

BEFORE THE CENTRAL OTAGO DISTRICT COUNCIL

Under The Resource Management Act 1991

And

In the matter of an application by TKO Properties Limited for a residential development and subdivision at Rocky Point, Bendigo (RC230179)

Evidence of Richard Andrew Ewans

(Technical Advisor - Ecology)

on behalf of the Director-General of Conservation *Tumuaki Ahurei*

Dated 11th November 2024

Department of Conservation Te Papa Atawhai

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Introduction

1. My full name is Richard Andrew Ewans.
2. I have been asked by the Director-General of Conservation ("DG") to provide ecological evidence on the potential effects of the proposal by TKO Properties Limited for a residential development and subdivision at Rocky Point, Bendigo.

Qualifications and experience

3. I am currently employed by the Department of Conservation (DOC) as a Technical Advisor – Ecology in the national Flora and Ecosystems Team, which is a component of the Terrestrial Biodiversity Unit. Part of my role is to provide indigenous flora and ecosystems expertise for resource management processes.
4. Prior to joining DOC, my two most recent roles were Partnerships Lead – Biodiversity for the Otago Regional Council (January 2022 to June 2023), and Biodiversity Advisor (council ecologist) for the Dunedin City Council based in the planning team (October 2018 to January 2022).
5. I hold a Bachelor of Science (Hons) First Class in Plant Ecology from the University of Otago (2000).
6. From January 2000 until June 2004, I worked as an independent ecological contractor in Dunedin. From July 2004 until August 2013, I was employed as a Biodiversity Ranger - Monitoring for the Department of Conservation (DOC) in the Fiordland District Office. From September 2013 until February 2014, I worked as an Ecologist for Contract Wild Animal Control Limited in Te Anau. From March 2014 until September 2018, I ran my own ecological consultancy called Eco-South, based in Dunedin.
7. My work experience includes providing botanical expertise on programs such as the Waitaki and Mackenzie Districts Significant Natural Areas assessments, South Island High Country Tenure Review (Otago), the Mackenzie Basin braided riverbeds vegetation survey, Environment Southland Wetland GIS Inventory and Monitoring Project, Hunua Ranges Watercare Catchment Restoration Project, monitoring of Oceana Gold Macraes mining ecological consent conditions, and Department of Conservation Tier 1 monitoring (a national biodiversity monitoring program).

8. My previous role at DOC involved establishing, maintaining, and reporting on multiple vegetation outcome monitoring programs and providing expertise on threatened plants and ecosystems, and plant pests.
9. I have extensive experience working in indigenous non-forest ecosystems including drylands and wetlands and have described over 50 Significant Natural Areas (SNAs), mostly dryland sites, for Mackenzie and Waitaki District Councils in the Mackenzie Basin while subcontracting to a consultant.
10. I have completed over 200 Resource Management Act 1991 (RMA) ecological significance (or similar) type surveys on private land in the lower South Island and reviewed/critiqued many ecological assessments as part of consenting or compliance processes.

Code of Conduct

11. Although this is a Council hearing, I confirm that I have read the code of conduct for expert witnesses as contained in clause 9 of the Environment Court's Practice Note 2023 ('the Code'). I have complied with the Code when preparing my written statement of evidence.
12. For the avoidance of doubt, in providing this evidence as an expert witness in accordance with the Code, I acknowledge that I have an overriding duty to impartially assist the Panel on matters within my area of expertise. The views expressed are my own expert views, and I do not speak on the DG's behalf.
13. The data, information, facts and assumptions I have considered in forming my opinions are set out in my evidence to follow. The reasons for the opinions expressed are also set out in the evidence to follow. This includes, where relevant:
 - a. why other alternative interpretations of data are not supported;
 - b. any qualification if my evidence may be incomplete or inaccurate without such qualification;
 - c. any knowledge gaps and the potential implication of the knowledge gap;
 - d. if my opinion is not firm or concluded because of insufficient research or data or for any other reason;
 - e. an assessment of the level of confidence and the likelihood of any outcomes specified in my conclusion.

14. Unless I state otherwise, this evidence is within my sphere of expertise and I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

Scope of evidence

15. I have been asked to provide evidence in relation to the DG's submission on the potential effects of the proposal by TKO Properties Limited for a residential development and subdivision at Rocky Point, Bendigo.
16. My evidence addresses the following issues:
- a. Whether the location constitutes a Significant Natural Area;
 - b. Presence of flora on the property and within the development area and threat status of flora;
 - c. The adequacy of the ecological information provided;
 - d. Importance of indigenous vegetation in Central Otago drylands;
 - e. The potential adverse effects of the proposal on flora;
 - f. Whether the proposed mitigation package could maintain indigenous biodiversity.
17. To assist the Panel, in my evidence I distinguish between:
- a. The 'property' (64.2 ha) as Rocky Point Subdivision Lot 1 DP561457.
 - b. The 'development area' as the proposed Rocky Point Subdivision lots, roads, tracks and other areas directly affected by subdivision enabled activities.
 - c. The 'covenant' as that part of Bendigo Conservation Covenant present on the Rocky Point property Lot 1 DP561457.

Material Considered

18. In preparing my evidence I have read and relied upon the following other documents:
- a. Beale Consultants. 2024. Rocky Point Subdivision Terrestrial Ecology Impact Assessment: Prepared for TKO Properties Limited, July 2024. Hereafter referred to as the 'EcIA'.

- b. Beale Consultants. 2024. Rocky Point Ecological Enhancement and Monitoring Plan: Prepared for TKO Properties Limited, July 2024. Hereafter referred to as the 'EEMP'.
 - c. Brown & Company Planning Group. 2024. Application for Resource Consent for a comprehensive residential development at Rocky Point, Cromwell, Updated 26 July 2024. Prepared for TKO Properties Limited. Hereafter referred to as the 'application'.
 - d. Harding M. 2024. Subdivision Application RC 230179 Bendigo Loop Road Central Otago District – Review of Proposed Biodiversity Offsetting. Report prepared for Central Otago District Council. Hereafter referred to as the 'offsetting review'.
 - e. Central Otago District Council (hereafter referred to as 'Council') Supplementary Report of Planning Officer for Application RC 230179. Hereafter referred to as the 'S42A Report Addendum'.
 - f. Other documents and publications referenced within this evidence
19. In preparing my evidence I have considered the submission of Kate Wardle in regard to local dryland indigenous biodiversity values.
 20. I undertook a site visit on 14 October 2024 which included most of the proposed subdivision lots, but I did not have sufficient time to visit the proposed offsetting sites which are on an adjacent property, or survey anywhere on the property apart from around proposed lots. I also led a site visit on 3 November 2023 to establish the presence of specific Threatened and/or At Risk plant species within the covenant on the property (also focussed around proposed lots) and on Bendigo Hills, an adjacent TKO Holdings property.

Executive Summary

21. This evidence was prepared in response to a proposal for subdivision and housing development at an ecologically significant location, supporting multiple Threatened and At Risk plant species, and subject in part to a Conservation Covenant near Bendigo in Central Otago.
22. Broadly, this evidence addresses the ecological significance of the location; the ecosystem, vegetation community and flora components that make the location significant; the presence of Threatened and At Risk plant species; the adequacy

of the ecological information in the EclA the proposal relies on; and whether the proposal sufficiently addresses adverse effects on the ecological values of indigenous flora. For clarity, it does not address effects on, or proposed mitigation for, indigenous fauna.

23. The development area is agreed by all parties to be a Significant Natural Area (SNA). Most of the property, including the development area, easily meets the applicable statutory criteria by supporting indigenous vegetation with good populations of multiple Threatened and At Risk flora species, and indigenous vegetation types and ecosystems that have historically experienced, and are still experiencing, substantial and ongoing loss and degradation to development.
24. The proposal will destroy multiple populations of several nationally Threatened and At Risk plant species unaccounted for in the EclA, with no matching mitigations. Some of these populations are regionally significant and collectively with adjoining habitat are nationally significant. This destruction represents an irreversible loss of significant indigenous biodiversity.
25. The proposal will result in the permanent removal of c. 4 ha of indigenous cushionfield, an ecosystem that has been severely impacted in Central Otago by irrigation, subdivision and viticulture developments, and which is dominated by an At Risk plant species. There is no proposal to restore an equivalent area of this ecosystem, nor is it feasible to do so. This removal represents an irreversible loss of At Risk indigenous biodiversity and of an already much reduced indigenous ecosystem/vegetation type.
26. It is agreed that broadly the vegetation on the property could slowly transition to a more woody dominated ecosystem, that may result in the replacement of some indigenous cushionfield in the medium to long term (possibly 50 to 100 years). However, in my opinion, this potential future transition does not justify the applicant's proposal to offset the loss of indigenous cushionfield, supporting Threatened and At Risk plant species, with woody revegetation plantings dominated by common (Not Threatened) species. This proposal is predicated on simplistic, linear predictions of future site state, overestimates the rate of change and establishment of a 'climax' woody community, and does not meet statutory principles for offsetting.
27. The EclA survey effort has not been directed to where it is most obviously required, i.e., to comprehensively assess the direct impacts of indigenous

vegetation clearance within the affected areas (for house platforms, curtilage and roads/tracks, wastewater disposal fields etc.)

28. The EclA is deficient in this regard, inexplicably missing obvious, multiple populations and occurrences of Threatened and At Risk plant species within the development areas, which were relatively easily found on DOC surveys. In my opinion, there is a very high likelihood that substantially larger populations and a higher diversity of Threatened and At Risk plants are present on the property and in the development areas. This makes the EclA unreliable, and as a result, it is not possible to conduct a robust assessment of biodiversity values lost set against any mitigations (including offsetting).
29. Even with the current substantial underestimate of indigenous biodiversity values, the proposed mitigations (including offsetting, which would be more appropriately categorised as compensation) do not result in the maintenance of indigenous biodiversity or a net biodiversity gain.
30. The offsetting proposal does not adhere to statutory principles and the model that underpins it cannot be relied upon because the ecological values inputted into it are so critically underestimated.
31. The offset sites themselves may support Threatened and At Risk plants which could be destroyed by offsetting revegetation planting. Because the botanical survey information is unreliable in the EclA, there can be no confidence that the offsetting sites have been adequately assessed.
32. In my opinion, particularly due to incomplete information on biodiversity values, it is not possible to create consent conditions to adequately mitigate the residual adverse effects on indigenous biodiversity of the full proposal.
33. The residual adverse effects of this proposal on indigenous biodiversity are clearly more than minor.
34. Some of the proposed lots on the northern and eastern parts of the property appear to support more highly modified indigenous vegetation or exotic vegetation where some indigenous vegetation clearance may be of less concern. However, there is no evidence to date that these areas have been adequately assessed for ecological values within the development footprint.

Ecological significance of location

35. I concur with the EclA conclusions that the vegetation and habitats within the development area are of very high ecological value and meet all of the ecological significance criteria of the Partially Operative Otago Regional Policy Statement (PORPS). Therefore, the development area is a Significant Natural Area (SNA). In addition, these values meet the similar SNA criteria in the National Policy Statement for Indigenous Biodiversity (NPS-IB) and are reasonably described in terms of drylands ecological value as 'outstanding' and part of a 'nationally important sequence of indigenous drylands vegetation'.
36. A comprehensive assessment of significance including SNA mapping for the property is not provided here because I consider that species occurrence information is incomplete.
37. However, it is clear that most, if not all, of the property and development area within it meets all statutory ecological significance criteria from the PORPS and NPS-IB. A brief summary of how the ecological values on the property meets these SNA criteria is provided below.
 - a. Representativeness – Modified dryland kanuka shrubland and scrub, grey shrubland, and scabweed (*Raoulia australis*) cushionfield is highly typical of the present-day indigenous vegetation, and characteristic of the original natural diversity, in the Dunstan Ecological District (ED).
 - b. Rarity/Distinctiveness – The property supports at least 1 Threatened,¹ 13 At Risk², 2 locally uncommon (within the ED) plant species, some of which include multiple occurrences and regionally important populations. The location supports indigenous vegetation types (woody - shrubland and scrub) which have been reduced to less than 20% of their pre-human extent in the ED.³
 - c. Diversity and Pattern – A moderate diversity of indigenous vegetation types is present (kanuka shrubland/scrub, indigenous cushionfield, and rocky substrates supporting indigenous vegetation) in the context of the ED. In my opinion, the number of indigenous species is underestimated in the EclA (a comprehensive species list is not provided), and it is likely that a high

¹ de Lange PJ, Gosden J, Courtney SP, Fergus AJ, Barkla JW, Beadel SM, Champion PD, Hindmarsh-Walls R, Mangan T and Michel P. 2024. Conservation status of vascular plants in Aotearoa New Zealand, 2023. New Zealand Threat Classification Series 43. 105 p.

² Note this includes one lichen species.

³ Original woody vegetation forest and shrubland/scrub has been mostly long removed from below natural treeline. Expert evidence of Richard Andrew Ewans, Technical Advisor - Ecology for Director-General on an application by TKO Holdings for consent to subdivide and clear indigenous vegetation at Bendigo, Central Otago– dated 11.11.24 – DOC-7808646.

diversity of indigenous plant species is present on the development site, in the context of these habitats in the ED.

- d. Ecological Context – Kanuka shrubland/scrub at the location links to and forms a corridor with a contiguous tract of kanuka on Bendigo Hills Estate and Bendigo Scenic Reserve that comprises one of the largest tracts of *Kunzea serotina* in the lower South Island.
38. The location also meets one national priority for protection on private land,⁴ i.e., priority 4. The priorities are reflected in the PORPS and NPS-IB ecological significance criteria for Rarity/Distinctiveness addressed above. National priority 4 is to protect habitats of acutely and chronically threatened⁵ indigenous species.

Indigenous flora recorded on the property and development area

39. I broadly concur with the vegetation communities described in the EclA in terms of overall patterns for the property and the Section 7 Summary of Key Ecological Features *with the following caveats* (which are addressed more fully in other paragraphs of my evidence):
- a. Indigenous plant species diversity is underreported;
 - b. Populations, occurrences and diversity of Threatened and At Risk plant species is critically underreported;
 - c. Further, the threat status of several species has changed since the EclA was written.
40. The EclA suggests the property supports c. 48 ha of indigenous vegetation (kanuka shrubland/scrub and cushionfield). These are the dominant indigenous vegetation types present. Other indigenous vegetation present includes grey shrubland and a variety of indigenous plant species around rocky substrates.
41. The EclA field surveys recorded 3 plant species classified as At Risk – Declining in the **development area**: pygmy mistletoe (*Korthosella*

⁴ Ministry for the Environment & Department of Conservation. 2007. Protecting our Places - Information about the Statement of National Priorities for Protecting Rare and Threatened Biodiversity on Private Land. ⁴ Ministry for the Environment. 51p.

⁵ Updated equivalent categories are Threatened and At Risk – Declining. Townsend AJ, de Lange PJ, Duffy CAJ, Miskelly CM, Molloy J, Norton DA. 2007. New Zealand Threat Classification System manual. Department of Conservation, Wellington. 35p.

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salicornioides),⁶ scabweed (*Raoulia australis*), and pin cushion (*Colobanthus brevisepalus*).

42. However, an additional 1 Threatened and 5 At Risk plant species were recorded in the **development area** on the DOC site visits of 3 November 2023 and 14 October 2024 (see Appendix 1): *Myosotis brevis*, Threatened – Nationally Vulnerable; New Zealand mousetail (*Myosurus minimus* subsp. *novae-zelandiae*), At Risk – Declining; *Raoulia beauverdii*, At Risk – Declining; *Poa maniototo*, At Risk – Declining; *Xanthoparmelia semiviridis* (a lichen),⁷ At Risk – Declining; *Crassula mataikona*, At Risk – Naturally Uncommon.
43. The DOC records are listed in Appendix 3 and shown on the map in Appendix 4. They include multiple occurrences of some Threatened and At Risk plants, including regionally significant populations of the ‘spring annuals’ New Zealand mousetail and *Myosotis brevis*. Most of these records were within **the covenant**, or within 75 m of the covenant boundary, where indigenous vegetation around proposed lots is less modified.
44. In total, 1 Threatened and 8 At Risk plant species were recorded in the **development area**. The cushionfield areas which are proposed to have the greatest level of clearance are dominated by scabweed, an At Risk – Declining species.
45. On the **property**, a total of 1 Threatened, 13 At Risk, 2 locally uncommon (within the ED) plant species have been recorded.
46. Of particular note, is the many occurrences of ‘spring annuals’,⁸ including some regionally significant populations. Annual species are rare in the New Zealand flora, and undeveloped low altitude areas of Central Otago are a stronghold for a group of three species which are becoming increasingly rare due to habitat loss and weed invasion. In my opinion, the general undeveloped area of Bendigo, including the two TKO Holdings properties, could be the most important remaining area nationally for the conservation of the spring annuals species. It is highly likely that further survey work by suitably qualified and experienced botanists would uncover further substantial populations of all three

⁶ Table 5-1 of the EclA records this species as present in the development area, while Table 10-1 reports that no plants were recorded in the development area. I assume it is present.

⁷ de Lange P, Blanchon D, Knight A, Elix J, Lücking R, Frogley K, Harris A, Cooper J, Rolfe J. 2018. Conservation status of New Zealand indigenous lichens and lichenicolous fungi, 2018. New Zealand Threat Classification Series 27. Department of Conservation, Wellington. 64 p.

⁸ Rogers G, Walker S, Tubbs M, Henderson J. 2002. Ecology and conservation status of three “spring annual” herbs in dryland ecosystems of New Zealand. New Zealand Journal of Botany 40: 649-669.

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species known from the covenant, one of which is Threatened – Nationally Critical.⁹

47. Saline-Sodic soils were recorded on the property associated with cushionfields.¹⁰ Inland saline (salt pans) are a naturally uncommon ecosystem¹¹ ranked as Critically Endangered¹² and are only found in Central Otago. It is unclear if any of the Saline-Sodic soil areas technically classify as the Inland saline (salt pans) naturally uncommon ecosystem, however small areas do appear similar to known salt pans elsewhere in Central Otago, and there are small areas of salt pan on the adjacent Bendigo Hills property.¹³ The EclA did not record any halophytic (salt tolerant) plant species (many of which are Threatened or At Risk), however it is possible they are present and have been missed. Again, further survey work by suitably qualified and experienced botanists would provide this information.

Threat status of indigenous flora present

48. The status of several plant species subject to this application has changed with the publication of the most recent New Zealand Threat Classification System review for vascular plants in September 2024, after the EclA was completed.
49. Of particular note, kanuka and matagouri are now classified as Not Threatened, and pygmy mistletoe has been classified down from the highest threat status (Threatened – Nationally Critical) to At Risk – Declining. Most other species with a threat ranking have remained at the same or similar classification, while some species present, and previously classified as Not Threatened, now have threat rankings e.g., *Poa maniototo* and *Olearia odorata* (both At Risk – Declining).
50. Importantly, these status changes do not affect the assessment of the site as an SNA, and in my opinion are not substantive in the discussion of overall adverse effects on ecological values. However, they do impact on the value of any proposed offsetting or rather, compensation package as discussed below.

⁹ *Ceratocephala pungens*, known from elsewhere in Bendigo Conservation Covenant.

¹⁰ Gibson R. 2024. Rocky Point Subdivision Bendigo – Saline/Sodic Soils Identification and Location. Roger Gibson Land and Sea Services.

¹¹ Williams PA, Wiser S, Clarkson B, Stanley MC. 2007. New Zealand's historically rare terrestrial ecosystems set in a physical and physiognomic framework. *New Zealand Journal of Ecology* (2007) 31(2).

¹² Holdaway RJ, Wiser SK, Williams PA. 2012. Status Assessment of New Zealand's Naturally Uncommon Ecosystems. *Conservation Biology* 26(4).

¹³ Pers. Obs. 3 November 2023 and Submission of Kate Wardle to RC 230179 TKO Properties Ltd application for Subdivision and Development at Lakefront Terrace, Bendigo, Pocky Point.

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Missed Threatened and At Risk flora; adequacy of EclA in context of Central Otago drylands

51. The ecological information in the EclA is based on walk over surveys and RECCE plots, with overall survey effort stated as totalling 152 person hours over 10 site visits. The survey recorded three At Risk plants species in the development area, of which there were few occurrences (see Appendix 5¹⁴).
52. This contrasts with the DOC site visits totalling 9 ecologist person hours. The DOC survey recorded 1 Threatened and 7¹⁵ At Risk plant species with multiple occurrences of multiple species within the **development area**, including large populations of 'spring annual' species. These records are shown in Appendix 4 and listed in Appendix 3 and are concentrated in and around the **covenant** on Lots 1-21 (shown in Appendix 6).
53. Therefore, it is clear that the EclA has not adequately assessed the presence of Threatened and At Risk flora at the site of impact i.e., the development areas where the indigenous vegetation clearance is proposed to occur. As a result, it cannot be determined how many Threatened and At Risk individuals of each species would be destroyed, and therefore what would constitute an appropriate mitigation package to maintain biodiversity, or if one is even feasible given the species involved.
54. The EclA has massively underestimated the amount of 'spring annuals' on the property and within the **development area**. I have made two short site visits and easily found good populations of two 'spring annual' species on the sites of the lots. This includes regionally significant populations estimated at several hundred for *Myosotis brevis* and likely thousands of New Zealand mousetail. I do not consider the time I have spent looking to be sufficient for a comprehensive assessment or inventory of populations.
55. In addition, the lots, house sites and curtilage areas are not clearly marked on the ground, so a comprehensive assessment of the flora present, at the site of impact, cannot be currently made.
56. In my opinion, considerably more Threatened or At Risk plant species occurrences are likely to be present than reported in the EclA (or from the DOC site visits). This makes the EclA fundamentally unreliable in terms of an

¹⁴ Note this map is different to the map in Appendix 3 of the Statement of Evidence of Simon Beale, including some plant locations.

¹⁵ Pygmy mistletoe was not searched for.

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assessment of ecological values, and so unable to adequately propose mitigation actions to address adverse effects.

57. Given the deficiencies in the EclA, there is a significant risk that the offset planting sites are also unlikely to have been adequately assessed for Threatened and At Risk species and appear to contain populations which it would not be appropriate to remove by densely overplanting with common shrub species. This issue is discussed further below in the comments on offsetting.
58. The EclA does not discount the presence of other Threatened and At Risk plant species on the property or development area in general (see Table 5-1 in the EclA), but it does not provide a comprehensive list of what else might be present. A non-exhaustive table of potential Threatened and At Risk plant species that could be found on the property (including in ecosystems within the development area) with adequate botanical expertise combined with appropriate timing and effort, is provided in Appendix 2.
59. Therefore, the EclA underestimates the Threatened and At Risk plant species values on the property, and most critically, within the **development area**.

Importance of indigenous vegetation in Central Otago drylands

60. Habitat clearance and modification is a principal, ongoing cause of indigenous biodiversity decline in New Zealand.¹⁶ There has been extensive loss of dryland ecosystems which are New Zealand's least protected and most threatened ecosystems, yet support about half of New Zealand's most threatened plant species.¹⁷ The remaining ecosystems of the inland South Island drylands are nationally significant.¹⁸
61. No representative examples remain of the pre-human forest types that once occupied the Central Otago basins and montane mountain slopes.¹⁹
62. It is noted that both indigenous shrubland/scrub and cushionfield communities on the property have been modified or induced by historic land clearance, pastoral practices and/or rabbit plagues. This is typical of Central Otago and eastern South Island dryland ecosystems generally. Kanuka shrubland/scrub is

¹⁶ Walker S, Bellingham PJ, Kaine G, Richardson S, Greenhalgh S, Simcock R, Brown MA, Stephens T, Lee WG. 2021. What effects must be avoided, remediated or mitigated to maintain indigenous biodiversity. *New Zealand Journal of Ecology* 45(2): 3445.

¹⁷ [Drylands: Habitats. www.doc.govt.nz](https://www.doc.govt.nz) Accessed 6 November 2024.

¹⁸ Walker S. 2019. Threats to New Zealand's dryland ecosystems. [Threats to New Zealand's dryland ecosystems | NZES](#). Accessed 6 November 2024.

¹⁹ Lloyd K. 2021. An overview of the state of indigenous biodiversity in the Otago Region. Contract Report No. 5704a prepared by Wildland Consultants Ltd for Otago Regional Council.

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recolonising from an almost complete historic clearance of pre-human woody vegetation (forest, shrubland/scrub) in Central Otago and cushionfield occupies land degraded by historic pastoral practices, exacerbated by long periods of rabbit plagues.

63. However, in my opinion, these vegetation types would have been present in the mosaic of pre-human vegetation, with kanuka shrubland in places where periodic natural fires occurred, and cushionfield on the extensive post-glacial Upper Clutha inland outwash gravels and moraines (flats).
64. Regardless, they are critical reservoirs of what little lowland Central Otago indigenous biodiversity remains, which has otherwise been extensively destroyed, heavily modified and continues to be threatened by development. For example:
 - a. Only a tiny fraction of indigenous vegetation remains on the extensive post-glacial Upper Clutha inland outwash gravels and moraines (flats) between Cromwell and Wanaka.
 - b. The inland saline (salt pan) ecosystem which is almost only found in Otago, primarily in the upper Clutha, Manuherekia valley and Maniototo, has been reduced to less than 1% of its extent since the 1960's/1970's.²⁰
 - c. Approximately 40,000 ha of land cover classes comprising indigenous vegetation was lost between 1996 and 2018 in Otago Region.²¹
 - d. Areas identified as having high biodiversity values through Protected Natural Area Programme (PNAP) in Otago i.e., Recommended Areas for Protection (RAPs) continue to be lost. In Central Otago Ecological Districts (EDs), such as Maniototo, Lindis, Pisa, Manorburn and Dunstan, 514 hectares (ha) of indigenous vegetation from 13 RAPs was lost between 1989 and 2015.²²
65. Remaining undeveloped lowland areas in Central Otago are nationally important for indigenous biodiversity because of the remaining drylands botanical values.

²⁰ Allen RB, McIntosh PD. 1997. Guidelines for the conservation of salt pans in Central Otago. Science for Conservation 49. Department of Conservation, Wellington.

²¹ Harding, M. 2022. Otago Region Analysis of Recent Changes to Terrestrial Indigenous Ecosystems. A report to Otago Regional Council, June 2022.

²² Ibid.

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Potential adverse effects of the proposal on flora

66. Proposed indigenous vegetation clearance areas are shown on the map in Appendix 5. Clearance for houses, curtilage areas (lawns, etc), roads, driveways and tracks will destroy c. 4 ha of indigenous cushionfield, dominated by an At Risk plant species. The proposal will also destroy populations of a further 1 Threatened and 6 At Risk plant species, including regionally important populations of 'spring annuals'. In addition, c. 1.5 ha of kanuka shrubland supporting an additional At Risk plant species will also be cleared.
67. Wastewater disposal fields and runoff from hard surfaces would concentrate relatively large volumes of water onto specific areas of the drylands environment, which would completely alter indigenous vegetation communities by competitively advantaging a range of exotic grasses and adventive herbaceous species. It is likely that this would result in further loss of cushionfield vegetation and Threatened and At Risk plants in these areas, as dense grasses and weeds outcompete native dryland species. This effect has not been anticipated or accounted for in the EclA, and the disposal field sites mapped in Figure 5 of the application²³ are next to a regionally important population of 'spring annuals' that likely extends into the disposal fields.
68. Edge effects from roads and curtilage (lawns, gardens, irrigation) and fragmentation will introduce and assist weed spread and degrade the ecological integrity of the indigenous cushionfields and shrubland margins around the development. These 'off site' effects may lead to further loss of Threatened and At Risk plants through competition with aggressive exotic adventive plants facilitated by increased water and nutrients.²⁴
69. There may be additional clearance of kanuka supporting pygmy mistletoe from wildfire mitigation measures as outlined in Fire and Emergency New Zealand (FENZ) guidelines²⁵ in Zones 1 and 2, up to 30 m from houses.
70. These effects are potentially seriously underestimated because the ecological assessment work carried out has been shown to be inadequate, and the DOC site inspections were unable to carry out a full inventory of values.

²³ p23.

²⁴ Brownstein G, Monks A. 2024. Adjacent land-use intensification facilitates plant invasions into indigenous shrubland fragments. *New Zealand Journal of Ecology* 48(1):1-12.

²⁵ Supplementary Statement of Evidence of James Patrick Cowan.

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71. In addition, fragmentation is effectively dismissed in terms of effects management in Table 10-1 of the EclA, and effects from disposal fields run off and other effects are not accounted for.
72. I concur with Mr Harding's independent offsetting review regarding the use of the EIANZ guidelines in the EclA which in my opinion has led to further underestimation of the magnitude of effects collectively. I agree that the use of EIANZ guidelines is problematic.²⁶ The EIANZ guidelines individualises values and effects, rather than assessing them collectively, and uses a pre-determined matrix of effect magnitude and ecological value to arrive at an overall 'level of effect'. This has the potential for biased guidance on the level of effects.²⁷ In this case, the ecological integrity of the site as a whole and its connection and contribution to a wider sequence of outstanding drylands indigenous vegetation is not valued. The use of the EIANZ guidelines is not supported by DOC or any statutory planning processes that I am aware of.
73. The assertion in Row 2 of Table 11-2 of the EclA, that minimises the loss of indigenous cushionfield dominated an At Risk species as an adverse effect of an activity because of its presence elsewhere, facilitates ongoing loss and does not address indigenous biodiversity loss at location. The flyover method of identifying cushionfield elsewhere does not address the quality and diversity of the ecosystem, or the presence of Threatened and At Risk species which cushionfield is habitat for.
74. The indigenous vegetation on and around Lots 22 - 30 appears to be more modified and in some cases degraded, with fewer occurrences of Threatened and At Risk species, although some areas are mapped as saline-sodic soils and could contain areas of Inland saline (salt pan) ecosystem. Adverse effects on indigenous biodiversity would be likely much reduced if the development was confined to this part of the property, however this would require an adequate assessment of ecological values for me to comment further, which has not been provided by the EclA.

²⁶ See Resource Consent Applications CRC184166, CRC200500, CRC201366, CRC201367, CRC201368, CRC203016, CRC214320, CRC214321 and SDC RC-185662 and RC185640 – Bathurst Coal Limited - Report and Decision of the Hearing Commissioners, 17 June 2022 and Resource Consent Applications CRC224567, CRC230898 and RM220048 – A. W. and K. F. Simpson - Report and Decision of the Hearing Commissioners, 8 November 2023.

²⁷ Wildland Consultants Ltd. 2023. Review of Ecological Information in an Application for a Solar Farm, Balmoral Station, Mackenzie Basin. Contract Report No. 6385, Prepared for Mackenzie District Council. Expert evidence of Richard Andrew Ewans, Technical Advisor - Ecology for Director-General on an application by TKO Holdings for consent to subdivide and clear indigenous vegetation at Bendigo, Central Otago– dated 11.11.24 – DOC-7808646.

Does the proposed mitigation package provide for maintaining indigenous biodiversity?

75. Avoidance of effects is fundamental to the maintenance of indigenous biodiversity in New Zealand. Recent advice to the New Zealand government published in the scientific literature²⁸ states clearly that avoiding a number of effects is required to maintain biodiversity. These effects are relevant to this application, as they include:
- a. Temporary or permanent fragmentation, reduction in size, or degradation of the ecological integrity of: habitats used by Threatened or At Risk species, indigenous vegetation and ecosystem in drylands, and areas identified as ecologically significant under Section 6(c) RMA i.e., SNAs;
 - b. The loss of, or damage to, part of a connected sequence of indigenous vegetation across different ecosystems or landforms, including ecotones.
76. In order to assess the adequacy of mitigation, good baseline data is required. In this instance, the EclA mitigation package cannot be relied upon because the ecological values in the EclA are significantly underreported for Threatened and At Risk plant species. Accordingly, the adverse effects of the proposal are substantively underestimated. This omission cannot be addressed without comprehensive survey of the areas impacted by the proposal.
77. For example, Table 10-1 in the EclA states the magnitude of effect of the reduction in population of *Myosotis brevis* (Threatened), New Zealand mousetail and *Colobanthus brevisepalus* (both At Risk) as negligible, and does not account at all for the presence of several other populations of At Risk species. It also states that much of the development area does not provide suitable habitat for the 'spring annuals' *Myosotis brevis* (Threatened) and New Zealand mousetail, which is incorrect.
78. Therefore, there remain potentially large, unaddressed residual adverse effects and the proposal will result in a substantial net loss of drylands indigenous biodiversity.

²⁸ Table 1 in Walker S, Bellingham PJ, Kaine G, Richardson S, Greenhalgh S, Simcock R, Brown MA, Stephens T, Lee WG. 2021. What effects must be avoided, remedied or mitigated to maintain indigenous biodiversity?. New Zealand Journal of Ecology 45(2): 1-12.
Expert evidence of Richard Andrew Ewans, Technical Advisor - Ecology for Director-General on an application by TKO Holdings for consent to subdivide and clear indigenous vegetation at Bendigo, Central Otago- dated 11.11.24 – DOC-7808646.

79. As it stands, the mitigation package will still result in a net loss for indigenous drylands biodiversity, because it does not appropriately avoid effects, instead relying on a small amount of high-risk remediation and inappropriate offsetting to mitigate for the loss of indigenous cushionfield and the fragmentation and loss of drylands indigenous vegetation. I discuss these matters further below.
80. Stock exclusion and herbivore control are presented as positive effects of the proposal, and that without these interventions indigenous biodiversity values would continue to decline. This is overly simplistic in modified drylands habitats and in my opinion, incorrect for most of the Threatened and At Risk ecological values which are associated with open cushionfield vegetation. A certain amount of herbivory and disturbance is likely to benefit at least 'spring annuals' by reducing exotic grass competition and increasing available habitat.²⁹ Herbivory may slow recruitment and spread of kanuka but is unlikely to stop it entirely. Therefore, I do not agree that indigenous biodiversity values would continue to decline under the status quo due to herbivory from stock or feral animals. Removal of all herbivory may in fact be detrimental to indigenous biodiversity values.

Avoidance measures

81. The proposal does not avoid the most ecologically important areas which support multiple occurrences and populations of Threatened and At Risk plant species, some of which are regionally important, and collectively are part of a nationally important drylands ecological sequence of indigenous vegetation.
82. The activity is not locationally constrained, and a cursory inspection on a site visit by DOC identified other areas of the property that supported more modified and degraded indigenous vegetation than where the bulk of the development is proposed, and where such development would potentially be better suited in terms of maintaining indigenous biodiversity.

Remediation measures

83. Remediation measures are proposed to mitigate for effects for two of the At Risk plant species present, which were reportedly found in very low numbers in the EclA. This measure involves digging them up and putting them somewhere else, out of the development area.³⁰

²⁹ Rogers, 2002.

³⁰ I note this is not listed under remediation measures in the Statement of Evidence of Simon Beale. Expert evidence of Richard Andrew Ewans, Technical Advisor - Ecology for Director-General on an application by TKO Holdings for consent to subdivide and clear indigenous vegetation at Bendigo, Central Otago- dated 11.11.24 – DOC-7808646.

84. In my experience, it is generally agreed by ecologists that translocation of small, herbaceous Threatened and At Risk plants is risky with low survival rates.³¹ Therefore, in the event that consent is granted and conditions imposed for remediation, additional measures would need to be implemented, such as the provision of nursery-raised seedlings for translocation. It is unknown to what extent translocation would be required until comprehensive surveys for these species are carried out. If this is not 'practicable' or proves unsuccessful, then the loss of these individuals remains an unmitigated adverse effect. Careful documented monitoring of translocation is needed for several years to establish if it was successful or not. The EEMP does not address remediation, monitoring or contingencies.
85. Remediation of very low numbers of a couple of At Risk species may be practicable, if done properly. However, in my opinion it is not feasible to dig up the actual current known quantity of Threatened and At Risk plant species for translocation, nor embark on ex situ propagation for translocation, let alone undertake translocation of the true number of these plants, which has not yet been accounted for within the development area.

Offset measures

86. Offsetting is proposed to mitigate for the 'unavoidable' loss and fragmentation of c. 4 ha of indigenous cushionfield dominated by scabweed (an At Risk – Declining species) and c. 1.5 ha of indigenous kanuka shrubland supporting pygmy mistletoe (At Risk – Declining) by planting indigenous woody and forest species on Rocky Point and an adjacent property (Bendigo Hills).
87. Note that apart from pygmy mistletoe, offsetting is **not** proposed as mitigation for the loss of Threatened and At Risk plant species in the EclA, large populations of which are not accounted for in the offset model (because they have been missed), or elsewhere in the mitigation package.
88. Best practice offsetting is 'like for like', however the 'like for unlike' proposal here is justified on the grounds that indigenous cushionfield would be naturally replaced by indigenous shrubland and forest in the long-term, and this is anticipated by the offset model.
89. It is agreed that the long-term trend (50 - 100 years) at the development area and property is towards woody vegetation dominated by kanuka except on

³¹ There is very little documented evidence of successful translocations of dryland species despite it being regularly conditioned in RMA consents and other statutory processes. Expert evidence of Richard Andrew Ewans, Technical Advisor - Ecology for Director-General on an application by TKO Holdings for consent to subdivide and clear indigenous vegetation at Bendigo, Central Otago– dated 11.11.24 – DOC-7808646.

saline-sodic soils, assuming no human disturbance or intervention, or natural stochastic disturbance events. However, this does not mean offsetting using woody vegetation is an appropriate mitigation for the loss of indigenous cushionfield.

90. A generalised linear presumption of vegetation trajectory does not account for many site-specific scenarios such as fire, management to maintain cushionfield habitat of Threatened and At Risk species such as 'spring annuals', and fluctuations in sheep grazing and rabbit herbivory. Nor can it be presumed that all Threatened and At Risk plant species populations would not persist under more woody vegetation in this time frame. Fire would likely advantage the cushionfield habitat of most Threatened and At Risk plant species, as cushionfield would likely survive fire and expand with more open and bare ground post-fire.
91. Kanuka will increase over the next 50 years, but in my opinion, natural succession to a low forest will take more like 100 -200 years, and it would not be closed-canopy forest over the whole site. This means that a natural sequence would likely include a diverse mosaic of vegetation structures and compositions, with most current species remaining in the landscape, and result in an ecosystem quite different to that derived from a densely planted woody system like the offsetting proposal.
92. The assessment of significance under the Resource Management Act and associated planning instruments is undertaken in the present-day context. In my opinion it is problematic to then use future predictions to simulate equivalence and 'like for like' in offsetting. For example, many peat bog wetlands in Southland are dominated by low stature indigenous vegetation but fringed by invasive gorse (*Ulex europaeus*) which continues to invade. Would the RMA permit draining and destroying those wetlands because in 100 years gorse will dominate them if the wetland was offset by native forest plantings elsewhere?
93. I broadly agree with Mr Harding's offsetting review in regard to the offsetting proposal and do not provide detailed comments here. It is noted that his assessment predates knowledge of the underreporting of the populations of Threatened and At Risk plants. With updated knowledge on the extent of Threatened and At Risk plant species populations in the development area, the NPS-IB Appendix 3 'Principles for biodiversity offsetting' principle of irreplaceability would also not be met because the regionally important populations of Threatened and At Risk 'spring annuals' are irreplaceable.

94. In my experience, the proposed planting would more accurately be described as a form of compensation. To that extent, Appendix 4 of the NPS-IB: 'Principles of biodiversity compensation' are relevant. These are similar to those for offsetting and I note in particular, Principle 2 that explains when biodiversity compensation is not appropriate, i.e., when the indigenous biodiversity is irreplaceable or vulnerable, and Principle 5, i.e., that the compensation design avoids displacing harm to other indigenous biodiversity in the same or any other location. For the reasons expressed in my evidence, the proposed compensation does not meet these (and potentially, other) principles in Appendix 4 of the NPS-IB.
95. Offsetting is proposed to provide a like for like biodiversity gain off site to offset the loss of 1.5 ha of kanuka shrubland/scrub.
96. To stop ongoing cumulative biodiversity loss and maintain biodiversity, effects can only be remediated for some recently established, usually low diversity indigenous ecosystems and habitats over time frames less than 25 years.³²
97. In my opinion, in the context of this application, the removal of young kanuka could be offset by revegetation plantings. However, the loss of an At Risk plant species associated with that community (e.g., pygmy mistletoe) cannot and so constitutes an irreversible loss of indigenous biodiversity.
98. The offset plantings in Table 11-1 of the EclA are described as 'high value'. This categorisation is subjective and the reality is that the offset *replaces* an ecosystem clearly vulnerable to development, dominated by an At Risk plant species and supporting multiple occurrences and populations of Threatened and At Risk plant species, *with* a structurally and compositionally different shrubland, dominated by common species with a small minority of five At Risk shrub species.
99. Proposed planting sites have almost certainly not been adequately surveyed for their current ecological values, based on the quality of survey elsewhere in the EclA. Enrichment plantings are proposed on Rocky Point, and similar ecological values to those described for Rocky Point exist on the adjacent Bendigo Hills property where the offset planting sites are proposed (see Appendix 3, 7 and 8). I have not inspected the offset planting or enrichment planting sites, but it is clear from the short DOC survey done on 3 November 2023 that Threatened and At Risk dryland species are present nearby planting sites, and I would

³² Walker et al., 2021. p1.

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expect some to be present within the offset planting and enrichment planting areas.

100. This issue is further evidenced by the presence of both 'spring annual' species found on Rocky Point next to the public Mt Koina walking track in what appears to be the offset planting site Hemlock Gully. This is an ephemeral seepage area, which despite the dominance of hemlock, can also be suitable habitat for 'spring annuals'.³³ The ephemeral seepage is likely to meet the definition of either an ephemeral wetland or seepage and flush, both naturally uncommon ecosystems.
101. As I understand it, offset and enrichment planting sites are within the Conservation Covenant and the applicant is required to get DOC agreement to plant within the covenant. Such agreement has not been sought and is subject to a separate statutory process. As such, it may be inappropriate or premature to count the proposed offset plantings as part of the mitigation package.

Conditions

102. No comment on consent conditions is provided here because the ecological information underpinning draft consent conditions is too incomplete to be able to build appropriate conditions from.

Conclusion

103. In my opinion the application lacks critical ecological information on the presence and abundance of Threatened and At Risk plant species and does not adequately address the ecological impacts from the proposal. This fatally undermines the mitigation package and offset model that underpins it.
104. The development area and most areas on the wider property are clearly SNAs with outstanding drylands ecological values, including Threatened and At Risk plant species. The development areas support multiple populations and occurrences of at least 1 Threatened and 8 At Risk plant species, some of which are regionally important populations of 'spring annuals', and collectively, nationally important. The loss of these regionally and nationally significant values should be avoided in order to maintain the significant indigenous biodiversity in the district, wider Otago region and New Zealand.

³³ See second photograph in Appendix 2 and Paragraph B.i.d of Submission of Kate Wardle to RC 230179 TKO Properties Ltd application for Subdivision and Development at Lakefront Terrace, Bendigo, Pocky Point. Expert evidence of Richard Andrew Ewans, Technical Advisor - Ecology for Director-General on an application by TKO Holdings for consent to subdivide and clear indigenous vegetation at Bendigo, Central Otago- dated 11.11.24 – DOC-7808646.

105. Even if the incomplete assessment of values in the EclA is used as a basis for evaluation, the proposal still leads to residual adverse effects being more than minor and a net loss of indigenous biodiversity because:
- a. Not all adverse effects have been accounted for e.g., wastewater disposal fields, edge effects, and the collective impact of the adverse effects is underestimated.
 - b. Remediation using translocation of in situ sourced or ex situ raised At Risk dryland plant species is risky and likely to fail, and no back up plan is evident.
 - c. Offsetting / compensation erroneously replaces indigenous cushionfield dominated by an At Risk species with indigenous shrubland dominated by common species; and offset and enrichment planting sites may support Threatened and At Risk plant species that would be displaced by plantings.
106. There are some proposed lots outside the conservation covenant that could possibly be supported for development. These lots support less intact and/or more modified cushionfield or exotic vegetation but they have not been adequately surveyed and an appropriate mitigation package cannot be evaluated. They may also contain saline-sodic soils and ecosystems. However, should the higher value areas on the property be protected and Threatened and At Risk plants avoided, a reworked proposal may be acceptable.

Richard Ewans

Richard Andrew Ewans

DATED this 11 day of November 2024

Appendix 1 – Summary and images of ‘spring annuals’ from Department of Conservation site visits to Rocky Point subdivision on 3 November 2023 and 14 October 2024.

3 November 2023

This site visit to the conservation covenant only was undertaken between 9:30 am and 4 pm by the following people:

- Richard Ewans – DOC Technical Advisor Ecology, Flora & Ecosystems Team
- Dr Geoff Rogers – Specialist Central Otago consultant botanist and landscape ecologist
- Nicola Holmes – DOC Operations Manager, Central Otago
- Kathryn Longstaff – DOC Senior Ranger Biodiversity, Central Otago

The focus of all parties was necessarily on finding spring annuals if present, which at that time had not been recorded by the original EclA³⁴, a full plant species inventory or ecological assessment was untenable due to time constraints.

The covenant was accessed directly from State Highway 8 (SH8). The vegetation in the vicinity of proposed Rocky Point subdivision lots 1-7 within the conservation covenant was inspected closely between 10:30am and 12:15pm. Nicola and Kathryn then exited the covenant directly to SH8. Between 12:45 and 4pm, Richard and Geoff further inspected the covenant on Lot 1 DP561457 (Rocky Point), then on Lot 2 DP561457 (Bendigo Hills Estate) before exiting via the public access Mt Koina track. Notes, photographs and GPS waypoints were taken to document the site visit.

14 October 2024

This site visit to the whole site was undertaken with a representative of the applicant between 12 pm and 5 pm by the following people:

- Richard Ewans – DOC Technical Advisor Ecology, Flora & Ecosystems Team
- Matt Schmidt – DOC Senior Heritage Advisor, Heritage Advice Team
- Jenna Sinclair – DOC Senior Ranger Community, Otago

³⁴ Beale Consultants. 2023. Bendigo Hills Estate and Rocky Point Subdivisions Terrestrial Ecology Impact Assessment. Prepared for TKO Properties Ltd.
Expert evidence of Richard Andrew Ewans, Technical Advisor - Ecology for Director-General on an application by TKO Holdings for consent to subdivide and clear indigenous vegetation at Bendigo, Central Otago– dated 11.11.24 – DOC-7808646.

- Liz Williams – RMA Planner, RM Regulatory Delivery Team

My focus was on visiting each lot site in the revised layout to briefly describe the vegetation and search for Threatened and At Risk plants in the vicinity of impact areas. The lots were not clearly marked on the ground, but focus was around the lot signs and landscape poles. A full plant species inventory or ecological assessment was untenable due to time constraints, as was assessment at the offset and enrichment planting sites. All lots except Lots 27-30 were briefly visited and surveyed. Notes, photographs and GPS waypoints were taken to document the site visit.

Photos

Photos were taken of the main habitat types and for most occurrences of 'spring annuals', which are associated with a GPS waypoint.



Figure 1 - *Myosotis brevis* at proposed Lot 7 (3 November 2023).



Figure 2 - New Zealand mousetail at proposed Lot 7 (3 November 2023).



Figure 3 – Relatively good condition scabweed vegetation community at proposed Lot 7 (14 October 2024).



Figure 4 – Relatively good condition scabweed vegetation community at proposed Lot 15 (14 October 2024).



Figure 5 – Myosotis brevis at or nearby proposed Lot 15 (14 October 2024).



Figure 6 - New Zealand mousetail habitat at proposed Lot 21 (14 October 2024).



Figure 7 – Mass of New Zealand mousetail at proposed Lot 21 (14 October 2024).



Figure 8 – *Myosotis brevis* at proposed Lot 19 (14 October 2024).



Figure 9 – Modified scabweed community invaded by stonecrop* (brighter green) at proposed Lot 23 (14 October 2024).



Figure 10 – Degraded scabweed community invaded by stonecrop* (brighter green) at proposed Lot 26 (14 October 2024).



Figure 11 - New Zealand mousetail and Myosotis brevis on Bendigo Hills property (3 November 2023).

Appendix 2 – Table of Threatened and At Risk plant species found in Bendigo Conservation Covenant on Rocky Point and Bendigo Hills or in similar lowland dryland Central Otago environments.

Species	Threat status	Source	Notes
<i>Ceratocephala pungens</i>	Threatened - Nationally Critical	Possible – in similar habitat. Known from elsewhere on covenant.	Cushionfield
<i>Puccinellia raroflorens</i>	Threatened - Nationally Critical	Possible – in saline habitat	Saline areas
<i>Crassula multicaulis</i>	Threatened - Nationally Endangered	Possible – in similar habitat	Seasonally damp ground
<i>Atriplex buchananii</i>	Threatened - Nationally Vulnerable	Possible – in saline habitat	Saline areas
<i>Carex inopinata</i>	Threatened - Nationally Vulnerable	Possible – Bendigo Scenic Reserve species list	Base of rocky overhangs
<i>Myosotis brevis</i>	Threatened - Nationally Vulnerable	Known – DOC site visits	Scattered in cushionfield, edge of saline
<i>Acaena buchananii</i>	At Risk - Declining	Possible – Bendigo Scenic Reserve species list	Grassland
<i>Asplenium subglandulosum</i>	At Risk - Declining	Known – DOC Bioweb database	Rocky overhangs
<i>Carex parvispica</i>	At Risk - Declining	Possible – Bendigo Scenic Reserve species list	Base of tors/rocky overhangs
<i>Colobanthus brevisepalus</i>	At Risk - Declining	Known – EcIA	Cushionfield
<i>Connorochloa tenuis</i>	At Risk - Declining	Known – DOC site visit	Under kanuka
<i>Epilobium angustum</i>	At Risk - Declining	Known – DOC site visits	Turfs and periodically wet stony ground
<i>Korthosella salicornioides</i>	At Risk - Declining	Known - EcIA	On kanuka
<i>Leptinella serrulata</i>	At Risk - Declining	Possible – in similar habitat	Cushionfield

Species	Threat status	Source	Notes
<i>Myosurus minimus</i> subsp. <i>novae-zelandiae</i>	At Risk - Declining	Known – DOC site visits	Mt Koinga track, saline soils, seepages, cushionfield, under kanuka
<i>Olearia lineata</i>	At Risk - Declining	Known - EclA	Shrubland
<i>Olearia odorata</i>	At Risk - Declining	Known - EclA	Shrubland
<i>Poa maniototo</i>	At Risk - Declining	Known – DOC site visits	Cushionfield
<i>Raoulia australis</i>	At Risk - Declining	Known - EclA	Cushionfield (dominant)
<i>Raoulia beauverdii</i>	At Risk - Declining	Known – DOC site visits	Cushionfield
<i>Raoulia monroi</i>	At Risk - Declining	Possible – in similar habitat	Cushionfield
<i>Rytidosperma thomsonii</i>	At Risk - Declining	Possible – Bendigo Scenic Reserve species list	Grassland
<i>Xanthoparmelia semiviridis</i>	At Risk - Declining	Known – DOC site visits	Cushionfield, gaps in kanuka woodland
<i>Crassula mataikona</i>	At Risk – Naturally Uncommon	Known – DOC site visit	Cushionfield, under kanuka
<i>Veronica pimeleoides</i> subsp. <i>faucicola</i>	At Risk – Naturally Uncommon	Possible – in similar habitat	Rocky herbfield
<i>Convolvulus waitaha</i>	Locally uncommon	Known – DOC site visit	Cushionfield
<i>Sophora microphylla</i>	Locally uncommon	Known - EclA	Shrubland

Appendix 3 – Table of Threatened and At Risk plant species found at the property, development area, or Bendigo Hills property recorded on site visits 3 November 2023 and 14 October 2024

Note – Regionally significant populations highlighted in grey.

[Threat Status] T-NV = Threatened – Nationally Vulnerable, AR-D = At Risk – Declining, AR-NU = At Risk – Naturally Uncommon, LU = Locally Uncommon.

(abundance) p = present, o = occasional, c = common.

Date	Map number	Property	Rocky Point Lot (updated design)	Covenant	Threatened and/or At Risk plants present
3/11/2023	1	Rocky Point	Road	Inside	<ul style="list-style-type: none"> • <i>Myosotis brevis</i> [T-NV] (1) • <i>Myosurus minimus</i> subsp. <i>novae-zelandiae</i> [AR-D] (1) • <i>Crassula mataikona</i> AR-NU] (p) • <i>Xanthoparmelia semiviridis</i> [AR-D] (p) • scabweed [AR-D] (c)
3/11/2023	2	Rocky Point	Lot 7	Inside	<ul style="list-style-type: none"> • <i>Myosotis brevis</i> [T-NV] (1, common to occasional in surrounding 50 sq m) • scabweed [AR-D] (c)
3/11/2023	3	Rocky Point	Lot 7	Inside	<ul style="list-style-type: none"> • <i>Myosotis brevis</i> [T-NV] (widespread in surrounding area) • <i>Myosurus minimus</i> subsp. <i>novae-zelandiae</i> [AR-D] (1) • scabweed [AR-D] (c)
3/11/2023	None	Rocky Point	Lots 1 to 7	Inside	<ul style="list-style-type: none"> • <i>Poa maniototo</i> [AR-D] (p) • <i>Raoulia beaverdii</i> [AR-D] (p)
14/10/2024	4	Rocky Point	Road	Outside	<ul style="list-style-type: none"> • <i>Colobanthus brevisepalus</i> [AR-D] (p) • scabweed [AR-D] (c)
14/10/2024	5	Rocky Point	Lot 7	Inside	<ul style="list-style-type: none"> • <i>Myosotis brevis</i> [T-NV] (300-500 around kanuka shrub and surrounds, regionally significant population)
14/10/2024	6	Rocky Point	Lot 25	Outside	<ul style="list-style-type: none"> • <i>Colobanthus brevisepalus</i> [AR-D] (p)

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Date	Map number	Property	Rocky Point Lot (updated design)	Covenant	Threatened and/or At Risk plants present
					<ul style="list-style-type: none"> • scabweed [AR-D] (c)
14/10/2024	7	Rocky Point	Road, Lot 23	Outside	<ul style="list-style-type: none"> • scabweed [AR-D] (c)
14/10/2024	8	Rocky Point	Lot 8	Outside	<ul style="list-style-type: none"> • <i>Colobanthus brevisepalus</i> [AR-D] (p) • scabweed [AR-D] (c)
14/10/2024	9	Rocky Point	Lot 8 or 9	Outside	<ul style="list-style-type: none"> • <i>Myosotis brevis</i> [T-NV] (50-100 around kanuka shrub) • scabweed [AR-D] (c)
14/10/2024	10	Rocky Point	Lot 9	Outside	<ul style="list-style-type: none"> • <i>Xanthoparmelia semiviridis</i> [AR-D] (p) • <i>Poa maniototo</i> [AR-D] (p) • scabweed [AR-D] (c)
14/10/2024	11	Rocky Point	Lot 7	Inside	<ul style="list-style-type: none"> • <i>Colobanthus brevisepalus</i> [AR-D] (o) • scabweed [AR-D] (c)
14/10/2024	12	Rocky Point	Lot 12	Inside	<ul style="list-style-type: none"> • <i>Colobanthus brevisepalus</i> [AR-D] (p) • scabweed [AR-D] (c)
14/10/2024	13	Rocky Point	Lot 13 or 14	Outside	<ul style="list-style-type: none"> • <i>Myosotis brevis</i> [T-NV] (10) • scabweed [AR-D] (c)
14/10/2024	14	Rocky Point	Lot 14	Outside	<ul style="list-style-type: none"> • <i>Myosotis brevis</i> [T-NV] (p) • scabweed [AR-D] (c)
14/10/2024	15	Rocky Point	Road, Lot 15	Outside	<ul style="list-style-type: none"> • <i>Poa maniototo</i> [AR-D] (p) • <i>Colobanthus brevisepalus</i> [AR-D] (o) • scabweed [AR-D] (c)
14/10/2024	16	Rocky Point	Lot 21	Outside	<ul style="list-style-type: none"> • <i>Myosurus minimus</i> subsp. <i>novae-zelandiae</i> [AR-D] (1000+, regionally significant population)
14/10/2024	17	Rocky Point	Lot 20	Inside	<ul style="list-style-type: none"> • <i>Myosurus minimus</i> subsp. <i>novae-zelandiae</i> [AR-D] (100-500, regionally significant population in wider area)
14/10/2024	18	Rocky Point	Lot 19	Inside	<ul style="list-style-type: none"> • <i>Myosotis brevis</i> [T-NV] (10+) • <i>Crassula mataikona</i> [AR-NU] (p) • scabweed [AR-D] (c)

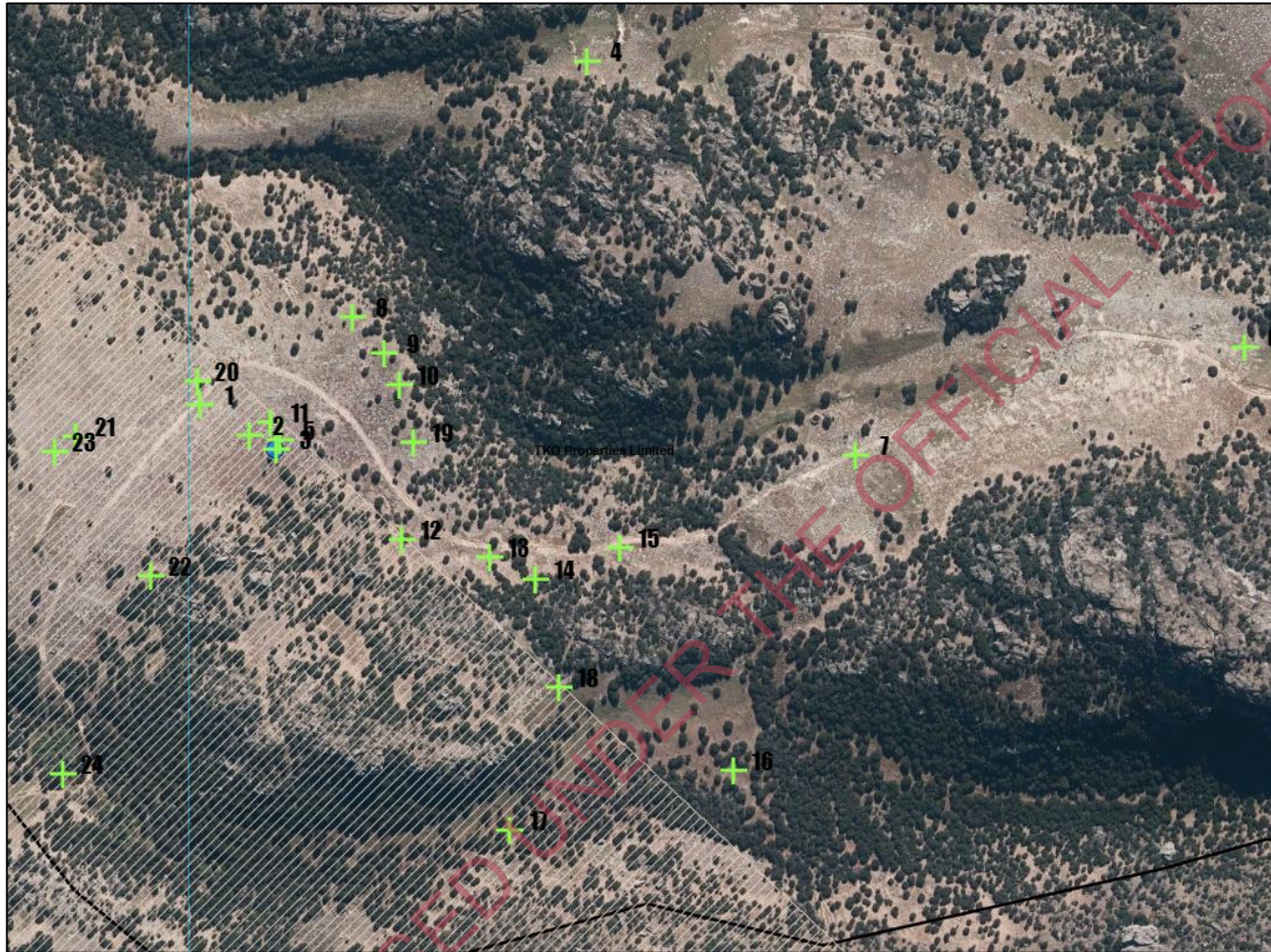
Date	Map number	Property	Rocky Point Lot (updated design)	Covenant	Threatened and/or At Risk plants present
14/10/2024	19	Rocky Point	Lot 9	Outside	<ul style="list-style-type: none"> • <i>Colobanthus brevisepalus</i> [AR-D] (o) • scabweed [AR-D] (c)
14/10/2024	20	Rocky Point	Lot 1	Inside	<ul style="list-style-type: none"> • <i>Colobanthus brevisepalus</i> [AR-D] (o) • scabweed [AR-D] (c)
14/10/2024	21	Rocky Point	Lot 2	Inside	<ul style="list-style-type: none"> • <i>Myosotis brevis</i> [T-NV] (p) • scabweed [AR-D] (c)
14/10/2024	22	Rocky Point	Lot 5	Inside	<ul style="list-style-type: none"> • <i>Myosotis brevis</i> [T-NV] (20+ around kanuka shrub)
14/10/2024	23	Rocky Point	Lot 2	Inside	<ul style="list-style-type: none"> • <i>Colobanthus brevisepalus</i> [AR-D] (o) • scabweed [AR-D] (c)
3/11/2023	24	Bendigo Hills	n/a	Inside	<ul style="list-style-type: none"> • <i>Olearia lineata</i> [AR-D] (p)
3/11/2023	25	Bendigo Hills	n/a	Inside	<ul style="list-style-type: none"> • <i>Myosurus minimus</i> subsp. <i>novae-zelandiae</i> [AR-D] (p)
3/11/2023	26	Bendigo Hills	n/a	Inside	<ul style="list-style-type: none"> • <i>Myosurus minimus</i> subsp. <i>novae-zelandiae</i> [AR-D] (p) • scabweed [AR-D] (c)
3/11/2023	27	Bendigo Hills	n/a	Inside	<ul style="list-style-type: none"> • scabweed [AR-D] (c) • <i>Convolvulus waitaha</i> (LU) (p)
3/11/2023	28	Bendigo Hills	n/a	Inside	<ul style="list-style-type: none"> • <i>Myosotis brevis</i> [T-NV] (10+) • <i>Myosurus minimus</i> subsp. <i>novae-zelandiae</i> [AR-D] (1000+, regionally significant population)
3/11/2023	29	Bendigo Hills	n/a	Inside	<ul style="list-style-type: none"> • <i>Crassula mataikona</i> [AR-NU] (p)
3/11/2023	30	Bendigo Hills	n/a	Inside	<ul style="list-style-type: none"> • <i>Myosurus minimus</i> subsp. <i>novae-zelandiae</i> [AR-D] (p)
3/11/2023	31	Bendigo Hills	n/a	Inside	<ul style="list-style-type: none"> • <i>Raoulia beaverdii</i> [AR-D] (p) • scabweed [AR-D] (c)
3/11/2023	32	Bendigo Hills	n/a	Inside	<ul style="list-style-type: none"> • <i>Myosurus minimus</i> subsp. <i>novae-zelandiae</i> [AR-D] (p) • <i>Epilobium angustum</i> [AR-D] (p) • scabweed [AR-D] (c)
3/11/2023	33	Bendigo Hills	n/a	Inside	<ul style="list-style-type: none"> • <i>Myosotis brevis</i> [T-NV] (p)

Expert evidence of Richard Andrew Ewans, Technical Advisor - Ecology for Director-General on an application by TKO Holdings for consent to subdivide and clear indigenous vegetation at Bendigo, Central Otago- dated 11.11.24 – DOC-7808646.

Date	Map number	Property	Rocky Point Lot (updated design)	Covenant	Threatened and/or At Risk plants present
					<ul style="list-style-type: none"> • <i>Myosurus minimus</i> subsp. <i>novae-zelandiae</i> [AR-D] (p) • <i>Raoulia beaverdii</i> [AR-D] (p) • scabweed [AR-D] (c)

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Appendix 4 – Map of Threatened and At Risk plant locations recorded on site visits at Rocky Point 3 November 2023 and 14 October 2024.



Note - Covenant in white hatching.

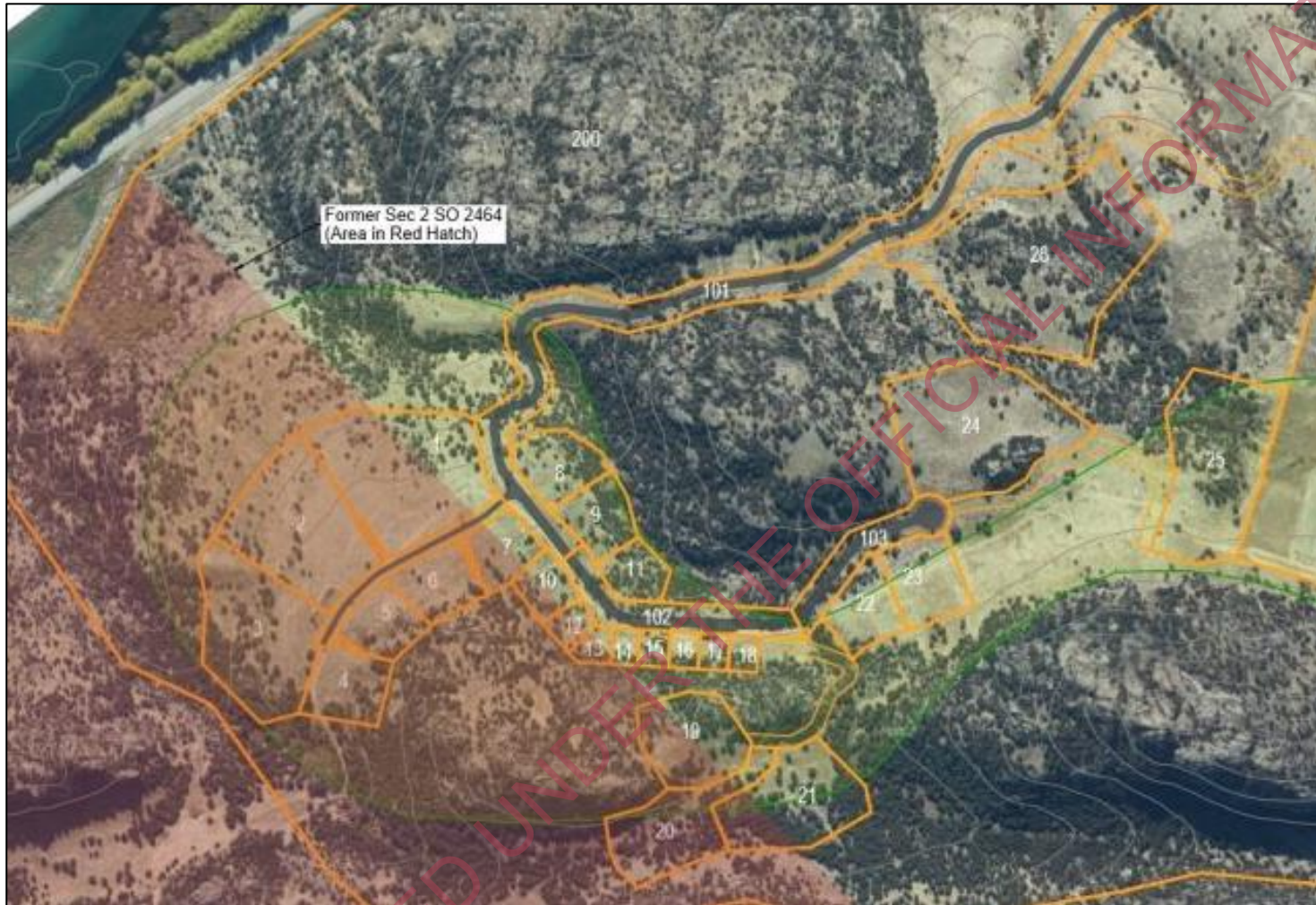
Appendix 5 – Map of subdivision lots and indigenous vegetation clearance areas in area of site visits 3 November 2023 and 14 October 2024.



Note - Hatching shows indigenous vegetation clearance areas. Dots show locations of 3 species of At Risk plants recorded by EclA. Image clipped from application further site survey and ecological mapping dated 8 July 2024.

Expert evidence of Richard Andrew Ewans, Technical Advisor - Ecology for Director-General on an application by TKO Holdings for consent to subdivide and clear indigenous vegetation at Bendigo, Central Otago– dated 11.11.24 – DOC-7808646.

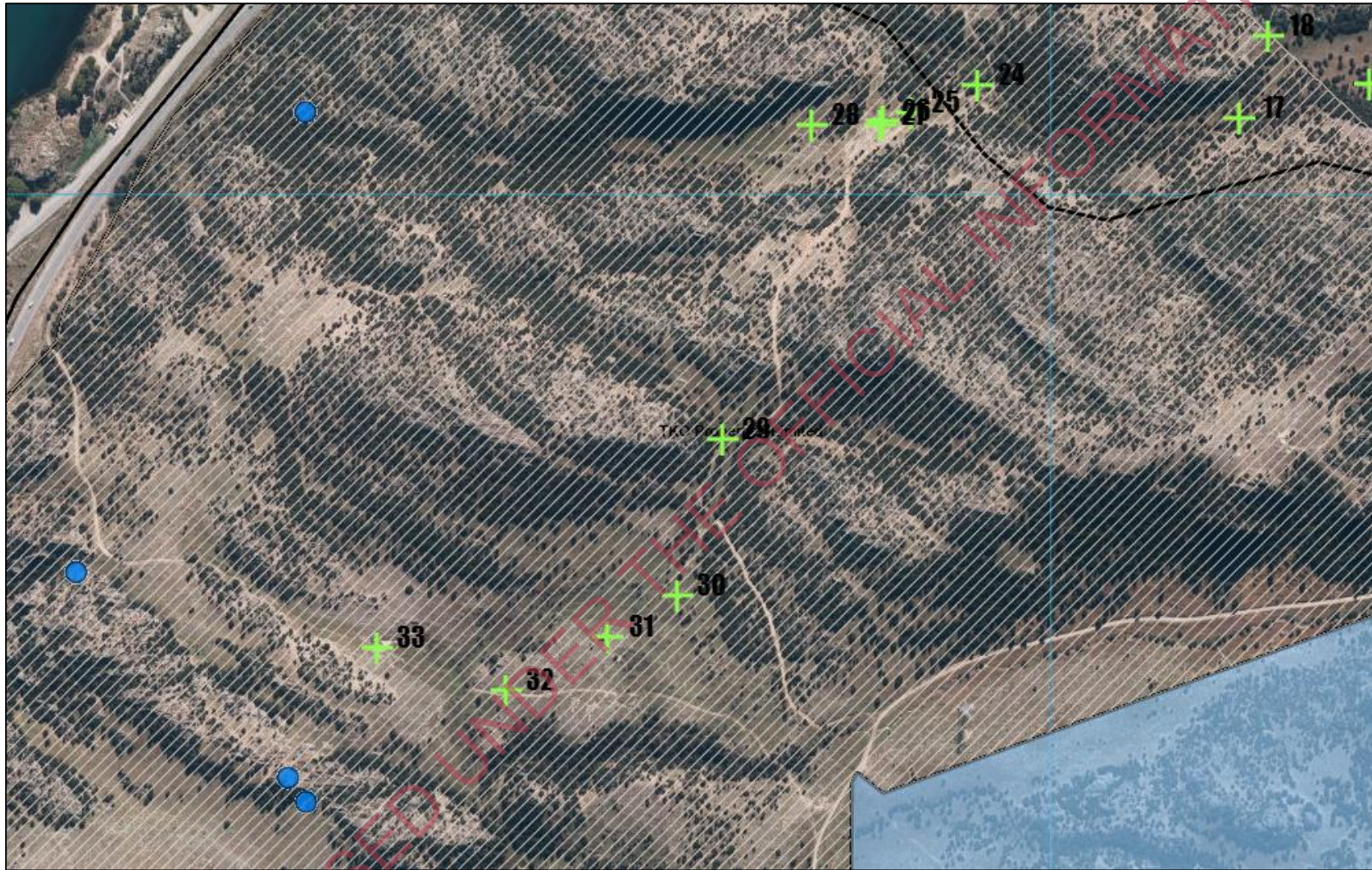
Appendix 6 – Map of subdivision lot layout in area of site visits 3 November 2023 and 14 October 2024.



Note - Covenant in red shading. Image clipped from application updated scheme plan dated June 2024.

Expert evidence of Richard Andrew Ewans, Technical Advisor - Ecology for Director-General on an application by TKO Holdings for consent to subdivide and clear indigenous vegetation at Bendigo, Central Otago— dated 11.11.24 – DOC-7808646.

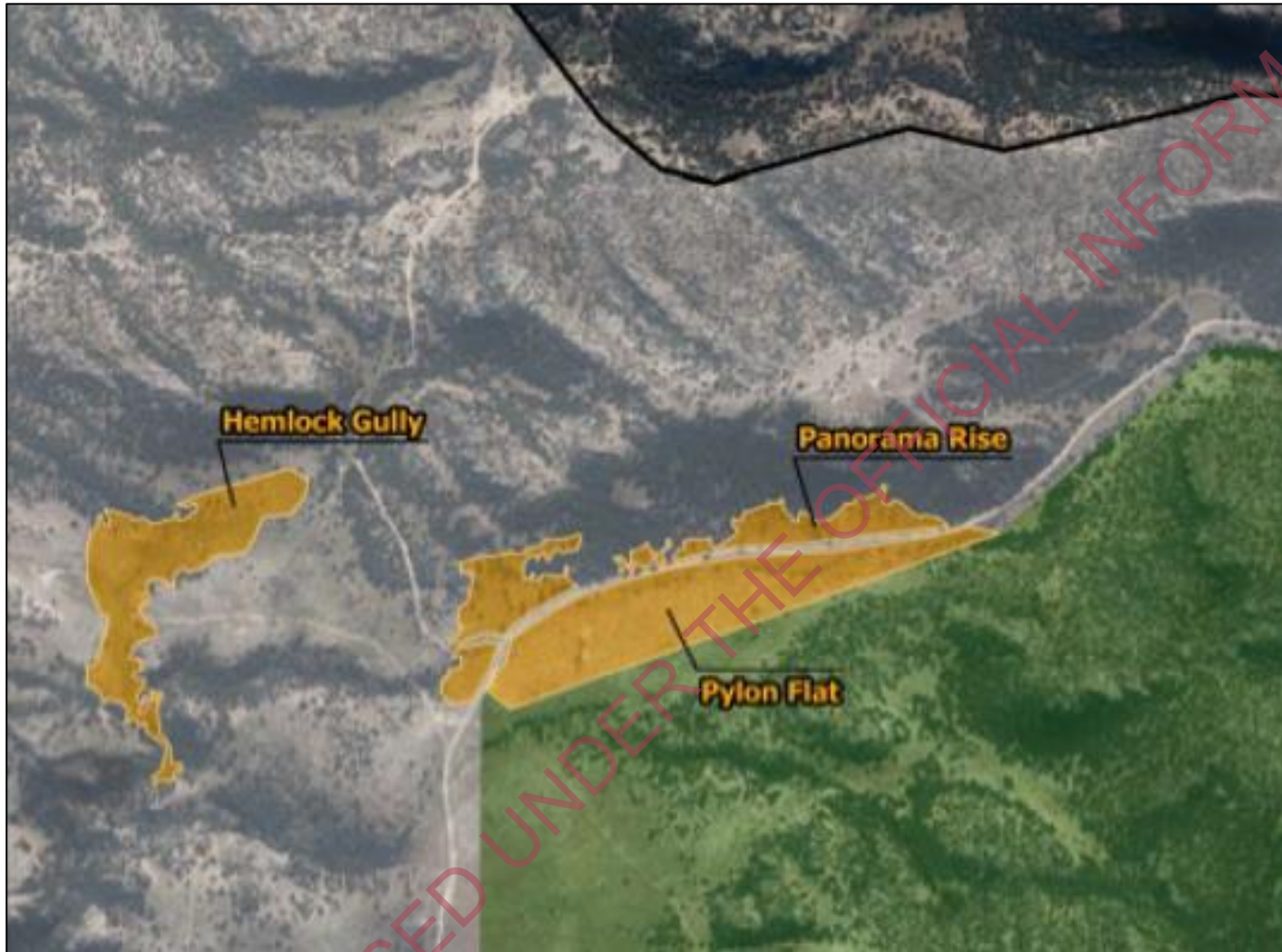
Appendix 7 – Map of Threatened and At Risk plant locations recorded on Bendigo Hills during site visit 3 November 2023.



Note - Covenant in white hatching. Blue dots are DOC threatened plant database (Bioweb) records.

Expert evidence of Richard Andrew Ewans, Technical Advisor - Ecology for Director-General on an application by TKO Holdings for consent to subdivide and clear indigenous vegetation at Bendigo, Central Otago– dated 11.11.24 – DOC-7808646.

Appendix 8 – Map of proposed offset sites on Bendigo Hills.



Note - Offset sites in orange. Image clipped from application EEMP.

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