

Native Vegetation Clearance

EPIC BIKE TRAIL

MOUNT REMARKABLE NATIONAL PARK

Data Report

Clearance under the *Native Vegetation Regulations 2017*

February 2022



Glossary and abbreviations

BAM	Bushland Assessment Method
BDBSA	Biological Database of South Australia (maintained by DEW)
DAWE	Department of Agriculture, Water and the Environment (Commonwealth)
DEW	Department for Environment and Water (South Australia)
EPBC Act	<i>Environmental Protection and Biodiversity Conservation Act 1999</i>
GIS	Geographic Information System (ESRI mapping software)
ha	Hectare(s)
IBRA	Interim Biogeographical Regionalisation of Australia
IMBA	International Mountain Bike Association
km	kilometre(s)
m	metres
MR	Mount Remarkable
Mt Remarkable NP	Mount Remarkable National Park
NPW Act	<i>National Parks and Wildlife Act 1972</i>
NVB	Native Vegetation Branch, Department for Environment and Water
PMST	Protected Matters Search Tool (under the EPBC Act; maintained by DAWE)
SA	South Australia(n)
SEB	Significant Environmental Benefit
TBC	Total Biodiversity Score (BAM methodology)
TEC	Threatened Ecological Community
UBS	Unit Biodiversity Score (BAM methodology)

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1. Application information

Table 1. Application details.

Applicant:	Department for Environment and Water (DEW) – National Parks and Wildlife		
Key contact:	Matthew Ackland Project Manager Department for Environment and Water		
Landowner:	<ul style="list-style-type: none"> Minister for Environment and Water District Council of Mount Remarkable Private landholder 1 Private landholder 2 		
Site Address:	Mount Remarkable National Park (near Melrose)		
Local Government Area:	District Council of Mount Remarkable	Hundred:	Gregory and Wongyarra
Crown Land – Minister for Environment and Water (Mount Remarkable National Park)			
Title ID:	CR5454/380 CR5772/843 CR5454/380 CR5772/843 CR5772/843	Parcel ID	H330700 S405 H331300 S489 H330700 S404 H331300 S474 H331300 S471
Crown Land – District Council of Mount Remarkable (Soldiers Memorial Park)			
Title ID:	CR5755/824	Parcel ID	H331300 S500
Road Reserve – District Council of Mount Remarkable (Horrocks Highway)			
Title ID:	NA	Parcel ID	NA
Private landholder 1			
Title ID:	CT6011/19 CT5397/907 CT5564/672 CT5564/672 CT5619/642 CT6011/19	Parcel ID	H331300 S205 F199842 A96 H331300 S311 H331300 S312 F216402 A103 H331300 S202
Private landholder 2			
Title ID:	CT5793/383 CT5822/306 CT5933/715	Parcel ID	H331300 S336 F184910 A828 H331300 S335

Summary of proposed clearance

Purpose of clearance	Clearance required for the construction of a recreational mountain biking trail.
Native Vegetation Regulation	Regulation 12, Schedule 1; clause 36, Recreation track
Description of the vegetation under application	<p>Clearance of 6.171 hectares (ha) of native vegetation for the construction of a 41 kilometre (km) mountain bike trail (Figure 1) within the Mt Remarkable NP and adjoining properties. The clearance impact is based on a 1.5 metre footprint, whilst the final bike path is likely to vary between 0.5m to 1m but with some degradation on the edges expected.</p> <ul style="list-style-type: none"> • <i>BAM A1 - 0.061 ha of Eucalyptus leucoxylon ssp. pruinosa Woodland over Cassinia laevis, Austrostipa sp. +/- Eucalyptus odorata</i> • <i>BAM B1 - 0.113 ha Eucalyptus albens/Allocasuarina verticillata Woodlands over Cassinia laevis, Bursaria spinosa +/- Eucalyptus camaldulensis ssp. camaldulensis</i> • <i>BAM B2 – 3.565 ha Eucalyptus goniocalyx/Eucalyptus cladocalyx Woodlands over Xanthorrhoea quadrangulata, Bursaria spinosa</i> • <i>BAM B3 – 0.412 ha Eucalyptus leucoxylon ssp. pruinosa/Allocasuarina verticillata/Eucalyptus camaldulensis ssp. camaldulensis Woodlands over Cassinia laevis +/- Eucalyptus odorata</i> • <i>BAM C1 – 0.143 ha Eucalyptus camaldulensis ssp. camaldulensis Woodlands over *Rosa canina and exotic Grassland</i> • <i>BAM C2 – 0.517 ha Eucalyptus odorata/Eucalyptus camaldulensis ssp. camaldulensis Woodlands over exotic species +/- native herbs</i> • <i>BAM C3 – 0.173 ha Eucalyptus albens Woodlands +/- Eucalyptus camaldulensis ssp. camaldulensis</i> • <i>BAM C4 – 0.136 ha Eucalyptus albens/Allocasuarina Open Woodlands +/- Eucalyptus cladocalyx</i> • <i>BAM D1 – 0.972 ha Eucalyptus goniocalyx/Eucalyptus cladocalyx Woodlands over mixed native species +/- Eucalyptus albens, Eucalyptus odorata</i> • <i>BAM D2 – 0.079 ha Eucalyptus leucoxylon ssp. pruinosa/Allocasuarina Woodlands/ Eucalyptus camaldulensis ssp. camaldulensis over Cassinia laevis +/- Eucalyptus odorata</i>
Total proposed clearance area (ha)	Clearance comprises 6.171 ha of remnant native vegetation along approximately 41 kilometres of bike trail.
Level of clearance	Level 4
Overlay (Planning and Design Code)	Not applicable

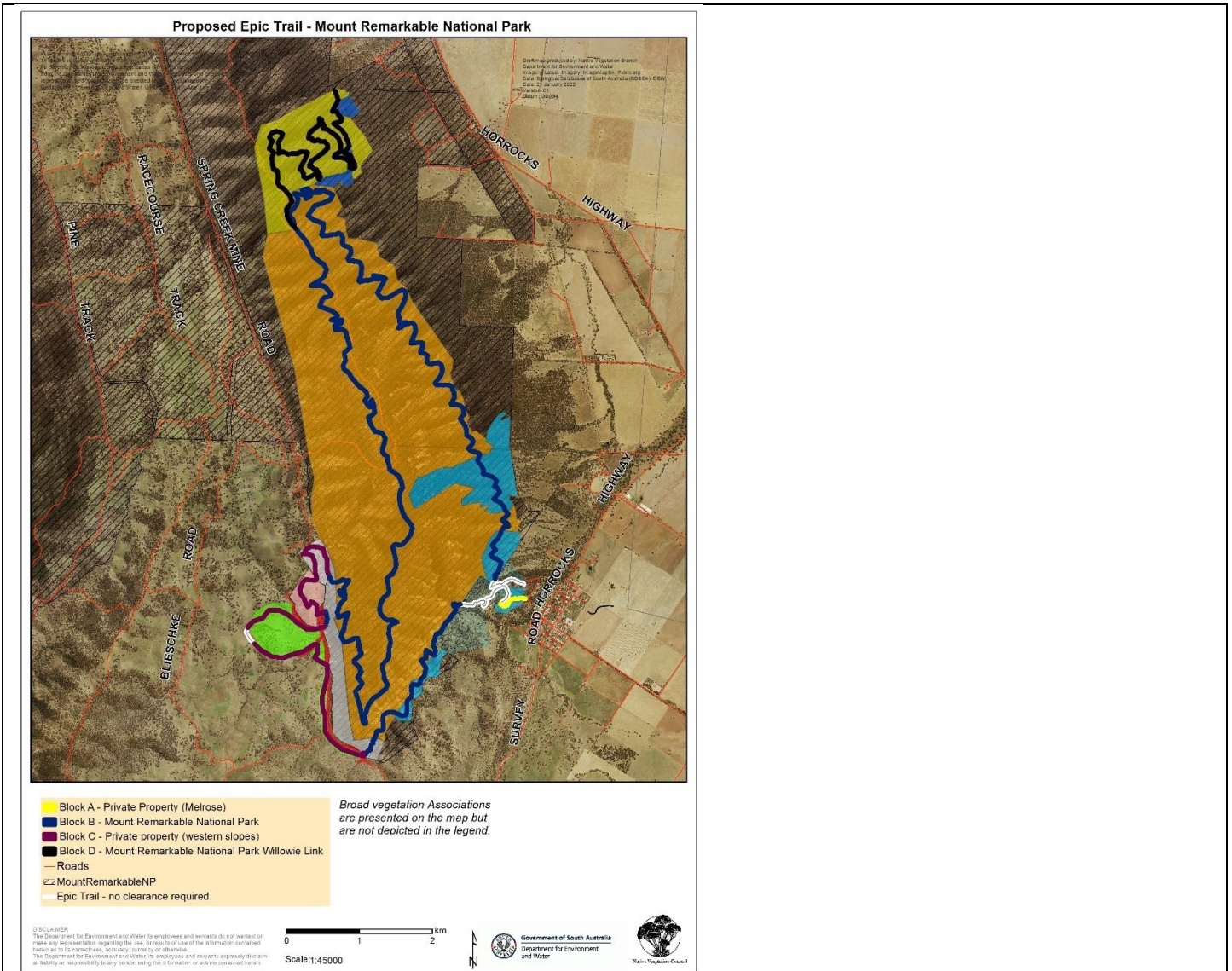


Figure 1. Map of proposed clearance area indicating vegetation Blocks (trail area delineated on map).

Mitigation hierarchy

Below is a summary of mitigation approaches. Detailed mitigation strategies are provided in the mitigation hierarchy section (Section 4.4).

AVOID

Except where clearing is required for permanent trail works or excavation operations, all trees, native shrubs and understorey grasses shall be preserved and protected from construction equipment and operations. Clearance of trees, particularly large trees, threatened trees and trees with hollows will be avoided. Clearance of threatened flora will be avoided and minimised as feasible based on the desktop assessment and field results. The trail will be subject to final approval and potential follow up surveys in sensitive areas to further avoid threatened flora, particularly orchids. The trail has been relocated out of potentially Nationally threatened *Eucalyptus odorata* Woodland on the eastern slopes, but some clearance is expected in degraded *E. odorata* Woodland on private land and in SA Vulnerable *E. leucoxyton ssp. pruinosa* Woodland. Through micro-sighting, existing trails and open areas will be utilised where possible, including some use-age of the existing trail network near Melrose. Trail positioning will align with cultural heritage considerations including avoiding clearance on scri-slopes whilst balancing trail construction and alignment feasibility with mitigating vegetation clearance.

	<p>MINIMISE</p> <p>Current industry best practice will be used in the design and construction of the trail. The construction of the trails is anticipated to be designed to minimal width, averaging 0.9m with sections at 0.6m. While the intent of the project is to create a backcountry trail, some descending sections have been designed as flow trails, meaning the trail will utilise the existing natural contours, limiting the need for additional clearance necessitated by excavation or filling. Clearance of vegetation, specifically trees and threatened flora, will be minimised where feasible. Secondary impacts are recognised as weed invasion, introduction of pathogens, the creation of feral animal corridors, increased erosion risk and altered hydrology. A range of mitigation strategies have been considered and/or recommended as outlined in Section 4.4.</p> <p>REHABILITATE</p> <p>At the completion of works, all disturbed construction areas that do not require landscaping or planting, will be scarified and left in a condition which facilitates natural regeneration. This includes allowing regeneration of the area adjacent to the trail between the potential 1.5m construction footprint and the final impact corridor of 0.6 to 1m.</p> <p>OFFSET</p> <p>Payment into the Native Vegetation Fund, unless a suitable on-ground offset can be identified.</p>
SEB Offset proposal	<p>Payment of \$344,571.15 into the Native Vegetation Fund (NVF) including a \$16,408.91 administration fee.</p> <p>On ground SEB options are being investigated, but otherwise the offset requirements will be met via payment into the NVF.</p>

2. Purpose of clearance

2.1 Description

The proposed clearance is associated with the construction of a 41km mountain bike trail through Mount Remarkable National Park (Mt Remarkable NP) and surrounding private land (the Project Area) near Melrose in South Australia (SA) (Figure 2, Figure 3). The trail forms part of the Department for Environment and Water's (DEW) 'Parks 2025' project which aims to build the capacity of parks across the state to conserve South Australia's natural landscapes and wildlife, activate nature-based tourism, boost the local economy and strengthen local communities. The Mount Remarkable Epic Trail project is a major component of the \$10m Remarkable Southern Flinders Building Better Regions Fund agreement which is a partnership between Commonwealth and State Governments and facilitated by the Foundation for National Parks and Wildlife. The proposed trail is in the concept design phase and will be subject to more detailed on ground design in early 2022 which may result in amendments to the trail alignment. The trail will be suitable for accreditation as an International Mountain Bike Association (IMBA) 'Epic Trail' with a vision for the Southern Flinders Ranges to become a pre-eminent cycle friendly destination in Australia that is renowned for its range of cycling opportunities including world class mountain biking (Govt SA 2021).

2.2 Background

The proposed Epic Trail occurs mainly within the Mt Remarkable NP but extends to private land on the lower western slopes and eastern slopes near Melrose. Mt Remarkable rises sharply to 961 m from the township of Melrose (389 m elevation) and occurs in the Mount Remarkable IBRA Association, Southern Flinders IBRA Sub-region and Mt Remarkable Land System. The Mt Remarkable land system comprises steep to very steep rugged quartzite hills occurring in two discrete formations (Mt Remarkable and Mambray Creek-Alligator Gorge) with the Mt Remarkable formation described as a single massive ridge with slopes of 20-100% rising to 600m above the Willochra Plain to the east and 400m above a belt of more subdued hills separating it from the Mambray Creek - Alligator Gorge formation to the west (DEWNR, 2022). The lower hills between the two formations are referred to as the 'Link Lands'.

Mt Remarkable NP was proclaimed in January 1952 and comprises vast areas of remnant vegetation supporting abundant threatened species with limited vehicle or recreation tracks in the Project Area except directly adjacent Melrose and from the township to the Summit. The town of Melrose is already recognised as a significant mountain bike tourism destination in the Southern Flinders Ranges with the terrain providing significant opportunities for developing high quality mountain bike trails. With the first trails constructed in 2005, the Melrose trail network has continued to expand and has developed into an important cycle-based tourism destination (SA Govt 2021). Approximately 100km of publicly accessible mountain bike trail already exists in the Melrose region, along with over 20km of private use trails. Public trails are currently grouped into three subregions (1) Melrose Township (52km of Singletrack Trail); (2) Bartagunyah Winery (31km of Singletrack Trail); and (3) Willowie Forest (Mt Remarkable NP) (19km singletrack and 6km vehicle track/doubletrack) (SA Govt 2021).

The proposed new Epic Trail will extend from the existing trail network on private land near Melrose into Mt Remarkable NP and through areas of very steep terrain, some of which have potentially never been traversed (and could not be accessed during the survey). On the western slopes the proposed trail will traverse lower, but steep rolling hills dissected by drainage lines on private land which are dominated by more Open Woodlands grazed by cattle. The entirety of the proposed trail is included in this data report, including the Willowie Link (Block D) which was included in the native

vegetation assessment in December 2021 (post field survey) (Figure 2). This section of the trail will link to a network of trails recently developed near Willowie for all levels.

2.3 Details of the proposal

The trail is proposed to be an approximately 41km circuit, beginning and ending in Melrose, forming one single loop route with a northern connection (Willowie Link) to Willowie where several bike trails have been recently established. The proposed Epic Trail will commence in private land near Melrose where a network trails already exist, proceed north around and over the Mount Remarkable Range, taking in the Mt Remarkable summit then descend through the park and traverse private land before meeting steep slopes at the southern end of the park and extending north back to Melrose. Another 40km walking trail is in the early concept stages at the recently proclaimed Wapma Thura National Park (Southern Flinders National Park) where it extends through the area previously known as Telowie Gorge Conservation Park and small areas of Mt Remarkable NP in this location. This trail will be assessed in a separate data report.

Clearance of native vegetation is required to facilitate construction of the trail, anticipated to be designed and constructed to average 0.9m in width, with sections at 0.6m, but with the total impact based on 1.5 m to allow for construction activities (Govt SA 2021). Trail difficulty categories will determine if an additional 0.3m is required in some locations. The intent is to limit the corridor clearing to 1m of the trail and back-slope edges, but some degradation on trail edges is expected. Mitigation strategies are proposed to minimise impact to threatened species and habitat, whilst also highlighting the high value natural features of the region. In addition to the trail tread, branch trimming will be required to achieve a nominal clearance height of 3m from the surface level and to mitigate hazards adjacent to dynamic trail segments such as high-speed corners and technical trail features (Govt SA 2021). The trail alignment is largely based on contour mapping and preliminary planning and has already undergone several iterations based on more detailed planning, cultural heritage considerations and advice from the Native Vegetation Branch (NVB). It is expected more amendments will be made to the alignment during and following detailed on ground design.

2.4 General location map

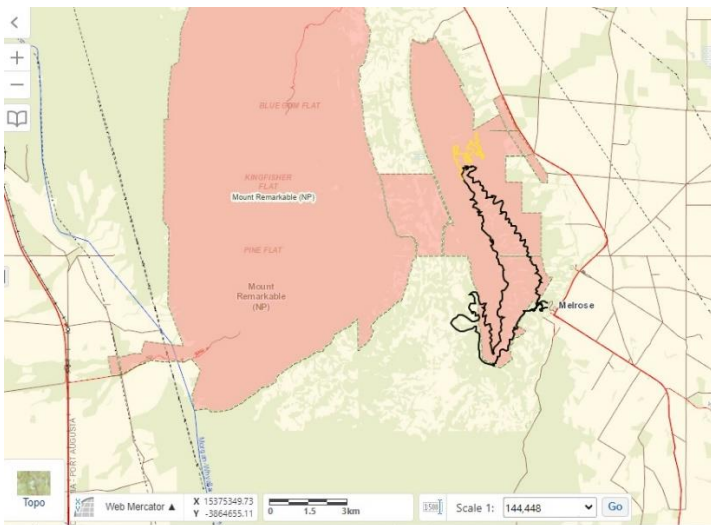
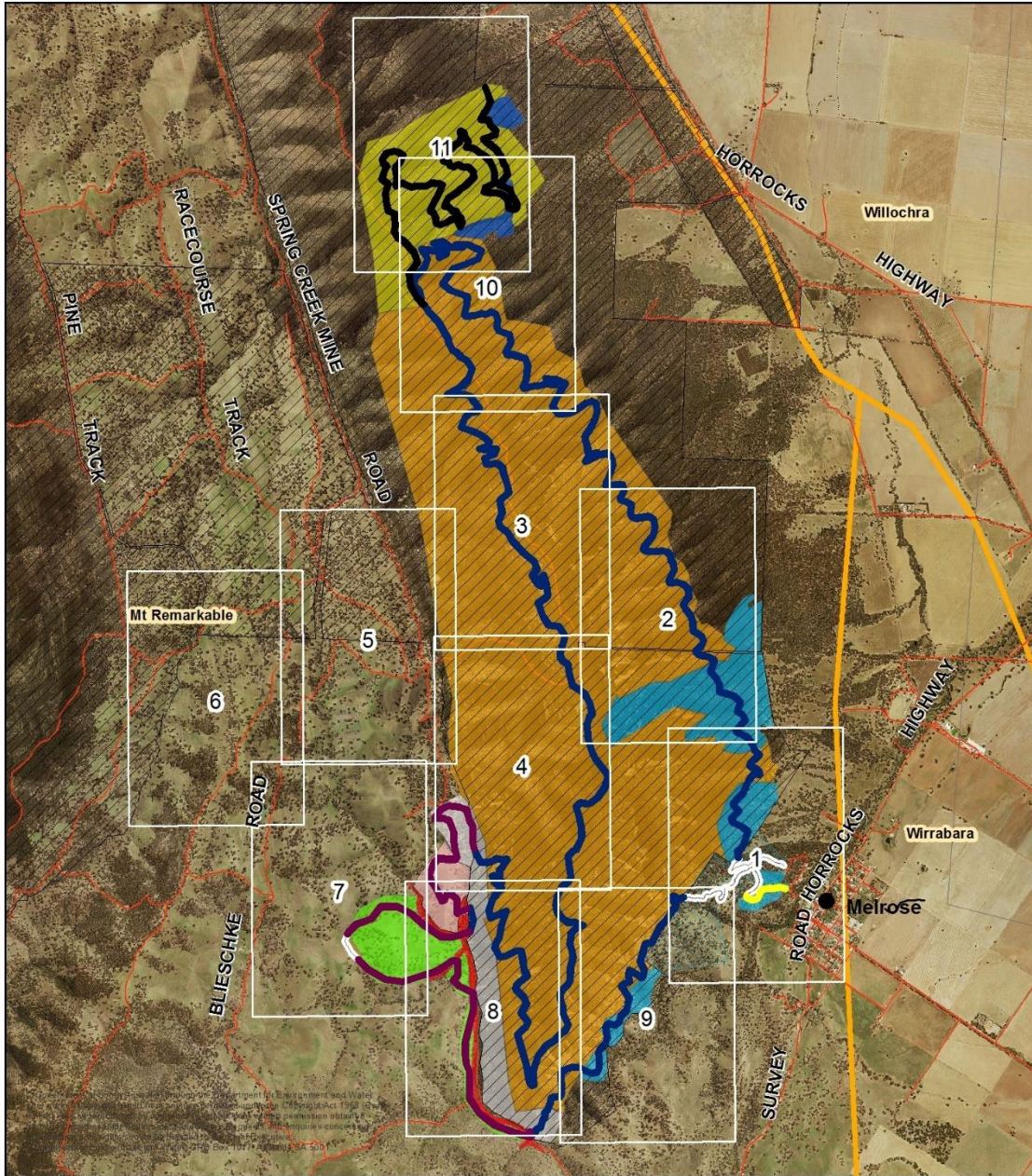
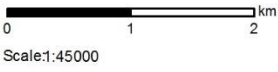


Figure 2. Proposed Epic Trail in Black with Willowie Link indicated in Yellow (base map extracted from Naturemaps (2022)).

Proposed Epic Trail - Mount Remarkable National Park



- Block A - Private Property (Melrose)
- Block B - Mount Remarkable National Park
- Block C - Private property (western slopes)
- Block D - Mount Remarkable National Park Willowie Link
- Epic Trail - no clearance required
- Epic Data Driven Pages
- Mount Remarkable National Park
- IBRA Associations
- Roads



Broad vegetation Associations are presented on the map but are not depicted in the legend.

DISCLAIMER

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Figure 3. Overview map indicating vegetation Blocks and background vegetation communities broadly mapped based on the field survey and DEW remnant vegetation mapping (not depicted in the legend). The 'data driven pages' are a mapping tool used to assist the field survey and referred to in this document, particularly in the desktop assessment.

2.5 Approvals required or obtained

Provide details of the following approvals or applications under the following legislation, where relevant:

- *Native Vegetation Act 1991*
- *Aboriginal Heritage Act 1988*

Matters of National Significance have been identified as possibly occurring within the trail alignment including Nationally threatened orchids and *Eucalyptus odorata* (Peppermint Box) Woodland. A self-assessment against Matters of National Significance, which possibly occur on site, would assist in ruling out the need for an approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

It is possible that *E. odorata* Woodland occurs on private land west of the range based on remnant vegetation mapping. This area was not assessed due to the trail being realigned post survey but was mapped based on DEW remnant vegetation mapping. However, assessment of *E. odorata* Woodland on the same property within 1 km was found to be highly degraded and not listed under the EPBC Act (BAM Site C2, Figure 18).

Nationally threatened orchids have been identified as likely to occur or possibly occurring in the Project Area based on nearby records and habitat suitability. However, it is unknown if they occur in the actual trail alignment as the survey coverage was limited based on difficult terrain and time constraints. Presence can only be determined with targeted survey of the alignment during the orchid's visible life phase (generally September to October). The area of highest risk is considered the lower eastern slopes of Mt Remarkable in *E. goniocalyx*/*E. cladocalyx* and *E. leucoxyton ssp. leucoxyton* Woodlands. Targeted survey in sensitive areas prior to trail construction would assist in mitigating risk and avoiding existing populations. Overall the risk to Nationally threatened orchids is considered relatively low given the long linear nature of the trail. The highest threat is considered to be weed invasion; therefore an appropriate weed management approach would assist in mitigating off target impacts.

2.6 Native Vegetation Regulation

The application to clear native vegetation is made under Regulation 12, Schedule 1, Clause 36 of the *Native Vegetation Regulations 2017*.

2.7 Development Application information (if applicable)

The trail development is exempt from requiring development approval under the *Planning Development and Infrastructure Regulations 2017* in accordance with Schedule 4, Clause 20.

3. Method

3.1. Desktop Assessment

The Bushland Assessment Methodology (BAM) was applied to the assessment of vegetation for the Epic Trail. The BAM was developed by the NVB (NVC 2020) and derived from the Nature Conservation Society of South Australia's Bushland Condition Monitoring methodology (Croft *et al.* 2007, 2008a, 2008b, 2009; Milne and Croft 2012; Milne and McCallum 2012).

A desktop flora assessment was undertaken prior to the field survey with a goal of identifying important species, habitat and sensitive areas to guide the field work whereby areas of concern were visited and specific species were targeted where feasible during the survey. As required by the BAM, 5km searches of the Biological Databases of South Australia (BDBSA), Naturemaps/EnvMaps (DEW 2022) and using the Protected Matters Search Tool (PMST) (DAWE 2022a) were undertaken to identify threatened species and communities that may occur in the project area. Searches were supplemented with information from NVB fauna experts and other resources including the South Australian Seed Conservation Centre Seed Conservation Centre (SASCC 2022), the SA Flora census (SA Herbarium 2022) and the Atlas of Living Australia (ALA 2022).

Nationally threatened communities (TEC) and threatened species considered likely or known to occur within 5km based on the PMST were assessed for their likelihood of occurrence within the Project Area based on the criteria in Table 2 and those for which the site provided suitable habitat were included in the BAM scoresheets. All species recorded within 5km of the Project Area (BDBSA) were assessed for their likelihood of occurrence, but only fauna and flora species observed since 1995 with a spatial reliability of less than 1km; and/or for which suitable habitat occurred in the Project Area were included in the BAM scoresheets. Note that the BAM does not generally require threatened flora not observed during the survey to be included in the BAM scoresheets, but as the on-ground survey coverage was so limited for Epic Trail, flora species were included in the scoresheets when observed since 1995 in a similar vegetation type and where the habitat was deemed suitable. This includes several threatened orchids that are known to occur and could not be accessed and/or were outside of their visible life phase during the survey.

Table 2. Criteria for the likelihood of occurrence of species within the Study area

Likelihood	Criteria
Highly Likely/known	Recorded in the last 10 years, the species does not have highly specific niche requirements, the habitat is present and falls within the known range of the species distribution or; The species was recorded as part of field surveys.
Likely	Recorded within the previous 20 years, the area falls within the known distribution of the species and the area provides habitat or feeding resources for the species.
Possible	Recorded within the previous 20 years, the area falls inside the known distribution of the species, but the area provides limited habitat or feeding resources for the species. Recorded within 20 -40 years, survey effort is considered adequate, habitat and feeding resources present, and species of similar habitat needs have been recorded in the area.
Unlikely	Recorded within the previous 20 years, but the area provides no habitat or feeding resources for the species, including perching, roosting or nesting opportunities, corridor for movement or shelter.

Likelihood	Criteria
	<p>Recorded within 20 -40 years; however, suitable habitat does not occur, and species of similar habitat requirements have not been recorded in the area.</p> <p>No records despite adequate survey effort.</p>

3.2. Field Survey and BAM Assessment

A broad native vegetation assessment of the proposed Epic Trail was undertaken by an Officer of the Native Vegetation Branch between 5 and 9 November 2021; accompanied for most sample points by DEW regional or local DEW parks staff. For each sample point a BAM assessment was undertaken in line with the methodology, focusing on flora and habitat on site, but with limited opportunities to collect fauna observation data due to severe time constraints and other limitations.

The Project Area was highly inaccessible therefore a sample point approach was taken, guided by the desktop assessment, remnant vegetation mapping and attempting to target sensitive areas such as those with a high number of threatened flora records or where records occurred near the trail. The BAM sample points represent areas that could be accessed during the survey with the intention of sampling characteristic vegetation types within the trail alignment (at the time of the survey) and applying these values across the broader landscape based on DEW mapping, aerial photography and knowledge of the site. However, it should be noted that survey coverage outside of the BAM sample points was limited and much of the Project Area was inaccessible or could not be reached within the survey timeframe. Furthermore a major trail realignment after the survey was undertaken, resulting in some areas having very limited or no survey coverage; and it should be noted that several of the BAM sample points fall well outside of the area impacted and classified as the same vegetation association. However, it is expected the BAM scores provide a reasonable reflection of the value of vegetation overall. Follow up surveys may be required in some areas to confirm the vegetation type (particularly where it could be threatened) and to determine the presence of significant vegetation communities and species.

The BAM scoresheets were completed in line with the BAM methodology. However, given the complexity and limited access, some amendments were made to scoresheets based on the desktop assessment, aerial photography and expected site features including location of the site and the predicted condition of vegetation. This includes manual amendments made to some attributes such as tree canopy cover, regeneration, floristic composition and the presence of threatened flora; and the likelihood of use by threatened fauna. This approach is deemed appropriate for a trail of this scale, located in inaccessible terrain and that may be subject to realignment following micro-sighting and ground truthing.

The rainfall factor was calculated using rainfall figures *approximately* every 2km along the proposed trail vicinity, then averaged to determine a rainfall figure of 542mm.

The impact footprint was calculated by applying broad mapping across the site then clipping it in the ESRI ArcMap Geographic Information System (GIS) using a 0.75m impact footprint from either side of the trail alignment provided in December 2021 (amended post-survey). Should the alignment be altered, the broad vegetation groupings can be re-clipped in GIS to determine the impact of the alignment.

3.2.1. Limitations

The Project Area was topographically very difficult to access and survey coverage was further limited within the available timeframe. Some areas of the trail alignment are currently not possible to access without potentially hiking for many hours or several days and will only become more readily accessible once the trail is partially constructed. Limited vehicle tracks exist on Mt Remarkable with 1-2 hour journeys to the Summit on rough tracks from both Melrose along the Mt Remarkable Range Track and from Mambray Creek to the Link Lands. These tracks were driven once each and sampled as feasible. A range of other factors also affected survey coverage including limited access to private land, severe weather and time constraints.

The survey did not cover many areas of the proposed trail alignment including potential *Eucalyptus odorata* Woodland on private land (as mapped by DEW), the entire Willowie link component of the trail (added post-survey); and most of the main trail. Scores, risk factors and threatened flora that may occur in these areas, was based on surveys in potentially similar vegetation which may occur outside of the mapped vegetation community, DEW remnant vegetation mapping, aerial photography and knowledge of the site.

A determination cannot be confirmed regarding potential EPBC listing of *E. odorata* Woodland on private land west of the ranges as this area was subject to a post-survey trail realignment and was not assessed. However, based on survey within 1km, it is considered unlikely that any *E. odorata* that may occur would represent the Nationally listed community. Regardless, this community has been classified as listed under the EPBC Act to provide a 'worst case scenario'.

The survey was conducted in November and outside the visible life phase of many native orchids, including Nationally threatened orchids (particularly *Caladenia* spp. (spider Orchids)). *Prasophyllum* spp. (Leek Orchids) may be visible in November but none were observed and given the survey coverage was limited their presence within the trail alignment cannot be determined. However, overall the impact to orchid populations is expected to be minimal, provided mitigation strategies and some follow up on ground surveys are conducted during the orchid's visible life phase in sensitive areas.

The fauna assessment was largely based on the desktop assessment given the access and coverage limitations, in addition to time constraints. However, fauna was recorded opportunistically where observed. Consideration has been given to project impacts on threatened fauna and efforts will be made to reducing any potential impacts.

4. Assessment Outcomes

4.1. Vegetation assessment – Field Survey

4.1.1. General description of the vegetation, the site and matters of significance

Landform through the proposed trail alignment varies from steep rocky slopes and ridges with communities of *Eucalyptus goniocalyx* and *Eucalyptus cladocalyx* on the highest slopes sharply falling away to the lower slopes and more open Woodlands near Melrose and tending to rolling hills west of Mt Remarkable NP. Lower hills on the western slopes appeared to be dominated by *Eucalyptus albens* and *Eucalyptus camaldulensis* ssp. *camaldulensis* but with patches of *Eucalyptus odorata*, particularly near creeklines. Woodlands near Melrose appeared dominated by *Eucalyptus leucoxylon* ssp. *leucoxylon* and *Eucalyptus camaldulensis* ssp. *camaldulensis* with patches of Box species including *E. odorata*, *E. albens*, *E. goniocalyx* and possibly *E. microcarpa*. Drainage lines wound through the base of Mount Remarkable, including deeper channels of *E. camaldulensis* ssp. *camaldulensis* but none were found to contain water during the survey and the BAM 'Blocks' have not been classified as containing a riparian zone given creeklines appeared relatively minor, were dry and impact through these areas is expected to be minimal.

Overall, the trail alignment was stratified into four Blocks and 11 vegetation types (Figure 13, Table 3). The Blocks were separated by property (where feasible) and trail concept design as follows:

- Block A (Figure 14) – Private landholder 1 and Council Road Reserve extending from the Horrocks Highway);
- Block B (Figure 15, Figure 16, Figure 17) – Mt Remarkable NP – main trail (excluding Willowie Link);
- Block C (Figure 18) – Private landholder 2;
- Block D (Figure 19) – Mt Remarkable NP (Willowie Link – added post-survey).

Vegetation community stratification is broad being largely based on remnant vegetation mapping, aerial photography and BAM in other locations. Vegetation in Block D was based completely on other associations in Block B, therefore is described under those associations. Blocks B and D occur completely within the Mt Remarkable NP dedicated to conservation with limited vehicle tracks and walking trails existing and intact native vegetation throughout. Block C occurs in private land most of which is understood to be currently grazed by cattle. Block A is on private land currently ungrazed but utilised as a Mountain Bike mecca with a network of existing trails throughout, some of which will be utilised for the new Epic Trail. Block A also contains a portion of the Horrocks Highway Road Reserve, which extends from the existing highway into bushland on private land. Whilst dedicated as road, this reserve presents as an extension through an area of existing bike trails.

Vegetation on the upper slopes and ridges in Block B was in good to excellent condition, diverse with few weeds except at the Summit which was subject to a higher level of weed invasion. Vegetation on the higher slopes supports abundant threatened flora which dominated understorey in small patches along the Range Track. Vegetation on the mid-slopes of Mt Remarkable (Block B) and areas near the Willowie Link (Block D) could not be accessed during the survey but are expected to be in good to excellent condition. Vegetation on the lower slopes of Mount Remarkable (Block B) and areas near existing trails was more degraded, particularly near creeklines, but did support threatened communities and scattered threatened flora. Private land south of the Link Lands between Mt Remarkable and Mambray Creek (Block C) was highly degraded with understorey dominated by weeds. Private land near Melrose (Block A) was variable with degraded patches near some trails and along creeklines, but with patches of high diversity and abundant native species.

Several significant vegetation communities were found to occur (or may occur on site based on DEW mapping in unsurveyed areas). This includes BAM Sites (communities) A1, B3 and D2 which could represent SA Vulnerable *Eucalyptus leucoxylon ssp. pruinosa* +/- *E. odorata* Grassy Low Woodland on loams of hill slopes (DEH, in progress); and BAM sites A2 and C2 which could represent SA Endangered *Eucalyptus odorata* +/- *E. leucoxylon* Grassy Low Woodland on loamy soils of low hills. *E. odorata* woodlands are also classified as EPBC Act Critically Endangered when meeting certain condition criteria. The new trail alignment traverses' areas of *E. odorata* that were not surveyed, but BAM assessment of *E. odorata* within 1km found the community to be highly degraded and not meeting listing criteria. Regardless, the community has been classified as Nationally listed to provide a 'worst case scenario'.

Table 3 provides a breakdown of the Blocks, BAM Sites, broad vegetation descriptions, the area proposed for clearance and the scores for each BAM site. Figure 13 to Figure 19 provide overview maps of the vegetation and Block impact area.

Table 3. Broad vegetation communities described within the Project Area (based on sample points, remnant vegetation mapping and aerial photography).

Tenure	BAM Block	BAM Site	Vegetation Description	Area (ha)	*UBS	**TBS	SEB Points required
Private land (east)	A	A1	<i>Eucalyptus leucoxylon ssp. pruinosa</i> Woodland over <i>Cassinia laevis</i> , <i>Austrostipa sp.</i> +/- <i>Eucalyptus odorata</i>	0.061	66.79	4.07	4.28
		A2	<i>Eucalyptus albens</i> / <i>Eucalyptus odorata</i> Woodlands over <i>Cassinia laevis</i> +/- <i>Eucalyptus leucoxylon ssp. pruinosa</i> / <i>Eucalyptus goniacalyx</i>	0	92.27	0.00	0.00
MT REMARKABLE NP (central)	B	B1 (B1a/B1b)	<i>Eucalyptus albens/Allocasuarina verticillata</i> Woodlands over <i>Cassinia laevis</i> , <i>Bursaria spinosa</i> +/- <i>Eucalyptus camaldulensis ssp. camaldulensis</i>	0.113	57.67	6.52	6.84
		B2 (B2a, B2b, B2c)	<i>Eucalyptus goniacalyx/Eucalyptus cladocalyx</i> Woodlands over <i>Xanthorrhoea quadrangulata</i> , <i>Bursaria spinosa</i>	3.565	82.08	292.62	307.25
		B3	<i>Eucalyptus leucoxylon ssp. pruinosa/Allocasuarina verticillata/Eucalyptus camaldulensis ssp. camaldulensis</i> Woodlands Low Open Forest over <i>Cassinia laevis</i> +/- <i>Eucalyptus odorata</i>	0.412	76.55	31.54	33.12
Private land (West/south)	C	C1 (C1a, C1b)	<i>Eucalyptus camaldulensis ssp. camaldulensis</i> Woodlands over <i>*Rosa canina</i> and exotic Grassland	0.143	27.89	3.99	4.19
		C2	<i>Eucalyptus odorata/Eucalyptus camaldulensis</i> Woodland over exotic species +/- native herbs	0.517	11.29	5.84	6.13
		C3	<i>Eucalyptus albens</i> Woodlands (moderate condition).	0.173	26.9	4.65	4.89
		C4	<i>Eucalyptus albens/Allocasuarina</i> Open Woodlands over exotic species +/- <i>Eucalyptus cladocalyx</i> and scattered natives	0.136	23.26	3.16	3.32
Mt Remarkable NP (Willowie Link)	D	D1	<i>Eucalyptus goniacalyx/Eucalyptus cladocalyx</i> Woodlands over mixed native species +/- <i>Eucalyptus albens</i> , <i>Eucalyptus odorata</i>	0.972	74.83	72.73	76.37
		D2	<i>Eucalyptus leucoxylon ssp. pruinosa/Allocasuarina verticillata</i> Low Open Forest over <i>Cassinia laevis</i> +/- <i>Eucalyptus odorata</i>	0.079	76.55	6.05	6.35
Total				6.171		431.70	452.73

*UBS: Unit Biodiversity Score; **TBS: Total Biodiversity Score (BAM Methodology)

4.1.2. Details of the vegetation associations / scattered trees proposed to be impacted

Table 4. Block A, BAM Site A1 - private land, lower eastern slopes near Melrose


Vegetation Association A1	<i>Eucalyptus leucoxylon ssp. pruinosa</i> Woodland over <i>Cassinia laevis</i> , <i>Austrostipa sp.</i> +/- <i>Eucalyptus odorata</i>				
					
<p>Figure 4. Left: <i>Eucalyptus leucoxylon ssp. pruinosa</i> Woodland indicating degraded creeklines with abundant fallen timber. Right: large trees with open understorey (right)</p>					
General description	Moderate condition with large trees some containing hollows and abundant fallen timber, but with variable understorey dominated by native grasses in patches but with weeds abundant particularly in drainage lines and including noxious weeds such as Olive and Dog Rose. Scattered native herbs and shrubs persist throughout.				
Threatened species or community	<p>SA Vulnerable community - <i>E. leucoxylon ssp. pruinosa</i> +/- <i>E. odorata</i> Grassy Low Woodland on loams of hill slopes (DEH, in progress).</p> <p><u>Threatened flora observed:</u> <i>Eucalyptus albens</i>, <i>Rumex dumosus</i>. <u>Other threatened flora included in scoresheets:</u> none.</p> <p><u>Threatened fauna observed:</u> none. <u>Threatened fauna included in scoresheet:</u> Bassian Thrush, Chestnut-rumped Heathwren, Eastern Shrike-tit, Elegant Parrot, Diamond Firetail, Gilberts Whistler, Hooded Robin, Jacky Winter, Painted Buttonquail, Scarlet Robin, White-wing Chough.</p>				
Landscape context score	1.1	Vegetation Condition Score	44	Conservation significance score	1.38
Unit biodiversity Score	66.79	Area (ha)	0.061	Total biodiversity Score	4.07

Table 5. Block A, BAM Site A2 – private land, lower eastern slopes near Melrose (no impact)

Vegetation Association A2	<i>Eucalyptus albens</i> / <i>Eucalyptus odorata</i> Woodlands over <i>Cassinia laevis</i> +/- <i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i> / <i>Eucalyptus goniocalyx</i> / <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> .
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Figure 5. Left: Mixed Box Woodland indicating existing walking trail and lower bike trail. Left/right: Open understory.

General description	Moderate to good condition with overstorey appeared to be dominated by <i>E. albens</i> with scattered box species, and scattered <i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i> and <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> . Few mature specimens in sample area and fruit could not be accessed. Unique understory of grasses, herbs, shrubs and some species suited to drier climate such as Quandong and Spinifex mixed with species associated with wetter climatic conditions that were observed across Mt Remarkable. Appears to contain patches of <i>E. odorata</i> but limited time to access and immature specimens with fruit not readily accessible. Degraded in patches particularly creeklines and near trails. Unique floristic composition and potentially representing Nationally TEC in some areas. Clearance will be avoided in this association.
Threatened species or community	<p>Could represent SA Endangered and Potentially EPBC Act Critically Endangered community - <i>E. odorata</i> +/- <i>E. leucoxylon</i> Grassy Low Woodland on loamy soils of low hills. Must meet minimum condition class to meet criteria for National listing. Areas of <i>E. odorata</i> patchy and not assessed for listing. Association not affected.</p> <p><u>Threatened flora observed:</u> <i>Eucalyptus albens</i>, <i>Rumex dumosus</i>. <u>Other threatened flora included in scoresheets:</u> none.</p> <p><u>Threatened fauna observed:</u> none <u>Threatened fauna included in scoresheet:</u> Bassian Thrush, Chestnut-rumped Heathwren, Eastern Shrike-tit, Elegant Parrot, Diamond Firetail, Gilberts Whistler, Hooded Robin, Jacky Winter, Painted Buttonquail, Scarlet Robin, White-wing Chough.</p>

Vegetation Association A2	<i>Eucalyptus albens / Eucalyptus odorata Woodlands over Cassinia laevis +/- Eucalyptus leucoxylon ssp. pruinosa / Eucalyptus goniocalyx / Eucalyptus camaldulensis ssp. camaldulensis.</i>				
Landscape context score	1.1	Vegetation Condition Score	53.09	Conservation significance score	1.58
Unit biodiversity Score	92.27	Area (ha)	0	Total biodiversity Score	0

Table 6. Block B, BAM Site B1 (a and b) – lower western slopes of Mt Remarkable NP

Vegetation Association B1	<i>Eucalyptus albens</i> / <i>Allocasuarina verticillata</i> Woodlands over <i>Cassinia laevis</i> , <i>Bursaria spinosa</i> +/- <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i>
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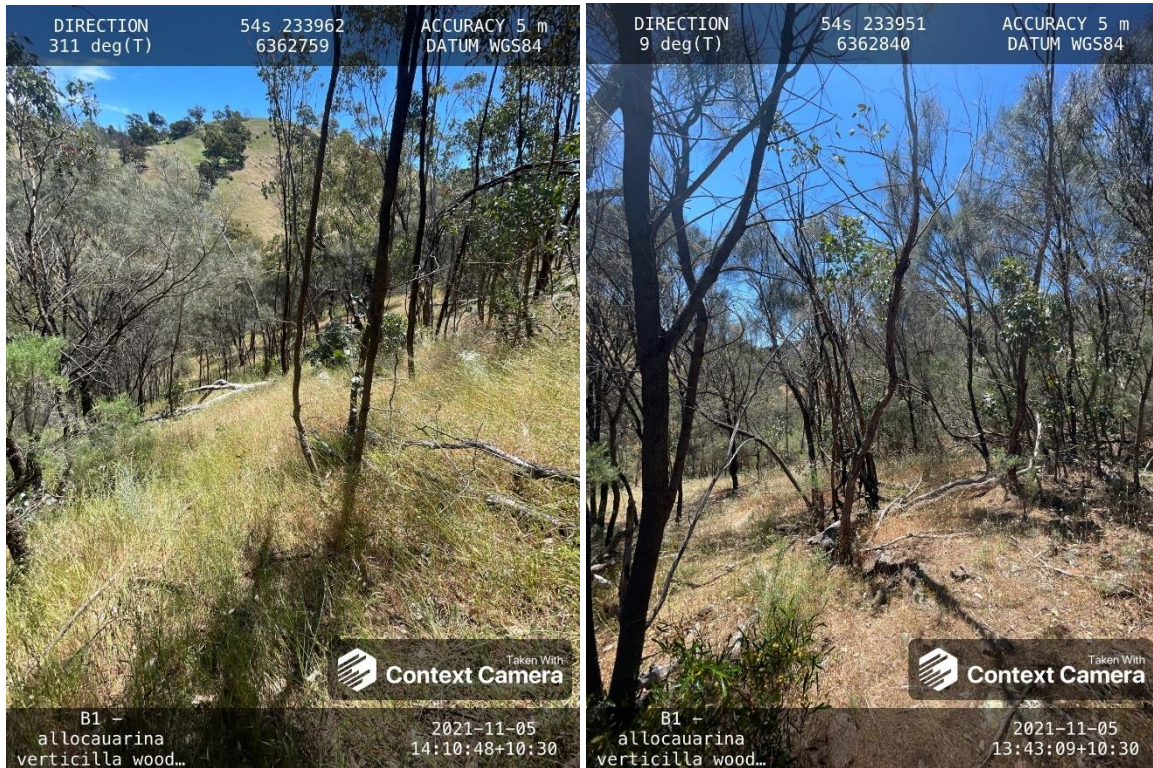


Figure 6. Rare tree *E. albens* Woodlands with *Allocasuarina verticillata* on steep western facing slopes near the base of Mount Remarkable.

General description	Moderate condition with overstorey appearing dominated by immature <i>E. albens</i> and <i>A. verticillata</i> . Few mature specimens in this location. Mixed understorey with scattered native species but abundant weed cover of Wild Oats and Quaking Grass.						
Threatened species or community	<p>Threatened flora observed in or near site: <i>Eucalyptus albens</i>, <i>Rumex dumosus</i>, <i>Scutellaria humilis</i>, <i>Glycine tabanica</i>.</p> <p>Other threatened flora included in scoresheets: <i>Festuca benthamiana</i>, <i>Ozothamnus scaber</i>.</p> <p>Threatened fauna observed: none</p> <p>Threatened fauna included in scoresheet: Bassian Thrush, Chestnut-rumped Heathwren, Eastern Shrike-tit, Elegant Parrot, Diamond Firetail, Gilberts Whistler, Hooded Robin, Jacky Winter, Scarlet Robin, White-wing Chough.</p>						
Landscape context score	1.1	Vegetation Condition Score	B1a	40.91	Conservation significance score	B1a	1.22
			B1b	47.45		B1b	1.22
			Average	44.18		Average	1.22
Unit biodiversity Score	B1a	53.40	Area (ha)	0.113	Total biodiversity Score	6.52	
	B1b	61.94					
	Average	57.67					

Table 7. Block B, BAM Site B2 (B2a, B2b and B2c) and D1 – ridges and rocky slopes Mt Remarkable NP. Includes Willowie Link (D1), not subject to on-ground assessment.

Vegetation Association B2 and D1	<i>Eucalyptus goniocalyx</i> Woodlands over <i>Xanthorrhoea quadrangulata</i> , <i>Bursaria spinosa</i> +/- <i>Eucalyptus cladocalyx</i>
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Figure 7. Overview photos of vegetation along Mount Remarkable Range Track (B2a, B2b and B2c). SA Rare *Hovea purpurea* and flowering *Pultenaea graveolens* at BAM site B2b (bottom left).

General description	Excellent condition with intact stratum across all vegetation layers, abundant threatened flora and few weeds which are restricted to low threat weeds such as Hair-grass (<i>Aira sp.</i>). Terrain drops sharply from ridge in deep rock with scri-slopes and largely inaccessible vegetation communities.
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Vegetation Association B2 and D1	<i>Eucalyptus goniocalyx</i> Woodlands over <i>Xanthorrhoea quadrangulata</i> , <i>Bursaria spinosa</i> +/- <i>Eucalyptus cladocalyx</i>							
Threatened species or community	<p><u>Threatened flora observed in or near site:</u> <i>Olearia pannosa</i> ssp. <i>cardiophylla</i>, <i>Hovea purpurea</i>, <i>Logania saxatilis</i>, <i>Pultenaea graveolens</i>, <i>Thelymitra grandiflora</i></p> <p><u>Other threatened flora included in scoresheets:</u> <i>Caladenia gladiolata</i>, <i>Caladenia woolcockiorum</i>, <i>Prasophyllum validum</i>, <i>Caladenia coactilis</i>, <i>Acacia gracilifolia</i>, <i>Eucalyptus albens</i>, <i>Festuca benthamiana</i>, <i>Ozothamnus scaber</i>.</p> <p><u>Threatened fauna observed:</u> none.</p> <p><u>Threatened fauna included in scoresheet:</u> Bassian Thrush, Chestnut-rumped Heathwren, Eastern Shrike-tit, Elegant Parrot, Diamond Firetail, Gilberts Whistler, Hooded Robin, Jacky Winter, Scarlet Robin, White-wing Chough.</p>							
Landscape context score	B	1.1	Vegetation Condition Score	B2a	65	Conservation significance score	B2a	1.30
				B2b	57.28		B2b	1.30
				B2c	54.74		B2c	1.30
				Average B2	59.01		Average B2	1.30
	D	1.07	D1	53.79	D1	1.30		
Unit biodiversity Score	B1a	90.42	Area (ha)	B2	3.565	Total biodiversity Score	B1	292.62
	B1b	79.67						
	B2c	76.14		D1	0.972			
	Average B2	82.08						
	D1	74.83					D1	72.73

Table 8. Block B, BAM Site B3 and D2 – Blue Gum +/- River Red Gum Woodlands, Mt Remarkable NP.

Vegetation Association B3/D2	<i>Eucalyptus leucoxylon ssp. pruinosa/Allocasuarina verticillata/Eucalyptus camaldulensis ssp. camaldulensis Woodlands over Cassinia laevis +/- Eucalyptus odorata</i>
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Figure 8. SA Blue-Gum Woodland on lower eastern slopes of Mt Remarkable NP.

General description	Moderate to good condition with mixed overstorey and some large trees. Includes <i>Eucalyptus camaldulensis ssp. camaldulensis</i> Woodland further north (not surveyed). Understorey open with mixed native herbs and grasses but abundant weeds including scattered noxious weeds Horehound, Bridal Creeper, Olive, Dog Rose and African Boxthorn. Weeds are expected to be less common or absent from Blue Gum Woodlands in the Willowie Link area. Terrain low but steep rolling hills, difficult to access therefore assessed near existing Summit walking trail.							
Threatened species or community	SA VULNERABLE community - <i>E. leucoxylon ssp. pruinosa +/- E. odorata</i> Grassy Low Woodland on loams of hill slopes (DEH, in Progress) <u>Threatened flora observed:</u> none. <u>Other threatened flora included in scoresheets:</u> <i>Prasophyllum validum, Eucalyptus albens.</i> <u>Threatened fauna observed:</u> none. <u>Threatened fauna included in scoresheet:</u> Bassian Thrush, Chestnut-rumped Heathwren, Eastern Shrike-tit, Elegant Parrot, Diamond Firetail, Gilberts Whistler, Hooded Robin, Jacky Winter, Painted Buttonquail, Scarlet Robin, White-wing Chough.							
Landscape context score	B3	1.07	Vegetation Condition Score	B3	49	Conservation significance score	B3	1.46
	D2	1.07		D2	49		D2	1.46
Unit biodiversity Score	B2	76.55	Area (ha)	B3	0.412	Total biodiversity Score	B3	31.54
	D2	76.55		D2	0.079		D2	6.05

Table 9. Block C, BAM Site C1 (a and b) – lower western hills and slopes on private land, south-west of Mt Remarkable NP

Vegetation Association C1	<i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> Woodlands over * <i>Rosa canina</i> and exotic Grassland
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Figure 9. River Red Gum drainage lines over exotic Grassland with scattered native species.

General description	Grazed by cattle and in poor condition in areas surveyed with understorey dominated by exotic species, but noting survey was restricted to locations generally outside of the updated proposed trail alignment. <i>Eucalyptus odorata</i> likely to be scattered around creek margins. Trees mix of large Gums with hollows and smaller regenerating specimens. Clearance of trees should be avoided, particularly larger specimens and those with hollows.						
Threatened species or community	<p><u>Threatened flora observed in or near site:</u> <i>Glycine tabanica</i>, <i>Eucalyptus albens</i>, <i>Scutellaria humilis</i>.</p> <p><u>Other threatened flora included in scoresheets:</u> <i>Eucalyptus albens</i>, <i>Rumex dumosus</i>, <i>Austrostipa densiflora</i>, <i>Festuca benthamiana</i>.</p> <p><u>Threatened fauna observed:</u> Peregrine Falcon roost.</p> <p><u>Threatened fauna included in scoresheet:</u> Eastern Shrike-tit, Elegant Parrot, Diamond Firetail, Gilberts Whistler, Hooded Robin, Jacky Winter, Peregrine Falcon, Scarlet Robin, White-wing Chough, Carpet Python.</p>						
Landscape context score	1.04	Vegetation Condition Score	C1a	18.38	Conservation significance score	C1a	1.2
			C1b	26.33		C1b	1.2
			Average	22.36		Average	1.2
Unit biodiversity Score	C1a	22.93	Area (ha)	0.143	Total biodiversity Score	3.99	
	C1b	32.85					
	Average	27.89					

Table 10. Block C, BAM Site C2 – private land, lower western slopes

Vegetation Association C2	<i>Eucalyptus odorata/Eucalyptus camaldulensis</i> Woodland over exotic species +/- native herbs
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Figure 10. Left: Peppermint Box Woodland on private land. Right: *E. albens* Woodland in the Link Lands, Mt Remarkable NP utilised to derive scores for the site (with some amendments).

General description	Site surveyed in poor condition with exotic species dominating the understorey, but actual site of proposed trail (Figure 20) was not surveyed due to post-survey trail alignment amendment and limited access during survey. Overstorey with some mature trees. As the site of the trail was not assessed it was classified as Nationally threatened community to provide a 'worst case scenario' but it is considered unlikely that any <i>E. odorata</i> Woodlands in the vicinity of the proposed trail <u>on private land</u> comprise the Nationally threatened community based on the areas surveyed, noting BAM site C2 may not even comprise <i>E. odorata</i> Woodland as this community was based only on DEW remnant vegetation mapping. Regardless, impact through these areas is expected to be limited.
Threatened species or community	Could represent SA Endangered and Potentially EPBC Act Critically Endangered community - <i>E. odorata</i> +/- <i>E. leucoxylon</i> Grassy Low Woodland on loamy soils of low hills. Must meet minimum condition class to meet criteria for National listing. Area assessed for original trail alignment did not meet criteria, but National listing cannot be ruled out without on ground assessment. <u>Threatened flora observed:</u> none. <u>Other threatened flora included in scoresheets:</u> <i>Eucalyptus albens</i> , <i>Rumex dumosus</i> . <u>Threatened fauna observed:</u> none. <u>Threatened fauna included in scoresheet:</u> Eastern Shrike-tit, Elegant Parrot, Diamond Firetail, Gilberts Whistler, Hooded Robin, Jacky Winter, Peregrine Falcon, Scarlet Robin, White-wing Chough.

Vegetation Association C2	<i>Eucalyptus odorata/Eucalyptus camaldulensis Woodland over exotic species +/- native herbs</i>				
Landscape context score	1.06	Vegetation Condition Score	6.83	Conservation significance score	1.56
Unit biodiversity Score	11.29	Area (ha)	0.517	Total biodiversity Score	5.83

Table 11. Block C, BAM Site C3 – private land, lower western slopes

Vegetation Association C3	<i>Eucalyptus albens</i> Woodlands (moderate condition) +/- <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> / <i>Allocasuarina verticillata</i>
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Figure 11. *Eucalyptus albens* Woodlands in Mt Remarkable NP (used to derive scores for nearby and heavily wooded BAM site C3).

General description	Sites surveyed in moderate condition with abundant exotic species in the understorey but native shrubs and herbs scattered throughout. Area for proposed trail was not surveyed therefore scores were based on nearby site in Mt Remarkable NP. It is likely that <i>B. spinosa</i> and other mid-storey shrubs have been grazed out on private land but without on ground survey this is difficult to determine and given the reasonable cover of vegetation on aerial photography it was deemed appropriate to use site in adjacent park as a reference point with some amendments				
Threatened species or community	<p><u>Threatened flora observed:</u> <i>Eucalyptus albens</i>.</p> <p><u>Other threatened flora included in scoresheets:</u> <i>Rumex dumosus</i>.</p> <p><u>Threatened fauna observed:</u> none.</p> <p><u>Threatened fauna included in scoresheet:</u> Eastern Shrike-tit, Elegant Parrot, Diamond Firetail, Gilberts Whistler, Hooded Robin, Jacky Winter, Painted Buttonquail, Scarlet Robin, White-wing Chough.</p>				
Landscape context score	1.04	Vegetation Condition Score	22.29	Conservation significance score	1.16
Unit biodiversity Score	26.9	Area (ha)	0.136	Total biodiversity Score	4.65

Table 12. Block C, BAM Site C4 – private land, lower western slopes

Vegetation Association C4	<i>Eucalyptus albens</i> / <i>Allocasuarina</i> Open Forest over exotic species +/- <i>Eucalyptus cladocalyx</i> and scattered natives (based on Site in the Link Lands, Mt Remarkable NP).
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Figure 12. *Eucalyptus albens* Woodlands in Link Lands, Mt Remarkable NP used to derive scores for C4

General description	Sites surveyed in moderate condition with abundant exotic species in the understorey and scattered native herbs and grasses (noting this was outside of the mapped BAM community). Exotic species dominate and expected to dominate in Site C4 which is known to be grazed by cattle.				
Threatened species or community	<p><u>Threatened flora observed:</u> <i>Eucalyptus albens</i>, <i>Rumex dumosus</i>. <u>Other threatened flora included in scoresheets:</u> none.</p> <p><u>Threatened fauna observed:</u> none. <u>Threatened fauna included in scoresheet:</u> Eastern Shrike-tit, Elegant Parrot, Diamond Firetail, Gilberts Whistler, Hooded Robin, Jacky Winter, Scarlet Robin, White-wing Chough.</p>				
Landscape context score	1.04	Vegetation Condition Score	19.62	Conservation significance score	1.14
Unit biodiversity Score	23.26	Area (ha)	0.173	Total biodiversity Score	3.16

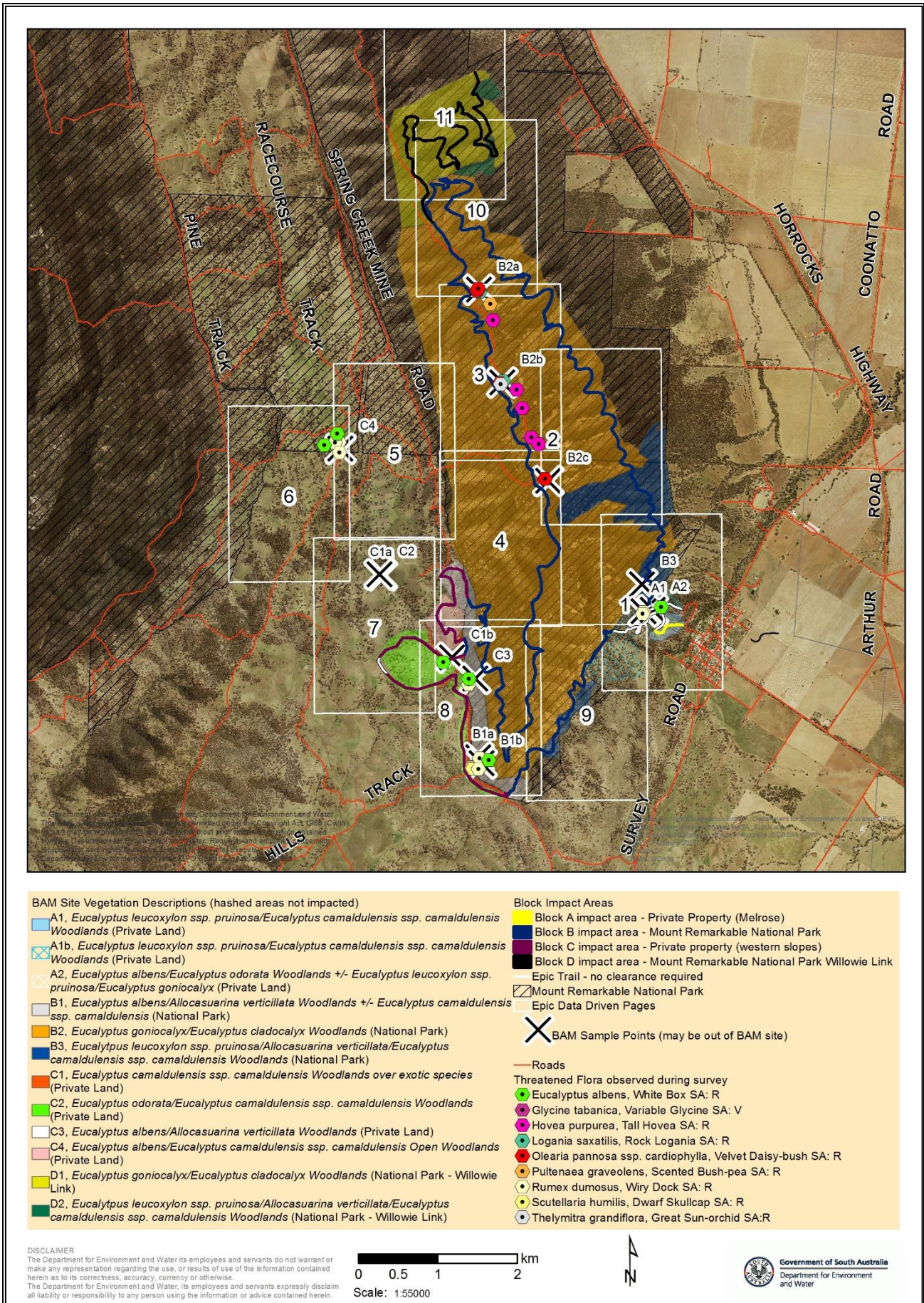


Figure 13. Overview of proposed Epic Trail showing broad vegetation communities, correlating BAM sample points and threatened flora observed during the survey.

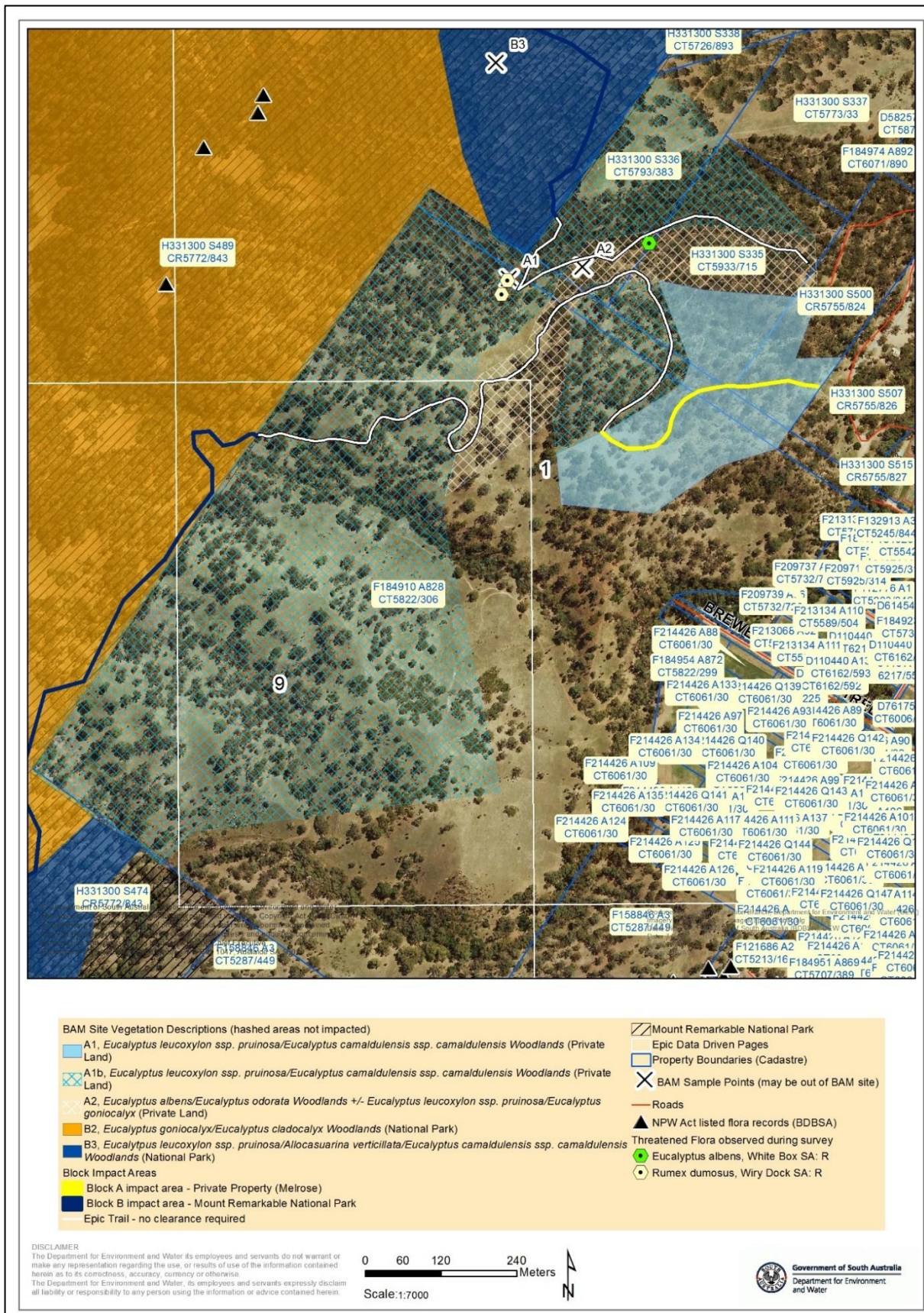


Figure 14. Vegetation Block A (private land) showing broad vegetation types and correlating BAM sample points. Threatened flora observed during the survey are depicted by species, whilst threatened flora records based on BDBSA records data are shown as generic symbols. Coloured hashed areas are mapped but are not impacted based on the current alignment as existing trails will be utilised in this area.

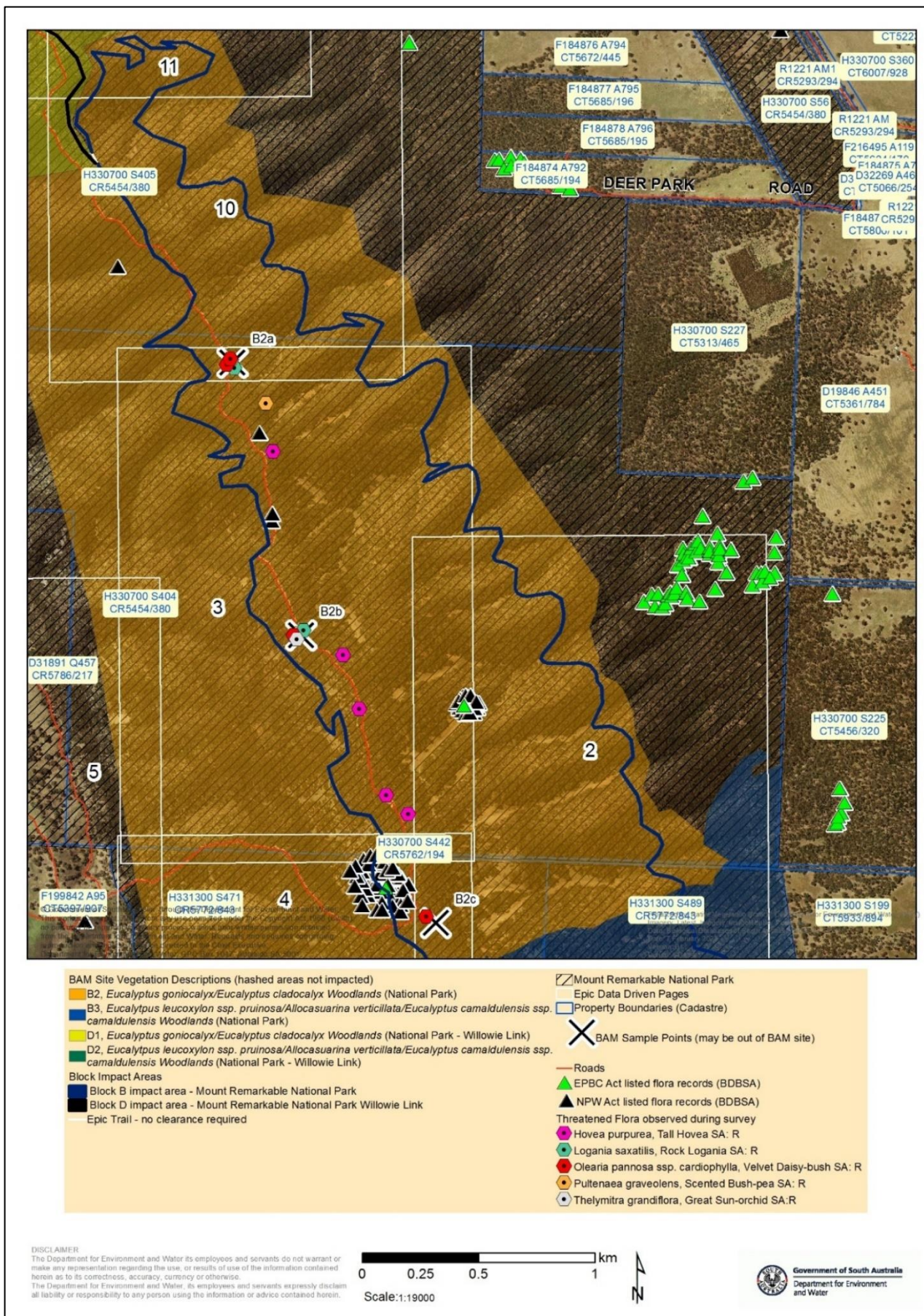


Figure 15. Block B (map 1 of 3) showing broad vegetation types and correlating BAM sample points. Threatened flora observed during the survey are depicted by species, whilst threatened flora records based on BDBSA records data are shown as generic symbols.

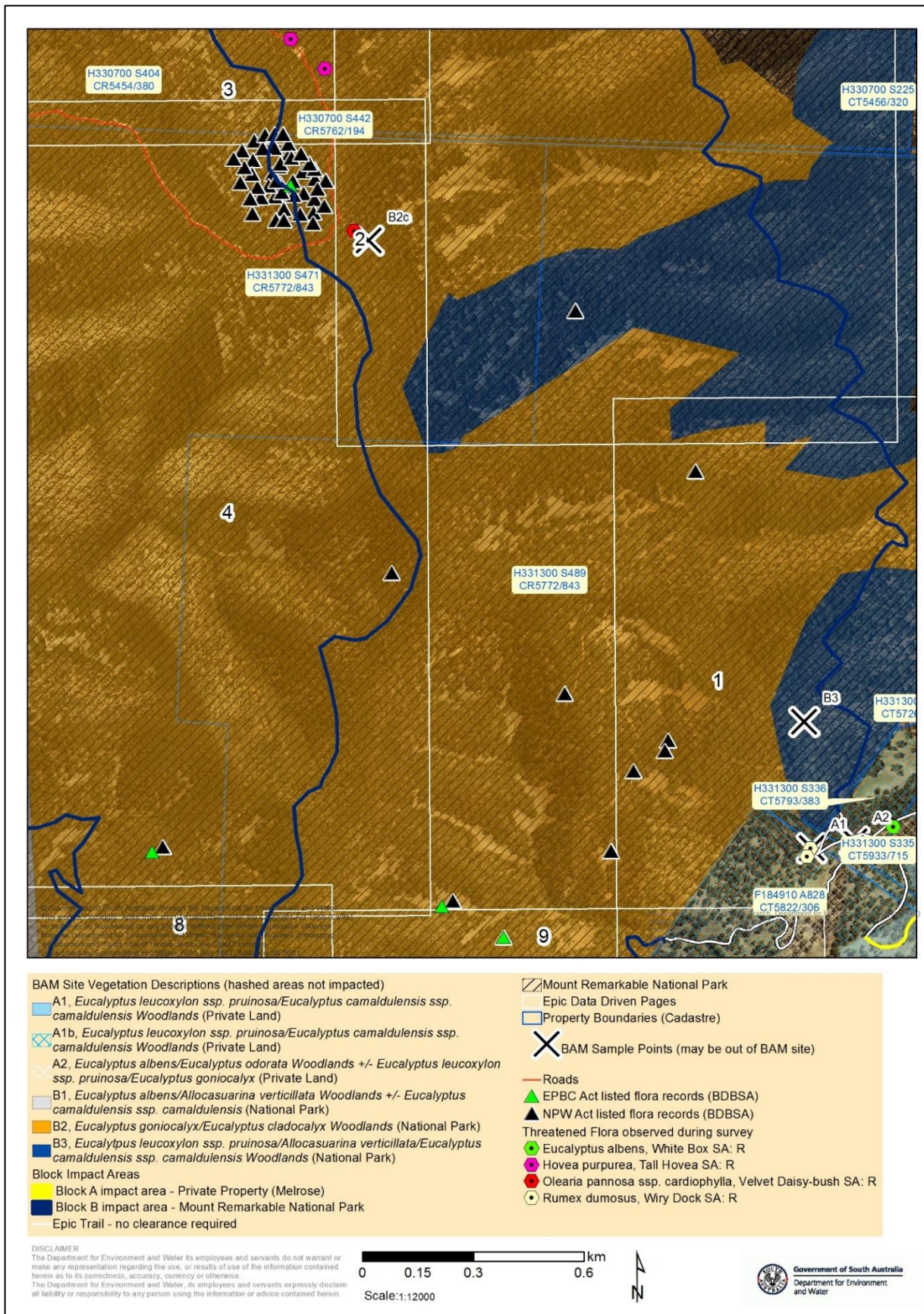


Figure 16. Block B (map 2 of 3) showing broad vegetation types and correlating BAM sample points. Threatened flora observed during the survey are depicted by species, whilst threatened flora records based on BDBSA records data are shown as generic symbols.

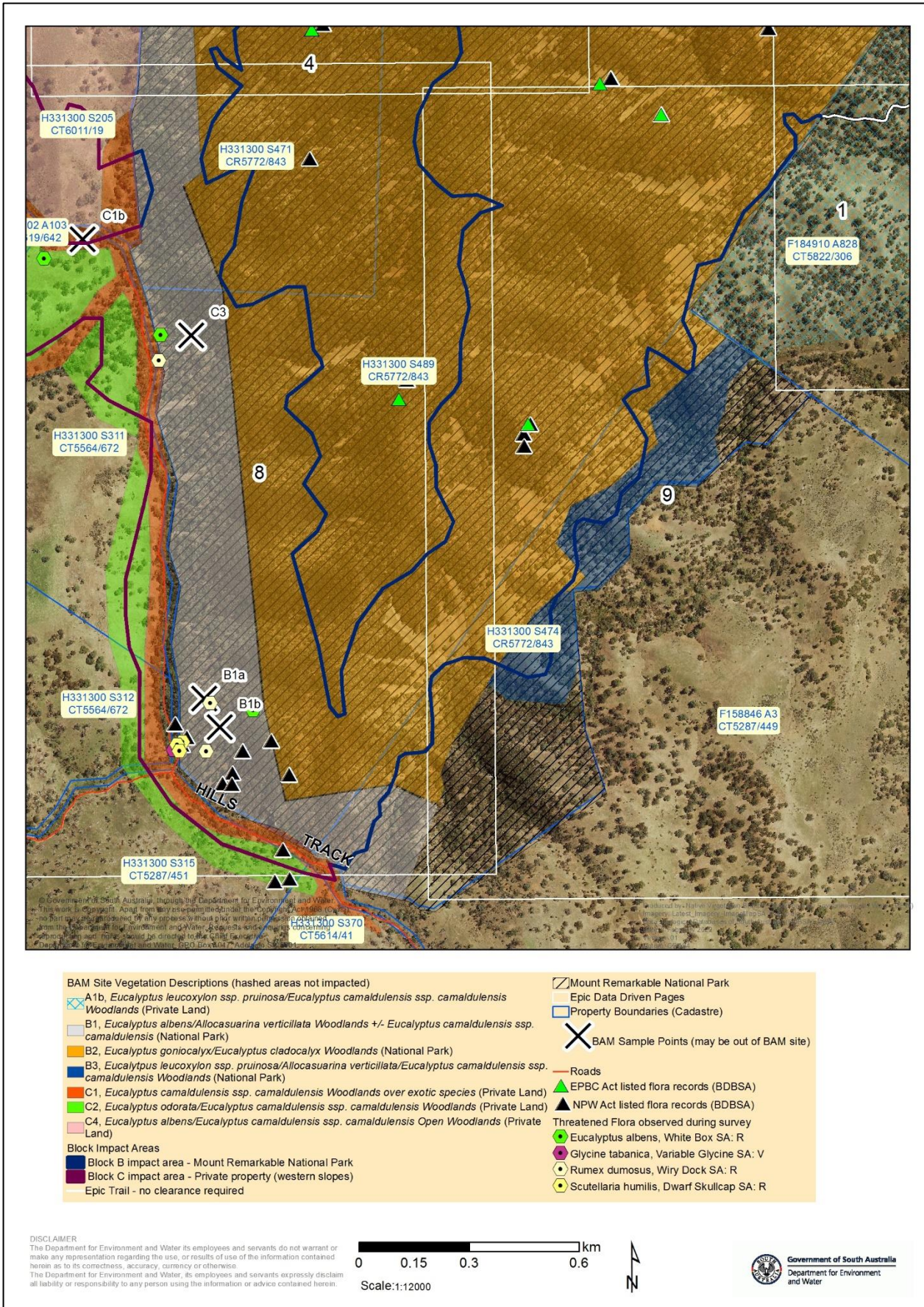


Figure 17. Block B (map 3 of 3) showing broad vegetation types and correlating BAM sample points. Threatened flora observed during the survey are depicted by species, whilst threatened flora records based on BDBSA records data are shown as generic symbols.

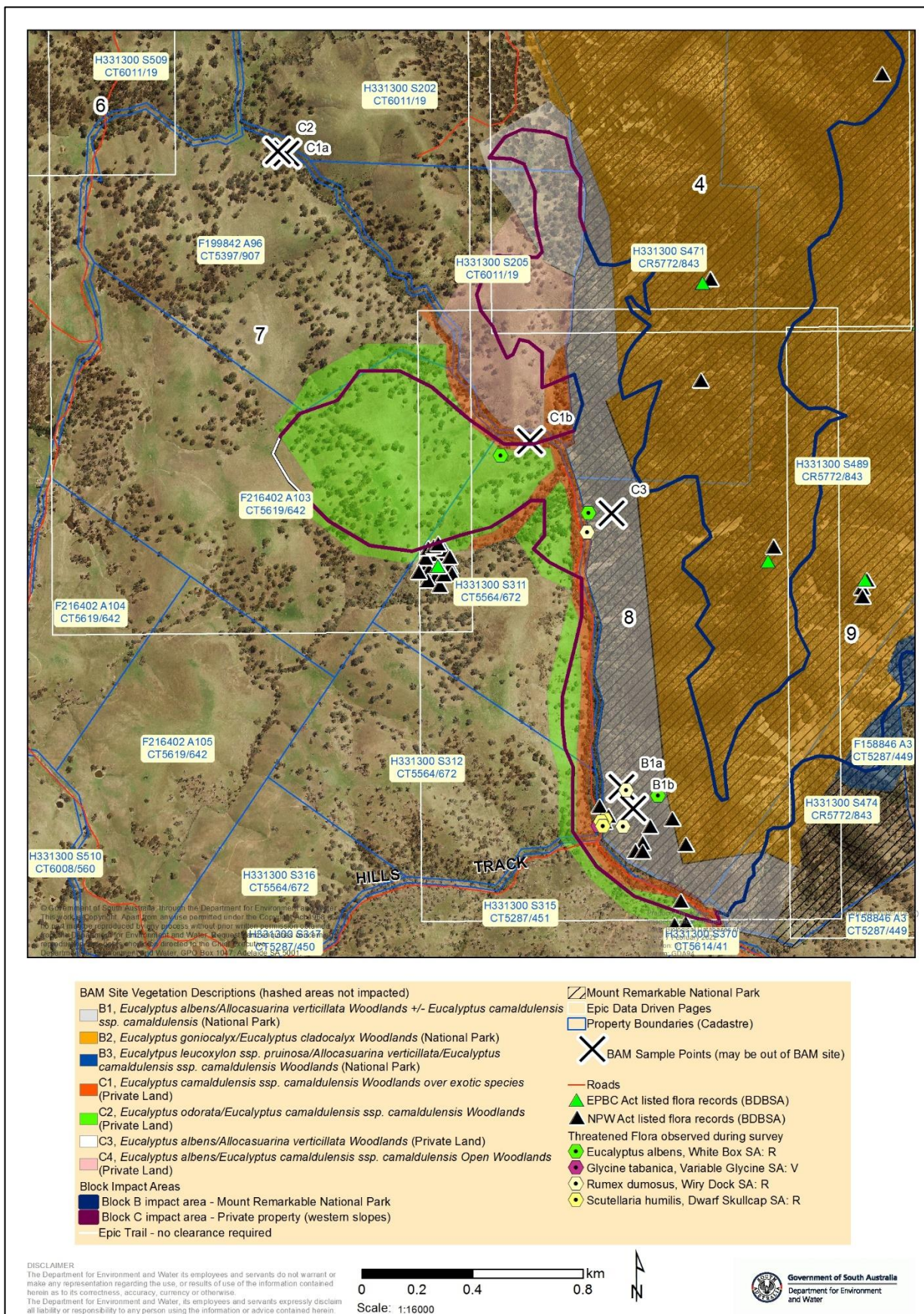


Figure 18. Block C showing broad vegetation types and correlating BAM sample points. Threatened flora observed during the survey are depicted by species, whilst threatened flora records based on BDBSA records data are shown as generic symbols.

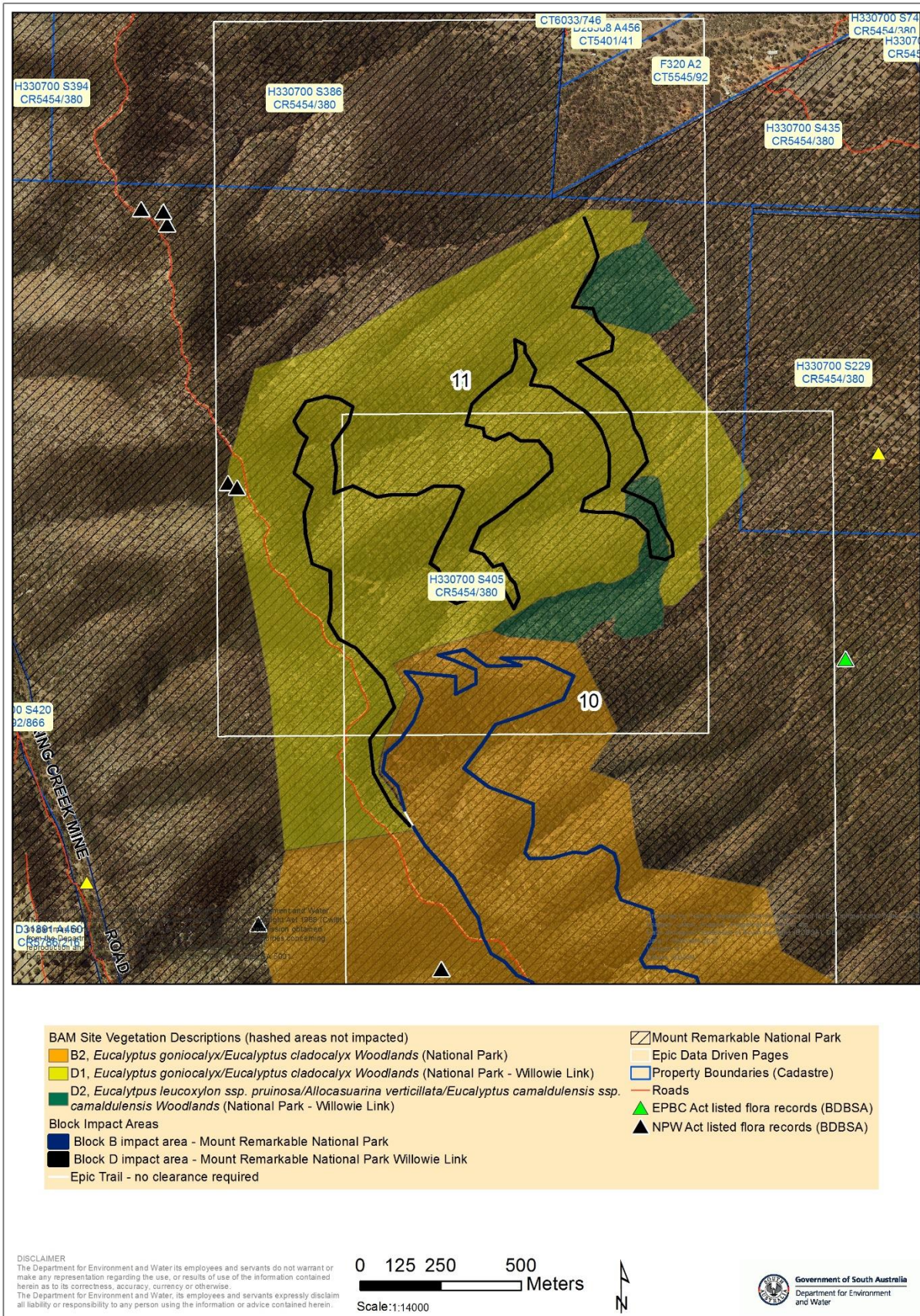


Figure 19. Block D showing broad vegetation types and correlating BAM sample points. Threatened flora records based on BDBSA records data are shown as generic symbols. Note that Block D was added post-survey, therefore no BAM assessments were done in this area and assessment is based on sites assessed in Block B.

4.2. Threatened Ecological Communities and Threatened Species Assessment

4.2.1. Threatened Vegetation Communities

Based on DEW vegetation mapping and the local IBRA Sub-region (FLB04), it was found that two threatened vegetation communities are likely or known to occur in the project area, including one Nationally threatened community (EPBC Act) and one State threatened community based on the *Provisional list of threatened ecosystems for South Australia (DEH, in Progress, unpublished and provisional list)* as follows:

1. *Eucalyptus odorata* +/- *Eucalyptus leucoxylon* Grassy Low Woodland on loamy soils of low hills **EPBC Act Critically Endangered** when meeting condition criteria; and **SA Endangered**.

This community is described as highly modified by clearance and grazing, and the few examples in reserves are very small. *E. odorata* is largely confined to SA (DEH, in progress).

Eucalyptus odorata (Peppermint Box) Woodland was found to occur in small patches in private land west of the range near creeklines (BAM sample point C2) based on the original alignment, noting the area mapped as *E. odorata* Woodland in the current alignment (BAM C2) was not assessed (Figure 20) and was classified based only on DEW mapping. However, nearby patches within 1km that were observed during the November 2021 survey were on highly degraded private land and did not reflect the EPBC listed community. Furthermore, as the proposed trail is intended to avoid clearance of trees it is expected that any impact on listed communities would be minimal. However, in the absence of on ground survey, the presence and listing status of Woodlands in this area cannot be confirmed and the community scores have been assumed as Nationally listed to provide a 'worst case scenario'. It should be noted that the trail alignment has been moved west to avoid areas of *E. odorata* likely to be Nationally threatened on the eastern slopes (based on DEW mapping) (Figure 20). Movement further west cannot be achieved due to cultural Heritage considerations regarding avoidance of scri-slopes.

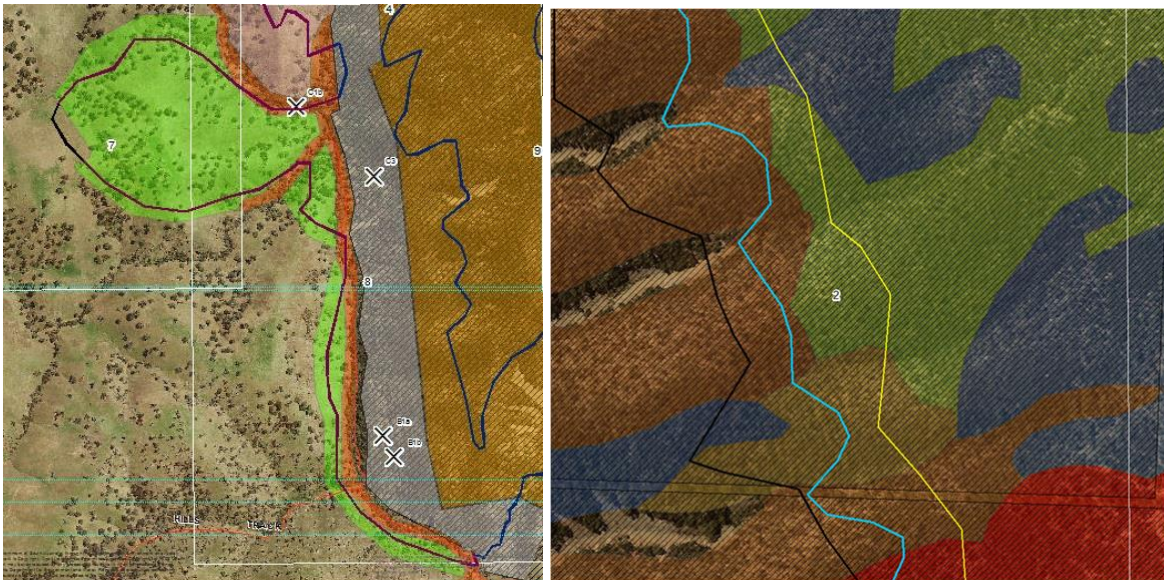


Figure 20. Left: *Eucalyptus odorata* Woodland on private land in Block C (indicated in green based on DEW mapping, but not assessed on ground as added post-survey). Right: Trail re-alignment in aqua to avoid *E. odorata* Woodland potentially impacted based on the previous alignment (yellow) (based on DEW remnant vegetation mapping).

2. *E. leucoxylon* ssp. *pruinosa* +/- *E. odorata* Grassy Low Woodland on loams of hill slopes **SA Vulnerable**. Described as occurring in the Mid North from Barossa to southern Flinders. Previously extensive. Poorly conserved. Highly modified by clearance and grazing. Lack of regeneration (listed in Robertson 1998 – in DEH in progress).

This community was only observed on the eastern slopes near Melrose during the 2021 survey (BAM A1 and B3). The community was not observed on the lower western slopes despite being mapped as this community based on DEW remnant vegetation mapping (noting that survey coverage was poor and more extensive survey would be required to determine the extent). Given construction of the proposed trail is expected to have minimal impact through these areas with no clearance of mature trees, overall impact is expected to be limited regardless of the vegetation community.

It should be noted that *Allocasuarina verticillata* Grassy Low Woodland on clay loams of low hills which is considered Vulnerable for South Australia in some areas, is not considered threatened in FLB04 where the Project Area occurs.

Clearance of threatened communities should be avoided where possible, acknowledging the clearance is not expected to result in the loss of trees, especially in open woodland communities. Clearance of threatened communities attracts a higher SEB cost.

4.2.2. Threatened Flora

Nationally threatened flora

Of the species recorded within 5km, seven are Nationally threatened, including six orchids and the Port Lincoln Speedwell (*Veronica parnkalliana*). A likelihood of occurrence assessment has been undertaken for each species (Table 14). All species have been observed within the project area. Figure 21 indicates the distribution of flora species threatened under the EPBC Act. Individual species cannot be displayed at this scale due to the high number of records and species present.

Two of these species are considered likely to occur within the project area; *Caladenia woolcockiorum* and *Prasophyllum validum*; which have numerous records scattered through the site and are expected to occur in *Eucalyptus cladocalyx* Woodland, *Eucalyptus leucoxydon* ssp. *pruinosa* Woodland, *Eucalyptus goniocalyx* Woodland and *Eucalyptus odorata* Woodland.

Four species are considered as possibly occurring; *Caladenia gladiolata*, *Caladenia xantholeuca*, *Prasophyllum pallidum* and *Veronica parnkalliana*. These species have limited historical records, but suitable habitat may occur. *Caladenia tensa* is considered unlikely to occur (Table 14). Two additional species were identified in the PMST search as likely or known to occur; *Olearia pannosa* ssp. *pannosa* and *Senecio megaglossus*. These species do not have records within 5km but are considered as possibly occurring in the Project Area, the former on roadsides and in Woodland, the latter on rocky ridges.

Based on discussion with the herbarium, it was indicated that the anticipated risk to Nationally threatened species populations is low, based on the current trail alignment. However, the occurrence of Nationally threatened species cannot be ruled out and overall impact is currently unknown, therefore all orchid populations should be avoided during trail alignment selection and construction (noting orchids have limited visible life phase). Sensitive areas on the eastern slopes of Mount Remarkable (near species records of National Significance) are recommended to be assessed prior to clearance during the orchid's visible life phase.

State threatened Flora

Of the State threatened flora, 13 were classified as likely or known to occur whilst 12 were classified as possibly occurring and 11 were classified as unlikely to occur (Table 15). Note this does not include species with a National rating. Species classified as unlikely to occur generally had very old or limited records, or habitat was considered unsuitable such as wetland plants. The cluster of records at the MR Summit was found to represent old records or those with a low spatial reliability and this area was generally found to be more degraded (Figure 16). Table 15 provides an assessment of the likelihood of species occurring in the area, whilst Figure 21 indicates the distribution of flora species threatened under the NPW Act. Individual species cannot be displayed at this scale due to the high number of records and species present.

The SA threatened species considered most likely (or known) to occur have all been observed within the proposed project area, had multiple records and it is expected there is suitable habitat on site. These include *Austrostipa breviglumis* (Cane Spear-grass), *Austrostipa densiflora* (Fox-tail Spear-grass), *Festuca benthamiana* (Bentham's Fescue), *Eucalyptus cajuputea* (Green mallee), *Ozothamnus scaber* (Rough Bush-everlasting), *Eucalyptus albens* (White Box), *Glycine tabanica* (Variable Glycine), *Hovea purpurea* (Tall Hovea), *Logania saxatilis* (Rock Logania), *Olearia pannosa*

ssp. cardiophylla (Velvet Daisy-bush), *Pultenaea graveolens* (Scented Bush-pea), *Scutellaria humilis* (Dwarf Skullcap) and *Thelymitra grandiflora* (Giant Sun-orchid).

Eight of these species were observed during the survey (Table 13, Figure 21), noting that some grasses have not been identified to species level and may occur. There were no Nationally threatened flora species observed during the survey, but some may occur as listed in the likelihood assessment. Threatened flora species were observed at nine of the 13 BAM sites and it is highly likely that threatened flora is very widespread, particularly throughout the rocky ridges and steep slopes where *Olearia pannosa ssp. cardiophylla*, *Pultenaea graveolens* and *Hovea purpurea* were common (Figure 26, Figure 30). *Logania saxatilis* was noted occasionally and is morphologically similar to common species *Myoporum petiolaris* (Figure 27, Figure 28), so it may be difficult to detect during trail alignment and construction; and therefore avoidance of both is recommended. On the lower slopes *Eucalyptus albens* was particularly common but it is expected the majority of larger trees can be avoided during trail construction (Figure 11, Figure 12, Figure 22). *Rumex dumosus* (Figure 25) was also widespread and common on lower slopes, including in degraded areas otherwise dominated by exotic grass species. *Rumex dumosus* is annual and may be difficult to detect at times. However, given the species is locally common the proposed trail is not expected to have any long-term impact on local populations. The occurrence of *Glycine tabanica* (Figure 23) and *Scutellaria humilis* at the southern end of the alignment (Figure 24) was considered more isolated, therefore this area should be considered sensitive and mitigation strategies implemented to avoid the specimens. These species may occur on lower slopes around the Project Area, particularly in ungrazed communities.

Based on discussion with the SA Herbarium it was considered that generally SA threatened flora species that may occur or occur are widespread and the trail would have limited impact on overall populations. The species considered at highest risk was *Hovea purpurea* which is known from the Mt Remarkable Summit area and has more limited distribution. Regardless of the trail being unlikely to impact on broader threatened species populations, their clearance should be avoided and minimised where possible (refer Section 4.4).

Table 13 provides a list of the threatened flora species observed during the survey whilst Figure 11 to Figure 31 provides photos of some of the threatened plants specimens observed in the field.

Table 13. Threatened flora species observed during November 2021 survey.

Scientific Name	Common name	NPW Act rating	Observation comment
<i>Eucalyptus albens</i>	White Box	Rare	Common – lower slopes
<i>Glycine tabanica</i>	Variable Glycine	Vulnerable	B1 – localised occurrence
<i>Hovea purpurea</i>	Tall Hovea	Rare	Locally common near ridge and summit
<i>Logania saxatilis</i>	Rock Logania	Rare	Uncommon near ridge
<i>Olearia pannosa ssp. cardiophylla</i>	Velvet Daisy-bush	Rare	Locally common near ridge and occasionally in lower lying areas
<i>Pultenaea graveolens</i>	Scented Daisy-bush	Rare	Locally common near ridge
<i>Rumex dumosus</i>	Wiry Dock	Rare	Common on lower slopes in Link Lands and less so in degraded private land.
<i>Scutellaria humilis</i>	Dwarf Skullcap	Rare	B1 - isolated occurrence of scattered plants.

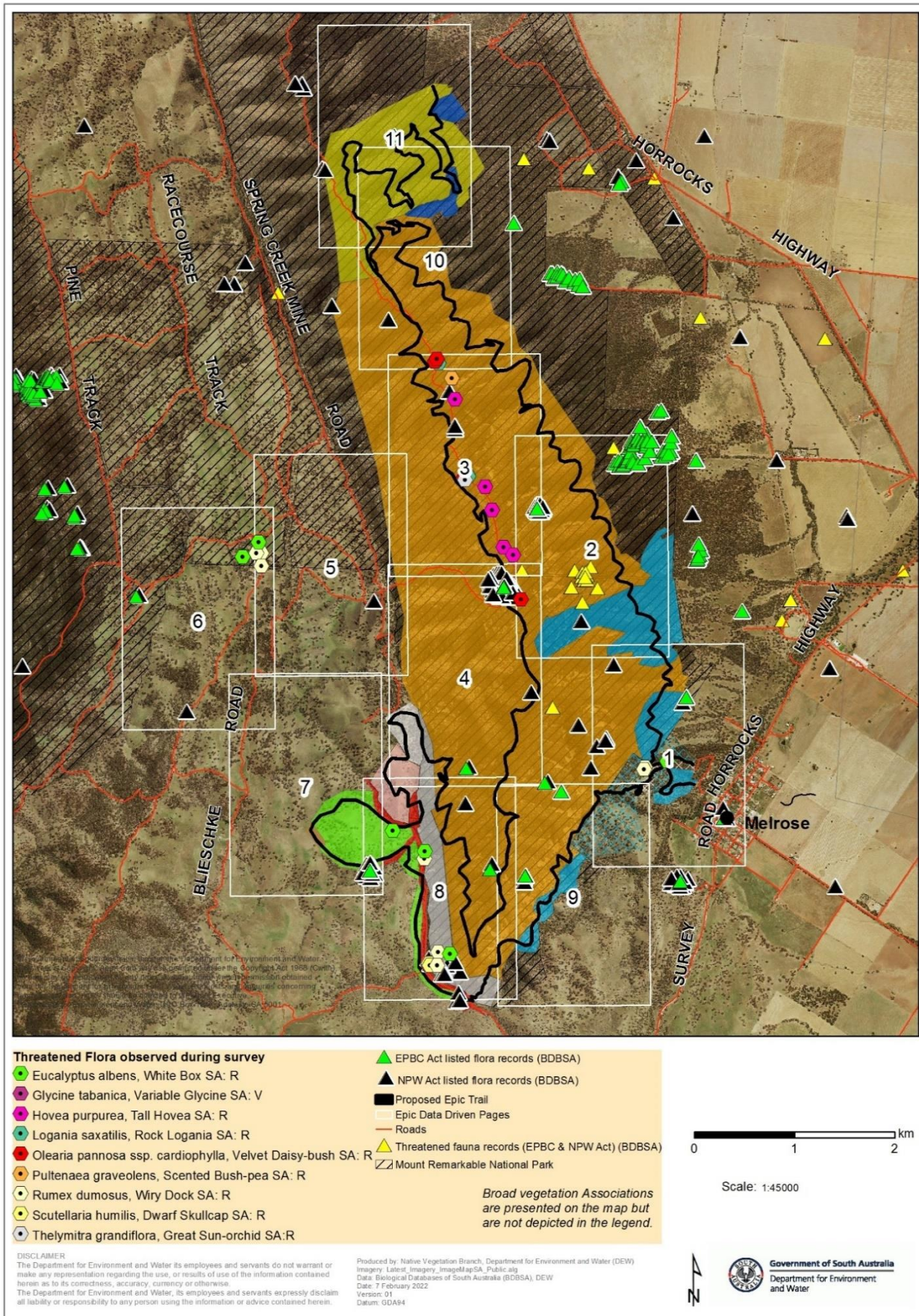


Figure 21. Map indicates threatened flora species observed during the survey and threatened flora and fauna records derived from the BDBSA. Note that BDBSA species records cannot be displayed by species in the map or legend at this scale due to the number of species and associated records that occur in the project area.

Table 14. Summary of Nationally threatened flora species recorded in the Biological Databases of South Australia within 5km of the site or identified in the 5km Protected Matters Search.

Species (common name)	NP&W Act	EPBC Act	Data source	Date of last record	Record notes	Species known habitat preferences	Likelihood of use for habitat – Comments
<i>Caladenia gladiolata</i> (Bayonet Spider-orchid)	E	EN	1, 2, 3	1966	One very old record just north of the proposed trail on Page 9 in <i>E. goniocalyx</i> Woodland. The SA Herbarium advised they have recorded this species in the area more recently but not within the trail alignment.	Two of the 4 known populations occur in the Mount Remarkable NP. Known to grow in <i>E. leucoxyton</i> (SA Blue Gum)/ <i>E. cladocalyx</i> (Sugar Gum) Woodland in the Park (Willowi). It is likely that this species was widespread in fertile grasslands before settlement, but it is now rare and known from only 3 or 4 localities (SA Herbarium). Refer Recovery Plan. Target: Blue Gum, Sugar Gum Woodland, <i>E. goniocalyx</i> Woodland.	POSSIBLE – suitable habitat and recorded by the herbarium more recently than indicated.
<i>Caladenia tensa</i> (Inland Green-comb Spider-orchid)	-	EN	1, 2	1988	Four old records (most recent 1988), three of which are in the vicinity of the proposed trail all growing on lower slopes in Blue Gum Woodland	Found in the upper South-east in South Australia, growing in dry woodland and mallee on sandy loams. Flowering from September to November. Target: Lower slopes, woodland and mallee.	UNLIKELY – suitable habitat but old records and taxonomy uncertain.
<i>Caladenia woolcockiorum</i> (Woolcock's Spider-orchid)	E	VU	1, 2	2008	119 records within 5km including multiple within the trail vicinity. Mostly appear in <i>E. goniocalyx</i> and <i>E. cladocalyx</i> Woodlands on high ridges. One record near Mt Remarkable NP Summit.	Known populations confined to Mt Remarkable NP. Larger populations in loamy soils near gullies in <i>Eucalyptus cladocalyx</i> ± <i>E. goniocalyx</i> ± <i>E. leucoxyton</i> open forest or woodland with <i>Acacia pycnantha</i> / <i>Cassinia laevis</i> overstorey and <i>Hibbertia exutiacies</i> , <i>Lomandra densiflora</i> and <i>Dianella revoluta</i> . <i>Caladenia woolcockiorum</i> also grows in <i>Eucalyptus leucoxyton</i> ssp. <i>pruinosa</i> , <i>Allocasuarina verticillata</i> woodland over <i>Acacia pycnantha</i> , <i>A. gracilifolia</i> , <i>Pultenaea graveolens</i> and <i>Cassinia laevis</i> . In this habitat type <i>C. woolcockiorum</i> grows on gentle south facing slopes and flats with clay loam soils. Flowering occurs from September to October.	LIKELY – suitable habitat and multiple nearby records.

Species (common name)	NP&W Act	EPBC Act	Data source	Date of last record	Record notes	Species known habitat preferences	Likelihood of use for habitat – Comments
<i>Caladenia xantholeuca</i> (Flinders Ranges White Caladenia)	E	EN	1, 2	2000	Three records within 5km, one in <i>E. goniocalyx</i> Woodland adjacent the Melrose - Cathedral Rock walking track in National Park.	Endemic to South Australia, known to have occurred in three sub-populations in the Southern Flinders Ranges. Two in Mount Remarkable NP and another in Telowie Gorge CP. Thought to be extinct since 1982, the species was rediscovered and any sub-populations are considered to be critical for conservation. Occurs in <i>Callitris glaucophylla</i> woodland, often on south facing slopes in heavily shaded areas, where it grows on mossy rock ledges and red-brown loam soils. The distribution overlaps with the 'Peppermint Box (<i>Eucalyptus odorata</i>) Grassy Woodland of South Australia' EPBC Act-listed threatened ecological community (DAWE 2008).	POSSIBLE - suitable habitat and several nearby records, however, very rare.
<i>Olearia pannosa ssp. pannosa</i> (Silver Daisy-Bush)	E	EN	2	-	None	Endemic to South Australia and found scattered in the southern part using roadsides with few individuals.	POSSIBLE – roadsides and low-lying areas.
<i>Prasophyllum pallidum</i> (Pale Leek-orchid)	R	VU	1, 2	1988	Three records, two near trail in Sugar Gum/Long-leaf Box and Blue Gum	Endemic to South Australia and found in southern Flinders Ranges and the Mount Lofty Ranges, growing on the more fertile soils of woodland and well-grassed open forests.	POSSIBLE - suitable habitat and nearby but old records.
<i>Prasophyllum validum</i> (Mount Remarkable Leek-orchid)	V	VU	1,2	2016	89 records within vicinity of trail, mostly 500m east of the proposed trail in Peppermint Box Woodland and near the Mount Remarkable Summit.	Little is known of the ecology or biology of the species, although it seems to prefer relatively dry woodland habitats. Currently 18 populations containing about 3,200 plants are known. In South Australia, <i>P. validum</i> occurs in <i>E. cladocalyx</i> woodland.	LIKELY - suitable habitat and multiple nearby records.
<i>Senecio megaglossus</i> (Superb Groundsel)	V	VU	2	-	None	Endemic to South Australia and found in the Flinders Ranges, Mid-North and the Marnie River, growing on rocky gorges and valley slopes in tall open shrublands, woodland, and open-woodland on variable soils of loam and clay loams.	POSSIBLE – suitable rocky habitat.

Species (common name)	NP&W Act	EPBC Act	Data source	Date of last record	Record notes	Species known habitat preferences	Likelihood of use for habitat – Comments
<i>Veronica parnkalliana</i> (Port Lincoln Speedwell)	V	VU	1	1984	One old record 0.7km north of the Summit. However, the describes the species also being recorded in Alligator Gorge in 2008 following a prescribed burn (SPRAT/DAWE 2016).	<i>Eucalyptus goniocalyx</i> (long-leaved box) woodland on sandy loam flats amongst scattered strewn sandstone rocks. Endemic to South Australia. It was first recorded from Eyre Peninsula but now only known from the southern Flinders Ranges. Known specimens closer to Alligator Gorge (SA Herbarium).	POSSIBLE - suitable habitat recorded in vicinity of trail. Very Rare plant and unlikely to be observed during surveys.
<p>Source; 1- BDBSA, 2 - Protected matters search tool, 3 – SA Herbarium. NP&W Act; E= Endangered, V = Vulnerable, R= Rare EPBC Act; Ex = Extinct, CR = Critically endangered, EN = Endangered; VU = Vulnerable</p>							

Table 15. Summary of State threatened flora species recorded within 5km of the Project Area or observed during the survey.

Species (common name)	NP&W Act	EPBC Act	Data source	Date of last record	Record notes	Species known habitat preferences	Likelihood of use for habitat – Comments
<i>Acacia gracilifolia</i> (Graceful Wattle)	R	-	1	2016	7 Records within 5km including one 0.7km NNE of Mount Remarkable Summit (1988) growing in Sugar Gum/SA Blue Gum Woodland. Historical record (1965) just south of Melrose in Peppermint Box Woodland. Most recent record from 2016 2.7 km NNE of Mt Cavern 4km west of the site.	Endemic to South Australia and restricted to the southern Flinders Ranges and northern Mount Lofty Ranges, growing on rocky hillsides and in gorges in open woodland scrub on shallow compact loam soil. Flowering between August and November.	POSSIBLE - Suitable habitat, some records.

Species (common name)	NP&W Act	EPBC Act	Data source	Date of last record	Record notes	Species known habitat preferences	Likelihood of use for habitat – Comments
<i>Amphibromus archeri</i> (Pointed Swamp Wallaby-grass)	R	-	1	1988	One record with low reliability from 1988. Recorded as 0.7km NE of Mount Remarkable at survey point with multiple TFS. Note, record has low reliability.	Found on Kangaroo Island, Mount Lofty ranges and the Southeast, growing in damp areas such as lagoons, waterholes and swamps, often on predominantly sandy soils. Flowering between October and January.	POSSIBLE - where trail crosses damp gullies or low-lying moist areas.
<i>Anogramma leptophylla</i> (Annual Fern)	R	-	1	1995	Two records in low lying areas 4km north of the site, possibly in similar habitat to page 2 and 3 of the proposed alignment. Records are over 4km from the trail.	Common on damp banks amongst grasses or in rocky crevices. In Tasmania <i>A. leptophylla</i> grows in shallow soil layers over rock, on exposed or semi-exposed outcrops in dry or damp sclerophyll forest. Plants are mostly found on rock ledges, often on, or just inside, the drip line of the overhead rock-face. The substrate is variable, including dolerite, basalt and sandstone.	POSSIBLE - where trail crosses damp gullies or low-lying moist areas.
<i>Anthocercis angustifolia</i> (Narrow-leaf Ray-flower)	R	-	1	1988	One record 4km north of the site in Sugar Gum Woodland	Endemic to South Australia and found in the Flinders Ranges and the southern Mount Lofty Ranges growing on steep rocky slopes on clay-loam; prolific particularly after fires. Flowering between May and November.	POSSIBLE - on rocky hill slopes.
<i>Austrostipa breviglumis</i> (Cane Spear-grass)	R	-	1	2019	Seven records within 5km, three being within the trail area. One in <i>E. goniocalyx</i> adjacent the Mungola Hut Track near Summit, one in Peppermint Box Woodland on private land and one near Melrose.	Found in the Flinders Ranges and the Mount Lofty Ranges in South Australia growing in hills and ridges on sandy loam soils.	LIKELY - multiple records within 5km.

Species (common name)	NP&W Act	EPBC Act	Data source	Date of last record	Record notes	Species known habitat preferences	Likelihood of use for habitat – Comments
<i>Austrostipa densiflora</i> (Fox-tail Spear-grass)	R	-	1	2015	Three records, one being adjacent the track on private land. The other two are approximately 4km north of the site occurring in Peppermint Box Woodland and <i>E. goniocalyx</i> Woodland.	Found in the Flinders Ranges, southern Mount Lofty Ranges and Kangaroo Island, growing in rocky sites on sandy, shallow rock or low-fertility soils.	LIKELY - nearby records and appropriate habitat. Rocky areas with shallow soils. Woodlands and Grasslands.
<i>Austrostipa tenuifolia</i>	R	-	1	1995	One record in Peppermint Box woodland 2.5 km northeast of site.	Found on the Eyre Peninsula, Mount Lofty Ranges, the Murray and the upper South-east in South Australia, growing sandy soils in grassland or grassy woodland associated with <i>Callitris</i> or <i>Allocasuarina</i> .	POSSIBLE - in Woodland, grassland and Peppermint Box Woodland.
<i>Bothriochloa macra</i> (Red-leg Grass)	R	-	1	1995	One record 2.5 km north of the site in Peppermint Box Woodland	Found mainly in the southern part of South Australia, south of Port Augusta but with a few scattered records further north in grasslands and grassy woodland communities but often in degraded sites. Flowering between December and April.	POSSIBLE - in Peppermint Box Woodland/grasslands.
<i>Caladenia coactilis</i> (Flinders Ranges Caladenia)	R	-	1	1988	Seven historical records within 5km, two being within the trail vicinity in <i>E. goniocalyx</i> Woodland	Usually grows in open forest and is found in the southern Flinders Ranges and northern Mount Lofty Ranges.	POSSIBLE – suitable habitat, multiple old records. The herbarium advised they have observed this species more recently but not in the trail alignment.
<i>Caladenia flaccida</i> (Drooping Spider-orchid)	V	-	1	2018	One recent record growing in <i>E. goniocalyx</i> Woodland adjacent northern Summit Track.	Limited information. Grows on ridges and slopes in sclerophyll forest with <i>Callitris</i> , in sandy soils or clay loams. Flowering from August to October.	POSSIBLE - recent record and suitable habitat
<i>Carex gunniana</i> (Mountain Sedge)	R	-	1	2005	One record near Mambray Creek 3km west of the trail.	Grows in wet places. Flowering from October to March.	UNLIKELY - no records and occurs only in damp areas.

Species (common name)	NP&W Act	EPBC Act	Data source	Date of last record	Record notes	Species known habitat preferences	Likelihood of use for habitat – Comments
<i>Christella dentata</i> (Soft Shield-fern)	R	-	1	2002	Two records 4.1 km NNW of Mount Remarkable Summit	Occurs on damp banks. Two records occur in the same place over the ridge. Western-most records of the distribution. Found mainly along the Murray River in South Australia, with a few records from the southern Flinders Ranges and the upper Eyre Peninsula growing on damp banks or in hollows in the limestone cliffs.	UNLIKELY - few records and only in damp places. However, check gullies.
<i>Cladium procerum</i> (Leafy Twig-rush)	R	-	1	2005	Two records 4.1 km NNW of Mount Remarkable Summit	Found in northern and southern Flinders Ranges, southern Mount Lofty Ranges and lower South-east in South Australia growing in coastal swamps and margins of deep-water creeks. Preference for swampy areas, soaks or inundation zones. Several records occur over the western ridge.	UNLIKELY - few records and only in damp places. However, check gullies.
<i>Crassula peduncularis</i> (Purple Crassula)	R	-	1	1988	One record on Horrocks Highway	Grows in marshy areas which are rarely flooded; occurring mainly in south-eastern Australia.	UNLIKELY – old record. marshy areas.
<i>Cullen parvum</i> (Small Scurf-pea)	V	-	1	1997	One 0.2 km WSW of Melrose	Found in the southern Flinders Ranges to the Mount Lofty Ranges in South Australia growing in grasslands, grassy woodland or open forest vegetation dominated by Eucalyptus species on alluvial plains, creeks, ephemeral pools and river channels.	UNLIKELY – one record, appears to prefer damp areas.
<i>Elatine gratioloides</i> (Waterwort)	R	-	1	1996	One record 1.9km ENE of Summit	Grows in wet places and fresh water usually less than 30cm deep. Found scattered across South Australia except for Kangaroo Island, growing in or on the margins of stationary or slow-flowing water to 40 cm deep.	UNLIKELY - few records and only occurs in wet damp places.

Species (common name)	NP&W Act	EPBC Act	Data source	Date of last record	Record notes	Species known habitat preferences	Likelihood of use for habitat – Comments
<i>Eucalyptus albens</i> (White Box)	R	-	1, 3	2006	55 records within 5km occurring throughout the proposed trail, particularly amongst <i>E. goniocalyx</i> and <i>E. leucoxydon</i>	Confined in South Australia as scattered trees amongst more numerous intermediates between this species and <i>E. microcarpa</i> to an area south of Melrose. Although it is rare throughout South Australia, it occurs commonly around Melrose. Found in the southern Flinders Ranges, growing in undulating to hilly terrain on loam to clay soils.	KNOWN - multiple records and suitable habitat. <i>Observed during survey.</i>
<i>Eucalyptus cajuputea</i> (Green Mallee)	R	-	1	1992	Multiple records, mostly near the Mount Remarkable Summit and some near Melrose.	Growing on rocky hillslopes and ridges and deeper soils on the foot slopes and undulating plains.	LIKELY - multiple records and suitable habitat.
<i>Festuca benthamiana</i> (Bentham's Fescue)	R	-	1	2009	Seven records, mostly in one area on private land just south of trail.	Very limited information available on this species. Requires further investigation.	LIKELY - known records and suitable habitat. Records near proposed trail.
<i>Glycine tabacina</i> (Variable Glycine)	V	-	1, 3	1992	Two records, one near Melrose in Peppermint Box Woodland and the other in Sugar Gum.	Found in the southern Flinders Ranges, southern Mount Lofty Ranges and the lower South-east in South Australia, growing in <i>Eucalyptus camaldulensis</i> woodland, more often in shady or moist gullies on sandy loam soils.	KNOWN - suitable habitat and nearby records. <i>Observed during survey.</i>
<i>Hovea purpurea</i> (Tall Hovea)	R	-	1, 3	2008	53 records, mostly near the Summit but also in other areas.	Known to occur in rocky ridge type areas and riparian habitat. Limited information available but Tall Hovea grows on banks near streams and rocky ledges in forests and woodland.	KNOWN - suitable habitat and multiple records. <i>Observed during survey.</i>
<i>Juncus homalocaulis</i> (Wiry Rush)	V	-	1	1992	Two records, one in vicinity of trail.	Grows in wet grassland. Found in the southern Flinders Ranges, southern Mount Lofty Ranges and the South-east in South Australia, growing in damp sites in grassland, woodland and dry sclerophyll forests.	POSSIBLE - in gullies/damp grasslands

Species (common name)	NP&W Act	EPBC Act	Data source	Date of last record	Record notes	Species known habitat preferences	Likelihood of use for habitat – Comments
<i>Juncus radula</i> (Hoary Rush)	V	-	1	1972	One record near Melrose	Found in the southern Flinders Ranges, Mount Lofty Ranges and the upper South-east, growing on seasonally damp areas in depressions and along drainage lines in woodland and open grassland.	UNLIKELY - few records, none near trail.
<i>Lepidium pseudotasmanicum</i> (Shade Peppergrass)	V	-	1	1993	Two records one near Horrocks Highway and one near trail.	Found in the southern Flinders Ranges, Mid-North and along the Murray River in South Australia, growing in rocky areas.	POSSIBLE - in rocky areas in woodland.
<i>Logania saxatilis</i> (Rock Logania)	R	-	1, 3	2011	13 records, mostly near Summit but also in Long-leaf Box/Sugar Gum/Blue Gum.	Endemic to South Australia and found in the Flinders Ranges and the Mount Lofty Ranges, growing on steep-sided sandstone gorges in open woodland community and in crevices of rocky outcrops in shallow sandy or clay-rich soils	KNOWN - suitable habitat and multiple records. Near trail at Summit and at northern extent of the site. <i>Observed during survey.</i>
<i>Olearia pannosa</i> ssp. <i>cardiophylla</i> (Velvet Daisy-bush)	R	-	1, 3	2017	12 Records, mostly near Summit but also in Sugar Gum, <i>E. goniocalyx</i> and Blue Gum. Records spread across the site.	Occurs mainly in dry open forest, on shallow rocky soils where the mean annual rainfall ranges from 450 to 650mm (Environment Vic).	KNOWN - suitable habitat multiple records. <i>Observed during survey.</i>
<i>Ottelia ovalifolia</i> ssp. <i>ovalifolia</i> (Swamp Lily)	R	-	1	2003	1 record nearly 5km from proposed trail	Occurs mainly in still water usually to 60 cm.	UNLIKELY - swamp plant, one record.
<i>Ozothamnus scaber</i> (Rough Bush-everlasting)	V	-	1	2008	12 records, near Summit and near trail. Scattered through woodlands.	Known to occur in Peppermint Box woodland. Endemic to South Australia and found in the Flinders Ranges.	LIKELY - suitable habitat multiple records.
<i>Phyllangium sulcatum</i>	V	-	1	1988	Two records, not near proposed trail	Found on northern Eyre Peninsula and the Flinders Ranges in South Australia, growing in sheltered, rocky areas on shallow soils overlying rock.	POSSIBLE - suitable habitat but few records.

Species (common name)	NP&W Act	EPBC Act	Data source	Date of last record	Record notes	Species known habitat preferences	Likelihood of use for habitat – Comments
<i>Pultenaea graveolens</i> (Scented Bush-pea)	R	-	1, 3	2019	29 records scattered across the site	East-facing quartzite slope. <i>Eucalyptus goniocalyx</i> Woodland over <i>Spyridium parvifolium</i> , <i>Pultenaea graveolens</i> and <i>Lomandra densiflora</i> 0.8 km ESE of Mount Remarkable Summit. Known to occur in Peppermint Box woodland associations. Found in the southern Flinders Range and the southern Mount Lofty Ranges in South Australia, with a single record from Kangaroo Island, growing in dry sclerophyll woodland.	KNOWN - suitable habitat and multiple records. <i>Observed during survey.</i>
<i>Pycnosorus globosus</i> (Drumsticks)	V	-	1	1915	1 record near Melrose	Found in the Flinders Ranges and the mid-north in South Australia, growing in open moist heavy soils prone to inundation.	UNLIKELY - one record
<i>Scutellaria humilis</i> (Dwarf Skullcap)	R	-	1, 3	1996	7 records scattered across trail vicinity including Summit	In moist sheltered places such as along creeks or ravines.	KNOWN - suitable habitat, multiple records <i>Observed during survey.</i>
<i>Swainsona procumbens</i> (Broughton Pea)	V	-	1	1922	One record near Summit	Found in heavy soil prone to waterlogging in the south-east region of South Australia. It was first collected in the mid-north but now assumed extinct from the region.	UNLIKELY - one very old record near Summit
<i>Thelymitra grandiflora</i> (Great Sun-orchid)	R	-	1, 3	1965	Three records, two near proposed trail, one 3km north. Very old records	The giant sun orchid grows in forest and scrubland, often in rocky places. It is widespread and locally common in the Mount Lofty Ranges and Southern Flinders Ranges.	LIKELY – Suitable habitat but very old records 1928/1965 and unknown <i>Observed during survey (?).</i>
<i>Thelymitra latifolia</i> (Blue Star Sun-orchid)	V	-	1	1988	One old record 4km north from the trail north	May now be <i>Thelymitra pauciflora</i> . Occurs in small to extensive numbers, often in small clumps in forest and heathland in areas receiving more than 300 mm of rainfall per annum.	UNLIKELY - one old record

Species (common name)	NP&W Act	EPBC Act	Data source	Date of last record	Record notes	Species known habitat preferences	Likelihood of use for habitat – Comments
<i>Veronica decorosa</i> (Showy Speedwell)	R	-	1	1986	Two old records near main trails (Melrose)	In rocky gorges and gullies and on ridge-tops mainly in the Flinders Ranges.	POSSIBLE - suitable habitat and records near trail. Although records are old, the species may occur in areas less traversed.
<p>Source; 1- BDBSA, 2 - Protected matters search tool, 3 – observed during survey (? = uncertain). NP&W Act; E= Endangered, V = Vulnerable, R= Rare EPBC Act; Ex = Extinct, CR = Critically endangered, EN = Endangered; VU = Vulnerable</p>							

Photo log – threatened species



Figure 22. *Eucalyptus albens* (SA rare), BAM site B1– larger tree and younger specimens with round leaves. Common on most lower slopes.



Figure 23. *Glycine tabanica* (SA: Vulnerable) near BAM Site B1 - avoid this area. Avoid access through this area.

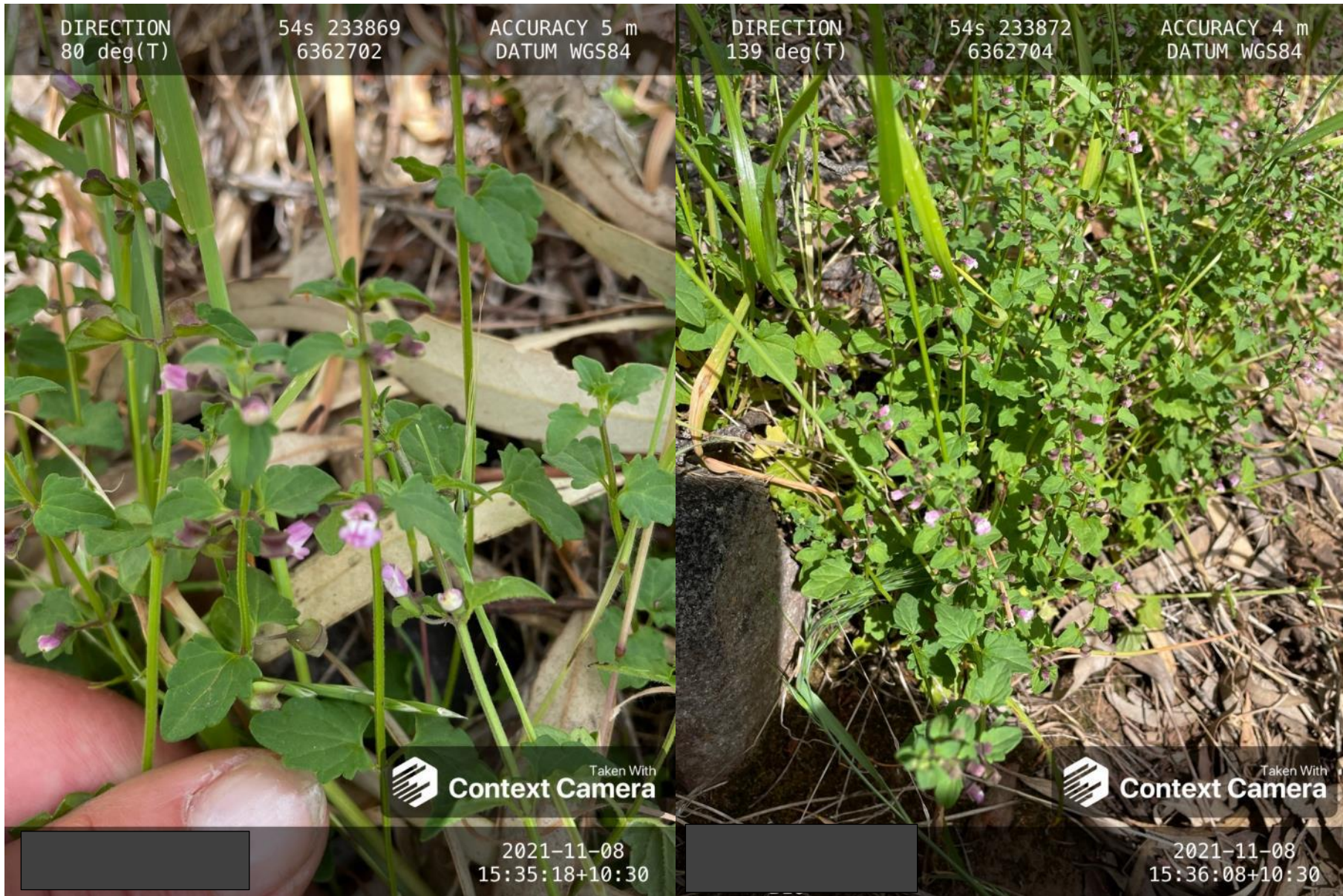


Figure 24. *Scutellaria humilis* (SA: Rare) near BAM B1 - avoid this area. Avoid access through this area.



Figure 25. *Rumex dumosus* (SA: Rare). Common throughout lower slopes. Annual species, avoid where feasible.

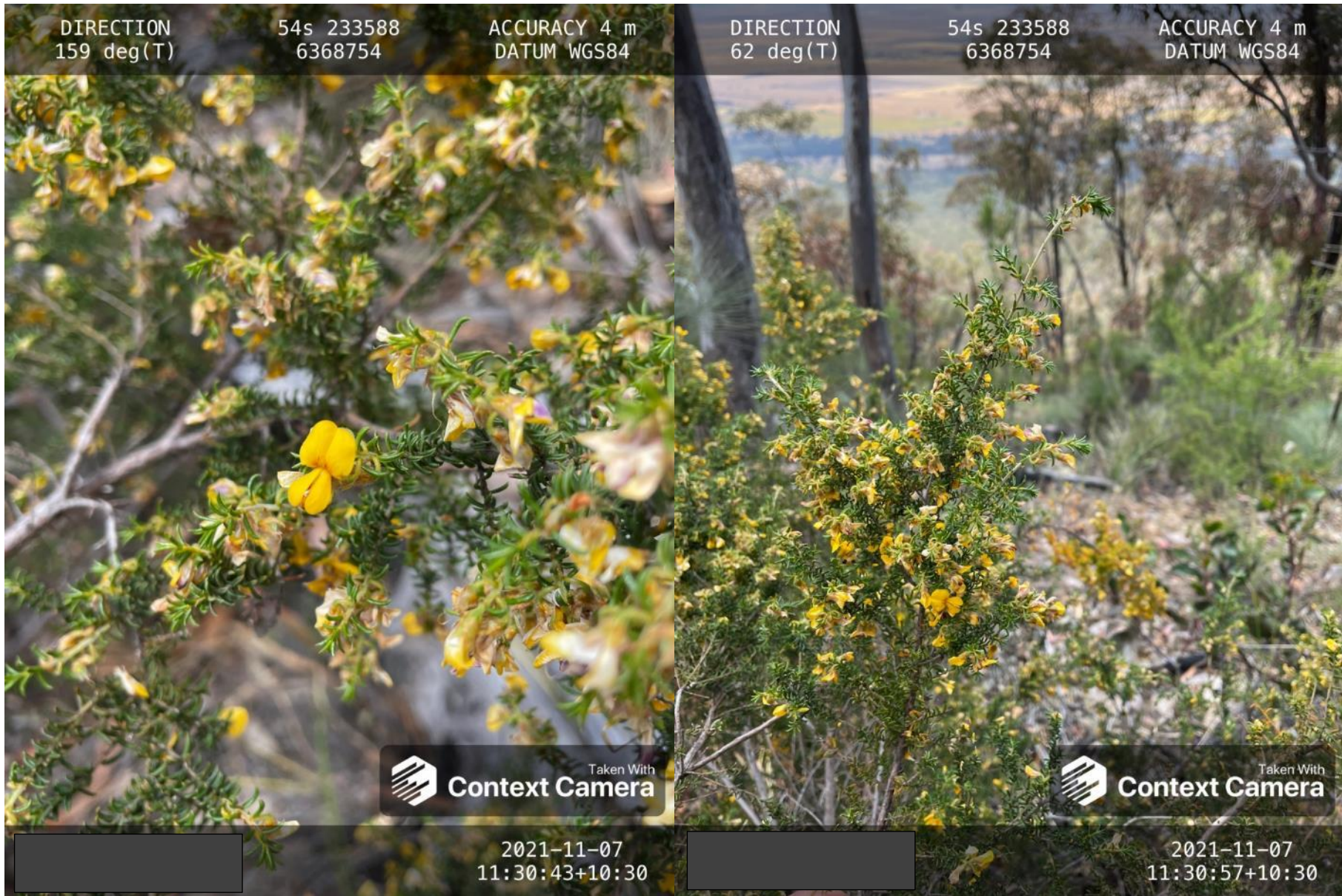


Figure 26. *Pultenaea graveolens* (SA: Rare) on Mount Remarkable Range Track. Avoid and minimise clearance where possible.

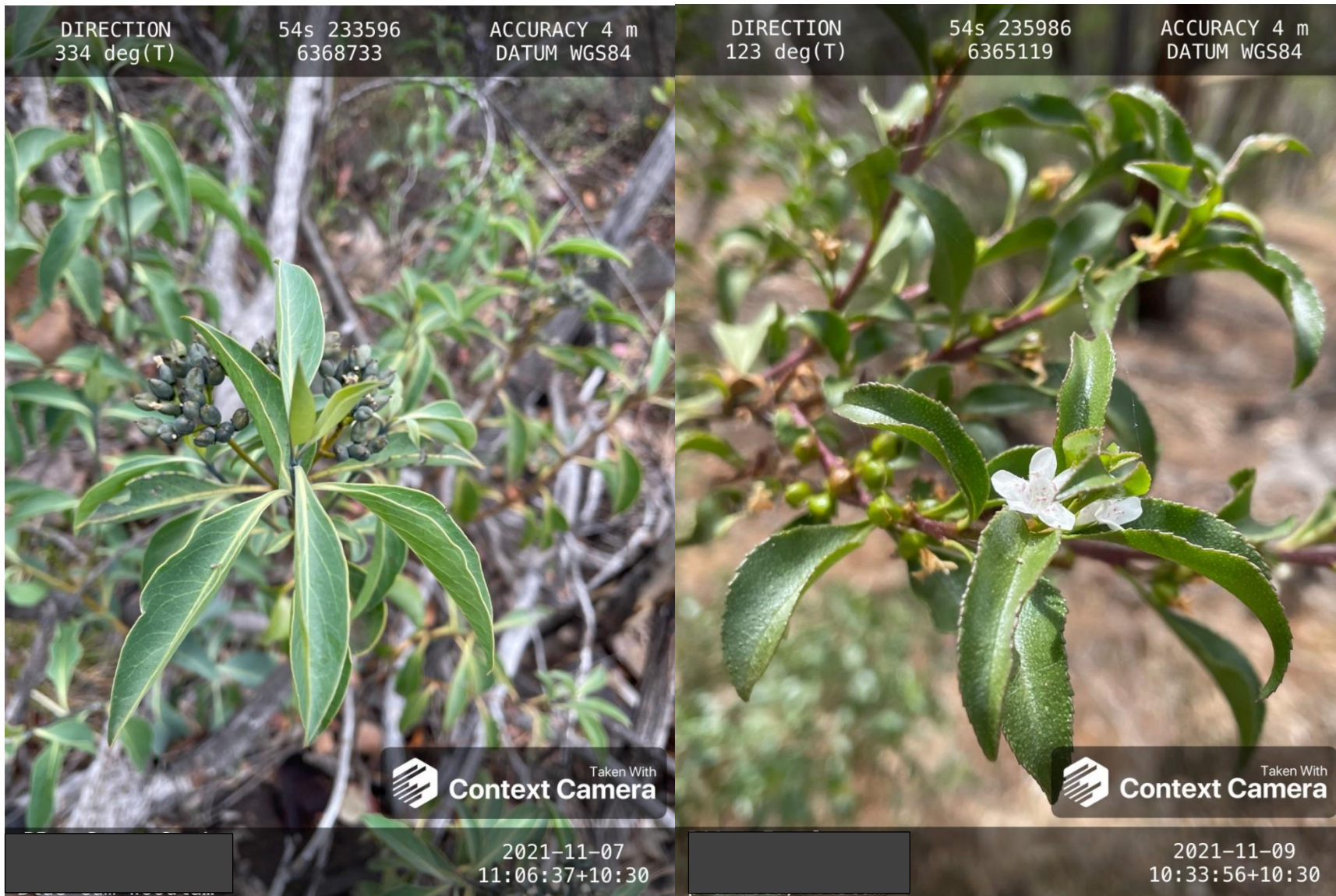


Figure 27. *Logania saxatilis* (left) and morphologically similar *Myoporum petiolatum* (right). Avoid clearance of *L. saxatilis* which is uncommon along the ridge. *Myoporum* has serrated somewhat sticky leaves, whilst *Logania* has entire leaf margins. It is recommended to avoid clearance of both species as they may be difficult to distinguish.

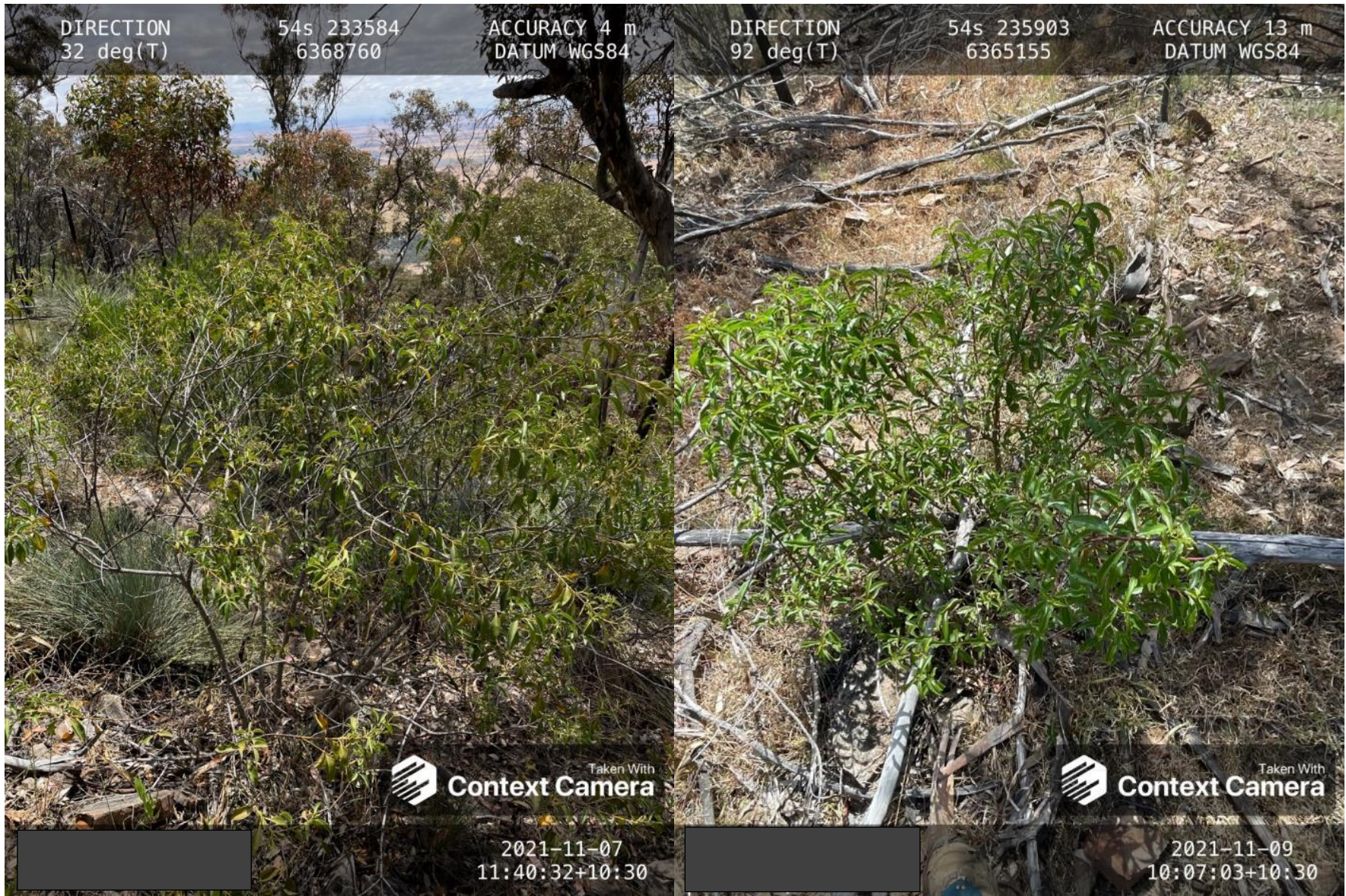


Figure 28. Morphologically similar *Logania saxatilis* (SA: Rare) (left) and *Myoporum petiolatum* (right). It is recommended to avoid clearance of both species as they may be difficult to distinguish.

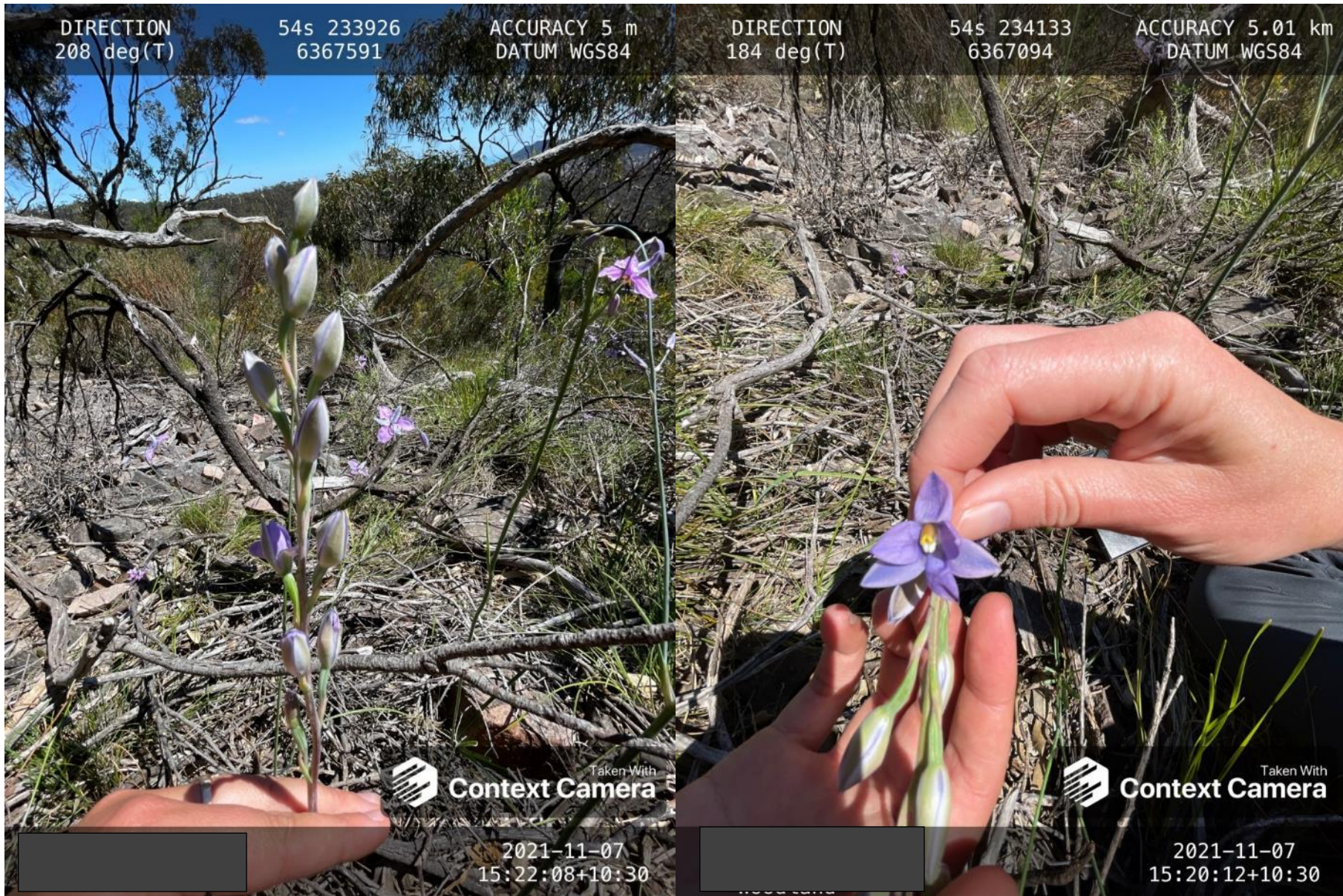


Figure 29. *Thelymitra grandiflora* (?) at BAM site B2b. Avoid and minimise clearance where possible.



Figure 30. *Hovea purpurea* (SA: Rare). Avoid clearance of this species. Common along ridges and observed along Mount Remarkable Range Track, but limited distribution in SA as advised by SA Herbarium.



Figure 31. Left: *Olearia pannosa ssp. cardiophylla*. Minimise clearance of this species. Common throughout the park including on the ridges and lower slopes. Right: Mount Remarkable Range Track. Which runs along the ridge from Willowie to the Summit.

4.2.3. Desktop Assessment Fauna

Mount Remarkable Conservation Park is considered an important refuge as it comprises somewhat un-fragmented blocks of native vegetation which are largely weed and feral predator free in some areas. Linear clearance through more intact areas may impact on threatened fauna species by providing a corridor for weeds and feral predators.

Threatened fauna species considered likely to utilise habitat within the site include Nationally threatened Bassian Thrush and State threatened birds Chestnut-rumped Heathwren, Crested Shrike-tit, Diamond Firetail, Gilberts Whistler, Hooded Robin, Jacky Winter, Painted Buttonquail, Scarlet Robin, White-winged Chough, Elegant Parrot and Peregrine Falcon. Peregrine Falcon Roost was observed near BAM site B1 (Figure 32). One Lace Monitor was observed on a roadside near the Project Area (Figure 32) and Carpet Python may occur near creeklines lines with large Gums.

Table 16 provides a summary of species identified as occurring within 5km based on the BDBSA assessment, the Protected Matters Search Tool, onsite observations and fauna experts within the NVB. Figure 21 indicates the distribution of fauna species threatened under the EPBC Act and NPW Act.

Table 16. Species observed on site, or recorded within 5km of the application area since 1995, or the vegetation is considered to provide suitable habitat

Species (common name)	NP&W Act	EPBC Act	Data source	Date of last record	Species known habitat preferences	Likelihood of use for habitat – Comments
Aves						
<i>Burhinus grallarius</i> (Bush Stone Curlew)	R	-	1	1982	The bush stone-curlew inhabits open forests and grassy woodlands (NSW Government Woodland Birds).	UNLIKELY – Very old record but note it does occur near trail alignment. Species prefers open habitat. Suitable habitat may occur on the lower eastern or western slopes. However given the linear clearance footprint and the limited habitat, the proposal is highly unlikely to affect this species.
<i>Falco hypoleucos</i> (Grey Falcon)	R	VU	2	No records within 5km	Restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast.	UNLIKELY – no previous records of it occurring. Nearest records >13km away. If present would not be affected by the proposal.
<i>Corcorax melanorhamphos</i> (White-winged Chough)	R	-	1	2020	Found in open forests and woodlands. The species tends to prefer the wetter areas, with lots of leaf-litter, for feeding, and available mud for nest building.	KNOWN - suitable habitat exists onsite species recently recorded. Given the linear nature of the development, this species and its habitat is highly unlikely to be impacted by the works.
<i>Falco peregrinus macropus</i> (Peregrine Falcon)	R	-	1, 3	1991	Small numbers breed on cliff faces and in large hollows in red gums and sugar gums (pers. Comm. Graham Carpenter).	KNOWN – roost observed on western slopes. Species expected to utilise habitat for flying over, perching, roosting in cliffs and potentially large hollows which are limited on site. Given it is intended that large trees will be retained, the trail would not have impact on the species. Specific focus should be given to avoiding clearance of trees with hollows. <i>Observed during survey.</i>

Species (common name)	NP&W Act	EPBC Act	Data source	Date of last record	Species known habitat preferences	Likelihood of use for habitat – Comments
<i>Falco subniger</i> (Black Falcon)	R	-	1	2005	The Black Falcon is found along tree-lined watercourses and in isolated woodlands, mainly in arid and semi-arid areas. It roosts in trees at night and often on power poles by day (Birdlife Australia). Several records occur along Horrocks Highway and White Well Road.	POSSIBLE – Recent nearby records. May occur along lower slopes. The proposed linear clearance with limited or no clearance of trees is expected to have no impact on the species.
<i>Falculculus frontatus</i> (Eastern Shrike-tit)	R	-	3	2001	Red gum and blue gum woodlands (pers. Comm. G. Carpenter).	POSSIBLE – suitable habitat on lower slopes. Given the linear nature of the proposed clearance and the intention to remove little or no trees, the proposal is expected to have no impact on the species.
<i>Hylacola pyrrhopygius pedleri</i> (Chestnut-rumped Heathwren (southern Flinders Ranges))	V	-	3	Few or no records	An isolated population occurs in the southern Flinders Ranges with records at Mount Remarkable and above Wirrabara in Long-leaf Box and Sugar Gum woodlands along highest parts (pers. Comm. G. Carpenter). The species forage mainly on the ground beneath dense, low vegetation, especially in areas with abundant fallen branches or rocks, and they sometimes also forage in low shrubs or low branches of small trees (Birdlife Australia).	POSSIBLE – suitable habitat along ridges. Given the linear nature of the proposed clearance, the proposal is expected to have no impact on the species. However, weed invasion and movement of feral predators along the trail poses an increased risk to species preferring habitat of lower vegetation stratum.
<i>Grantiella picta</i> (Painted Honeyeater)	R	VU	2	No records	The species inhabits mistletoes in eucalypt forests/woodlands, riparian woodlands of black box and river red gum, box-ironbark-yellow gum woodlands, acacia-dominated woodlands, paperbarks, casuarinas, callitris, and trees on farmland or gardens. The species prefers woodlands which contain a higher	UNLIKELY – no records. Some mistletoe habitat occurs, but project is highly unlikely to impact this species given removal of trees will be limited and there are no records of the species utilising habitat on the project area.

Species (common name)	NP&W Act	EPBC Act	Data source	Date of last record	Species known habitat preferences	Likelihood of use for habitat – Comments
					number of mature trees, as these host more mistletoes.	
<i>Melanodryas cucullata</i> (Hooded Robin)	R	-	3	No records	River Red Gum and Blue Gum woodlands plus Box woodlands (pers. Comm. G. Carpenter). Hooded Robins are found in lightly timbered woodland, mainly dominated by acacia and/or eucalypts. The Hooded Robin sits on exposed perches, such as dead branches and stumps and pounces on arthropods (mainly insects). It forages on or near the ground and constructs a cup-shaped nest of leaves and bark, bound with spiders' web, placed in a crevice, hollow or hole in a tree or stump.	POSSIBLE – Suitable habitat on lower slopes but no records. Proposal unlikely to affect this species, particularly given there is low likelihood of many trees being removed. However, weed invasion and movement of feral predators along the trail poses an increased risk to species utilising habitat of lower vegetation stratum.
<i>Microeca fascinans</i> (Jacky Winter)	R	-	1	2020	Prefer open woodland with an open shrub layer and a lot of bare ground. Often seen in farmland and parks.	KNOWN - suitable habitat exists onsite on lower slopes and recently recorded. Given the linear nature of the clearance, this species and its habitat is highly unlikely to be impacted by the works.
<i>Neophema elegans</i> (Elegant Parrot)	R	-	1	1991	Inhabiting open habitats, the Elegant Parrot can be found in a wide variety of habitats, including grasslands, shrublands, mallee, woodlands and thickets, bluebush plains, heathlands, saltmarsh and farmland. Nesting in hollow branches of trees. Usually feed on the ground, where they take the seeds of grasses or low-growing shrubs.	POSSIBLE - Suitable habitat exists onsite on lower slopes and along creeklines, although last record is more than 20 years ago. Given the linear nature of the clearance and the low likelihood of tree removal, this species and its habitat is highly unlikely to be impacted by the works. The species is fairly mobile and adjacent habitat is widely available. However, removal of trees with hollows should be avoided.
<i>Pedionomus torquatus</i> (Plains Wanderer)		CE	2	No records	Species inhabit sparse grasslands with c.50% bare ground, with most vegetation less than 5 cm in height	UNLIKELY – Very rare. Habitat not suitable – prefers low open habitat. There are no records and no suitable habitat on site.

Species (common name)	NP&W Act	EPBC Act	Data source	Date of last record	Species known habitat preferences	Likelihood of use for habitat – Comments
					and some widely spaced plants up to 30 cm high.	
<i>Petroica boodang</i> (Scarlet Robin)	R	-	1	1992	The Scarlet Robin lives in open forests and woodlands. During winter, it will visit more open habitats such as grasslands and will be seen in farmland and urban parks and gardens at this time. Species forages on or near the ground and uses tree forks with dense cover to build nests.	LIKELY - suitable habitat exists onsite although last BDBSA record is more than 20 years ago. Birddata (Birdlife Australia 2022) shows some records within 5km from 1999/2000 and more recently (2020) on the ridgetop. Given the linear nature of the clearance, this species and its habitat is highly unlikely to be impacted by the works. The species is fairly mobile and adjacent habitat is widely available. However, weed invasion and movement of feral predators along the trail poses an increased risk to species utilising habitat of lower vegetation stratum.
<i>Rostratula benghalensis (sensu lato)</i> (Painted Snipe)	E	EN	2	No records	Generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. They also use inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains.	UNLIKELY – no suitable habitat or nearby records.
<i>Stagonopleura guttata</i> (Diamond Firetail)	V	-	3	2001	Red Gum and Blue Gum woodlands plus Box woodlands (pers. Comm. G. Carpenter). Diamond Firetails are found in open grassy woodland, heath and farmland or grassland with scattered trees (Birdlife 2022). Diamond Firetails feed on the ground and generally eat ripe or partially ripe seeds and can be seen hopping around on the ground. The Diamond Firetail builds a nest with green grass	POSSIBLE - lower slopes in Blue Gum and Red Gum Woodland. Scattered records in Mt Remarkable NP including one from 2001, 120m east of trail. The trail could potentially impact on some habitat of this species through shrub and tree removal, but given the linear clearance is unlikely to impact on the species overall population.

Species (common name)	NP&W Act	EPBC Act	Data source	Date of last record	Species known habitat preferences	Likelihood of use for habitat – Comments
					blades and stems and lines it with fine grasses and feathers. The nest can be found in trees and shrubs with dense foliage.	
<i>Turnix varius</i> (Painted Buttonquail)	R		3	1999	<i>E. goniocalyx</i> and Sugar Gum woodlands, plus Blue Gum woodlands (pers. Comm. G. Carpenter). The species tends to prefer closed canopies with some understorey and deep leaf litter on the ground. Painted Button Quail are active during the evening, night and early morning, feeding on the ground (Birdlife Australia 2022).	POSSIBLE – Suitable habitat in some more wooded vegetation with litter on the ground. The trail could potentially impact on habitat of this species through shrub and tree removal, and the mobilisation of weeds and feral predators as the species utilises ground level litter and may be vulnerable to predators. However, given the narrow linear nature of the trail impact to the species is unlikely.
<i>Zoothera lunulata halmaturina</i> (Bassian Thrush)	-	VU	1	1999	Mostly inhabits damp eucalypt forest or woodland. Densely forested areas and gullies are favored, usually with a thick canopy overhead, a thick understorey of small trees and tall shrubs, and leaf-litter below. In much of its range, suitable habitat is confined to creek lines or dune swales where the birds forage for worms among damp leaf litter. Damp habitats seem particularly important in summer. In this region the species is known to occur in the southern Flinders Ranges from Wirrabara Forest Reserve and Telowie Gorge Conservation Park to Mt Remarkable NP (DAWE 2015).	POSSIBLE - habitat exists onsite and the location is within the known distribution of this species although last record is more than 20 years ago. This is a mobile species which may relocate during the construction period. Operation of the trail network is unlikely to impact this species.

Species (common name)	NP&W Act	EPBC Act	Data source	Date of last record	Species known habitat preferences	Likelihood of use for habitat – Comments
Mammals						
<i>Petrogale xanthopus</i> (Yellow-footed Rock-wallaby)	-	VU	2	2016	The Yellow-footed Rock Wallaby inhabits rocky outcrops, cliffs and ridges in semi-arid country, ranging from sandstones, limestones and conglomerates in the Flinders Ranges, to granites in the Gawler Ranges and Olary Hills (Copley & Alexander, 1997 in DAWE 2022b)). These rocky outcrops provide shelter sites that enable the wallabies to escape predators. Furthermore, these areas often contain permanent fresh water, although the supply may be restricted to mere soaks at the edges of rock faces (Lim et al., 1992 in DAWE 2022).	UNLIKELY – species not known from Mount Remarkable. Nearest records nearly 6km west in Alligator Gorge area. Included in 5km search based on old trail. Suitable rocky habitat with freshwater does not occur on site.
<i>Trichosurus vulpecula</i> (Common Brushtail Possum)	R	-	1	2020	Found in Eucalyptus and Sheoak woodlands. As arboreal animals, they make their nests (also known as dens) in tree hollows or other dark confined spaces such as hollow logs, dense vegetation or cork crevices.	KNOWN - suitable habitat exists onsite and recently recorded. Nature and extent of the clearance is not likely to have a significant impact on the species there is limited clearance of trees expected. Trees with hollows should not be removed.
Reptilia						
<i>Aprasia pseudopulchella</i> (Flinders Ranges Worm-lizard)	-	VU	2		The species occurs in open woodland, native tussock grassland, riparian habitats and rocky isolates. It prefers stony soils, or clay soils with a stony surface, and has been found sheltering beneath stones and rotting stumps. The species is sometimes found underground debris and logs, or in ant and termite nests (Cogger 2000, Cogger et al. 1993; Wilson & Knowles 1988). Distribution overlaps	POSSIBLE – suitable habitat exists and the location is within the known distribution of this species but no records within 5km. A few scattered near Mambray Creek. The species is also thought to be more widespread in South Australia and hence does not have a state listing. Nature and extent of the clearance is not likely to have a significant impact on this species (if present).

Species (common name)	NP&W Act	EPBC Act	Data source	Date of last record	Species known habitat preferences	Likelihood of use for habitat – Comments
					with the EPBC Act-listed TEC Peppermint Box (<i>Eucalyptus odorata</i>) Grassy Woodland of South Australia.	
<i>Morelia spilota</i> (Carpet Python)	-	R	1	20	Occurs in mesic (areas with moderate amounts of moisture) to semiarid habitats. It is arboreal, terrestrial, and rock-dwelling. In some areas it shelters in burrows made by other animals, hollow tree limbs, or rock crevices. Favoured logs are often 150 mm in diameter, with a hollow section that usually extends for at least one metre (Department of Environment and Conservation 2022).	POSSIBLE – two recent records on the lower eastern slopes. May occur near drainage lines, particularly where large trees with hollows occur. Impact can be minimised by avoiding removal of trees. There is not expected to be any impacts on population of this species.
<i>Notechis scutatus ater</i> (Krefft's Tiger Snake)	-	VU	1, 3	2005	Restricted to wetter parts of the Flinders Ranges and Broughton River, within the 500 mm annual rainfall isohyet, along permanent and semi-permanent watercourses and forages in water for frogs, tadpoles and possibly fish. It occurs in rocky, often steep margins of watercourses that may dry to become isolated pools during the summer, beginning in September. Riparian vegetation (southern Flinders Ranges) consists of woodland dominated by River Red Gum (<i>Eucalyptus camaldulensis</i>) and Sugar Gum (<i>Eucalyptus cladocalyx</i>) (Wilson & Knowles 1988; Mirtschin & Bailey 1990; Cogger et al. 1993).	UNLIKELY – limited or no suitable habitat exists onsite. Previously, recorded within 5km of the site 15 years ago. However the record notes an observation of a “brown snake”, which could on balance be another common species within the Park. The trail alignment is expected to cross water courses only in a few locations and they are expected to be degraded and not sitting water with the expectation of the large watercourse near Melrose where clearance is limited or absent and several trails already exist. The nature and extent of the clearance is unlikely to have a significant impact on populations of this species.
<i>Varanus varius</i> (Lace Monitor)	R	-	1, 3	2018	Woodland habitats where it can forage in the leaf litter and termite mounds, known to climb trees and utilise hollows. Occurs in isolated	KNOWN – observed within 5km of the site driving from Mambray Creek to the Link Lands (Mt Remarkable NP). Suitable habitat

Species (common name)	NP&W Act	EPBC Act	Data source	Date of last record	Species known habitat preferences	Likelihood of use for habitat – Comments
					populations in the Southern Flinders Ranges.	exists onsite and recently recorded within 5km. However, given the long linear nature of the impact, it is highly unlikely that this species will be impacted by the works. <i>Observed during survey.</i>
<p>Source; 1- BDBSA, 2 - Protected matters search tool, 3 – other (including personal comments by fauna expert graham Carpenter). NP&W Act; E= Endangered, V = Vulnerable, R= Rare EPBC Act; Ex = Extinct, CR = Critically endangered, EN = Endangered; VU = Vulnerable</p>						



Figure 32. Lace Monitor (SA: Rare) on Alligator Gorge Trail (left) and Peregrine Falcon (SA: Rare) Roost near BAM Site B1 (right).

4.3. Cumulative impacts

When exercising a power or making a decision under Division 5 of the Native Vegetation Regulations 2017, the NVC must consider the potential cumulative impact, both direct and indirect, that is reasonably likely to result from a proposed clearance activity

The direct impact includes clearance of 6.172 hectares of native vegetation including 5.141 ha of vegetation in Mt Remarkable NP (Blocks B and D) and 1.030 ha on private land (Blocks A and C) (Figure 13). The clearance area is based upon a 1.5 m corridor along 41,146.67 m of trail. This excludes areas of Block A where existing trails will be utilised (Figure 14); and areas that appeared devoid of native vegetation in Block C (Figure 19). It is expected that the final direct bike trail clearance footprint will be less than 4ha, based on a 0.5 to 1m final impact width, but it is expected that degradation will occur directly adjacent the main trail through weed invasion and 'edge effect'. The construction works and trail usage are expected to introduce and spread weeds, commonly observed near other trails which has the potential to impact threatened flora communities and threatened species in a wilderness which is largely weed free away from existing trails. Proposed and recommended mitigation strategies are described under 'Minimisation' in Section 4.4. in relation to minimisation of weed invasion through construction and operations; in addition to an adequate weed monitoring and control program once the trail is established.

The clearance is expected to involve the clearance of some threatened flora. Avoidance and minimisation recommendations are provided under 'Avoidance' in Section 4.4 aimed at reducing total direct impact on species of concern. The full extent of threatened flora extent is largely unknown due to limited survey coverage and some annual species (including orchids) being outside of their visible life phase. Mitigation strategies are outlined under Section 4.4 including reference to species likely to occur that may be found along surveyed and unsurveyed areas of the trail and can be avoided, avoiding orchids of any species observed during the trail construction; and avoiding construction in sensitive areas until checked for Nationally Threatened Orchids during their visible life phase.

The trail has the potential to provide a corridor for feral animals such as foxes, cats and goats to move along. Feral animal monitoring and control is recommended (as required) to reduce the risk of the trail becoming a corridor for feral animals, posing a risk of predation on native fauna species and increased grazing pressure.

There is some risk of introduction of Phytophthora (*Phytophthora cinnamoni*) during the construction phase, but provided it is considered, the risk is expected to be very low. There is also some risk of introduction of Phytophthora via contaminated soil on bike tyres during operation where mountain bikes have been used on trails in infested areas (Figure 33). Phytophthora is a parasitic pathogen that lives in soil and water and attacks the roots and basal stems of plants. This pathogen has been introduced to SA and can cause extensive damage to native vegetation by killing or injuring native plants (DIT 2000). Phytophthora has not been identified within or near Mt Remarkable NP, however there is the potential for its establishment within the reserve given the environmental conditions, including climate, slightly acid and infertile soils; and the presence of susceptible host species (DEH 2006a). *Xanthorrhoea quadrangulata* is particularly susceptible to Phytophthora which can spread quickly downhill with the movement of water through the soil and slowly in any direction through 'root to root' contact (DEH 2006a). Other susceptible species onsite include *Allocasuarina verticillata* and *Hibbertia* spp. There are no known infestations within 190km of Mt Remarkable, the nearest being on lower Eyre Peninsula, Nuriootpa and Bimbowrie Conservation Park and the Southern Flinders Ranges has been classified as 'Moderate Risk' to infestation of the soil fungus (Figure 33). However, given the very high value of the vegetation and the abundance of *Xanthorrhoea* in the main park, specific attention should be given to potential impact, particularly where machinery, vehicles and equipment have moved through or been used in risk areas (Figure 33); and in relation to contaminated soil being introduced on bike tyres. Guidance for

Phytophthora management is available in Phytophthora (Dieback) Control Environmental Instruction 21.3 (DIT 2000) and the Phytophthora Guidelines (DEH 2006b).

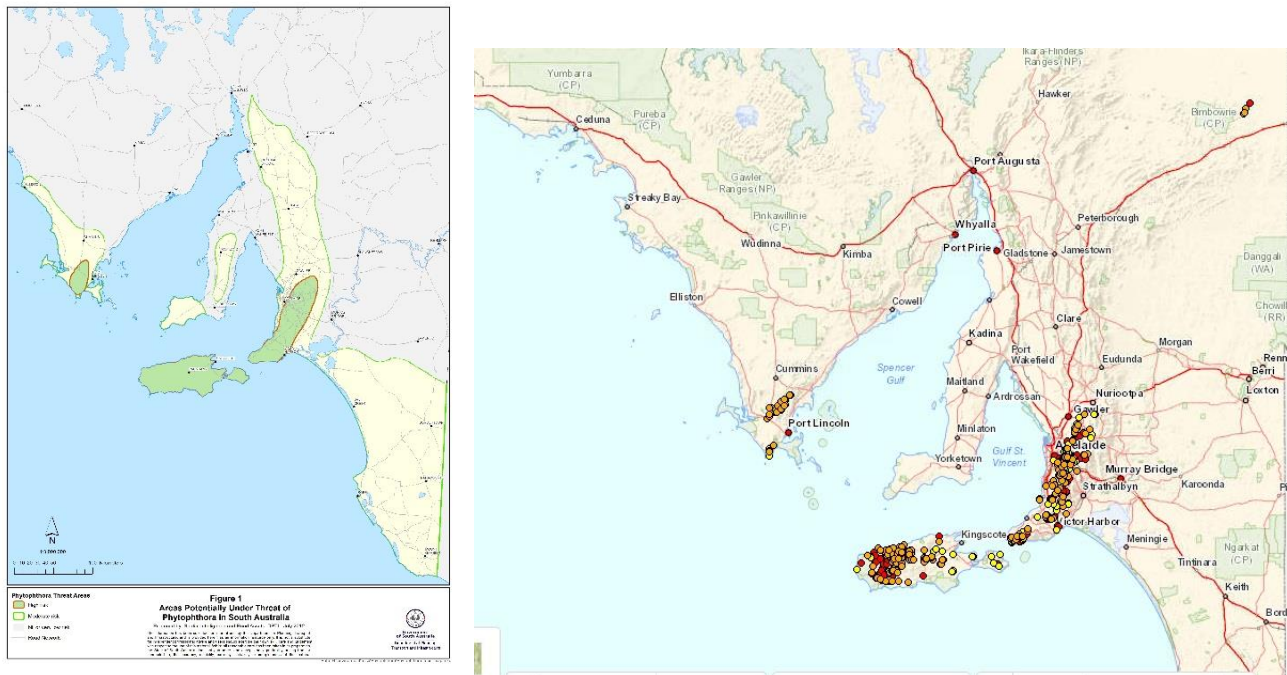


Figure 33. Left: Map indicating Phytophthora risk levels in SA (DIT 2000). Right: Map indicating known Phytophthora records in South Australia (Source EnvMaps/NatureMaps, DEW 2022).

Other threats to vegetation include altered hydrology and erosion adjacent the trail, particularly where alignment contains tight switchbacks, but many strategies are used globally to minimise such factors in bike trails. Mitigation strategies to avoid off target impact through erosion and altered hydrology for the Epic Trail are provided in Section 4.4 based on the Epic Trail tender documentation (Govt SA 2021). The mitigation strategies may be altered and improved as the concept design becomes more certain.

Indirect impacts occurring during operation of the trail will also be managed as part of the standard operations of Mt Remarkable NP and issues will be addressed through these operations. It should also be recognised that National Parks and Wildlife, as part of their stewardship role, will continue to monitor for disturbance impacts as part of the trail operations and National Parks and Wildlife can close and rehabilitate trails at their discretion.

4.4. Mitigation Hierarchy

When exercising a power or making a decision under Division 5 of the Native Vegetation Regulations 2017, the NVC must have regard to the mitigation hierarchy. The NVC will also consider, with the aim to minimise, impacts on biological diversity, soil, water and other natural resources, threatened species or ecological communities under the EPBC Act or listed species under the NPW Act.

a) **Avoidance – outline measures taken to avoid clearance of native vegetation**

Clearance of trees and general clearance

Critical to the success of delivering a high-amenity trail is the preservation of the natural landscape, including trees and shrubs. Except where clearing is required for permanent works or excavation operations, all trees, native shrubs and understorey grasses shall be preserved and protected from construction operations and equipment.

While the clearance of some smaller *Eucalyptus camaldulensis* ssp. *camaldulensis* specimens within creek or drainage lines may be required, it is intended that clearance of trees in the trail alignment is avoided where possible.

Avoidance will be particularly focussed on medium to large trees, trees of threatened species and trees containing hollows. It should be noted that many trees on the lower slopes reflect rare species *Eucalyptus albens* which can be difficult to distinguish from co-habitant Eucalypt Box species *E. odorata*, *E. microcarpa* and *E. goniocalyx* and is known to hybridise with some species. Therefore an approach that avoids the clearance of all trees with rough bark on the lower slopes is optimal. The trail will be designed around trees to retain vegetation and valuable habitat on site, which has added benefits for the riding experience through enhancement of the natural surroundings and added complexity to the trail. Retaining the existing canopy structure in Woodlands across the site is expected to lower the overall impact on habitat impact, whilst also reducing visual impact such that the trail will be less visible from the surrounding landscape, an important cultural consideration. To further avoid visual scars, the trail has been aligned away from scri-slopes following cultural considerations and advice.

Threatened ecological communities

Clearance of TEC in the Project Area will be avoided where possible and limited to linear removal of understorey species and avoiding the clearance of trees or completely avoiding clearance.

This includes impact to SA Vulnerable *Eucalyptus leucoxylon* ssp. *pruinosa* Woodland across the lower eastern slopes of Mt Remarkable (BAM A1) and SA Endangered *Eucalyptus odorata* +/- *Eucalyptus albens* Woodland near lower western slopes on private land (BAM C2) and in patches on the lower eastern slopes (BAM A2). Clearance of *E. odorata* on the lower eastern slopes near Melrose (BAM Site A2) has been completely avoided with existing tracks being utilised for this portion of the trail. There is a 400m stretch of trail that requires upgrading from Melrose in SA Vulnerable *E. leucoxylon* ssp. *pruinosa* Woodland, but clearance in this area is expected to be minimal.

It is unknown if *E. odorata* Woodland on the western slopes (BAM C2) represents the EPBC Critically Endangered community (if it is *E. odorata* Woodland), but this is considered unlikely given survey in nearby landscape. Regardless, clearance in this area will aim to avoid the removal of all rough barked trees and shrubs left in the landscape (the latter of which are expected to be grazed out).

On the lower eastern slopes (south of Willowie Forest), the trail alignment has been moved west to avoid vegetation expected to represent Nationally listed *E. odorata* Woodland based on DEW mapping, aerial photography and location in the Mt Remarkable NP. This area was not included in the original trail alignment and was not surveyed but became at risk following realignment to avoid scri-slopes. Following discussion with the NVB, the trail has been

moved west into *E. goniocalyx* Woodland (Figure 20). Further realignment is constrained by the necessity to avoid scree-slopes in line with cultural heritage advice and the need to align the trail in feasible terrain for construction and riding.

Threatened flora

It is acknowledged that significantly steep terrain constrains the available alignment options. However a detailed micro-siting approach is intended to be taken to avoid or minimise the impact on threatened flora. The Mount Remarkable Range Track was found to contain abundant threatened flora species. It is expected that some clearance of threatened flora may be required, but clearance of species with limited distribution or with only scattered occurrence in the survey area have been flagged for avoidance. The proponent will aim to avoid the clearance of *Hovea purpurea* (Figure 30) which has limited distribution in SA; and *Logania saxatilis* which was uncommon along the ridge. This species looks morphologically similar to common species *Myoporum petiolatum* (Figure 27), therefore clearance of both species should be avoided. Clearance of threatened flora species that were found to be more common in the park will be avoided and minimised as feasible. This includes *Pultenaea graveolens* which was common along the Range track and *Olearia pannosa* ssp. *cardiophylla* which is common throughout the Park.

A cluster of threatened flora occur at the southern end of the proposed trail alignment in/near BAM B1 (Figure 34) which is nearby a vehicle access point. This area has been highlighted as sensitive and threatened species should be flagged off and access through this area restricted to avoid off target impacts. Threatened flora in this area include *Scutellaria humilis* (Figure 24) and *Glycine tabanica* (Figure 23).

The trail alignment avoids known populations of orchids, except where they comprise old or uncertain records considered unlikely to occur (Figure 14). However, the distribution of threatened orchids in the trail alignment is unknown, particularly in areas that are largely inaccessible. Therefore, an approach that avoids clearance of orchids of any species will aim to be adopted by the proponent. As orchids have a limited visible life phase follow up survey and realignment should focus on sensitive areas, particularly Woodlands on the lower eastern slopes where a large population of *Prasophyllum validum* is known to occur in *E. odorata* Woodland a few hundred metres downslope of the trail (Figure 34).

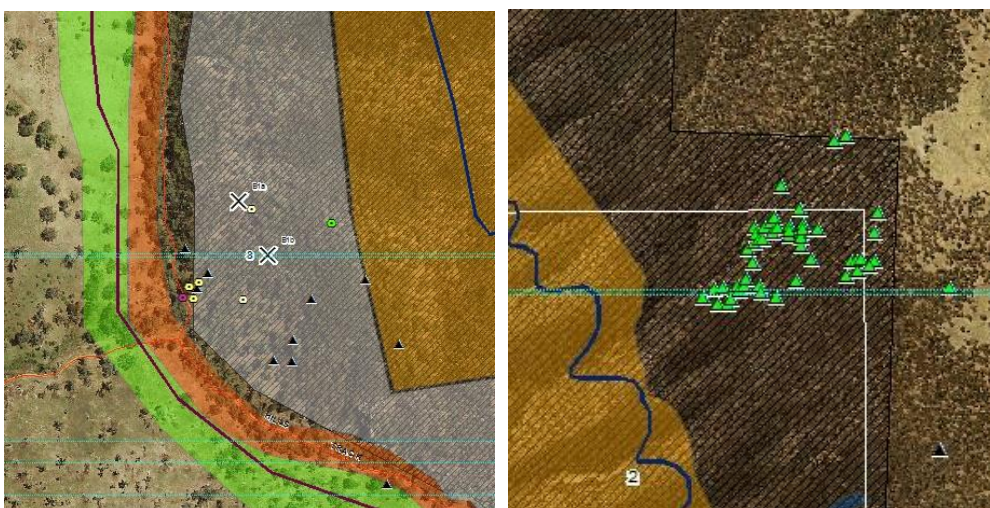


Figure 34. Left: Cluster of threatened flora at southern end of trail (map page 8), including SA Vulnerable *Glycine tabanica* and State Rare *Scutellaria humilis*. Right: Cluster of Nationally threatened *Prasophyllum validum* near proposed trail (map page 20).

It is recommended an ecologist or suitably qualified flora expert review the final trail alignment prior to construction to ensure clearance of threatened flora and trees have been avoided where possible.

b) *Minimisation – if clearance cannot be avoided, outline measures taken to minimise the extent, duration and intensity of impacts of the clearance on biodiversity to the fullest possible extent (whether the impact is direct, indirect or cumulative).*

Impact footprint

A conservative approach was taken when calculating the potential clearance impact, assuming a 1.5m wide footprint. However, the construction of trails are anticipated to be designed to be of minimal width, closer to 1m with the final trail averaging 0.9m wide with sections closer to 0.6m, further minimising the clearance envelope along the majority of the trail. It is expected that degradation will occur on trail edges, mainly through weed spread.

Construction

Current industry best practice will be used in the design and construction of the trail. While the intent of the project is to create a backcountry trail, some descending sections will be designed as flow trails, meaning the trail will utilise the existing natural contours, limiting the need for additional clearance necessitated by excavation or filling (Govt SA 2021). It is anticipated that light machinery will be used to assist in the construction of the trail, but due to terrain constraints, some areas may not be suitable for mechanised equipment and hand-building will be required in these instances (Govt SA 2021).

To minimise the impact on vegetation adjoining the track, mechanical equipment will be restricted to a maximum track width of 1m of the trail and back-slope edges. Affected areas will be finished to have a natural shape, spoils piles rounded, smoothed and cleared of significant brush, blade edges blended (Govt SA 2021). Stockpiling vegetation must occur in clear areas or will be considered within the impact footprint, whilst individual branches and small plants/shrubs can be placed in adjacent bushland.

The construction of the trail will aim to avoid the removal of natural features, rather maximising the use of in-situ objects such as rocks and logs as optional obstacles, trail features, and points of interest. It is anticipated that rocks embedded in the trail surface will be stable and retained. Smaller rocks requiring removal will be utilised for bench stabilisation and the sifted soil used to form the trail surface. Where large rocks cannot be avoided and micro-siting is unviable, rock relocation will take place into cleared areas (Govt SA 2021).

At watercourse crossings, the trail will be managed through appropriate design and construction methods to minimise disturbance to the natural flow of water (e.g. armouring, culvert, bridge) (Govt SA 2021).

Given the steep and rocky terrain, special consideration will be given to mitigating challenges imposed by soil type and geology by adhering to sustainable trail building principles and designing and constructing the right trail for the soil, geology and terrain (Govt SA 2021).

Weed and pathogen management

Weed invasion is considered a high threat to intact native vegetation communities in Mt Remarkable NP which are largely free of noxious weeds away from Melrose and existing trails. An adequate weed mitigation approach will be implemented during construction. To reduce the spread of invasive plant species the tender document (Govt SA 2021) specifies that (1) all hand tools and mechanised equipment will be free of invasive seeds and clean of any dirt and mud when entering the project site; (2) consideration should be made while trail clearing and construction through areas occupied by invasive species (such areas to be identified by DEW) as to not propagate as construction

progresses; and (3) the use of imported surface and organic material will require the further approval of DEW. The following mitigation approaches are further recommended to minimise the risk of the introduction and spread of weeds including:

- earth-moving machinery, vehicles and equipment will be clean of soil and vegetation prior to entering and leaving the area to be cleared;
- no known weed-affected soil, mulch, fill or other material will be brought into the area to be cleared;
- the movement of machines and other vehicles will be restricted to the limits of the areas to be cleared;
- personnel entering the work site will ensure their clothing and shoes are clean and free of weed seeds;
- any soil introduced to the site will be free of weed seeds and pathogens; and
- the site will be monitored for new outbreaks during construction and weeds should be removed using low impact methods (e.g. hand pulling juvenile specimens).

An ongoing weed monitoring and control program should be considered to minimise the risk of new and noxious weeds during trail operation. Some weed invasion is expected, but more noxious and invasive weeds introduced may threaten intact vegetation and local threatened species (including orchid) populations. Mitigation may include adequate signage and cleaning stations at appropriate risk points (e.g. at the commencement of the trail and/or where the trail leaves private land and enters National Park where feasible). However, this would require sufficient space and terrain for riders to stop, read the sign and clean their tyres, clothes etc. therefore appropriate positions, clear of vegetation, should be considered (noting that these areas may themselves become weed sources, therefore require careful planning). Signage may be combined with 'STOP' signal and include interesting features of the National Park and Epic Trail.

The trail poses some difficulty for weed monitoring and maintenance given the difficult terrain and length. However, an appropriate weed management control program should be considered to minimise the risk of new and noxious outbreaks. The trail is expected to require ongoing monitoring and maintenance to address erosion, fallen timber and vegetation regrowth, therefore this may provide an opportunity to monitor and control weeds concurrently.

The Southern Flinders is classified as a moderate risk of *Phytophthora cinnamoni infestation*, but Mt Remarkable could be considered of higher risk given the higher rainfall and abundance of susceptible species such as *Xanthorrhoea*; in addition to the high value of the vegetation. Mitigation measures will be implemented regarding avoidance of bringing foreign soil and plant material into the site with particular focus made in the instance where machines, vehicles and equipment have been used in areas of known *Phytophthora* infestation (Figure 33). Furthermore, consideration should be given to adequate signage and cleaning stations outside of the trail to reduce the risk of riders introducing *Phytophthora* after riding in affected areas. Ideally this should occur prior arrival at the trail.

Erosion and altered hydrology

To mitigate the risk of erosion occurring, and subsequently impacting vegetation, control measures will involve the trail being finished as the project advances. This is proposed to be achieved through staging of operations, progressive restoration of disturbed areas and spreader banks, or other measures to disperse concentrated run-off (Govt SA 2021).

Alterations to localised hydrology will be mitigated through the installation of filter strips, being vegetated areas down-slope of the trail corridor intended to treat sheet flows coming off the trail. Filter strips function by slowing

down flow velocities, filtering out sediments and providing an opportunity for infiltration into the underlying soils (Govt SA 2021)

- c) Rehabilitation or restoration – outline measures taken to rehabilitate ecosystems that have been degraded, and to restore ecosystems that have been degraded, or destroyed by the impact of clearance that cannot be avoided or further minimized, such as allowing for the re-establishment of the vegetation.**

At the completion of works, all disturbed construction areas that do not require landscaping or planting, will be scarified and left in a condition which facilitates natural regeneration (Govt SA 2021). The wider impact construction impact footprint of 1.5 metres will be allowed to regenerate to the maintained width of the trail which is currently unknown but expected to be between 0.6 and 1m wide. Vegetation will then be maintained to that width.

- d) Offset – any adverse impact on native vegetation that cannot be avoided or further minimized should be offset by the achievement of a significant environmental benefit that outweighs that impact.**

The NVC will only consider an offset once avoidance, minimization and restoration have been documented and fulfilled. The SEB Policy explains the biodiversity offsetting principles that must be met.

Potential on ground offsets are being considered. However, SEB requirements will be achieved through payment into the Native Vegetation Fund, unless a suitable on-ground offset can be identified.

4.5. Principles of Clearance

The Native Vegetation Council will consider Principles 1(b), 1(c) and 1(d) when assigning a level of Risk under Regulation 16 of the Native Vegetation Regulations. The Native Vegetation Council will consider all the Principles of clearance of the Act as relevant, when considering an application referred under the Planning, Development and Infrastructure Act 2016, but this is not required for the current application.

Table 17. Assessment against the Principles of Clearance.

Principle of clearance	Relevant information	Assessment against the principles	Moderating factors that may be considered by the NVC																						
<p>Principle 1(b) – significance as a habitat for wildlife</p>	<p>Much of the vegetation in the Project Area forms part of a National Park with vast areas of intact native vegetation providing habitat for threatened fauna species. Threatened fauna are also expected to utilise more open woodlands on adjacent private property. Of particular value are trees with hollows and areas with understorey and leaf litter.</p> <p>Species that may utilise habitat on site include Bassian Thrush, Chestnut-rumped Heathwren, Eastern Shrike-tit, Elegant Parrot, Diamond Firetail, Gilberts Whistler, Hooded Robin, Jacky Winter, Painted Button Quail, Peregrine Falcon, Scarlet Robin, White-wing Chough, Carpet Python and Lace Monitor.</p> <p>BAM vegetation community threatened fauna scores:</p> <table border="1" data-bbox="268 1227 715 1608"> <tbody> <tr><td>A1</td><td>0.1</td></tr> <tr><td>A2</td><td>0.1</td></tr> <tr><td>B1</td><td>0.1</td></tr> <tr><td>B2</td><td>0.1</td></tr> <tr><td>B3</td><td>0.1</td></tr> <tr><td>C1</td><td>0.08</td></tr> <tr><td>C2</td><td>0.08</td></tr> <tr><td>C3</td><td>0.08</td></tr> <tr><td>C4</td><td>0.06</td></tr> <tr><td>D1</td><td>0.1</td></tr> <tr><td>D2</td><td>0.1</td></tr> </tbody> </table>	A1	0.1	A2	0.1	B1	0.1	B2	0.1	B3	0.1	C1	0.08	C2	0.08	C3	0.08	C4	0.06	D1	0.1	D2	0.1	<p><u>Seriously at Variance</u> All associations</p>	<p>Although vegetation within the trail alignment provides important habitat for threatened fauna species, including Nationally threatened species, clearance in any one area is expected to be minor given the long linear nature of the trail.</p> <p>Clearance of trees in general and particularly large trees and/or trees with hollows will be avoided further reducing impact on fauna. However, removal of trees is considered a potential threat to fauna.</p> <p>The highest threat to fauna (apart from tree removal) is expected to be (1) the introduction of weeds that may invade and affect understorey and species that rely on native shrub layers/leaf litter etc; and (2) opening a corridor for feral animals that may predate on threatened fauna.</p> <p>The NVC may consider moderating the clearance to At Variance provided there is an adequate weed and feral animal monitoring and control program established; and that trees (particularly large trees or those with hollows) are not removed.</p>
A1	0.1																								
A2	0.1																								
B1	0.1																								
B2	0.1																								
B3	0.1																								
C1	0.08																								
C2	0.08																								
C3	0.08																								
C4	0.06																								
D1	0.1																								
D2	0.1																								
<p>Principle 1(c) – plants of a rare, vulnerable or endangered species</p>	<p>The site is known habitat for many threatened flora species. Eight were observed during the survey (<i>Eucalyptus albens</i>, <i>Glycine tabanica</i>, <i>Hovea purpurea</i>, <i>Logania saxatilis</i>, <i>Olearia pannosa ssp. cardiophylla</i>, <i>Pultenaea graveolens</i>, <i>Rumex dumosus</i> and <i>Scutellaria humilis</i>).</p> <p>Several other threatened species have been identified as likely or possibly occurring as listed in the desktop assessment. These</p>	<p><u>Seriously at Variance</u> B1, B2, B3, D1, D2</p> <p><u>At Variance</u> A1, A2, C1, C2, C3, C4,</p>	<p>The proposal is considered to pose a high threat to threatened species within the Mt Remarkable NP, based on the abundance of threatened flora observed along the Range Track and the high number of records in the Park. Threats include removal of threatened specimens and introduction of weeds.</p> <p>Given the lack of survey coverage the impact to threatened species in other</p>																						

Principle of clearance	Relevant information	Assessment against the principles	Moderating factors that may be considered by the NVC																								
	<p>include Nationally threatened orchids <i>Caladenia gladiolata</i>, <i>Caladenia woolcockiorum</i>, <i>Caladenia xantholeuca</i>, <i>Prasophyllum pallidum</i>, <i>Prasophyllum validum</i>.</p> <p>Threatened Flora Score(s) BAM vegetation community threatened flora scores:</p> <table border="1" data-bbox="268 488 715 904"> <tr><td>A1</td><td>0.08</td></tr> <tr><td>A2</td><td>0.08</td></tr> <tr><td>B1</td><td>0.12</td></tr> <tr><td>B2</td><td>0.2</td></tr> <tr><td>B3</td><td>0.16</td></tr> <tr><td>C1</td><td>0.08</td></tr> <tr><td>C2</td><td>0.08</td></tr> <tr><td>C3</td><td>0.08</td></tr> <tr><td>C4</td><td>0.12</td></tr> <tr><td>D1</td><td>0.2</td></tr> <tr><td>D2</td><td>0.16</td></tr> <tr><td></td><td></td></tr> </table>	A1	0.08	A2	0.08	B1	0.12	B2	0.2	B3	0.16	C1	0.08	C2	0.08	C3	0.08	C4	0.12	D1	0.2	D2	0.16				<p>areas is somewhat unknown, particularly for orchids. Micro-siting and follow up surveys in high-risk areas during trail construction would assist in mitigating risk to threatened flora species. Clearance in Mt Remarkable NP is recommended to be retained as Seriously at Variance.</p> <p>Clearance outside the Park is expected to pose a low threat to threatened flora species provided removal of trees is avoided and threatened species are avoided if observed.</p>
A1	0.08																										
A2	0.08																										
B1	0.12																										
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B3	0.16																										
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D1	0.2																										
D2	0.16																										
<p>Principle 1(d) – the vegetation comprises the whole or part of a plant community that is Rare, Vulnerable or endangered</p>	<p>BAM A1, B3 and D2 are considered to represent SA Vulnerable <i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i> +/- <i>E. odorata</i> Grassy Low Woodland on loams of hill slopes (DEH, in progress).</p> <p>BAM A2 and C2 may represent SA Endangered <i>Eucalyptus odorata</i> +/- <i>E. leucoxylon</i> Grassy Low Woodland on loamy soils of low hills (limited or no survey coverage) (DEH, in progress). Woodlands meeting minimum condition class criteria can be classified as Critically Endangered Nationally threatened community but BAM C2 is not expected to be listed and there is no impact in BAM site A2.</p> <p>Threatened community scores</p> <table border="1" data-bbox="268 1512 715 1926"> <thead> <tr> <th>BAM</th> <th>TCS</th> </tr> </thead> <tbody> <tr><td>A1</td><td>1.2</td></tr> <tr><td>A2 (no clearance)</td><td>1.4</td></tr> <tr><td>B1</td><td>1</td></tr> <tr><td>B2</td><td>1</td></tr> <tr><td>B3</td><td>1.2</td></tr> <tr><td>C1</td><td>1</td></tr> <tr><td>C2</td><td>1.4</td></tr> <tr><td>C3</td><td>1</td></tr> <tr><td>C4</td><td>1</td></tr> <tr><td>D1</td><td>1</td></tr> <tr><td>D2</td><td>1.2</td></tr> </tbody> </table>	BAM	TCS	A1	1.2	A2 (no clearance)	1.4	B1	1	B2	1	B3	1.2	C1	1	C2	1.4	C3	1	C4	1	D1	1	D2	1.2	<p><u>At Variance</u> A1, B3, C2, D2</p> <p>Clearance of threatened communities is classified as At Variance as threatened communities exist within the trail alignment but the impact to these communities is not considered significant.</p>	<p>Given the long linear nature of the trail clearance and the removal of trees being avoided, the overall impact to threatened communities is expected to be low. However, introduction of weeds that may invade and degrade threatened communities poses a risk</p> <p>It is recommended that Clearance is retained as At Variance.</p>
BAM	TCS																										
A1	1.2																										
A2 (no clearance)	1.4																										
B1	1																										
B2	1																										
B3	1.2																										
C1	1																										
C2	1.4																										
C3	1																										
C4	1																										
D1	1																										
D2	1.2																										

4.6. Risk Assessment

The proposed clearance is classified as risk level 4 with a Total Biodiversity Score of 431.09 (Table 18).

Table 18. Summary of the level of risk associated with the application.

Total clearance	No. of trees	0
	Area (ha)	6.171 ha
	Total Biodiversity Score	431.09
Seriously at variance with principle 1(b), 1(c) or 1 (d)	1(b) and 1(c)	
Risk assessment outcome	Level 4	

5. Clearance Summary

Clearance Area(s) Summary table

Table 19 provides a summary of the Blocks, BAM sites and their corresponding SEB values whilst Table 20 provides a summary of the total SEB requirement and Table 21 provides a summary of the rainfall factor calculated and the applicable economies of scale figure for the SEB calculation.

Table 19. Impact Summary with unit biodiversity scores and Significant Environmental Benefit Requirements

Block	Site	Species diversity score	Threatened Ecological community	Threatened plant score	Threatened fauna score	UBS	Area (ha)	Total Biodiversity score	Loss factor	Loadings	Reductions	SEB Points required	SEB payment	*Admin Fee
A	A1	20	1.2	0.08	0.1	66.79	0.061	4.07	1			4.28	\$3,101.01	\$155.05
A	A2	26	1.4	0.08	0.1	92.27	0	0.00	1			0.00	\$0.00	\$0.00
B	B1	19	1	0.12	0.1	57.67	0.113	6.52	1			6.84	\$4,960.10	\$248.01
B	B2	19.33	1	0.2	0.1	82.08	3.565	292.62	1			307.25	\$222,719.87	\$11,135.99
B	B3	20	1.2	0.16	0.1	76.55	0.412	31.54	1			33.12	\$24,005.15	\$1,200.26
C	C1	14	1	0.08	0.08	27.89	0.143	3.99	1			4.19	\$3,035.61	\$151.78
C	C2	2	1.4	0.08	0.08	11.29	0.517	5.84	1			6.13	\$4,442.70	\$222.13
C	C3	12	1	0.08	0.08	26.43	0.173	4.57	1			4.80	\$3,542.10	\$177.10
C	C4	12	1	0.08	0.06	23.26	0.136	3.16	1			3.32	\$2,407.75	\$120.39
D	D1	16	1	0.2	0.1	74.83	0.972	72.73	1			76.37	\$55,361.02	\$2,768.05
D	D2	20	1.2	0.16	0.1	76.55	0.079	6.05	1			6.35	\$4,602.93	\$230.15
Total							6.171	431.09				452.64	\$328,178.24	\$16,408.91

* DEW Projects do not attract GST for the administration fee, therefore GST has been subtracted from the administration figures.

Table 20. SEB Totals summary table

	Total Biodiversity score	Total SEB points required	SEB Payment	*Admin Fee	Total Payment
Application	431.09	452.64	\$328,178.24	\$16,408.91	\$344,587.15

* DEW Projects do not attract GST for the administration fee, therefore GST has been subtracted from this figure.

Table 21. Economies of scale and rainfall factors applied to calculate the SEB.

Economies of Scale Factor	0.5
Rainfall (mm)	542

6. Significant Environmental Benefit

A Significant Environmental Benefit (SEB) is required for approval to clear under Division 5 of the *Native Vegetation Regulations 2017*. The NVC must be satisfied that as a result of the loss of vegetation from the clearance that an SEB will result in a positive impact on the environment that is over and above the negative impact of the clearance.

The SEB requirement has been provided as a dollar value for payment into the Native Vegetation Fund. However, investigations into on ground SEB options are being considered.

ACHIEVING AN SEB

Indicate how the SEB will be achieved by ticking the appropriate box and providing the associated information:

- Establish a new SEB Area on land owned by the proponent.
- Use SEB Credit that the proponent has established. Provide the SEB Credit Ref. No. _____
- Apply to have SEB Credit assigned from another person or body. The [application form](#) needs to be submitted with this Data Report.
- Apply to have an SEB to be delivered by a Third Party. The [application form](#) needs to be submitted with this Data Report.
- Pay into the Native Vegetation Fund.

PAYMENT SEB

If a proponent proposes to achieve the SEB by paying into the Native Vegetation Fund, summary information must be provided on the amount required to be paid and the manner of payment which is indicated in Table 22.

Table 22. SEB payment requirement into the NVF Fund

	Total Biodiversity score	Total SEB points required	SEB Payment	*Admin Fee	Total Payment
Application	431.09	452.64	\$328,178.24	\$16,408.91	\$344,587.15

* DEW Projects do not attract GST for the administration fee, therefore GST has been subtracted from this figure.

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