SUBDIVISION APPLICATION RC 230179
BENDIGO LOOP ROAD
CENTRAL OTAGO DISTRICT

REVIEW OF PROPOSED
BIODIVERSITY OFFSETTING

Report prepared for

Central Otago District Council

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September 2024

Contents

1.0 Introduction

In March 2024 I reviewed the biodiversity offsetting/compensation proposed for an application to subdivide land at the corner of State Highway 8 and Bendigo Loop Road (RC 230179).[1] Since that time the applicant has submitted a revised proposal. This September 2024 report reviews that revised proposal, as requested by Adam Vincent, Planning Officer, Central Otago District Council.

2.0 Scope and Method

The specific questions I was asked to consider in the March 2024 review were:

1. Does the application contain sufficient information?
2. Will the measures proposed in the adaptive land management regime be sufficient to fulfil its intended purpose?
3. Will the offsetting and compensation measures proposed in the adaptive land management regime likely be sufficient to achieve no net loss in biodiversity?
4. Are the proposed offset and compensation areas sufficiently proximate and equivalent that offsetting and compensation in these areas is useful to offset the effects on the application site?

This September report considers the additional information provided by the applicant, principally Appendix H[2] (hereafter called the **EIA**). It is a review of the biodiversity offset proposal, consistent with the scope (above). It does not review in detail other ecological matters, such as the ecological significance of the project area. This report is the outcome of a desk-top review undertaken over three days in September 2024.

This report is confined to my area of expertise – terrestrial ecology – and benefits from more than 30 years' experience of survey, research, and assessment of eastern South Island dryland ecosystems.

3.0 The Biodiversity Offset Proposal

The documents reviewed in March 2024 contained a "biodiversity compensation proposal".[3] There is no reference to a compensation proposal in the EIA; instead, it describes a "proposed biodiversity offset" (p33-44).[4]

[1] Review of Proposed Biodiversity Offsetting/Compensation, Unpublished Report to Central Otago District Council, Mike Harding, March 2024. 12p.
[2] Rocky Point Subdivision Terrestrial Ecology Impact Assessment, prepared for TKO Properties Limited by Beale Associates, July 2024. 168p.
[3] Adaptive Land Management Regime for Rocky Point Compensation Sites, Beale Associates, February 2024.
[4] Page numbers (in brackets) are those in the EIA.

The proposed biodiversity offset is "…planting of forest and shrub species that includes high value plant species representing the pre-settlement climax communities at Rocky Point…" (p34) at three sites in the adjacent Bendigo Hills Estate, (Hemlock Gully, Panorama Rise and Pylon Flat). The three offset areas lie just south of and on a similar landform to that at the application area (hereafter called the **project area**).

The plantings are intended to offset the loss of kanuka shrubland and cushionfield through establishment of forest and shrubland. The biodiversity offset proposal is based on "…potential ecosystem mapping which shows woody vegetation would have dominated the site, except on steep terrace risers and saline/sodic soils" (p34). The plantings are not intended to create cushionfield. The offset model anticipates the eventual replacement of most cushionfield with indigenous woodland through natural succession of woody species at the project area (35).

The EIA assesses the proposed biodiversity offset against the principles set out in the National Policy Statement for Indigenous Biodiversity 2023 (NPS-IB) and describes the positive effects of the proposal. The proposed biodiversity offset is reviewed in section 6 of this report.

4.0 Information Requirements

My earlier (March 2024) review concluded that the application contained insufficient information for the assessment of effects on indigenous biodiversity and that the surveys upon which the earlier proposal was based were inadequate. The EIA describes and presents a considerable amount of additional data, arising from further survey work. The EIA states that the survey effort now totals 152 person hours over ten site visits (p3).

The data are far more comprehensive than those provided earlier, enabling a more robust assessment of the potential ecological effects of the activity. Data that are incomplete, or not clearly presented in the EIA, are discussed below.

4.1 Plant Species Data

The locations of the transects upon which the RECCE plots were located are illustrated in Figure 1.2 of the EIA. The number of plots is not stated, though the data presented in Appendix 2 of the EIA indicate that there were 30 plots within the project area and seven plots at the proposed offset areas.

The EIA states that a summary of the RECCE plot data is presented in Appendix 2. Appendix 2 does not list the species recorded – nor their percentage cover – in the RECCE plots, as required by the RECCE plot method.[5] Instead, the data are the percentage covers of vegetation types (e.g., exotic herb cover) and of three of the species (*Raoulia australis*, kanuka and *Colobanthus brevisepalus*).

Plant species recorded at the RECCE plots do not appear to be included in Appendix 1 (Plant Species List), which is described as "by no means exhaustive and identifies the more common plants encountered". Neither do the "vegetation community" descriptions in the EIA (p10-16)

[5] Hurst, J.M.; Allen, R.B. 2007. The Recce Method for describing New Zealand vegetation – Field Protocols. Landcare Research-Manaaki Whenua, Lincoln, New Zealand.

appear to list all plant species. For example, the description for 'kanuka shrubland/scrub' lists only one species (kanuka), even though dwarf mistletoe (*Korthalsella salicornioides*) is known to be present.

Further, the RECCE plot survey data are likely limited by the small plot size (4m^2) in cushionfield communities. RECCE plots in non-woody plant communities are typically 10m^2 or a variable area that is large enough to contain most of the species that occur in the plant community.[6] Smaller plots have been found to significantly underestimate indigenous species richness and dominance at non-woody vegetation sampling sites.[7]

The EIA states that the RECCE plot and walkover surveys did not record the spring annual species New Zealand mousetail (*Myosurus minimus* subsp. *novae-zelandiae*) or *Myosotis brevis* within the project area (p17). New Zealand mousetail is small, ephemeral and easily overlooked. The plants are only evident above ground for a relatively short period of time (2-3 months)[8] and its presence and abundance vary year to year, depending on factors such as moisture and temperature. The project area contains suitable habitat for this species.[9] Lack of detection over one season is not a reliable indication of the absence of spring annual species from the project area.

In summary, it is unclear whether all plant species were recorded in the RECCE plot surveys, whether the cushionfield plot size was sufficient to adequately describe that vegetation type, and whether the surveys can reliably confirm the absence of threatened spring annual species. Ideally, all parts of the project area directly affected by the proposed development should be thoroughly surveyed – not just sampled – over more than one spring-summer season.

4.2 Invertebrate Species Data

Invertebrate data presented in the EIA are derived from a desktop assessment of species' records. No on-site survey of invertebrates is described.

The "permanent effects" of habitat fragmentation at the project area are described in Appendix 4 of the EIA as "Habitat fragmentation will result in further isolation of populations that are already limited in their ability to move between patches of habitat in different areas. Edge effects will also become an issue, particularly in the kānuka scrub, as the edges of habitat have different properties from the interior."[10]

A desktop survey is insufficient for assessment of the effects of an activity at a location where vulnerable ('at risk') invertebrate species have a high "likelihood of being on-site" and where the potential effects of the activity may be permanent (i.e., "for at least 35 years").[11]

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[6] Hurst, J.M.; Allen, R.B.; Fergus, A.J. 2022. The Recce Method for describing New Zealand vegetation – expanded manual, Version 5. Landcare Research-Manaaki Whenua, Lincoln, New Zealand.

[7] Walker, S.; Comrie, J.; Head, N; Ladley, K.J.; Clarke, D.; Monks, A. 2016. Sampling method and sample size affect diversity and indigenous dominance estimates in a mixed grassland community. *NZ Journal of Ecology 40*: 150-159.

[8] Ogle, C.C. Mouse-tail (*Myosurus novae-zelandiae*), a declining species? *Wellington Botanical Society Journal* 1985: 57-61.

[9] de Lange, P.; Heenan, P.; Norton, D.; Rolfe, J.; Sawyer, J. 2010. *Threatened Plants of New Zealand.* Canterbury University Press. 471p.

[10] Terrestrial invertebrate desktop assessment of a proposed subdivision at Rocky Point, Central Otago. Vikki Smith, Wildlands (Ref. 7080c), p.3. (EIA Appendix 4)

[11] ibid, p2-3.

4.3 Land Environments Data

The EIA presents Threatened Environments Classification (TEC) data showing that the project area lies within two Level IV land environments (N4.1e & N8.1b)[12] within which indigenous vegetation is depleted to 23.7% and 5.2% (respectively) of its former extent nationally (p8).

The TEC analysis is based on 2012 data.[13] There has been considerable loss of indigenous vegetation within those land environments in Central Otago since 2012, notably through land-use change to high-producing grassland (pasture) and built-up area (settlement).[14] Indigenous vegetation is now likely to be depleted to less than 20% of its former extent in the N4.1e Land Environment (i.e., 'chronically threatened') and be further reduced in the N8.1b Land Environment (i.e., still 'acutely threatened').

Further, the TEC data should be used with caution, especially at this scale. The mapped Land Cover Database (LCDB) polygons upon which the TEC is based are determined by remote sensing; they are not field checked. Closer analyses of mapped polygons have revealed errors in the identity of cover classes, and inaccuracies in polygon boundaries.[15] The grassland and shrubland cover classes are especially unreliable in the eastern South Island.[16]

4.4 Vegetation Classification

The EIA description of potential vegetation in the project area is from "research undertaken by Wildlands and analysis of mapping of "potential terrestrial ecosystem", (i.e. those ecosystems that would have occurred in Otago prior to human settlement)" (p8), as presented in Appendix 6 of the EIA.[17] The terrestrial ecosystem classification upon which the Wildlands analysis is based depicts indigenous vegetation that would be expected to be present in the absence of human disturbance.[18]

The RMA does not necessarily place significance on 'original' or 'potential' vegetation. Instead, it requires protection of existing ecologically significant indigenous vegetation/habitat (s.6(c)) and the maintenance of existing indigenous biodiversity (s.31b). Any uncertainty about those requirements has been clarified by the NPS-IB which defines 'indigenous biodiversity' as "living organisms that occur naturally in New Zealand'[19] and requires assessment of the significance of indigenous vegetation typical of that in the present-day environment.[20]

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[12] Leathwick, J.; Wilson, G.; Rutledge, D.; Wardle, P.; Morgan, F.; Johnston, K.; McLeod, M.; Kirkpatrick, R. 2003. *Land Environments of New Zealand*. David Bateman, Auckland. 184p.

[13] Cieraad, E.; Walker, S.; Price, R.; Barringer, J. 2015. An updated assessment of indigenous cover remaining and legal protection in New Zealand's land environments. *NZ Journal of Ecology 39*: 309-315.

[14] Harding, M.A. 2022. Otago Region: analysis of recent changes to terrestrial indigenous ecosystems. Unpublished Contract Report. Otago Regional Council. 30p.

[15] Brockerhoff, E.G.; Shaw, W.B.; Hock, B.; Kimberley, M. 2008. Re-examination of recent loss of indigenous cover in New Zealand and the relative contributions of different land uses. *NZ Journal of Ecology 32(1)*: 115-126.

[16] Weeks, E.S.; Walker, S.; Dymond, J.R.; Shepherd, J.D.; Clarkson, B.D. 2012. Patterns of past and recent conversion of indigenous grasslands in the South Island, New Zealand. *NZ Journal of Ecology 37(1)*: 127-138.

[17] Wildlands 2024. Vegetation succession and climax communities at Rocky Point. Wildlands Contract Report 7080a. (EIA Appendix 6).

[18] Singers, N.J.D.; Rogers, G.M. 2014. A classification of New Zealand's terrestrial ecosystems. *Science for Conservation 325*. Department of Conservation, Wellington.

[19] NPS-IB, Clause 1.6 (1).

[20] NPS-IB, Appendix 1, Clause A (2).

Therefore, descriptions of the vegetation that would have occurred or is expected to occur (climax communities) at the project area are of limited relevance for assessment of the effects of the activity or for the design of a biodiversity offset (or compensation) proposal. These analyses should also recognise the contribution the project area makes to maintenance of present-day indigenous biodiversity, the vulnerability of that biodiversity, and the need to protect and maintain existing indigenous biodiversity.

The project area is within a part of New Zealand that is predicted to experience a greater frequency and severity of wildfire events.[21] The likely vegetation pattern over time is gradual succession to drought-tolerant woody vegetation (such as kanuka), followed by removal of that woody vegetation by wildfire. The length of each vegetation succession-wildfire period will likely be determined by climate – which is predicted to change rapidly – and the consequent extreme wildfire events, the frequency of which is expected to increase.

5.0 Assessment of Effects

The biodiversity offset proposal outlined in the EIA uses the EIANZ Guidelines method to assess ecological value and magnitude of effects.[22] These guidelines are non-statutory and are not recommended or endorsed by the Ministry for the Environment, Department of Conservation, nor Ecological Society of New Zealand. Recent hearing decisions have expressed concern that use of the EIANZ Guidelines can result in wide differences in assessed ecological value and magnitude of effect and noted that use of the guidelines is problematic.[23]

The EIA assesses the overall ecological value of the project area as "very high" (p24) and confirms that it is ecologically significant. The EIA then proceeds to assess selected components of the location separately, using the EIANZ Guidelines method. This method gives insufficient regard to the importance of ecological processes (ecological integrity) at the project area and the contribution the area makes to the surrounding environment (ecological context).

The EIA then applies the NPS-IB effects management hierarchy to outline how the proposed activity will avoid, minimize or remediate adverse effects (p28-30). However, it applies this assessment to individual components of the project area, regardless of its assessment of the whole project area as ecologically significant and having 'very high' ecological value.

The risk of the EIANZ method is that ecological attributes, such as diversity and pattern, and important adverse effects of the activity, notably fragmentation of the project area (not just each vegetation type), may not be adequately assessed. The project area is ecologically significant as an area (SNA), not just ecologically significant for its separate components.

Further, there remains uncertainty about the potential effects of the proposed development (roads, houses, gardens, lawns) on remaining indigenous biodiversity at the project area, notably the health

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[21] Melia, N.; Dean, S.; Pearce, H.G.; Harrington, L.; Frame, D.J.; Strand, T. 2022. Aotearoa New Zealand's 21st-century wildfire climate. *Earth's Future 10*. https://doi.org/10.1029/2022EF002853

[22] Roper-Lindsay, J.; Fuller, S.A.; Hoosen, S.; Sanders, M.D.; Ussher, G.T. 2018. Ecological Impact Assessment. EIANZ guidelines for use in New Zealand: terrestrial and freshwater ecosystems. 2nd edition.

[23] Report and Decision of the Hearing Commissioners, Bathurst Coal Limited v Canterbury Regional Council and Selwyn District Council, 17 June 2022; & Joint Report and Decision of Hearing Commissioners, AW & AK Simpson v Mackenzie District Council and Canterbury Regional Council, 8 November 2023.

and survival of 'at risk' or 'threatened' species, especially species that may be present at saline habitats. The 'edge' or 'off site' effects on saline and cushionfield habitats appear to be strongly correlated with an intensification of land-use in the surrounding area.[24] Similarly, increased nutrients, water and weeds from intensified land use have been shown to facilitate plant invasions into dryland shrubland.[25]

The assessment of effects is also constrained by limitations of the data (section 4, above), notably invertebrate data.

6.0 Review of the Proposed Biodiversity Offset

This part of the review assesses the proposed biodiversity offset against the Principles for Biodiversity Offsetting in Appendix 3 of the NPS-IB, specifically whether the offset will achieve no net loss of indigenous biodiversity and will be proximate and equivalent (as required by the review scope).

6.1 No Net Loss

The proposed biodiversity offset – as described in the EIA – is "planting of forest and shrub species that includes high value plant species representing the pre-settlement climax communities at Rocky Point" over an area of 5.7ha at three locations near the project area. The offset will not replicate the vegetation that is lost; instead, it proposes planting a greater diversity of "high value" species, predominantly woody (not cushionfield) species.

The stated rationale for this approach is that the vegetation established through the offset planting represents the expected climax vegetation at the site, that cushionfield vegetation is successional (not climax), and that the offset plantings will have higher ecological value than the vegetation present within the project area. The EIA proposes that this outcome represents a 'net gain' for indigenous biodiversity values.

The proposed biodiversity offset – if successful – will be woody vegetation that is more diverse than the kanuka shrubland/scrub that will be lost or adversely affected at the project area. The proposed offset will not replicate the cushionfield community and fauna habitat; nor will it replicate the condition (structure and quality) of indigenous biodiversity values at the project area.

The proposal offsets the loss of woody plant species in the project area. It does not adequately offset the loss of other plant communities or the effects on other ecological values, such as fragmentation of a naturally functioning and ecologically significant site (ecological integrity).

The adverse effects on indigenous biodiversity (vegetation and habitat) may be minor in the wider context if intact, naturally occurring kanuka-cushionfield vegetation was common, widespread and

[24] Walker, S.; Harding, M.A.C.; Loh, G. 2023. The pattern of declines and local extinctions of endemic inland *Lepidium* species in the eastern South Island. NZ Journal of Ecology 47(1): 3547. https://doi.org/10.20417/nzjecol.47.3547

[25] Brownstein, G.; Monks, A. 2024. Adjacent land-use intensification facilitates plant invasions into indigenous shrubland fragments. NZ Journal of Ecology 48(1): 1-12.

not threatened. This vegetation is relatively common in the vicinity of the project area but is not common or widespread in Central Otago. It is also threatened by changes in land use.

Analysis of aerial images indicates widespread loss of kanuka-cushionfield vegetation through conversion to exotic grassland (pasture), viticulture, and rural residences (lifestyle blocks) in Central Otago. Land-use change (conversion) has generally been small scale (property by property), but the combined effect has been incremental loss of a substantial area of kanuka-cushionfield vegetation.

The proposed biodiversity offset is inconsistent with the Net Gain Principle (Principle 3(c)) of the NPS-IB (Appendix 3), which requires that the condition (structure and quality) of the indigenous biodiversity values at the offset site "are equivalent to or exceed those being lost at the impact site".

6.2 Equivalence

The three proposed biodiversity offset areas lie just south of and on a similar landform to that at the project area. They are "close to the impact site" and "within the same ecological district".[26] The locations are proximate.

However, the character of the proposed biodiversity offset is different to the vegetation/habitat that will be lost or adversely affected at the project area. The offset proposes three discrete areas of indigenous species plantings that will comprise an assemblage of species representative of a climax woody community.

The proposed offset does not provide a like-for like gain in the condition (structure and quality) of the indigenous biodiversity present at the project area. The proposed activity will remove vegetation/habitat at parts of the project area and will fragment the remaining vegetation/habitat with roads and residential sections.

The proposed biodiversity offset is inconsistent with the Net Gain Principle (Principle 3) of the NPS-IB (Appendix 3), which requires that the condition (structure and quality) of the indigenous biodiversity values at the offset site "are equivalent to or exceed those being lost at the impact site".

6.3 Leakage

The EIA states that the "offset sites are dominated by exotic grassland and forbs" (p42). The EIA also states that there are "small stands of kanuka" at the Panorama Rise site, "cushionfield" at the Pylon Flat site, and "an ephemeral seepage wetland" at the Hemlock Gully site (p36-38). Indigenous species are evident in photographs of the Panorama Rise and Pylon Flat sites (EIA figures 11-2 & 11-3). Vegetation at parts (if not all) of these two sites appears very likely to meet the definition for 'indigenous vegetation'. Seepages are a naturally uncommon ecosystem with an 'endangered' threat status.[27]

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[26] NPS-IB, Appendix 3 Principles for Offsetting, Principle 7.

[27] Holdaway, R.J.; Wiser, S.K.; Williams, P.A. 2012. Status assessment of New Zealand's naturally uncommon ecosystems. *Conservation Biology 26*: 619-629.

The proposed biodiversity offset planting will likely result in clearance of indigenous vegetation (loss of indigenous biodiversity) at the Panorama Rise and Pylon Flat offset sites. These effects do not appear to have been assessed in the application or considered in the biodiversity offset modelling. The offset plantings will – in effect – displace existing vegetation and replace it with small patches of indigenous vegetation that is not typical or characteristic of the present day indigenous biodiversity at these locations.

The proposed biodiversity offset is inconsistent with the Leakage Principle (Principle 5) of the NPS-IB (Appendix 3), which requires that the offset "avoids displacing harm to other indigenous biodiversity".

6.4 Long-term Outcomes

The proposed biodiversity offset is planting of indigenous species at densities of 7500 plants/ha at three sites. Management of these offset sites is described in an Ecological Enhancement and Monitoring Plan (EIA, Appendix 8). The plan describes irrigation, weed control and replacement planting, with a 'performance metric' of 80% plant survival within five years of planting.

The area is described as semi-arid with annual median rainfall of 400-450mm.[28] It is a drought prone location. The location is vulnerable to wildfire, the intensity of which will likely increase if the extent and height of woody vegetation increases in the wider area. The return periods for severe drought or extreme wildfire events are unclear but are predicted to become shorter.[29]

The EIA and EEMP do not adequately address the risks posed by drought or wildfire and do not explain how the biodiversity offsets will be sustained in the long-term. Compliance with resource consent conditions in New Zealand is poor, especially where actions and outcomes are poorly defined.[30] The EIA contains insufficient information to provide confidence that the outcomes of the proposed biodiversity offset will be achieved and maintained in the long term.

The proposed biodiversity offset is unlikely to satisfy the Long-term Outcomes Principle (Principle 6) of the NPS-IB (Appendix 3), which states that "a biodiversity offset is managed to secure outcomes of the activity that will last at least as long as the impacts, and preferably in perpetuity".

6.5 Appropriateness

Several species at the location are listed as 'at risk' of, or 'threatened' with, extinction. These listed species are vulnerable, as defined by the New Zealand Threat Classification System.[31]

Most parts of the project area are in a Level IV land environment within which indigenous vegetation is listed as 'at risk' or – more likely – 'chronically threatened' (depleted to less than 20% of its former extent). Other parts of the project area lie in an 'acutely threatened' Level IV land

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[28] Rocky Point Subdivision. Saline/Sodic Soils Identification and Location. Roger Gibson Land and Sea Services. (EIA Appendix 5).

[29] Melia, N.; Dean, S.; Pearce, H.G.; Harrington, L.; Frame, D.J.; Strand, T. 2022. Aotearoa New Zealand's 21st-century wildfire climate. *Earth's Future 10*. https://doi.org/10.1029/2022EF002853

[30] Brown, M.A.; Clarkson, B.D.; Barton, B.J.; Joshi, C. 2013. Ecological compensation: an evaluation of regulatory compliance in New Zealand. *Impact Assessment and Project Appraisal 31*: 34-44.

[31] Townsend, A.J.; de Lange P.J.; Duffy, C.A.J.; Miskelly, C.M.; Molloy, J.; Norton, D.A. 2008. *New Zealand Threat Classification System Manual*. Department of Conservation, Wellington.

environment. This indigenous vegetation is vulnerable, as assessed by the Threatened Environment Classification.

The proposed activity will have adverse effects on vulnerable indigenous biodiversity. The proposed biodiversity offset is inconsistent with Principle 2(a) of the NPS-IB (Appendix 3), which states that the offsetting is not appropriate where the "residual effects cannot be addressed because of the irreplaceability or vulnerability of the indigenous biodiversity affected".

7.0 Summary

The revised application contains substantially more information than the earlier application, enabling a more robust assessment of potential adverse effects. The data, as presented in the EIA, remain limited for: plant species; invertebrate species; vegetation depletion (land environments data); and predicted future vegetation (wildfire risk).

The assessment of adverse effects is constrained by the limited scope of the assessment method (the EIANZ Guidelines). The assessment gives insufficient regard to the ecological integrity (structure and quality) of indigenous vegetation/habitat at the project area and does not permit a meaningful assessment of the effects of fragmentation.

The proposed activity will result in the loss of ecological integrity (structure and quality) of a naturally occurring and ecologically robust area of kanuka-cushionfield; a community that has been substantially depleted in recent years and the remnants of which are the most extensive in Central Otago.

The proposed biodiversity offset will replace some components of the indigenous biodiversity that will be lost from the project area (woody species); it will not replace or provide a net gain for other components of indigenous biodiversity that will be adversely affected by the proposed activity.

The proposed biodiversity offset lies close to and on the same landform as that at the project area. However, the ecological character of the proposed biodiversity offset will be different from that lost or adversely affected at the project site.

The proposed activity will remove vegetation/habitat at parts of the project area and will fragment the remaining vegetation/habitat with roads and residential sections. The practicality and achievability of confining the adverse effects of the activity (subdivision) to the proposed development footprint at the project area are uncertain.

The proposed activity will have adverse effects on 'at risk' and 'threatened' species and on indigenous vegetation that is now most likely 'chronically threatened' ('at risk' in 2012). Those species and vegetation within those land environments are vulnerable.

The proposed biodiversity offset planting will likely result in loss of indigenous biodiversity at the offset areas and replace it with small patches of indigenous shrubland/forest that are not typical or characteristic of the present day indigenous biodiversity at these locations.

The achievability and sustainability of the proposed biodiversity offset in a drought-prone and high fire-risk environment are uncertain.

8.0 Conclusion

The proposed biodiversity offset is inconsistent with four of the NPS-IB (Appendix 3) principles for biodiversity offsetting: Principle 2 (appropriateness), Principle 3 (net gain), Principle 5 (leakage), and Principle 6 (long-term outcomes).

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22nd September 2024