detail potential species, suitable habitat, vegetation clearance methodologies, steps to undertake in the event of incidental discovery and record keeping.

Indirect threatened fauna habitat loss

54. I concur that artificial light at night from the new tanks and walkways has the potential to reduce long-tailed bat (LTB) use of surrounding suitable habitat, resulting in a moderate level of ecological effect. To manage this impact, a Lighting Plan must be developed in accordance with NZ DOC Bat Recovery Group protocols. This plan should include measures such as directional lighting, placement of luminaries, lighting wavelength, shielding, and timing controls. With these mitigation measures in place, the magnitude of effect is expected to be reduced to negligible, resulting in a very low overall level of ecological impact.

Disturbance to avifauna during construction

55. I agree that disturbance to indigenous avifauna using the site for foraging will result in a very low overall level of ecological effect. This conclusion is supported by the temporary nature of the proposed works and the availability of suitable habitat in the immediate surrounding area, which helps to minimise potential impacts.

Matters raised in submissions

Submission #002 – Department of Conservation

56. Under quantification and valuation of bat habitat within the site

The DG raises the matter of the under quantification of bat habitat values within the proposed designation area. The DG notes that the EcIA does not provide an ecological value for grassland which is known foraging habitat for LTB. Additionally, the DG notes that the extent of grassland habitat has not been included in biodiversity compensation modelling (BCM).

It is well known that grassland particularly that within a mosaic of treeland and forest habitat provides valuable foraging habitat for LTB (Rockell *et al*, 2017). I agree that the loss of valuable foraging 'edge' habitat provided by a mosaic of grassland and treeland should be considered within the BCM.

57. Use of artificial bat roost boxes and features as a compensation measure

The DG does not support the use of artificial bat boxes and artificial bat features as compensation for the loss of bat roost trees.

Although there is limited research supporting the effectiveness of bat boxes as supplementary roosts—with occupation infrequent and lacking clear seasonal patterns (Robinson et al., 2024)—there is emerging evidence of their value in Hamilton. A local study (AECOM, 2022) reported a high success rate of bat box utilisation over a short two-year period, indicating that bat boxes can provide immediate roosting opportunities in appropriate contexts.

I note that the Department of Conservation (DG) accepted the use of artificial bat boxes and roost features in the Waikato Region in 2020. However, this was primarily to address residual uncertainty and lag-time effects, rather than to fully compensate for the complete loss of natural roost trees. In this instance, DG has offered increased predator control as an alternative to artificial bat features.

Taking all of this into account, I acknowledge the uncertainty surrounding the use of artificial roost features as a direct replacement for lost roost trees. However, I consider there to be merit in providing immediate roosting habitat, particularly during the period required for planted vegetation to mature. Therefore, I recommend the use of artificial bat boxes and roost features as a **partial mitigation measure** for the loss of suitable roost trees associated with the Ruakiwi NOR, alongside increased predator control.

58. Remaining unmanaged residual effects

The DG raises concerns of unmanaged residual effects on LTB and their habitat. The DG specifies that proposed compensation planting at a 1:1 ratio will not create new habitat for LTB and therefore there is a loss in overall habitat considering the issue of the time lag in plant establishment.

The potential planting site (Figure 5.1 in the EcIA) comprises native forest and open grassland, with the grassland offering an opportunity for replanting to create new mosaic habitat suitable for LTB foraging. However, I agree with the DG that this will improve existing habitat rather than creating new habitat. Creating new habitat that replicates the ecological functions of the lost habitat is challenging. Therefore, an increase in compensation—such as additional planting or predator control—should be considered to ensure the level of compensation is commensurate with the overall level of effect.

The EcIA has proposed short- to medium term solutions acknowledging the lag time in form of bat boxes and pest control.

59. Consent condition recommendations

The DG has requested specific information and wording to be included within consent conditions relating to ecological effects management. The recommended detail would be expected to be provided within ecological management plans submitted to council at a minimum. This detail would be included if management plans are prepared in accordance with standard guidance and best practice methodology.

60. Recommendation, including any amended or new conditions

One new condition relating to the incidental discovery of native lizards is recommended in point 64a. Recommended alterations to existing conditions or additional conditions are required to ensure ecological effects are appropriately managed. Although it is noted that the Requiring Authority may choose to amend condition wording based on the DG submission.

Statutory Considerations

61. I have reviewed the discussion in Section 13 of the NoR on the provisions in the statutory documents relating to ecology that are listed below. I agree with the comments on those provisions. In my opinion, based on that analysis, the Requirement is consistent with those provisions.

    a. RMA – Section 5 – Purpose of RMA,

    b. RMA – Section 6 – Matters of national importance,

i. the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna

c. RMA – section 7 – Other matters,

i. intrinsic values of ecosystems

ii. maintenance and enhancement of the quality of the environment

d. National Policy Statement for:

i. Indigenous Biodiversity (NPS-IB), specifically Appendix 4: Principles for biodiversity compensation and application of the effects management hierarchy

ii. Freshwater Management (NPS-FM)

e. Waikato Regional Policy Statement (WRPS) – objectives relating to ecosystems and indigenous biodiversity

i. ECO – P1 maintenance and enhancement of indigenous biodiversity

ii. ECO – P2 protection of significant vegetation and habitats of indigenous fauna and

iii. ECO – P3 collaborative management

f. Hamilton District Plan – objectives 25.1.2.2 and 25.2.2.1 relating to impacts on SNAs and biodiversity due development and vegetation removal.

Conclusions

62. In my opinion, from an ecological perspective, the proposed works for which designation is sought:

a. The effects can be managed through appropriate designation conditions, reducing adverse impacts on ecological features and values to a low or very low level, while ensuring compliance with the relevant statutory requirements outlined above.

b. Reconsideration of the scale of compensation is required to address remaining residual effects and ensure a net benefit is achieved at the site is required.

Recommendations

Designation conditions

63. I have reviewed the proposed *Draft NOR Conditions – Ruakiwi Reservoir: 31 October 2025* and support the conditions relating to ecological matters (proposed conditions 41 – 45, 46, 48b, and 70 - 72).

64. I recommend the following amendments and additions to the Requiring Authority's proposed designation conditions:

Vegetation Removal

a. An Incidental Discovery Protocols should be prepared in the unlikely event that native lizards are found during clearance of suitable habitat (i.e. agapanthus). Protocols should detail appropriate steps to undertake following the incidental discovery of a lizard, particularly regarding the discovery of an injured lizard(s) and reporting requirements.

Ecological, Cultural and Landscape Management Plan

b. Provide a detailed ecological plan based on the Ecological Impact Assessment Report prepared by Tonkin and Taylor to provide the following:

i. the location of the 21 artificial bat roost boxes and 21 artificial bat roost features within the Hamilton Lake Domain.

ii. Map showing location of 7.4 hectares of pest mammal control within the Hamilton Lake Domain and details of how that pest mammal control will be carried out including required duration.

iii. showing where the 0.58 hectares of planting will be located within the Hamilton Lake Domain and how that planting will be established, monitored and maintained. Plant maintenance should be undertaken for a minimum of five years.

Lighting Design

70. A Lighting Plan (LP) shall be provided to Hamilton City Council's Chief Executive or nominee for certification at least 3 months before the issue of practical completion of Reservoir 1. The objective of the LP is to set out the Best Practicable Option for the management of lighting effects. The plan shall be prepared by a suitably qualified and experienced person in lighting design and shall provide for the following objectives:

a. The spill of light from artificial lighting from the activities within the designation shall satisfy the recommendations contained in AS/NZS 4282: 2023 (Control of the obtrusive effects of outdoor lighting) for environmental zone A3 (medium district brightness).

b. The spill of light from artificial lighting from the activities within the designation shall seek to address adverse effects on LTB and their foraging and roosting habitats by managing light strength, placement of luminaries, lighting wavelength, shielding, and timing controls.

71. In order to achieve the objective established in condition 70 above, the LP shall, as a minimum, address the following matters:

a. Provide a detailed LP (text and graphics) for the Reservoir site that incorporates the following requirements:

   i. Exterior lighting fixtures shall be selected, designed and installed to ensure that the light source is not directly visible from any residential window.

   ii. Lighting fixtures shall be fully downward facing with zero upward light output and have a nominal colour temperature no more than 2700K.

   iii. Façade lighting shall be controlled to limit its use from sunset to 11.00 pm.

   iv. Functional maintenance lighting fixtures shall be controlled by a motion sensor with a maximum 5-minute timer and a master override switch to completely turn off when not required.

   v. Designed to ensure that the added light spill (i.e. light in excess of the ambient light from natural and other sources) at the Bat Habitat Boundary (i.e. the Designation boundary and further than 20 metres from the western boundary of the Ruakiwi Road Reserve) does not exceed 0.1 lux in the vertical plane at any height).

   vi. Designed in accordance with the NZ DOC Bat Recovery Group best practice lighting design principles.

b. Identify the nearest residential properties where post construction light levels can be measured to confirm compliance with the recommended limits in AS/NZS 4282 and the permitted activity limits in the Operative District Plan.