



# Mt Cass Wind Farm

## Rare Plant Guide



Revision 4 – 11 October 2021



**PREPARED FOR:**

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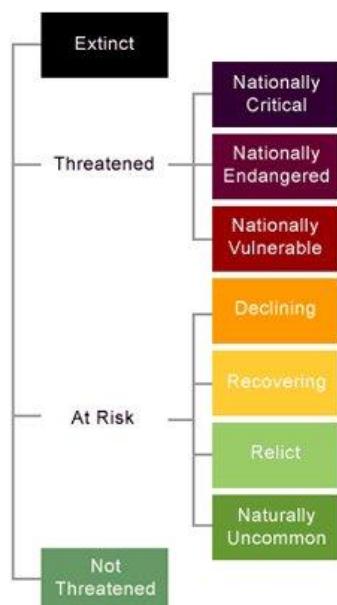
## 1 Introduction

As part of the mitigation for its Mt Cass wind farm, Mt Cass Wind Farm Ltd (MCWF) is required by conditions of its land use consent (dated 3 February 2012) to undertake a programme of conservation protection and restoration that within 50 years will result in an increase in the overall biodiversity values of the Mt Cass wind farm site and will protect and enhance ca. 127 ha of limestone forest, shrubland and escarpment/boulderfield within the Mt Cass Conservation Management Area.

There are resource consent conditions identifying a number of management actions both during construction and subsequently once the wind farm has been commissioned for the protection of 'Threatened' and 'At Risk' plant species. These actions are contained within the project Environmental Management Plan<sup>1</sup>, of which action A5.42 includes the preparation of a field guide to 'Threatened' and 'At Risk' plant species present at the Mt Cass site.

The Mt Cass site has high conservation values with a rich assemblage of unique flora. The site has a mosaic of botanical communities of varying ecological value and significance. Patches of native forest are lined with calcicolous (limestone-inhabiting) shrubland interspersed with silver tussock and pasture grasses. The limestone and the rendzinas (a fertile, lime-rich soil with dark humus above a soft or hard calcareous layer) on site create specific growing conditions that host a range of interesting flora – the calcicolous plants. Due to their restrictive growing habits, these species are naturally uncommon, and often threatened with 71 (47%) of New Zealand's 152 calcicolous plants ranked as Data Deficient or Threatened (cf. 14% of the entire flora) and 43 (29%) ranked as Nationally Critical.

The conservation status assessments are based on de Lange et al. (2018)<sup>2</sup>. The New Zealand Threat Classification System (Townsend et al. 2008) provides the criteria to undertake a conservation assessment of the flora and fauna that occur naturally in New Zealand. This is illustrated on Figure 1.



[Figure 1] New Zealand Threat Classification System

<sup>1</sup> Mt Cass Wind Farm. Environmental Management Plan. Revision 7 – 29 July 2020.

<sup>2</sup> de Lange, P.J.; Rolfe, J.R.; Barkla, J.W.; Courtney, S.P.; Champion, P.D.; Perrie, L.R.; Beadel, S.M.; Ford, K.A.; Breitwieser, I.; Schonberger, I.; Hindmarsh-Walls, R.; Heenan, P.B.; Ladley, K. 2018: Conservation status of New Zealand indigenous vascular plants, 2017. New Zealand Threat Classification Series 22. Department of Conservation, Wellington. 82 p.

Mt Cass has twenty four (24) species that have been recorded or could possibly be on site which are classified in the latest threat classifications as Threatened, At Risk or Data Deficient. eight (8) species are classified as Threatened, thirteen (13) species are classified as At Risk, and three (3) species are classified as Data Deficient. In addition to the species recorded on site, there has also been an unidentified *Pimelea* species which could possibly be *Pimelea declivis* (Threatened) or *Pimelea pseudolyallii* (At Risk), and as such these species have been included in this guide.

The purpose of this guide is to describe the Threatened, At Risk and Data Deficient plants on the site to provide for the protection of these species. This is a reference guide for staff working on the project whom are not familiar with these species, but have a basic knowledge of botany.

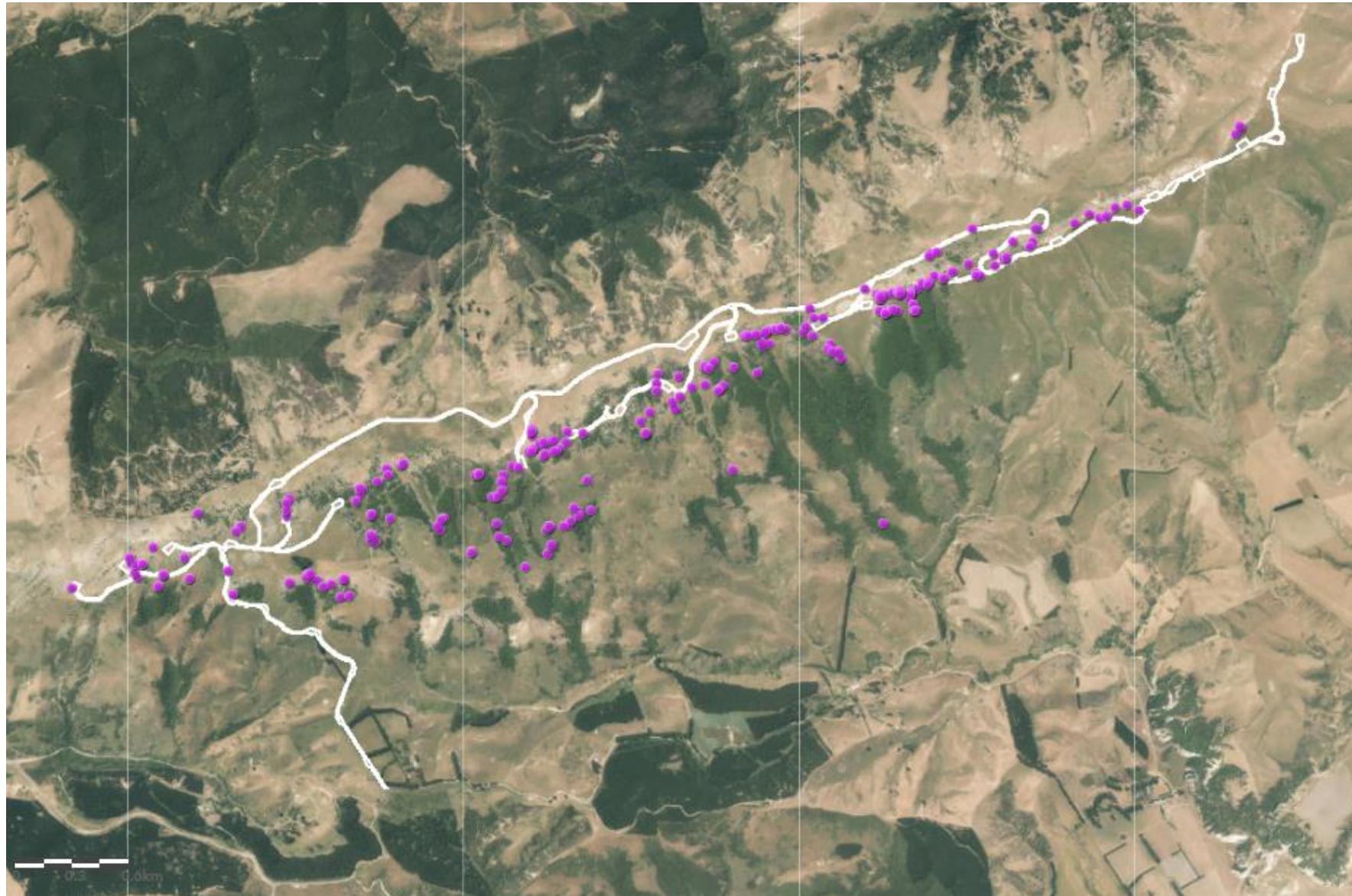
Descriptions are largely derived from the New Zealand Plant Conservation Network and 'conserving the plants of eastern South Island limestone Ngā tipu ō te pākeho' (Heenan and Rogers 2019)<sup>3</sup>, and have been interpreted into common terms where possible.

**We are grateful and acknowledge the use of the images from these sources, and we thank them for their significant contribution to this guide.**

A full list of indigenous plants recorded on site is provided in Appendix 1.

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<sup>3</sup> Heenan PB, Rogers GM. 2019. Conserving the plants of eastern South Island limestone Ngā tipu ō te pākeho.



[Figure 2] Mt Cass Wind Farm Overview - White area is the approximate construction footprint, purple points are recorded locations of either Threatened or At Risk plants via numerous surveys from 2004-2019. The purpose of this figure is to demonstrate the extensive coverage of Threatened and At Risk plants on site.

## 2 Threatened Plants

There are seven plants recorded on site that are classified as Threatened, including two species which are Nationally Endangered, the second highest threat classification, and four species which are Nationally Vulnerable, the third highest threat classification. In addition, the Nationally Critical *Pimelea declivis* could be on site.

Limestone wheatgrass (*Australopyrum calcis* subsp. *optatum*) is an inconspicuous grass associated with limestone outcrops, while kanuka (*Kunzea robusta*) is a well-known tree, recently classified as threatened due to the potential effects of myrtle rust (*Austropuccinia psidii*).

Herbs such as *Craspedia* grow within the limestone runnels (grooves on limestone pavement), fan-leaved mat daisy (*Raoulia monroi*) and McCaskill's hebe (*Veronica maccaskillii*) also grow in open areas adjacent to limestone, while climbing broom (*Carmichaelia kirkii*) can be found in areas of grey scrub (shrubland surrounding limestone).

Threatened species and two similar data deficient species recorded on site are provided in Table 1.

Common Name	Species	Life Form	Threat Status (2018)
Limestone wheatgrass	<i>Australopyrum calcis</i> subsp. <i>optatum</i>	Grass	Threatened - Nationally Endangered
	<i>Cardamine coronata</i>	Herb	Threatened – Nationally Endangered
	<i>Cardamine heleniae</i>	Herb	Data deficient
Climbing broom	<i>Carmichaelia kirkii</i>	Liane	Threatened - Nationally Vulnerable
	Craspedia (uu) "Mt Cass A"	Herb	Data deficient
Craspedia (ii) "Mt Cass B"	<i>Craspedia</i> (ii) CHR 489432 Mt Cass	Herb	Threatened - Nationally Vulnerable
Kanuka	<i>Kunzea robusta</i>	Tree	Threatened - Nationally Vulnerable
-	<i>Pimelea declivis</i>	Shrub	Threatened – Nationally Critical
Fan-leaved mat daisy	<i>Raoulia monroi</i>	Herb	Threatened - Nationally Vulnerable
MacCaskill's hebe	<i>Veronica maccaskillii</i>	Shrub	Threatened - Nationally Endangered

[Table 1] Threatened plants and similar data deficient plants present on the Mt Cass Wind Farm Site

## 2.1 Limestone Wheatgrass (*Australopyrum calcis* subsp. *optatum*)

- **General description** - Limestone wheatgrass is a small slender, creeping, perennial grass up to 60 cm tall and is found sparsely under rock overhangs on the south-facing dip slope. In order to confidently identify limestone wheatgrass, the seed heads must present. The seed heads and the purple-coloured node confirm a grass as Canterbury limestone wheatgrass.

Both access road and turbine construction associated with wind farm development may result in the loss of some limestone wheatgrass, although all surveys to date suggest that limestone wheatgrass plants are not within the project earthworks footprint.

- **Flowers** – Flowering between December and January.



[Plate 1] Descriptions of limestone wheatgrass. Source (Shanks 2019)<sup>4</sup>.

<sup>4</sup> Shanks, A. 2019. Canterbury limestone wheat grass. *Australopyrum calcis* subspecies *optatum*. Population census and trend on the MainPower windfarm land at Mt Cass, Waipara, North Canterbury. August 2019.

## 2.2 *Cardamine coronata*

- **General Description** - This Cardamine is a perennial herb, with a single rosette or multiple rosettes. The leaves are up to 140 mm long, divided, light green to green. Semi-transparent hydathodes (pores that secrete water) on the leaflet margin and in the leaflet axil are conspicuous and usually associated with additional hairs.
- **Habitat** – It usually occurs in sheltered sites on exposed limestone outcrops and on limestone within the canopy of relatively open forest and shrubland.
- **Flower** – White. Flowers between November and January. The inflorescence is a raceme (a flower cluster with the separate flowers attached by short equal stalks at equal distances along a central stem), often with lateral racemes, and each with 6–12 flowers. The sepals are 2.4–3.2 mm long and the petals 4.5–8.0 mm long. The fruit is 25.0–38.0 mm long, and glabrous (without hairs) or occasionally hairy.
- **Similar Species** – The most common *Cardamine* species on site is *C. chlorina*. There are a number of differences between these species, an easily identifiable feature is *C. coronata* has a cordate (heart-shaped, stem in cleft) leaf shape, while *C. chlorina* typically has an ovate (widest at base) leaf shape.



[Plate 2] (left) general form, leaves, and flower of *C. coronata*. Image source (Heenan and Rogers 2019). (left) general form and leaves of *C. chlorina*. Image source NZPCN.

## 2.3 *Cardamine heleniae*

- **General Description** - This Cardamine is a perennial herb, with a single rosette or multiple rosettes. Has strigose-hairy leaves
- **Habitat** – Disturbed sites - earth paths
- **Flower** – White.
- **Similar Species** – The most common *Cardamine* species on site is *C. chlorina*. There are a number of differences between these species, an easily identifiable feature is *C. heleniae* is conspicuously hairy.



[Plate 3] (top) general form (bottom) leaves with conspicuous hairs. Image source NZPCN.

## 2.4 Climbing broom (*Carmichaelia Kirkii*)

- **General Description** - Sprawling or climbing nearly leafless greyish brown shrub. Form is mostly a vine 1-3 m tall, usually climbing, scrambling or sprawling, very rarely a bushy shrub. Branches are up to 40 mm diameter, ascending and spreading. Twigs are many, rounded, slightly grooved. Leaves few except in shaded sites or on young plants. Flowers whiteish with darker purple centre, pea-like, in small clusters. Fruit a small sharp-tipped dry pod partly splitting to release the small white mottled hard seeds.
- **Habitat** - Usually associated with grey scrub communities and is often associated with totara forest.
- **Flower** – Violet/ Purple, white. Flowers between November and January. Fruits between January and June.
- **Similar Species** – include common broom (*Carmichaelia australis*) and leafless clematis (*Clematis afoliata*). Climbing broom has mottled seeds and prominently beaked pods, which persist throughout the year. *Carmichaelia australis* is a shrub rather than a climber. *Clematis afoliata* is always leafless.



[Plate 4] (top left) leaves, (top right) capsules and seeds, (bottom left) flowers, (bottom right) general form.  
Image source NZPCN.

## 2.5 *Craspedia* (uu) "Mt Cass A"

- **General Description** - Tufted herb with one or several rosettes. Leaves are up to 12 cm long and 2.6 cm wide, usually much less, grey-green to grey, upper surface moderately covered with matted hairs, lower leaf surface lacking cottony hairs (but with short glandular hairs) or sparsely covered with matted hairs, not viscid; elliptic, narrowly elliptic, to elliptic-obovate, base attenuate, apex subacute to obtuse (bluntly tipped). Scape (leafless flower stalk) up to 35 cm tall, with 8–10 evenly spaced leafy bracts, not viscid.
- **Habitat** - Occurs on limestone soil, talus and colluvium, on ledges on limestone bluffs and runnels within outcrops. On site it is predominantly found in runnels within limestone outcrops.
- **Flower** – Flower head 1.8–2.0 cm diam., with numerous flowers, corolla (petals) cream or off-white.
- **Similar Species** – Differs from *Craspedia* "Mt Cass B" by its leaves covered with cottony hairs, leaf base attenuate (gradually narrowing to a point), petiole flattened at leaf base, and elliptic leaves that are broadest near the middle.



[Plate 5] (top) growing habit (bottom left) general form (bottom right) inflorescence. Image source (Heenan and Rogers 2019)

## 2.6 *Craspedia* (ii) "Mt Cass B" (*Craspedia* (ii) CHR 489432 Mt Cass)

- **General Description** - Tufted herb with one or several rosettes. Leaves are up to 14 cm long and 3.0 cm wide, usually much less, green, upper and lower surfaces lacking cottony hairs (but with short glandular hairs), margin with white cottony hairs, not viscid; lanceolate, elliptic-lanceolate to elliptic, base cuneate, apex acute. Scape up to 35 cm tall, with 8–10 evenly spaced leafy bracts, not viscid.
- **Habitat** - Occurs on limestone soil, talus and colluvium, on ledges on limestone bluffs and runnels within outcrops. On site it is predominantly found in runnels within limestone outcrops.
- **Flower** – Flower head 1.8–2.0 cm diam., with numerous flowers, corolla (petals) cream or off-white.
- **Similar Species** – Differs from another threatened plant, *Craspedia* "Mt Cass A" by the leaves lacking cottony hairs, leaf base cuneate (wedge shaped, acute base), petiole distinctly channelled at leaf base, and usually lanceolate (pointed at both ends) leaves that are broadest towards the base.



*Craspedia* (uu) "Mt Cass A" (left), *Craspedia* (ii) "Mt Cass B" (right).



[Plate 6] (top) Comparison of Mt Cass A – left, and Mt Cass B – right. (bottom left) inflorescence (bottom right) general form. Image source (Heenan and Rogers 2019)

## 2.7 Kanuka (*Kunzea robusta*)

- **General Description** - Widespread, common tree of North and South Islands. Bark usually basally detached long leathery strips. Branches bearing masses of green leaves and clusters of small white flowers. Branchlets usually copiously covered in silky, appressed hairs. Leaves variable in size (up to 28 mm long), soft to grasp.
- **Habitat** - Shrubland, regenerating forest and forest margins.
- **Flower** – Flowers borne in ‘corymbiform’ clusters, white with a red centre. Fruit a small dry capsule 2.2–4.6 × 3.2–5.3 mm. Flowering between August and June.
- **Similar species** – None on site.



[Plate 7] (Top left) general form, (top right) bark on trunk, (bottom) inflorescence. Image source NZPCN.

## 2.8 *Pimelea declivis*

- **General Description** - This Pimelea is a shrub, much-branched, erect, suberect or decumbent (growing flat along the ground with the ends turning upward), and up to 50 cm high. Young stems covered in short, appressed hairs. Leaves up to 15 mm long, glaucous green (having whitish waxy covering), ovate or elliptic, flat or slightly keeled. Leaf back with sparse hairs, mainly along margins, mid-vein, and near tip, and older leaves glabrous (without hairs).
- **Habitat** - Usually occurs on limestone ridges, scarps, cliffs, outcrops, screes, boulder heaps, and colluvium slopes.
- **Flower** – Inflorescences terminal, with up to 14 flowers. Plants with female and female/male flowers. Flowers white, scented, on short pedicels, densely hairy outside, inside sparsely hairy. Fruits ovoid, fleshy, red.
- **Similar species** – see *Pimelea pseudolyallii* in the At Risk section below.



[Plate 8] (Top) general form, (middle) inflorescence, (bottom left) leaves (bottom right) fruit. Image source (Heenan and Rogers 2019).

## 2.9 Fan-leaved mat daisy (*Raoulia monroi*)

- **General Description** - Stems growing flat along the ground (prostrate), creeping and rooting; final branchlets ascending; forming close to open flat patches. Leaves closely occurring in two opposite rows along a central axis, 2-3 mm long, linear-oblong to oblong-spathulate (shaped like a spatula), obtuse (bluntly tipped), sometimes apiculate (coming to an abrupt, short point); basal portion 3-nerved (where leaves are attached to the base of a plant), clad in appressed white tomentum (short woolly hairs); ventral (upper side of leaf) surface can be densely clad in matted tomentum; dorsal (under side of leaf) surface with appressed dense to sparse tomentum.
- **Habitat** - Open ground and rocky places.
- **Flower** – Consists of a capitulum (dense head-like inflorescence of many flowers) up to 5 mm in diameter. White.
- **Similar Species** – None on site.



[Plate 9] (top left) general form, (top right) inflorescence (bottom) example of 'fan-shaped' leaves.  
Image source NZPCN.

## 2.10 MacCaskill's Hebe (*Veronica maccaskillii*)

- **General Description** - This spreading, semi-divaricating (branching at a very wide angle with stiff intertwined stems) shrub grows to 50-300 mm tall and is common at nine locations along the limestone escarpment where it occurs on ledges and in crevices on the limestone bluffs, and less often in open mixed herb-shrub communities in limestone boulder field adjacent to the escarpment. Bearing pairs of small rounded leaves (4-9 mm x 2-5 mm), which can have entire (smooth) or bluntly toothed margins. Upper leaf surface green to bronze-green, dull. Petiole (leaf stalk).
- **Habitat** - Typically occurs on open, sparsely vegetated, stable to semi-stable rocky limestone outcrops and associated colluvium, in a range of aspects, including open and sunny or sheltered and shaded. A species of North Canterbury in the vicinity of Waipara and at Mt Cass.
- **Flower** – Flowering stem densely hairy, with 10–60 flowers. Petals mauve, fading to pale mauve or white with age.
- **Similar Species** – *Veronica raoulii*. *Veronica raoulii* is distinguished from *Veronica maccaskillii* by its narrower, more toothed leaves, often pink corollas (petals), and more erect softer habit.



[Plate 10] (top) general form, (bottom left) leaves, (bottom right) inflorescence.  
Image source (Heenan and Rogers 2019)

### 3 At Risk Plants

There are fourteen (14) plant species listed as At Risk listed in Table 2, and one Data Deficient species. These include a wide array of plant species, ranging from those that are relatively common on site, shrubs such as matagouri (*Discaria toumatou*), to rather small inconspicuous herbs including New Zealand mint (*Mentha cunninghamii*). There are two parasitic epiphytes (a plant that grows upon another plant); the leafless mistletoe (*Korthalsella clavata*) which typically grows within grey scrub on shrubs such as matagouri and mingimingi (*Coprosma propinqua*), and the white mistletoe (*Tupeia antarctica*) is parasitic on a wide range of hosts including very common species on site such as fivefinger (*Pseudopanax arboreus*).

At Risk plants are scattered throughout the site in a range of habitats, and vigilance is required in order to minimise accidental adverse effects during works.

Common Name	Species	Life Form	Threat Status (2018)
Fierce speargrass	<i>Aciphylla</i> aff. <i>ferox</i> W.R.B.Oliv	Herb	At Risk - Naturally Uncommon
-	<i>Aciphylla subflabellata</i>	Herb	At Risk - Declining
-	<i>Chenopodium allanii</i>	Herb	At Risk - Naturally Uncommon
-	<i>Coprosma virescens</i>	Shrub	At Risk - Declining
Matagouri	<i>Discaria toumatou</i>	Shrub	At Risk - Declining
Leafless mistletoe	<i>Korthalsella clavata</i>	Parasite	At Risk - Declining
Rauhuia	<i>Linum monogynum</i> var. <i>monogynum</i>	Herb	At Risk - Declining
New Zealand mint	<i>Mentha cunninghamii</i>	Herb	At Risk - Declining
-	<i>Pimelea pseudolyallii</i>	Shrub	At Risk – Naturally Uncommon
Fierce lancewood	<i>Pseudopanax ferox</i>	Tree	At Risk - Naturally Uncommon
-	<i>Senecio</i> aff. <i>glaucophyllus</i> (e) CHR 437799; Mt Cass	Herb	Data deficient
-	<i>Senecio glaucophyllus</i> subsp. <i>toa</i>	Herb	At Risk - Naturally Uncommon
-	<i>Senecio</i> sp. aff. <i>dunedinensis</i>	Herb	At Risk - Naturally Uncommon
White mistletoe	<i>Tupeia antarctica</i>	Parasite	At Risk - Declining

[Table 2] At Risk and similar data deficient plants present on the Mt Cass Wind Farm site

### 3.1 Fierce speargrass (*Aciphylla* aff. *ferox* W.R.B. Oliv)

- **General Description** - This *Aciphylla* is a robust perennial herb with single rosettes or forming large clumps of multiple rosettes. Leaves up to 50 cm long, yellow-green to light green and slightly glaucous (having a whitish waxy covering on the surface that easily wipes away), with 6–8 primary pinnae (secondary leaflets) up to 30 cm long, sharp tipped, and usually no secondary pinnae.
- **Habitat** – Open sites, tussock grassland and adjacent to limestone rocks.
- **Flower** – Yellow. Flowering stem up to about 1.2 m long, with male and female flowers on different plants. Flowering between December and February.
- **Similar Species** – Much larger, wider leaved plant than the typical form of *A. subflabellata*, and differs by not having the subflabellate flattened leaves.



[Plate 11] (top) general form with inflorescence, (bottom left) general form, (bottom right) stipule at base of leaf. Image source (Heenan and Rogers 2019).

### 3.2 *Aciphylla subflabellata*

- **General Description** - Stout perennial forming a dense rosette of long, sharp and very narrow leaflets. Stems up to 0.8 m long. Leaves yellow-green to grey-green, narrowly subflabellate-bipinnate (slightly shaped like a fan with each primary pinna divided to the midrib into a secondary pinna).
- **Habitat** - Open sites within tussock grassland and adjacent to limestone rocks. On site it tends to occur in lone specimens in grassland in contrast to *A. aff ferox* which is predominantly within boulderfields and grouped in clusters.
- **Flower** – Yellow. Flowering stem up to about 0.6 m long. Flowering between December and February.
- **Similar Species** – Much smaller, slender leaved plant than the typical form of *A. ferox*, and differs by the subflabellate flattened leaves - a condition caused by the close-set leaf pinnae which are positioned more or less in the same plane as the leaf axis.



[Plate 12] (top left) general form and young inflorescence, (top right) inflorescence (bottom) general form.  
Image source NZPCN.

### 3.3 *Chenopodium allanii*

- **General Description** – Small scrambling, spreading herb which can creep along the ground and ascend. Leaves ovate (egg-shaped, wide at base). Procumbent, decumbent or ascending and straggling perennial herb, farinose at least when young; stems slender, becoming rather thick and woody at base. Petiole c. 5– (20) mm long, filiform. Leaf blade 2–12– (25) × 2–10–(15) mm, usually broad-elliptic to orbicular (oval to round, widest at base), thin, entire (smooth), rounded; apex often mucronulate (spine on leaf tip), sometimes emarginate (recessed at tip).
- **Habitat** – Base of limestone, shaded sites.
- **Flower** – Very slender, compact, small, white with a thin, papery perianth (outer part of a flower). Located axillary (at intersection of the leaf and stem) and terminal spikes (at end of plant). Flowering between November and March.
- **Similar species** - No similar species on site.



[Plate 13] (left) general form (right) inflorescence. Image source NZPCN.

### 3.4 Limestone pincushion (*Colobanthus* aff. *brevisepalus* "limestone")

- **General Description** – This *Colobanthus* is a cushion plant up to 10 cm across with numerous closely placed, tightly packed stems with compact rosettes of leaves. Leaves densely overlapping, rounded on back, 3–4 mm long, with long needle-like tips.
- **Habitat** – Confined to limestone escarpments and cliffs, where it grows in rock crevices, rendzina (limestone derived) soils. Often persisting in solution hollows.
- **Flower** – Flower stalks short, embedded among leaves. Flowers 3–4 mm long, with 5 sepals, broader than leaves, ending in short needle-like tip.
- **Similar Species** –The most similar species on site is *C. acicularis* which has longer, needle-like shaped leaves.



[Plate 14] (top) general form, (bottom) inflorescence. Image source (Heenan and Rogers 2019).



[Plate 15] (left) general form of *C. acicularis*, Image source NZPCN, (right) form of *C. aff. brevisepalus*  
Image source Payne 2020.

### 3.5 *Coprosma virescens*

- **General Description** - Rare orangeish or olive-green bushy shrub with tangled wide-angled branches bearing pairs of small pointed oval leaves on flattened leaf stalk. Bark has distinctive patterning and is smooth and knobbed, greenish to grey. Leaves 5-9mm long, rhomboid (diamond shaped), with a ridge of small hairs on stem between leaf bases.
- **Habitat** - Sparse component of grassland, and predominantly on forest margins and shrubland.
- **Flower** – Small, petals cream to white, males in a funnel form and females in a tube form. Drupes 5-6 mm, yellowish white with small black dots, oblong. Flowering September to November, fruiting May to July.
- **Similar Species** – There are a number of small leaved Coprosma on site. This one is recognised by the divaricating growth habit, branching at a very wide angle with stiff intertwined stems, green to greyish bark with distinctive patterning, and small pale greenish or brown-green rhomboid (diamond shaped, nearly rhombic), bluntly tipped leaves that are abruptly narrowed to the petiole (stalk that attaches the leaf blade to the stem).



[Plate 16] (left) form (top right) divaricating branches and leaves (bottom right) drupe. Image source NZPCN.

### 3.6 Matagouri (*Discaria toumatou*)

- **General Description** - Spiky grey shrub with many zig-zagging long flexible twigs bearing long (up to 5cm long) green spines interspersed with small oval dark green leaves. Bark rough, broken into squares. Leaves 10-20mm long.
- **Habitat** - Most common in tussock grassland.
- **Flower** – Flowers small, white, inconspicuous. Fruit a dry, 3-sided capsule.
- **Similar Species** – Easily recognised with no similar species on site.



[Plate 17] (top left) inflorescence (bottom left) branch form (right) general form.

### 3.7 Leafless mistletoe (*Korthalsella clavata*)

- **General Description** – This small, tufted mistletoe reaches up to 8 cm in length and branches at wide angles. Branches are few. Flattened, 5-10 mm long and 1.5-3.5 mm wide and tapered between nodes. It is leafless, hairless and mostly golden brown but can be olive green.
- **Habitat** – Occurs in forest and shrubland with mingmingi (*Coprosma propinqua*), and matagouri (*Discaria toumatou*) as hosts. On site it has predominantly been recorded on *C. propinqua*.
- **Flower** – Flowering branches are narrower than normal branches, usually solitary, and 1-1.5 cm long. Each flowering branch has two groups of green flowers which are separated by two tufts of hair. Flowers between October and March.
- **Similar Species** – No similar species on site.



[Plate 18] (top) general form (bottom) growing on matagouri.

### 3.8 Rauhuia (*Linum monogynum* var. *monogynum*)

- **General Description** – This is a low-growing short-lived perennial or woody subshrub, growing up to 60 cm tall and is glabrous (without hairs). Stems simple or branched, woody toward base. Its spear-shaped, leathery-grey to green leaves are entire (smooth edge), with 1-3 nerves, and 5–30 mm long.
- **Habitat** – Exposed sites, adjacent to limestone rocks.
- **Flower** – It has pretty white flowers up to 2.5 cm in diameter, which have five overlapping petals.
- **Similar Species** – No similar species on site.



[Plate 19] (top) general form (bottom) flower. Image source NZPCN.

### 3.9 New Zealand mint (*Mentha cunninghamii*)

- **General Description** – Fragrant (like mint), rhizomatous/ stoloniferous (underground creeping stems) plant that forms loose patches up to 300 mm across. Stems sparse to numerous, very slender, purple to purple-red, puberulent (few small, soft hairs), usually much branched. Leaves bright green to yellow-green, sessile (attached at the base without stalks) or with short hairy petioles (leaf stalks) 2-4 mm long. Lamina (leaf blade) 2-15 x 2-15 mm, broad-ovate (wide at base) to suborbicular (almost circular), smooth, entire or shallowly crenate (rounded teeth), gland-dotted, mostly glabrous (without hairs) except for nerves on lower surface; base broad-cuneate or truncate (tapering at base); apex rounded.
- **Habitat** - Sparse component of grassland and other open places such as cliffs, and grey scrub.
- **Flower** – White, axillary (at intersection of the leaf and stem), fragrant, solitary or in clusters of 1-3. Flowering between October and April.
- **Similar Species** – No similar species on site.



[Plate 20] (left) general form in flower within grass (right) general form. Image source NZPCN.

### 3.10 *Pimelea pseudolyallii*

- **General Description** - Low growing scrambling shrub with hairy twigs bearing pairs of green pointed leaves that are silkily hairy underneath and bearing hairy white flowers and red fruit inhabiting the eastern South Island. Leaves 5-15mm long by 3-6.5mm wide, hairs project beyond margin to give a silver-edged effect.
- **Habitat** - amongst shrubs in tussock grassland and within tussock grassland
- **Flower** – Cream, white, scented, on short (0.6 mm) pedicels, very hairy outside, inside hairless. Flowering between November and January. Fruiting between December and January.
- **Similar Species** – See *Pimelea declivis* in Threatened plants section above.



[Plate 21] (left) general form (right) inflorescence. Image source NZPCN

### 3.11 Fierce lancewood (*Pseudopanax ferox*)

- **General Description** - Small tree with a striking juvenile form consisting of down pointing roundish long narrow very tough leaves that have irregular blunt bumps along the edge which grows into a bushy small tree bearing long narrow leathery leaves that have a few teeth on the margin towards the tip and produces 8-9mm wide purple fruit. Adult leaves 50-150 x 10-20 mm, dark or light chocolate brown, oblong to linear-obovate or broadly lanceolate, narrowing to a stout petiole (leaf stalk) 10-20 mm long; apex obtuse (bluntly tipped) or mucronate-apiculate (recessed tip), entire, veins evident above.
- **Habitat** - In grey scrub and limestone outcrops. This species prefers drier habitats and conditions than *P. crassifolius*.
- **Flower** – Umbel flowers (cluster in which stalks of nearly equal length spring from a common centre and form a flat or curved surface) in a terminal position (end of a branch) with 5-12 rays, 30-50 mm long. Flowering between November and April.
- **Similar Species** – *Pseudopanax crassifolius* is similar but the sapling and subadult leaves are green to dark green, usually with smaller, narrow-based, straight teeth, and the adult has much broader, greener, elliptic-cuneate (wedge shaped, nearest at base), lanceolate to linear-obovate, sharp or blunt tip, entire to sinuate (wave like indentations) or rarely coarsely serrated leaves. *P. crassifolius* is a much larger tree reaching up to 20 m in good conditions.



[Plate 22] (left) juvenile form (right) adult leaves on the left next to *P. crassifolius* leaves on the right.  
Image source NZPCN

### 3.12 *Senecio (e) aff. glaucophyllus "Mt Cass"*

- **General Description** - This Senecio is a perennial herb, spreading to upright growth habit. Stems branched, woody toward base. Lower leaves entire to shallowly toothed, broadly elliptic to elliptic, semi-succulent, glabrous, up to 30 mm long, green above, sometimes purple beneath. Upper stem leaves deeply toothed.
- **Habitat** - On bluffs and their associated talus or rendzina soils where it prefers well-lit or open sites.
- **Flower** – Inflorescence up to 10 cm long, spreading to ascending, usually with 1–3 flowers. Flower head with 9–13 involucral bracts (modified leaves subtending a flower) that are glabrous. Outer ray florets absent. Central disc 6–9 mm diameter, yellow or pale yellow, with 70–75 flowers.
- **Similar Species** – Closest species resembling *Senecio (e) aff. glaucophyllus "Mt Cass"* on site is *S. glaucophyllus subsp. toa*.



[Plate 23] General form. Image source (Heenan and Rogers 2019).

### 3.13 *Senecio glaucophyllus* subsp. *toa*

- **General Description** – No general description available. See *S. glaucophyllus* subsp. *basinudus* form similar general description.
- **Habitat** – Open limestone rock. Favouring exposed cliff faces and associated talus, boulder field.
- **Flower** – A dense head-like inflorescence of many flowers. Yellow.
- **Similar Species** – Closest species resembling *S. glaucophyllus* subsp. *toa* on site is *S. glaucophyllus* subsp. *basinudus*



[Plate 24] General form. Image source NZPCN.

### 3.14 *Senecio sp. aff. dunedinensis*

- **General Description** - Erect, annual to short-lived, dark green to purple-green (almost brown-purple) perennial herb. Mid cauline (belonging to the stem) leaves 40-100 x 3-15 mm, dark green, purple-green to brown-purple, glabrescent (lacking hairs) on both surfaces when mature, sometimes sparsely white-lanate (woolly hairs) on upper surface, and moderately so on undersides, sessile (lack a leaf stalk), narrow-elliptic (small or no point) or narrowly elliptic-obovate (narrow at base) to linear, usually remotely denticulate (with fine teeth) on leaf edge, sometimes entire (smooth edge), usually revolute (leaf rolled downward to underside of leaf). Uppermost leaves similar but smaller, usually linear and more distinct white-lanate (particularly on leaf undersides).
- **Habitat** - Frequenting grey scrub where it grows in shaded sites under taller shrubs. Also often seen growing in shaded sites amongst boulders, or near or under rock overhangs. Sometimes it has been gathered from open grassland.
- **Flower** – A dense head-like inflorescence of many flowers. Inner flower disc is greenish yellow to dark yellow, 2-3 mm diameter. No ray florets (outer petals). Flowering between November and February.
- **Similar Species** – No similar species on site.



[Plate 25] (top) general form (bottom) general form with inflorescence. Image source NZPCN.

### 3.15 White mistletoe (*Tupeia antarctica*)

- **General Description** - Rounded shrub to 1m wide. Leaves are oppositely arranged, variable in shape, 10 to 70 by 10 to 40 mm, slightly fleshy and bright green. Stems are always rounded in cross section near the tips, have pale white to grey bark, and downy or hairy branchlets.
- **Habitat** – Most common in regenerating forest/scrub.
- **Flower** – Flowers are tiny, greenish-yellow. Flowers from October to December. Fruit are fleshy, white to pink, 5 to 7 mm diameter.
- **Similar Species** – *Illeostylus micranthus* has tiny, yellow-green flowers, a ‘bent’ style, yellow fruit and young stems that are squarish in cross-section and have multiple attachments to its host.



[Plate 26] (top) general form (bottom left) juvenile leaves (bottom right) fruit. Image source NZPCN.

## Appendix 1: Mt Cass Wind Farm Site All Recorded Indigenous Vascular Plants

Species	Life Form	Threat Status (2018)
<i>Acaena anserinifolia</i>	Herb	
<i>Acaena novae-zelandiae</i>	Herb	
<i>Aciphylla aff. ferox</i>	Herb	At Risk - Naturally Uncommon
<i>Aciphylla subflabellata</i>	Herb	At Risk - Declining
<i>Adiantum cunninghamii</i>	Fern	
<i>Alectryon excelsus</i>	Tree	
<i>Anaphalioides bellidoides</i>	Herb	
<i>Anthosachne solandri</i>	Grass	
<i>Aristotelia fruticosa</i>	Shrub	
<i>Aristotelia serrata</i>	Tree	
<i>Arthropodium candidum</i>	Herb	
<i>Asplenium flabellifolium</i>	Fern	
<i>Asplenium flaccidum</i>	Fern	
<i>Asplenium gracillimum</i>	Fern	
<i>Asplenium lyallii</i>	Fern	
<i>Astelia fragrans</i>	Herb	
<i>Australina pusilla</i>	Herb	
<i>Australopyrum calcis subsp. optatum</i>	Grass	Threatened - Nationally Endangered
<i>Azorella hookeri</i>	Herb	
<i>Blechnum chambersii</i>	Fern	
<i>Blechnum fluviatile</i>	Fern	
<i>Blechnum penna-marina</i>	Fern	
<i>Brachyglottis monroi</i>	Shrub	
<i>Brachyscome sinclairii</i>	Herb	
<i>Calystegia tuguriorum</i>	Liane	
<i>Cardamine coronata</i>	Herb	Threatened – Nationally Endangered

Species	Life Form	Threat Status (2018)
<i>Cardamine chlorina</i>	Herb	
<i>Cardamine heleniae</i>	Herb	Data deficient
<i>Carex flagellifera</i>	Sedge	
<i>Carex secta</i>	Sedge	
<i>Carmichaelia australis</i>	Shrub	
<i>Carmichaelia kirkii</i>	Liane	Threatened - Nationally Vulnerable
<i>Carpodetus serratus</i>	Tree	
<i>Celmisia gracilenta</i>	Herb	
<i>Chaerophyllum novae-zelandiae</i>	Herb	
<i>Chaerophyllum ramosum</i>	Herb	
<i>Chenopodium allanii</i>	Herb	At Risk - Naturally Uncommon
<i>Chiloglottis cornuta</i>	Herb	
<i>Clematis afoliata</i>	Liane	
<i>Clematis foetida</i>	Liane	
<i>Clematis forsteri</i>	Liane	
<i>Clematis marata</i>	Liane	
<i>Clematis paniculata</i>	Liane	
<i>Colobanthus acicularis</i>	Herb	
<i>Colobanthus apetalus</i>	Herb	
<i>Colobanthus aff. brevisepalus "limestone"</i>	Herb	At Risk - Declining
<i>Colobanthus muelleri</i>	Herb	
<i>Convolvulus waitaha</i>	Herb	
<i>Coprosma crassifolia</i>	Shrub	
<i>Coprosma dumosa</i>	Shrub	
<i>Coprosma linariifolia</i>	Shrub	
<i>Coprosma lucida</i>	Shrub	
<i>Coprosma propinqua</i>	Shrub	
<i>Coprosma rhamnoides</i>	Shrub	
<i>Coprosma robusta</i>	Shrub	

Species	Life Form	Threat Status (2018)
<i>Coprosma rotundifolia</i>	Shrub	
<i>Coprosma rubra</i>	Shrub	
<i>Coprosma virescens</i>	Shrub	At Risk - Declining
<i>Cordyline australis</i>	Tree	
<i>Corokia cotoneaster</i>	Shrub	
<i>Corybas sp.</i>	Herb	
<i>Craspedia (uu) "Mt Cass A" CHR 489432 Mt Cass</i>	Herb	Data Deficient
<i>Craspedia (ii) "Mt Cass B" CHR 489432 Mt Cass</i>	Herb	Threatened - Nationally Vulnerable
<i>Dacrycarpus dacrydioides</i>	Tree	
<i>Dichelachne crinita</i>	Grass	
<i>Dichondra repens</i>	Herb	
<i>Discaria toumatou</i>	Shrub	At Risk - Declining
<i>Echinopogon ovatus</i>	Grass	
<i>Epilobium nummulariifolium</i>	Herb	
<i>Epilobium rotundifolium</i>	Herb	
<i>Festuca multinodis</i>	Grass	
<i>Festuca novae-zelandiae</i>	Grass	
<i>Fuchsia excorticata</i>	Tree	
<i>Fuchsia perscandens</i>	Liane	
<i>Galium propinquum</i>	Herb	
<i>Galium trilobum</i>	Herb	
<i>Geranium brevicaule</i>	Herb	
<i>Geranium aff. microphyllum</i>	Herb	
<i>Gingidia montana</i>	Herb	
<i>Griselinia littoralis</i>	Tree	
<i>Haloragis erecta</i>	Herb	
<i>Helichrysum filicaule</i>	Herb	
<i>Hierochloe redolens</i>	Grass	

Species	Life Form	Threat Status (2018)
<i>Hoheria angustifolia</i>	Tree	
<i>Hydrocotyle heteromeria</i>	Herb	
<i>Hydrocotyle moschata</i>	Herb	
<i>Hydrocotyle novae-zeelandiae</i>	Herb	
<i>Ileostylus micranthus</i>	Parasite	
<i>Korthalsella clavata</i>	Parasite	At Risk - Declining
<i>Kunzea robusta</i>	Tree	Threatened - Nationally Vulnerable
<i>Lachnagrotis lyallii</i>	Grass	
<i>Lagenifera pumila</i>	Herb	
<i>Leptinella pusilla</i>	Herb	
<i>Leptinella squalida</i>	Herb	
<i>Libertia ixioides</i>	Herb	
<i>Linum monogynum var. monogynum</i>	Herb	At Risk - Declining
<i>Melicope simplex</i>	Shrub	
<i>Melicytus ramiflorus</i>	Tree	
<i>Melicytus sp. aff. alpinus</i>	Shrub	
<i>Mentha cunninghamii</i>	Herb	At Risk - Declining
<i>Microsorum pustulatum</i>	Fern	
<i>Microtis sp.</i>	Herb	
<i>Muehlenbeckia australis</i>	Liane	
<i>Muehlenbeckia complexa</i>	Liane	
<i>Myoporum laetum</i>	Tree	
<i>Myrsine australis</i>	Tree	
<i>Myrsine divaricata</i>	Tree	
<i>Nematoceras macranthum</i>	Herb	
<i>Olearia avicenniifolia</i>	Shrub	
<i>Olearia bullata</i>	Shrub	
<i>Oxalis exilis</i>	Herb	

Species	Life Form	Threat Status (2018)
<i>Parietaria debilis</i>	Herb	
<i>Parsonsia capsularis</i>	Liane	
<i>Parsonsia heterophylla</i>	Liane	
<i>Passiflora tetrandra</i>	Liane	
<i>Pellaea rotundifolia</i>	Fern	
<i>Pennantia corymbosa</i>	Tree	
<i>Phormium cookianum</i>	Herb	
<i>Phormium tenax</i>	Herb	
<i>Pimelea declivis</i>	Shrub	Threatened – Nationally Critical
<i>Pimelea pseudolyallii</i>	Shrub	At Risk – Naturally Uncommon
<i>Piper excelsum</i>	Shrub	
<i>Pittosporum eugenoides</i>	Tree	
<i>Pittosporum tenuifolium</i>	Tree	
<i>Plagianthus regius</i>	Tree	
<i>Plantago spathulata</i>	Herb	
<i>Pneumatopteris pennigera</i>	Fern	
<i>Poa cita</i>	Grass	
<i>Poa colensoi</i>	Grass	
<i>Poa imbecilla</i>	Grass	
<i>Podocarpus totara</i>	Tree	
<i>Polystichum richardii</i>	Fern	
<i>Polystichum vestitum</i>	Fern	
<i>Prumnopitys taxifolia</i>	Tree	
<i>Pseudopanax arboreus</i>	Tree	
<i>Pseudopanax crassifolius</i>	Tree	
<i>Pseudopanax ferox</i>	Tree	At Risk - Naturally Uncommon
<i>Pteridium esculentum</i>	Fern	
<i>Pterostylis areolata</i>	Herb	

Species	Life Form	Threat Status (2018)
<i>Pterostylis banksii</i>	Herb	
<i>Ranunculus multiscapus</i>	Herb	
<i>Ranunculus reflexus</i>	Herb	
<i>Raoulia monroi</i>	Herb	Threatened- Nationally Vulnerable
<i>Raukaua anomalus</i>	Shrub	
<i>Ripogonum scandens</i>	Liane	
<i>Rubus schmideliooides</i>	Liane	
<i>Rubus squarrosus</i>	Liane	
<i>Rytidosperma clavatum</i>	Grass	
<i>Rytidosperma racemosum</i>	Grass	
<i>Scandia geniculata</i>	Liane	
<i>Schefflera digitata</i>	Tree	
<i>Senecio aff. glaucophyllum (e) CHR 437799; Mt Cass</i>	Herb	Data Deficient
<i>Senecio glaucophyllum subsp. toa</i>	Herb	At Risk - Naturally Uncommon
<i>Senecio sp. aff. dunedinensis</i>	Herb	At Risk - Naturally Uncommon
<i>Solanum laciniatum</i>	Shrub	
<i>Sophora microphylla</i>	Tree	
<i>Sophora prostrata</i>	Shrub	
<i>Stellaria gracilenta</i>	Herb	
<i>Stellaria parviflora</i>	Herb	
<i>Stenostachys gracilis</i>	Grass	
<i>Streblus heterophyllus</i>	Shrub	
<i>Tetragonia implexicoma</i>	Herb	
<i>Trisetum lepidum</i>	Grass	
<i>Tupeia antarctica</i>	Parasite	At Risk - Declining
<i>Uncinia sp.</i>	Herb	
<i>Urtica ferox</i>	Shrub	

Species	Life Form	Threat Status (2018)
<i>Urtica incisa</i>	Herb	
<i>Veronica maccaskillii</i>	Shrub	Threatened - Nationally Endangered
<i>Veronica raoulii</i> subsp. <i>raoulia</i>	Shrub	
<i>Veronica salicifolia</i>	Shrub	
<i>Viola cunninghamii</i>	Herb	
<i>Vittadinia australis</i>	Herb	
<i>Wahlenbergia albomarginata</i>	Herb	