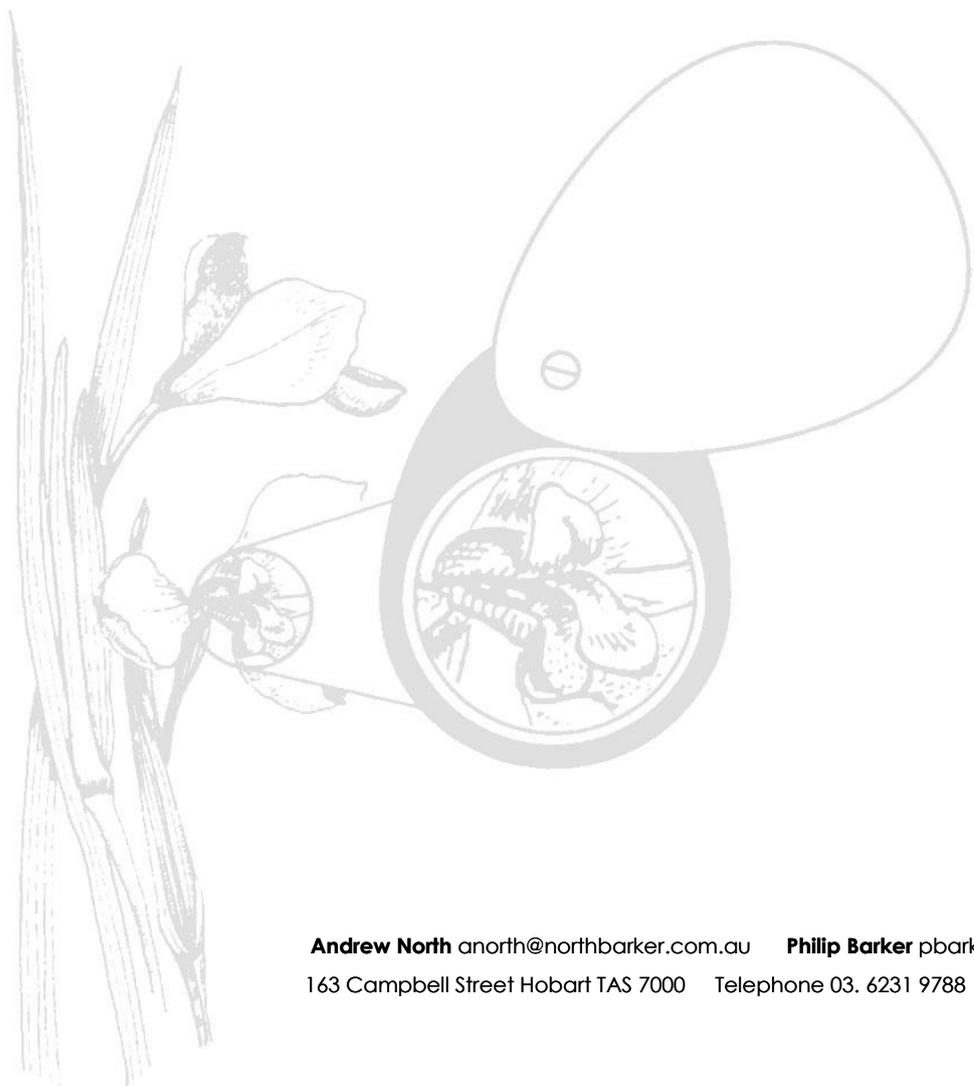




Hall's Island, Lake Malbena, Walls of Jerusalem

## FLORA AND FAUNA ASSESSMENT

21<sup>st</sup> November 2016  
For Riverfly (RIV002)





## Summary

The lessee of a historic hut on Hall's Island, Lake Malbena, in the Walls of Jerusalem National Park, is investigating the potential for guided tours to the island. The proposed impacts to the island include the construction of 4 new huts (joined by boardwalk), a helicopter landing pad, and potentially some boardwalks and foot pads leading to points of interest. To assist in the avoidance of threatened natural values and inform a Reserve Activity Assessment, the proponent engaged North Barker Ecosystem Services to undertake a flora and fauna assessment of the island.

### Vegetation

Prior to our survey, data held within the TASVEG v3.0 database suggested that Hall's Island was covered by *Athrotaxis cupressoides/ Nothofagus gunnii* short rainforest (RPF). Our field survey established that this community is not actually present and that the island is comprised of the following units:

- *Sphagnum* peatland (MSP) – 0.60 ha – NCA<sup>1</sup> threatened and EPBCA<sup>2</sup> endangered;
- Lichen lithosphere (ORO) – 0.18 ha;
- *Athrotaxis selaginoides* rainforest (RKP) – 0.03 ha – NCA threatened;
- Highland low rainforest and scrub (RSH) – 1.16 ha; and
- *Eucalyptus subcrenulata* forest and woodland (WSU) – 7.8 ha.

### Threatened Flora

The island supports a population of *Pterosphaera hookeriana*, which is listed as vulnerable under the Tasmanian *Threatened Species Protection Act 1995* (TSPA).

### Threatened Fauna

The only threatened fauna species known to occur within 5 km of the island is the Clarence galaxias, *Galaxias johnstoni* (TSPA and EPBCA endangered). The known occurrence of this species is adjacent to an area that will potentially be traversed on foot by visitors to the island. The island itself has no suitable habitat for the species.

No impacts to other threatened fauna species are likely to result from the proposal.

### Summary

Our field survey has established that the island contains two threatened vegetation communities (MSP and RKP) and one threatened plant species (*P. hookeriana*). It is recommended that the locations of these values are not utilised for hut or helicopter pad placement. Management prescriptions should also be applied to protect these values from fire and to avoid tramping.

It is understood that the current proposal is to place the hut and helicopter pad footprint within the ORO and WSU communities. These non-threatened communities are likely to be resilient to a proposal of this nature and potential losses in extent are considered to be negligible. It may be possible to construct boardwalks within the other communities by using a boardwalk design with minimal footprint and shading.

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<sup>1</sup> Tasmanian *Nature Conservation Act 2002* (NCA)

<sup>2</sup> Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA)

## Acknowledgments

**Project management:** Grant Daniels

**Field work and photographs:** Grant Daniels

**Report:** Grant Daniels

**Mapping:** Grant Daniels

**Client consultation:** Dan Hackett



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# 1. Introduction and Methods

## 1.1. Background

The lessee of a historic hut on Hall's Island, Lake Malbena, in the Walls of Jerusalem National Park<sup>3</sup>, is investigating the potential for guided tours to the island. The proposed impacts to the island include the construction of 4 new huts (joined by boardwalk), a helicopter landing pad, and potentially some boardwalks and foot pads leading to points of interest. To assist in the avoidance of threatened natural values and inform a Reserve Activity Assessment by the Tasmanian Parks and Wildlife Service, the proponent engaged North Barker Ecosystem Services to undertake a flora and fauna assessment of the island and a targeted threatened flora search within potential impact areas. The proposal may also include guests hiking to Lake Malbena from the east, but at this stage no formal track has been proposed and it is expected that the number of walkers will be low and proposed that concentrated impacts can be avoided by walkers fanning out and traversing the edges of bogs.

## 1.2. Location and Methods

### 1.2.1. Hall's Island

Hall's Island is located within the Central Highlands Council and the Tasmanian Central Highlands bioregion (Figure 1). Altitude on the island ranges from 1030 m to 1050 m AHD<sup>4</sup>. Average annual rainfall in the area is around 1000 mm<sup>5</sup>. The substrate is derived from Jurassic dolerite and the island is part of the listed geoconservation site 'Central Plateau Terrain', which is listed for its global significance as an example of both a continental erosion surface and a passive margin horst block.

### 1.2.2. Survey Area and Field Methods

The potential impact areas on the island were not definitively marked on the ground, but the proponent was present to identify proposed actions and sites, which are approximately indicated in Figure 2.

Field work was undertaken on foot by one observer on the 24<sup>th</sup> and 25<sup>th</sup> of October, 2016. Vegetation was mapped across the island in accordance with units defined in TASVEG 3.0<sup>6</sup>. Three quarters of the island (excluding the northwest quadrant where no actions are proposed and no impacts are anticipated based on the vegetation) were surveyed for vascular plants using a meandering area search technique<sup>7</sup>. Additional effort was focussed around the potential impact footprint, within potential threatened species<sup>8</sup> habitats and within threatened vegetation communities<sup>9</sup>. Plant species lists were compiled within each vegetation type using the current census of

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<sup>3</sup> Part of the Tasmanian Wilderness World Heritage Area

<sup>4</sup> Australian Height Datum

<sup>5</sup> Station details: Liawenee, Central Tasmania, 41.8997°S, 146.6694°E, 1057m AHD, commenced 2001

<sup>6</sup> Kitchener and Harris 2013

<sup>7</sup> Goff *et al.* 1982

<sup>8</sup> Tasmanian *Threatened Species Protection Act 1995* (TSPA) and/or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA)

<sup>9</sup> Tasmanian *Nature Conservation Act 2002* (NCA) or the EPBCA

Tasmanian plants<sup>10</sup> for nomenclature. Surveying and identification of non-vascular flora was limited to searches for the EPBCA vulnerable *Pseudocephalozia paludicola*. Observations of habitat suitability for fauna, as well as direct or indirect indicators of presence (i.e. sightings, scats, tracks, dens, etc.) were made concurrently with the flora survey.

Vegetation was not mapped on the walk to Lake Malbena, but to aid the avoidance of vegetation potentially sensitive to trampling, waypoints were taken adjacent to patches of *Sphagnum* peatland.

All data points were recorded with a handheld GPS.

### 1.2.3. Limitations

Due to seasonal variations in detectability and identification, there may be some species on the island that have been overlooked or were seasonally absent during the survey. In particular, grasses and graminoids were largely lacking fertile material. To compensate for these limitations to some degree, data from the present survey are supplemented with data from the Tasmanian Natural Values Atlas<sup>11</sup> (NVA) and the EPBC Significant Matters database (PMST\_GLKPXZ). From these sources, all threatened species known or with the potential to occur within 5 km are considered in terms of habitat suitability on the island.

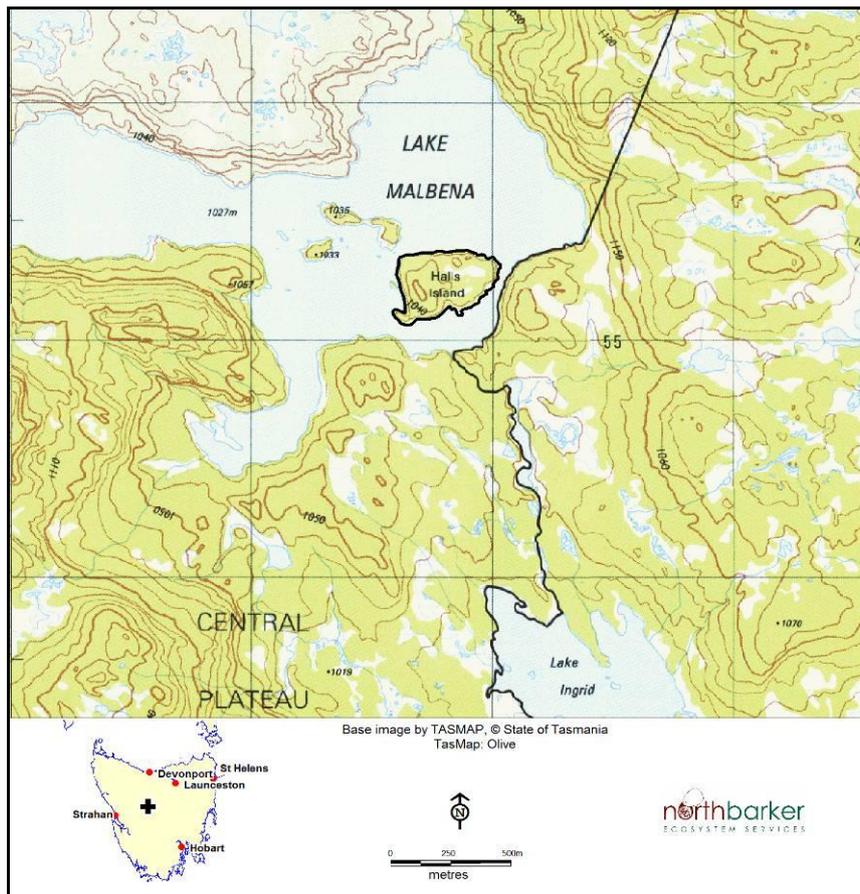


Figure 1: Location of Lake Malbena and Hall's Island, within the Walls of Jerusalem

<sup>10</sup> de Salas and Baker 2016

<sup>11</sup> nvr\_2\_02-Sep-2016

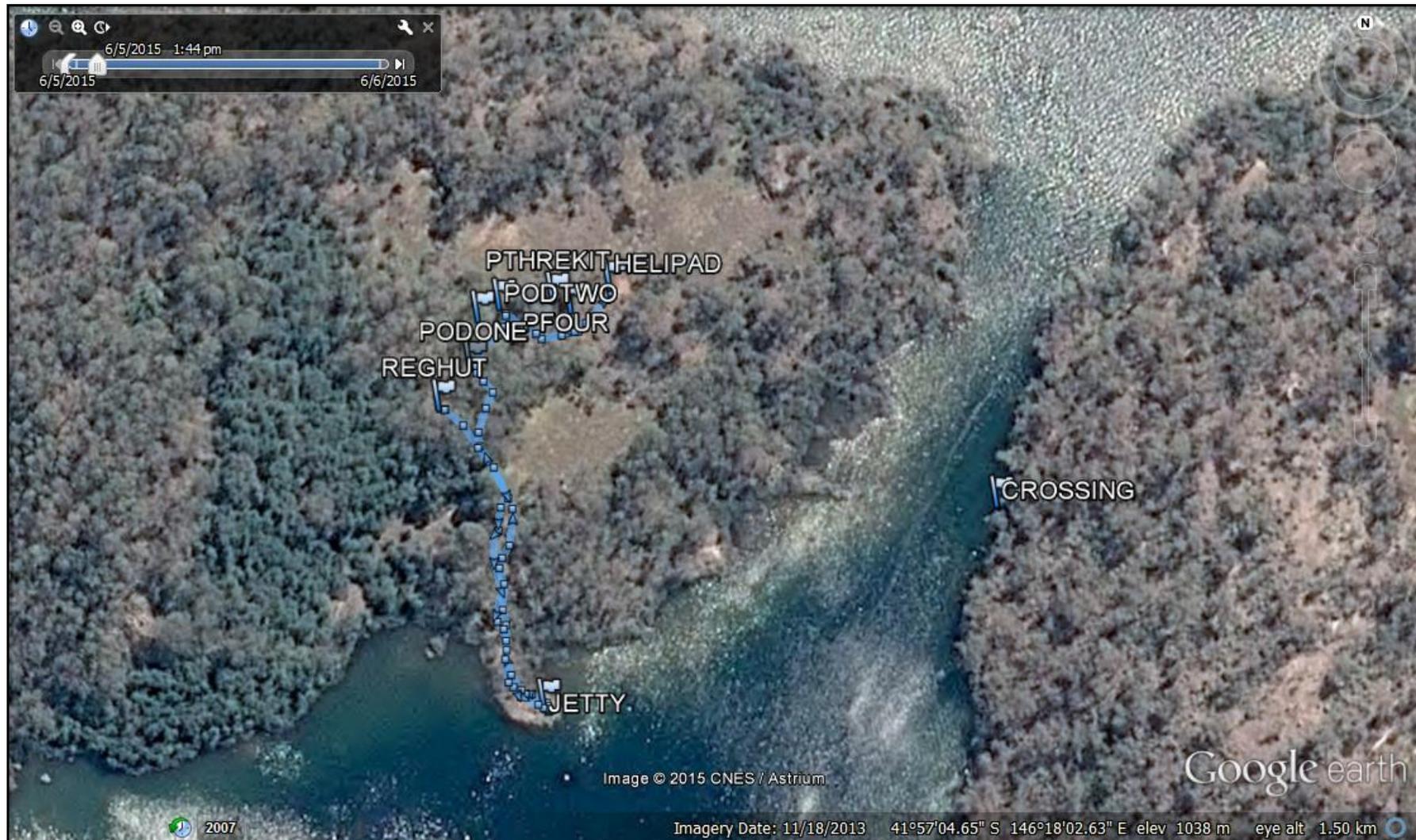


Figure 2: Approximate locations of proposed huts and helipad on Hall's Island (points and image supplied by proponent)

## 2. Results - Biological Values

### 2.1. Vegetation

Prior to our survey, data held within the TASVEG v3.0 database suggested that Hall's Island was covered by *Athrotaxis cupressoides/ Nothofagus gunnii* short rainforest (RPF). Our field survey established that this community is not actually present and that the island is comprised of the following units:

- *Sphagnum* peatland (MSP) – 0.60 ha – NCA threatened and EPBCA endangered;
- Lichen lithosphere (ORO) – 0.18 ha;
- *Athrotaxis selaginoides* rainforest (RKP) – 0.03 ha – NCA threatened;
- Highland low rainforest and scrub (RSH) – 1.16 ha; and
- *Eucalyptus subcrenulata* forest and woodland (WSU) – 7.8 ha.

Distribution of vegetation communities within the island are presented in Figure 3, with floristics in Appendix A and brief summaries of defining traits below.

#### 2.1.1. *Sphagnum* peatland (MSP)

This bog community occupies poorly drained depressions in the eastern half of the island (Figure 3). Dominant vascular plant species were found to be *Gleichenia alpina* (coral fern) and *Empodisma minus*, with occasional patches of other sedges and graminoids, including *Carpha alpina*, *Carex appressa* and *Juncus sarophorus* (Plate 1). Shrub species were infrequent, but some patches of *Richea scoparia* and *Baeckea gunniana* were present, as well as infrequent *Sprengelia incarnata* and *Almaleea subumbellata*. Herbs were mostly sparse, although a small pond within one patch contained a high cover of *Isolepis fluitans*.

Despite the high percentage cover of coral fern and monocots, the dominant factor defining this community is the percentage of ground covered by *Sphagnum* moss. 30 % cover of *Sphagnum* is required to be classified as *Sphagnum* peatland (MSP) under TASVEG 3.0<sup>12</sup>, which is listed as threatened under the NCA and meets the definition for the 'alpine sphagnum bog and associated fens' community listed as endangered under the EPBCA. All the bogs on Hall's Island have thus been mapped as MSP because of the percentage cover of *Sphagnum* species, with most patches having well over the required 30 % cover (up to 80 % ground cover in some cases) and over 50 cm depth of *Sphagnum* being evident in places (Plate 2). Of note, the patch of MSP adjacent to the rainforest communities contains emergent pencil pines *Athrotaxis cupressoides* (Plate 3). The description of the TASVEG community for pencil pine woodland (RPW), allows for the presence of *Sphagnum* at ground level. However, because the percentage cover of *Sphagnum* in this patch is so high (> 75 %) it best fits the definition of the MSP community with emergent pencil pines (MSP\_AC). In all cases throughout this report, MSP can be taken to include MSP\_AC.

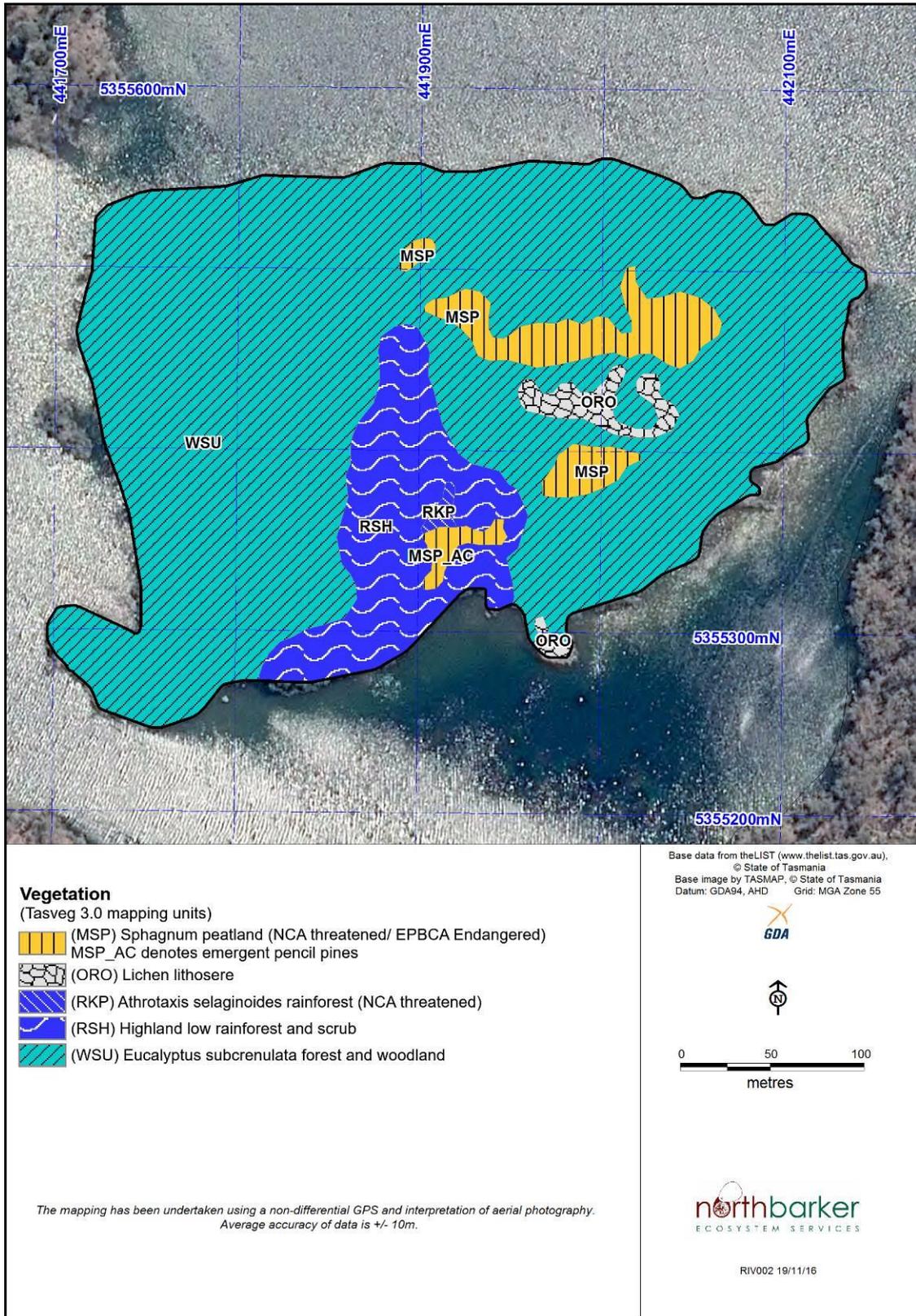
Several *Sphagnum* bogs were recorded on the way into Lake Malbena (Appendix B).

#### 2.1.2. Lichen lithosphere (ORO)

This community has been mapped on the island where bare rock and/or lichens predominate over vascular plants or *Sphagnum* species. The largest patch of ORO on the island includes small clusters of shrubs on the edge of the rock (Plate 4), with the species composition mostly being derived from the adjacent sclerophyll vegetation. The most frequent shrubs include *Orites revolutus*, *Planocarpa petiolaris* and *Monotoca empetrifolia*.

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<sup>12</sup> Kitchener and Harris 2013



**Figure 3: Distribution of TASVEG units on Hall's Island**



**Plate 1: *Sphagnum* peatland (foreground) with emergent *Gleichenia* and *Empodisma* – MSP community**



**Plate 2: Bench of *Sphagnum* on edge of MSP\_AC patch**



**Plate 3: *Sphagnum* peatland with emergent pencil pine *Athrotaxis cupressoides* – MSP\_AC**



**Plate 4: Lichen lithosphere within the potential impact area of hut number 1**

### 2.1.3. Rainforest – highland low rainforest and scrub (RSH), and *Athrotaxis selaginoides* rainforest (RKP)

These communities occur in a shallow but protected gully in the south of the island (Figure 3). The patch is characteristically species poor and structurally simple (Plate 5 and 6). The RSH is dominated by a canopy of *Nothofagus cunninghamii* over a very sparse understorey of occasional *Leptecophylla juniperina* ssp. *parvifolia*, *Coprosma nitida*, *Phyllocladus aspleniifolius* and *Telopea truncata*. Occasional epiphytic ferns include *Grammitis billardierei* and *Hymenophyllum peltatum*. The small area of *Athrotaxis selaginoides* rainforest (RKP) was differentiated from the RSH because of the presence of a cluster of sub-dominant and co-dominant king billy pines amongst the *Nothofagus cunninghamii*. RKP is a threatened community listed under the Tasmanian NCA.

### 2.1.4. *Eucalyptus subcrenulata* forest and woodland (WSU)

This was the dominant community across the island in terms of area covered (Figure 3). The canopy was dominated mainly by the yellow gum *Eucalyptus subcrenulata*, with localised patches of *E. delegatensis* and *E. coccifera*. The majority of the understorey was comprised of a relatively dry facies dominated by medium tall sclerophyll shrubs (Plate 7), including *Hakea lissosperma*, *Persoonia gunnii*, *Lomatia polymorpha* and *Banksia marginata*. The open ground layer included patches of *Planocarpa petiolaris*, *Monotoca empetrifolia*, *Bellenden montana* and *Diplarrena moraea*. Poorly drained niches included *Bauera rubioides*, *Leptospermum lanigerum*, *Gahnia grandis* and *Epacris gunnii*. Other sheltered niches included small stands of subcanopy *Nothofagus cunninghamii* and *Phyllocladus aspleniifolius*. The waterside margins of the community in the south-eastern part of the island included a dense stand of *Pherosphaera hookeriana*.



Plate 5: The edge of the patch of highland low rainforest and scrub (RSH)



**Plate 6: *Athrotaxis selaginoides* rainforest (RKP) on the edge of a broader area of RSH**



**Plate 7: *Eucalyptus subcrenulata* forest and woodland in the north of the island**

## 2.2. Plant Species of Conservation Significance

In total, 53 species of vascular plants were recorded during our field survey (Appendix C). This included one species, *Pherosphaera hookeriana* listed as vulnerable under the schedules of the TSPA (Table 1, Figure 4). This species, known as the Mount Mawson pine (or the drooping pine), was already known from Hall's Island and is the only threatened species previously recorded from within 500 m<sup>13</sup>.

Only two other threatened flora species have previously been recorded within 5 km of the island (Table 1). Although the island contains suitable habitat for these species, neither is considered highly likely to have been overlooked to the extent where unanticipated impacts may occur.

Three other EPBCA listed species are considered to have the potential to occur within 5 km<sup>14</sup> but do not have suitable habitat on the island (Table 1).

**Table 1: Flora species of conservation significance known or predicted to potentially occur within a 5 km radius of the island<sup>15</sup>**

Species	Status TSPA / EPBCA	Potential to occur if not observed	Observations and preferred habitat
<b>KNOWN FROM HALL'S ISLAND</b>			
<i>Pherosphaera hookeriana</i> Mt Mawson pine	Vulnerable/ -	<b>PRESENT</b>	A coniferous shrub or small tree that is highly sensitive to fire. Can form extensive clonal thickets by suckering, which can make the estimation of population size difficult.  Our field survey recorded a dense but narrow band of plants around most of the southern edge of the island (Figure 4, Plates 8 and 9). Estimated percentage cover within this area of 3,500 m <sup>2</sup> is 30 %. The previous record of this species attributed to Hall's Island estimated 150 ± 50 plants are present, but this is likely to be an underestimate based on our mapping.
<b>REPORTED FROM WITHIN 5 km<sup>16</sup></b>			
<i>Planocarpa nitida</i> black cheeseberry	Rare/ -	Very low	A short, compact shrub endemic to Tasmanian and found mostly on the eastern Central Plateau. Only one record known from within 5 km of Hall's Island.  Habitat on the island is moderately suitable in areas of WSU and ORO, but the distinctive species is considered highly unlikely to have been overlooked.  The more widespread congeneric species, <i>Planocarpa petiolaris</i> , was

<sup>13</sup> nvr\_2\_02-Sep-2016

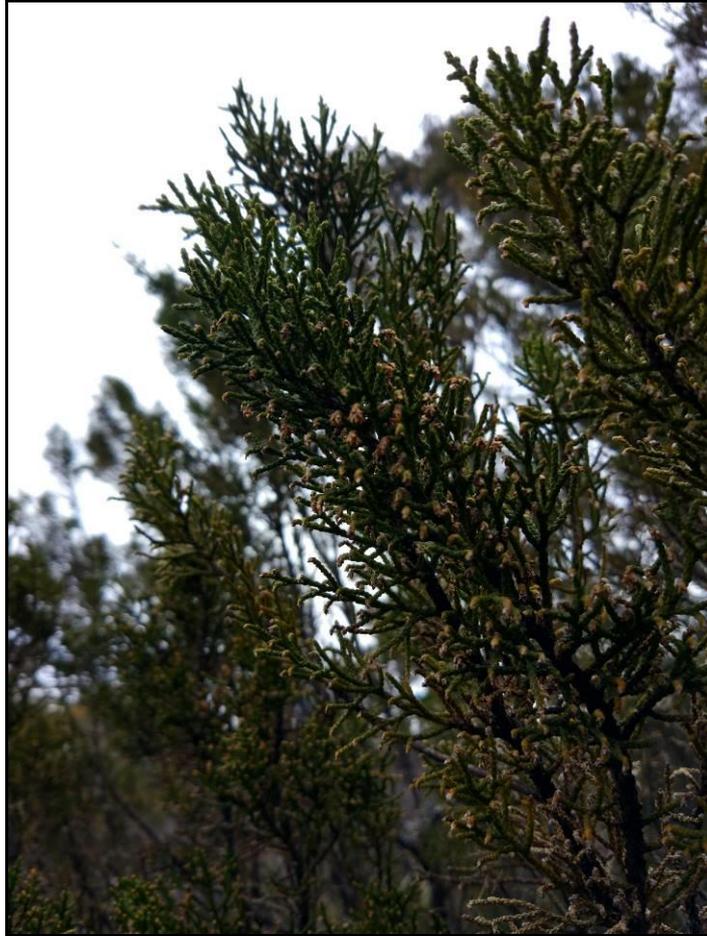
<sup>14</sup> EPBC Significant Matters database report PMST\_GLKPXZ

<sup>15</sup> nvr\_2\_02-Sep-2016; EPBC Significant Matters database report PMST\_GLKPXZ

<sup>16</sup> nvr\_2\_02-Sep-2016

Species	Status TSPA / EPBCA	Potential to occur if not observed	Observations and preferred habitat
			present on the island and is differentiated by leaf morphology and inflorescence traits.
<i>Pseudocephalozia paludicola</i> liverwort	-/ VULNERABLE	Low	An erect liverwort that is light coloured and often lucid green. Known to occur in wet ground in subalpine grassland, moorland and sphagnum areas. Only one record is known from within 5 km of the island.  Suitable habitat (areas of MSP) were searched for the species and it was not recorded.
<b>PREDICTED AS POSSIBLY OCCURRING WITHIN 5 km<sup>17</sup></b>			
<i>Colobanthus curtisiae</i> Curtis' colobanth	Rare/ VULNERABLE	None	A small perennial herb of grasslands and grassy woodlands, often on rocky outcrops within these habitats.  No suitable habitat on the island and not likely to have been overlooked.
<i>Eucalyptus gunnii</i> ssp. <i>divaricata</i> Miena cider gum	Endangered/ ENDANGERED	None	No suitable habitat is found on the island and the species is highly unlikely to have been overlooked.  During the walk in to Lake Malbena some specimens of <i>E. gunnii</i> were noted around 443429.59 E, 5355189.74 N. Material collected from these plants is being examined to differentiate to the subspecies level. Impacts to these trees are very unlikely given the nature of the proposal.
<i>Leucochrysum albicans</i> var. <i>tricolor</i> grassland paper daisy	Endangered/ ENDANGERED	None	A floriferous herb of grasslands and grassy woodlands, generally on basalt soil.  No suitable habitat on the island and not likely to have been overlooked.

<sup>17</sup> EPBC Significant Matters database report PMST\_GLKPXZ



**Plate 8: Female *Pherosphaera hookeriana* on Hall's Island**



**Plate 9: Thicket of *Pherosphaera hookeriana* on the edge of the water of Lake Malbena (looking east from Hall's Island)**



Figure 4: Threatened flora observations on Hall's Island

## 2.3. Introduced Plants

No introduced plant species were observed on the island.

## 2.4. Fauna Species of Conservation Significance

### 2.4.1. Field survey results

Eleven species of vertebrate fauna were observed directly or indirectly during our survey (Appendix D). Based on our observations, the long-tailed mice (*Pseudomys higginsi*) and the Tasmanian froglet (*Crinia tasmaniensis*) may be the only vertebrate species permanently resident on the island. No threatened fauna species were observed, nor were any habitat elements that could conceivably be used for nesting or denning by threatened species.

### 2.4.2. Range boundaries within 500 m

Based on range boundaries from the NVA, the island is in the potential range of seven threatened fauna species (Table 2). Each of these species have average home range sizes that are too large for the island to support permanent populations. Based on the absence of available nesting and denning opportunities, it is likely that if any of these species use the island it would only be occasionally for foraging. Even if nesting or denning was attempted by any of the species in Table 2, it is unlikely that the island would have sufficient prey to make raising a litter/brood there energetically viable.

No eagle nests are known or likely to occur within 500 m or 1 km line of sight.

**Table 2: Threatened fauna species with range boundaries within a 500 m radius of the island<sup>18</sup> - SS = TSPA; NS = EPBCA**

Species	Common Name	SS	NS	Potential	Known	Core
<i>Aquila audax</i>	wedge-tailed eagle	pe	PEN	I	0	0
<i>Dasyurus maculatus</i>	spotted-tailed quoll	r	VU	I	0	0
<i>Aquila audax subsp. fleayi</i>	tasmanian wedge-tailed eagle	e	EN	I	0	0
<i>Sarcophilus harrisi</i>	tasmanian devil	e	EN	I	0	0
<i>Tyto novaehollandiae</i>	masked owl	pe	PVU	I	0	0
<i>Accipiter novaehollandiae</i>	grey goshawk	e		I	0	0
<i>Haliaeetus leucogaster</i>	white-bellied sea-eagle	v		I	0	0

### 2.4.3. Known occurrences within 5 km

The only threatened fauna species known to occur within 5 km of the island is the Clarence galaxias, *Galaxias johnstoni* (TSPA and EPBCA endangered). The known occurrence of this species (Table 3) is adjacent to an area that will potentially be traversed on foot by visitors to the island. The island itself has no suitable habitat for the species.

### 2.4.4. EPBCA database predictions within 5 km

Several other species are predicted by the EPBCA protected matters database as having potential to occur within 5 km of the island (Table 4)<sup>19</sup>. Of these species, only the Japanese snipe and the satin flycatcher have a moderate likelihood of utilising the island. The snipe is a non-breeding migrant that may use the bogs for foraging. The flycatcher is unlikely to be impacted by a proposal of this scale and nature.

<sup>18</sup> nvr\_2\_02-Sep-2016

<sup>19</sup> EPBC Significant Matters database report PMST\_GLKPXZ

**Table 3: Known observations of threatened fauna within a 5 km radius of the island<sup>20</sup> -  
SS = TSPA; NS = EPBCA**

Id	Species	Common Name	SS	NS	Observers	Date	Obs Type	Easting/Northing GDA94 Zone 55
1357038	<i>Galaxias johnstoni</i>	clarence galaxias	e	EN	Jean Jackson (1308), Andrew Harvey (1844)	13-Apr-2000	Sighting	446588, 5355240 +/- 20m
1262700	<i>Galaxias johnstoni</i>	clarence galaxias	e	EN	Robert Freeman (20722)	01-Jan-2009	Sighting	446808, 5355059 +/- 200m
1357039	<i>Galaxias johnstoni</i>	clarence galaxias	e	EN	Jean Jackson (1308), Andrew Harvey (1844)	13-Apr-2000	Sighting	446588, 5355240 +/- 20m
1262702	<i>Galaxias johnstoni</i>	clarence galaxias	e	EN	Jean Jackson (1308)	07-Nov-2001	Sighting	446008, 5355006 +/- 100m
1262701	<i>Galaxias johnstoni</i>	clarence galaxias	e	EN	Jean Jackson (1308)	13-Apr-2000	Sighting	446812, 5355058 +/- 100m

**Table 4: Potential for EPBCA listed threatened and/or migratory species to occur within 5 km of the island, based on the protected matters database and excluding species covered in Table 2 and 3 – status refers to EPBCA listing only<sup>21</sup>**

Name	Status	Type of Presence
<b>Birds</b>		
<u><i>Botaurus poiciloptilus</i></u> Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area
<u><i>Calidris ferruginea</i></u> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<u><i>Lathamus discolor</i></u> Swift Parrot [744]	Critically Endangered	Species or species habitat may occur within area
<u><i>Numenius madagascariensis</i></u> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
<u><i>Pterodroma leucoptera leucoptera</i></u> Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area
<b>Insects</b>		
<u><i>Oreixenica ptunarra</i></u> Ptunarra Brown, Ptunarra Brown Butterfly, Ptunarra Xenica [26327]	Endangered	Species or species habitat may occur within area

<sup>20</sup> nvr\_2\_02-Sep-2016

<sup>21</sup> EPBC Significant Matters database report PMST\_GLKPXZ

**Table 4 continued**

<b>Migratory Marine Birds</b>		
<u>Apus pacificus</u>		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
<b>Migratory Terrestrial Species</b>		
<u>Myiagra cyanoleuca</u>		
Satin Flycatcher [612]		Species or species habitat likely to occur within area
<b>Migratory Wetlands Species</b>		
<u>Calidris ferruginea</u>		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<u>Gallinago hardwickii</u>		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
<u>Numenius madagascariensis</u>		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

### 3. Potential Impacts and Scope for Mitigation

The current proposal is to locate the new huts primarily within the main patch of ORO, with some encroachment into the WSU, but no buildings will be located within *Sphagnum* bogs or any of the rainforest communities. The proposal may include boardwalks through these communities.

#### 3.1. Threatened Vegetation Communities

- *Sphagnum* peatlands are vulnerable to trampling. Permanent tracks should not be formed within the areas of MSP on the island and the patches specified in Appendix B.
- Patches within Appendix B can be avoided by routing visitors around the margins of the patches into more resilient vegetation types. Should other patches be found following route changes, no walking should occur within areas with > 30 % cover of *Sphagnum* moss.
- If necessary, patches on the island may be traversed with boardwalks that have minimal footprint and block very little light. In one patch, a small foot pad already exists from the jetty to the existing hut site (Reg's Hut in Figure 2). Given this pad is already present with seemingly minimal impacts (Plate 10), it could be viable to maintain it as a track without compromising the MSP patch. Lining the edges of the track with natural stone or similar could dissuade visitors from encroaching beyond the existing pad.
- The island contains patches of fire sensitive vegetation in the form of MSP, RKP and to a lesser extent RSH. The pencils pines within MSP\_AC and the king billy pines within the RKP are very fire sensitive.
- The Walls of Jerusalem is a Fuel Stove Only Area and large areas of the parks fire sensitive vegetation have been lost to past fires. Any intention to equip the huts with fireplaces would need to be done with strict specifications to prevent a bushfire.



**Plate 10: Existing foot pad through one patch of MSP on the island**

### **3.2. Threatened Fauna**

- Impacts to the habitat of the Clarence galaxias should be avoided by routing visitors to the island around the bog in which the species is known to occur. As this area is one of the bogs specified for avoidance in Appendix B, this will be achieved by following the mitigation measures for threatened vegetation communities. No other impacts to the habitat of this species are likely.
- No impacts to other threatened fauna species are likely to result from the proposal.

### **3.3. Weeds**

- Although the vegetation communities on the island are relatively resilient to weed invasion, there is suitable habitat for the orange hawkweed *Hieracium aurantiacum*, which is a declared weed under the *Tasmanian Weed Management Act 1999* and is recognised as a threat to *Sphagnum* communities<sup>22</sup>. The orange hawkweed is known from the Derwent Bridge/ Lake St Clair area, as well as near the Lake Highway.
- Any proposal to guide visitors to the island, either by foot or by air, should include hygiene measures to prevent visitors introducing weeds such as orange hawkweed to the island and the National Park more broadly. Hygiene measures should include inspections of gear for seeds and other contaminants (such as clumps of soil).

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<sup>22</sup> Commonwealth of Australia 2009

### 3.4. Threatened Flora

- The impact footprint should be designed to avoid *Pherosphaera hookeriana*.
- During works, physical impacts to any *P. hookeriana* plants near the impact area should be avoided by flagging or cordoning off the plants and alerting construction workers as to their location.
- If there are any plants of this species (or any other threatened flora species) that cannot be avoided entirely, the proponent must apply for a permit to take from DPIPW.
- *P. hookeriana* are very fire sensitive. As is a similar species of small pine, *Diselma archeri*, which also occurs on the island, including co-occurring within the main patch of *P. hookeriana*. For the same reasons as mentioned in the threatened community section, any intention to equip the huts with fireplaces would need to be done with strict specifications to prevent a bushfire and damage to these species.

### 3.5. General

- During works, to avoid inadvertent and unnecessary impact beyond the footprint, threatened species and communities near impact areas should be flagged and construction workers made aware of their locations. This includes locations for stockpiling materials, which should be excluded from areas of threatened values and where possible not be located near trees (to prevent root smothering).
- Avoidance and protection of values may best be achieved by having an ecologist present during site design/ placement of huts, pads, etc.
- A sensitive construction method in this case could involve airlifting in kit-style huts and depositing them within the impact area.
- Because neither ORO nor WSU are threatened communities, the impact footprint should be placed preferentially in these communities. The potential scale of losses to the communities from this proposal is negligible in relation to their extent at a local, State and national level.

## 4. Legislative Requirements for Flora and Fauna

### 4.1. Commonwealth Environment Protection and Biodiversity Conservation Act 1999

The EPBCA is structured for self-assessment, with guidelines and criteria available<sup>23</sup> to assist any person who proposes to take an action to decide whether they should submit a referral to the Australian Government Department of the Environment for a decision by the Australian Government Environment Minister (the minister) on whether assessment and approval is required under the Act.

Under the Act, an action will require approval from the minister if the action has, will have, or is likely to have, a significant impact on a matter of national environmental significance (MNES), which includes all species and communities listed as threatened and/or migratory under the Act.

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<sup>23</sup> Commonwealth of Australia 2013

Although it was not observed during our survey, the patches of MSP on Hall's Island are suitable habitat for the EPBCA vulnerable *Pseudocephalozia paludicola*. The species is unlikely to have been overlooked, but if it is in fact present, a significant impact is likely to be avoided by following the recommended prescriptions for the avoidance of trampling and prevention of fire within the MSP community. The probability of any other EPBCA listed flora species occurring within the impact area is negligible.

Significant impacts to the Clarence galaxias are likely to be avoided by the avoidance of trampling the patches of bog within Appendix B. No other significant impacts to EPBCA listed fauna are likely.

Significant impacts to the EPBCA listed 'alpine sphagnum bogs and associated fens' ecological community can be avoided by applying the prescriptions for avoidance of trampling and fire within the MSP community (Appendix E).

With these prescriptions and careful design of the impact footprint, referral to the minister based on impacts to species or communities that are MNES is not considered to be necessary for this proposal. However, because the proposal is within a World Heritage Area this aspect must also be considered in relation to significant impacts.

## **4.2. Tasmanian Threatened Species Protection Act 1995**

Any impact on threatened plant species listed under the TSPA will require a 'permit to take' from the Policy and Conservation Assessments Branch (PCAB) at the Department of Primary Industries, Parks, Wildlife and the Environment (DPIPWE). Thus, if complete avoidance is not possible, the proponent will be required to obtain a permit to take for *Pherosphaera hookeri*.

## **4.3. Tasmanian Weed Management Act 1999**

No action is currently required to eradicate or control species under this Act. Appropriate visitor hygiene should be applied to maintain compliance.

## **5. Conclusion**

Our field survey has established that the island contains two threatened vegetation communities (MSP and RKP) and one threatened plant species (*P. hookeriana*). It is recommended that the locations of these values are not utilised for hut or helicopter pad placement. Management prescriptions should also be applied to protect these values from fire and to avoid trampling.

It is understood that the current proposal is to place the hut and helicopter pad footprint within the ORO and WSU communities. These non-threatened communities are likely to be resilient to a proposal of this nature and potential losses in extent are considered to be negligible. It may be possible to construct boardwalks within the other communities by using a boardwalk design with minimal footprint and shading.

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## Appendix A - Vascular Plant Species in Communities

### ORO in potential impact footprint

Grid Reference: 441961E, 5355432N  
Accuracy: within 50 metres  
Recorder: Grant Daniels  
Date of Survey: 25 Oct 2016

Trees: *Eucalyptus delegatensis* subsp. *tasmaniensis*, *Eucalyptus subcrenulata*,  
*Phyllocladus aspleniifolius*  
Tall Shrubs: *Leptospermum lanigerum*, *Oxylobium ellipticum*  
Shrubs: *Bauera rubioides*, *Hakea lissosperma*, *Leptecophylla juniperina* subsp. *parvifolia*,  
*Monotoca submutica*, *Orites revolutus*, *Persoonia gunnii*, *Planocarpa petiolaris*,  
*Pultenaea juniperina*  
Low Shrubs: *Olearia erubescens*  
Herbs: *Stylidium graminifolium*  
Grasses: *Poa* sp., *Rytidosperma* sp.

### MSP - sphagnum peatland with emergent coral fern and cord rush

Grid Reference: 441969E, 5355456N  
Accuracy: within 50 metres  
Recorder: Grant Daniels  
Date of Survey: 25 Oct 2016

Shrubs: *Baeckea gunniana*, *Richea scoparia*, *Sprengelia incarnata*  
Herbs: *Almaleea subumbellata*, *Ranunculus* sp.  
Graminoids: *Carex appressa*, *Carpha* sp., *Empodisma minus*, *Gahnia grandis*, *Isolepis fluitans*,  
*Juncus sarophorus*  
Ferns: *Gleichenia alpina*

### WSU - *E. subcrenulata* forest

Grid Reference: 441919E, 5355498N  
Accuracy: within 100 metres  
Recorder: Grant Daniels  
Date of Survey: 25 Oct 2016

Trees: *Eucalyptus coccifera*, *Eucalyptus delegatensis* subsp. *tasmaniensis*, *Eucalyptus subcrenulata*, *Phyllocladus aspleniifolius*  
Tall Shrubs: *Banksia marginata*, *Leptospermum lanigerum*, *Olearia argophylla*, *Oxylobium ellipticum*, *Telopea truncata*  
Shrubs: *Bauera rubioides*, *Bossiaea riparia*, *Coprosma nitida*, *Diselma archeri*, *Epacris gunnii*, *Exocarpos humifusus*, *Hakea lissosperma*, *Leptecophylla juniperina* subsp. *parvifolia*, *Lomatia polymorpha*, *Monotoca empetrifolia*, *Orites revolutus*, *Persoonia gunnii*, *Pherosphaera hookeriana*, *Pultenaea juniperina*, *Tasmannia lanceolata*  
Low Shrubs: *Olearia erubescens*, *Pentachondra pumila*  
Herbs: *Bellenden montana*, *Stylidium graminifolium*  
Graminoids: *Diplarrena moraea*, *Gahnia grandis*  
Grasses: *Poa* sp.

**RSH - highland scrub rainforest, RPK - king billy pine rainforest and edge of MSP\_AC**

Grid Reference: 441844E, 5355339N  
Accuracy: within 100 metres  
Recorder: Grant Daniels  
Date of Survey: 25 Oct 2016

Trees: *Athrotaxis cupressoides*, *Athrotaxis selaginoides*, *Nothofagus cunninghamii*,  
*Phyllocladus aspleniifolius*

Tall Shrubs: *Telopea truncata*

Shrubs: *Coprosma nitida*, *Leptecophylla juniperina* subsp. *parvifolia*, *Ptherosphaera*

Low Shrubs: *Olearia erubescens*

Herbs: *Viola hederacea*

Grasses: *Poa tenera*

Ferns: *Grammitis billardierei*, *Hymenophyllum peltatum*, *Polystichum proliferum*

## Appendix B – *Sphagnum* bogs identified for avoidance

The following patches of bogs were identified on the walk into Hall's Island as containing *Sphagnum* species and potentially being sensitive to trampling – no formal surveys were undertaken in these patches but it is likely the percentage cover of *Sphagnum* in most or all patches is sufficient to qualify for protection under the NCA and EPBCA

Habitat type	East_GDA	North_GDA	Location accuracy (m)	Date	Surveyed by
Bog with <i>Sphagnum</i> spp.	446520.23	5355466.07	within 100 m	24/10/2016	Grant Daniels
Bog with <i>Sphagnum</i> spp.	446441.23	5355401.19	within 100 m	24/10/2016	Grant Daniels
Bog with <i>Sphagnum</i> spp.	446400.08	5355373.56	within 100 m	24/10/2016	Grant Daniels
Bog with <i>Sphagnum</i> spp.	446340.86	5355301.83	within 100 m	24/10/2016	Grant Daniels
Bog with <i>Sphagnum</i> spp.	446176.24	5355215.53	within 100 m	24/10/2016	Grant Daniels
Bog with <i>Sphagnum</i> spp.	446060.71	5355213.88	within 100 m	24/10/2016	Grant Daniels
Bog with <i>Sphagnum</i> spp.	445880.12	5355256.14	within 100 m	24/10/2016	Grant Daniels
Bog with <i>Sphagnum</i> spp.	445492.97	5355417.51	within 100 m	24/10/2016	Grant Daniels
Bog with <i>Sphagnum</i> spp.	445176.34	5355418.52	within 100 m	24/10/2016	Grant Daniels
Bog with <i>Sphagnum</i> spp.	443870.44	5355128.17	within 100 m	24/10/2016	Grant Daniels
Bog with <i>Sphagnum</i> spp.	442444.95	5355257.45	within 100 m	24/10/2016	Grant Daniels
Bog with <i>Sphagnum</i> spp.	444823.14	5355057.69	within 100 m	25/10/2016	Grant Daniels
Bog with <i>Sphagnum</i> spp.	445149.15	5355236.21	within 100 m	25/10/2016	Grant Daniels

## Appendix C - Vascular Plant Species List

### Status codes:

ORIGIN	NATIONAL SCHEDULE	STATE SCHEDULE
i - introduced	EPBC Act 1999	TSP Act 1995
d - declared weed WM Act	CR - critically endangered	e - endangered
en - endemic to Tasmania	EN - endangered	v - vulnerable
t - within Australia, occurs only in Tas.	VU - vulnerable	r - rare

### Sites:

1	ORO in potential impact footprint - E441961, N5355432	25-10-2016	Grant	Daniels
2	MSP - sphagnum peatland with emergent coral fern and cord rush - E441969, N5355456	25-10-2016	Grant	Daniels
3	WSU - E. subcrenulata forest - E441919, N5355498	25-10-2016	Grant	Daniels
4	Vertebrate fauna recorded on island - E441925, N5355500	25-10-2016	Grant	Daniels
5	RSH - highland scrub rainforest, RPK - king billy pine rainforest and edge of MSP_AC - E441844, N5355339	25-10-2016	Grant	Daniels

Site	Name	Common name	Status
	<b>DICOTYLEDONAE</b>		
	<b>ASTERACEAE</b>		
3	<i>Olearia argophylla</i>	musk daisybush	
1 3 5	<i>Olearia erubescens</i>	moth daisybush	
	<b>CUNONIACEAE</b>		
1 3	<i>Bauera rubioides</i>	wiry bauera	
	<b>EPACRIDACEAE</b>		
3	<i>Epacris gunnii</i>	coral heath	
1 3 5	<i>Leptecophylla juniperina subsp. parvifolia</i>	mountain pinkberry	en
3	<i>Monotoca empetrifolia</i>	mat broomheath	en
1	<i>Monotoca submutica</i>	mountain broomheath	en
3	<i>Pentachondra pumila</i>	carpet frillyheath	
1	<i>Planocarpa petiolaris</i>	alpine cheeseberry	en
2	<i>Richea scoparia</i>	scoparia	en
2	<i>Sprengelia incarnata</i>	pink swampheath	
	<b>FABACEAE</b>		
2	<i>Almaleea subumbellata</i>	wiry bushpea	
3	<i>Bossiaea riparia</i>	leafless bossiaea	
1 3	<i>Oxylobium ellipticum</i>	golden shaggypea	
1 3	<i>Pultenaea juniperina</i>	prickly beauty	
	<b>FAGACEAE</b>		
5	<i>Nothofagus cunninghamii</i>	myrtle beech	
	<b>MYRTACEAE</b>		
2	<i>Baeckea gunniana</i>	alpine heathmyrtle	
3	<i>Eucalyptus coccifera</i>	snow peppermint	en
1 3	<i>Eucalyptus delegatensis subsp. tasmaniensis</i>	gumtopped stringybark	en
1 3	<i>Eucalyptus subcrenulata</i>	alpine yellow gum	en
1 3	<i>Leptospermum lanigerum</i>	woolly teatree	
	<b>PROTEACEAE</b>		
3	<i>Banksia marginata</i>	silver banksia	
3	<i>Bellenden montana</i>	mountain rocket	en
1 3	<i>Hakea lissosperma</i>	mountain needlebush	
3	<i>Lomatia polymorpha</i>	mountain guitarplant	en
1 3	<i>Orites revolutus</i>	revolute orites	en
1 3	<i>Persoonia gunnii</i>	mountain geebung	en
3 5	<i>Telopea truncata</i>	tasmanian waratah	en
	<b>RANUNCULACEAE</b>		

2	<i>Ranunculus sp.</i>	buttercup	
	<b>RUBIACEAE</b>		
3 5	<i>Coprosma nitida</i>	mountain currant	
	<b>SANTALACEAE</b>		
3	<i>Exocarpos humifusus</i>	mountain native-cherry	en
	<b>STYLIDIACEAE</b>		
1 3	<i>Stylidium graminifolium</i>	narrowleaf triggerplant	
	<b>VIOLACEAE</b>		
5	<i>Viola hederacea</i>	ivyleaf violet	
	<b>WINTERACEAE</b>		
3	<i>Tasmania lanceolata</i>	mountain pepper	
	<b>GYMNOSPERMAE</b>		
	<b>CUPRESSACEAE</b>		
5	<i>Athrotaxis cupressoides</i>	pencil pine	en
5	<i>Athrotaxis selaginoides</i>	king billy pine	en
3	<i>Diselma archeri</i>	dwarf pine	en
	<b>PHYLLOCLADACEAE</b>		
1 3 5	<i>Phyllocladus aspleniifolius</i>	celerytop pine	en
	<b>PODOCARPACEAE</b>		
3 5	<i>Pherosphaera hookeriana</i>	drooping pine	en
V			
	<b>MONOCOTYLEDONAE</b>		
	<b>CYPERACEAE</b>		
2	<i>Carex appressa</i>	tall sedge	
2	<i>Carpha sp.</i>	flower-rush	
2 3	<i>Gahnia grandis</i>	cutting grass	
2	<i>Isolepis fluitans</i>	floating clubsedge	
	<b>IRIDACEAE</b>		
3	<i>Diplarrena moraea</i>	white flag-iris	
	<b>JUNCACEAE</b>		
2	<i>Juncus sarophorus</i>	broom rush	
	<b>POACEAE</b>		
1 3	<i>Poa sp.</i>	poa	
5	<i>Poa tenera</i>	scrambling tussockgrass	
1	<i>Rytidosperma sp.</i>	wallabygrass	
	<b>RESTIONACEAE</b>		
2	<i>Empodisma minus</i>	spreading roperush	
	<b>PTERIDOPHYTA</b>		
	<b>ASPIDIACEAE</b>		
5	<i>Polystichum proliferum</i>	mother shieldfern	
	<b>GLEICHENIACEAE</b>		
2	<i>Gleichenia alpina</i>	alpine coralfern	en
	<b>GRAMMITIDACEAE</b>		
5	<i>Grammitis billardierei</i>	common fingerfern	
	<b>HYMENOPHYLLACEAE</b>		
5	<i>Hymenophyllum peltatum</i>	alpine filmyfern	

## Appendix D - Vertebrate Species List

### Vertebrate fauna recorded on Hall's island

Grid Reference: 441925E, 5355500N  
Accuracy: within 100 metres  
Recorder: Grant Daniels  
Date of Survey: 25 Oct 2016

Amphibians: *Crinia tasmaniensis*  
Mammals: *Macropus rufogriseus*, *Pseudocheirus peregrinus*, *Pseudomys higginsi*  
Birds: *Chalcites lucidus*, *Colluricincla harmonica*, *Lichenostomus flavicollis*, *Phylidonyris pyrrhoptera*, *Platycercus caledonicus*, *Strepera fuliginosa*, *Zosterops lateralis*

#### Birds

<i>Chalcites lucidus</i>	Shining Bronze Cuckoo
<i>Colluricincla harmonica</i>	Grey Shrike-Thrush
<i>Lichenostomus flavicollis</i>	Yellow-Throated Honeyeater
<i>Phylidonyris pyrrhoptera</i>	Crescent Honeyeater
<i>Platycercus caledonicus</i>	Green Rosella
<i>Strepera fuliginosa</i>	Black Currawong
<i>Zosterops lateralis</i>	Silvereye

#### Frogs

<i>Crinia tasmaniensis</i>	Tasmanian Froglet
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#### Mammals

<i>Macropus rufogriseus</i>	Bennett's Wallaby
<i>Pseudocheirus peregrinus</i>	Common Ringtail Possum
<i>Pseudomys higginsi</i>	Long-Tailed Mouse

## Appendix E – EPBCA significant impact criteria for MSP

### Critically endangered and endangered ecological communities

#### Significant impact criteria

An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:

- reduce the extent of an ecological community
- fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines
- adversely affect habitat critical to the survival of an ecological community
- modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns
- cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting
- cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:
  - assisting invasive species, that are harmful to the listed ecological community, to become established, or
  - causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or
- interfere with the recovery of an ecological community.

Halls Island Standing Camp  
Lake Malbena  
Walls of Jerusalem

Proposed Helicopter Landing Site and Access to Halls Island

Vegetation Survey

For Wild Drake Pty Ltd

14 June 2018



Preferred Helicopter Landing Site, central-left of image

## Introduction

The project for a Standing Camp on Halls Island was assessed in 2016<sup>1</sup>. That report included a provisional helicopter landing site on the island. Subsequent planning for the project has identified an alternate location east of the island set back from the lake shore.

This assessment should be read as an addendum to that original assessment report. It focuses on two nominated options and includes an assessment of foot pad to the lakeshore. The term 'helipad' used through this document refers to a location for helicopter landing. Whether or not a built helipad structure is ultimately required or whether the natural features are sufficient for landing has not been resolved.

The location of both landing sites is within a clearing in the forest, mapped on TASVEG 3 (and TasVEG online) as ASP - *Sphagnum peatland*. Sphagnum peatland is a significant vegetation community that is listed as threatened on the *Tasmanian Nature Conservation Act 2002* and in situations where condition thresholds are met can accord to the EPBC listed ecological community - *Alpine Sphagnum Bog and Associated Fens*<sup>1</sup>

Figure 1 present the latest official vegetation mapping (TASVEG3). Both helipad sites are located within a polygon of Sphagnum peatland MSP (recently updated to ASP).

Figure 2 presents the most up to date vegetation mapping (TASVEG live).

Figure 3 presents amended mapping of the area based on field assessment.

The main part of the clearing is correctly mapped as ASP (Plate 1). The site is a patchwork of shrubs (*Baeckea gunnii* and *Richea gunnii*) and fern (*Gleichenia alpina*) over extensive hummocks of sphagnum (plate 1). The peat layer is deep and generally >75cm throughout.



Plate 1: Sphagnum peatland ASP (exMSP)

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<sup>1</sup> North Barker Ecosystem Services 2016



Figure 1 - TASVEG v3

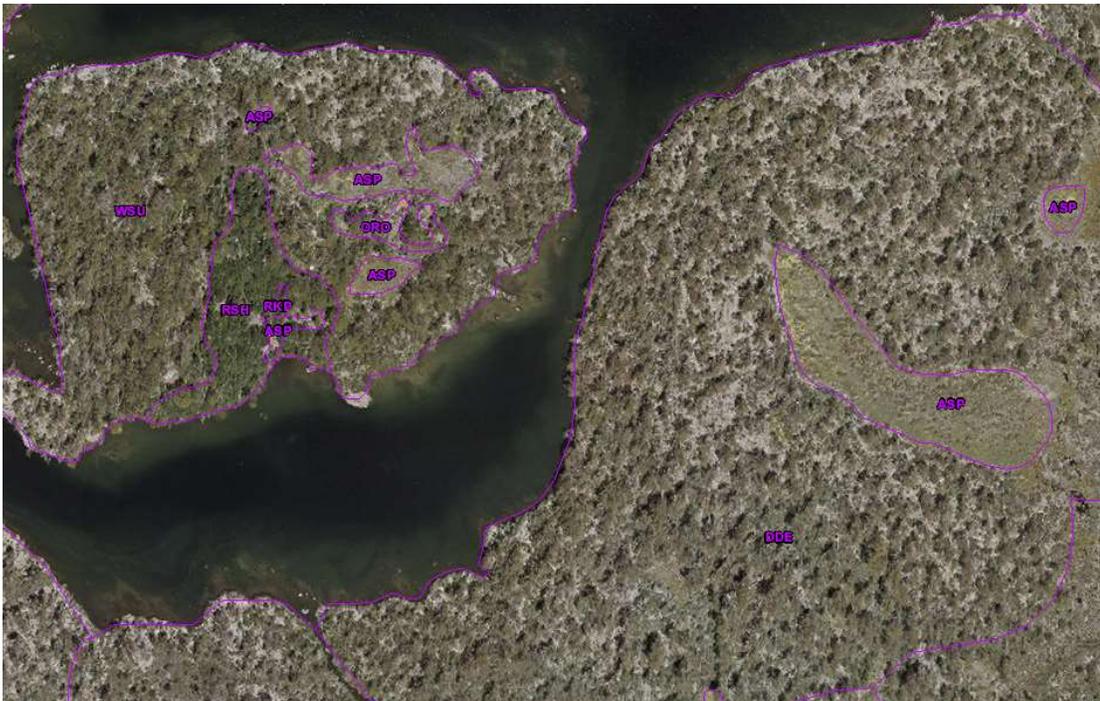


Figure 2 - TASVEG live. Note the mapping on Halls Island incorporates mapping undertaken by NBES 2016



**Significant trees**

- Eg - Eucalyptus gunnii ssp. gunnii

**Threatened Flora (No. of plants)  
Status (TSPA/EPBCA)**

- Ph - Pherosphaera hookeriana (v/-)
- Ph - Pherosphaera hookeriana (v/-)

**Vegetation Communities  
(Using Tasveg 3.0 mapping units)**

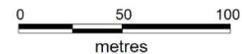
- ASP - Sphagnum peatland
- HSE - Eastern alpine sedgeland
- HHE - Eastern alpine heathland
- DDE - Eucalyptus delegatensis dry forest and woodland
- DCO - Eucalyptus coccifera forest and woodland

**Helipad and infrastructure**

- Helipad access route

*The mapping has been undertaken using a non-differential GPS and interpretation of aerial photography.  
Average accuracy of data is +/- 10m.*

Base data from theLIST ([www.thelist.tas.gov.au](http://www.thelist.tas.gov.au)),  
© State of Tasmania  
Base image by TASMAR, © State of Tasmania  
Datum: GDA94, AHD Grid: MGA Zone 55



RIV002 29/05/2018

Figure 3 – TASVEG this survey.

## Vegetation

### Helipad Site 1 (Plates 2,3,4)

This patch is clearly discernible on the aerial photograph reflecting the distinctive flora. It occupies an areas of 20 x 15 m. *Gleichenia alpina* dominates with 50-70% cover interspersed with heavily browsed cordrushes (*Baloskion australe* and *Empodisma minus*) and a prominent layer of coral lichen (*Cladia reptora*) (30%). Few other plants occur. Peat and topsoil depth varies but is predominantly 15-30cm<sup>2</sup>. No sphagnum is growing in this patch. This community forms the fernland facies of Eastern alpine sedgeland (HSE), which is a widespread and well reserved community that is not listed.

The character of this vegetation is moderately robust and able to tolerate compaction from helicopter landing. The site is well drained and showed no evidence of waterlogging even following a significant rain event at the time of survey.

A larger polygon of Eastern alpine sedgeland (HSE) has been mapped; this includes a localised patch of buttongrass *Gymnoschoenus sphaerocephalus*, but elsewhere is dominated by *Gleichenia alpina* with *Baloskion australe*, *Epacris lanuginosa*, *Almaleea subumbellata* and no sphagnum.

### Helipad Site 2 (Plates 2,5)

This is located across a small creek / drainage line from Helipad 1 Exposed flat bedrock dominates with various shrubs and sedges occupying the fissures and spaces in the rocks. Occasional woolly tea tree (*Leptospermum lanigerum*) to 2m are scattered amongst low vegetation characterised by *Baeckea gunnii*, *Baloskion australe* and other heavily browsed prostrate plants such as *Hibbertia prostrata*.

Some rocks may need to be relocated and a few shrubs of *L. lanigerum* may need to be removed to accommodate the space for a helicopter to safely land.

There is one cider gum nearby in very poor health plus a few saplings growing within the shelter of the tea tree.

This community accords to Eastern alpine heathland (HHE) or Subalpine heathland (SHS).

“On the Central Plateau, shrubby subalpine heathland is replaced by Eastern alpine heathland (HHE) at 1050m, with the loss of most of the Proteaceae and other tall shrub species. The site is at 1040 m which puts it at the transition point between these two communities. Nether community is considered significant and both are well represented within the reserve system.

We have mapped this patch as HHE.

### Foot pad to Lake Malbena (Plates 6,7,8)

The margins of the open area were inspected. The best hard standing is located along the southern boundary of the sphagnum peatland (ASP). The least impacting option would be to follow the drainage line where exposed rocks form most of the footfalls. There is a small patch of buttongrass to cross before reaching the forest margin. At the western end of the sphagnum peatland there is easy walking through rocky terrain within *Eucalyptus*

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<sup>2</sup> A wire rod was used to penetrate the ground at 21 locations at 3m intervals across three transects (refer Appendix 2)

*delegatensis* dry forest (DDE) over a moderately dense shrubby layer to 3m dominated by *Hakea lissosperma* over a diverse low shrubby layer.

### Threatened Flora

No evidence of threatened flora was observed within the Helipad sites or the walking route to the lakeshore. There is a single plant of drooping pine *Pherosphaera hookeriana* 20m from the preferred launching point (Plate 9). *P. hookeriana* is prominent around the southern shoreline of Halls Island, but only occasional on the Lake Malbena shoreline.

The occasional cider gums (*Eucalyptus gunnii* ssp. *gunnii*) are notable. Although only one surviving tree was identified, there are numerous saplings (Plate 10). Cider gums are suffering significant declines throughout their range. Although these do not correspond to the listed Miena cider gum (*E. gunnii* ssp. *divaricata*) they are still significant. Marks on the trunk of the small tree may indicate tapping for sap (Plate 11).



Plate 2: Helipad 1 – foreground, Helipad 2 clear ground behind the buttongrass



Plate 3: Helipad 1 – ASP in background



Plate 4: Helipad 1 – *Gleichenia alpina* fernland



Plate 5: Helipad 2 - Sheetrock provide robust support

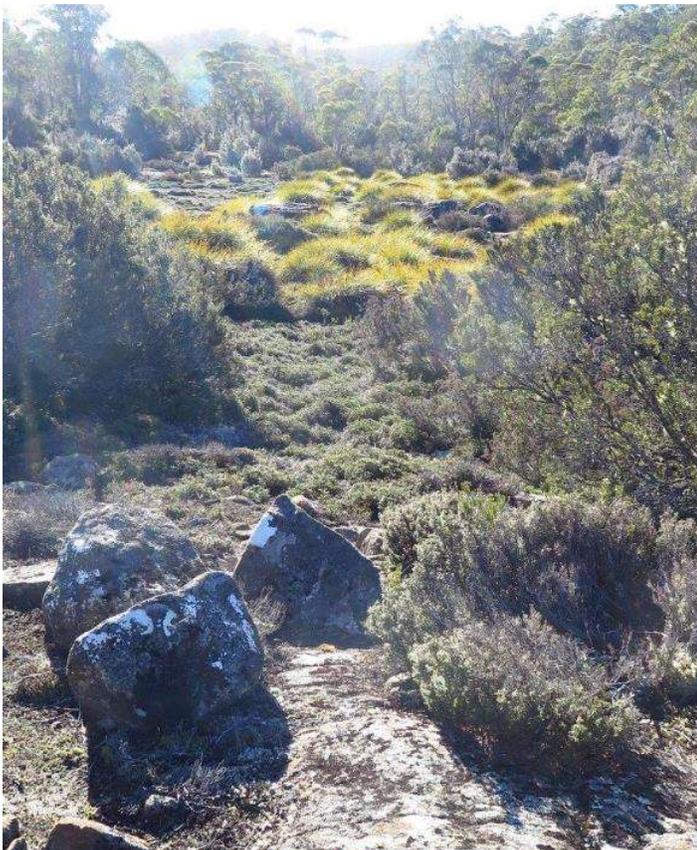


Plate 6: Walking route looking from edge of forest to helipad (behind buttongrass )



Plate 7: Walking route - Terrain on edge of *E. delegatensis* forest DDE skirting south side of Sphagnum peatland



Plate 8: Walking route through *E. delegatensis* forest DDE to lakeshore



Plate 9: Drooping pine *Pterosphaera hookeriana* near to launching point

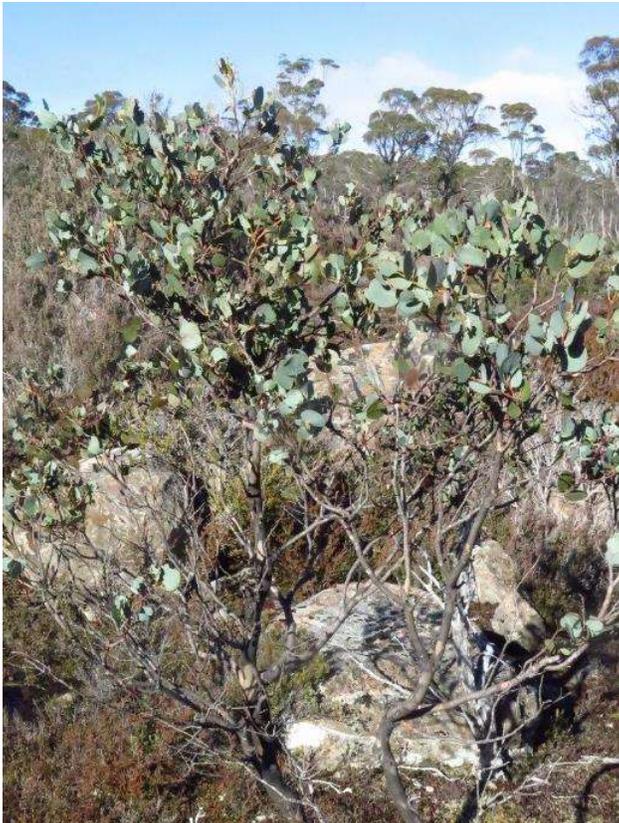


Plate 10: Cider gum sapling near Helipad 2



Plate 11: Cider gum exhibiting trunk damage – possible sap tapping marks

## Fire History Halls Island

The distribution of vegetation communities and form of several tree species indicates a complex fire history on the island. The vegetation of Halls Island clearly differs from the surrounding vegetation. The presence of a range of fire sensitive coniferous species (notably *Athrotaxis selaginoides* and *A. cupressoides*), the persistence of a patch of rainforest (on the leeward side of the island south of a 4m drop off) and the prominence of *Eucalyptus subcrenulata* yellow gum (absent elsewhere in the vicinity) suggest fires far less frequent across the island than elsewhere in this part of the Central Plateau. However, fire has still shaped the structure of the vegetation on Halls island. Many of the trees show trunk damage most easily attributable to fire scarring (plate 12). The multi-stemmed form of the *E. subcrenulata* suggest fire coppice (Plate 13). Most regenerating small trees of celery-top pine *Phyllocladus aspleniifolius* suggest a single regrowth cohort post the last fire which is likely to have been 30-50 years ago.



Plate 12: Possible fire induced scarring on trunk of *E. subcrenulata*

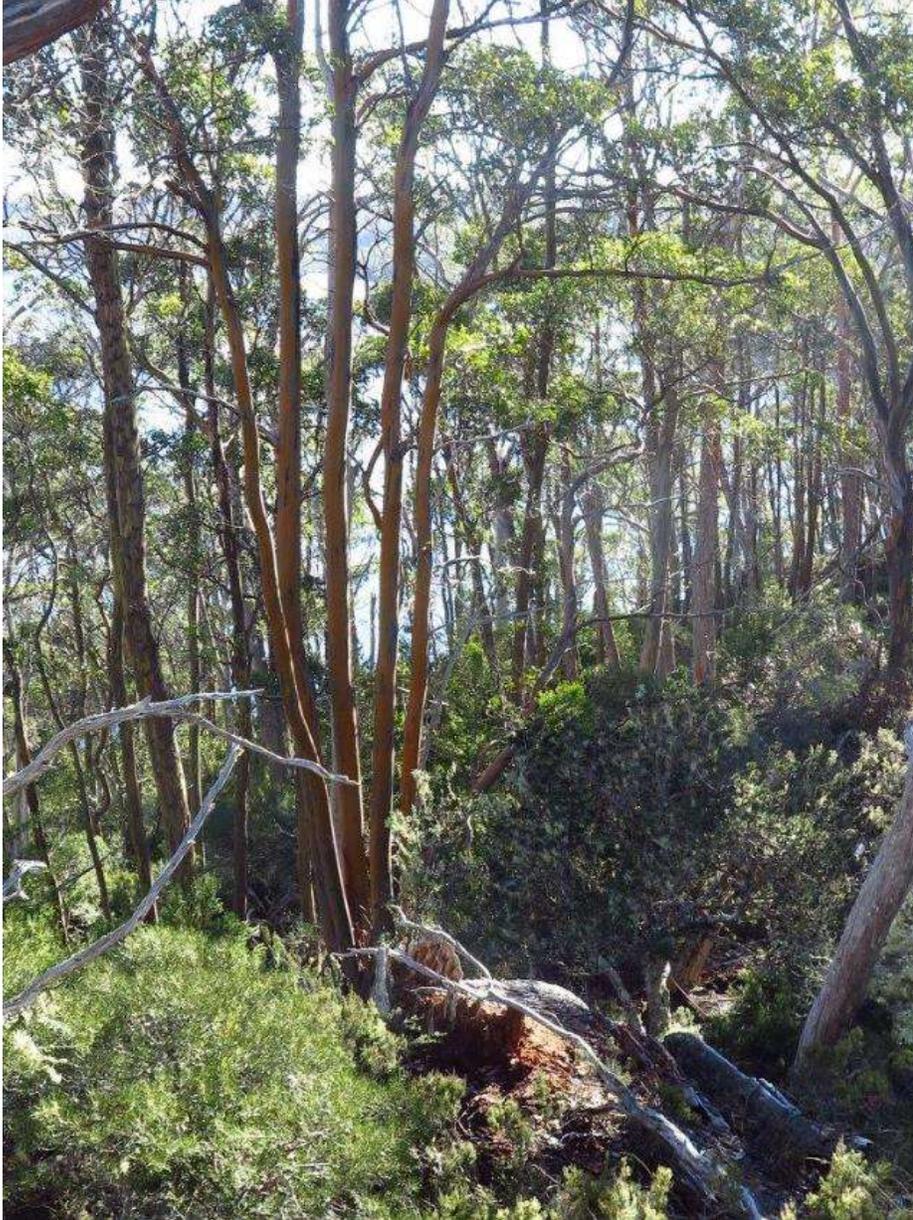


Plate 13: Coppice growth form of *E. subcrenulata* suggestive of fire

## Appendix 1 – Site species lists

### Helicopter pad site 1 - HSE

Grid Reference: 442500E, 5355300N  
Accuracy: GPS (within 10 metres)  
Recorder: Andrew J. North  
Date of Survey: 24 May 2018  
Herbs: *Gonocarpus micranthus* subsp. *micranthus*, *Rubus gunnianus*  
Graminoids: *Empodisma minus*  
Ferns: *Gleichenia alpina*

### Helicopter pad site 2 - HHE

Grid Reference: 442545E, 5355300N  
Accuracy: GPS (within 10 metres)  
Recorder: Andrew J. North  
Date of Survey: 24 May 2018  
Trees: *Eucalyptus gunnii* subsp. *gunnii*  
Tall Shrubs: *Leptospermum lanigerum*  
Shrubs: *Baeckea gunniana*, *Monotoca empetrifolia*, *Orites revolutus*  
Low Shrubs: *Acrothamnus montanus*, *Hibbertia prostrata*, *Leucopogon pilifer*  
Herbs: *Almaleea subumbellata*, *Brachyscome spathulata*, *Pappochroma* sp., *Viola hederacea*  
Graminoids: *Baloskion australe*  
Grasses: *Poa gunnii*, *Rytidosperma* sp.

### Route from helipad section 1 - edge of sphagnum (HSE)

Grid Reference: 442517E, 5355252N  
Accuracy: GPS (within 10 metres)  
Recorder: Andrew J. North  
Date of Survey: 24 May 2018  
Trees: *Eucalyptus delegatensis* subsp. *tasmaniensis*, *Eucalyptus gunnii*  
Tall Shrubs: *Leptospermum lanigerum*  
Shrubs: *Baeckea gunniana*, *Boronia parviflora*, *Epacris lanuginosa*, *Melaleuca virens*, *Richea gunnii*  
Low Shrubs: *Grevillea australis*  
Herbs: *Almaleea subumbellata*  
Graminoids: *Erychorda complanata*, *Gymnoschoenus sphaerocephalus*  
Ferns: *Lycopodiella* sp.

### Route from helipad section 2 E. delegatensis forest (DDE)

Grid Reference: 442290E, 5355300N  
Accuracy: within 100 metres  
Recorder: Andrew J. North  
Date of Survey: 24 May 2018  
Trees: *Eucalyptus delegatensis* subsp. *tasmaniensis*  
Tall Shrubs: *Leptospermum lanigerum*, *Oxylobium ellipticum*  
Shrubs: *Coprosma nitida*, *Hakea lissosperma*, *Leptecophylla parvifolia*, *Leptomeria drupacea*, *Lomatia polymorpha*, *Monotoca empetrifolia*, *Orites revolutus*, *Persoonia gunnii*, *Pherosphaera hookeriana*, *Pultenaea juniperina*  
Low Shrubs: *Acrothamnus montanus*, *Hibbertia procumbens*, *Olearia erubescens*, *Pentachondra pumila*, *Tetratheca procumbens*  
Herbs: *Euchiton* sp., *Gonocarpus montanus*, *Oreomyrrhis sessiliflora*, *Rubus gunnianus*, *Stylidium graminifolium*, *Wahlenbergia* sp.  
Grasses: *Rytidosperma* sp.

Appendix 2 – Soil depth data for Helipad 1 cm

Depth in cm

Core	Transect A	Transect B	Transect C
1	30	30	20
2	15	30	20
3	30	15	50
4	20	30	30
5	30	60	50
6	50	30	35
7	>70	50	>70



Significant trees

- Eg - Eucalyptus gunnii ssp. gunnii

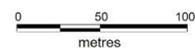
Helipad and infrastructure

- Helipad Access route
- Helipad 1 transects

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northbarker  
ECOSYSTEM SERVICES

RIV002.28/05/2018

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Average accuracy of data is +/- 10m.