Wildland Consultants Ltd
764 Cumberland Street
Dunedin 9016
New Zealand
Ph +64 7 477 2096
Ecology@wildlands.co.nz
www.wildlands.co.nz

Our Ref: 7080e

10 February 2025

TKO Properties Ltd
c/- Centennial Avenue ALEXANDRA

Dear Shanon

SUPPLEMENTARY INFORMATION ON THREATENED/AT RISK PLANT SURVEY AT ROCKY POINT, DECEMBER 2024

The results of a Threatened/At Risk plant survey undertaken by Wildlands at Rocky Point for TKO Properties in December 2024 were presented in a previous memo (dated 16 December 2024). Two Threatened and eight At Risk plant species were observed within the proposed impact zone at Rocky Point (30 lots, roads, and wastewater disposal area), all of which were also observed in the site outside of the development zone. These species were generally widely distributed across the site, although notable variations in abundances were recorded. Four broad habitat types defined by soil-landform units provided a useful framework to understand the distribution and abundance of Threatened/At Risk plants at Rocky Point.

All the species found within the development zone were also observed outside of the impact zone in surrounding areas of similar habitat during the less detailed walk-through survey of these areas. It is therefore reasonable to assume that the adjoining habitat has similar abundances of these species to those recorded in the more detailed surveys in the impact zone. Individuals of two additional At Risk-Declining shrub species were also found near to the wastewater disposal area - *Olearia lineata* and *O. odorata*.

This previous memo noted that a fuller synopsis of habitats and species distributions at the Rocky Point site would follow. These additional details are presented below and should be read in conjunction with the original memo. This memo also outlines additional suggested measures in applying the effects management hierarchy to manage effects to achieve no overall loss of indigenous biodiversity.

Descriptions of Soil-Landform Units and Associated Vegetation and Habitat

An overview of the broad locations of the soil-landform units is provided in Figure 1. Note that a map showing locations of Threatened/At Risk species observed was not produced, because the species are widespread within the survey area (soil and landform Units 1-4) and there were too many occurrences of species to usefully map. Summaries of the distribution and abundance of the Threatened/At Risk species are provided in Tables 1 and 2.

1. Silty basins/sideslopes (including Lots 20-21, and wastewater area)

   This landform unit occupies a broad flat to gently sloping basin/gully between rocky hillslopes and ridges. The soil is predominantly silty, and notable for the near absence of rocks and gravels. The

area is very sheltered from prevailing winds. The basin contains areas of kānuka (*Kunzea serotina*)/ exotic herb treeland with several Threatened and At Risk plant species, and areas of kānuka scrub.

The treeland comprises kānuka c.3-4 metres tall scattered as individuals and in small clusters. The inter-tree spaces contain small to large areas of hard, bare soils with commonly scattered pimpernel (*Lysimachia arvensis*), mosses, and resurrection lichen (*Xanthoparmelia semiviridis*). Large patches of Californian thistle (*Cirsium arvense*) or dwarf nettle (*Urtica urens*) dominate occasional areas alongside pimpernel. *Raoulia australis* and stonecrop (*Sedum acre*) are rare in the open bare soil herbfield habitat between the kānuka, with patches of dead *R. australis* under branches. *Ceratocephala pungens* and mousetail (*Myosurus minimus* subsp. *novae-zelandiae*) were present within this habitat scattered in patches of the open bare soil herbfield and on the kānuka margins under low hanging branches. *Crassula mataikona* was present in the open bare soil herbfield between kānuka and occasionally within the kānuka margins with higher hanging branches. *Myosotis brevis* was observed on the kānuka margins under low hanging branches, but was also found in one small open bare soil herbfield that was sheltered by closer kānuka.

Denser, closed canopy kānuka scrub is also present over large portions of the basin, reflecting a slightly more advanced successional stage than the kānuka/exotic herb treeland described above. These areas have leaf litter or bare ground beneath the canopy. No Threatened/At Risk plants were found in this vegetation.

Retrolens imagery shows that kānuka has colonised this landform over the past 50 years. Over this time the kānuka canopy has closed over much of the area. Canopy closure over the remainder of the area is likely to continue to develop, through maturing of already established plants and additional regeneration, further reducing the favoured habitat for spring annuals.

Two rare plants were notable within the kānuka/exotic herb treeland of this landform unit:

- Many very dense patches of mousetail, with populations in patches numbering in the thousands, were observed scattered throughout the area. These patches were within areas of open ground near kānuka trees with sparse exotic herbs, although occasional smaller and less dense populations were observed in larger open areas of ground away from kānuka. Very large populations were also observed on a south-facing silty slope on the north side of the basin, in a band several metres wide just below the kānuka fringe.
- Occasional small patches of *C. pungens* (up to 5-10 individuals) were observed throughout in open bare soil herbfield near kānuka and on the kānuka margins under low hanging branches.

2. <u>Rocky/coarse hillslopes (including Lots 8-18, 22-25)</u>

Rocky and/or coarse-textured hillslopes are a widespread landform unit across Rocky Point. The thin coarse soils support a successional kānuka/*Raoulia australis* shrubland up to four metres tall, with *R. australis* sometimes abundant in larger gaps between kānuka shrubs and several other Threatened and At Risk plant species present in low abundances. Dead cushions of *R. australis* under kānuka are a common feature, reflecting the recent expansion of shrubs in this landform unit. Clusters of seedling and sapling kānuka are widespread, indicating the ongoing expansion of kānuka.

Four plant features are notable within the kānuka/*R. australis* shrubland of this landform unit:

- High abundance of *R. australis* in remaining open areas between kānuka shrubs.
- Scattered occurrence of *Crassula mataikona*, *Poa maniototo*, *Colobanthus brevis* and *Myosotis brevis*, sometimes in small clusters of plants. *M. brevis* was restricted to fringes of kānuka and under branches.

- Almost no mousetail was observed.
- Kānuka is well established and continuing to expand, leading to ongoing reduction in cushionfield and open habitat.

3. Gravelly hillslopes/toeslopes (including Lots 1-7, 19 and 26)

This landform unit is widespread at the site and includes the west facing area containing Lots 1-7 at the southwest of the site and the large spurs and faces at the east of the site. These areas contain a mix of young kānuka shrubland and (kānuka)/*R. australis* herbfield, with frequent kānuka seedlings and saplings and patches of hemlock (*Conium maculatum*). Briar (*Rosa rubiginosa*) is also vigorously invading the eastern faces.

Kānuka is in the process of colonising many of the remaining areas of cushionfield, in a similar but more dramatic and prolific manner to that noted above for Area 2. Many areas of high quality cushionfield are presently being colonised by kānuka, with frequent patches of seedlings and saplings throughout. This includes Lots 4-7 at the west of the site. Many of the seedlings are estimated to be less than 10 years in age, and it is possible their establishment coincides with the destocking that has occurred as part of the ongoing Bendigo Station land development programme. The increase in seedlings and saplings on this landform over the past two growing seasons since Wildlands staff first visited the site is visibly dramatic in some areas, perhaps in part reflecting the very favourable wet spring/early summer of 2024-25.

Lots 1-3 are on a flatter toeslope with a higher proportion of rocks, and contain *R. australis* herbfield with only a few kānuka shrubs. *R. australis* is generally abundant, *P. maniototo* and *Rytidosperma maculatum* are locally common to occasional within open areas with coarse substrates, and *C. mataikona* and *C. pungens* are occasional to scattered. Other Threatened or At Risk plants present in lower abundances include *R. beauverdii*, *M. brevis* and *C. brevisepalus*. Similar coarser substrates with fewer kānuka are also widespread at the east of the site.

Eight plant features are notable within the herbfield and shrubland of this landform unit:

- High abundance of *R. australis* in open areas.
- Recent vigorous colonisation by kānuka in many parts of the landform, much of which is estimated at <10 years old.
- Relatively high abundance of *C. mataikona*.
- Presence of *C. pungens*, more abundant in less rocky areas of the landform.
- Presence of *R. beauverdii* and *R. maculatum.*
- Relatively high abundance of *P. maniototo* throughout.
- Relatively high abundance of *C. brevisepalus* throughout, often occurring in clusters of 10-30 small plants.
- Absence of mousetail, and few *M. brevis* other than some patches under kānuka shrubs.

4. Alluvial flats (including Lots 27-30)

The northeastern corner of the site contains gravelly alluvial flats and terraces deposited by small watercourses, which support an exotic grassland with occasional shrubs of sweet briar (*Rosa rubiginosa*). A few shrubs of *Coprosma propinqua* and korokio (*Corokia cotoneaster*) are also present at the eastern end. The only Threatened or At Risk plants observed were a very few individuals of *R. australis*, *C. pungens* and *C. mataikona*.

Three plant features are notable within the exotic grassland of this landform unit:

- A dominance of exotic vegetation across the whole area.

- No regeneration of kānuka is present.
- A few plants of *C. pungens* and *C. mataikona* were present.

5&6 Narrow gullies and steep bedrock slopes with ledges

These were not studied within the time available. However, the steep bedrock gullies with ledges are most likely to contain a similar array of rare plant species where small pockets of habitat exist. Narrow gullies are likely to contain very few individuals of the rare plant species, due to the dominance of closed kānuka canopy in these areas.

Summary of the Bendigo Hills Estate Survey

The walk-through survey combined with intensive survey of several habitat patches in the adjoining Bendigo Hills Estate (see Figure 2) found eight of the above rare plant species distributed throughout (all but *R. beauverdii* and *R. maculatum* were observed; it is reasonable to conclude that these two species are also present and would be found with more survey effort). As at Rocky Point, all eight species were widespread with a scattered occurrence across the surveyed area, with denser populations in localised areas, especially of *R. australis*, *P. maniototo*, *C. mataikona*, *C. pungens* and mousetail. For example, very large populations of mousetail (numbering in the hundreds to thousands) were observed around some single kānuka trees, and over a large area on the south-facing slopes of a small silty basin. Local clusters of up to 18 *C. pungens* and up to 80 *M. brevis* were found scattered across the survey area. Regeneration of kānuka within bare ground and cushionfield is also apparent.

Walk-though surveys undertaken by Ms Wardle and DOC, concentrated along the public walking easement to the southeast, also found many occurrences of Threatened/At Risk species at Bendigo Hills Estate, including *M. brevis*.

Bendigo Scenic Reserve

The 650 hectare Bendigo Scenic Reserve administered by DOC adjoins the Rocky Point and Bendigo Hills Estate properties. We have not made a comparable plant survey within the scenic reserve. However, given the comparable habitats across Rocky Point, Bendigo Hills Estate and Bendigo Scenic Reserve, it can reasonably be assumed that these same species are present within the reserve in similar distributions and abundances. Historic anecdotal observations by botanists over the past several decades of seasons with mass populations of spring annuals within the reserve are consistent with this assumption.

Overall summary of the survey

The survey has found that Threatened/At Risk plants have a wide occurrence across Rocky Point and Bendigo Hills Estate, with similar distributions and abundances inside and outside of the proposed development zone and the DOC covenant area. Local areas contain larger populations of some species, presumably reflecting localised more favourable habitat. Kānuka is continuing to progressively colonise the site, with recent establishment of seedlings and saplings particularly abundant in areas of cushionfield on gravelly hillslopes/toeslopes including within Lots 4-7. A summary of succession and representative photographs from the February 2025 site visit are provided in Appendix 1.

Areas of steep bedrock slopes with ledges were not able to be surveyed in the time available, but based on the findings of the survey are likely to contain a similar scattered occurrence of many of the Threatened/At Risk species. Narrow gullies were also not surveyed, but very few individuals of the Threatened/At Risk species are likely to be present due to the dominance of closed kānuka canopy in these areas.

Discussion

The survey provides one of the most detailed assessments of spring annuals over a wide area known to have been carried out in the district. It provides a solid basis for understanding the distributional patterns of these species at Rocky Point and Bendigo Hills Estate (and likely the Bendigo Scenic Reserve also). There is no reason to assume that similar patterns of Threatened/At Risk species distribution and abundance are not also found in similar habitats in the wider landscape. Seed sources of all plants discussed above will be widespread across Rocky Point, Bendigo Hills and Bendigo Scenic Reserve, allowing potential colonisation by these species wherever suitable habitat is present.

The survey indicates that the At Risk and Threatened plants are widespread and abundant across most of the surveyed areas, with large populations both within and outside of the proposed development zone at Rocky Point.

This survey has allowed characteristic habitats to be identified for the rare plant species, as described in the above text and Table 2. Key variables in this regard are soil texture, moisture retention, and degree of shading provided by woody vegetation.

The following generalisations can be made about habitat:

- Closed canopy kānuka provides poor habitat for all of the At Risk and Threatened plants that have been discussed above, and these species do not establish in these conditions.
- Most spring annuals are found at the fringes of woody vegetation (just under overhanging branches and extending c.30 centimetres beyond the drip line of branches), with that woody vegetation providing dappled light, bare soil and shelter from wind. Bare open areas provide poor habitat.
- The most abundant populations of spring annuals are found where there is the combination of partial shading, heavier soils, and heightened moisture retention (whether from topography enabling some intermittent overland flow or shade).
- The perennial species such as *Raoulia australis* occur primarily in coarser textured substrates free of woody canopy cover.
- Kānuka is continuing its rapid colonisation of the site, with vigorous regeneration starting to displace the remaining indigenous dominant cushionfields on gravelly hillslopes/toeslopes.

Proposed Revisions to the Effects Management Approach

The results of this survey confirm that there are additional ecological values at Rocky Point associated with spring annuals and other threatened plant species, that were not fully addressed in the original EcIA or effects management package. The survey also confirms the earlier observations that kānuka is continuing its progressive colonisation of the site, with vigorous regeneration evident on many areas of remaining higher quality cushionfields (see Appendix 1 for an overview). To account for these factors and to ensure no net loss of indigenous biodiversity, three changes to the proposed effects management package are suggested as set out below.

1. Modification of the Proposed Offset/Compensation Plantings at Bendigo Hills Estate to Create More Diverse Habitats

   The diverse woody vegetation community originally proposed as an offset for the affected 'kānuka shrubland' is still considered a valid offset. The proposed planting of 2.1 hectares of this vegetation on deeper soils at the offset sites should therefore be retained as per the original proposal.

However, the woody vegetation community originally proposed as an offset for the affected 'cushionfield vegetation' could be modified to take on a more clumped planting distribution, thus creating islands of woody vegetation with open areas in between. This was suggested by DOC during the hearing, and the results of this survey confirm that this is a valid approach. As the woody vegetation develops, relatively bare ground would concurrently form around the fringes of woody vegetation and between islands. Aerial imagery indicates that natural succession at the site has achieved these vegetation structures over the past 20-50 years (see the Wildlands succession report), so it is very reasonable to assume that managed plantings will develop much more rapidly and will attain similar structures within the required 35-year consent timeframe. It is also noted that the ongoing absence of grazing stock and pest control to be achieved through proposed covenant/consent conditions will support accelerated kānuka woodland habitat creation, at a rate faster than can be observed from that historical imagery.

Based on the observations from the survey, bare ground near woody vegetation provides favourable habitat for colonisation/establishment by many of the species of Threatened/At Risk plant species found during the additional survey, whereas closed-canopy areas exclude these species. The generally widespread scattered distribution of these species across Rocky Point and Bendigo Hills Estate (in almost all habitat types) provides good confidence that most of these species could easily colonise suitable habitat in the offset sites and attain a scattered distribution similar to that currently at Rocky Point, and potentially also with dense clumps of some species in localised most favoured conditions. The generally heavier soils at the proposed planting sites will favour spring annual establishment; this is confirmed by observations made during the walk over survey of Bendigo Hills Estate of spring annual populations on the fringes of kānuka in woodland adjacent to the offset sites.

Therefore, a revised planting regime could aim to provide a vegetation and habitat mosaic that is close in structure to the shrub/herb mosaic vegetation currently present across much of the affected cushionfields at Rocky Point and in areas outside of the development zone.

The two main anticipated differences are that there would be a much greater diversity of woody indigenous species, and *R. australis* and *C. brevisepalus* (which appears to only co-occur with *R. australis*) would be unlikely to establish. Overall, however, it is considered that this revised planting regime would allow for the creation of large areas of habitat within 35 years that would be successfully colonised by many of the additional Threatened/At Risk species, while also maintaining the positive ecological aspects of the original proposed regime (such as greater overall species richness and habitat quality for avifauna and invertebrates). Effective rabbit control as proposed in the existing management regime would be important to achieve these outcomes.

Given that the vegetation and habitats in this environment are very dynamic and transient, it is ecologically more important to ensure that effects management measures provide suitable long-term indigenous-dominant vegetation assemblages and habitat within which indigenous species can adjust to changing conditions, than it is to attempt to reproduce replicas of certain parts of the present-day impacted vegetation (which is itself highly spatially variable). This intrinsically permits an outcome in which some species will be higher in abundance at offset sites than in parts of the impacted vegetation, but this is not regarded as ecologically inappropriate or adverse if the offset communities are broadly similar to those affected and the same successional trajectory. Such an outcome will still ensure no net loss, and even a net gain in overall indigenous biodiversity.

It is also important to keep in mind that maintaining indigenous habitat is the key aspect when considering spring annuals, rather than the individuals themselves, due to the expected dynamic nature of populations both spatially and temporally. This is especially so considering the ongoing changes from successional processes, but also in relation to resilience to future unpredictable changes such as wildfires and climate change. Getting too narrowly focussed on the detail of individual species or population differences at a specific micro-location or point in time is

problematic when considering effects management, as the communities are so transitory. The key is to ensure that indigenous habitat is available in perpetuity within which species assemblages can adapt to the climatic or successional processes. This is the approach taken by DOC, for example, in managing Bendigo Scenic Reserve, where the current loss of habitat for and consequent reductions in populations of Threatened/At Risk spring annuals as closed kānuka forest increases is not perceived as a negative ecological outcome. Likewise, future ecosystem disturbance may lead to a resurgence in spring annual habitat and a decline in kānuka, which will be able to proceed naturally if the indigenous habitat is functioning.

Suggested revised planting scheme

The plantings need to enable the formation of viable woody vegetation clusters while ensuring development of large areas of open ground habitat fringing shrubs. Observations of kānuka near the proposed offset sites on similar substrates suggest that exotic vegetation will persist between kānuka where the spacing between shrubs is greater than about three metres.

An appropriate ratio of woody vegetation plantings to open ground cover is therefore considered to be about 65/35. To achieve this, a suggested layout is to have a series of 3.5 $\times$ 3.5 metre patches of woody vegetation plantings separated by three metres of open ground without plantings. Kānuka should be planted on the edges of these patches, with other species planted internally. As the woody vegetation matures, exotic vegetation within the open ground between planted patches will die off and progressively provide favourable habitat for spring annuals. The expanding branches of shrubs on the edges will also progressively reduce the gap between patches; adaptive management to maintain open habitat may be required at this point, and would involve selective removal of shrubs and branches in order to maintain a gap of at least a metre of open ground between woody vegetation patches.

The addition of species other than kānuka will create a more complex and variable woody vegetation structure, which may provide additional habitat for spring annuals on the forest floor beneath these species. The previously proposed planting list is still considered appropriate for this clustered planting regime.

This revised planting approach is considered to be an appropriate way to account for the additional values of Threatened/At Risk species found in the survey. It will recreate the general variability of habitat types within early successional vegetation communities, which in turn can reasonably be expected to be colonised by scattered populations of Threatened/At Risk species and in particular spring annuals. As noted in the hearing, the proposed plantings will create an overall larger area of habitat than that lost. While the revised planting plan does not allow for the establishment of cushionfield (as it is an early successional community at the site), it allows for the development of a much larger area of habitat suitable for spring annuals than presently exists in the development zone.

In summary, it is proposed to undertake clustered plantings of shrubland communities (composition as per the original cushionfield offset) over 4.3 hectares at the Bendigo Hills Estate sites, as a compensation measure for the loss of 3.95ha of (kānuka)/*R. australis* cushionfield.

2. <u>Planting of Two Additional Clusters of Higher-Value Woody Species at Rocky Point</u>

An additional two clusters of plantings (c.600m2 each) of higher-value woody vegetation are proposed, to provide additional compensation for the loss of At Risk-Threatened herbaceous species. These would be positioned within kānuka scrub in the central gully. Thinning of existing kānuka may be required. This is in addition to the four clusters previously proposed in the southern gully.

3. Maintenance of Higher Quality Cushionfield Through Control of Colonising Woody Species

It is proposed to maintain areas of higher quality cushionfield (i.e. with a high abundance of indigenous cushion plants) outside of the development zone by manually removing regenerating seedlings and saplings of kānuka and woody weeds for 35 years. These areas are undergoing active colonisation by kānuka and briar, and there is very high certainty that under the current regime much of the remaining higher quality cushionfield will be replaced by kānuka-dominant vegetation within the next 35 years without this intervention.

The conclusions of the Wildlands succession report and expert evidence are reinforced in this regard. There is ongoing and recent very vigorous colonisation of kānuka (and briar) in many places of cushionfield throughout the site, and it can be concluded with a high degree of confidence that in the absence of disturbance such as fire most of the remaining extensive cushionfields at Rocky Point not yet containing woody vegetation will be dominated by relatively closed kānuka shrubland like the surrounding slopes within the next few decades. This is the continuation of the process of the past 50 years, and there is no reason to suggest that this successional trajectory will change or slow. While this is a natural process, the current cushionfield species composition would be largely lost, as *R. australis* and associated species do not persist under kānuka.

This includes the remaining higher quality cushionfields on gravelly substrates, which are currently experiencing the most notable colonisation by kānuka of any remaining areas at Rocky Point (this includes Lots 4-7). The replacement of the cushionfields with shrubland in these areas is imminent and inevitable. High quality cushionfields on coarser textured ground (this includes Lots 1-3) are presently undergoing slower colonisation.

To identify areas of higher quality cushionfields that would be good candidates for maintaining cushionfields through control of woody species regeneration, a further three-hour site visit was undertaken on 7 February 2025. Four suitable areas were identified; other cushionfields either already have a notable component of kānuka with dead cushions prominent or contain a lower proportion of cushion plants and more bare ground. Three of these four areas occupy north-facing hillslopes at the east of Rocky Point, and contain cushionfields on gravelly and coarser substrates that are very similar to those around Lots 1-7. Scattered older kānuka are present, with abundant colonisation by kānuka and briar in some patches of cushionfield and sparser colonisation in other areas. There is little doubt that kānuka will dominate these areas over the next 30 years under the current regime. The other area is immediately to the west and north of the building platforms at Lots 1-3, and comprises cushionfield on coarser substrates with occasional older kānuka shrubs and sparser seedlings and saplings of kānuka; slower ongoing recruitment of kānuka can be expected in this area.

The approximate extent of higher quality cushionfield at these locations is mapped in Figure 3. Approximate areas are:

- Eastern gully 1 (Area D) – 1.0 hectares
- Eastern gully 2 (Area C) – 2.0 hectares
- Eastern gully 3 (Area B) – 1.8 hectares
- Western hillslope (Area A) – 1.6 hectares

This totals approximately 6.4 hectares of higher quality cushionfield. It is proposed that a minimum of 4.0 hectares of this area is maintained, ensuring that an area greater than the 3.95 hectares of cushionfield (of mixed quality) in the development zone is maintained. Ongoing clearance of kānuka/woody vegetation regeneration within this 4.0 hectares would ensure that these cushionfields and their plant assemblages are retained for 35 years at least. Without this intervention, the progressive loss of almost all of these communities over this timeframe will occur. In fact, a large proportion of this transition will take place much more rapidly; based on the

field survey, for example, it is estimated that at least 1.6 hectares of higher quality cushionfield currently contains abundant kānuka colonisation such that its transition to shrubland is imminent within the next five to 10 years.

Biannual manual clearance of newly established woody seedlings is proposed over this area of the site. As part of the management regime, it is also proposed that a small number of kānuka seedlings are retained and allowed to mature, to create new habitat for spring annuals. An overall cover of kānuka shrubs of around 15-20% would be a suggested aim over 35 years, ensuring continuation of most of the cushionfields while providing significant new spring annual habitat.

Offset and/or Compensation?

Offsetting is to be provided where possible under the NPSIB effects management hierarchy. It is considered that the revised proposed plantings at the Bendigo Hills Estate 'offset sites' are best regarded as a combined offset/compensation approach. The plantings would still reasonably qualify as offsets for affected areas of kānuka woodland. However, it is acknowledged that technically the proposed plantings intended to replace those impacted areas of the site with very high *R. australis* cover and little kānuka (e.g. Lots 1-3) are more appropriately considered as compensation with reference to Appendix 4 of the NPSIB. Like-for-like species offsetting is not possible for cushionfield communities at present, because no technically feasible techniques for re-establishing these communities on a large scale are known.

Offsetting of spring annuals is also not possible, because their transient nature and yearly variability would make it extremely difficult if not impossible to monitor their populations such that the necessary quantification of a net gain or net loss in strict offset terms cannot be undertaken.

The NPSIB clearly recognises the role of biodiversity compensation in circumstances where it is not possible to develop a measurable offset. Compensation is therefore an appropriate path, in the above instances, in which to consider how positive gains can be made. Whichever way the proposed off-site plantings are categorised, the combined effects management approach sequentially applies the effects management hierarchy to create a net positive biodiversity outcome.

Regarding the appropriateness of compensation, Principle 2 of Appendix 4 of the NPSIB requires consideration as to whether the indigenous biodiversity values in question are able to be compensated for. The principle sets out circumstances in which compensation may not be appropriate as including where:

a) The indigenous biodiversity affected is irreplaceable or vulnerable.
b) Effects on indigenous biodiversity are uncertain, unknown, or little understood but potential effects are significantly adverse or irreversible.
c) There are no technically feasible options by which to secure a proposed net gain within acceptable timeframes.

It is considered that irreplaceability relates to the ecological value that the species and habitats of Rocky Point contribute to the viability of surrounding and connected areas. Put another way, to what extent would the protection of the development zone be necessary if the values it holds are to be maintained in the wider area? Based on our assessments, the remaining habitat and species total population sizes at Rocky Point and surrounding landscape are very large and widespread compared to those affected by the proposed development. This is the conclusion we reached in our original reports and evidence for cushionfield, kānuka woodland and *R. australis*. The threatened plant survey findings lead us to this same conclusion for spring annuals and other species found at Rocky Point and surrounding landscape, such that the loss of species is most unlikely to adversely affect the wider populations. The area of habitat and species within the development zone is a small part (<10%) of the Rocky Point site, which is itself a very small part of the area of similar habitat in the surrounding region

including Bendigo Hills Estate and Bendigo Scenic Reserve. The numbers of individuals of species affected is a very small proportion of the overall population size within Rocky Point and over the similar landscapes that provide habitat for the affected species. The loss of individuals from the development zone will make very little difference to the full range of diversity, as the species are found widespread over many sites including large populations and habitats. There are plenty of other populations of the species both within Rocky Point and the surrounding areas where the populations are in similar numbers and/or the habitat is of similar quality. The lack of restriction of species and habitats within the landscape leads us to the conclusion that the habitat affected at Rocky Point is not irreplaceable, but represents widespread and abundant successional states typical of the landscape.

This analysis does not mean that a species would not qualify as irreplaceable simply because it was found on other sites in the surrounding habitat. Other parameters need to be taken into account such as successional/population trend in making such a judgement. A species or habitat would, for example, be irreplaceable if it was found in a very limited number or size of locations or in habitat that is unique, or was the best example of its type. An example at Rocky Point is cushionfield habitat within saline ecosystems.

Regarding vulnerability, while the definition of 'vulnerability' in the NPSIB is not straightforward to interpret it clearly does not exclude threatened species from proposals for biodiversity compensation. As noted in our previous reports and evidence, threat ranking alone is not sufficient to evaluate vulnerability; the key issue is what the effects of the proposal are on the values of species and whether these effects can be adequately dealt with through the effects management hierarchy. In this regard, vulnerability of species and habitats can be addressed in a similar way to the above discussion of irreplaceability, leading to the conclusion that the habitats and species have a low vulnerability to the proposed development. Using the NPS-IB definition, there is a low "threat of destruction or degradation faced by indigenous biodiversity" from the proposed development. Further, as noted previously, the current land use places the species and habitats at Rocky Point overall at a far greater threat of destruction or degradation than the proposed development; this includes the saline ecosystems at the site. The mosaics of successional communities that have established over the past 50 years at Rocky Point also indicate that the indigenous biodiversity at the site will maintain a very high ability to "adapt to harmful impacts or change".

On this basis, it is concluded that the proposed development does not impact habitats that are irreplaceable or affect species or habitats that are vulnerable.

Regarding point B, the additional survey provides confidence that the effects on indigenous biodiversity are now well understood. As for point C, while it is true that there is low confidence in the technical ability to recreate cushionfield communities, the observed historic successional trends at Rocky Point provide a high degree of confidence that the proposed net gains from the effects management package will be achieved within a 35-year timeframe.

The Importance of Legal Protection in Perpetuity

The additional survey results reinforce the importance of the proposed legal protection of the Rocky Point site outside of the development zone offered by the landowner as part of the mitigation package to protect the ecological values of the site. Low altitude sites in Central Otago are among the highest priority for legal protection, and any additional protection of indigenous vegetation and habitats in these areas is of very high conservation value nationally. Legal protection in perpetuity of over 90% of Rocky Point, as offered by the landowner is a notable outcome of the proposed subdivision, and is an important ecological outcome compared to the status quo. Without these formal protections, the ecological values over the entire site will remain vulnerable to being lost to future development.

The argument has been presented that the current level of protection (provided through the district plan and the DOC covenant implemented at tenure review) is adequate to protect the ecological values, because the values have been successfully maintained for the past few decades. However, this

is clearly not the case, because almost all indigenous biodiversity values on similarly protected lowland areas in the Bendigo area have been lost to agricultural and horticultural development over the past few decades. At the time of tenure review it is likely that planners had not considered the possibility of viticulture transforming the landscape. The key reason Rocky Point's values remain today is because the landowners have opted for a realisation of the Rocky Point development zone contained in the Central Otago District Plan, instead of intensification for agriculture or horticulture. But if the proposed development is not viable, it is understood that intensified agriculture and horticulture is permitted over a large portion of the block immediately including saline ecosystems and higher quality cushionfields, unless much stronger legal protection is provided. Without this there is a high likelihood that the land will be developed similarly to adjoining properties. This is not theoretical, as the landowners need to make a return from their land. Legal protection also provides the surest way to safeguard land from the uncertainties of future land development options.

Legal protection would also ensure a high degree of connectivity is maintained in perpetuity between the lakeshore and Bendigo Scenic Reserve, which is not certain at present.

The DOC covenant providing for removal of woody vegetation (subject to obtaining Ministerial permission) from a small part of Rocky Point provides a degree of protection to woody vegetation in this area. However, the covenant area is somewhat arbitrary in relation to biodiversity values (many important values lie outside of the covenant area), and it also does not provide protection to non-woody vegetation in the covenant area or to any vegetation outside of the covenant area. The legal protection proposed as part of the subdivision would provide a far greater level of active protection of ecological values across Rocky Point, protecting indigenous biodiversity and habitat in perpetuity including non-woody and woody vegetation. At present, for example, if a fire was to burn through the site and kill kānuka, or if a severe drought killed kānuka over areas of the site, the landowner would be free to develop the entire area for agriculture or horticulture. The same issue applies to all the areas of the site dominated by kānuka.

For the above reasons, the legal protection proposed as part of the subdivision is a very important part of the effects management package. It would ensure, for the first time at the site, the permanent legal protection of a large area of low altitude habitats for indigenous flora and fauna with valuable ecological context values and indigenous biodiversity values that are currently not safeguarded into the future.

Appropriateness of Proposed Woody Indigenous Plantings

Vegetation that would have been present historically in the Dunstan Ecological District is appropriate for plantings at Rocky Point. Almost all the species concerned continue to persist as isolated individuals in the region, and their near local extinction reflects historic land management and not underlying ecological shifts. This vegetation is "typical and characteristic of the indigenous biodiversity of the relevant ecological district", as per the definition of representativeness in Appendix 1 of the NPSIB. Department of Conservation has used this same approach and rationale for woody vegetation restoration at Flat Top Hill Conservation Area near Alexandra (see photograph of signage in Appendix 2). While the NPSIB refers to a "present day" context in the representativeness key assessment principles, neither the criterion itself nor the attributes of representativeness mention a present-day context. Furthermore, under clause 1 of Appendix 1, a site qualifies as significant if it meets the attributes of the four criteria, not the key assessment principles.

Regardless of these technical matters, understanding future ecological trends is an essential element in informing ecologically meaningful and robust offset/compensation measures that project at least 35 years into the future. This is part of the process of ensuring that offsetting/compensation is informed by science (as required by clauses in Appendices 3 and 4 of the NPSIB). Ecological trends are also relevant to additionality, as natural succession may bring back many of the ecologically important woody species to these communities.

It is for the above reasons that the replacement of the At Risk/Threatened non-woody species with the At Risk/Not Threatened woody species is considered appropriate at Rocky Point, and allows for attaining no overall net loss of indigenous biodiversity. In the context of the Rocky Point site and surrounding landscape, the woody species are of local very high ecological value because of their current near local extinction (this includes the nationally Not Threatened species as well as the At Risk species), as opposed to the high abundances of the At Risk/Threatened non-woody species. On top of this, the vegetation communities with high numbers of At Risk/Threatened non-woody species are early successional and will largely be replaced by woody vegetation in the very near future. Considering these factors, an ecologically robust proposal for ensuring no net loss over a 35-year timeframe is the planting of diverse woody plant communities that reinstate ecologically important components to the ecosystem. Once again, the important ecological value of these communities is acknowledged in DOC's approach at Flat Top Hill Conservation Area.

As another example of applying these factors to developing the effects management measures, consideration was given to creating additional habitat for spring annuals in the upper silty basin, by making clearings in the dense kānuka canopy. However, the recent and ongoing establishment of dense kānuka here would mean that kānuka would quickly colonise such clearings, and ongoing gardening would be required to maintain the habitat. A more ecologically appropriate and sustainable approach to achieving net gains was therefore to acknowledge that tall woody vegetation is appropriate here, and compensate for the loss of spring annual habitat by planting clusters of diverse ecologically important and locally absent At Risk/Not Threatened trees.

This approach also recognises that developing the best site-specific ecological solution often requires a balancing of several ecological factors, and may therefore not fulfil all the aspects of the principles of offsetting/compensation in the NPSIB. For example, the "trading up" principle for compensation requires that the indigenous biodiversity gains are "demonstrably greater or higher than those lost" and that "the proposal shows the values lost are not to Threatened or At Risk(declining) species or to species considered vulnerable or irreplaceable". But at Rocky Point, consideration of successional trends, historic loss of the woody component of vegetation, and widespread abundance of spring annuals means that the overall most ecologically appropriate way to achieve a demonstrable gain for indigenous biodiversity is found through accepting a potential loss of spring annual habitat for the gains provided by introducing At Risk/Not Threatened woody vegetation over the long term.

Conclusion

The additional ecological values associated with At Risk/Threatened plants at Rocky Point have been outlined. These plants are scattered across the site and the wider landscape, and local denser populations are occasionally present.

Three changes to the effects management measures are proposed to account for the additional values and to better account for the cushionfield habitats that would be lost. These changes and the overall approach result from sequentially applying the effects management hierarchy, and include compensation measures for aspects where offsetting is inappropriate. The important contribution of legal protection in protecting the values of the site relating to these species over the long term is also highlighted, given the realities of rapid ongoing kānuka succession and present potential for alternative development.

Overall, it is concluded that the adverse effects to the habitats and At Risk/Threatened indigenous species at Rocky Point posed by the proposed development are appropriately managed by the mitigation actions proposed, such that any residual effects are very well compensated for. The measures include off-site planting and habitat creation over a larger area than that impacted, on-site woody vegetation plantings, on-site woody vegetation clearance to maintain cushionfield and At Risk/Threatened plant habitat, lizard habitat creation, pest plant and animal control, and robust legal protection for conservation purposes of approximately 90% of the site.

If these measures are implemented, it is considered that the objective of the NPSIB of maintaining indigenous biodiversity across Aotearoa New Zealand "so that there is at least no overall loss in indigenous biodiversity" will be well achieved at Rocky Point through the proposed development.

Yours sincerely

Andrew Wells
Senior Ecologist
Wildland Consultants Ltd

Reviewed and approved for release by:

Kelvin Lloyd
Senior Principal Ecologist
Wildland Consultants Ltd

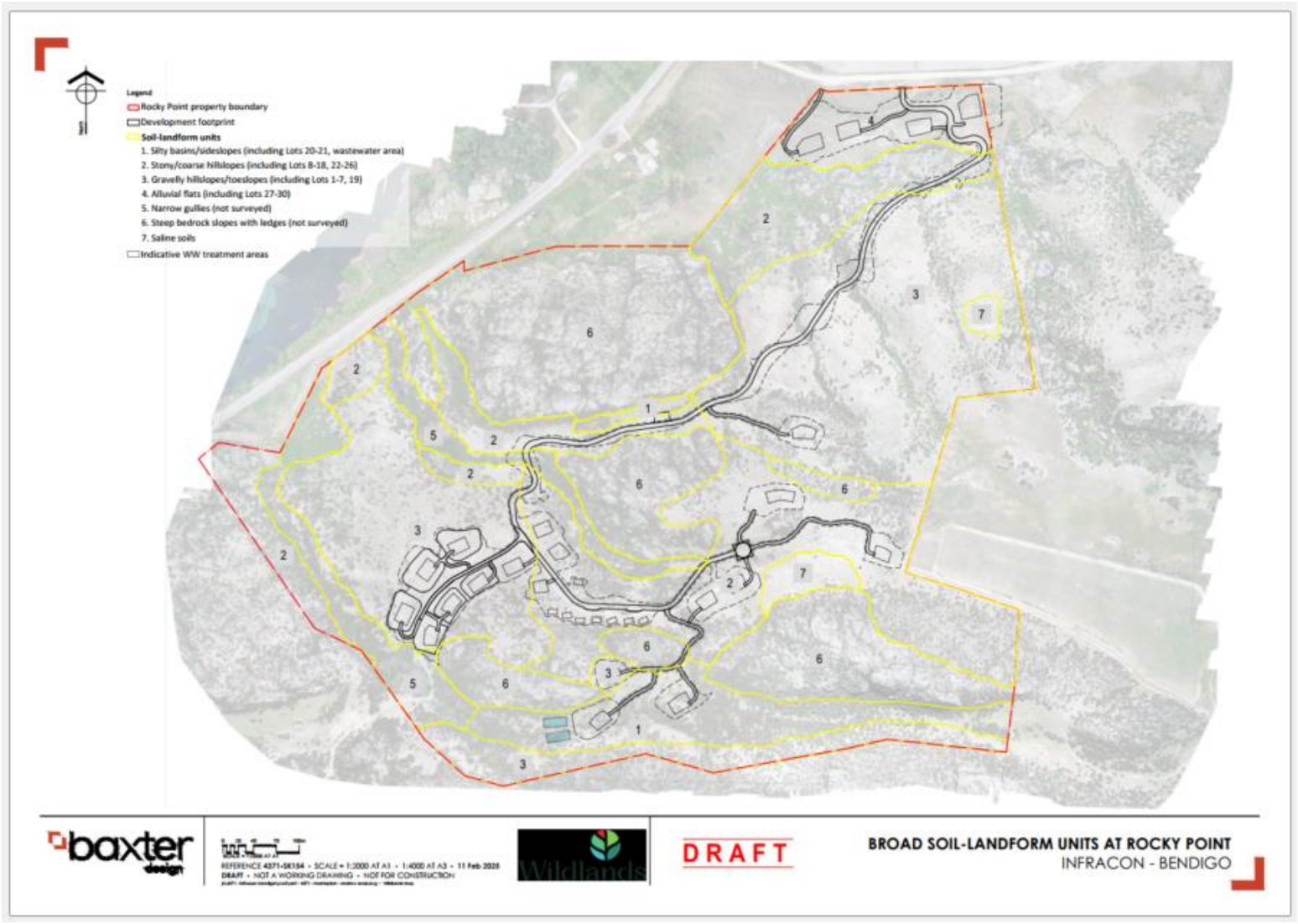

Figure 1: Broad soil-landform units at Rocky Point.

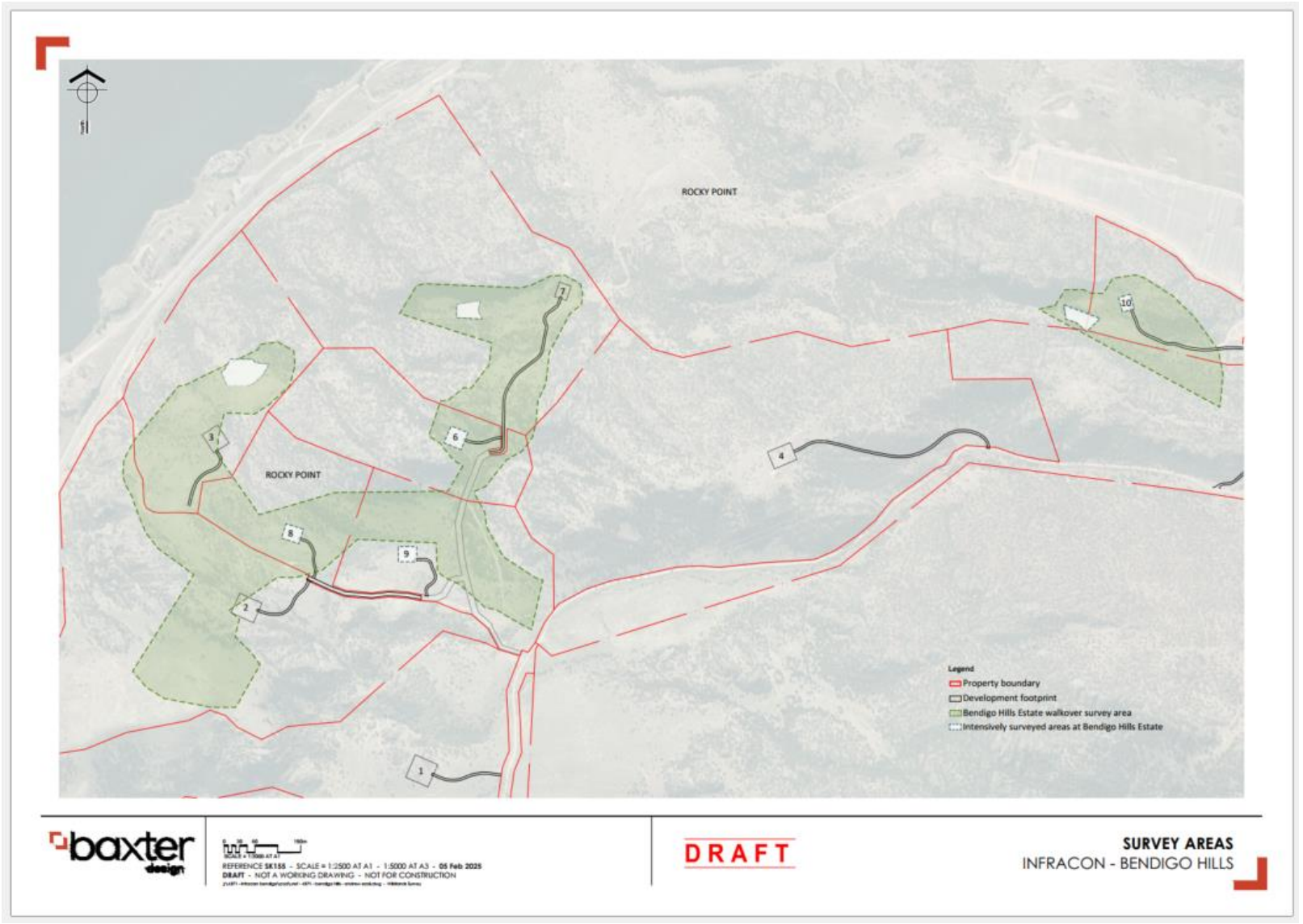

Figure 2: Locations of walk-over and intensive Threatened and At Risk plant survey at Bendigo Hills Estate.

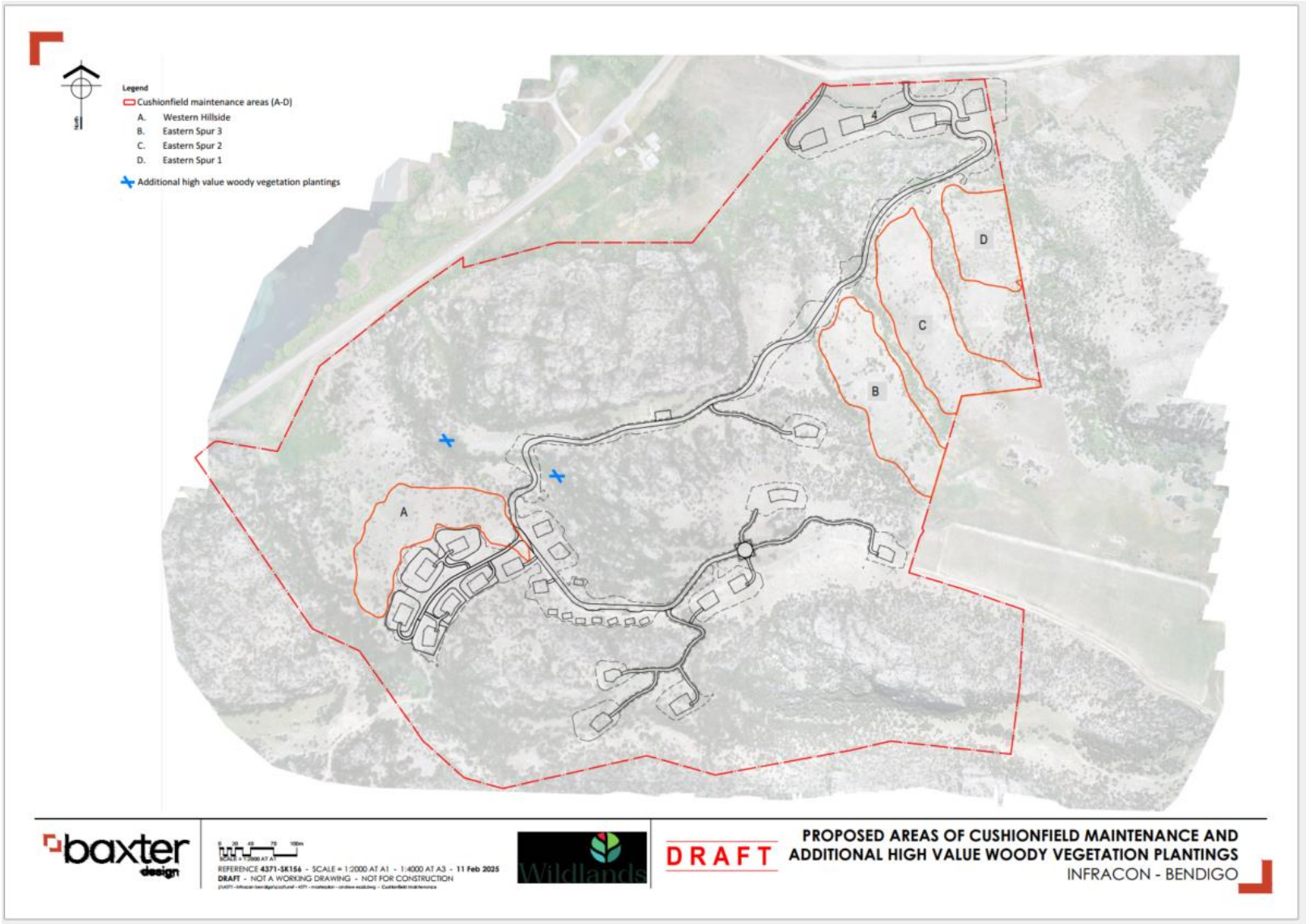

Figure 3: Proposed areas of cushionfield maintenance and additional high value woody vegetation plantings.

Table 1 – Summary of key features of soil-landform units surveyed at Rocky Point in December 2024, and associated aspects of Threatened/At Risk plant distribution and abundance. Species name abbreviations are as follows: CERpun *Ceratocephala pungens*; COLbre *Colobanthus brevisepalus*; CONwai *Convolvulus waitaha*; CRAmat *Crassula mataikona*; MYObre *Myosotis brevis*; MYOmsn *Myosurus minimus* subsp. *novae-zelandiae*; POAman *Poa maniototo*; RAOaus *Raoulia australis*; RAObea *Raoulia beauverdii*; RYTmac *Rytidosperma maculatum*; XANsem *Xanthoparmelia semiviridis*.

Soil-Landform Unit	Features	Key Aspects of Threatened/At Risk Plant Distribution and Abundance
Silty basins/sideslopes (Lots 20-21, wastewater area)	Small flat basin of fine alluvium formed between rocky ridges, with silty slopes on northern edges. Kānuka treeland and exotic herbfield vegetation.	Locally common to frequent MYOmsn. Large populations. A few MYObre and CERpun A few *Olearia lineata* and *O. odorata*
Rocky/coarser hillslopes (Lots 8-18, 22-25)	Rocky and coarse gravelly sideslopes below ridges. Kānuka treeland with some *Raoulia*.	Abundant RAOaus in places A few to occasional POAman A few COLbre, MYOmsn, MYObre
Gravelly hillslopes/toeslopes (Lot 1-7, 19 and 26)	Gently sloping toeslopes and lower hillslopes with gravelly to silty substrates. *Raoulia* cushionfield and scattered kānuka vegetation.	Abundant RAOaus A few to occasional CERpun, COLbre, CRAmat, POAman, RYTmac A few MYObre, RAObre
Alluvial terraces/flats (Lots 27-30)	Gently sloping stony to gravelly alluvium. Exotic grassland vegetation.	A few CRAmat, CERpun and RAOaus

Table 2 – Summary of the distribution and abundance of 10 Threatened/At Risk plant species observed at Rocky Point in December 2024.

Species	Summary of Distribution and Abundance at Rocky Point
Ceratocephala pungens	A few individuals scattered across the site, but with the main populations in the gravelly hillslopes/toeslopes (this includes Lots 1-7, 19 and 26)
Colobanthus brevisepalus (pin cushion)	A few individuals scattered across the site, but most abundant on the gravelly hillslopes/toeslopes (this includes Lots 1-7, 19 and 26) where some clusters of up to 50 plants are present. Only observed growing on RAOaus.
Crassula mataikona	A few individuals scattered across the site, but with the main populations found in the gravelly hillslopes/toeslopes (this includes Lots 1-7,19 and 26)
Myosotis brevis	A few individuals scattered across the site, but with the main populations found in the gravelly hillslopes/toeslopes (this includes Lots 1-7, 19 and 26) and silty basins/sideslopes (this includes Lots 20-21). Almost always observed on the fringes of kānuka or just beneath the canopy.
Myosurus minimus subsp. *novae-zelandiae* (New Zealand mousetail)	Largely confined to the silty basins/sideslopes (this includes Lots 20-21 and wastewater area), where large populations are present both on the fringes of kānuka and on bare silts in exotic herbfield. Very large populations of many thousands of individuals are locally present throughout on bare silty soils.
Poa maniototo (desert poa)	Largely confined to the rocky/coarser hillslopes (this includes Lots 8-18, 22-25) and gravelly hillslopes/toeslopes (this includes Lots 1-7, 19 and 26), where it is scattered to locally common.
Raoulia australis (common mat daisy)	Widespread and frequently abundant, except on the alluvial terraces/flats (this includes Lots 27-30).
Raoulia beauverdii	A few individuals found on gravelly hillslopes/toeslopes (this includes Lots 1-7, 19 and 26)
Rytidosperma maculatum	A few individuals to occasional on gravelly hillslopes/toeslopes (this includes Lots 1-7, 19 and 26).
Xanthoparmelia semiviridis (resurrection lichen)	Widespread and frequent across most of the site, except on the alluvial terraces/flats (this includes Lots 27-30).

Appendix 1: Summary of historic vegetation succession (from the Wildlands succession report), and recent observations of kānuka expansion from 7 February 2025

A. Historic Vegetation Succession

The Wildlands succession report provided a detailed analysis of succession at Rocky Point since 1958, based on aerial imagery. A brief time summary is:

- 1958 – >90% non-woody vegetation, primarily cushionfield. A few shrubs are evident in the main gullies and on rocky outcrops throughout, most probably of kānuka.
- 1975 – c.85% non-woody vegetation, primarily cushionfield. Kānuka almost exclusively on rocky outcrops.
- 2024 – c.30% non-woody vegetation. Kānuka has expanded to cover all rocky outcrops, most of the upper silty basin, and large areas of cushionfield on gravelly substrates.

Page 17 of that report states:

"*The successional trends at Rocky Point provide a good example of how communities of plants 'come and go', or at least drastically change in relative abundance, during stages of vegetation recovery from severe human-induced disturbance. These changes are particularly dramatic at Rocky Point and within the adjoining lower western and northern flanks of the Dunstan Range, because they are occurring at a landscape level. At present the decline of the formally dominant* Raoulia australis *cushionfield community is particularly apparent, along with the associated increased extent of kānuka shrubland"*.

B. Observations of kānuka expansion into high quality cushionfields, 7 February 2025

During the most recent site inspection of cushionfields at Rocky Point, the continuing rapid expansion of kānuka into remaining areas of higher quality (i.e. higher density of cushions) cushionfield was most evident. Many patches of dense young seedlings and saplings were observed, with more extensive regeneration present across the remainder of the areas. The only large area of cushionfield where no woody vegetation establishment was observed was in the saline soils patch on the easternmost spur.

Marked increases in the density and height of seedlings/saplings were visually obvious in areas of the site that had been previously visited in 2023 and 2024, including the areas around Lots 4-7. New seedling establishment (i.e. seedlings that had grown up in the past two seasons) was also apparent in many places. The very favourable growth conditions experienced over the past two seasons may have contributed to this, but alternatively this may simply be reflective of the ongoing rapid rate of kānuka colonisation since the late 1970s.

Several photographs (taken on 7 February 2025) that are typical of the areas of cushionfields at Rocky Point are presented below.

Plate 1: A view from the centre of Lot 7 looking east. The area of kānuka regeneration in the upper part of the photograph is within the proposed cushionfield maintenance Area A (western hillside).

Plate 2: Looking southwest from Lot 6, with poles of Lots 4 and 3 visible on the left.

Plate 3: Lower quality cushionfield with sparse woody regeneration on a hillslope at the west of the site, outside of the proposed cushionfield maintenance area.

Plate 4: Cushionfield to the north of Lots 1-3 has only occasional kānuka seedlings and saplings. This view is within the proposed cushionfield maintenance Area A (western hillside).

Plate 5: Proposed cushionfield maintenance Area B (eastern Spur 3) has frequent patches of recent kānuka regeneration within higher quality cushionfield.

Plate 6: Higher quality cushionfield in the upper portion of the proposed cushionfield maintenance Area C (eastern Spur 2).

Plate 7: Cushionfield on the middle section of the proposed cushionfield maintenance Area C (eastern Spur 2).

Plate 8: Lower density cushionfield on the proposed cushionfield maintenance Area C (eastern Spur 2), with kānuka regeneration and wilding pine.

Plate 9: Cushionfield on the upper portion of the proposed cushionfield maintenance Area D (eastern Spur 1).

Plate10: A view looking upslope from the middle section of the proposed cushionfield maintenance Area D (eastern Spur 1).

Plate 11: Cushionfield on the lower slopes of the proposed cushionfield maintenance Area D (eastern Spur 1), with briar forming large patches in the background and a few kānuka seedlings and saplings.

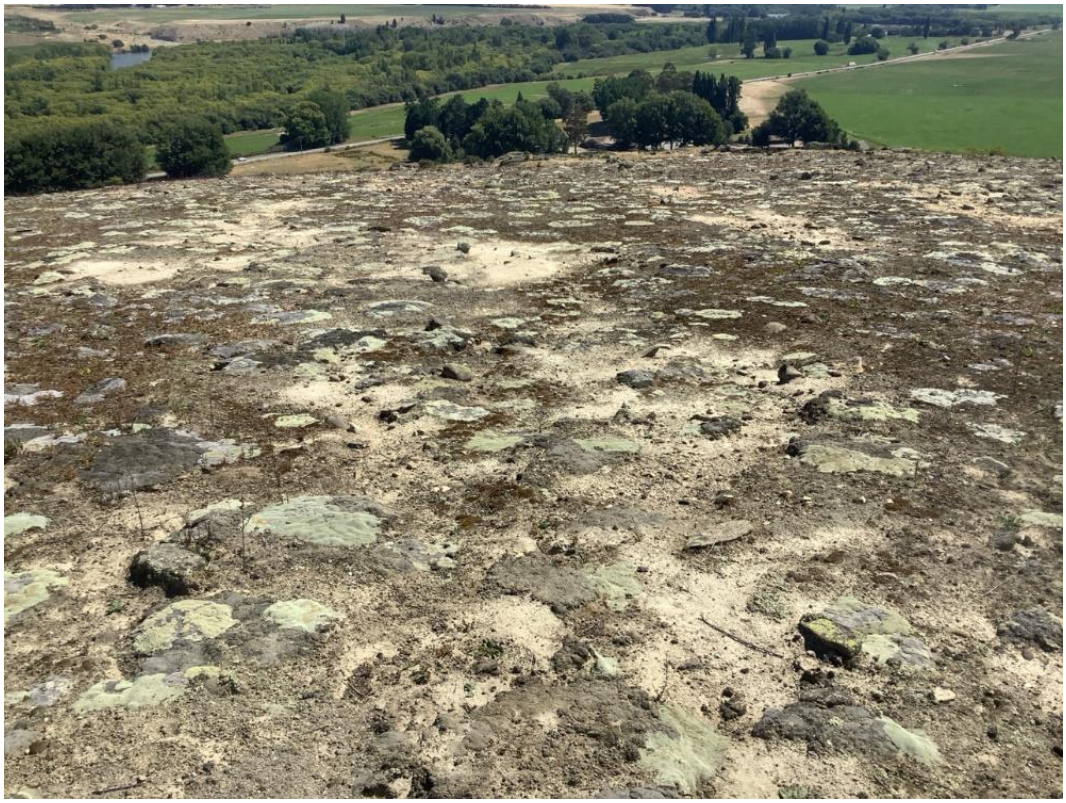

Plate 12: Looking north over the extensive patch of saline soils at the east of the site (just above the proposed cushionfield maintenance Area D [eastern Spur 1]). This is the only large area of cushionfield at Rocky Point lacking woody species regeneration.

Appendix 2: Information signage for ecological restoration plantings of woody indigenous vegetation at Flat Top Hill Conservation Area, Alexandra

The website of the Haehaeata Natural Heritage Trust (www.haehaeata.org.nz) reports that woody plantings undertaken at Flat Top Hill Reserve in 2022 achieved an 83% survival rate, without irrigation. Species included lowland ribbonwood (*Plagianthus regius*), kōwhai (*Sophora microphylla*), cabbage tree (*Cordyline australis*), *Coprosma* spp. and *Olearia* spp.