Waipapa Taumata Rau University of Auckland

Buller Plateaux Continuation Project Peer Review by Bruce Burns

EXECUTIVE SUMMARY

1. I am Dr Bruce Burns of the University of Auckland and in 2025 I undertook peer reviews of two projects undertaken for the Buller Plateaux Continuation Project – development of a vegetation classification and map, and conservation prioritisation evaluations.

2. I undertook an initial review of each full draft of a report on these projects on which I provided high level commentary and direction / feedback. This was then incorporated into the next iteration of the reporting and then I reviewed the final versions.

3. The vegetation classification and map project was based on a dataset of 152 plots located by stratified random sampling across the vegetation complex present on the Buller Plateaux. These were analysed using a broad suite of multivariate ordination and classification techniques to identify 13 vegetation types that amongst them fully describe the vegetation present. A machine learning approach was then used to extrapolate from vegetation types represented by individual plots to develop a full vegetation map. In my opinion, this is a high resolution and accurate representation of the vegetation of the Buller Plateaux.

4. The conservation prioritisation project used Zonation software to map areas of different relative conservation value across the Buller Plateaux study area. To do this, the report adopted two different approaches: (1) using spatial location data of species and ecosystems of conservation value, and (2) assessing the habitat suitability of each vegetation type/landcover class for each species and feature of conservation interest and using these as input data. The two conservation rank maps for each approach were broadly

similar and identified key areas for conservation management on the Buller Plateaux. The authors of the report indicated a preference for the second approach as it was not dependent only on the location of survey data that only covered subsets of the total area.

5. Both projects (vegetation map and conservation prioritisation) used state-of-the-art methodologies to achieve their objectives using as comprehensive as possible and high-quality datasets. The outputs generated provide a solid framework for decision-making and management and I endorse the processes used in developing them and the results.

INTRODUCTION

6. My full name is Bruce Richard Burns. I am an Associate Professor in the School of Biological Sciences at the University of Auckland.

7. This technical assessment addresses the vegetation classification and mapping, and conservation prioritisation evaluations undertaken over the Buller Plateaux (Stockton and Denniston Plateaux which includes the area of the Buller Plateaux Continuation Project) and provides an independent review of the validity of the results obtained by these evaluations.

Qualifications and experience

8. I have the following qualifications and experience relevant to this assessment:

   (a) My qualifications are BSc, MSc (1st class hons.), Diploma in Natural Resources, PhD (Colorado)

   (b) Since September 2009 I have been employed at the University of Auckland. Prior to that I was employed from 1991 to 2009 with Manaaki Whenua Landcare Research.

   (c) I specialise in the study and application of plant ecology, restoration ecology and conservation biology. My role at the University of Auckland includes research and teaching but also includes consulting on relevant projects and providing expert advice. I have produced 89 peer-reviewed journal articles, books or book chapters related to issues of plant ecology. Pertinent to my peer review of the evaluations of the Buller Plateaux, I have undertaken and published vegetation descriptions for the Waipoua Forest (including a detailed map), Auckland volcanic cones, and Te Kopia geothermal

area. My research on conservation management is evidenced by my publications on New Zealand ecosanctuaries and particularly those with conservation fences.

Code of conduct

9. I confirm that I have read the Code of Conduct for expert witnesses contained in the Environment Court Practice Note 2023. This assessment has been prepared in compliance with that Code, as if it were evidence being given in Environment Court proceedings. In particular, unless I state otherwise, this assessment 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.

Purpose and scope of assessment

10. The purpose of this assessment is to provide independent reviews of and comments on:

    (a) The vegetation description and mapping undertaken for the Buller Plateaux as detailed in Bramley, G.N., Aguilar, G., Lloyd, B., Newburry, M., McLennan, O., Taylor, P., Gorinski, S., Lambert, M., Nichol, R., Roxburgh, S., Maguire, L. 2025. Buller Plateaux Vegetation Mapping. Unpublished report prepared by Ecological Solutions Limited for Bathurst Resources Limited. August 2025. Ecological Solutions Limited, Kāeo.

    (b) The conservation prioritisation evaluation undertaken for the Buller Plateaux as detailed in Taylor, P., McLennan, O., Gorinski, S., Woodward, O., Bodley, R. 2025. Conservation Prioritisation at the Buller Coal Plateau. Unpublished report prepared by Ecological Solutions Limited for Bathurst Resources Limited. August 2025. Ecological Solutions Limited, Kāeo.

THE BULLER PLATEAUX CONTINUATION PROJECT

11. The full description for the Project is provided at section 5 of the AEE. I do not repeat it in my assessment.

METHODOLOGY

Introduction

12. My approach was to review the two Project reports (1) on the development of a vegetation description and map for the Buller Plateaux (i.e., Bramley et al. 2025), and (2) on

conservation prioritisation (i.e. Taylor et al. 2025). I undertook an initial review of each full draft on which I provided high level commentary and direction / feedback. This was then incorporated into the next iteration of the reporting and then I reviewed the final versions. In my review, I considered the methodologies used, the data collected, and the analyses undertaken and assessed whether the results provided were a valid distillation of the processes used. My key question was whether the end results reasonably reflected the true nature and spatial distribution of vegetation and conservation values present on the Buller Plateaux and provided a high-quality basis for designing future management and mitigation options.

13. I also undertook a site visit to the Buller Plateaux on the 16th and 17th June 2025 in which I traversed the full range of vegetation types present on the Plateaux (as much as possible) and noted key plant species and associations.

COMMENT ON THE METHODOLOGIES USED TO CLASSIFY VEGETATION AND DEVELOP CONSERVATION PRIORITIES AND THE RESULTS

14. The dataset used to generate the vegetation description was a combination of plots measured in previous surveys (88) and additional new plots sampled in 2024 and 2025 (64). Plots were located using a stratified random approach to ensure adequate geographic spread and reflected the broad variation in vegetation classes observed. All plots were measured using the RECCE methodology (Hurst et al. 2022), although some adjustments were necessary to standardize the plots from different past surveys incorporated, so they were comparable. More data is always better, but the size and distribution of the plots sampled here was appropriate for the purpose.

15. These data were then analyzed using a very broad suite of multivariate techniques, including ordination and classification, to reduce the complexity of the dataset and identify a small number of vegetation types that appropriately described the variation in vegetation across the Plateaux. In general, the approaches used here were those widely used in this type of analysis. However, the use of species within height tiers, rather than using one overall abundance measure for a species in a plot, as the basic data unit was non-standard, and not what I would recommend. Having said that, the analysis compared

various approaches which all returned similar results, so the final accepted solution appears to appropriately and reasonably reflect the vegetation present.

16. A map was then developed using a machine learning approach. On a high resolution combined aerial image of the full study area, the spectral signatures of plots of known vegetation types were used to train an algorithm to extrapolate the vegetation classification over the entire area. This produced a fine-scale, vegetation map of the Buller Plateaux. This appears to be an exceptional and accurate representation of the vegetation and ground cover of the Plateaux, although some manual editing was required to correct a few identified errors. Further ground checking of this map over time would further increase confidence in this output.

17. Vegetation is manifest as the combination of the individual distributions of many plant species each reflecting their abilities to exist along environmental gradients, e.g., soil moisture, temperature. Often vegetation can change gradually along such gradients as a result, so sometimes it is difficult to place sharp discontinuities between vegetation types that gradually change. This seems to be the case here. Although some vegetation types are clearly distinct, e.g., forest types versus pakihi types, the boundaries between some different pakihi types were more gradational. This is a limitation of the overall process of vegetation typing and not unique to this study. Nevertheless, I believe the types recognized are still a reasonable and accurate portrayal of the vegetation present.

18. The conservation prioritization exercise was initiated to determine and map areas of different relative conservation value on the Buller Plateaux. This assessment used Zonation software (Moilanen et al. 2024) which is a spatial prioritization software package used widely internationally for conservation issues and highly rated. The exercise took two approaches to determine the most valuable locations for conservation within the Buller Plateaux study area.

19. The first approach used a dataset based on the known spatial locations of species and ecosystems of conservation interest gained from past surveys and reports. This included a thorough list of key species known from the Buller Plateaux from a wide range of taxonomic groups, e.g., bryophytes, reptiles, etc., although a few were not included, e.g. fish. Each species or ecosystem was rated by irreplaceability and vulnerability scores based on input from a panel of experts (from a dedicated workshop), and species threat statuses. The concern expressed in the report with this approach was that it might be biased by locations

where surveys were carried out and indeed, many of the areas rated as of high conservation value were those where intensive survey had occurred, and less elsewhere.

20. The second approach used the recent vegetation types and map developed by Bramley et al (2025) as the basis for prioritization. The habitat suitability of each vegetation type/landcover class were assessed for each species and feature of conservation interest, and these were then used as input data. The zonation output for approach 2 is therefore more based on the potential of sites to support species of conservation interest than actual survey data.

21. The two approaches created reasonably similar heat maps of conservation priority over the study area, providing key focal zones for focussing conservation management. There were a few differences between the two approaches though, particularly north and west of Mt Stockton which was rated highly in Approach 1 but not so in Approach 2. The authors of this report consider that Approach 2 is a more objective reflection of conservation priorities, and I concur with this opinion.

22. The zonation process is based on static spatial location data for species. I suggest that a perspective that needs to be considered when using these outputs is that individuals of many species are both mobile and occur in populations that require a certain minimum size/density to be viable. When considering areas for mitigation/off-setting, etc., it will be important to reflect on whether the area under consideration would be large enough to support self-sustaining populations of each focal species, i.e., think of species in populations rather than as individuals.

CONCLUSION

23. I have reviewed reports on projects to describe and map vegetation and conservation values across the Buller Plateaux. In my opinion, these reports have used state-of-the-art methodologies in their analyses, along with large, comprehensive, and appropriate datasets. The results obtained provide decision tools with a high degree of detail, validity and integrity and a solid framework on which to plan possible proposals for mitigation, biodiversity offsetting and/or compensation. I endorse the processes used in developing them and the results obtained.

BRUCE RICHARD BURNS

20 November 2025

References

Bramley, G.N., Aguilar, G., Lloyd, B., Newburry, M., McLennan, O., Taylor, P., Gorinski, S., Lambert, M., Nichol, R., Roxburgh, S., Maguire, L. 2025. Buller Plateaux Vegetation Mapping. Unpublished report prepared by Ecological Solutions Limited for Bathurst Resources Limited. August 2025. Ecological Solutions Limited, Kāeo.

Hurst, J.M., Allen, R.B. & Fergus, A.J. 2022. The Recce method for describing New Zealand vegetation – expanded manual. Version 5. Manaaki Whenua Landcare Research.

Moilanen, A., Kohonen, I., Lehtinen, P., Kivistö, I., Jalkanen, J., Virtanen, E., & Kujala, H. 2024. Zonation 5 v2.0 user manual. https://zonationteam.github.io/Zonation5/

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