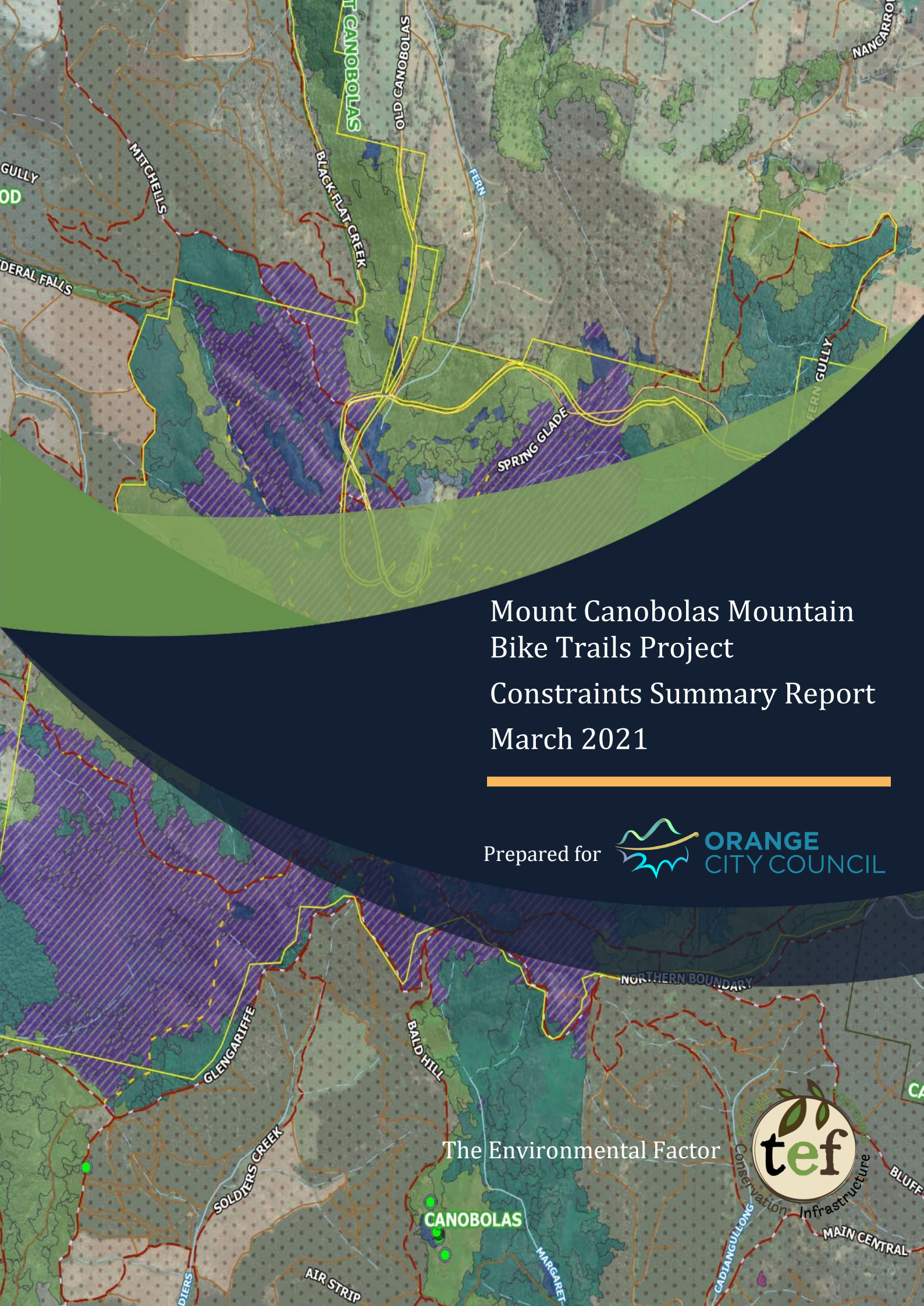

Mount Canobolas Mountain Bike Trails Project

Constraints Summary Report

March 2021

Prepared for ORANGE CITY COUNCIL

The Environmental Factor

Mount Canobolas Mountain Bike Trails Project Constraints Summary Report

Document Verification

Revision	Author/s	Internal Review	Date submitted	Client and Stakeholder Review and Approval	
				Name	Date
DRAFT V_0.1	J Dessmann, A Uhrig, J Sanderson	E Cotterill	03/02/2021	DPIE, NPWS, OCC	February – March
V_0.2 Address comments from DPIE, OCC and NPWS; inclusion of land northwest of SCA within study area; addition of datasets received from community groups and individuals; additional description of Aboriginal Heritage constraints assessment included.	J Sanderson, A Uhrig, J Bate (AA)	E Cotterill	29/03/2021	OCC	April
V_1.0 Final					

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This Report has been prepared by The Environmental Factor (TEF) on behalf of Orange City Council (OCC or Council) to describe the processes undertaken to identify environmental constraints in order to guide the development of the revised Concept Plan and Detailed Design of a proposed mountain bike trail network throughout Mt Canobolas State Conservation Area, adjoining Crown Lands, and Forestry Corporation of NSW (FCNSW) lands. This document is not intended to be utilised or relied upon by any persons other than OCC and their appointed contractors, nor to be used for any purpose other than that articulated above. Accordingly, TEF accepts no responsibility in any way whatsoever for the use of this report by any other persons or for any other purpose.

The information, statements, and commentary (together the "Information") contained in this report have been prepared by TEF from material provided by OCC, FCNSW, NSW National Parks and Wildlife Service (NPWS), through NSW Government provided databases, and data obtained through the stakeholder and community consultation and assessment process. TEF has not sought any independent confirmation of the reliability, accuracy or completeness of this information. And, while all care has been taken in validating available data against other datasets and aerial imaging, it should not be construed that TEF has carried out any form of audit of the information which has been relied upon. Accordingly, whilst the statements made in this report are given in good faith, TEF accepts no responsibility for any errors in the information provided by OCC, FCNSW, NSW NPWS, individual or community groups datasets nor the effect of any such errors on the analysis undertaken, suggestions provided, or this report.

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1 INTRODUCTION

Orange City Council (OCC) are seeking to investigate the practicality and feasibility of establishing a world class mountain bike trail network in the Mount Canobolas State Conservation Area (SCA), in Orange, NSW. Mount Canobolas SCA is a popular recreational area for Orange residents and visitors alike, attracting approximately 75, 000 visitors per annum to the region (OEH, 2015). The construction of a world class mountain bike trail is hoped to provide further recreational possibilities for the area, tapping into a growing local, national, and international mountain biking community. The project also seeks to offer improved amenities for other visitors to the SCA, whilst facilitating further business development opportunities and jobs for the local Aboriginal community. Improved management of, and increased funding for, feral species and weed control actions will also form an integral part of any future stages of project development and delivery.

The previous Concept Plan developed by World Trail proposed approximately 115 km of trails across the Mt Canobolas State Conservation Area (SCA) and adjoining Forestry Corporation of NSW (FCNSW) lands, including Glenwood and Canobolas State Forests. The former Concept Plan was developed based on a preliminary discussion paper (GHD 2015); however, several legislative changes have occurred since 2015, including the listing of additional threatened biota, and the enacting of the *Biodiversity Conservation Act 2016* (BC Act) and the Biodiversity Assessment Method (BAM), which are of relevance to the Project.

Orange City Council has also received considerable feedback from community and stakeholder groups wishing to see a more environmentally sensitive design developed, as well as opportunities to construct a route which appeals to a wider audience and highlight the unique scenic qualities of the location.

To appropriately inform the design of the new Concept Trail Plan, a detailed Constraints Identification process, within the SCA and adjacent Crown Land and Forestry Corporation of NSW (FCNSW) lands, has been undertaken. This Constraints Identification process was aimed at capturing any potential constraints present, mapped as occurring, or previously recorded to ensure sensitive areas can be avoided in the new design. TEF completed extensive desktop investigations, collating available datasets, derived from government databases, and provided by a range of interested parties, community groups and individuals. In addition to this, two (2) three-day site inspections with two (2) qualified environmental consultants were undertaken in November and December of 2020, to complete site familiarization surveys, document the existing environment and ground-truth some of the outcomes derived from desktop investigations along existing access tracks, roads and fire trails.

As part of this Constraints Identification process, the following was undertaken and considered:

- Collation of existing datasets from a range of sources.
- Collation of datasets provided by interested parties, individuals and community groups.
- Rapid data point (RDP) field data collection for ecology to confirm Plant Community Types (PCTs) present and their relative condition.
- Heritage desktop constraints assessment prepared by specialist archaeologists, Apex Archaeology.
- Potential for listed threatened species and communities assessed by habitat assessment and previous records.
- Categorization of constraints as either no-go (black hatching), high (red), moderate (orange) or low (green) to provide a framework for the development of the new concept design by Dirt Art.
- Observation of local roads, residences and accesses that will influence traffic, noise, air quality, sustainability, socio-economic and other considerations.

The results of the constraints investigations detailed within this brief report, as well as spatial information (shapefiles or similar) describing this data, have been developed to guide the design of the new Concept trails.

The detailed constraints identification, aimed at informing the design phase of the Mountain Bike trail, builds on the existing opportunities and constraints discussion paper prepared (GHD 2015).

Dirt Art have also completed a comprehensive review of the previous trail concept developed by World Trail (Dirt Art 2021). The concept was reviewed against the following criteria:

- Environmental values analysis – minimising impacts on environmental values.
- Social values analysis, ensuring the trails do not have undue impacts on social values.
- Cultural values analysis, ensuring cultural impacts are minimized.
- Market analysis, reviewing the concept against current market demands and trends.
- Minimising development approval complexity by ensuring the trail concepts avoid significant assets onsite, thereby assisting to streamline the development approvals process.
- Minimsing construction complexity by ensuring trail concepts avoid unnecessary construction complexity and costs through considered trail design.

The outcomes of the review identified opportunities for improvement on the previous design and highlighted guiding principles that will steer the development of the new concept design.

2 METHODOLOGY

The following chapters describe the methodology used to identify the constraints for the proposed Mountain Bike trail project, within the nominated study area.

2.1 Desktop Review

Review existing databases, mapping and aerial imagery for the area including:

- NSW Bionet Wildlife Atlas for threatened species records
- EPBC Act Protected Matters Search Tool for potential habitat for nationally listed species
- NSW DPI Threatened Fish distribution and habitat descriptions
- Vegetation Information System
- Extended AHIMS search for recorded Aboriginal Heritage values within the study area and immediate surrounds (15 km x 15 km)
- Land zonings and LEP data
- Riparian corridors
- Specialist reports prepared for NPWS
  - Orchid monitoring reports (Bower 2018 and 2019)
  - Fauna monitoring report (Kerle Environmental 2019)

As part of the investigation into the Aboriginal Cultural Heritage Options and Constraints Summary, Apex Archaeology completed thorough examinations of site cards associated with the recorded Aboriginal heritage sites included on the AHIMS database. Due to record duplicates, the site cards have been sorted, reviewed and combined where appropriate. A process of Aboriginal community consultation in accordance with the *Aboriginal cultural heritage consultation requirements for proponents 2010* (the ACHCRs) is underway, led by Apex Archaeology.

2.2 Nomenclature and Naming Conventions

Naming conventions used throughout this report are based on the Royal Botanical Gardens Sydney New South Wales Flora Online database (PlantNET). Some exceptions to this include potentially endemic species, i.e. *Diuris sp. aff. Chryseopsis*, *Dipodium sp. aff. Atropurpureum* and *Craspedia sp. aff. lamicola,* or recently named species *Prasophyllum canobolense* where taxonomic distinctions have yet to be included in the database. For the purposes of this report, where species are not currently recognised as new or distinct, nomenclature used by Medd & Bower (2019) has been adopted.

2.3 Categories of Constraint

The following categories have been adopted to reflect the levels of constraint each environmental aspect is considered to pose. These are described below.

Each dataset has been attributed a level of 'constraint' and included on a mapping layer. These mapping layers have then each been overlaid to present a consolidated figure to show various levels of constraint to guide the development of the developing concept design (Figure 1).

- **No-Go constraints** (black hatching)

  These items are highly significant, cryptic and / or immobile features making them vulnerable to impacts. They may be highly significant as they include unique Aboriginal ceremonial sites, highly cryptic threatened species and areas known to support 'orchid hotspots' as well as immobile and highly restricted extents of Critically Endangered Ecological Community (CEEC; i.e. the Mt Canobolas Lichen Community).

- **High constraints** (red)

  Items included as high constraint include notable species recorded locations (25 m buffer), riparian areas (10 m corridor) and previously recorded items of Aboriginal heritage including a 10 m buffer that has been attributed to protect these features.

- **Moderate constraints** (orange)

  This category includes mobile and highly visible threatened species records which are considered easily avoidable, NPWS monitoring sites, as well as PCTs likely to align with listed Threatened Ecological Communities.

- **Low constraints** (green)

  Includes native vegetation, State Forest plantation areas and haulage roads, and exotic vegetation as well as other existing roads, fire trails, and walking paths.

2.4 Ground truthing

TEF staff undertook the ground-truthing of discrete areas during two (2) separate field surveys completed 27-29th November and 19-21 December 2020, each with two (2) ecologists present (TEF 2020).

Opportunistic records of threatened species and areas of interest were recorded, as well as rock outcrops as they were encountered. Targeted threatened species surveys were restricted to three (3) nights of call playback and spotlighting for threatened owls and mammals. Call playback was not undertaken during forecast rain events or windy weather.

Avenza Maps version 3.7.2 Build (483) ARCH64 was used on a smartphone / tablet to record Rapid Data Points (RDP's) to summarise the dominant vegetation present at point locations and used to cross check with vegetation mapping currently available.

Once at the patch of vegetation, a point was created within *Avenza Maps* using a specially developed georeferenced TIFF image (Geotiff) to orient field staff, and the following details were recorded:

- GPS location
- Dominant canopy, midstorey and groundstorey species present
- Likely PCT association of the vegetation recorded, and
- Photos facing in several directions, typically up/down the existing trail, and immediately either side.

During the field inspection a total of thirty-three (33) RDP's were completed throughout the SCA to cross-check on-ground vegetation against mapped PCTs (vegetation mapping used was CentTableSVM_v1p0_PCT_E_4778, 2019). Opportunistic recording of threatened and notable species was also completed using Avenza and hand- held GPS units.

Targeted surveys for fauna included;

- Two (2) Songmeter Minis were deployed along waterways scheduled to record for two (2) hours at dawn and dusk each day. These were set for a minimum of forty (40) nights each.
- Two (2) Anabats were deployed and relocated to capture data at four (4) separate locations. Each Anabat was actively deployed for a minimum of two (2) survey nights in accordance with survey guidelines.

- A total of six (6) motion activated cameras were deployed and baited with universal bait with meat (rolled oats, peanut butter and canned tuna). These were set for a minimum of forty (40) nights each.
- Three (3) nights of call playback and spotlighting for owls and arboreal mammals were completed.
- Three (3) bird surveys completed over 20 min intervals were completed.
- Opportunistic records of threatened species were recorded including collection of predator scats for hair analysis.

Future surveys will further investigate the SCA and surrounding FCNSW Lands in detail with vegetation plots and preliminary trail verification.

2.5 Assumptions and Limitations

The following assumptions and limitations of this constraints investigation should be noted:

Brief on ground ecological investigations were undertaken throughout the easily accessible areas of the SCA area only and did not extend into the FCNSW lands, or areas far off existing trails and access roads. FCNSW Lands will be investigated for their potential inclusion pending access permissions, and all proposed trails will be carefully assessed later, as part of the impact assessment if the project progresses.

Rocky areas and rock outcrops have been mapped based on the assumed presence of PCT 759 *Heath on rock outcrops* from existing PCT mapping datasets, in lieu of using high resolution aerial imagery interpretation. Available Landsat imagery was not of sufficient quality to meaningfully extract rock outcrop locations. Areas mapped as PCT 759 were not ground-truthed as part of the preliminary surveys.

On-ground surveys to inform this analysis were limited to two (2) blocks of three-day / two-night surveys during late November and late December 2020. Consequently, surveys were completed mid-summer outside the survey season for many species, which may have limited detectability. Surveys were not intended to be exhaustive as part of this process; rather, the preliminary ecological surveys were intended as a site familiarization exercise, to ground-truth specific records and datasets, collect additional data where possible, and to inform this report.

Registered user Bionet records including quarantine records collected were accessed to inform the Constraints Summary mapping. Several records for threatened and notable species known to have been recorded recently by local NPWS staff were absent from the Bionet records.

The presence of these species has been included and is based on knowledgeable accounts of Mt Canobolas biodiversity as well as NPWS monitoring data (2018-2019), however specific locations have not informed the Constraints Summary.

3 RESULTS

Following the completion of the desktop reviews and preliminary ecological investigations, a summary of the detailed Constraints Identification has been prepared in a range of categories as outlined below.

3.1 Aboriginal and European Heritage Constraints

A basic search of the Aboriginal Heritage Information Management System (AHIMS) database was undertaken on the 3rd of September 2020 by Apex Archaeology. A search box of 15 km x 15 km was centred over Mt Canobolas with seventeen (17) sites initially identified within the study area. A subsequent extensive search of this search area was undertaken on the 25th of November 2020, with an additional fifteen (15) sites included. A further extensive search of the search area was undertaken on the 8th of March 2021, prior to finalising the initial constraints analysis, with an additional four (4) new sites and five (5) further updates to previously recorded sites.

Site types identified include artefact concentrations, isolated finds, scarred/carved trees, and ceremonial sites.

A search of LEP heritage mapping and review of the State Heritage Inventory Database identified that Mount Canobolas Parklands are listed on the Cabonne LEP 2012 as an item of environmental heritage for its landscape values. This has triggered the requirement for a heritage assessment prior to any impact occurring. No other items of historical heritage were identified during the initial assessment.

As part of the desktop investigations, known items and sites have been mapped at a high level to assist in identifying options and constraints for the project. These constraints have been consolidated into a single constraints map (Figure 1) and will be provided to Dirt Art as part of the constraints shapefile suite.

All individual sites were mapped and a minimum 10m buffer applied to their site extent. AHIMS records comprise single point site locations (i.e. a single coordinate location for what could be an extensive site) and as such detailed mapping of artefact concentrations based on information provided in the relevant site cards was undertaken during the constraints analysis. It is clear a complex of interconnecting sites exists around Young Man Canobolas and its surrounding areas, and as such, this whole region has been mapped as a 'no go zone' rather than separating the disparate sites. This is in line with the cultural understanding that this is a ceremonial and highly significant area to the local Aboriginal community, and as a result this entire complex will be avoided.

Consultation with the Aboriginal community has been undertaken in accordance with the *Aboriginal cultural heritage consultation requirements for proponents 2010*, up to the stage of providing further information about the project and the methodology for undertaking the cultural heritage assessment to the registered Aboriginal parties (RAPs) for the project for their review and comment.

These constraints as described above have been consolidated into the single constraints map (Figure 1) and will be provided to Dirt Art as part of the constraints shapefile suite.

3.2 Ecological Values

3.2.1 Notable (rare and endemic) flora species

As described in NPWS (2019) orchid monitoring report, to date thirty-four (34) species of native orchids are known to occur in the Mt Canobolas SCA. Orchid species recorded on Mt Canobolas, but not in nearby lower altitude areas include:

- *Caladenia boweri,* Canobolas Spider Orchid (no Bionet records available)
- *Prasophyllum canobolense,* Canobolas Leek Orchid (no Bionet records available)

- *Diuris sp. aff. chryseopsis* (recorded during current survey November 2020, and 3 records previously recorded Bionet search Jan 2021)
- *Dipodium sp. aff. atropurpureum* (recorded during current survey December 2020, and 10 records previously recorded – Bionet search Jan 2021)
- *Gastrodia sesamoides,* Potato Orchid (recorded during current survey November 2020) (7 records previously recorded Bionet search Jan 2021)
- *Pterostylis aestiva,* Long-tongued Summer Greenhood (2 records previously recorded Bionet search Jan 2021)
- *Pterostylis decurva,* Summer Greenhood (no Bionet records available)
- *Pterostylis laxa,* Antelope Greenhood (no Bionet records available)
- *Pterostylis coccina,* Scarlet Greenhood (no Bionet records available)

The following species have been proposed for listing as threatened species under the BC Act; *Prasophyllum canobolense* (Canobolas Leek Orchid) and *Caladenia boweri* (Canobolas Spider Orchid).

Additional species which may be recognized as endemic to Mt Canobolas in the future include:

- *Bulbine glauca* (no Bionet records available)
- *Craspedia sp. aff. lamicola* (1 record previously recorded Bionet search January 2021)
- *Asterolasia sp* (10 records previously recorded Bionet search January 2021)
- *Melichrus sp* (8 records previously recorded Bionet search January 2021)
- *Phebalium sp* (29 records previously recorded Bionet search January 2021)

3.2.2 Vegetation communities

Vegetation mapping, CentTableSVM_v1p0_PCT_E_4778 (2019), has been used as part of this Constraints Identification mapping.

Hunter (2000; 2002) defined seven vegetation communities within the SCA. Medd and Bower (2019) also reviewed the vegetation present against currently described Plant Community Types (PCTs), suggesting the current vegetation mapping does not entirely align with the current mapping.

On ground verification surveys found some discrepancies between on-ground communities and the vegetation types mapped, however found the existing mapping to broadly align. This was considered suitable for the purposes of this constraints identification process. One (1) Endangered Ecological Community (EEC) and one (1) Critically Endangered Ecological Community (CEEC) are confirmed to be represented within the SCA. It should be noted that further ground-truthing is likely to reveal further discrepancies, requiring edits to the mapping, within the SCA and in the adjacent FCNSW and Crown land.

3.2.3 Threatened Ecological Communities

Tablelands Basalt Forest EEC

Tableland Basalt Forest in the Sydney Basin and South Eastern Highlands Bioregions EEC is dominated by an open eucalypt canopy of variable composition. *Eucalyptus viminalis, E. radiata, E. dalrympleana subsp. dalrympleana* and *E. pauciflora* may occur in the community in pure stands or in varying combinations. The community typically has an open canopy of eucalypts with sparse mid-story shrubs (e.g. *Acacia melanoxylon* and *A. dealbata*) and understory shrubs (e.g. *Rubus parvifolius*) and a dense groundcover of herbs and grasses, although disturbed stands may lack either or both of the woody strata. The structure of the community varies depending on past and current disturbances, particularly fire history (DPIE 2020).

Vegetation communities likely to align with Tableland Basalt Forest TEC include PCTs 1197 and PCT 730 occurring within the Mt Canobolas SCA.

Mt Canobolas Xanthoparmelia Lichen Community CEEC

Ascomycota fungi records, mainly lichens, show a great diversity among the > 90 species growing on logs, tree trunks, branches, soil and rocky outcrops or platforms in the SCA. Together with Basidiomycetes, these occur in some twenty-eight (28) families and forty-seven (47) genera (Table 2). Four lichens, *Gyalideopsis halocarpa*, *Sarcogyne sekikaica*, *Megalaria montana* (McCarthy and Elix 2016) and *Xanthoparmelia metastrigosa* (Scientific Committee 2001) are endemic to the SCA. One particular assemblage of at least nine (9) species of foliose lichens, including the endemic *X. metastrigosa*, is listed as an Endangered Ecological Community; the only lichen community in Australia with such legal protection. It has been recognised as unique to the SCA, and gazetted as the Mt Canobolas Xanthoparmelia Lichen Community Endangered Ecological Community (Scientific Committee 2001). The assemblage consists of *Cladia fuliginosa, Xanthoparmelia canobolasensis, X. digitiformis, X. metaclystoides, X. metastrigosa, X. multipartita, X. neorimalis* and *X. sulcifera*. It occurs mainly above 1,100 m altitude on rock faces and soils unique to the MCVC. *Xanthoparmelia metastrigosa* is endemic to Mt Canobolas and *X. canobolasensis* is known only from Mt Canobolas and one locality in Tasmania while *X. sulcifera* and *C. fuliginosa* are each known from a limited number of other localities within NSW (DPIE profile 2020).

Heathlands on the rock plates PCT 759

Hunter (2002) considers these communities to be restricted to the SCA and unique. No floristically similar heathlands are recognised as PCTs in the BioNet Vegetation Classification (BioNet 2019).

These areas of heathlands have been designated as no-go areas as they correlate strongly with the Mt Canobolas Lichen Community CEEC.

PCT 759 is likely to include the Mt Canobolas Xanthoparmelia Lichen Community. PCT 727 is also noted to be associated with Mt Canobolas Xanthoparmelia Lichen Community, however the lichen community is likely to be more restricted than the current PCT mapping extent.

Additional TECs which may be present include Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion which may be associated with PCT 1191 and White Box Yellow Box Blakely's Red Gum Woodland which has the potential to occur as part of PCT 266.

3.2.4 Listed threatened species

Numerous threatened species have been recorded throughout the SCA. A list of current biota recorded within the SCA are detailed below.

Table 1 Known threatened species records within the SCA

Scientific Name	Common Name	NSW Status	Comm Status	Nature of record
Acacia meiantha		E	E	Unpublished unverified records
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V		Bionet
Burhinus grallarius	Bush Stone-curlew	E		Bionet
Certhionyx variegatus	Pied Honeyeater	V		Bionet

Scientific Name	Common Name	NSW Status	Comm Status	Nature of record
Chthonicola sagittata	Speckled Warbler	V		Bionet
Daphoenositta chrysoptera	Varied Sittella	V		Bionet, current surveys
Eucalyptus aggregata	Black Gum	V	V	Bionet, PMST
Eucalyptus canobolensis	Silver-Leaf Candlebark	V	E	Bionet, unpublished records, PMST, current surveys
Eucalyptus robertsonii hemisphaerica	Robertson's Peppermint	V	V	Unpublished, unverified records
Glossopsitta pusilla	Little Lorikeet	V		Bionet
Haliaeetus leucogaster	White-bellied Sea-Eagle	V		Bionet
Hieraaetus morphnoides	Little Eagle	V		Bionet
Hirundapus caudacutus	White-throated Needletail		V	Bionet, PMST
Miniopterus orianae oceanensis	Large Bent-winged Bat	V		Bionet, Anabat data
Ninox strenua	Powerful Owl	V,		Bionet, current surveys
	Barking Owl	V		current surveys
Oxyura australis	Blue-billed Duck	V		Bionet
Petauroides volans	Greater Glider		V	Bionet, PMST
Petaurus australis	Yellow-bellied Glider	V		Bionet, current surveys
Petaurus norfolcensis	Squirrel Glider	V		Bionet, current surveys
Petroica boodang	Scarlet Robin	V		Bionet
Petroica phoenicea	Flame Robin	V		Bionet, current surveys
Phascolarctos cinereus	Koala	V	V	Bionet, PMST
Polytelis swainsonii	Superb Parrot	V	V	Bionet, PMST
Prostanthera gilesii	Prostanthera gilesii	CE		Bionet
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	Bionet, PMST
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V		Bionet, Anabat data
Stagonopleura guttata	Diamond Firetail	V		Bionet

Scientific Name	Common Name	NSW Status	Comm Status	Nature of record
Stictonetta naevosa	Freckled Duck	V		Bionet

Key: V= Vulnerable, E = Endangered, CE = Critically Endangered

Additionally, the following species (sourced from PMST; Table 2) are predicted to occur within the SCA.

Table 2 Threatened species predicted to occur within the SCA

Scientific Name	Common Name	Comm Status	Nature of record	Likelihood of occurrence
Ammobium craspedioides	Yass Daisy	V	PMST	Species or species habitat likely to occur within area
Anthochaera phrygia	Regent Honeyeater	CE	PMST	Foraging, feeding or related behaviour may occur within area
Calidris ferruginea	Curlew Sandpiper	CE	PMST	Species or species habitat may occur within area
Chalinolobus dwyeri	Large-eared Pied Bat	V	PMST	Species or species habitat likely to occur within area
Dasyurus maculatus	Spotted-tail Quoll	E	PMST	Species or species habitat likely to occur within area
Delma impar	Striped Legless Lizard	V	PMST	Species or species habitat may occur within area
Eucalyptus pulverulenta	Silver-leaved Mountain Gum	V	PMST	Species or species habitat known to occur within area
Euphrasia arguta		CE	PMST	Species or species habitat may occur within area
Falco hypoleucos	Grey Falcon	V	PMST	Species or species habitat may occur within area
Grantiella picta	Painted Honeyeater	V	PMST	Species or species habitat likely to occur within area
Lathamus discolor	Swift Parrot	CE	PMST	Species or species habitat likely to occur within area
Leipoa ocellata	Malleefowl	V	PMST	Species or species habitat likely to occur within area

Scientific Name	Common Name	Comm Status	Nature of record	Likelihood of occurrence
Lepidium hyssopifolium	Basalt Pepper-cress	E	PMST	Species or species habitat may occur within area
Leucochrysum albicans subsp. tricolor	Hoary Sunray	E	PMST	Species or species habitat may occur within area
Litoria booroolongensis	Booroolong Frog	E	PMST	Species or species habitat likely to occur within area
Litoria castanea	Yellow-spotted Tree Frog	CE	PMST	Species or species habitat likely to occur within area
Maccullochella macquariensis	Trout Cod	E	PMST	Species or species habitat may occur within area
Maccullochella peelii	Murray Cod	V	PMST	Species or species habitat may occur within area
Macquaria australasica	Macquarie Perch	E	PMST	Species or species habitat may occur within area
Numenius madagascariensis	Eastern Curlew	CE	PMST	Species or species habitat may occur within area
Rostratula australis	Australian Painted Snipe	E	PMST	Species or species habitat likely to occur within area
Swainsona recta	Small Purple-pea	E	PMST	Species or species habitat may occur within area
Synemon plana	Golden Sun Moth	CE	PMST	Species or species habitat may occur within area
Thesium australe	Austral Toadflax	V	PMST	Species or species habitat may occur within area
Natural Temperate Grassland of the South Eastern Highlands		CE	PMST	Community may occur
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland		CE	PMST	Community likely to occur

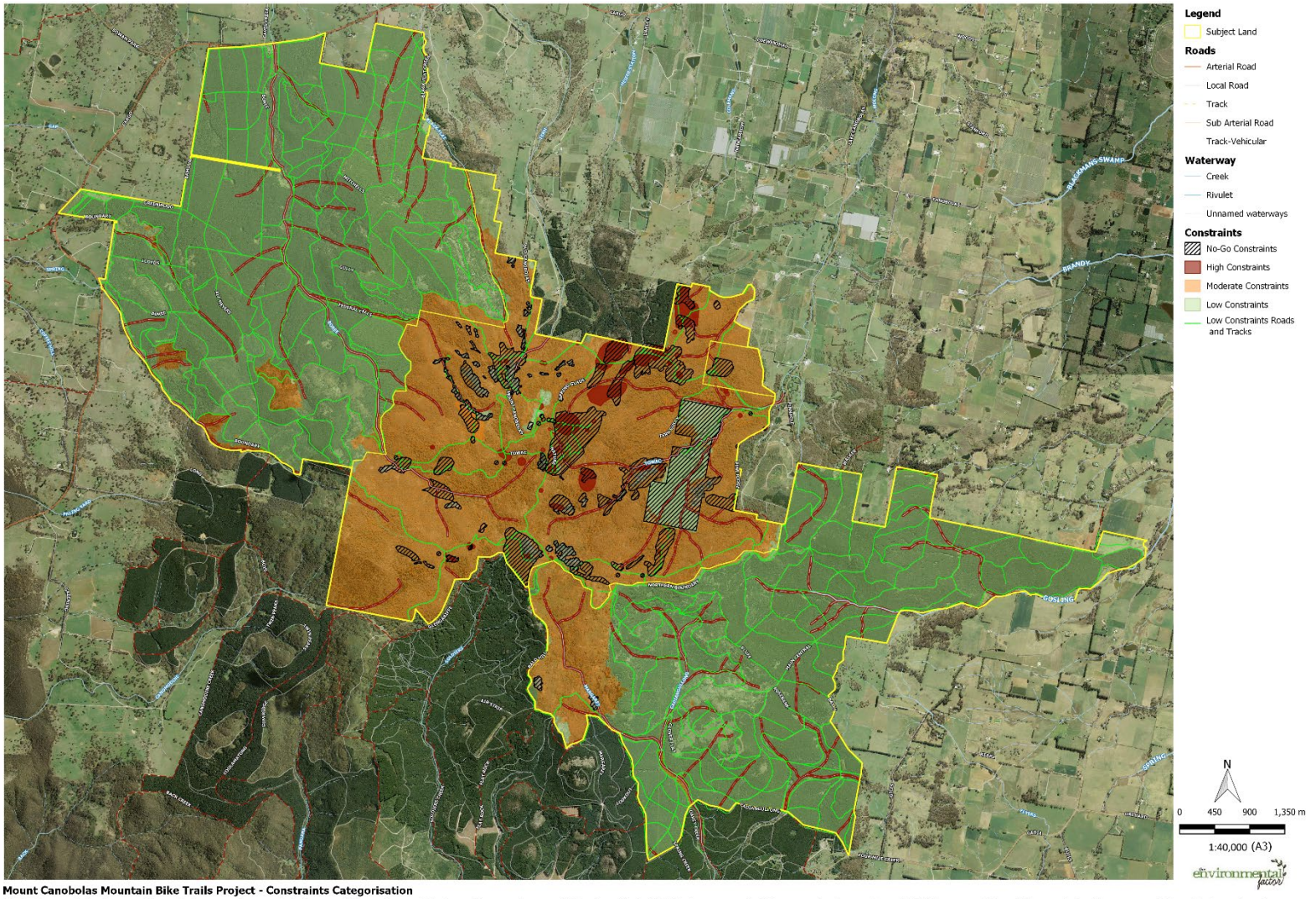

Figure 1 Mount Canobolas Mountain Bike Trails – Constraints Map

4 MANAGEMENT ACTIONS

4.1 Recommended management actions for constraints categories

Management actions have been recommended for each of the constraints categories as tabled below.

Table 3 Description of Constraints items and recommended management actions

Level of Constraint	Description of item	Source of data	Shapefile name	Buffer area applied where necessary	Management action
No-go	Lichen community EEC	Mapped based on vegetation associated with PCT 579 heath on rock platform. Discrete areas of rock / boulder observed with lichen were also recorded using hand held GPS during on site constraints investigation.	No-Go Constraint Lichen PCTs No-Go Constrain Rock Outcrops Garmin and Avenza	25 m buffer	Avoid impacts to rock platforms / outcrops. During detailed design adjust concept route to avoid impacting exposed rock supporting lichen.
No -go	Non mobile threatened species which are not highly visible	Records of non-mobile threatened species taken from Bionet (non-denatured records used) Verification of locations during field investigation.	No-Go Constraint Threatened Species NM and *Protanthera Gilesii* (Terry Mazzer non denatured records)	25 m to account for imprecise recordings and potential community seedbank/population spread	Avoid locations of previously recorded non mobile cryptic threatened species.
No-go	Orchid 'hot spots'	Areas identified as supporting high biodiversity of orchid species were extrapolated from NPWS survey reports and from data collected during TEF site surveys.	No-Go Constraint Orchid Hotspot Nov20	A buffer of 10 m has been applied to protect these areas from recreational users.	Avoid locations of known orchid hotspots.

Level of Constraint	Description of item	Source of data	Shapefile name	Buffer area applied where necessary	Management action
No-go	Aboriginal ceremonial site, artefact scatter and scarred tree	AHIMS database results	No-Go Constraint-Aboriginal Heritage	Minimum 10 m buffer applied	Avoid location of ceremonial site.
High	Notable / uncommon flora species including flora species possibly endemic to Mt Canobolas	Bionet records – non denatured and not quarantined	High Constraint Notable spp.	25 m to account for imprecise recordings and potential community seedbank/population spread	Minimise direct impact footprint to < 1 m, avoid removal of trees.
High	Waterways and riparian corridors	Waterways mapped on topographic maps	High Constraint Waterways	10 m to allow for opportunities to engineer solutions to avoid and reduce impacts.	Waterways consider approach and protecting the bank from erosion by design (i.e. perpendicular).
High	Aboriginal heritage items; Isolated finds, artefact scatters	AHIMS database results	High Constraint-Aboriginal Heritage	Minimum 10 m buffer applied	Avoid known heritage items. Minimise direct impact footprint to < 1 m
Moderate	PCT 1197, PCT 1101, PCT 1191, PCT 759, PCT 727, PCT 266 each	Current Vegetation mapping Central Tablelands SVM PCT E 4778 (2019)	Moderate constraint Plant Community Types	No buffer	Minimise direct impact footprint to < 3 m. Avoid removal of trees.

Level of Constraint	Description of item	Source of data	Shapefile name	Buffer area applied where necessary	Management action
	associated with a potential TEC				
Moderate	Highly visible and avoidable threatened species i.e. Mt Canobolas Silver Gum, Robertson's Peppermint, *Acacia meiantha*	Records of highly visible non-mobile and mobile threatened species taken from Bionet (non denatured records used). Opportunistic records collected using hand held GPS during constraints identification field investigation. Records of non-mobile threatened species taken from Bionet (non-denatured records used). Opportunistic records collected using hand held GPS during constraints identification field investigation.	Moderate Constraint Threatened Species	No buffer area applied to known records. It is apparent that several thousand individuals of *E. canobolensis* occur throughout the SCA. From initial surveys, these form the dominant canopy throughout some sections of the SCA. Removal and impact to trees will be largely avoidable as the Mountain Bike trail detailed design will endeavour to avoid removing any mature trees.	Minimise direct impact footprint to < 3 m. Avoid removal of trees.
Moderate	NPWS Monitoring Site	Locations of NPWS regular monitoring sites provided by NPWS. These areas have been included as moderate constraint to ensure	Moderate Constraint NPWS monitoring sites	50 m to allow for some protection from recreational users	Minimise direct impact footprint to < 3 m. Avoid removal of trees.

Level of Constraint	Description of item	Source of data	Shapefile name	Buffer area applied where necessary	Management action
		they are not impacted by the location of the mountain bike trail.			
Low	Native vegetation within the study area (including the FCNSW estate)	PCT mapping and aerial imagery interpretation	PCT map, minus TECs	No buffer applied	Minimise disturbance footprint to < 5m, seek input from stakeholders (e.g. NPWS)
Low	Forestry pine plantation	Existing mapping and site survey	N/A	No buffer has been applied.	
Low	Existing walking tracks and trails, fire trails, and public sealed and unsealed roads	Existing maps.	Low Constraint Roads and Tracks	No buffer area applied as surrounding vegetation will have its own constraint level.	Minimise disturbance footprint to < 5m, seek input from stakeholders (e.g. FCNSW)

5 REFERENCES

Australasian Virtual Herbarium (AVH), https://avh.chah.org.au/

Atlas of Living Australia database (ALA), https://www.ala.org.au/

Bower CC (2021). *Biodiversity Values, and Constraints on Development, in the Mount Canobolas State Conservation Area.* Canobolas Conservation Alliance Inc., Orange.

DECCW 2010, Aboriginal cultural heritage consultation requirements for proponents 2010 https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Aboriginal-cultural-heritage/aboriginal-cultural-heritage-consultation-requirements-for-proponents-2010-090781.pdf

Department of Planning, Industry and Environment, threatened species profiles, https://www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species/about-threatened-species

DirtArt (2021) Review of Concept Trails report prepared for OCC

DPI Fisheries for the Key Fish Habitat shapefiles; kindly provided by David Ward, Fisheries Manager, DPI Fisheries - Aquatic Environment, Department of Primary Industries

DPIE (2019) Vegetation mapping used CentTableSVM_v1p0_PCT_E_4778

DPIE 2020 , Tableland Basalt Forest Profile, https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=20074

Ellis, M. E. (2019) Microbat survey results (Dec 2018) from Mount Canobolas. Report to NPWS

Fungi and invertebrate records from the Biosecurity Collections Unit, NSW Department of Primary Industries at Orange

GHD 2015, Opportunities and Constraints discussion paper prepared for OCC

Kerle Environmental (2019), Mt Canobolas Fauna Survey report prepared for NPWS

Hunter, J.T. (2002). Vegetation and floristics of the Mount Canobolas State Recreation Area, Orange, New South Wales. Cunninghamia 7(3): 501–526.

LLS Native Vegetation Regulatory Map https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=NVRMap

McCarthy and Elix (2016), A new species of Micarea (lichenized Ascomycota, Pilocarpaceae) from alpine Australia, Telopea, **19**; 31-35

Medd, R.W., Bower, C.C. (2019), Biodiversity and endemism within the Mount Canobolas Volcanic complex, article in proceedings- Linnean society of New South Wales, December 2019.

NSW Flora Online, (PlantNet) https://plantnet.rbgsyd.nsw.gov.au/search/simple.htm

NSW Planning Portal at www.planningportal.nsw.gov.au

NSW BioNet (2020) database, http://www.bionet.nsw.gov.au/

NSW DFI SIX Maps Clip and Ship at https://maps.six.nsw.gov.au/clipnship.html

OEH, Mount Canobolas State Conservation Area, 2015, https://www.nationalparks.nsw.gov.au/visit-a-park/parks/mount-canobolas-state-conservation-area

OEH 2020, NSW Government SEED Portal at www.seed.nsw.gov.au

OEH 2020, The NSW Bionet Atlas at www.bionet.nsw.gov.au

OEH 2020 Biodiversity Values Map https://www.environment.nsw.gov.au/biodiversity/biodiversity-values-map.htm

Personal observations by the knowledgeable experts (pers. comm. C Bower, C Mills 2020)

Porteners, M. (2019) Floristic survey of 24 selected survey sites on Mount Canobolas. Report to NPWS Scientific Committee (2001)

Mount Canobolas Xanthoparmelia Lichen Community - endangered ecological community listing Final Determination https://www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species/nsw-threatened-species-scientific-committee/determinations/final-determinations/2000-2003/mount-canobolas-xanthoparmelia-lichen-community-endangered-ecological-community-listing

The Environmental Factor (2020), flora and fauna surveys, completed November/December 2020.