

## 14. References

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- Adams S, Hereford S, & Hyseni C 2021. 'Burrow Densities of Primary Burrowing Crayfishes in Relation to Prescribed Fire and Mechanical Vegetation Treatments', *Water*, 13: 1–15.
- AECOM 2021a. Warburton Mountain Bike Destination Noise technical report, Draft report 7 May 2021.
- AECOM 2021b. Warburton Mountain Bike Destination Air Quality technical report, Draft report 5 May 2021.
- Backhouse G, Jackson J, & O'Connor J 2008. National Recovery Plan for the Australian Grayling *Prototroctes maraena*, Victorian Government Department of Sustainability and Environment, Melbourne.
- Berry 2002. Predation rates of artificial nests in the edge and interior of a southern Victorian forest. *Wildlife Research* 29: 341-345.
- Biosis Research 2011. Monitoring of Broad-toothed Rat *Mastacomys fuscus* and Eastern Pygmy-possum *Cercartetus nanus*, Yarra Ranges National Park, Victoria – 2010/2011. Report prepared for Parks Victoria. Biosis Research Pty Ltd, Port Melbourne.
- BirdLife Australia (no date). *A Guide to Identifying the Critically Endangered Swift Parrot*. Woodland Birds for Biodiversity Project. Accessed 5 February 2021. [https://www.birdlife.org.au/documents/WL-A\\_Guide\\_to\\_Identifying\\_the\\_Critically\\_Endangered\\_Swift\\_Parrot.pdf](https://www.birdlife.org.au/documents/WL-A_Guide_to_Identifying_the_Critically_Endangered_Swift_Parrot.pdf)
- Brooker, M & Slee, A 1996. 'Eucalyptus' in Walsh, N & Entwisle, T (eds), *Flora of Victoria Volume 3: Dicotyledons Winteraceae to Myrtaceae*, Inkata Press, Melbourne.
- Bryant, D., Crowther, D., & Papas, P. 2014. 'Engaeus Erichson (Decapoda: Parastacidae) capture using two versions of a Norrocky trap', *Australian Zoologist*: 188–192
- Bryant GL, Kobryn HT, Hardy GE and Fleming PA 2017. 'Habitat islands in a sea of urbanisation'. *Urban Forestry and Urban Greening* 28: 131-137.
- CoA 2009. Alpine Sphagnum Bogs and Associated Fens A nationally threatened ecological community Environment Protection and Biodiversity Conservation Act 1999 Policy Statement 3.16. Commonwealth of Australia 2009.
- CoA 2018a. *National Recovery Plan for Macquarie Perch* (*Macquaria australasica*), Commonwealth of Australia 2018
- CoA 2018b. Background document: Threat abatement plan for disease in natural ecosystems caused by *Phytophthora cinnamomi*, Commonwealth of Australia 2018'. Parks Victoria 2021. Weeds and Diseases. <https://www.parks.vic.gov.au/get-into-nature/conservation-and-science/conserving-our-parks/weeds-and-pests>
- CoA 2011a. *Environment Protection and Biodiversity Conservation Act 1999 draft referral guidelines for the endangered southern brown bandicoot (eastern), Isoodon obesulus obesulus*, Australian Government Department of Sustainability, Environment, Water, Population & Communities, Canberra.
- CoA 2013. *Matters of National Environmental Significance. Significant impact guidelines 1.1*. Environment Protection and Biodiversity Conservation Act 1999. Australian Government Department of the Environment, Commonwealth of Australia, Canberra.

- CoA 2016. Draft National Recovery Plan for Leadbeater's possum (*Gymnobelideus leadbeateri*). Commonwealth of Australia 2016. <https://www.environment.gov.au/system/files/resources/6e2618ee-b799-4505-ac96-b3b3e0eb99c4/files/draft-national-recovery-plan-leadbeaters-possum.pdf>
- Cooke R, Wallis R and Webster A 2002. 'Urbanisation and the ecology of powerful owls (*Ninox strenua*) in outer Melbourne, Victoria', Ecology and Conservation of Owls.
- Connell KA, Munro U & Torpy FR 2006. 'Daytime behaviour of the Grey-headed Flying Fox *Pteropus Poliocephalus Temminck* (Pteropodidae: Megachiroptera) at an autumn/winter roost.' Australian Mammalogy 28: 7-14.
- CSIRO 2014. *The National Flying-fox Monitoring Program: Report of the May 2014 count*. CSIRO Ecosystem Sciences, Canberra (count details available at <http://www.environment.gov.au/webgis-framework/apps/ffc-wide/ffc-wide.jsf>, accessed 5 February 2021).
- Cutler, S and Murphy, H 2010. National Recovery Plan for the Tall Astelia *Astelia australiana*, Victorian Government Department of Sustainability and Environment, Melbourne.
- DAWE 2020. Species Profile and Threats Database - Listed Key Threatening Processes. Australian Government Department of Agriculture, Water and the Environment, Canberra. Accessed 4 December 2020. <http://www.environment.gov.au/cgi-bin/sprat/public/publicgetkeythreats.pl>.
- DAWE 2021. Species Profile and Threats Database. Australian Government Department of Agriculture, Water and the Environment, Canberra. Accessed 13 July 2021. <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>
- DEE 2018. National Recovery Plan for the Macquarie Perch (*Macquaria australasica*), Department of the Environment and Energy. Commonwealth of Australia.
- DEE 2020. Analysis of species listed under the *Environment Protection and Biodiversity Conservation Act 1999* which occur in areas affected by bushfires between 1 August 2019 and 13 January 2020 in southern and eastern Australia. Published by the Department of the Environment and Energy 20 January 2020.
- DELWP 2014a. Native Vegetation - Modelled Extent 2005. Victorian Government Department of Environment, Land, Water & Planning, Melbourne. <http://services.land.vic.gov.au/catalogue/metadata?anzlicId=ANZVI0803003404&publicId=guest&extractionProviderId=1>.
- DELWP 2014b. Fire history overlay of most recent fires. Victorian Government Department of Environment, Land, Water & Planning, Melbourne. <http://services.land.vic.gov.au/catalogue/metadata?anzlicId=ANZVI0803004774&publicId=guest&extractionProviderId=1>.
- DELWP 2014c. Native Vegetation - Modelled 1750 Ecological Vegetation Classes. Victorian Government Department of Environment, Land, Water & Planning, Melbourne. <http://services.land.vic.gov.au/catalogue/metadata?anzlicId=ANZVI0803003494&publicId=guest&extractionProviderId=1>.
- DELWP 2016a. Victorian Wetland Inventory (Current). Victorian Government Department of Environment, Land, Water & Planning, Melbourne. <http://services.land.vic.gov.au/catalogue/metadata?anzlicId=ANZVI0803004912&publicId=guest&extractionProviderId=1>.
- DELWP 2016b. Native Vegetation - Modelled Quality (Site condition and landscape context) 2005. Victorian Government Department of Environment, Land, Water & Planning, Melbourne.



<https://discover.data.vic.gov.au/dataset/native-vegetation-modelled-quality-site-condition-and-landscape-context-2005>.

DELWP 2016c. *Processes List – December 2016*. Victorian Government Department of Environment, Land, Water, and Planning, Melbourne.

DELWP 2016d. National Recovery Plan for the Spotted-tailed Quoll *Dasyurus maculatus*. Prepared for the Australian Government, Canberra.

DELWP 2017a. *Guidelines for the removal, destruction or lopping of native vegetation*, Victorian Government Department of Environment, Land, Water, and Planning, Melbourne.

DELWP 2017b. Native Vegetation Regulation Location (2017). Victorian Government Department of Environment, Land, Water & Planning, Melbourne.

<http://services.land.vic.gov.au/catalogue/metadata?anzlicId=ANZVI0803005811&publicId=guest&extractionProviderId=3>.

DELWP 2018. *Assessor's handbook – Applications to remove, destroy or lop native vegetation. Version 1.1 October 2018*. Victorian Government Department of Environment, Land, Water & Planning, Melbourne.

DELWP 2019. Native Vegetation Regulation (2017) Habitat Importance Maps (HIM) for VROTs species. Victorian Government Department of Environment, Land, Water & Planning, Melbourne.

<http://services.land.vic.gov.au/catalogue/metadata?anzlicId=ANZVI0803005813&publicId=guest&extractionProviderId=3>.

DELWP 2020a. NatureKit: Biodiversity web mapping and reporting tool, NatureKit, Victorian Government Department of Environment, Land, Water and Planning.

<http://maps.biodiversity.vic.gov.au/viewer/?viewer=NatureKit>.

DELWP 2020b. Victorian Biodiversity Atlas. Victorian Government Department of Environment, Land, Water & Planning, Melbourne. <https://www.environment.vic.gov.au/biodiversity/victorian-biodiversity-atlas>.

DELWP 2021a. Environment Effects Act 1978 Advisory Note DELWP Impact Assessment Guidance Use of impact assessment and risk assessment in environment effects statements. The State of Victoria Department of Environment, Land, Water and Planning 2021

DELWP 2021b. Flora and Fauna Guarantee Act 1988 – Threatened List – Characteristics of Threatened Communities. Victorian Government Department of Environment, Land, Water & Planning, Melbourne.

[https://www.environment.vic.gov.au/\\_data/assets/pdf\\_file/0018/50418/04072019-Flora-and-Fauna-Guarantee-Characteristics-of-Threatened-Communities-3.pdf](https://www.environment.vic.gov.au/_data/assets/pdf_file/0018/50418/04072019-Flora-and-Fauna-Guarantee-Characteristics-of-Threatened-Communities-3.pdf)

DELWP 2021c. Flora and Fauna Guarantee Act 1988 - Threatened List June 2021. The State of Victoria Department of Environment, Land, Water and Planning 2021.

[https://www.environment.vic.gov.au/\\_data/assets/pdf\\_file/0031/533893/20210714-FFG-Threatened-List.pdf](https://www.environment.vic.gov.au/_data/assets/pdf_file/0031/533893/20210714-FFG-Threatened-List.pdf)

DELWP 2021d Leadbeater's Possum confirmed colonies within Central Highlands RFA (LBPAG\_SITES\_CHRFA) and Leadbeater's Possum 200m buffer for confirmed colonies within Central Highlands RFA (LBPAG\_BUFF\_CHRFA). Obtained from Spatial Datamart Victoria

<https://services.land.vic.gov.au/SpatialDatamart/>. Victorian Government Department of Environment, Land, Water & Planning, Melbourne.

DELWP, ARI, & VFA 2019a. Australian Grayling *Prototroctes maraena*, Department of Environment, Land, Water and Planning, Arthur Rylah Institute and Victorian Fisheries Association, Melbourne, VIC.

- DELWP, ARI, & VFA 2019b. Murray Cod *Maccullochella peelii*, Department of Environment, Land, Water and Planning, Arthur Rylah Institute and Victorian Fisheries Association, Melbourne, VIC.
- DELWP, ARI, & VFA 2019c. Macquarie Perch *Macquaria australasica*, Department of Environment, Land Water and Planning, Arthur Rylah Institute and Victorian Fisheries Association, Melbourne, VIC.
- Department of State Growth 2014. A guide to managing threatened burrowing crayfish in the Department of State Growth road reserves,  
[https://www.transport.tas.gov.au/\\_\\_data/assets/pdf\\_file/0008/275246/EDA\\_SG\\_Freshwater\\_Burrowing\\_Crayfish\\_Management\\_Guidelines\\_Final\\_-\\_May\\_2014.PDF](https://www.transport.tas.gov.au/__data/assets/pdf_file/0008/275246/EDA_SG_Freshwater_Burrowing_Crayfish_Management_Guidelines_Final_-_May_2014.PDF).
- Department of Sustainability, Environment, Water, Population and Communities 2011. Draft referral guidelines for four threatened Tasmanian burrowing crayfish, accessed 7 July 2021,  
<https://www.environment.gov.au/system/files/resources/abf38bef-37b2-4362-8fca-a9770254149a/files/referral-guidelines-tasmanian-burrowing-crayfish.pdf>.
- DEPI 2014a. *Advisory list of rare or threatened plants in Victoria – 2014*. Victorian Government Department of Environment and Primary Industries, Melbourne.
- DEPI 2014b. *Action Statement No. 62 Leadbeater's Possum* *Gymnobelideus leadbeateri*. Victorian Government Department of Environment and Primary Industries, Melbourne.
- DEWHA 2008. *Approved Conservation Advice for Alpine Sphagnum Bogs and Associated Fens ecological community*. Australian Government Department of the Environment, Water, Heritage and the Arts, Canberra.
- DNRE 2002. Water Act 1989 – Waterway determination guidelines, Department of Natural Resources and Environment, Victorian Government.
- DoE 2014. *Approved Conservation Advice for Pomaderris vacciniifolia (round-leaf pomaderris)*. Australian Government Department of the Environment, Canberra.
- DoE 2015. *Referral guideline for 14 birds listed as migratory species under the EPBC Act*. Australian Government Department of the Environment, Canberra.
- Doran N 2001. Burrowing Crayfish Group Recovery Plan 2001-2005,  
<http://www.environment.gov.au/system/files/resources/87da923e-e3d9-481d-ae3b-d4719dfef0ff/files/burrowing-crayfish-group-recovery-plan-2001-2005.pdf>.
- DPIPWE 2006. *Cyathea cunninghamii Slender treefern – Tasmanian Threatened Flora Listing Statement*. Tasmanian Government Department of Primary Industries, Parks, Water & Environment, Hobart.
- DSE 2003. *Action Statement No. 125 Mount Donna Buang Wingless Stonefly* *Riekoperla darlingtoni*. Victorian Government Department of Sustainability and Environment, Melbourne.
- DSE 2004a. *Native Vegetation: Sustaining a living landscape. Vegetation Quality Assessment Manual – Guidelines for applying the Habitat hectares scoring method. Version 1.3*, Victorian Government Department of Sustainability and Environment, Melbourne.
- DSE 2004b. Myrtle Wilt: A disease of Myrtle Beech. Victorian Government Department of Sustainability and Environment, Melbourne.
- DSE 2006. *Ministerial Guidelines for Assessment of Environmental Effects under the Environment Effects Act 1978*. Victorian Government Department of Sustainability and Environment, Melbourne.
- DSE 2009a. *Advisory List of Threatened Invertebrate Fauna in Victoria - 2009*, Victorian Government Department of Sustainability and Environment. East Melbourne, Victoria.

DSE 2009b. Victorian Biodiversity Atlas 'VBA\_FAUNA25, FAUNA100 & FAUNARestricted, FLORA25, FLORA100 & FLORARestricted', Victorian Government Department of Sustainability and Environment. Melbourne, Victoria.

DSE 2009c. Action Statement No. 238 Human activity which results in artificially elevated or epidemic levels of Myrtle Wilt within Nothofagus dominated Cool Temperate Rainforest. Victorian Government Department of Sustainability and Environment, Melbourne.

DSE 2013. Advisory List of Threatened Vertebrate Fauna in Victoria – 2013, Victorian Government Department of Sustainability and Environment. Melbourne, Victoria.

Dunstan, W., Howard, K. Hardy, G. and Burgess, T. 2016. An overview of Australia's Phytophthora species assemblage in natural ecosystems recovered from a survey in Victoria. *IMA Fungus* 7(1): 47–58 (2016)

EPA Victoria 2003. *Guidelines for Environmental Management – Rapid Bioassessment methodology for rivers and streams*. EPA Victoria, Publication No 604.1, Environment Protection Authority Victoria, <https://www.epa.vic.gov.au/about-epa/publications/604-1>.

FPA 2011. *Flora technical Note No. 5: Identification and management of treeferns*. Tasmanian Government Forest Practices Authority, Hobart.

Fungimap 2018a. *Asterophora mirabilis – Grey Jockey*. Accessed 1 December 2020. <https://fungimap.org.au/asterophora-mirabilis-grey-jockey/>.

Fungimap 2018b. *Chlorovibrissea bicolor – Two-toned Pins*. Accessed 1 December 2020. <https://fungimap.org.au/chlorovibrissea-bicolor-two-toned-pins/>.

Fungimap 2018c. *Hypocreopsis amplexans – Tea-tree Fingers*. Accessed 1 December 2020. <https://fungimap.org.au/hypocreopsis-sp-nora-tea-tree-fingers/>.

GHD 2019a. *Warburton Mountain Bike Destination Project – Preliminary Surface Water & Geotechnical Assessment*. S Harrow, G Jones, R Hayes & K Jelly-Butterworth. GHD, Melbourne. Project no. 3137322.

GHD 2019b. *Warburton Mountain Bike Destination Project Desktop Hydrogeological Assessment*, A Wilson, GHD, Melbourne, VIC. Project no. 3137322.

GHD 2019b. *Warburton Mountain Bike Destination Project Desktop Hydrogeological Assessment*. A Wilson, GHD, Melbourne. Project no. 3137322.

GHD 2021. *Surface water, Groundwater and Geotechnical impact assessment report for Warburton Mountain Bike Destination Environment Effect Statement*. J Gourley, T Anderson, A Schofield, C Morris & R Hayes, GHD, Melbourne. Project no. 12538175.

Gibson M, Milne R, Cahill D, Wilson B and Baker B 2002. Preliminary review of the actual and potential distribution of *Phytophthora cinnamoni* dieback in parks and reserves across Victoria. Centre for Environmental Management University of Ballarat (2002).

Goosem 2002. 'Effects of tropical rainforest roads on small mammals: Fragmentation, edge effects and traffic disturbance', *Wildlife Research* 29: 277-289.

Grant TR and Temple-Smith PD 1998. 'Field biology of the platypus (*Ornithorhynchus anatinus*): historical and current perspectives'. *The Royal Society* 353: 1081-1091.

Green, K. and Osborne, W. S. 2003. The distribution and status of the Broad-toothed Rat *Mastacomys fuscus* (Rodentia: Muridae) in New South Wales and the Australian Capital Territory. *Australian Zoologist* 32, 229-237.

- Greet, J., Harley, D., Ashman, K., Watchorn, D. and Duncan, D. 2020. The vegetation structure and condition of contracting lowland habitat for Leadbeater's possum (*Gymnobelideus leadbeateri*). *Australian Mammalogy* - <https://doi.org/10.1071/AM20047>. Published online: 16 December 2020.
- Guarino F 2002. 'Spatial ecology of a large carnivorous lizard, *Varanus varius* (Squamata: Varanidae)'. *Journal of Zoology* 258:449-457.
- Harley, DKP. 2006. A role for nest boxes in the conservation of Leadbeater's possum (*Gymnobelideus leadbeateri*). *Wildlife Research* **33**: 385-395.
- Harris J and Maloney KS 2010. '*Petauroides Volans* (Diprotodontia: Pseudocheiridae)'. *Mammalian Species* 42 (866):207-219.
- Hook, K. 2011. Susceptibility of native plants species to *Phytophthora cinnamomi* and the spread of *Phytophthora dieback* in South Australia. PhD thesis. University of Adelaide.
- Hopper J & Huryn A 2012. 'A New, Non-Destructive Method for Sampling Burrowing Crayfish', *Southeastern Naturalist*, 11: 43-48.
- Hopper, J. & Huryn, A. 2012. 'A New, Non-Destructive Method for Sampling Burrowing Crayfish', *Southeastern Naturalist*, **11**: 43-48.
- Horwitz P & Richardson A 1986. 'An ecological classification of the burrows of Australian freshwater crayfish', *Marine and Freshwater Research*, 37, 2, [https://www.researchgate.net/publication/248886465\\_An\\_ecological\\_classification\\_of\\_the\\_burrows\\_of\\_Australian\\_freshwater\\_crayfish](https://www.researchgate.net/publication/248886465_An_ecological_classification_of_the_burrows_of_Australian_freshwater_crayfish).
- Horwitz P 1990. 'A taxonomic revision of species in the freshwater crayfish genus *Engaeus* Erichson (Decapoda : Parastacidae)', *Invertebrate Taxonomy*, 4, 3: 427-614.
- Horwitz, P. & Richardson, A. 1986. 'An ecological classification of the burrows of Australian freshwater crayfish', *Marine and Freshwater Research* **37**, 2, [https://www.researchgate.net/publication/248886465\\_An\\_ecological\\_classification\\_of\\_the\\_burrows\\_of\\_Australian\\_freshwater\\_crayfish](https://www.researchgate.net/publication/248886465_An_ecological_classification_of_the_burrows_of_Australian_freshwater_crayfish).
- Horwitz, P. 1990. 'A taxonomic revision of species in the freshwater crayfish genus *Engaeus* Erichson (Decapoda : Parastacidae)', *Invertebrate Taxonomy*, **4**, **3**: 427-614.
- Howard, K., Clemann, N and Antrobus, J. (2012). Assessment of the status of threatened herpetofauna following fire in sub alpine habitat at Lake Mountain and Mount Bullfight, near Marysville, north-east Victoria. Department of Sustainability and Environment, Heidelberg, Victoria.
- Kile G. A, Packham, J. M. and Elliott, H. J. 1989. Myrtle Wilt and its possible management in association with human disturbance of rainforest in Tasmania. *New Zealand Journal of Forestry Science* 19(2/3): 256-264.
- Kile, G and Walker, J 1987. *Chalara australis* sp nov (Hyphomycetes), a Vascular Pathogen of *Nothofagus cunninghamii* (Fagaceae) in Australia and Its Relationship to Other *Chalara* Species. *Australian Journal of Botany*, 35(1), pp. 1 - 32.
- Koehn J & Clunie P 2010. National Recovery Plan for the Murray Cod *Maccullochella peelii peelii*, Victorian Government Department of Sustainability and Environment.
- Koster WM 2015., Movement Ecology and Conservation Implications for Riverine Fishes of South-eastern Australia, PhD thesis, Deakin University, Melbourne, VIC.

- Lawton JA, Holland GJ and Bennett AF 2021. 'What determines the distribution of a threatened species, the brush-tailed phascogale *Phascogale tapoatafa* (Marsupialia: Dasyuridae), in a highly modified region?'. *Austral Ecology*.
- Lunney D, Grant TR and Matthews A 2004. 'Distribution of the platypus in the Bellinger catchment from community knowledge and field survey and its relationship to river disturbance'. In *Proceedings of the Linnean Society of New South Wales* 125: 243-258
- Macak, P and Menkhorst, P 2017. Forest fire break not a barrier to movement for a threatened rodent, the smoky mouse, *Pseudomys fumeus* (Rodentia : Muridae). *Australian Mammalogy* **39 (1)**: 42-47
- Macfarlane, M.A., Smith, J. & Lowe, K. 1997. Leadbeater's Possum Recovery Plan. Department of Natural Resources and Environment, East Melbourne.
- Menkhorst, P (ed) 1995. *Mammals of Victoria: Distribution, Ecology and Conservation*. Revised edition. Oxford University Press, Melbourne.
- Menkhorst, P. & L. Broome 2006. *National Recovery Plan for the Smoky Mouse Pseudomys fumeus*. Department of Sustainability and Environment, Melbourne.
- Milione M and Harding E 2009. 'Habitat use by platypus (*Ornithorhynchus anatinus*) in a modified Australian Wet Tropics catchment, north-eastern Queensland'. *Australian Mammalogy*, 31: 35-46
- NSW Scientific Committee 2008. Sooty Owl *Tyto tenebricosa*. Review of current information in NSW. September 2008. Unpublished report arising from the Review of the Schedules of the Threatened Species Conservation Act 1995. NSW Scientific Committee, Hurstville.
- Packham, J. M. 1994. *Studies on Myrtle Wilt*. PhD Thesis. University of Tasmania, Hobart.
- Parks Victoria 2002. *Yarra Ranges National Park Management Plan*. Parks Victoria, Melbourne, Victoria.
- Patykowski, J, Gibson, M & Dell, M 2014. A review of the conservation ecology of Round-leaf Pomaderris *Pomaderris vacciniifolia* F. Muell. ex Reissek (Rhamnaceae). *The Victorian Naturalist*, 131(2), pp. 44-51.
- Practical Ecology 2019. *Biodiversity Impact Assessment – Proposed Warburton Mountain Bike Trail*. G James, L Kern, A Hamer & A Ewing. Practical Ecology Pty Ltd, Melbourne. Project no. YAR2769.
- RBG 2020. Conservation research for Tea-tree Fingers. Royal Botanic Gardens Victoria. Accessed 3 December 2020. [rbg.vic.gov.au/science/projects/mycology/conservation-mycology/tea-tree-fingers-research](http://rbg.vic.gov.au/science/projects/mycology/conservation-mycology/tea-tree-fingers-research).
- RBGV 2020. Flora of Victoria, VICFLORA-Royal Botanic Gardens Victoria, accessed 26 March 2020, <https://vicflora.rbg.vic.gov.au/flora/taxon/92359bf9-5cfa-4dcf-8b4b-f0e62fcdc70c>.
- Roberts, N, Wapstra, M, Duncan, F, Woolley, A, Morley, J & Fitzgerald, N 2003. Shedding some light on *Thismia rodwayi* F. Muell. (Fairy Lanterns) in Tasmania: Distribution, Habitat and Conservation Status. *Papers and Proceedings of the Royal Society of Tasmania*, 137, pp. 55-66.
- SAC 2013. *Flora and Fauna Guarantee Act 1988 – Threatened List: Characteristics of Threatened Communities*, Victorian Government Department of Environment, Land, Water & Planning, Melbourne.
- Saunders, D and Tzaros, C 2011. *National Recovery Plan for the Swift Parrot Lathamus discolor*. Birds Australia, Melbourne.
- Seppelt, R & Stone, I 2016, *Australian Mosses Online 70. Fissidentaceae*. Australian Biological Resources Study, Canberra. Version 16 June 2016. Accessed 1 December 2020. [http://www.anbg.gov.au/abrs/Mosses\\_online/70\\_V2\\_Fissidentaceae.html](http://www.anbg.gov.au/abrs/Mosses_online/70_V2_Fissidentaceae.html).



- SES 2020. *Warburton – Local Flood Guide*. Victorian Government State Emergency Service, Melbourne.
- Shipway, S, Rowe, K & Rowe, K 2020. Persistence of the broad-toothed rat (*Mastacomys fuscus*) across Victoria is correlated with climate and elevation. *Wildlife Research* **47**: 267-278.
- Smales, I. J. 1994. The discovery of Leadbeater's possum, *Gymnobelideus leadbeateri* McCoy, resident in a lowland swamp woodland. *Victorian Naturalist* **111**, 178-182.
- Smith A 1984. 'Demographic consequences of reproduction, dispersal and social interaction in a population of Leadbeater's Possum (*Gymnobelideus leadbeateri*)'. In *Possum and Gliders*: 359-373.
- Stech et al. 2008. Explaining the 'anomalous' distribution of Echinodium (Bryopsida: Echinodiaceae): Independent evolution in Macaronesia and Australasia. *Organisms, Diversity & Evolution*, 8, pp. 282-292.
- Streimann, H 2012. *Australian Mosses Online 11. Hookeriaceae*. Australian Biological Resources Study, Canberra. Version 19 April 2012. Accessed 1 December 2020.  
[http://www.anbg.gov.au/abrs/Mosses\\_online/11\\_Hooker.html](http://www.anbg.gov.au/abrs/Mosses_online/11_Hooker.html).
- Tarburton MK 2014. 'Status of the White-throated Needletail *Hirundapus caudacutus* in Australia: Evidence for a marked decline'. *Australian Field Ornithology* 31:122-140
- TSSC 2009. *Commonwealth Listing Advice on Alpine Sphagnum Bogs and Associated Fens*. Australian Government Department of the Environment, Water, Heritage and the Arts, Canberra.
- TSSC 2016a. Conservation Advice *Petauroides volans* greater glider. Canberra: Department of the Environment. Available from: <http://www.environment.gov.au/biodiversity/threatened/species/pubs/254-conservation-advice-20160525.pdf>. Accessed 5 February 2021.
- TSSC 2016b. Conservation Advice *Mastacomys fuscus mordicus* broad-toothed rat (mainland). Canberra: Department of the Environment. Available from: <http://www.environment.gov.au/biodiversity/threatened/species/pubs/87617-conservation-advice-05052016.pdf>. Accessed 17 February 2021.
- TSSC 2016c. Conservation Advice *Isoodon obesulus obesulus* southern brown bandicoot (eastern). Canberra: Department of the Environment. Available from: <http://www.environment.gov.au/biodiversity/threatened/species/pubs/68050-conservation-advice-05052016.pdf>. Accessed 17 February 2021.
- TSSC 2019. Conservation Advice *Gymnobelideus leadbeateri* Leadbeater's Possum. Canberra: Department of the Environment and Energy. Available from: <http://www.environment.gov.au/biodiversity/threatened/species/pubs/273-conservation-advice-22062019.pdf>. Accessed 17 February 2021.
- Tsyrlin, E 2019. *Survey of the Wingless Donna Buang Stonefly Riekoperla darlingtoni in relation to the proposed Warburton mountain bike trail*. University of Melbourne, Melbourne.
- UTAS 2019a. *Acrobolbus cinerascens (Acrobolbaceae)*. Accessed 25 June 2021.  
[https://www.utas.edu.au/dicotkey/dicotkey/Lworts/ACROBOLBACEAE/sAcrob\\_cine.htm](https://www.utas.edu.au/dicotkey/dicotkey/Lworts/ACROBOLBACEAE/sAcrob_cine.htm)
- UTAS 2019b. *Adelanthus (Adelanthaceae)*. Accessed 24 June 2021.  
<https://www.utas.edu.au/dicotkey/dicotkey/Lworts/ADELANTHACEAE/gAdelanthus.htm>
- VFA 2018. Yarra River - angling waters, Victorian Fisheries Department, Yarra River - angling waters, Victorian Fisheries Department, accessed 20 February 2021, <https://vfa.vic.gov.au/recreational-fishing/fishing-locations/inland-angling-guide/areas/yarra/yarra-angling-waters>.



- VicFlora 2015. *Pomaderris vacciniifolia*. Accessed 3 December 2020.  
<https://vicflora.rbg.vic.gov.au/flora/taxon/a5bb4193-9e85-44aa-b5ad-30864eb68e1f>.
- VicFlora 2017. *Asterolasia asteriscophora* subsp. *albiflora* Emerald Star-bush. Accessed 24 June 2021.  
<https://vicflora.rbg.vic.gov.au/flora/taxon/a4ad85fc-869c-472b-83af-40dfeb54b10d>.
- VicFlora 2018a. *Eucalyptus camphora* subsp. *humeana* *Mountain Swamp-gum*. Accessed 25 June 2021.  
<https://vicflora.rbg.vic.gov.au/flora/taxon/03760963-adb4-481c-9893-d9ef409ef017>
- VicFlora 2018b. *Acacia howittii* *Sticky Wattle*. Accessed 1 December 2020.  
<https://vicflora.rbg.vic.gov.au/flora/taxon/f9d0ac14-065c-462d-a5f5-565343ef3761>.
- VicFlora 2018c. *Acacia stictophylla* *Dandenong Range Cinnamon Wattle*. Accessed 24 June 2021.  
<https://vicflora.rbg.vic.gov.au/flora/taxon/787e2ae6-114e-4755-be47-77db6efce9a6>
- VicFlora 2019. *Utricularia gibba* *Floating Bladderwort*. Accessed 3 December 2020.  
<https://vicflora.rbg.vic.gov.au/flora/taxon/c77afeb0-1a15-445b-8ca0-4d65f2fb3d6b>.
- VicFlora 2020. *Acacia nanodealbata* *Dwarf Silver-wattle* . Accessed 24 June 2021.  
<https://vicflora.rbg.vic.gov.au/flora/taxon/86490866-14b5-4670-91f8-5ee0f1f78fd1>
- VicFlora 2021. *Astelia australiana* *Tall Astelia*. Accessed 18 June 2021.  
<https://vicflora.rbg.vic.gov.au/flora/taxon/11110b23-8273-4b14-88d5-b8da9f417ebd>.
- Webb JA, Koster WM, Stuart IG, Reich P, & Stewardson MJ 2018. 'Make the Most of the Data You've Got: Bayesian Models and a Surrogate Species Approach to Assessing Benefits of Upstream Migration Flows for the Endangered Australian Grayling', *Environmental Management*, 61: 398–407.
- Webster A, Cooke R, Jameson G and Wallis R 1999. 'Diet, Roosts and Breeding of Powerful Owls *Ninox strenua* in a Disturbed, Urban Environment: A case for cannibalism? Or a case of infanticide?', *Emu – Austral Ecology* 99:80-83.
- Whisson, D. A., Holland, G. J., and Kelly, T. R. 2015. Persistence of a threatened species in a modified alpine resort environment: the broad-toothed rat. *Journal of Mammalogy* **96**, 151–158.
- White, M, Batpurev, K, Salkin, O & Newell, G .2019 Primary Rainforest Mapping in Victoria 2018 - extent and type. Arthur Rylah Institute for Environmental Research Technical Report Series No. 309. Victorian Government Department of Environment, Land, Water and Planning, Heidelberg, Victoria.
- White, M, Cheal, D, Carr, G, Adair, R, Blood, K & Meagher, D 2018. Advisory list of environmental weeds in Victoria. Arthur Rylah Institute for Environmental Research Technical Report Series No. 287. Victorian Government Department of Environment, Land, Water and Planning, Heidelberg, Victoria.
- YRSC 2021a. *Ozothamnus rogersianus* *Nunniong Everlasting*. Accessed 24 June 2021.  
<https://www.yarraranges.vic.gov.au/PlantDirectory/Shrubs/Shurbs-1.5-10-metres/Ozothamnus-rogersianus>
- YRSC 2021b. *Eucalyptus goniocalyx* ssp. *goniocalyx* *Long-leaf Box, Bundy*. Accessed 24 June 2021.  
<https://www.yarraranges.vic.gov.au/PlantDirectory/Trees/Trees-5m/Eucalyptus-goniocalyx-ssp.-goniocalyx>
- Yugovic, J. 1991. Tall *Astelia Astelia australiana*, Flora and Fauna Guarantee Act Action Statement no. 7. The State of Victoria, Department of Sustainability and Environment, 2003 web version.

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## Appendices

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## Appendix 1 Risk register (construction & operation)

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Risk ID	Ecological value(s)	Risk pathway	Mitigation measure ID	Mitigation measure	Consequence	Likelihood	Initial risk	Mitigation measure ID	Additional mitigation measures	Consequence	Likelihood	Residual risk
BR01	Terrestrial ecosystems, Aquatic ecosystems	Introduction and / or spread of environmental weeds / pests / pathogens from construction activities which negatively impact ecosystem health.	BM02	All trail alignments and all known site-specific environmental issues will be incorporated into the WorldTrail GIS platform which will be accessible by construction crew on site at all times.	Moderate	Possible	Medium	BM01	CEMP / OEMP to include independent auditing of trail construction and operation against environmental objectives and approval conditions. Independent auditor should have power to stop work / use of trails should project be non-compliant. A suitably qualified ecologist/botanist to be present during micro-siting and construction activities in sensitive areas.	Moderate	Unlikely	Medium
			BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.				BM07	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.			
			BM22	A comprehensive weed management program would be implemented along and in the immediate vicinity of trails. The program would be developed in consultation with land managers and would continue for as long as the trails remain in use.				BM23	Construction and operation phase staff trained as part of site induction to identify high threat environmental weeds within the project area and to implement procedures to minimise risk of spread. Training will include distribution of fact sheets, Yarra Ranges Weed ID guide and CaLP Act obligations.			
			BM24	Avoid disturbance to the ground surface in areas known to contain invasive weeds and pathogens (including Myrtle Wilt) wherever possible. In high risk areas a suitably qualified ecologist will accompany trail crew to identify weed species and key areas to avoid. High risk areas will be mapped prior to construction.				BM25	CEMP / OEMP to include appropriate hygiene procedures for weeds / pathogens throughout the trail alignment.			
			BM28	Any fill material introduced to the National Park must be certified clean and be weed and pathogen free and exhibit similar properties to local natural soils e.g. pH, drainage, texture. Any fill material introduced to the State Forest will be undertaken according to DELWP FFM procedures and exhibit similar properties to local natural soils e.g. pH, drainage, texture. Fill areas should be monitored for germination of weeds.				BM26	Construction and operation phase staff trained as part of site induction to identify signs of plant pathogens e.g. Myrtle Wilt, understand conditions that can cause spread and to implement procedures minimise risk of spread.			
			BM29	Minimise the introduction of fill material for the construction and ongoing management of the trail.				BM27	CEMP / OEMP to include commissioning & maintenance schedule and procedures for bike washing facilities as per SWM14 (GHD 2021). These facilities will be maintained for the entire life of the project i.e. as long as the trails remain in use.			
			BM20	Project will work with relevant land managers to support existing pest animal programs. Support will be provided for the entire life of the project i.e. as long as the trails remain in use.				BM30	Construction and operation phase staff trained as part of site induction to identify pest animals and signs of their presence to inform pest management program e.g. locating traps near feral cat sightings. This data will be recorded in a GIS platform for the project.			
			BR02	Terrestrial ecosystems, Aquatic ecosystems				More people and / or machinery in the landscape due to construction activities increases risk of wildfire.	BM04			
BM08	An Emergency Management Plan will be implemented as part of the CEMP / OEMP. The plan will include measures to manage fire risk from project activities including compliance with any requirements under the Forests Act (Fire Protection Regulations) 2014 for construction and operational activities in Fire Protected Areas.											
BM13	Trail closure during periods of extreme weather as per SWM15 (GHD 2021) and in accordance with the Emergency Management Plan and any additional directions required under the Forests Act.											

Risk ID	Ecological value(s)	Risk pathway	Mitigation measure ID	Mitigation measure	Consequence	Likelihood	Initial risk	Mitigation measure ID	Additional mitigation measures	Consequence	Likelihood	Residual risk
BR03	Terrestrial ecosystems, Aquatic ecosystems	Loss / damage to vegetation outside impact area causing unnecessary damage to ecosystem (e.g. accidental clearing of native vegetation).	BM02	All trail alignments and all known site-specific environmental issues will be incorporated into the WorldTrail GIS platform which will be accessible by construction crew on site at all times.	Moderate	Possible	Medium	BM01	CEMP / OEMP to include independent auditing of trail construction and operation against environmental objectives and approval conditions. Independent auditor should have power to stop work / use of trails should project be non-compliant. A suitably qualified ecologist/botanist to be present during micro-siting and construction activities in sensitive areas.	Moderate	Unlikely	Medium
			BM03	CEMP / OEMP will include procedures for flagging of the final trail alignment and demarcating environmental values to be avoided e.g. 'no-go zones' during works. Biodegradable tape will be preferentially used with any other non-biodegradable markers removed from site.				BM07	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.			
			BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.				BM35	All watercourses are designated no-go zones during construction and operations unless works are required directly in / adjacent to watercourse.			
			BM18	OEMP will include monitoring for any off-trail tracks and process for closing unauthorised trails and assisted regeneration.								
BR04	Terrestrial ecosystems, Aquatic ecosystems	Construction of trail may result in alterations to surface water flows and / or soil stability which can negatively impact ecosystem health (e.g. erosion and sedimentation, land slips).	BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.	Moderate	Possible	Medium	BM01	CEMP / OEMP to include independent auditing of trail construction and operation against environmental objectives and approval conditions. Independent auditor should have power to stop work / use of trails should project be non-compliant. A suitably qualified ecologist/botanist to be present during micro-siting and construction activities in sensitive areas.	Moderate	Possible	Medium
			BM09	Adequately manage all construction and operation activities to maintain landform stability and avoid / minimise landslips and erosion and sedimentation. This includes: - Seasonal closure of selected trails, - Incorporate management measures outlined in GHD (2021) e.g. GTM01, GTM02 & GMT03, - Rock armoured surfaces to be constructed on steep gradients to minimise erosion as per GTR03 (GHD 2021), - Rock walls and / or retaining walls constructed from local rock from constructed areas where possible to stabilise steep slopes and batters (rock is not to be collected from surrounding areas), - If a retaining wall is required in a remote location, it would be brought in by helicopter to avoid surface impacts beyond the trail impact area, - Remediation of areas where landslips and / or erosion and sedimentation occur as a result of the trail.				BM07	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.			
			BM11	Existing vehicle roads and tracks e.g. Cemetery Track to be incorporated into the trail network. Upgrades associated with incorporating these tracks will reduce existing erosion and sedimentation issues.				BM33	Construction of all watercourse crossings, whether permanent waterways or intermittent, must follow Melbourne Water requirements for works on waterways & crossings and is to be supervised and certified by a suitably qualified person.			
			BM12	Existing mountain bike trails in vicinity of Mount Tugwell will be incorporated into the trail network. Upgrades associated with incorporating these trails will reduce existing erosion and sedimentation issues.				BM37	Works in proximity to watercourses should not occur during wet months (e.g. June – September) unless conditions are such that land degradation and surface water management problems can be avoided or appropriate mitigation measures implemented. Where practicable, all watercourse crossings should be constructed during no or low flow conditions.			
			BM13	Trail closure during periods of extreme weather as per SWM15 (GHD 2021) and in accordance with the Emergency Management Plan and any additional directions required under the Forests Act.								
			BM15	Regular trail inspections undertaken to identify any problems or changes to the trails that need to be repaired. This includes after extreme weather events. Details to be outlined in the CEMP / OEMP.								
			BM14	Pre-construction trail micro-siting in accordance with the existing contours, to make the most of the existing terrain and minimise the need for significant excavation or soil disturbance.								

Risk ID	Ecological value(s)	Risk pathway	Mitigation measure ID	Mitigation measure	Consequence	Likelihood	Initial risk	Mitigation measure ID	Additional mitigation measures	Consequence	Likelihood	Residual risk
			<b>BM28</b>	Any fill material introduced to the National Park must be certified clean and be weed and pathogen free and exhibit similar properties to local natural soils e.g. pH, drainage, texture. Any fill material introduced to the State Forest will be undertaken according to DELWP FFM procedures and exhibit similar properties to local natural soils e.g. pH, drainage, texture. Fill areas should be monitored for germination of weeds.								
			<b>BM29</b>	Minimise the introduction of fill material for the construction and ongoing management of the trail.								
			<b>BM31</b>	All waterway crossings are to be elevated by installing small bridges on raised pedestals either side of the waterway. All other watercourse crossings will involve bridges, boardwalks or rock armouring where deemed appropriate as per GHD (2021). These structures will ensure that any water and sediments are absorbed along the trail edge and not draining into the watercourse.								
			<b>BM32</b>	Trail micro-siting to identify narrowest practicable crossing location where watercourse crossing required as per SWM01 (GHD 2021).								
			<b>BM36</b>	No instream works within Yarra River to minimise disturbance and alterations to existing conditions.								
			<b>BM38</b>	Micro-siting to avoid areas of wet or boggy ground, including areas where vegetation changes suggest such conditions may be present (i.e. thickets, sedges, rushes, mosses etc.)								
			<b>BM39</b>	Where wet or boggy ground is present and unavoidable, use suitable rock armouring to harden and reinforce the trail or elevate trail using boardwalk or another appropriate engineered/design solution.								
			<b>BM49</b>	Implement measures outlined in GWM01 to manage potential impacts to GDEs / seeps / springs (GHD 2021).								
			<b>BM69</b>	Minimise impacts to trees through micro-siting and adequate implementation of sympathetic mitigation measures outlined in Treelogic (2021).								
<b>BR05</b>	<b>Terrestrial ecosystems, Aquatic ecosystems</b>	Leaks, spills, litter and / or waste from construction (e.g. chemical contamination from machinery fluids) negatively impacts ecosystem health.	<b>BM04</b>	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.				<b>BM01</b>	CEMP / OEMP to include independent auditing of trail construction and operation against environmental objectives and approval conditions. Independent auditor should have power to stop work / use of trails should project be non-compliant. A suitably qualified ecologist/botanist to be present during micro-siting and construction activities in sensitive areas.			
			<b>BM06</b>	Implement standard CEMP / OEMP controls for chemicals (inc. fungicides), fuel and waste management including procedures for spill containment and clean-up as per SWM10 (GHD 2021).	Moderate	Unlikely	Medium	<b>BM07</b>	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.	Moderate	Rare	Low
								<b>BM35</b>	All watercourses are designated no-go zones during construction and operations unless works are required directly in / adjacent to watercourse.			



Risk ID	Ecological value(s)	Risk pathway	Mitigation measure ID	Mitigation measure	Consequence	Likelihood	Initial risk	Mitigation measure ID	Additional mitigation measures	Consequence	Likelihood	Residual risk
BR06	Terrestrial ecosystems, Aquatic ecosystems	Damage to trail from extreme weather event(s) during construction causes further damage to ecosystem (e.g. landslips, increased erosion and sedimentation).	BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.	Moderate	Rare	Low	-	No additional biodiversity mitigation measures recommended.	Moderate	Rare	Low
			BM09	Adequately manage all construction and operation activities to maintain landform stability and avoid / minimise landslips and erosion and sedimentation. This includes: - Seasonal closure of selected trails, - Incorporate management measures outlined in GHD (2021) e.g. GTM01, GTM02 & GMT03, - Rock armoured surfaces to be constructed on steep gradients to minimise erosion as per GTR03 (GHD 2021), - Rock walls and / or retaining walls constructed from local rock from constructed areas where possible to stabilise steep slopes and batters (rock is not to be collected from surrounding areas), - If a retaining wall is required in a remote location, it would be brought in by helicopter to avoid surface impacts beyond the trail impact area, - Remediation of areas where landslips and / or erosion and sedimentation occur as a result of the trail.								
			BM13	Trail closure during periods of extreme weather as per SWM15 (GHD 2021) and in accordance with the Emergency Management Plan and any additional directions required under the Forests Act.								
			BM15	Regular trail inspections undertaken to identify any problems or changes to the trails that need to be repaired. This includes after extreme weather events. Details to be outlined in the CEMP / OEMP.								
BR07	Terrestrial ecosystems, Aquatic ecosystems	Use of inappropriate imported fill material during construction (e.g. drastically different pH or drainage properties) negatively impacts ecosystem health.	BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.	Minor	Possible	Low	BM01	CEMP / OEMP to include independent auditing of trail construction and operation against environmental objectives and approval conditions. Independent auditor should have power to stop work / use of trails should project be non-compliant. A suitably qualified ecologist/botanist to be present during micro-siting and construction activities in sensitive areas.	Minor	Possible	Low
			BM14	Pre-construction trail micro-siting in accordance with the existing contours, to make the most of the existing terrain and minimise the need for significant excavation or soil disturbance.				BM07	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.			
			BM29	Minimise the introduction of fill material for the construction and ongoing management of the trail.								
			BM28	Any fill material introduced to the National Park must be certified clean and be weed and pathogen free and exhibit similar properties to local natural soils e.g. pH, drainage, texture. Any fill material introduced to the State Forest will be undertaken according to DELWP FFM procedures and exhibit similar properties to local natural soils e.g. pH, drainage, texture. Fill areas should be monitored for germination of weeds.								

Risk ID	Ecological value(s)	Risk pathway	Mitigation measure ID	Mitigation measure	Consequence	Likelihood	Initial risk	Mitigation measure ID	Additional mitigation measures	Consequence	Likelihood	Residual risk
BR08	Terrestrial ecosystems, Aquatic ecosystems	Vegetation clearing in construction phase will reduce quality and / or extent of ecosystem (including habitat for native species) negatively impacting ecosystem health.	BM02	All trail alignments and all known site-specific environmental issues will be incorporated into the WorldTrail GIS platform which will be accessible by construction crew on site at all times.	Major	Almost certain	Very High	BM01	CEMP / OEMP to include independent auditing of trail construction and operation against environmental objectives and approval conditions. Independent auditor should have power to stop work / use of trails should project be non-compliant. A suitably qualified ecologist/botanist to be present during micro-siting and construction activities in sensitive areas.	Major	Almost certain	Very High
			BM03	CEMP / OEMP will include procedures for flagging of the final trail alignment and demarcating environmental values to be avoided e.g. 'no-go zones' during works. Biodegradable tape will be preferentially used with any other non-biodegradable markers removed from site.				BM07	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.			
			BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.				BM35	All watercourses are designated no-go zones during construction and operations unless works are required directly in / adjacent to watercourse.			
			BM18	OEMP will include monitoring for any off-trail tracks and process for closing unauthorised trails and assisted regeneration.				BM05	Minimise use / removal of natural materials such as rocks, woody debris, fallen timber, organic litter during construction, operation and maintenance of trail. Natural materials would not be collected from outside of the trail construction area. Any material removed must be retained on site nearby.			
			BM17	Native vegetation allowed / assisted to regenerate within construction footprint to a 30 to 60 centimetre wide tread width.								
			BM19	Removal of vegetation will be to the minimum extent required, according to variable trail construction footprint which is a function of slope class. Accidental / excessive clearing will be remediated through assisted regeneration or additional offsets.								
			BM67	Native vegetation (trees including mid-storey species) removal is subject to the following constraints: 1) No trees (including mid-storey trees) with DBH > 10 centimetres are to be removed in the National Park (unless condition 3) applies). 2) Within State Forest trees < 20 centimetres DBH in single age stands of Eucalyptus spp. and mid-storey (i.e. regrowth following bushfire) may be removed. 3) Excluding areas of suitable habitat for Leadbeater's Possum, any small dead trees (< 20 centimetres DBH) within 2 metres of the trail may require removal if significant defects are identified. Such trees would be felled and kept nearby as habitat logs (coarse woody debris).								
			BM69	Minimise impacts to trees through micro-siting and adequate implementation of sympathetic mitigation measures outlined in Treelogic (2021).								
			BM71	Trail micro-siting to avoid existing stands of dense vegetation, particularly mid-storey vegetation between 1 to 5 metres in height, wherever possible.								
			BM72	All large hollow-bearing canopy trees (dead and alive) are to be retained with no substantial works encroachment that would compromise the health and viability of such trees.								
BM21	Project will include environmental enhancement works such as species monitoring programs and installation of nesting boxes for significant fauna.											

Risk ID	Ecological value(s)	Risk pathway	Mitigation measure ID	Mitigation measure	Consequence	Likelihood	Initial risk	Mitigation measure ID	Additional mitigation measures	Consequence	Likelihood	Residual risk
BR09	Terrestrial ecosystems, Aquatic ecosystems	A lack of adequate independent auditing and / or regulatory oversight during construction leads to environmental damage in excess of approvals.	BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.	Moderate	Possible	Medium	BM01	CEMP / OEMP to include independent auditing of trail construction and operation against environmental objectives and approval conditions. Independent auditor should have power to stop work / use of trails should project be non-compliant. A suitably qualified ecologist/botanist to be present during micro-siting and construction activities in sensitive areas.	Moderate	Rare	Low
			BM02	All trail alignments and all known site-specific environmental issues will be incorporated into the WorldTrail GIS platform which will be accessible by construction crew on site at all times.				BM33	Construction of all watercourse crossings, whether permanent waterways or intermittent, must follow Melbourne Water requirements for works on waterways & crossings and is to be supervised and certified by a suitably qualified person.			
BR10	Terrestrial ecosystems, Aquatic ecosystems	Removal of adjacent vegetation during construction phase increases light levels changing microclimate resulting in negative impact on ecosystem health.	BM17	Native vegetation allowed / assisted to regenerate within construction footprint to a 30 to 60 centimetre wide tread width.	Minor	Unlikely	Low	-	No additional biodiversity mitigation measures recommended.	Minor	Unlikely	Low
			BM19	Removal of vegetation will be to the minimum extent required, according to variable trail construction footprint which is a function of slope class. Accidental / excessive clearing will be remediated through assisted regeneration or additional offsets.								
			BM67	Native vegetation (trees including mid-storey species) removal is subject to the following constraints: 1) No trees (including mid-storey trees) with DBH > 10 centimetres are to be removed in the National Park (unless condition 3) applies. 2) Within State Forest trees < 20 centimetres DBH in single age stands of Eucalyptus spp. and mid-storey (i.e. regrowth following bushfire) may be removed. 3) Excluding areas of suitable habitat for Leadbeater's Possum, any small dead trees (< 20 centimetres DBH) within 2 metres of the trail may require removal if significant defects are identified. Such trees would be felled and kept nearby as habitat logs (coarse woody debris).								
			BM69	Minimise impacts to trees through micrositing and adequate implementation of sympathetic mitigation measures outlined in Treelogic (2021).								
			BM71	Trail micrositing to avoid existing stands of dense vegetation, particularly mid-storey vegetation between 1 to 5 metres in height, wherever possible.								
BR11	Terrestrial ecosystems, Aquatic ecosystems	Removal of natural materials such as rocks, woody debris, fallen timber, organic litter for trail construction negatively impacts ecosystem health.	BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.	Moderate	Almost certain	High	BM01	CEMP / OEMP to include independent auditing of trail construction and operation against environmental objectives and approval conditions. Independent auditor should have power to stop work / use of trails should project be non-compliant. A suitably qualified ecologist/botanist to be present during micro-siting and construction activities in sensitive areas.	Moderate	Almost certain	High
			BM03	CEMP / OEMP will include procedures for flagging of the final trail alignment and demarcating environmental values to be avoided e.g. 'no-go zones' during works. Biodegradable tape will be preferentially used with any other non-biodegradable markers removed from site.				BM05	Minimise use / removal of natural materials such as rocks, woody debris, fallen timber, organic litter during construction, operation and maintenance of trail. Natural materials would not be collected from outside of the trail construction area. Any material removed must be retained on site nearby.			
			BM19	Removal of vegetation will be to the minimum extent required, according to variable trail construction footprint which is a function of slope class. Accidental / excessive clearing will be remediated through assisted regeneration or additional offsets.				BM07	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.			
			BM14	Pre-construction trail micro-siting in accordance with the existing contours, to make the most of the existing terrain and minimise the need for significant excavation or soil disturbance.								

Risk ID	Ecological value(s)	Risk pathway	Mitigation measure ID	Mitigation measure	Consequence	Likelihood	Initial risk	Mitigation measure ID	Additional mitigation measures	Consequence	Likelihood	Residual risk
BR12	Terrestrial ecosystems, Aquatic ecosystems	Construction activities, primarily the removal of vegetation, result in edge effects, habitat fragmentation and / or loss of connectivity, negatively impacting ecosystem health e.g. breaks in vegetation connectivity will create additional movement corridors for pest animals.	BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.	Moderate	Almost certain	High	BM30	Construction and operation phase staff trained as part of site induction to identify pest animals and signs of their presence to inform pest management program e.g. locating traps near feral cat sightings. This data will be recorded in a GIS platform for the project.	Moderate	Almost certain	High
			BM17	Native vegetation allowed / assisted to regenerate within construction footprint to a 30 to 60 centimetre wide tread width.								
			BM19	Removal of vegetation will be to the minimum extent required, according to variable trail construction footprint which is a function of slope class. Accidental / excessive clearing will be remediated through assisted regeneration or additional offsets.								
			BM71	Trail micrositing to avoid existing stands of dense vegetation, particularly mid-storey vegetation between 1 to 5 metres in height, wherever possible.								
			BM67	Native vegetation (trees including mid-storey species) removal is subject to the following constraints: 1) No trees (including mid-storey trees) with DBH > 10 centimetres are to be removed in the National Park (unless condition 3) applies). 2) Within State Forest trees < 20 centimetres DBH in single age stands of Eucalyptus spp. and mid-storey (i.e. regrowth following bushfire) may be removed. 3) Excluding areas of suitable habitat for Leadbeater's Possum, any small dead trees (< 20 centimetres DBH) within 2 metres of the trail may require removal if significant defects are identified. Such trees would be felled and kept nearby as habitat logs (coarse woody debris).								
			BM69	Minimise impacts to trees through micrositing and adequate implementation of sympathetic mitigation measures outlined in Treelogic (2021).								
			BM72	All large hollow-bearing canopy trees (dead and alive) are to be retained with no substantial works encroachment that would compromise the health and viability of such trees.								
			BM20	Project will work with relevant land managers to support existing pest animal programs. Support will be provided for the entire life of the project i.e. as long as the trails remain in use.								
			BM21	Project will include environmental enhancement works such as species monitoring programs and installation of nesting boxes for significant fauna.								
			BM22	A comprehensive weed management program would be implemented along and in the immediate vicinity of trails. The program would be developed in consultation with land managers and would continue for as long as the trails remain in use.								
BM31	All waterway crossings are to be elevated by installing small bridges on raised pedestals either side of the waterway. All other watercourse crossings will involve bridges, boardwalks or rock armouring where deemed appropriate as per GHD (2021). These structures will ensure that any water and sediments are absorbed along the trail edge and not draining into the watercourse.											

Risk ID	Ecological value(s)	Risk pathway	Mitigation measure ID	Mitigation measure	Consequence	Likelihood	Initial risk	Mitigation measure ID	Additional mitigation measures	Consequence	Likelihood	Residual risk
BR13	Terrestrial ecosystems, Aquatic ecosystems	Unintentional damage to trees during construction e.g. during excavation causes decline and / or death of tree negatively impacting ecosystem health.	BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.	Moderate	Unlikely	Medium	BM01	CEMP / OEMP to include independent auditing of trail construction and operation against environmental objectives and approval conditions. Independent auditor should have power to stop work / use of trails should project be non-compliant. A suitably qualified ecologist/botanist to be present during micro-siting and construction activities in sensitive areas.	Moderate	Rare	Low
			BM03	CEMP / OEMP will include procedures for flagging of the final trail alignment and demarcating environmental values to be avoided e.g. 'no-go zones' during works. Biodegradable tape will be preferentially used with any other non-biodegradable markers removed from site.				BM07	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.			
			BM62	No removal of existing habitat trees unless deemed hazardous in which case treatment of these trees would be discussed with land manager, arborist & ecologist e.g. habitat pruning of tree. Any hazardous tree considered for removal will be assumed to be a habitat tree unless deemed otherwise.				BM68	Construction and operation phase staff trained as part of site induction in tree protection methods, SRZ and root protection methods and identification of hazardous trees.			
			BM69	Minimise impacts to trees through micrositing and adequate implementation of sympathetic mitigation measures outlined in Treelogic (2021).				BM70	CEMP / OEMP to include procedure to capture relevant data where direct tree impacts are possible, where tree root protection is required, or where hazardous tree removal or excessive pruning is required.			
BR14	Aquatic ecosystems	Inappropriate and / or unnecessary watercourse crossings causing unnecessary damage to aquatic ecosystem. This includes poor construction and / or failure of structures across watercourses.	BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.	Moderate	Unlikely	Medium	BM01	CEMP / OEMP to include independent auditing of trail construction and operation against environmental objectives and approval conditions. Independent auditor should have power to stop work / use of trails should project be non-compliant. A suitably qualified ecologist/botanist to be present during micro-siting and construction activities in sensitive areas.	Moderate	Rare	Low
			BM03	CEMP / OEMP will include procedures for flagging of the final trail alignment and demarcating environmental values to be avoided e.g. 'no-go zones' during works. Biodegradable tape will be preferentially used with any other non-biodegradable markers removed from site.				BM33	Construction of all watercourse crossings, whether permanent waterways or intermittent, must follow Melbourne Water requirements for works on waterways & crossings and is to be supervised and certified by a suitably qualified person.			
			BM31	All waterway crossings are to be elevated by installing small bridges on raised pedestals either side of the waterway. All other watercourse crossings will involve bridges, boardwalks or rock armouring where deemed appropriate as per GHD (2021). These structures will ensure that any water and sediments are absorbed along the trail edge and not draining into the watercourse.				BM35	All watercourses are designated no-go zones during construction and operations unless works are required directly in / adjacent to watercourse.			
			BM32	Trail micrositing to identify narrowest practicable crossing location where watercourse crossing required as per SWM01 (GHD 2021).				BM37	Works in proximity to watercourses should not occur during wet months (e.g. June – September) unless conditions are such that land degradation and surface water management problems can be avoided or appropriate mitigation measures implemented. Where practicable, all watercourse crossings should be constructed during no or low flow conditions.			
			BM36	No instream works within Yarra River to minimise disturbance and alterations to existing conditions.				BM50	Construction and operation phase staff trained as part of site induction to identify GDEs, seeps / springs and associated vegetation communities / species.			
			BM38	Micrositing to avoid areas of wet or boggy ground, including areas where vegetation changes suggest such conditions may be present (i.e. thickets, sedges, rushes, mosses etc.)								
			BM39	Where wet or boggy ground is present and unavoidable, use suitable rock armouring to harden and reinforce the trail or elevate trail using boardwalk or another appropriate engineered/design solution.								

Risk ID	Ecological value(s)	Risk pathway	Mitigation measure ID	Mitigation measure	Consequence	Likelihood	Initial risk	Mitigation measure ID	Additional mitigation measures	Consequence	Likelihood	Residual risk
BR15	Cool Temperate Rainforest (CTR) / Cool Temperate Mixed Forest (CTMF)	Construction activities reduce extent and / or quality of CTR / CTMF. This includes the potential for infection of Myrtle Beech with Myrtle Wilt.	BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.	Major	Almost certain	Very High	BM01	CEMP / OEMP to include independent auditing of trail construction and operation against environmental objectives and approval conditions. Independent auditor should have power to stop work / use of trails should project be non-compliant. A suitably qualified ecologist/botanist to be present during micro-siting and construction activities in sensitive areas.	Major	Almost certain	Very High
			BM03	CEMP / OEMP will include procedures for flagging of the final trail alignment and demarcating environmental values to be avoided e.g. 'no-go zones' during works. Biodegradable tape will be preferentially used with any other non-biodegradable markers removed from site.				BM07	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.			
			BM02	All trail alignments and all known site-specific environmental issues will be incorporated into the WorldTrail GIS platform which will be accessible by construction crew on site at all times.				BM25	CEMP / OEMP to include appropriate hygiene procedures for weeds / pathogens throughout the trail alignment.			
			BM17	Native vegetation allowed / assisted to regenerate within construction footprint to a 30 to 60 centimetre wide tread width.				BM26	Construction and operation phase staff trained as part of site induction to identify signs of plant pathogens e.g. Myrtle Wilt, understand conditions that can cause spread and to implement procedures minimise risk of spread.			
			BM19	Removal of vegetation will be to the minimum extent required, according to variable trail construction footprint which is a function of slope class. Accidental / excessive clearing will be remediated through assisted regeneration or additional offsets.				BM27	CEMP / OEMP to include commissioning & maintenance schedule and procedures for bike washing facilities as per SWM14 (GHD 2021). These facilities will be maintained for the entire life of the project i.e. as long as the trails remain in use.			
			BM24	Avoid disturbance to the ground surface in areas known to contain invasive weeds and pathogens (including Myrtle Wilt) wherever possible. In high risk areas a suitably qualified ecologist will accompany trail crew to identify weed species and key areas to avoid. High risk areas will be mapped prior to construction.				BM45	Construction and operation phase staff trained as part of site induction to identify Myrtle Beech, CTR and CTMF.			
			BM40	Trail micro-siting in consultation with a suitably qualified ecologist to avoid and where possible/ minimise final trail alignment through CTR / CTMF and avoid areas showing signs of Myrtle Wilt.								
			BM41	Micro-siting to avoid areas showing signs of Myrtle Wilt as per micro-siting protocol outlined in CEMP.								
			BM42	Where areas containing Myrtle Beech cannot be avoided, minimise disturbance within the drip line of all Myrtle Beech trees using a design/engineered solution.								
			BM43	Where pruning or wounding of Myrtle Beech trees and / or roots is likely to occur trail crews will be trained in pruning methods and application of anti-fungal agents to prevent the spread of Myrtle Wilt.								
			BM44	No imported fill material (including gravel, rock and soil) is to be used within CTR / CTMF.								
			BM46	No machinery excavation is to be undertaken within CTR / CTMF. Where soils are damp and boggy, trail must be elevated using boardwalk or another appropriate engineered/design solution.								
			BM47	Trail construction and maintenance is to be undertaken using hand tools only within CTR / CTMF.								
			BM48	Micro-site to avoid the drip line of Myrtle Beech including scattered individuals outside of mapped CTR / CTMF.								



Risk ID	Ecological value(s)	Risk pathway	Mitigation measure ID	Mitigation measure	Consequence	Likelihood	Initial risk	Mitigation measure ID	Additional mitigation measures	Consequence	Likelihood	Residual risk
BR16	Groundwater dependent ecosystems (GDEs)	Construction activities cause disruption to natural groundwater flow pathways which negatively impact ecosystem health.	BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.	Moderate	Rare	Low	BM01	CEMP / OEMP to include independent auditing of trail construction and operation against environmental objectives and approval conditions. Independent auditor should have power to stop work / use of trails should project be non-compliant. A suitably qualified ecologist/botanist to be present during micro-siting and construction activities in sensitive areas.	Moderate	Rare	Low
			BM02	All trail alignments and all known site-specific environmental issues will be incorporated into the WorldTrail GIS platform which will be accessible by construction crew on site at all times.				BM07	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.			
			BM03	CEMP / OEMP will include procedures for flagging of the final trail alignment and demarcating environmental values to be avoided e.g. 'no-go zones' during works. Biodegradable tape will be preferentially used with any other non-biodegradable markers removed from site.				BM16	Develop and integrate a procedure to document and deal with finds into the CEMP / OEMP. Procedure will encompass: 1) Significant flora observations, 2) Significant fauna observations, 3) Discovery of nests / burrows / roosts used by native fauna, 4) Dealing with injured / killed / displaced / trapped fauna, 5) Works that encounter GDEs, seeps / springs and associated vegetation communities / species. Observations of the above will be entered into the WorldTrail GIS platform and records of significant flora, significant fauna and threatened ecological communities will be periodically uploaded to the VBA.  Where there is potential for harm of threatened species, works will be stopped until the risk of harm has been removed.			
			BM09	Adequately manage all construction and operation activities to maintain landform stability and avoid / minimise landslips and erosion and sedimentation. This includes: - Seasonal closure of selected trails, - Incorporate management measures outlined in GHD (2021) e.g. GTM01, GTM02 & GMT03, - Rock armoured surfaces to be constructed on steep gradients to minimise erosion as per GTR03 (GHD 2021), - Rock walls and / or retaining walls constructed from local rock from constructed areas where possible to stabilise steep slopes and batters (rock is not to be collected from surrounding areas), - If a retaining wall is required in a remote location, it would be brought in by helicopter to avoid surface impacts beyond the trail impact area, - Remediation of areas where landslips and / or erosion and sedimentation occur as a result of the trail.				BM50	Construction and operation phase staff trained as part of site induction to identify GDEs, seeps / springs and associated vegetation communities / species.			
			BM14	Pre-construction trail micro-siting in accordance with the existing contours, to make the most of the existing terrain and minimise the need for significant excavation or soil disturbance.								
			BM38	Micrositing to avoid areas of wet or boggy ground, including areas where vegetation changes suggest such conditions may be present (i.e. thickets, sedges, rushes, mosses etc.)								
			BM39	Where wet or boggy ground is present and unavoidable, use suitable rock armouring to harden and reinforce the trail or elevate trail using boardwalk or another appropriate engineered/design solution.								
			BM49	Implement measures outlined in GWM01 to manage potential impacts to GDEs / seeps / springs (GHD 2021).								
			BM06	Implement standard CEMP / OEMP controls for chemicals (inc. fungicides), fuel and waste management including procedures for spill containment and clean-up as per SWM10 (GHD 2021).								

Risk ID	Ecological value(s)	Risk pathway	Mitigation measure ID	Mitigation measure	Consequence	Likelihood	Initial risk	Mitigation measure ID	Additional mitigation measures	Consequence	Likelihood	Residual risk
BR17	Leadbeater's Possum (LBP)	Removal of, and / or degradation to, known or suitable high quality LBP habitat (i.e. dense montane thickets or wet forest areas with high levels of sub-canopy connectivity) during construction phase which negatively impacts current population and / or future viability of the species.	BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.	Moderate	Unlikely	Medium	BM01	CEMP / OEMP to include independent auditing of trail construction and operation against environmental objectives and approval conditions. Independent auditor should have power to stop work / use of trails should project be non-compliant. A suitably qualified ecologist/botanist to be present during micro-siting and construction activities in sensitive areas.	Moderate	Unlikely	Medium
			BM03	CEMP / OEMP will include procedures for flagging of the final trail alignment and demarcating environmental values to be avoided e.g. 'no-go zones' during works. Biodegradable tape will be preferentially used with any other non-biodegradable markers removed from site.				BM07	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.			
			BM02	All trail alignments and all known site-specific environmental issues will be incorporated into the WorldTrail GIS platform which will be accessible by construction crew on site at all times.				BM16	Develop and integrate a procedure to document and deal with finds into the CEMP / OEMP. Procedure will encompass: 1) Significant flora observations, 2) Significant fauna observations, 3) Discovery of nests / burrows / roosts used by native fauna, 4) Dealing with injured / killed / displaced / trapped fauna, 5) Works that encounter GDEs, seeps / springs and associated vegetation communities / species. Observations of the above will be entered into the WorldTrail GIS platform and records of significant flora, significant fauna and threatened ecological communities will be periodically uploaded to the VBA.  Where there is potential for harm of threatened species, works will be stopped until the risk of harm has been removed.			
			BM19	Removal of vegetation will be to the minimum extent required, according to variable trail construction footprint which is a function of slope class. Accidental / excessive clearing will be remediated through assisted regeneration or additional offsets.				BM51	Construction and operation phase staff trained as part of site induction to identify high quality LBP habitat indicators. Training will include distribution of fact sheets including notes and photos.			
			BM17	Native vegetation allowed / assisted to regenerate within construction footprint to a 30 to 60 centimetre wide tread width.				BM73	No construction activities at night. No use of trail infrastructure in the National Park at night. Night riding allowed for selected trails within State Park.			
			BM21	Project will include environmental enhancement works such as species monitoring programs and installation of nesting boxes for significant fauna.				BM76	CEMP / OEMP to include procedure for fauna entrapment. Any structures that could trap fauna must be covered, checked and an egress point provided.			
			BM53	Supervision and guidance by a suitably qualified ecologist will be provided during the construction phase within LBP habitat and potential habitat to identify any additional potential LBP habitat and assist with micro-siting.				BM77	Management of potential impacts from noise, vibrations and air quality as outlined in NM01 to NM06 in AECOM (2021a) and AM01 to AM07 AECOM (2021b). In addition to these measures, project activities should minimise amount of equipment / machinery in use at any one time to reduce intensity of noise, vibrations and / or reduced air quality.			
			BM52	Removal of vegetation within suitable Leadbeater's Possum habitat will be subject to the following constraints: 1) In the National Park no removal of trees, including mid-storey trees, with > 10 cm DBH, 2) In State Forest where there is a stand of single age Eucalyptus sp. and mid-storey (i.e. regrowth following bushfire), trees < 20 cm DBH may be removed, 3) No removal of dense stands of montane thickets (comprising Bottlebrush Callistemon spp. and / or Tea-tree Leptospermum spp.) anywhere in the project area. Minor pruning of these species may occur at the edges of these thickets.								

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BR18	Mt Donna-Buang Wingless Stonefly (MDBWS)	Construction activities in proximity to suitable habitat for MDBWS cause ground disturbance, sedimentation, water pollution, obstructions in waterways, changes in light levels and / or soil compaction which negatively impacts current population(s) and / or future viability of these species.	BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.	Moderate	Unlikely	Medium	BM01	CEMP / OEMP to include independent auditing of trail construction and operation against environmental objectives and approval conditions. Independent auditor should have power to stop work / use of trails should project be non-compliant. A suitably qualified ecologist/botanist to be present during micro-siting and construction activities in sensitive areas.	Moderate	Unlikely	Medium
			BM03	CEMP / OEMP will include procedures for flagging of the final trail alignment and demarcating environmental values to be avoided e.g. 'no-go zones' during works. Biodegradable tape will be preferentially used with any other non-biodegradable markers removed from site.				BM07	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.			
			BM02	All trail alignments and all known site-specific environmental issues will be incorporated into the WorldTrail GIS platform which will be accessible by construction crew on site at all times.				BM33	Construction of all watercourse crossings, whether permanent waterways or intermittent, must follow Melbourne Water requirements for works on waterways & crossings and is to be supervised and certified by a suitably qualified person.			
			BM06	Implement standard CEMP / OEMP controls for chemicals (inc. fungicides), fuel and waste management including procedures for spill containment and clean-up as per SWM10 (GHD 2021).				BM35	All watercourses are designated no-go zones during construction and operations unless works are required directly in / adjacent to watercourse.			
			BM09	Adequately manage all construction and operation activities to maintain landform stability and avoid / minimise landslips and erosion and sedimentation. This includes: - Seasonal closure of selected trails, - Incorporate management measures outlined in GHD (2021) e.g. GTM01, GTM02 & GMT03, - Rock armoured surfaces to be constructed on steep gradients to minimise erosion as per GTR03 (GHD 2021), - Rock walls and / or retaining walls constructed from local rock from constructed areas where possible to stabilise steep slopes and batters (rock is not to be collected from surrounding areas), - If a retaining wall is required in a remote location, it would be brought in by helicopter to avoid surface impacts beyond the trail impact area, - Remediation of areas where landslips and / or erosion and sedimentation occur as a result of the trail.				BM37	Works in proximity to watercourses should not occur during wet months (e.g. June – September) unless conditions are such that land degradation and surface water management problems can be avoided or appropriate mitigation measures implemented. Where practicable, all watercourse crossings should be constructed during no or low flow conditions.			
			BM14	Pre-construction trail micro-siting in accordance with the existing contours, to make the most of the existing terrain and minimise the need for significant excavation or soil disturbance.				BM61	Construction and operation phase staff trained as part of site induction to identify MDBWS habitat indicators. Training will include distribution of fact sheets including notes and photos.			
			BM15	Regular trail inspections undertaken to identify any problems or changes to the trails that need to be repaired. This includes after extreme weather events. Details to be outlined in the CEMP / OEMP.								
			BM18	OEMP will include monitoring for any off-trail tracks and process for closing unauthorised trails and assisted regeneration.								
			BM19	Removal of vegetation will be to the minimum extent required, according to variable trail construction footprint which is a function of slope class. Accidental / excessive clearing will be remediated through assisted regeneration or additional offsets.								
			BM31	All waterway crossings are to be elevated by installing small bridges on raised pedestals either side of the waterway. All other watercourse crossings will involve bridges, boardwalks or rock armouring where deemed appropriate as per GHD (2021). These structures will ensure that any water and sediments are absorbed along the trail edge and not draining into the watercourse.								
BM32	Trail micro-siting to identify narrowest practicable crossing location where watercourse crossing required as per SWM01 (GHD 2021).											



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BR19	Mt Donna-Buang Wingless Stonefly (MDBWS)	Infection of Myrtle Beech by Myrtle Wilt from construction activities negatively impacts on current population and / or future viability of the species. Areas with a Myrtle Beech understorey are favoured by the species (DSE 2003).	BM24	Avoid disturbance to the ground surface in areas known to contain invasive weeds and pathogens (including Myrtle Wilt) wherever possible. In high risk areas a suitably qualified ecologist will accompany trail crew to identify weed species and key areas to avoid. High risk areas will be mapped prior to construction.	Moderate	Unlikely	Medium	BM07	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.	Moderate	Unlikely	Medium
			BM03	CEMP / OEMP will include procedures for flagging of the final trail alignment and demarcating environmental values to be avoided e.g. 'no-go zones' during works. Biodegradable tape will be preferentially used with any other non-biodegradable markers removed from site.				BM25	CEMP / OEMP to include appropriate hygiene procedures for weeds / pathogens throughout the trail alignment.			
			BM02	All trail alignments and all known site-specific environmental issues will be incorporated into the WorldTrail GIS platform which will be accessible by construction crew on site at all times.				BM26	Construction and operation phase staff trained as part of site induction to identify signs of plant pathogens e.g. Myrtle Wilt, understand conditions that can cause spread and to implement procedures minimise risk of spread.			
			BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.				BM45	Construction and operation phase staff trained as part of site induction to identify Myrtle Beech, CTR and CTMF.			
			BM41	Micro-siting to avoid areas showing signs of Myrtle Wilt as per micrositing protocol outlined in CEMP.				BM61	Construction and operation phase staff trained as part of site induction to identify MDBWS habitat indicators. Training will include distribution of fact sheets including notes and photos.			
			BM42	Where areas containing Myrtle Beech cannot be avoided, minimise disturbance within the drip line of all Myrtle Beech trees using a design/engineered solution.								
			BM43	Where pruning or wounding of Myrtle Beech trees and / or roots is likely to occur trail crews will be trained in pruning methods and application of anti-fungal agents to prevent the spread of Myrtle Wilt.								
			BM48	Micro-site to avoid the drip line of Myrtle Beech including scattered individuals outside of mapped CTR / CTMF.								

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BR20	Other significant aquatic fauna	Construction activities in proximity to suitable habitat for other significant aquatic fauna negatively impacts current population(s) and / or future viability of these species.	BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.	Moderate	Unlikely	Medium	BM07	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.	Moderate	Unlikely	Medium
			BM03	CEMP / OEMP will include procedures for flagging of the final trail alignment and demarcating environmental values to be avoided e.g. 'no-go zones' during works. Biodegradable tape will be preferentially used with any other non-biodegradable markers removed from site.				BM01	CEMP / OEMP to include independent auditing of trail construction and operation against environmental objectives and approval conditions. Independent auditor should have power to stop work / use of trails should project be non-compliant. A suitably qualified ecologist/botanist to be present during micro-siting and construction activities in sensitive areas.			
			BM02	All trail alignments and all known site-specific environmental issues will be incorporated into the WorldTrail GIS platform which will be accessible by construction crew on site at all times.				BM16	Develop and integrate a procedure to document and deal with finds into the CEMP / OEMP. Procedure will encompass: 1) Significant flora observations, 2) Significant fauna observations, 3) Discovery of nests / burrows / roosts used by native fauna, 4) Dealing with injured / killed / displaced / trapped fauna, 5) Works that encounter GDEs, seeps / springs and associated vegetation communities / species. Observations of the above will be entered into the WorldTrail GIS platform and records of significant flora, significant fauna and threatened ecological communities will be periodically uploaded to the VBA.  Where there is potential for harm of threatened species, works will be stopped until the risk of harm has been removed.			
			BM06	Implement standard CEMP / OEMP controls for chemicals (inc. fungicides), fuel and waste management including procedures for spill containment and clean-up as per SWM10 (GHD 2021).				BM33	Construction of all watercourse crossings, whether permanent waterways or intermittent, must follow Melbourne Water requirements for works on waterways & crossings and is to be supervised and certified by a suitably qualified person.			
			BM09	Adequately manage all construction and operation activities to maintain landform stability and avoid / minimise landslips and erosion and sedimentation. This includes: - Seasonal closure of selected trails, - Incorporate management measures outlined in GHD (2021) e.g. GTM01, GTM02 & GMT03, - Rock armoured surfaces to be constructed on steep gradients to minimise erosion as per GTR03 (GHD 2021), - Rock walls and / or retaining walls constructed from local rock from constructed areas where possible to stabilise steep slopes and batters (rock is not to be collected from surrounding areas), - If a retaining wall is required in a remote location, it would be brought in by helicopter to avoid surface impacts beyond the trail impact area, - Remediation of areas where landslips and / or erosion and sedimentation occur as a result of the trail.				BM35	All watercourses are designated no-go zones during construction and operations unless works are required directly in / adjacent to watercourse.			
			BM11	Existing vehicle roads and tracks e.g. Cemetery Track to be incorporated into the trail network. Upgrades associated with incorporating these tracks will reduce existing erosion and sedimentation issues.				BM37	Works in proximity to watercourses should not occur during wet months (e.g. June – September) unless conditions are such that land degradation and surface water management problems can be avoided or appropriate mitigation measures implemented. Where practicable, all watercourse crossings should be constructed during no or low flow conditions.			
			BM12	Existing mountain bike trails in vicinity of Mount Tugwell will be incorporated into the trail network. Upgrades associated with incorporating these trails will reduce existing erosion and sedimentation issues.				BM50	Construction and operation phase staff trained as part of site induction to identify GDEs, seeps / springs and associated vegetation communities / species.			
			BM31	All waterway crossings are to be elevated by installing small bridges on raised pedestals either side of the waterway. All other watercourse crossings will involve bridges, boardwalks or rock armouring where deemed appropriate as per GHD (2021). These structures will ensure that any water and sediments are absorbed along the trail edge and not draining into the watercourse.				BM75	Construction or maintenance activities, particularly in proximity to the Yarra River or sensitive areas within Yarra Ranges National Park, to use slow-start construction measures to enable both aquatic and terrestrial fauna time to disperse.			
			BM32	Trail micro-siting to identify narrowest practicable crossing location where watercourse crossing required as per SWM01 (GHD 2021).				BM76	CEMP / OEMP to include procedure for fauna entrapment. Any structures that could trap fauna must be covered, checked and an egress point provided.			





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BR21	Other significant canopy dwelling fauna	Removal of, and / or degradation to, habitat for other significant canopy dwelling fauna during construction phase negatively impacts on current population(s) and / or future viability of these species.	BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.			Medium	BM01	CEMP / OEMP to include independent auditing of trail construction and operation against environmental objectives and approval conditions. Independent auditor should have power to stop work / use of trails should project be non-compliant. A suitably qualified ecologist/botanist to be present during micro-siting and construction activities in sensitive areas.			Low
			BM03	CEMP / OEMP will include procedures for flagging of the final trail alignment and demarcating environmental values to be avoided e.g. 'no-go zones' during works. Biodegradable tape will be preferentially used with any other non-biodegradable markers removed from site.				BM07	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.			
			BM02	All trail alignments and all known site-specific environmental issues will be incorporated into the WorldTrail GIS platform which will be accessible by construction crew on site at all times.				BM16	Develop and integrate a procedure to document and deal with finds into the CEMP / OEMP. Procedure will encompass: 1) Significant flora observations, 2) Significant fauna observations, 3) Discovery of nests / burrows / roosts used by native fauna, 4) Dealing with injured / killed / displaced / trapped fauna, 5) Works that encounter GDEs, seeps / springs and associated vegetation communities / species. Observations of the above will be entered into the WorldTrail GIS platform and records of significant flora, significant fauna and threatened ecological communities will be periodically uploaded to the VBA.  Where there is potential for harm of threatened species, works will be stopped until the risk of harm has been removed.			
			BM21	Project will include environmental enhancement works such as species monitoring programs and installation of nesting boxes for significant fauna.				BM68	Construction and operation phase staff trained as part of site induction in tree protection methods, SRZ and root protection methods and identification of hazardous trees.			
			BM62	No removal of existing habitat trees unless deemed hazardous in which case treatment of these trees would be discussed with land manager, arborist & ecologist e.g. habitat pruning of tree. Any hazardous tree considered for removal will be assumed to be a habitat tree unless deemed otherwise.				BM70	CEMP / OEMP to include procedure to capture relevant data where direct tree impacts are possible, where tree root protection is required, or where hazardous tree removal or excessive pruning is required.			
			BM67	Native vegetation (trees including mid-storey species) removal is subject to the following constraints: 1) No trees (including mid-storey trees) with DBH > 10 centimetres are to be removed in the National Park (unless condition 3) applies). 2) Within State Forest trees < 20 centimetres DBH in single age stands of Eucalyptus spp. and mid-storey (i.e. regrowth following bushfire) may be removed. 3) Excluding areas of suitable habitat for Leadbeater's Possum, any small dead trees (< 20 centimetres DBH) within 2 metres of the trail may require removal if significant defects are identified. Such trees would be felled and kept nearby as habitat logs (coarse woody debris).				BM76	CEMP / OEMP to include procedure for fauna entrapment. Any structures that could trap fauna must be covered, checked and an egress point provided.			

Risk ID	Ecological value(s)	Risk pathway	Mitigation measure ID	Mitigation measure	Consequence	Likelihood	Initial risk	Mitigation measure ID	Additional mitigation measures	Consequence	Likelihood	Residual risk
			<b>BM69</b>	Minimise impacts to trees through micrositing and adequate implementation of sympathetic mitigation measures outlined in Treelogic (2021).				<b>BM78</b>	Construction and operation phase staff trained as part of site induction to identify signs of native fauna habitation including, but not limited to: 1) Lyrebird display mounds, 2) Roosting or nesting sites for forest owls, 3) Platypus burrows, 4) Habitat indicators for Curve-tail Burrowing Crayfish and Tubercle Burrowing Crayfish, 5) Burrows used by ground-dwelling fauna e.g. wombats. Training will include distribution of fact sheets including notes and photos.			
			<b>BM71</b>	Trail micrositing to avoid existing stands of dense vegetation, particularly mid-storey vegetation between 1 to 5 metres in height, wherever possible.								
			<b>BM72</b>	All large hollow-bearing canopy trees (dead and alive) are to be retained with no substantial works encroachment that would compromise the health and viability of such trees.								
			<b>BM74</b>	Where appropriate and where high risk areas are identified, under the supervision of a qualified ecologist, microsite final trail alignment to avoid, minimise and appropriately buffer any burrows / nests / roosting sites for native fauna identified during construction activities. This includes, but is not limited to: 1) Lyrebird display mounds, 2) Forest owl nesting or roosting sites, 3) Platypus burrows, 4) Curve-tail Burrowing Crayfish and Tubercle Burrowing Crayfish burrows, 5) Ground-dwelling native fauna burrows e.g. wombat, 6) Rocky outcrops with cracks and crevices, 7) Research sites e.g. LBP monitoring plots. Any burrows / nests / roosting sites for native fauna will be mapped to WorldTrail GIS platform as per finds procedure outlined in BM16.								

Risk ID	Ecological value(s)	Risk pathway	Mitigation measure ID	Mitigation measure	Consequence	Likelihood	Initial risk	Mitigation measure ID	Additional mitigation measures	Consequence	Likelihood	Residual risk
BR22	Significant ground dwelling fauna	Removal of, and / or degradation to, habitat for other significant ground dwelling fauna during construction phase negatively impacts on current population(s) and / or future viability of these species.	BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.				BM01	CEMP / OEMP to include independent auditing of trail construction and operation against environmental objectives and approval conditions. Independent auditor should have power to stop work / use of trails should project be non-compliant. A suitably qualified ecologist/botanist to be present during micro-siting and construction activities in sensitive areas.			
			BM03	CEMP / OEMP will include procedures for flagging of the final trail alignment and demarcating environmental values to be avoided e.g. 'no-go zones' during works. Biodegradable tape will be preferentially used with any other non-biodegradable markers removed from site.				BM07	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.			
			BM02	All trail alignments and all known site-specific environmental issues will be incorporated into the WorldTrail GIS platform which will be accessible by construction crew on site at all times.				BM16	Develop and integrate a procedure to document and deal with finds into the CEMP / OEMP. Procedure will encompass: 1) Significant flora observations, 2) Significant fauna observations, 3) Discovery of nests / burrows / roosts used by native fauna, 4) Dealing with injured / killed / displaced / trapped fauna, 5) Works that encounter GDEs, seeps / springs and associated vegetation communities / species. Observations of the above will be entered into the WorldTrail GIS platform and records of significant flora, significant fauna and threatened ecological communities will be periodically uploaded to the VBA.			
			BM21	Project will include environmental enhancement works such as species monitoring programs and installation of nesting boxes for significant fauna.				BM76	CEMP / OEMP to include procedure for fauna entrapment. Any structures that could trap fauna must be covered, checked and an egress point provided.			
			BM17	Native vegetation allowed / assisted to regenerate within construction footprint to a 30 to 60 centimetre wide tread width.				BM05	Minimise use / removal of natural materials such as rocks, woody debris, fallen timber, organic litter during construction, operation and maintenance of trail. Natural materials would not be collected from outside of the trail construction area. Any material removed must be retained on site nearby.			
			BM19	Removal of vegetation will be to the minimum extent required, according to variable trail construction footprint which is a function of slope class. Accidental / excessive clearing will be remediated through assisted regeneration or additional offsets.	Moderate	Unlikely	Medium	BM78	Construction and operation phase staff trained as part of site induction to identify signs of native fauna habitation including, but not limited to: 1) Lyrebird display mounds, 2) Roosting or nesting sites for forest owls, 3) Platypus burrows, 4) Habitat indicators for Curve-tail Burrowing Crayfish and Tubercle Burrowing Crayfish, 5) Burrows used by ground-dwelling fauna e.g. wombats. Training will include distribution of fact sheets including notes and photos.	Moderate	Rare	Low



Risk ID	Ecological value(s)	Risk pathway	Mitigation measure ID	Mitigation measure	Consequence	Likelihood	Initial risk	Mitigation measure ID	Additional mitigation measures	Consequence	Likelihood	Residual risk
BR23	Significant flora	Construction activities, primarily the removal of native vegetation, resulting in negative impacts on current population(s) and / or future viability of these species via: - Direct loss of significant flora, and / or - Direct loss of, and / or degradation to, habitat for significant flora.	BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.				BM07	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.			
			BM03	CEMP / OEMP will include procedures for flagging of the final trail alignment and demarcating environmental values to be avoided e.g. 'no-go zones' during works. Biodegradable tape will be preferentially used with any other non-biodegradable markers removed from site.				BM01	CEMP / OEMP to include independent auditing of trail construction and operation against environmental objectives and approval conditions. Independent auditor should have power to stop work / use of trails should project be non-compliant. A suitably qualified ecologist/botanist to be present during micro-siting and construction activities in sensitive areas.			
			BM02	All trail alignments and all known site-specific environmental issues will be incorporated into the WorldTrail GIS platform which will be accessible by construction crew on site at all times.				BM05	Minimise use / removal of natural materials such as rocks, woody debris, fallen timber, organic litter during construction, operation and maintenance of trail. Natural materials would not be collected from outside of the trail construction area. Any material removed must be retained on site nearby. Develop and integrate a procedure to document and deal with finds into the CEMP / OEMP. Procedure will encompass: 1) Significant flora observations, 2) Significant fauna observations, 3) Discovery of nests / burrows / roosts used by native fauna, 4) Dealing with injured / killed / displaced / trapped fauna, 5) Works that encounter GDEs, seeps / springs and associated vegetation communities / species. Observations of the above will be entered into the WorldTrail GIS platform and records of significant flora, significant fauna and threatened ecological communities will be periodically uploaded to the VBA.  Where there is potential for harm of threatened species, works will be stopped until the risk of harm has been removed.			
			BM17	Native vegetation allowed / assisted to regenerate within construction footprint to a 30 to 60 centimetre wide tread width.				BM16	Observations of the above will be entered into the WorldTrail GIS platform and records of significant flora, significant fauna and threatened ecological communities will be periodically uploaded to the VBA.  Where there is potential for harm of threatened species, works will be stopped until the risk of harm has been removed.			
			BM18	OEMP will include monitoring for any off-trail tracks and process for closing unauthorised trails and assisted regeneration.				BM23	Construction and operation phase staff trained as part of site induction to identify high threat environmental weeds within the project area and to implement procedures to minimise risk of spread. Training will include distribution of fact sheets, Yarra Ranges Weed ID guide and CaLP Act obligations.			
			BM19	Removal of vegetation will be to the minimum extent required, according to variable trail construction footprint which is a function of slope class. Accidental / excessive clearing will be remediated through assisted regeneration or additional offsets.				BM25	CEMP / OEMP to include appropriate hygiene procedures for weeds / pathogens throughout the trail alignment.			
			BM20	Project will work with relevant land managers to support existing pest animal programs. Support will be provided for the entire life of the project i.e. as long as the trails remain in use.				BM26	Construction and operation phase staff trained as part of site induction to identify signs of plant pathogens e.g. Myrtle Wilt, understand conditions that can cause spread and to implement procedures minimise risk of spread.			
			BM22	A comprehensive weed management program would be implemented along and in the immediate vicinity of trails. The program would be developed in consultation with land managers and would continue for as long as the trails remain in use.				BM63	CEMP / OEMP to include procedures for minimal disturbance to suitable habitat for epiphytic / lithophytic species e.g. avoid use of boulders covered with bryophytes and / or ferns.			





Risk ID	Ecological value(s)	Risk pathway	Mitigation measure ID	Mitigation measure	Consequence	Likelihood	Initial risk	Mitigation measure ID	Additional mitigation measures	Consequence	Likelihood	Residual risk
BR24	Terrestrial fauna	Breaks in vegetation connectivity at any strata layer from construction activities will negatively impact movement corridors of native fauna that rely on heavy vegetation cover to move through the landscape protected from predators thus negatively impacting on current population(s) and / or future viability of these species.	BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.				BM07	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.			
			BM03	CEMP / OEMP will include procedures for flagging of the final trail alignment and demarcating environmental values to be avoided e.g. 'no-go zones' during works. Biodegradable tape will be preferentially used with any other non-biodegradable markers removed from site.				BM05	Minimise use / removal of natural materials such as rocks, woody debris, fallen timber, organic litter during construction, operation and maintenance of trail. Natural materials would not be collected from outside of the trail construction area. Any material removed must be retained on site nearby.			
			BM17	Native vegetation allowed / assisted to regenerate within construction footprint to a 30 to 60 centimetre wide tread width.				BM33	Construction of all watercourse crossings, whether permanent waterways or intermittent, must follow Melbourne Water requirements for works on waterways & crossings and is to be supervised and certified by a suitably qualified person.			
			BM18	OEMP will include monitoring for any off-trail tracks and process for closing unauthorised trails and assisted regeneration.				BM78	Construction and operation phase staff trained as part of site induction to identify signs of native fauna habitation including, but not limited to: 1) Lyrebird display mounds, 2) Roosting or nesting sites for forest owls, 3) Platypus burrows, 4) Habitat indicators for Curve-tail Burrowing Crayfish and Tubercle Burrowing Crayfish, 5) Burrows used by ground-dwelling fauna e.g. wombats. Training will include distribution of fact sheets including notes and photos.			
			BM19	Removal of vegetation will be to the minimum extent required, according to variable trail construction footprint which is a function of slope class. Accidental / excessive clearing will be remediated through assisted regeneration or additional offsets.				BM30	Construction and operation phase staff trained as part of site induction to identify pest animals and signs of their presence to inform pest management program e.g. locating traps near feral cat sightings. This data will be recorded in a GIS platform for the project.			
			BM20	Project will work with relevant land managers to support existing pest animal programs. Support will be provided for the entire life of the project i.e. as long as the trails remain in use.								
			BM21	Project will include environmental enhancement works such as species monitoring programs and installation of nesting boxes for significant fauna.								
			BM31	All waterway crossings are to be elevated by installing small bridges on raised pedestals either side of the waterway. All other watercourse crossings will involve bridges, boardwalks or rock armouring where deemed appropriate as per GHD (2021). These structures will ensure that any water and sediments are absorbed along the trail edge and not draining into the watercourse.								
			BM32	Trail micro-siting to identify narrowest practicable crossing location where watercourse crossing required as per SWM01 (GHD 2021).								
			BM38	Micro-siting to avoid areas of wet or boggy ground, including areas where vegetation changes suggest such conditions may be present (i.e. thickets, sedges, rushes, mosses etc.)								

Risk ID	Ecological value(s)	Risk pathway	Mitigation measure ID	Mitigation measure	Consequence	Likelihood	Initial risk	Mitigation measure ID	Additional mitigation measures	Consequence	Likelihood	Residual risk
			<b>BM62</b>	No removal of existing habitat trees unless deemed hazardous in which case treatment of these trees would be discussed with land manager, arborist & ecologist e.g. habitat pruning of tree. Any hazardous tree considered for removal will be assumed to be a habitat tree unless deemed otherwise.	Moderate	Unlikely	Medium			Moderate	Unlikely	Medium
			<b>BM67</b>	Native vegetation (trees including mid-storey species) removal is subject to the following constraints: 1) No trees (including mid-storey trees) with DBH > 10 centimetres are to be removed in the National Park (unless condition 3) applies). 2) Within State Forest trees < 20 centimetres DBH in single age stands of Eucalyptus spp. and mid-storey (i.e. regrowth following bushfire) may be removed. 3) Excluding areas of suitable habitat for Leadbeater's Possum, any small dead trees (< 20 centimetres DBH) within 2 metres of the trail may require removal if significant defects are identified. Such trees would be felled and kept nearby as habitat logs (coarse woody debris).								
			<b>BM69</b>	Minimise impacts to trees through micrositing and adequate implementation of sympathetic mitigation measures outlined in Treelogic (2021).								



Risk ID	Ecological value(s)	Risk pathway	Mitigation measure ID	Mitigation measure	Consequence	Likelihood	Initial risk	Mitigation measure ID	Additional mitigation measures	Consequence	Likelihood	Residual risk	
BR25	Terrestrial fauna	Breaks in vegetation connectivity creates additional movement corridors for animals that compete with and / or predate native fauna negatively impacting on current population(s) and / or future viability of these species.	BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.			Medium	BM07	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.			Medium	
			BM03	CEMP / OEMP will include procedures for flagging of the final trail alignment and demarcating environmental values to be avoided e.g. 'no-go zones' during works. Biodegradable tape will be preferentially used with any other non-biodegradable markers removed from site.				BM05	Minimise use / removal of natural materials such as rocks, woody debris, fallen timber, organic litter during construction, operation and maintenance of trail. Natural materials would not be collected from outside of the trail construction area. Any material removed must be retained on site nearby.				
			BM17	Native vegetation allowed / assisted to regenerate within construction footprint to a 30 to 60 centimetre wide tread width.				BM33	Construction of all watercourse crossings, whether permanent waterways or intermittent, must follow Melbourne Water requirements for works on waterways & crossings and is to be supervised and certified by a suitably qualified person.				
			BM18	OEMP will include monitoring for any off-trail tracks and process for closing unauthorised trails and assisted regeneration.				BM78	Construction and operation phase staff trained as part of site induction to identify signs of native fauna habitation including, but not limited to: 1) Lyrebird display mounds, 2) Roosting or nesting sites for forest owls, 3) Platypus burrows, 4) Habitat indicators for Curve-tail Burrowing Crayfish and Tubercle Burrowing Crayfish, 5) Burrows used by ground-dwelling fauna e.g. wombats. Training will include distribution of fact sheets including notes and photos.				
			BM19	Removal of vegetation will be to the minimum extent required, according to variable trail construction footprint which is a function of slope class. Accidental / excessive clearing will be remediated through assisted regeneration or additional offsets.									
			BM20	Project will work with relevant land managers to support existing pest animal programs. Support will be provided for the entire life of the project i.e. as long as the trails remain in use.									
			BM21	Project will include environmental enhancement works such as species monitoring programs and installation of nesting boxes for significant fauna.									
			BM31	All waterway crossings are to be elevated by installing small bridges on raised pedestals either side of the waterway. All other watercourse crossings will involve bridges, boardwalks or rock armouring where deemed appropriate as per GHD (2021). These structures will ensure that any water and sediments are absorbed along the trail edge and not draining into the watercourse.									
			BM32	Trail micro-siting to identify narrowest practicable crossing location where watercourse crossing required as per SWM01 (GHD 2021).									
			BM38	Micro-siting to avoid areas of wet or boggy ground, including areas where vegetation changes suggest such conditions may be present (i.e. thickets, sedges, rushes, mosses etc.)									
			BM62	No removal of existing habitat trees unless deemed hazardous in which case treatment of these trees would be discussed with land manager, arborist & ecologist e.g. habitat pruning of tree. Any hazardous tree considered for removal will be assumed to be a habitat tree unless deemed otherwise.	Moderate	Unlikely	Medium				Moderate	Unlikely	Medium





Risk ID	Ecological value(s)	Risk pathway	Mitigation measure ID	Mitigation measure	Consequence	Likelihood	Initial risk	Mitigation measure ID	Additional mitigation measures	Consequence	Likelihood	Residual risk
			<b>BM17</b>	Native vegetation allowed / assisted to regenerate within construction footprint to a 30 to 60 centimetre wide tread width.	Moderate	Unlikely	Medium	<b>BM05</b>	Minimise use / removal of natural materials such as rocks, woody debris, fallen timber, organic litter during construction, operation and maintenance of trail. Natural materials would not be collected from outside of the trail construction area. Any material removed must be retained on site nearby.	Moderate	Rare	Low
			<b>BM18</b>	OEMP will include monitoring for any off-trail tracks and process for closing unauthorised trails and assisted regeneration.				<b>BM76</b>	CEMP / OEMP to include procedure for fauna entrapment. Any structures that could trap fauna must be covered, checked and an egress point provided.			
			<b>BM19</b>	Removal of vegetation will be to the minimum extent required, according to variable trail construction footprint which is a function of slope class. Accidental / excessive clearing will be remediated through assisted regeneration or additional offsets.				<b>BM23</b>	Construction and operation phase staff trained as part of site induction to identify high threat environmental weeds within the project area and to implement procedures to minimise risk of spread. Training will include distribution of fact sheets, Yarra Ranges Weed ID guide and CaLP Act obligations.			
			<b>BM20</b>	Project will work with relevant land managers to support existing pest animal programs. Support will be provided for the entire life of the project i.e. as long as the trails remain in use.				<b>BM25</b>	CEMP / OEMP to include appropriate hygiene procedures for weeds / pathogens throughout the trail alignment.			
			<b>BM22</b>	A comprehensive weed management program would be implemented along and in the immediate vicinity of trails. The program would be developed in consultation with land managers and would continue for as long as the trails remain in use.				<b>BM35</b>	All watercourses are designated no-go zones during construction and operations unless works are required directly in / adjacent to watercourse.			
			<b>BM38</b>	Micrositing to avoid areas of wet or boggy ground, including areas where vegetation changes suggest such conditions may be present (i.e. thickets, sedges, rushes, mosses etc.)				<b>BM30</b>	Construction and operation phase staff trained as part of site induction to identify pest animals and signs of their presence to inform pest management program e.g. locating traps near feral cat sightings. This data will be recorded in a GIS platform for the project.			
			<b>BM62</b>	No removal of existing habitat trees unless deemed hazardous in which case treatment of these trees would be discussed with land manager, arborist & ecologist e.g. habitat pruning of tree. Any hazardous tree considered for removal will be assumed to be a habitat tree unless deemed otherwise.								
			<b>BM67</b>	Native vegetation (trees including mid-storey species) removal is subject to the following constraints: 1) No trees (including mid-storey trees) with DBH > 10 centimetres are to be removed in the National Park (unless condition 3) applies). 2) Within State Forest trees < 20 centimetres DBH in single age stands of Eucalyptus spp. and mid-storey (i.e. regrowth following bushfire) may be removed. 3) Excluding areas of suitable habitat for Leadbeater's Possum, any small dead trees (< 20 centimetres DBH) within 2 metres of the trail may require removal if significant defects are identified. Such trees would be felled and kept nearby as habitat logs (coarse woody debris).								
			<b>BM69</b>	Minimise impacts to trees through micrositing and adequate implementation of sympathetic mitigation measures outlined in Treelogic (2021).								
			<b>BM71</b>	Trail micrositing to avoid existing stands of dense vegetation, particularly mid-storey vegetation between 1 to 5 metres in height, wherever possible.								
			<b>BM72</b>	All large hollow-bearing canopy trees (dead and alive) are to be retained with no substantial works encroachment that would compromise the health and viability of such trees.								







Risk ID	Ecological value(s)	Risk pathway	Mitigation measure ID	Mitigation measure	Consequence	Likelihood	Initial risk	Mitigation measure ID	Additional mitigation measures	Consequence	Likelihood	Residual risk
BR28	Terrestrial ecosystems, Aquatic ecosystems	Introduction and / or spread of environmental weeds / pests / pathogens from operation of trails which negatively impact ecosystem health e.g. nintentional or deliberate damage to Myrtle Beech by trail users allows Myrtle Wilt to spread.	BM02	All trail alignments and all known site-specific environmental issues will be incorporated into the WorldTrail GIS platform which will be accessible by construction crew on site at all times.	Moderate	Possible	Medium	BM01	CEMP / OEMP to include independent auditing of trail construction and operation against environmental objectives and approval conditions. Independent auditor should have power to stop work / use of trails should project be non-compliant. A suitably qualified ecologist/botanist to be present during micro-siting and construction activities in sensitive areas.	Moderate	Unlikely	Medium
			BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.				BM07	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecogocial qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.			
			BM22	A comprehensive weed management program would be implemented along and in the immediate vicinity of trails. The program would be developed in consultation with land managers and would continue for as long as the trails remain in use.				BM23	Construction and operation phase staff trained as part of site induction to identify high threat environmental weeds within the project area and to implement procedures to minimise risk of spread. Training will include distribution of fact sheets, Yarra Ranges Weed ID guide and CaLP Act obligations.			
			BM24	Avoid disturbance to the ground surface in areas known to contain invasive weeds and pathogens (including Myrtle Wilt) wherever possible. In high risk areas a suitably qualified ecologist will accompany trail crew to identify weed species and key areas to avoid. High risk areas will be mapped prior to construction.				BM25	CEMP / OEMP to include appropriate hygiene procedures for weeds / pathogens throughout the trail alignment.			
			BM28	Any fill material introduced to the National Park must be certified clean and be weed and pathogen free and exhibit similar properties to local natural soils e.g. pH, drainage, texture. Any fill material introduced to the State Forest will be undertaken according to DELWP FFM procedures and exhibit similar properties to local natural soils e.g. pH, drainage, texture. Fill areas should be monitored for germination of weeds.				BM26	Construction and operation phase staff trained as part of site induction to identify signs of plant pathogens e.g. Myrtle Wilt, understand conditions that can cause spread and to implement procedures minimise risk of spread.			
			BM29	Minimise the introduction of fill material for the construction and ongoing management of the trail.				BM27	CEMP / OEMP to include commissioning & maintenance schedule and procedures for bike washing facilities as per SWM14 (GHD 2021). These facilities will be maintained for the entire life of the project i.e. as long as the trails remain in use.			
			BM20	Project will work with relevant land managers to support existing pest animal programs. Support will be provided for the entire life of the project i.e. as long as the trails remain in use.				BM30	Construction and operation phase staff trained as part of site induction to identify pest animals and signs of their presence to inform pest management program e.g. locating traps near feral cat sightings. This data will be recorded in a GIS platform for the project.			
			BM10	Full time maintenance workers will maintain the trails to ensure they remain in good condition. Trail maintenance will continue for the entire life of the project i.e. as long as the trails remain in use. Details of the maintenance program outlined in the OEMP.								

Risk ID	Ecological value(s)	Risk pathway	Mitigation measure ID	Mitigation measure	Consequence	Likelihood	Initial risk	Mitigation measure ID	Additional mitigation measures	Consequence	Likelihood	Residual risk
BR29	Terrestrial ecosystems, Aquatic ecosystems	More people and / or machinery in the landscape due to operation activities increases risk of wildfire.	BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.	Moderate	Rare	Low	BM07	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.	Moderate	Rare	Low
			BM08	An Emergency Management Plan will be implemented as part of the CEMP / OEMP. The plan will include measures to manage fire risk from project activities including compliance with any requirements under the Forests Act (Fire Protection Regulations) 2014 for construction and operational activities in Fire Protected Areas.								
			BM13	Trail closure during periods of extreme weather as per SWM15 (GHD 2021) and in accordance with the Emergency Management Plan and any additional directions required under the Forests Act.								
BR30	Terrestrial ecosystems, Aquatic ecosystems	Loss / damage to vegetation outside impact area causing unnecessary damage to ecosystem (e.g. trampling, establishment of unauthorised trail segments).	BM02	All trail alignments and all known site-specific environmental issues will be incorporated into the WorldTrail GIS platform which will be accessible by construction crew on site at all times.	Moderate	Rare	Low	BM01	CEMP / OEMP to include independent auditing of trail construction and operation against environmental objectives and approval conditions. Independent auditor should have power to stop work / use of trails should project be non-compliant. A suitably qualified ecologist/botanist to be present during micro-siting and construction activities in sensitive areas.	Moderate	Rare	Low
			BM03	CEMP / OEMP will include procedures for flagging of the final trail alignment and demarcating environmental values to be avoided e.g. 'no-go zones' during works. Biodegradable tape will be preferentially used with any other non-biodegradable markers removed from site.				BM07	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.			
			BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.				BM35	All watercourses are designated no-go zones during construction and operations unless works are required directly in / adjacent to watercourse.			
			BM18	OEMP will include monitoring for any off-trail tracks and process for closing unauthorised trails and assisted regeneration.								

Risk ID	Ecological value(s)	Risk pathway	Mitigation measure ID	Mitigation measure	Consequence	Likelihood	Initial risk	Mitigation measure ID	Additional mitigation measures	Consequence	Likelihood	Residual risk
BR31	Terrestrial ecosystems, Aquatic ecosystems	Operation of trail may result in alterations to surface water flows and / or soil stability which can negatively impact ecosystem health (e.g. erosion and sedimentation).	BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.	Moderate	Unlikely	Medium	BM01	CEMP / OEMP to include independent auditing of trail construction and operation against environmental objectives and approval conditions. Independent auditor should have power to stop work / use of trails should project be non-compliant. A suitably qualified ecologist/botanist to be present during micro-siting and construction activities in sensitive areas.	Moderate	Unlikely	Medium
			BM09	Adequately manage all construction and operation activities to maintain landform stability and avoid / minimise landslips and erosion and sedimentation. This includes: - Seasonal closure of selected trails, - Incorporate management measures outlined in GHD (2021) e.g. GTM01, GTM02 & GMT03, - Rock armoured surfaces to be constructed on steep gradients to minimise erosion as per GTR03 (GHD 2021), - Rock walls and / or retaining walls constructed from local rock from constructed areas where possible to stabilise steep slopes and batters (rock is not to be collected from surrounding areas), - If a retaining wall is required in a remote location, it would be brought in by helicopter to avoid surface impacts beyond the trail impact area, - Remediation of areas where landslips and / or erosion and sedimentation occur as a result of the trail.				BM07	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.			
			BM11	Existing vehicle roads and tracks e.g. Cemetery Track to be incorporated into the trail network. Upgrades associated with incorporating these tracks will reduce existing erosion and sedimentation issues.								
			BM12	Existing mountain bike trails in vicinity of Mount Tugwell will be incorporated into the trail network. Upgrades associated with incorporating these trails will reduce existing erosion and sedimentation issues.								
			BM13	Trail closure during periods of extreme weather as per SWM15 (GHD 2021) and in accordance with the Emergency Management Plan and any additional directions required under the Forests Act.								
			BM15	Regular trail inspections undertaken to identify any problems or changes to the trails that need to be repaired. This includes after extreme weather events. Details to be outlined in the CEMP / OEMP.								

Risk ID	Ecological value(s)	Risk pathway	Mitigation measure ID	Mitigation measure	Consequence	Likelihood	Initial risk	Mitigation measure ID	Additional mitigation measures	Consequence	Likelihood	Residual risk
			<b>BM28</b>	Any fill material introduced to the National Park must be certified clean and be weed and pathogen free and exhibit similar properties to local natural soils e.g. pH, drainage, texture. Any fill material introduced to the State Forest will be undertaken according to DELWP FFM procedures and exhibit similar properties to local natural soils e.g. pH, drainage, texture. Fill areas should be monitored for germination of weeds.								
			<b>BM29</b>	Minimise the introduction of fill material for the construction and ongoing management of the trail.								
			<b>BM36</b>	No instream works within Yarra River to minimise disturbance and alterations to existing conditions.								
			<b>BM49</b>	Implement measures outlined in GWM01 to manage potential impacts to GDEs / seeps / springs (GHD 2021).								
			<b>BM69</b>	Minimise impacts to trees through micro-siting and adequate implementation of sympathetic mitigation measures outlined in Treelogic (2021).								
			<b>BM10</b>	Full time maintenance workers will maintain the trails to ensure they remain in good condition. Trail maintenance will continue for the entire life of the project i.e. as long as the trails remain in use. Details of the maintenance program outlined in the OEMP.								
<b>BR32</b>	<b>Terrestrial ecosystems, Aquatic ecosystems</b>	Leaks, spills, litter and / or waste from users and / or maintenance (e.g. chemical contamination from machinery fluids) negatively impacts ecosystem health.	<b>BM04</b>	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.				<b>BM01</b>	CEMP / OEMP to include independent auditing of trail construction and operation against environmental objectives and approval conditions. Independent auditor should have power to stop work / use of trails should project be non-compliant. A suitably qualified ecologist/botanist to be present during micro-siting and construction activities in sensitive areas.			
			<b>BM06</b>	Implement standard CEMP / OEMP controls for chemicals (inc. fungicides), fuel and waste management including procedures for spill containment and clean-up as per SWM10 (GHD 2021).	Moderate	Rare	Low	<b>BM07</b>	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.	Moderate	Rare	Low
								<b>BM35</b>	All watercourses are designated no-go zones during construction and operations unless works are required directly in / adjacent to watercourse.			

Risk ID	Ecological value(s)	Risk pathway	Mitigation measure ID	Mitigation measure	Consequence	Likelihood	Initial risk	Mitigation measure ID	Additional mitigation measures	Consequence	Likelihood	Residual risk
BR33	Terrestrial ecosystems, Aquatic ecosystems	Damage to trail from extreme weather event(s) during operation causes further damage to ecosystem (e.g. increased erosion and sedimentation).	BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.	Moderate	Rare	Low	-	No additional biodiversity mitigation measures recommended.	Moderate	Rare	Low
			BM09	Adequately manage all construction and operation activities to maintain landform stability and avoid / minimise landslips and erosion and sedimentation. This includes: - Seasonal closure of selected trails, - Incorporate management measures outlined in GHD (2021) e.g. GTM01, GTM02 & GMT03, - Rock armoured surfaces to be constructed on steep gradients to minimise erosion as per GTR03 (GHD 2021), - Rock walls and / or retaining walls constructed from local rock from constructed areas where possible to stabilise steep slopes and batters (rock is not to be collected from surrounding areas), - If a retaining wall is required in a remote location, it would be brought in by helicopter to avoid surface impacts beyond the trail impact area, - Remediation of areas where landslips and / or erosion and sedimentation occur as a result of the trail.								
			BM13	Trail closure during periods of extreme weather as per SWM15 (GHD 2021) and in accordance with the Emergency Management Plan and any additional directions required under the Forests Act.								
			BM15	Regular trail inspections undertaken to identify any problems or changes to the trails that need to be repaired. This includes after extreme weather events. Details to be outlined in the CEMP / OEMP.								
			BM10	Full time maintenance workers will maintain the trails to ensure they remain in good condition. Trail maintenance will continue for the entire life of the project i.e. as long as the trails remain in use. Details of the maintenance program outlined in the OEMP.								
BR34	Terrestrial ecosystems, Aquatic ecosystems	Use of inappropriate imported fill material during operation (e.g. drastically different pH or drainage properties) negatively impacts ecosystem health.	BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.	Minor	Rare	Very Low	BM01	CEMP / OEMP to include independent auditing of trail construction and operation against environmental objectives and approval conditions. Independent auditor should have power to stop work / use of trails should project be non-compliant. A suitably qualified ecologist/botanist to be present during micro-siting and construction activities in sensitive areas.	Minor	Rare	Very Low
			BM29	Minimise the introduction of fill material for the construction and ongoing management of the trail.				BM07	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.			
			BM28	Any fill material introduced to the National Park must be certified clean and be weed and pathogen free and exhibit similar properties to local natural soils e.g. pH, drainage, texture. Any fill material introduced to the State Forest will be undertaken according to DELWP FFM procedures and exhibit similar properties to local natural soils e.g. pH, drainage, texture. Fill areas should be monitored for germination of weeds.								



Risk ID	Ecological value(s)	Risk pathway	Mitigation measure ID	Mitigation measure	Consequence	Likelihood	Initial risk	Mitigation measure ID	Additional mitigation measures	Consequence	Likelihood	Residual risk
BR35	Terrestrial ecosystems, Aquatic ecosystems	Vegetation clearing in operation phase (e.g. trail repair) will reduce quality and / or extent of ecosystem (including habitat for native species) negatively impacting ecosystem health.	BM02	All trail alignments and all known site-specific environmental issues will be incorporated into the WorldTrail GIS platform which will be accessible by construction crew on site at all times.	Moderate	Almost certain	High	BM01	CEMP / OEMP to include independent auditing of trail construction and operation against environmental objectives and approval conditions. Independent auditor should have power to stop work / use of trails should project be non-compliant. A suitably qualified ecologist/botanist to be present during micro-siting and construction activities in sensitive areas.	Moderate	Almost certain	High
			BM03	CEMP / OEMP will include procedures for flagging of the final trail alignment and demarcating environmental values to be avoided e.g. 'no-go zones' during works. Biodegradable tape will be preferentially used with any other non-biodegradable markers removed from site.				BM07	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.			
			BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.				BM35	All watercourses are designated no-go zones during construction and operations unless works are required directly in / adjacent to watercourse.			
			BM18	OEMP will include monitoring for any off-trail tracks and process for closing unauthorised trails and assisted regeneration.				BM05	Minimise use / removal of natural materials such as rocks, woody debris, fallen timber, organic litter during construction, operation and maintenance of trail. Natural materials would not be collected from outside of the trail construction area. Any material removed must be retained on site nearby.			
			BM17	Native vegetation allowed / assisted to regenerate within construction footprint to a 30 to 60 centimetre wide tread width.								
			BM19	Removal of vegetation will be to the minimum extent required, according to variable trail construction footprint which is a function of slope class. Accidental / excessive clearing will be remediated through assisted regeneration or additional offsets.								
			BM67	Native vegetation (trees including mid-storey species) removal is subject to the following constraints: 1) No trees (including mid-storey trees) with DBH > 10 centimetres are to be removed in the National Park (unless condition 3) applies). 2) Within State Forest trees < 20 centimetres DBH in single age stands of Eucalyptus spp. and mid-storey (i.e. regrowth following bushfire) may be removed. 3) Excluding areas of suitable habitat for Leadbeater's Possum, any small dead trees (< 20 centimetres DBH) within 2 metres of the trail may require removal if significant defects are identified. Such trees would be felled and kept nearby as habitat logs (coarse woody debris).								
			BM69	Minimise impacts to trees through micrositing and adequate implementation of sympathetic mitigation measures outlined in Treelogic (2021).								
			BM72	All large hollow-bearing canopy trees (dead and alive) are to be retained with no substantial works encroachment that would compromise the health and viability of such trees.								
			BM21	Project will include environmental enhancement works such as species monitoring programs and installation of nesting boxes for significant fauna.								
BM10	Full time maintenance workers will maintain the trails to ensure they remain in good condition. Trail maintenance will continue for the entire life of the project i.e. as long as the trails remain in use. Details of the maintenance program outlined in the OEMP.											
BR36	Terrestrial ecosystems, Aquatic ecosystems	A lack of independent auditing and / or regulatory oversight during trail operation leads to environmental damage in excess of approvals.	BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.	Moderate	Possible	Medium	BM01	CEMP / OEMP to include independent auditing of trail construction and operation against environmental objectives and approval conditions. Independent auditor should have power to stop work / use of trails should project be non-compliant. A suitably qualified ecologist/botanist to be present during micro-siting and construction activities in sensitive areas.	Moderate	Rare	Low
			BM02	All trail alignments and all known site-specific environmental issues will be incorporated into the WorldTrail GIS platform which will be accessible by construction crew on site at all times.				BM34	All watercourse crossings must be inspected and maintained by a suitably qualified person as per GTM05 (GHD 2021).			

Risk ID	Ecological value(s)	Risk pathway	Mitigation measure ID	Mitigation measure	Consequence	Likelihood	Initial risk	Mitigation measure ID	Additional mitigation measures	Consequence	Likelihood	Residual risk
BR37	Terrestrial ecosystems, Aquatic ecosystems	Removal of adjacent vegetation during operation phase increases light levels changing microclimate resulting in negative impact on ecosystem health.	BM17	Native vegetation allowed / assisted to regenerate within construction footprint to a 30 to 60 centimetre wide tread width.	Moderate	Unlikely	Medium	-	No additional biodiversity mitigation measures recommended.	Minor	Rare	Medium
			BM19	Removal of vegetation will be to the minimum extent required, according to variable trail construction footprint which is a function of slope class. Accidental / excessive clearing will be remediated through assisted regeneration or additional offsets.								
			BM67	Native vegetation (trees including mid-storey species) removal is subject to the following constraints: 1) No trees (including mid-storey trees) with DBH > 10 centimetres are to be removed in the National Park (unless condition 3) applies). 2) Within State Forest trees < 20 centimetres DBH in single age stands of Eucalyptus spp. and mid-storey (i.e. regrowth following bushfire) may be removed. 3) Excluding areas of suitable habitat for Leadbeater's Possum, any small dead trees (< 20 centimetres DBH) within 2 metres of the trail may require removal if significant defects are identified. Such trees would be felled and kept nearby as habitat logs (coarse woody debris).								
			BM69	Minimise impacts to trees through micrositing and adequate implementation of sympathetic mitigation measures outlined in Treelogic (2021).								
BR38	Terrestrial ecosystems, Aquatic ecosystems	Removal of natural materials such as rocks, woody debris, fallen timber, organic litter during trail operation negatively impacts ecosystem health.	BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.	Minor	Almost certain	Medium	BM01	CEMP / OEMP to include independent auditing of trail construction and operation against environmental objectives and approval conditions. Independent auditor should have power to stop work / use of trails should project be non-compliant. A suitably qualified ecologist/botanist to be present during micro-siting and construction activities in sensitive areas.	Minor	Almost certain	Medium
			BM03	CEMP / OEMP will include procedures for flagging of the final trail alignment and demarcating environmental values to be avoided e.g. 'no-go zones' during works. Biodegradable tape will be preferentially used with any other non-biodegradable markers removed from site.				BM05	Minimise use / removal of natural materials such as rocks, woody debris, fallen timber, organic litter during construction, operation and maintenance of trail. Natural materials would not be collected from outside of the trail construction area. Any material removed must be retained on site nearby.			
			BM19	Removal of vegetation will be to the minimum extent required, according to variable trail construction footprint which is a function of slope class. Accidental / excessive clearing will be remediated through assisted regeneration or additional offsets.				BM07	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.			
			BM10	Full time maintenance workers will maintain the trails to ensure they remain in good condition. Trail maintenance will continue for the entire life of the project i.e. as long as the trails remain in use. Details of the maintenance program outlined in the OEMP.								

Risk ID	Ecological value(s)	Risk pathway	Mitigation measure ID	Mitigation measure	Consequence	Likelihood	Initial risk	Mitigation measure ID	Additional mitigation measures	Consequence	Likelihood	Residual risk
BR39	Terrestrial ecosystems, Aquatic ecosystems	Operation activities result in edge effects, habitat fragmentation and / or loss of connectivity, negatively impacting ecosystem health e.g. breaks in vegetation connectivity will create additional movement corridors for pest animals..	BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.	Moderate	Almost certain	High	BM30	Construction and operation phase staff trained as part of site induction to identify pest animals and signs of their presence to inform pest management program e.g. locating traps near feral cat sightings. This data will be recorded in a GIS platform for the project.	Moderate	Almost certain	High
			BM17	Native vegetation allowed / assisted to regenerate within construction footprint to a 30 to 60 centimetre wide tread width.								
			BM19	Removal of vegetation will be to the minimum extent required, according to variable trail construction footprint which is a function of slope class. Accidental / excessive clearing will be remediated through assisted regeneration or additional offsets.								
			BM67	Native vegetation (trees including mid-storey species) removal is subject to the following constraints: 1) No trees (including mid-storey trees) with DBH > 10 centimetres are to be removed in the National Park (unless condition 3) applies). 2) Within State Forest trees < 20 centimetres DBH in single age stands of Eucalyptus spp. and mid-storey (i.e. regrowth following bushfire) may be removed. 3) Excluding areas of suitable habitat for Leadbeater's Possum, any small dead trees (< 20 centimetres DBH) within 2 metres of the trail may require removal if significant defects are identified. Such trees would be felled and kept nearby as habitat logs (coarse woody debris).								
			BM69	Minimise impacts to trees through micrositing and adequate implementation of sympathetic mitigation measures outlined in Treelogic (2021).								
			BM72	All large hollow-bearing canopy trees (dead and alive) are to be retained with no substantial works encroachment that would compromise the health and viability of such trees.								
			BM20	Project will work with relevant land managers to support existing pest animal programs. Support will be provided for the entire life of the project i.e. as long as the trails remain in use.								
			BM21	Project will include environmental enhancement works such as species monitoring programs and installation of nesting boxes for significant fauna.								
BM22	A comprehensive weed management program would be implemented along and in the immediate vicinity of trails. The program would be developed in consultation with land managers and would continue for as long as the trails remain in use.											
BR40	Terrestrial ecosystems, Aquatic ecosystems	Unintentional damage to trees during operation e.g. during trail repair causes decline and / or death of tree negatively impacting ecosystem health.	BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.	Moderate	Unlikely	Medium	BM01	CEMP / OEMP to include independent auditing of trail construction and operation against environmental objectives and approval conditions. Independent auditor should have power to stop work / use of trails should project be non-compliant. A suitably qualified ecologist/botanist to be present during micro-siting and construction activities in sensitive areas.	Moderate	Rare	Low
			BM03	CEMP / OEMP will include procedures for flagging of the final trail alignment and demarcating environmental values to be avoided e.g. 'no-go zones' during works. Biodegradable tape will be preferentially used with any other non-biodegradable markers removed from site.				BM07	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.			
			BM62	No removal of existing habitat trees unless deemed hazardous in which case treatment of these trees would be discussed with land manager, arborist & ecologist e.g. habitat pruning of tree. Any hazardous tree considered for removal will be assumed to be a habitat tree unless deemed otherwise.				BM68	Construction and operation phase staff trained as part of site induction in tree protection methods, SRZ and root protection methods and identification of hazardous trees.			
			BM69	Minimise impacts to trees through micrositing and adequate implementation of sympathetic mitigation measures outlined in Treelogic (2021).				BM70	CEMP / OEMP to include procedure to capture relevant data where direct tree impacts are possible, where tree root protection is required, or where hazardous tree removal or excessive pruning is required.			
			BM10	Full time maintenance workers will maintain the trails to ensure they remain in good condition. Trail maintenance will continue for the entire life of the project i.e. as long as the trails remain in use. Details of the maintenance program outlined in the OEMP.								

Risk ID	Ecological value(s)	Risk pathway	Mitigation measure ID	Mitigation measure	Consequence	Likelihood	Initial risk	Mitigation measure ID	Additional mitigation measures	Consequence	Likelihood	Residual risk
BR41	Aquatic ecosystems	Degradation and / or failure of structures across watercourses result in unnecessary damage to aquatic ecosystem.	BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.	Moderate	Unlikely	Medium	BM01	CEMP / OEMP to include independent auditing of trail construction and operation against environmental objectives and approval conditions. Independent auditor should have power to stop work / use of trails should project be non-compliant. A suitably qualified ecologist/botanist to be present during micro-siting and construction activities in sensitive areas.	Moderate	Rare	Low
			BM03	CEMP / OEMP will include procedures for flagging of the final trail alignment and demarcating environmental values to be avoided e.g. 'no-go zones' during works. Biodegradable tape will be preferentially used with any other non-biodegradable markers removed from site.				BM34	All watercourse crossings must be inspected and maintained by a suitably qualified person as per GTM05 (GHD 2021).			
			BM36	No instream works within Yarra River to minimise disturbance and alterations to existing conditions.				BM35	All watercourses are designated no-go zones during construction and operations unless works are required directly in / adjacent to watercourse.			
			BM10	Full time maintenance workers will maintain the trails to ensure they remain in good condition. Trail maintenance will continue for the entire life of the project i.e. as long as the trails remain in use. Details of the maintenance program outlined in the OEMP.								
BR42	Cool Temperate Rainforest (CTR) / Cool Temperate Mixed Forest (CTMF)	Operation activities reduce extent and / or quality of CTR / CTMF. This includes the potential for infection of Myrtle Beech with Myrtle Wilt.	BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.	Moderate	Possible	Medium	BM01	CEMP / OEMP to include independent auditing of trail construction and operation against environmental objectives and approval conditions. Independent auditor should have power to stop work / use of trails should project be non-compliant. A suitably qualified ecologist/botanist to be present during micro-siting and construction activities in sensitive areas.	Moderate	Possible	Medium
			BM03	CEMP / OEMP will include procedures for flagging of the final trail alignment and demarcating environmental values to be avoided e.g. 'no-go zones' during works. Biodegradable tape will be preferentially used with any other non-biodegradable markers removed from site.				BM07	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.			
			BM02	All trail alignments and all known site-specific environmental issues will be incorporated into the WorldTrail GIS platform which will be accessible by construction crew on site at all times.				BM25	CEMP / OEMP to include appropriate hygiene procedures for weeds / pathogens throughout the trail alignment.			
			BM17	Native vegetation allowed / assisted to regenerate within construction footprint to a 30 to 60 centimetre wide tread width.				BM26	Construction and operation phase staff trained as part of site induction to identify signs of plant pathogens e.g. Myrtle Wilt, understand conditions that can cause spread and to implement procedures minimise risk of spread.			
			BM19	Removal of vegetation will be to the minimum extent required, according to variable trail construction footprint which is a function of slope class. Accidental / excessive clearing will be remediated through assisted regeneration or additional offsets.				BM27	CEMP / OEMP to include commissioning & maintenance schedule and procedures for bike washing facilities as per SWM14 (GHD 2021). These facilities will be maintained for the entire life of the project i.e. as long as the trails remain in use.			
			BM24	Avoid disturbance to the ground surface in areas known to contain invasive weeds and pathogens (including Myrtle Wilt) wherever possible. In high risk areas a suitably qualified ecologist will accompany trail crew to identify weed species and key areas to avoid. High risk areas will be mapped prior to construction.				BM45	Construction and operation phase staff trained as part of site induction to identify Myrtle Beech, CTR and CTMF.			
			BM43	Where pruning or wounding of Myrtle Beech trees and / or roots is likely to occur trail crews will be trained in pruning methods and application of anti-fungal agents to prevent the spread of Myrtle Wilt.								
			BM44	No imported fill material (including gravel, rock and soil) is to be used within CTR / CTMF.								
			BM46	No machinery excavation is to be undertaken within CTR / CTMF. Where soils are damp and boggy, trail must be elevated using boardwalk or another appropriate engineered/design solution.								
			BM47	Trail construction and maintenance is to be undertaken using hand tools only within CTR / CTMF.								

Risk ID	Ecological value(s)	Risk pathway	Mitigation measure ID	Mitigation measure	Consequence	Likelihood	Initial risk	Mitigation measure ID	Additional mitigation measures	Consequence	Likelihood	Residual risk
BR43	Groundwater dependent ecosystems (GDEs)	Operation activities cause disruption to natural groundwater flow pathways which negatively impact ecosystem health.	BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.	Moderate	Rare	Low	BM01	CEMP / OEMP to include independent auditing of trail construction and operation against environmental objectives and approval conditions. Independent auditor should have power to stop work / use of trails should project be non-compliant. A suitably qualified ecologist/botanist to be present during micro-siting and construction activities in sensitive areas.	Moderate	Rare	Low
			BM02	All trail alignments and all known site-specific environmental issues will be incorporated into the WorldTrail GIS platform which will be accessible by construction crew on site at all times.				BM07	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.			
			BM03	CEMP / OEMP will include procedures for flagging of the final trail alignment and demarcating environmental values to be avoided e.g. 'no-go zones' during works. Biodegradable tape will be preferentially used with any other non-biodegradable markers removed from site.				BM16	Develop and integrate a procedure to document and deal with finds into the CEMP / OEMP. Procedure will encompass: 1) Significant flora observations, 2) Significant fauna observations, 3) Discovery of nests / burrows / roosts used by native fauna, 4) Dealing with injured / killed / displaced / trapped fauna, 5) Works that encounter GDEs, seeps / springs and associated vegetation communities / species. Observations of the above will be entered into the WorldTrail GIS platform and records of significant flora, significant fauna and threatened ecological communities will be periodically uploaded to the VBA.  Where there is potential for harm of threatened species, works will be stopped until the risk of harm has been removed.			
			BM09	Adequately manage all construction and operation activities to maintain landform stability and avoid / minimise landslips and erosion and sedimentation. This includes: - Seasonal closure of selected trails, - Incorporate management measures outlined in GHD (2021) e.g. GTM01, GTM02 & GMT03, - Rock armoured surfaces to be constructed on steep gradients to minimise erosion as per GTR03 (GHD 2021), - Rock walls and / or retaining walls constructed from local rock from constructed areas where possible to stabilise steep slopes and batters (rock is not to be collected from surrounding areas), - If a retaining wall is required in a remote location, it would be brought in by helicopter to avoid surface impacts beyond the trail impact area, - Remediation of areas where landslips and / or erosion and sedimentation occur as a result of the trail.				BM50	Construction and operation phase staff trained as part of site induction to identify GDEs, seeps / springs and associated vegetation communities / species.			
			BM49	Implement measures outlined in GWM01 to manage potential impacts to GDEs / seeps / springs (GHD 2021).								
			BM06	Implement standard CEMP / OEMP controls for chemicals (inc. fungicides), fuel and waste management including procedures for spill containment and clean-up as per SWM10 (GHD 2021).								
			BM10	Full time maintenance workers will maintain the trails to ensure they remain in good condition. Trail maintenance will continue for the entire life of the project i.e. as long as the trails remain in use. Details of the maintenance program outlined in the OEMP.								

Risk ID	Ecological value(s)	Risk pathway	Mitigation measure ID	Mitigation measure	Consequence	Likelihood	Initial risk	Mitigation measure ID	Additional mitigation measures	Consequence	Likelihood	Residual risk
BR44	Leadbeater's Possum (LBP)	Removal of, and / or degradation to, known or suitable high quality LBP habitat (i.e. dense montane thickets or wet forest areas with high levels of sub-canopy connectivity) during operations phase which negatively impacts on current population and / or future viability of the species.	BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.	Moderate	Unlikely	Medium	BM01	CEMP / OEMP to include independent auditing of trail construction and operation against environmental objectives and approval conditions. Independent auditor should have power to stop work / use of trails should project be non-compliant. A suitably qualified ecologist/botanist to be present during micro-siting and construction activities in sensitive areas.	Moderate	Unlikely	Medium
			BM03	CEMP / OEMP will include procedures for flagging of the final trail alignment and demarcating environmental values to be avoided e.g. 'no-go zones' during works. Biodegradable tape will be preferentially used with any other non-biodegradable markers removed from site.				BM07	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.			
			BM02	All trail alignments and all known site-specific environmental issues will be incorporated into the WorldTrail GIS platform which will be accessible by construction crew on site at all times.				BM16	Develop and integrate a procedure to document and deal with finds into the CEMP / OEMP. Procedure will encompass: 1) Significant flora observations, 2) Significant fauna observations, 3) Discovery of nests / burrows / roosts used by native fauna, 4) Dealing with injured / killed / displaced / trapped fauna, 5) Works that encounter GDEs, seeps / springs and associated vegetation communities / species. Observations of the above will be entered into the WorldTrail GIS platform and records of significant flora, significant fauna and threatened ecological communities will be periodically uploaded to the VBA.  Where there is potential for harm of threatened species, works will be stopped until the risk of harm has been removed.			
			BM19	Removal of vegetation will be to the minimum extent required, according to variable trail construction footprint which is a function of slope class. Accidental / excessive clearing will be remediated through assisted regeneration or additional offsets.				BM51	Construction and operation phase staff trained as part of site induction to identify high quality LBP habitat indicators. Training will include distribution of fact sheets including notes and photos.			
			BM17	Native vegetation allowed / assisted to regenerate within construction footprint to a 30 to 60 centimetre wide tread width.				BM73	No construction activities at night. No use of trail infrastructure in the National Park at night. Night riding allowed for selected trails within State Park.			
			BM21	Project will include environmental enhancement works such as species monitoring programs and installation of nesting boxes for significant fauna.				BM76	CEMP / OEMP to include procedure for fauna entrapment. Any structures that could trap fauna must be covered, checked and an egress point provided.			
			BM52	Removal of vegetation within suitable Leadbeater's Possum habitat will be subject to the following constraints: 1) In the National Park no removal of trees, including mid-storey trees, with > 10 cm DBH, 2) In State Forest where there is a stand of single age Eucalyptus sp. and mid-storey (i.e. regrowth following bushfire), trees < 20 cm DBH may be removed, 3) No removal of dense stands of montane thickets (comprising Bottlebrush Callistemon spp. and / or Tea-tree Leptospermum spp.) anywhere in the project area. Minor pruning of these species may occur at the edges of these thickets.				BM77	Management of potential impacts from noise, vibrations and air quality as outlined in NM01 to NM06 in AECOM (2021a) and AM01 to AM07 AECOM (2021b). In addition to these measures, project activities should minimise amount of equipment / machinery in use at any one time to reduce intensity of noise, vibrations and / or reduced air quality.			

Risk ID	Ecological value(s)	Risk pathway	Mitigation measure ID	Mitigation measure	Consequence	Likelihood	Initial risk	Mitigation measure ID	Additional mitigation measures	Consequence	Likelihood	Residual risk
BR45	Mt Donna-Buang Wingless Stonefly (MDBWS)	Operation activities in proximity to suitable habitat for MDBWS cause ground disturbance, sedimentation, water pollution, obstructions in waterways, changes in light levels and / or soil compaction which negatively impacts current population(s) and / or future viability of these species.	BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.			Medium	BM01	CEMP / OEMP to include independent auditing of trail construction and operation against environmental objectives and approval conditions. Independent auditor should have power to stop work / use of trails should project be non-compliant. A suitably qualified ecologist/botanist to be present during micro-siting and construction activities in sensitive areas.			Medium
			BM03	CEMP / OEMP will include procedures for flagging of the final trail alignment and demarcating environmental values to be avoided e.g. 'no-go zones' during works. Biodegradable tape will be preferentially used with any other non-biodegradable markers removed from site.				BM07	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.			
			BM02	All trail alignments and all known site-specific environmental issues will be incorporated into the WorldTrail GIS platform which will be accessible by construction crew on site at all times.				BM34	All watercourse crossings must be inspected and maintained by a suitably qualified person as per GTM05 (GHD 2021).			
			BM06	Implement standard CEMP / OEMP controls for chemicals (inc. fungicides), fuel and waste management including procedures for spill containment and clean-up as per SWM10 (GHD 2021).				BM35	All watercourses are designated no-go zones during construction and operations unless works are required directly in / adjacent to watercourse.			
			BM09	Adequately manage all construction and operation activities to maintain landform stability and avoid / minimise landslips and erosion and sedimentation. This includes: - Seasonal closure of selected trails, - Incorporate management measures outlined in GHD (2021) e.g. GTM01, GTM02 & GMT03, - Rock armoured surfaces to be constructed on steep gradients to minimise erosion as per GTR03 (GHD 2021), - Rock walls and / or retaining walls constructed from local rock from constructed areas where possible to stabilise steep slopes and batters (rock is not to be collected from surrounding areas), - If a retaining wall is required in a remote location, it would be brought in by helicopter to avoid surface impacts beyond the trail impact area, - Remediation of areas where landslips and / or erosion and sedimentation occur as a result of the trail.				BM37	Works in proximity to watercourses should not occur during wet months (e.g. June - September) unless conditions are such that land degradation and surface water management problems can be avoided or appropriate mitigation measures implemented. Where practicable, all watercourse crossings should be constructed during no or low flow conditions.			
			BM10	Full time maintenance workers will maintain the trails to ensure they remain in good condition. Trail maintenance will continue for the entire life of the project i.e. as long as the trails remain in use. Details of the maintenance program outlined in the OEMP.				BM61	Construction and operation phase staff trained as part of site induction to identify MDBWS habitat indicators. Training will include distribution of fact sheets including notes and photos.			
			BM15	Regular trail inspections undertaken to identify any problems or changes to the trails that need to be repaired. This includes after extreme weather events. Details to be outlined in the CEMP / OEMP.								
			BM18	OEMP will include monitoring for any off-trail tracks and process for closing unauthorised trails and assisted regeneration.								



Risk ID	Ecological value(s)	Risk pathway	Mitigation measure ID	Mitigation measure	Consequence	Likelihood	Initial risk	Mitigation measure ID	Additional mitigation measures	Consequence	Likelihood	Residual risk
			<b>BM19</b>	Removal of vegetation will be to the minimum extent required, according to variable trail construction footprint which is a function of slope class. Accidental / excessive clearing will be remediated through assisted regeneration or additional offsets.								
			<b>BM56</b>	Any work within the potential range of the species must minimise habitat disturbance e.g. soil compaction and sedimentation by elevating the trail to cross waterways, bogs, damp areas or seasonal drainage lines within the mapped suitable habitat zone. Any elevated trail must be constructed to maintain natural light levels.								
			<b>BM57</b>	Construction and operation of the trails within potential range of MDBWS managed to decrease sediment from Mt Donna-Buang Road or surrounds flowing into the adjacent springs downstream of the road as per SWM07 (GHD 2021).								
			<b>BM58</b>	Minimise sedimentation into permanent or ephemeral waterbodies within potential range of the species through appropriate procedures for erosion and sedimentation in CEMP / OEMP as per SWM02 (GHD 2021).								
			<b>BM59</b>	Within potential range of MDBWS minimise pollution from trail construction & / or use that can soak into soil through implementing appropriate procedures for leaks / spills in CEMP / OEMP as per SWM02 & SWM10 (GHD 2021).								
			<b>BM60</b>	Ensure trail construction & / or use does not interrupt flow rate of ground water within or upslope of potential range of the species.								
<b>BR46</b>	<b>Mt Donna-Buang Wingless Stonefly (MDBWS)</b>	Infection of Myrtle Beech by Myrtle Wilt from operation activities negatively impacts on current population and / or future viability of the species. Areas with a Myrtle Beech understorey are favoured by the species (DSE 2003).	<b>BM24</b>	Avoid disturbance to the ground surface in areas known to contain invasive weeds and pathogens (including Myrtle Wilt) wherever possible. In high risk areas a suitably qualified ecologist will accompany trail crew to identify weed species and key areas to avoid. High risk areas will be mapped prior to construction.	Moderate	Rare	Low	<b>BM07</b>	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.	Moderate	Rare	Low
		<b>BM03</b>	CEMP / OEMP will include procedures for flagging of the final trail alignment and demarcating environmental values to be avoided e.g. 'no-go zones' during works. Biodegradable tape will be preferentially used with any other non-biodegradable markers removed from site.	<b>BM25</b>				CEMP / OEMP to include appropriate hygiene procedures for weeds / pathogens throughout the trail alignment.				
		<b>BM02</b>	All trail alignments and all known site-specific environmental issues will be incorporated into the WorldTrail GIS platform which will be accessible by construction crew on site at all times.	<b>BM26</b>				Construction and operation phase staff trained as part of site induction to identify signs of plant pathogens e.g. Myrtle Wilt, understand conditions that can cause spread and to implement procedures minimise risk of spread.				
		<b>BM04</b>	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.	<b>BM45</b>				Construction and operation phase staff trained as part of site induction to identify Myrtle Beech, CTR and CTMF.				
		<b>BM43</b>	Where pruning or wounding of Myrtle Beech trees and / or roots is likely to occur trail crews will be trained in pruning methods and application of anti-fungal agents to prevent the spread of Myrtle Wilt.	<b>BM61</b>				Construction and operation phase staff trained as part of site induction to identify MDBWS habitat indicators. Training will include distribution of fact sheets including notes and photos.				
		<b>BM42</b>	Where areas containing Myrtle Beech cannot be avoided, minimise disturbance within the drip line of all Myrtle Beech trees using a design/engineered solution.									

Risk ID	Ecological value(s)	Risk pathway	Mitigation measure ID	Mitigation measure	Consequence	Likelihood	Initial risk	Mitigation measure ID	Additional mitigation measures	Consequence	Likelihood	Residual risk
BR47	Other significant aquatic fauna	Operation activities in proximity to suitable habitat for other significant aquatic fauna negatively impacts current population(s) and / or future viability of these species.	BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.	Moderate	Rare	Low	BM07	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.	Moderate	Rare	Low
			BM03	CEMP / OEMP will include procedures for flagging of the final trail alignment and demarcating environmental values to be avoided e.g. 'no-go zones' during works. Biodegradable tape will be preferentially used with any other non-biodegradable markers removed from site.				BM01	CEMP / OEMP to include independent auditing of trail construction and operation against environmental objectives and approval conditions. Independent auditor should have power to stop work / use of trails should project be non-compliant. A suitably qualified ecologist/botanist to be present during micro-siting and construction activities in sensitive areas.			
			BM02	All trail alignments and all known site-specific environmental issues will be incorporated into the WorldTrail GIS platform which will be accessible by construction crew on site at all times.				BM16	Develop and integrate a procedure to document and deal with finds into the CEMP / OEMP. Procedure will encompass: 1) Significant flora observations, 2) Significant fauna observations, 3) Discovery of nests / burrows / roosts used by native fauna, 4) Dealing with injured / killed / displaced / trapped fauna, 5) Works that encounter GDEs, seeps / springs and associated vegetation communities / species. Observations of the above will be entered into the WorldTrail GIS platform and records of significant flora, significant fauna and threatened ecological communities will be periodically uploaded to the VBA.  Where there is potential for harm of threatened species, works will be stopped until the risk of harm has been removed.			
			BM06	Implement standard CEMP / OEMP controls for chemicals (inc. fungicides), fuel and waste management including procedures for spill containment and clean-up as per SWM10 (GHD 2021).				BM78	Construction and operation phase staff trained as part of site induction to identify signs of native fauna habitation including, but not limited to: 1) Lyrebird display mounds, 2) Roosting or nesting sites for forest owls, 3) Platypus burrows, 4) Habitat indicators for Curve-tail Burrowing Crayfish and Tubercle Burrowing Crayfish, 5) Burrows used by ground-dwelling fauna e.g. wombats. Training will include distribution of fact sheets including notes and photos.			
			BM09	Adequately manage all construction and operation activities to maintain landform stability and avoid / minimise landslips and erosion and sedimentation. This includes: - Seasonal closure of selected trails, - Incorporate management measures outlined in GHD (2021) e.g. GTM01, GTM02 & GMT03, - Rock armoured surfaces to be constructed on steep gradients to minimise erosion as per GTR03 (GHD 2021), - Rock walls and / or retaining walls constructed from local rock from constructed areas where possible to stabilise steep slopes and batters (rock is not to be collected from surrounding areas), - If a retaining wall is required in a remote location, it would be brought in by helicopter to avoid surface impacts beyond the trail impact area, - Remediation of areas where landslips and / or erosion and sedimentation occur as a result of the trail.				BM35	All watercourses are designated no-go zones during construction and operations unless works are required directly in / adjacent to watercourse.			
			BM11	Existing vehicle roads and tracks e.g. Cemetery Track to be incorporated into the trail network. Upgrades associated with incorporating these tracks will reduce existing erosion and sedimentation issues.				BM77	Management of potential impacts from noise, vibrations and air quality as outlined in NM01 to NM06 in AECOM (2021a) and AM01 to AM07 AECOM (2021b). In addition to these measures, project activities should minimise amount of equipment / machinery in use at any one time to reduce intensity of noise, vibrations and / or reduced air quality.			
			BM12	Existing mountain bike trails in vicinity of Mount Tugwell will be incorporated into the trail network. Upgrades associated with incorporating these trails will reduce existing erosion and sedimentation issues.				BM50	Construction and operation phase staff trained as part of site induction to identify GDEs, seeps / springs and associated vegetation communities / species.			
			BM10	Full time maintenance workers will maintain the trails to ensure they remain in good condition. Trail maintenance will continue for the entire life of the project i.e. as long as the trails remain in use. Details of the maintenance program outlined in the OEMP.				BM75	Construction or maintenance activities, particularly in proximity to the Yarra River or sensitive areas within Yarra Ranges National Park, to use slow-start construction measures to enable both aquatic and terrestrial fauna time to disperse.			

Risk ID	Ecological value(s)	Risk pathway	Mitigation measure ID	Mitigation measure	Consequence	Likelihood	Initial risk	Mitigation measure ID	Additional mitigation measures	Consequence	Likelihood	Residual risk
BR48	Other significant canopy dwelling fauna	Removal of, and / or degradation to, habitat for other significant canopy dwelling fauna during operations phase negatively impacts on current population(s) and / or future viability of these species.	BM49	Implement measures outlined in GWM01 to manage potential impacts to GDEs / seeps / springs (GHD 2021).	Moderate	Rare	Low	BM76	CEMP / OEMP to include procedure for fauna entrapment. Any structures that could trap fauna must be covered, checked and an egress point provided.	Moderate	Rare	Low
			BM36	No instream works within Yarra River to minimise disturbance and alterations to existing conditions.				BM01	CEMP / OEMP to include independent auditing of trail construction and operation against environmental objectives and approval conditions. Independent auditor should have power to stop work / use of trails should project be non-compliant. A suitably qualified ecologist/botanist to be present during micro-siting and construction activities in sensitive areas.			
			BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.				BM07	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.			
			BM03	CEMP / OEMP will include procedures for flagging of the final trail alignment and demarcating environmental values to be avoided e.g. 'no-go zones' during works. Biodegradable tape will be preferentially used with any other non-biodegradable markers removed from site.				BM16	Develop and integrate a procedure to document and deal with finds into the CEMP / OEMP. Procedure will encompass: 1) Significant flora observations, 2) Significant fauna observations, 3) Discovery of nests / burrows / roosts used by native fauna, 4) Dealing with injured / killed / displaced / trapped fauna, 5) Works that encounter GDEs, seeps / springs and associated vegetation communities / species. Observations of the above will be entered into the WorldTrail GIS platform and records of significant flora, significant fauna and threatened ecological communities will be periodically uploaded to the VBA.  Where there is potential for harm of threatened species, works will be stopped until the risk of harm has been removed. Construction and operation phase staff trained as part of site induction in tree protection methods, SRZ and root protection methods and identification of hazardous trees.			
			BM02	All trail alignments and all known site-specific environmental issues will be incorporated into the WorldTrail GIS platform which will be accessible by construction crew on site at all times.				BM68	CEMP / OEMP to include procedure to capture relevant data where direct tree impacts are possible, where tree root protection is required, or where hazardous tree removal or excessive pruning is required.			
			BM21	Project will include environmental enhancement works such as species monitoring programs and installation of nesting boxes for significant fauna.				BM76	CEMP / OEMP to include procedure for fauna entrapment. Any structures that could trap fauna must be covered, checked and an egress point provided.			
			BM62	No removal of existing habitat trees unless deemed hazardous in which case treatment of these trees would be discussed with land manager, arborist & ecologist e.g. habitat pruning of tree. Any hazardous tree considered for removal will be assumed to be a habitat tree unless deemed otherwise.				BM78	Construction and operation phase staff trained as part of site induction to identify signs of native fauna habitation including, but not limited to: 1) Lyrebird display mounds, 2) Roosting or nesting sites for forest owls, 3) Platypus burrows, 4) Habitat indicators for Curve-tail Burrowing Crayfish and Tubercle Burrowing Crayfish, 5) Burrows used by ground-dwelling fauna e.g. wombats. Training will include distribution of fact sheets including notes and photos.			
			BM67	Native vegetation (trees including mid-storey species) removal is subject to the following constraints: 1) No trees (including mid-storey trees) with DBH > 10 centimetres are to be removed in the National Park (unless condition 3) applies). 2) Within State Forest trees < 20 centimetres DBH in single age stands of Eucalyptus spp. and mid-storey (i.e. regrowth following bushfire) may be removed. 3) Excluding areas of suitable habitat for Leadbeater's Possum, any small dead trees (< 20 centimetres DBH) within 2 metres of the trail may require removal if significant defects are identified. Such trees would be felled and kept nearby as habitat logs (coarse woody debris).				BM72	All large hollow-bearing canopy trees (dead and alive) are to be retained with no substantial works encroachment that would compromise the health and viability of such trees.			
			BM69	Minimise impacts to trees through micrositing and adequate implementation of sympathetic mitigation measures outlined in Treelogic (2021).				BM10	Full time maintenance workers will maintain the trails to ensure they remain in good condition. Trail maintenance will continue for the entire life of the project i.e. as long as the trails remain in use. Details of the maintenance program outlined in the OEMP.			

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BR49	Significant ground dwelling fauna	Removal of, and / or degradation to, habitat for significant ground dwelling fauna during operations phase negatively impacts on current population(s) and / or future viability of these species.	BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.	Moderate	Rare	Low	BM01	CEMP / OEMP to include independent auditing of trail construction and operation against environmental objectives and approval conditions. Independent auditor should have power to stop work / use of trails should project be non-compliant. A suitably qualified ecologist/botanist to be present during micro-siting and construction activities in sensitive areas.	Moderate	Rare	Low
			BM03	CEMP / OEMP will include procedures for flagging of the final trail alignment and demarcating environmental values to be avoided e.g. 'no-go zones' during works. Biodegradable tape will be preferentially used with any other non-biodegradable markers removed from site.				BM07	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.			
			BM02	All trail alignments and all known site-specific environmental issues will be incorporated into the WorldTrail GIS platform which will be accessible by construction crew on site at all times.				BM16	Develop and integrate a procedure to document and deal with finds into the CEMP / OEMP. Procedure will encompass: 1) Significant flora observations, 2) Significant fauna observations, 3) Discovery of nests / burrows / roosts used by native fauna, 4) Dealing with injured / killed / displaced / trapped fauna, 5) Works that encounter GDEs, seeps / springs and associated vegetation communities / species. Observations of the above will be entered into the WorldTrail GIS platform and records of significant flora, significant fauna and threatened ecological communities will be periodically uploaded to the VBA.  Where there is potential for harm of threatened species, works will be stopped until the risk of harm has been removed.			
			BM21	Project will include environmental enhancement works such as species monitoring programs and installation of nesting boxes for significant fauna.				BM76	CEMP / OEMP to include procedure for fauna entrapment. Any structures that could trap fauna must be covered, checked and an egress point provided.			
			BM17	Native vegetation allowed / assisted to regenerate within construction footprint to a 30 to 60 centimetre wide tread width.				BM05	Minimise use / removal of natural materials such as rocks, woody debris, fallen timber, organic litter during construction, operation and maintenance of trail. Natural materials would not be collected from outside of the trail construction area. Any material removed must be retained on site nearby.			
			BM19	Removal of vegetation will be to the minimum extent required, according to variable trail construction footprint which is a function of slope class. Accidental / excessive clearing will be remediated through assisted regeneration or additional offsets.				BM78	Construction and operation phase staff trained as part of site induction to identify signs of native fauna habitation including, but not limited to: 1) Lyrebird display mounds, 2) Roosting or nesting sites for forest owls, 3) Platypus burrows, 4) Habitat indicators for Curve-tail Burrowing Crayfish and Tubercle Burrowing Crayfish, 5) Burrows used by ground-dwelling fauna e.g. wombats. Training will include distribution of fact sheets including notes and photos.			
			BM20	Project will work with relevant land managers to support existing pest animal programs. Support will be provided for the entire life of the project i.e. as long as the trails remain in use.				BM30	Construction and operation phase staff trained as part of site induction to identify pest animals and signs of their presence to inform pest management program e.g. locating traps near feral cat sightings. This data will be recorded in a GIS platform for the project.			
			BM22	A comprehensive weed management program would be implemented along and in the immediate vicinity of trails. The program would be developed in consultation with land managers and would continue for as long as the trails remain in use.								
			BM10	Full time maintenance workers will maintain the trails to ensure they remain in good condition. Trail maintenance will continue for the entire life of the project i.e. as long as the trails remain in use. Details of the maintenance program outlined in the OEMP.								

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BR50	Significant flora	Operation activities resulting in negative impacts on current population(s) and / or future viability of these species via: - Direct loss of significant flora, and / or - Direct loss of, and / or degradation to, habitat for significant flora.	BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.	Moderate	Rare	Low	BM07	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.	Moderate	Rare	Low
			BM03	CEMP / OEMP will include procedures for flagging of the final trail alignment and demarcating environmental values to be avoided e.g. 'no-go zones' during works. Biodegradable tape will be preferentially used with any other non-biodegradable markers removed from site.				BM01	CEMP / OEMP to include independent auditing of trail construction and operation against environmental objectives and approval conditions. Independent auditor should have power to stop work / use of trails should project be non-compliant. A suitably qualified ecologist/botanist to be present during micro-siting and construction activities in sensitive areas.			
			BM02	All trail alignments and all known site-specific environmental issues will be incorporated into the WorldTrail GIS platform which will be accessible by construction crew on site at all times.				BM05	Minimise use / removal of natural materials such as rocks, woody debris, fallen timber, organic litter during construction, operation and maintenance of trail. Natural materials would not be collected from outside of the trail construction area. Any material removed must be retained on site nearby. Develop and integrate a procedure to document and deal with finds into the CEMP / OEMP. Procedure will encompass: 1) Significant flora observations, 2) Significant fauna observations, 3) Discovery of nests / burrows / roosts used by native fauna, 4) Dealing with injured / killed / displaced / trapped fauna, 5) Works that encounter GDEs, seeps / springs and associated vegetation communities / species. Observations of the above will be entered into the WorldTrail GIS platform and records of significant flora, significant fauna and threatened ecological communities will be periodically uploaded to the VBA.			
			BM17	Native vegetation allowed / assisted to regenerate within construction footprint to a 30 to 60 centimetre wide tread width.				BM16	Where there is potential for harm of threatened species, works will be stopped until the risk of harm has been removed. Construction and operation phase staff trained as part of site induction to identify high threat environmental weeds within the project area and to implement procedures to minimise risk of spread. Training will include distribution of fact sheets, Yarra Ranges Weed ID guide and CaLP Act obligations.			
			BM18	OEMP will include monitoring for any off-trail tracks and process for closing unauthorised trails and assisted regeneration.				BM23	CEMP / OEMP to include appropriate hygiene procedures for weeds / pathogens throughout the trail alignment.			
			BM19	Removal of vegetation will be to the minimum extent required, according to variable trail construction footprint which is a function of slope class. Accidental / excessive clearing will be remediated through assisted regeneration or additional offsets.				BM25	Construction and operation phase staff trained as part of site induction to identify signs of plant pathogens e.g. Myrtle Wilt, understand conditions that can cause spread and to implement procedures minimise risk of spread.			
			BM20	Project will work with relevant land managers to support existing pest animal programs. Support will be provided for the entire life of the project i.e. as long as the trails remain in use.				BM26	CEMP / OEMP to include procedures for minimal disturbance to suitable habitat for epiphytic / lithophytic species e.g. avoid use of boulders covered with bryophytes and / or ferns.			
			BM22	A comprehensive weed management program would be implemented along and in the immediate vicinity of trails. The program would be developed in consultation with land managers and would continue for as long as the trails remain in use.				BM63	Construction and operation phase staff informed as part of site induction regarding potential presence of significant flora species (including epiphytic / lithophytic species) in order to minimise risk of damage to species or suitable habitat.			
			BM24	Avoid disturbance to the ground surface in areas known to contain invasive weeds and pathogens (including Myrtle Wilt) wherever possible. In high risk areas a suitably qualified ecologist will accompany trail crew to identify weed species and key areas to avoid. High risk areas will be mapped prior to construction.				BM64	Construction and operation phase staff trained as part of site induction to identify any additional high-risk habitats for rare or threatened flora e.g. wet gullies, rainforests, etc. Training will include distribution of fact sheets including notes and photos.			
			BM28	Any fill material introduced to the National Park must be certified clean and be weed and pathogen free and exhibit similar properties to local natural soils e.g. pH, drainage, texture. Any fill material introduced to the State Forest will be undertaken according to DELWP FFM procedures and exhibit similar properties to local natural soils e.g. pH, drainage, texture. Fill areas should be monitored for germination of weeds.				BM65	Construction and operation phase staff trained as part of site induction to identify pest animals and signs of their presence to inform pest management program e.g. locating traps near feral cat sightings. This data will be recorded in a GIS platform for the project.			
			BM29	Minimise the introduction of fill material for the construction and ongoing management of the trail.				BM30				







Risk ID	Ecological value(s)	Risk pathway	Mitigation measure ID	Mitigation measure	Consequence	Likelihood	Initial risk	Mitigation measure ID	Additional mitigation measures	Consequence	Likelihood	Residual risk
BR52	Terrestrial fauna	Breaks in vegetation connectivity creates additional movement corridors for animals that compete with and / or predate native fauna negatively impacting on current population and future viability of those species.	BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.	Moderate	Unlikely	Medium	BM07	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.	Moderate	Unlikely	Medium
			BM03	CEMP / OEMP will include procedures for flagging of the final trail alignment and demarcating environmental values to be avoided e.g. 'no-go zones' during works. Biodegradable tape will be preferentially used with any other non-biodegradable markers removed from site.				BM05	Minimise use / removal of natural materials such as rocks, woody debris, fallen timber, organic litter during construction, operation and maintenance of trail. Natural materials would not be collected from outside of the trail construction area. Any material removed must be retained on site nearby.			
			BM17	Native vegetation allowed / assisted to regenerate within construction footprint to a 30 to 60 centimetre wide tread width.				BM34	All watercourse crossings must be inspected and maintained by a suitably qualified person as per GTM05 (GHD 2021).			
			BM18	OEMP will include monitoring for any off-trail tracks and process for closing unauthorised trails and assisted regeneration.				BM78	Construction and operation phase staff trained as part of site induction to identify signs of native fauna habitation including, but not limited to: 1) Lyrebird display mounds, 2) Roosting or nesting sites for forest owls, 3) Platypus burrows, 4) Habitat indicators for Curve-tail Burrowing Crayfish and Tubercle Burrowing Crayfish, 5) Burrows used by ground-dwelling fauna e.g. wombats. Training will include distribution of fact sheets including notes and photos.			
			BM19	Removal of vegetation will be to the minimum extent required, according to variable trail construction footprint which is a function of slope class. Accidental / excessive clearing will be remediated through assisted regeneration or additional offsets.								
			BM20	Project will work with relevant land managers to support existing pest animal programs. Support will be provided for the entire life of the project i.e. as long as the trails remain in use.								
			BM21	Project will include environmental enhancement works such as species monitoring programs and installation of nesting boxes for significant fauna.								
			BM62	No removal of existing habitat trees unless deemed hazardous in which case treatment of these trees would be discussed with land manager, arborist & ecologist e.g. habitat pruning of tree. Any hazardous tree considered for removal will be assumed to be a habitat tree unless deemed otherwise.								
			BM67	Native vegetation (trees including mid-storey species) removal is subject to the following constraints: 1) No trees (including mid-storey trees) with DBH > 10 centimetres are to be removed in the National Park (unless condition 3) applies). 2) Within State Forest trees < 20 centimetres DBH in single age stands of Eucalyptus spp. and mid-storey (i.e. regrowth following bushfire) may be removed. 3) Excluding areas of suitable habitat for Leadbeater's Possum, any small dead trees (< 20 centimetres DBH) within 2 metres of the trail may require removal if significant defects are identified. Such trees would be felled and kept nearby as habitat logs (coarse woody debris).								
			BM69	Minimise impacts to trees through micrositing and adequate implementation of sympathetic mitigation measures outlined in Treelogic (2021).								
BM72	All large hollow-bearing canopy trees (dead and alive) are to be retained with no substantial works encroachment that would compromise the health and viability of such trees.											



Risk ID	Ecological value(s)	Risk pathway	Mitigation measure ID	Mitigation measure	Consequence	Likelihood	Initial risk	Mitigation measure ID	Additional mitigation measures	Consequence	Likelihood	Residual risk
BR53	Terrestrial fauna, Aquatic fauna	Operation activities, including inappropriate timing, lighting, noise, vibrations and / or air quality, negatively impacting on current population(s) and / or future viability of these species via: - Injury / displacement / mortality / entrapment of native fauna, or - Direct loss of, and / or degradation to, habitat for native fauna, or - Disturbance to native fauna life-cycle activities e.g. resting, foraging, breeding.	BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.				BM07	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.			
			BM02	All trail alignments and all known site-specific environmental issues will be incorporated into the WorldTrail GIS platform which will be accessible by construction crew on site at all times.				BM16	Develop and integrate a procedure to document and deal with finds into the CEMP / OEMP. Procedure will encompass: 1) Significant flora observations, 2) Significant fauna observations, 3) Discovery of nests / burrows / roosts used by native fauna, 4) Dealing with injured / killed / displaced / trapped fauna, 5) Works that encounter GDEs, seeps / springs and associated vegetation communities / species. Observations of the above will be entered into the WorldTrail GIS platform and records of significant flora, significant fauna and threatened ecological communities will be periodically uploaded to the VBA.			
			BM03	CEMP / OEMP will include procedures for flagging of the final trail alignment and demarcating environmental values to be avoided e.g. 'no-go zones' during works. Biodegradable tape will be preferentially used with any other non-biodegradable markers removed from site.				BM73	No construction activities at night. No use of trail infrastructure in the National Park at night. Night riding allowed for selected trails within State Park.			
			BM21	Project will include environmental enhancement works such as species monitoring programs and installation of nesting boxes for significant fauna.				BM75	Construction or maintenance activities, particularly in proximity to the Yarra River or sensitive areas within Yarra Ranges National Park, to use slow-start construction measures to enable both aquatic and terrestrial fauna time to disperse.			
			BM36	No instream works within Yarra River to minimise disturbance and alterations to existing conditions.				BM77	Management of potential impacts from noise, vibrations and air quality as outlined in NM01 to NM06 in AECOM (2021a) and AM01 to AM07 AECOM (2021b). In addition to these measures, project activities should minimise amount of equipment / machinery in use at any one time to reduce intensity of noise, vibrations and / or reduced air quality.			
			BM72	All large hollow-bearing canopy trees (dead and alive) are to be retained with no substantial works encroachment that would compromise the health and viability of such trees.				BM78	Construction and operation phase staff trained as part of site induction to identify signs of native fauna habitation including, but not limited to: 1) Lyrebird display mounds, 2) Roosting or nesting sites for forest owls, 3) Platypus burrows, 4) Habitat indicators for Curve-tail Burrowing Crayfish and Tubercle Burrowing Crayfish, 5) Burrows used by ground-dwelling fauna e.g. wombats. Training will include distribution of fact sheets including notes and photos.			
			BM17	Native vegetation allowed / assisted to regenerate within construction footprint to a 30 to 60 centimetre wide tread width.				BM05	Minimise use / removal of natural materials such as rocks, woody debris, fallen timber, organic litter during construction, operation and maintenance of trail. Natural materials would not be collected from outside of the trail construction area. Any material removed must be retained on site nearby.			

Risk ID	Ecological value(s)	Risk pathway	Mitigation measure ID	Mitigation measure	Consequence	Likelihood	Initial risk	Mitigation measure ID	Additional mitigation measures	Consequence	Likelihood	Residual risk
			<b>BM18</b>	OEMP will include monitoring for any off-trail tracks and process for closing unauthorised trails and assisted regeneration.	Moderate	Likely	High	<b>BM76</b>	CEMP / OEMP to include procedure for fauna entrapment. Any structures that could trap fauna must be covered, checked and an egress point provided.	Moderate	Possible	Medium
			<b>BM19</b>	Removal of vegetation will be to the minimum extent required, according to variable trail construction footprint which is a function of slope class. Accidental / excessive clearing will be remediated through assisted regeneration or additional offsets.				<b>BM23</b>	Construction and operation phase staff trained as part of site induction to identify high threat environmental weeds within the project area and to implement procedures to minimise risk of spread. Training will include distribution of fact sheets, Yarra Ranges Weed ID guide and CaLP Act obligations.			
			<b>BM20</b>	Project will work with relevant land managers to support existing pest animal programs. Support will be provided for the entire life of the project i.e. as long as the trails remain in use.				<b>BM25</b>	CEMP / OEMP to include appropriate hygiene procedures for weeds / pathogens throughout the trail alignment.			
			<b>BM22</b>	A comprehensive weed management program would be implemented along and in the immediate vicinity of trails. The program would be developed in consultation with land managers and would continue for as long as the trails remain in use.				<b>BM35</b>	All watercourses are designated no-go zones during construction and operations unless works are required directly in / adjacent to watercourse.			
			<b>BM69</b>	Minimise impacts to trees through micro-siting and adequate implementation of sympathetic mitigation measures outlined in Treelogic (2021).				<b>BM30</b>	Construction and operation phase staff trained as part of site induction to identify pest animals and signs of their presence to inform pest management program e.g. locating traps near feral cat sightings. This data will be recorded in a GIS platform for the project.			
			<b>BM62</b>	No removal of existing habitat trees unless deemed hazardous in which case treatment of these trees would be discussed with land manager, arborist & ecologist e.g. habitat pruning of tree. Any hazardous tree considered for removal will be assumed to be a habitat tree unless deemed otherwise.								



Risk ID	Ecological value(s)	Risk pathway	Mitigation measure ID	Mitigation measure	Consequence	Likelihood	Initial risk	Mitigation measure ID	Additional mitigation measures	Consequence	Likelihood	Residual risk
BR54	Terrestrial flora	Operation activities resulting in negative impacts on current population(s) and / or future viability of these species via: - Direct loss of non-significant flora, or - Direct loss of, and / or degradation to, habitat for non-significant flora.	BM04	CEMP / OEMP will set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP will include monitoring, reporting, auditing and complaint management processes.	Moderate	Rare	Low	BM07	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications must be appointed to assist with inductions and to provide ecological advice throughout the course of the project.	Moderate	Rare	Low
			BM03	CEMP / OEMP will include procedures for flagging of the final trail alignment and demarcating environmental values to be avoided e.g. 'no-go zones' during works. Biodegradable tape will be preferentially used with any other non-biodegradable markers removed from site.				BM01	CEMP / OEMP to include independent auditing of trail construction and operation against environmental objectives and approval conditions. Independent auditor should have power to stop work / use of trails should project be non-compliant. A suitably qualified ecologist/botanist to be present during micro-siting and construction activities in sensitive areas.			
			BM02	All trail alignments and all known site-specific environmental issues will be incorporated into the WorldTrail GIS platform which will be accessible by construction crew on site at all times.				BM05	Minimise use / removal of natural materials such as rocks, woody debris, fallen timber, organic litter during construction, operation and maintenance of trail. Natural materials would not be collected from outside of the trail construction area. Any material removed must be retained on site nearby.			
			BM17	Native vegetation allowed / assisted to regenerate within construction footprint to a 30 to 60 centimetre wide tread width.				BM63	CEMP / OEMP to include procedures for minimal disturbance to suitable habitat for epiphytic / lithophytic species e.g. avoid use of boulders covered with bryophytes and / or ferns.			
			BM18	OEMP will include monitoring for any off-trail tracks and process for closing unauthorised trails and assisted regeneration.				BM23	Construction and operation phase staff trained as part of site induction to identify high threat environmental weeds within the project area and to implement procedures to minimise risk of spread. Training will include distribution of fact sheets, Yarra Ranges Weed ID guide and CaLP Act obligations.			
			BM19	Removal of vegetation will be to the minimum extent required, according to variable trail construction footprint which is a function of slope class. Accidental / excessive clearing will be remediated through assisted regeneration or additional offsets.				BM25	CEMP / OEMP to include appropriate hygiene procedures for weeds / pathogens throughout the trail alignment.			
			BM20	Project will work with relevant land managers to support existing pest animal programs. Support will be provided for the entire life of the project i.e. as long as the trails remain in use.				BM26	Construction and operation phase staff trained as part of site induction to identify signs of plant pathogens e.g. Myrtle Wilt, understand conditions that can cause spread and to implement procedures minimise risk of spread.			
			BM22	A comprehensive weed management program would be implemented along and in the immediate vicinity of trails. The program would be developed in consultation with land managers and would continue for as long as the trails remain in use.								
			BM24	Avoid disturbance to the ground surface in areas known to contain invasive weeds and pathogens (including Myrtle Wilt) wherever possible. In high risk areas a suitably qualified ecologist will accompany trail crew to identify weed species and key areas to avoid. High risk areas will be mapped prior to construction.								
			BM28	Any fill material introduced to the National Park must be certified clean and be weed and pathogen free and exhibit similar properties to local natural soils e.g. pH, drainage, texture. Any fill material introduced to the State Forest will be undertaken according to DELWP FFM procedures and exhibit similar properties to local natural soils e.g. pH, drainage, texture. Fill areas should be monitored for germination of weeds.								
			BM29	Minimise the introduction of fill material for the construction and ongoing management of the trail.								



## Appendix 2 Flora and threatened communities

The following abbreviations and symbols are relevant to this Appendix:

Code	Meaning	Reference
<b>National listings (EPBC Act)</b>		
<b>CR</b>	Critically endangered	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act)
<b>EN</b>	Endangered	
<b>VU</b>	Vulnerable	
<b>PMST</b>	Protected Matters Search Tool	
<b>State listings (FFG Act and Advisory List)</b>		
<b>L</b>	Listed as threatened	Victorian <i>Flora and Fauna Guarantee Act 1988</i> (FFG Act)
<b>P</b>	Protected species (public land only)	
<b>N</b>	Nominated for listing as threatened	
<b>I</b>	Determined ineligible for listing	
<b>D</b>	Delisted	
<b>Cr</b>	Critically endangered	Victorian <i>Flora and Fauna Guarantee Act 1988</i> (FFG Act), noting these status levels have been updated from DELWP's Advisory List of Rare or Threatened Plants in Victoria (DEPI 2014a). Advisory lists are still used in the Guidelines.
<b>e</b>	Endangered	
<b>v</b>	Vulnerable	
<b>r</b>	Rare	
<b>k</b>	Poorly known	
<b>HIM</b>	Habitat importance maps	
<b>Noxious weed status (CaLP Act)</b>		
<b>SP</b>	State prohibited species	Victorian <i>Catchment and Land Protection Act 1994</i> (CaLP Act)
<b>RP</b>	Regionally prohibited species	
<b>RC</b>	Regionally controlled species	
<b>R</b>	Restricted species	
<b>Other</b>		
<b>#</b>	Native species outside its natural range	Victorian Biodiversity Atlas (VBA)

## A2.1 Flora species recorded from the project area

Table A2.1 Flora species recorded from the project area

Status Adv/F FG	Scientific name	Common name	Recorded by Practical Ecology (2019)	Recorded by Biosis (2020/21)
<b>Indigenous species</b>				
	<i>Acacia dealbata</i>	Silver Wattle	Y	Y
P	<i>Acacia frigescens</i>	Frosted Wattle		Y
P	<i>Acacia genistifolia</i>	Spreading Wattle	Y	Y
P	<i>Acacia mearnsii</i>	Black Wattle		Y
	<i>Acacia melanoxylon</i>	Blackwood	Y	Y
P	<i>Acacia mucronata</i> subsp. <i>longifolia</i>	Narrow-leaf Wattle	Y	Y
P	<i>Acacia myrtifolia</i>	Myrtle Wattle	Y	
P	<i>Acacia obliquinervia</i>	Mountain Hickory Wattle	Y	Y
P	<i>Acacia oxycedrus</i>	Spike Wattle		Y
P	<i>Acacia stricta</i>	Hop Wattle	Y	
P	<i>Acacia verticillata</i>	Prickly Moses	Y	Y
P	<i>Acacia verticillata</i> subsp. <i>cephalantha</i>	Needle-leaf Prickly Moses		Y
	<i>Acaena echinata</i>	Sheep's Burr	Y	
	<i>Acaena novae-zelandiae</i>	Bidgee-widgee	Y	Y
P	<i>Acrotriche prostrata</i>	Trailing Ground-berry	Y	
P	<i>Acrotriche serrulata</i>	Honey-pots	Y	Y
P	<i>Adiantum aethiopicum</i>	Common Maidenhair	Y	Y
	<i>Amperea xiphoclada</i> var. <i>xiphoclada</i>	Broom Spurge		Y
P	<i>Anogramma leptophylla</i>	Annual Fern	Y	
	<i>Arthropodium strictum</i> s.l.	Chocolate Lily	Y	
P	<i>Asperula gunnii</i>	Mountain Woodruff	Y	
P	<i>Asperula polymera</i>	Forest Woodruff		Y
P	<i>Asplenium gracillimum</i>	Mother Spleenwort		Y
	<i>Astrotricha asperifolia</i> subsp. <i>1</i>	Rough Star-hair		Y
	<i>Astrotricha</i> spp.	Star Hair	Y	
	<i>Atherosperma moschatum</i> subsp. <i>moschatum</i>	Southern Sassafras		Y
	<i>Australina pusilla</i> subsp. <i>muelleri</i>	Shade Nettle	Y	Y
	<i>Austrocynoglossum latifolium</i>	Forest Hound's-tongue		Y
	<i>Austrostipa</i> spp.	Spear Grass		Y
	<i>Banksia marginata</i>	Silver Banksia		Y
I	<i>Banksia spinulosa</i> var. <i>cunninghamii</i>	Hairpin Banksia		Y
	<i>Bauera rubioides</i>	Wiry Bauera	Y	
P	<i>Bedfordia arborescens</i>	Blanket Leaf	Y	Y
	<i>Billardiera macrantha</i>	Purple Apple-berry		Y
	<i>Billardiera mutabilis</i>	Common Apple-berry	Y	Y
	<i>Billardiera</i> spp.	Apple Berry		Y

Status Adv/F FG	Scientific name	Common name	Recorded by Practical Ecology (2019)	Recorded by Biosis (2020/21)
P	<i>Blechnum cartilagineum</i>	Gristle Fern	Y	Y
P	<i>Blechnum chambersii</i>	Lance Water-fern	Y	Y
P	<i>Blechnum fluviatile</i>	Ray Water-fern	Y	Y
P	<i>Blechnum nudum</i>	Fishbone Water-fern	Y	Y
P	<i>Blechnum wattsii</i>	Hard Water-fern	Y	Y
	<i>Bossiaea prostrata</i>	Creeping Bossiaea	Y	
	<i>Burchardia umbellata</i>	Milkmaids	Y	Y
	<i>Bursaria spinosa</i> subsp. <i>spinosa</i>	Sweet Bursaria	Y	Y
	<i>Caesia parviflora</i>	Pale Grass-lily		Y
P	<i>Caladenia</i> spp.	Caladenia	Y	
	<i>Callistemon pallidus</i>	Lemon Bottlebrush	Y	Y
P	<i>Calochilus robertsonii</i> s.l.	Purple Beard-orchid	Y	
P	<i>Calochlaena dubia</i>	Common Ground-fern		Y
	<i>Calystegia marginata</i>	Forest Bindweed		Y
	<i>Cardamine</i> spp.	Bitter Cress		Y
	<i>Carex appressa</i>	Tall Sedge	Y	Y
	<i>Carex austroflaccida</i>	Mountain Hook-sedge		Y
	<i>Carex breviculmis</i>	Common Grass-sedge		Y
P	<i>Cassinia aculeata</i> subsp. <i>aculeata</i>	Common Cassinia	Y	Y
P	<i>Cassinia longifolia</i>	Shiny Cassinia	Y	Y
P	<i>Cassinia trinerva</i>	Three-nerved Cassinia		Y
	<i>Cassytha glabella</i>	Slender Dodder-laurel		Y
	<i>Cassytha pubescens</i> s.s.	Downy Dodder-laurel		Y
P	<i>Chiloglottis cornuta</i>	Green Bird-orchid		Y
P, L r/v	<i>Chiloglottis jeanesii</i>	Mountain Bird-orchid		Y
P	<i>Chiloglottis</i> spp.	Bird Orchid		Y
P	<i>Chiloglottis valida</i>	Common Bird-orchid	Y	Y
	<i>Clematis aristata</i>	Mountain Clematis	Y	Y
	<i>Comesperma volubile</i>	Love Creeper		Y
	<i>Coprosma hirtella</i>	Rough Coprosma	Y	Y
	<i>Coprosma nitida</i>	Shining Coprosma		Y
	<i>Coprosma quadrifida</i>	Prickly Currant-bush	Y	Y
P	<i>Coronidium scorpioides</i> s.s.	Button Everlasting	Y	Y
P	<i>Correa lawrenceana</i>	Mountain Correa	Y	
P	<i>Correa lawrenceana</i> var. <i>latrobeana</i>	Mountain Correa		Y
P	<i>Correa reflexa</i>	Common Correa		Y
P	<i>Correa reflexa</i> var. <i>reflexa</i>	Common Correa	Y	
P	<i>Corybas</i> spp.	Helmet Orchid	Y	
P	<i>Cryptostylis subulata</i>	Large Tongue-orchid		Y
P	<i>Cyathea australis</i>	Rough Tree-fern	Y	Y
	<i>Cyatophorum bulbosum</i>	False Fern Moss		Y



Status Adv/F FG	Scientific name	Common name	Recorded by Practical Ecology (2019)	Recorded by Biosis (2020/21)
	<i>Cynoglossum suaveolens</i>	Sweet Hound's-tongue		Y
	<i>Dampiera stricta</i>	Blue Dampiera	Y	
	<i>Deyeuxia quadriseta</i>	Reed Bent-grass	Y	
	<i>Deyeuxia rodwayi</i>	Tasman Bent-grass		Y
	<i>Dianella revoluta s.l.</i>	Black-anther Flax-lily	Y	Y
	<i>Dianella tasmanica</i>	Tasman Flax-lily	Y	Y
	<i>Dichelachne crinita</i>	Long-hair Plume-grass	Y	
	<i>Dichondra repens</i>	Kidney-weed	Y	Y
P	<i>Dicksonia antarctica</i>	Soft Tree-fern	Y	Y
	<i>Dillwynia cinerascens s.l.</i>	Grey Parrot-pea	Y	
	<i>Dillwynia phylloides</i>	Small-leaf Parrot-pea		Y
	<i>Dillwynia sericea</i>	Showy Parrot-pea	Y	
	<i>Dillwynia</i> spp.	Parrot Pea		Y
P	<i>Diplazium australe</i>	Austral Lady-fern		Y
P	<i>Dipodium roseum s.l.</i>	Rosy Hyacinth-orchid		Y
	<i>Drosera auriculata</i>	Tall Sundew		Y
	<i>Drosera peltata s.l.</i>	Pale Sundew	Y	
	<i>Drosera</i> spp.	Sundew		Y
	<i>Dryopoa dives</i>	Giant Mountain-grass	Y	Y
	<i>Echinopogon ovatus</i>	Hedgehog Grass		Y
P	<i>Epacris impressa</i>	Common Heath	Y	Y
	<i>Eucalyptus baxteri s.l.</i>	Brown Stringybark		Y
	<i>Eucalyptus cephalocarpa s.l.</i>	Silver-leaf Stringybark	Y	
	<i>Eucalyptus cypellocarpa</i>	Mountain Grey-gum	Y	Y
	<i>Eucalyptus delegatensis</i> subsp. <i>delegatensis</i>	Alpine Ash	Y	Y
	<i>Eucalyptus dives</i>	Broad-leaf Peppermint		Y
	<i>Eucalyptus goniocalyx s.l.</i>	Bundy	Y	
	<i>Eucalyptus macrorhyncha</i>	Red Stringybark		Y
	<i>Eucalyptus nitens</i>	Shining Gum	Y	Y
	<i>Eucalyptus obliqua</i>	Messmate Stringybark	Y	Y
	<i>Eucalyptus ovata</i>	Swamp Gum	Y	
	<i>Eucalyptus radiata</i> subsp. <i>radiata</i>	Narrow-leaf Peppermint	Y	Y
	<i>Eucalyptus regnans</i>	Mountain Ash	Y	Y
	<i>Eucalyptus sieberi</i>	Silvertop Ash	Y	Y
	<i>Eucalyptus viminalis</i> subsp. <i>viminalis</i>	Manna Gum	Y	Y
P	<i>Euchiton japonicus s.s.</i>	Creeping Cudweed		Y
P	<i>Euchiton</i> spp.	Cudweed		Y
	<i>Exocarpos cupressiformis</i>	Cherry Ballart	Y	Y
	<i>Gahnia radula</i>	Thatch Saw-sedge	Y	Y
	<i>Gahnia sieberiana</i>	Red-fruit Saw-sedge	Y	Y
	<i>Galium binifolium</i>	Reflexed Bedstraw	Y	

Status Adv/F FG	Scientific name	Common name	Recorded by Practical Ecology (2019)	Recorded by Biosis (2020/21)
	<i>Galium gaudichaudii</i>	Rough Bedstraw	Y	
	<i>Galium leiocarpum</i>	Maori Bedstraw		Y
	<i>Galium</i> spp.	Bedstraw		Y
P	<i>Gastrodia</i> spp.	Potato Orchid		Y
P	<i>Gaultheria appressa</i>	Wax-berry		Y
	<i>Geranium gardneri</i>	Rough Crane's-bill		Y
	<i>Geranium potentilloides</i>	Soft Crane's-bill		Y
	<i>Geranium</i> spp.	Crane's Bill		Y
P	<i>Glossodia major</i>	Wax-lip Orchid	Y	
	<i>Glycine clandestina</i>	Twining Glycine	Y	Y
	<i>Glycine microphylla</i>	Small-leaf Glycine		Y
	<i>Gonocarpus humilis</i>	Shade Raspwort	Y	Y
	<i>Gonocarpus micranthus</i>	Creeping Raspwort	Y	
	<i>Gonocarpus tetragynus</i>	Common Raspwort	Y	Y
	<i>Goodenia hederacea</i> subsp. <i>hederacea</i>	Ivy Goodenia		Y
	<i>Goodenia lanata</i>	Trailing Goodenia	Y	
	<i>Goodenia ovata</i>	Hop Goodenia	Y	Y
	<i>Goodia lotifolia</i> s.l.	Golden Tip		Y
	<i>Gratiola peruviana</i>	Austral Brooklime	Y	
	<i>Hackelia latifolia</i>	Forest Hound's-tongue	Y	
	<i>Hackelia suaveolens</i>	Sweet Hound'stongue	Y	
	<i>Hakea decurrens</i> subsp. <i>physocarpa</i>	Bushy Needlewood		Y
	<i>Hakea</i> spp.	Hakea		Y
P	<i>Hardenbergia violacea</i>	Purple Coral-pea	Y	
	<i>Hedycarya angustifolia</i>	Austral Mulberry		Y
P	<i>Histiopteris incisa</i>	Bat's Wing Fern	Y	Y
	<i>Hovea heterophylla</i>	Common Hovea	Y	Y
	<i>Hydrocotyle algida</i>	Mountain Pennywort		Y
	<i>Hydrocotyle geraniifolia</i>	Forest Pennywort	Y	Y
	<i>Hydrocotyle hirta</i>	Hairy Pennywort	Y	Y
	<i>Hydrocotyle laxiflora</i>	Stinking Pennywort	Y	
P	<i>Hymenophyllum australe</i>	Austral Filmy-fern		Y
P	<i>Hymenophyllum cupressiforme</i>	Common Filmy-fern		Y
P	<i>Hymenophyllum flabellatum</i>	Shiny Filmy-fern		Y
	<i>Hypericum gramineum</i>	Small St John's Wort	Y	Y
	<i>Hypericum japonicum</i>	Matted St John's Wort	Y	
P	<i>Hypolepis rugosula</i>	Ruddy Ground-fern		Y
	<i>Isolepis inundata</i>	Swamp Club-sedge		Y
	<i>Isolepis</i> spp.	Club Sedge		Y
	<i>Juncus alexandri</i> subsp. <i>alexandri</i>	Mountain Rush		Y
	<i>Juncus bufonius</i>	Toad Rush		Y

Status Adv/F FG	Scientific name	Common name	Recorded by Practical Ecology (2019)	Recorded by Biosis (2020/21)
k/-	<i>Kunzea leptospermoides</i>	Yarra Burgan	Y	Y
P	<i>Lagenophora stipitata s.l.</i>	Common Bottledaisy	Y	Y
P	<i>Lagenophora sublyrata</i>	Slender Bottle-daisy	Y	
r	<i>Leionema bilobum</i> subsp. <i>serrulatum</i>	Toothed Leionema		Y
	<i>Lepidosperma elatius</i>	Tall Sword-sedge	Y	Y
	<i>Lepidosperma gunnii</i>	Slender Sword-sedge	Y	
	<i>Lepidosperma laterale</i>	Variable Sword-sedge	Y	Y
	<i>Lepidosperma</i> spp.	Sword Sedge		Y
P	<i>Leptinella filicula</i>	Mountain Cotula		Y
	<i>Leptospermum continentale</i>	Prickly Tea-tree	Y	Y
	<i>Leptospermum grandifolium</i>	Mountain Tea-tree		Y
	<i>Leptospermum lanigerum</i>	Woolly Tea-tree	Y	
	<i>Leptostigma breviflorum</i>	Mountain Nertera		Y
	<i>Leptostigma reptans</i>	Dwarf Nertera		Y
P	<i>Leucopogon virgatus</i>	Common Beard-heath	Y	
	<i>Libertia pulchella</i>	Pretty Grass-flag		Y
P	<i>Lindsaea linearis</i>	Screw Fern		Y
	<i>Lobelia rhombifolia</i>	Tufted Lobelia	Y	
	<i>Lobelia simplicicaulis</i>	Narrow Lobelia		Y
	<i>Lomandra filiformis</i> subsp. <i>coriacea</i>	Wattle Mat-rush	Y	
	<i>Lomandra filiformis</i> subsp. <i>filiformis</i>	Wattle Mat-rush	Y	Y
	<i>Lomatia fraseri</i>	Tree Lomatia		Y
	<i>Lomatia ilicifolia</i>	Holly Lomatia	Y	Y
	<i>Luzula meridionalis</i> var. <i>flaccida</i>	Common Woodrush		Y
	<i>Luzula</i> spp.	Woodrush		Y
	<i>Mentha laxiflora</i>	Forest Mint	Y	Y
	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass	Y	Y
P	<i>Microsorium pustulatum</i> subsp. <i>pustulatum</i>	Kangaroo Fern		Y
P	<i>Monotoca scoparia</i>	Prickly Broom-heath		Y
	<i>Myrsine howittiana</i>	Mutton-wood		Y
	<i>Notelaea ligustrina</i>	Privet Mock-olive	Y	
	<i>Nothofagus cunninghamii</i>	Myrtle Beech	Y	Y
P	<i>Notogrammitis billardierei</i>	Common Finger-fern	Y	Y
P	<i>Olearia argophylla</i>	Musk Daisy-bush	Y	Y
P	<i>Olearia lirata</i>	Snowy Daisy-bush	Y	Y
P	<i>Olearia phlogopappa</i>	Dusty Daisy-bush	Y	Y
P	<i>Olearia rugosa</i>	Wrinkled Daisy-bush	Y	
	<i>Opercularia varia</i>	Variable Stinkweed	Y	
	<i>Oreomyrrhis eriopoda</i>	Australian Caraway		Y
P	<i>Orthoceras strictum</i>	Horned Orchid		Y
	<i>Oxalis exilis</i>	Shade Wood-sorrel	Y	Y

Status Adv/F FG	Scientific name	Common name	Recorded by Practical Ecology (2019)	Recorded by Biosis (2020/21)
	<i>Oxalis</i> spp.	Wood Sorrel		Y
	<i>Pandorea pandorana</i> subsp. <i>pandorana</i>	Wonga Vine	Y	Y
	<i>Parsonsia brownii</i>	Twining Silkpod		Y
	<i>Pelargonium inodorum</i>	Kopata	Y	Y
	<i>Pelargonium</i> spp.	Stork's Bill		Y
P	<i>Pellaea falcata</i> s.l.	Sickle Fern	Y	
L v/e	<i>Persoonia arborea</i>	Tree Geebung		Y
L r/e	<i>Phebalium squamulosum</i> subsp. <i>squamulosum</i>	Forest Phebalium	Y	Y
P	<i>Philotheca myoporoides</i> subsp. <i>myoporoides</i>	Long-leaf Wax-flower		Y
	<i>Phyllanthus</i> spp.	Spurge		Y
	<i>Pimelea axiflora</i> subsp. <i>axiflora</i>	Bootlace Bush	Y	Y
	<i>Pimelea humilis</i>	Common Rice-flower	Y	Y
	<i>Pimelea ligustrina</i>	Tall Rice-flower	Y	Y
	<i>Pittosporum bicolor</i>	Banyalla		Y
	<i>Pittosporum undulatum</i>	Sweet Pittosporum	Y	Y
	<i>Plantago debilis</i>	Shade Plantain	Y	Y
	<i>Plantago varia</i>	Variable Plantain	Y	Y
	<i>Platylobium formosum</i> spp. agg.	Handsome Flat-pea	Y	
L r/e	<i>Platylobium reflexum</i>	Victorian Flat-pea		Y
	<i>Poa ensiformis</i>	Sword Tussock-grass	Y	Y
	<i>Poa labillardierei</i>	Common Tussock-grass	Y	
	<i>Poa sieberiana</i>	Grey Tussock-grass		Y
	<i>Poa tenera</i>	Slender Tussock-grass	Y	
	<i>Podolobium alpestre</i>	Alpine Podolobium		Y
	<i>Polyscias sambucifolia</i>	Elderberry Panax	Y	Y
	<i>Polyscias sambucifolia</i> subsp. 1	Broad-leaf Panax	Y	Y
	<i>Polyscias sambucifolia</i> subsp. 3	Mountain Panax	Y	Y
P	<i>Polystichum proliferum</i>	Mother Shield-fern	Y	Y
	<i>Pomaderris aspera</i>	Hazel Pomaderris	Y	Y
	<i>Pomaderris elliptica</i> var. <i>elliptica</i>	Smooth Pomaderris	Y	
	<i>Poranthera microphylla</i> s.l.	Small Poranthera	Y	Y
P	<i>Prasophyllum flavum</i>	Yellow Leek-orchid		Y
P	<i>Prasophyllum odoratum</i> s.l.	Scented Leek-orchid		Y
P	<i>Prostanthera lasianthos</i> var. <i>lasianthos</i>	Victorian Christmas-bush	Y	Y
P	<i>Prostanthera rotundifolia</i>	Round-leaf Mint-bush		Y
	<i>Pteridium esculentum</i> subsp. <i>esculentum</i>	Austral Bracken	Y	Y
P	<i>Pterostylis</i> spp.	Greenhood		Y
	<i>Pultenaea daphnoides</i>	Large-leaf Bush-pea		Y

Status Adv/F FG	Scientific name	Common name	Recorded by Practical Ecology (2019)	Recorded by Biosis (2020/21)
	<i>Pultenaea forsythiana</i>	Prickly Bush-pea	Y	Y
	<i>Pultenaea gunnii</i> subsp. <i>gunnii</i>	Golden Bush-pea	Y	Y
	<i>Pultenaea scabra</i>	Rough Bush-pea	Y	Y
	<i>Pultenaea</i> spp.	Bush-pea		Y
	<i>Ranunculus lappaceus</i>	Australian Buttercup	Y	
	<i>Ranunculus</i> spp.	Buttercup	Y	
	<i>Rhynchospora procumbens</i>	White Marianth		Y
	<i>Rubus parvifolius</i>	Small-leaf Bramble	Y	Y
P	<i>Rumohra adiantiformis</i>	Leathery Shield-fern		Y
	<i>Rytidosperma pallidum</i>	Silvertop Wallaby-grass	Y	Y
	<i>Rytidosperma racemosum</i> var. <i>racemosum</i>	Slender Wallaby-grass	Y	
	<i>Sambucus gaudichaudiana</i>	White Elderberry	Y	Y
P	<i>Senecio glomeratus</i>	Annual Fireweed	Y	
P	<i>Senecio hispidulus</i> s.l.	Rough Fireweed	Y	Y
P	<i>Senecio linearifolius</i>	Fireweed Groundsel	Y	Y
P	<i>Senecio minimus</i>	Shrubby Fireweed	Y	Y
P	<i>Senecio prenanthoides</i>	Beaked Fireweed		Y
P	<i>Senecio</i> spp.	Groundsel		Y
P	<i>Senecio velleioides</i>	Forest Groundsel		Y
P	<i>Sigesbeckia orientalis</i> subsp. <i>orientalis</i>	Indian Weed	Y	Y
	<i>Solanum prinophyllum</i>	Forest Nightshade	Y	Y
	<i>Spyridium parvifolium</i>	Dusty Miller	Y	Y
	<i>Stackhousia monogyna</i> s.l.	Creamy Stackhousia	Y	Y
	<i>Stellaria flaccida</i>	Forest Starwort	Y	Y
P	<i>Stylidium</i> spp.	Trigger Plant		Y
	<i>Tasmania lanceolata</i>	Mountain Pepper	Y	Y
	<i>Tetrarrhena juncea</i>	Forest Wire-grass	Y	Y
	<i>Tetradlea ciliata</i>	Pink-bells	Y	Y
	<i>Tetradlea</i> spp.	Pink Bells		Y
r	<i>Tetradlea stenocarpa</i>	Long Pink-bells	Y	
P	<i>Thelymitra media</i> s.l.	Tall Sun-orchid		Y
P	<i>Thelymitra</i> spp.	Sun Orchid		Y
	<i>Themeda triandra</i>	Kangaroo Grass	Y	
P	<i>Thysanotus tuberosus</i> subsp. <i>tuberosus</i>	Common Fringe-lily		Y
P, L r/e	<i>Tmesipteris ovata</i>	Oval Fork-fern		Y
P	<i>Todea barbara</i>	Austral King-fern	Y	Y
	<i>Urtica incisa</i>	Scrub Nettle	Y	Y
	<i>Veronica calycina</i>	Hairy Speedwell	Y	
	<i>Veronica derwentiana</i>	Derwent Speedwell	Y	
	<i>Veronica notabilis</i>	Forest Speedwell	Y	Y

Status Adv/F FG	Scientific name	Common name	Recorded by Practical Ecology (2019)	Recorded by Biosis (2020/21)
	<i>Veronica plebeia</i>	Trailing Speedwell	Y	Y
	<i>Veronica serpyllifolia</i>	Thyme Speedwell		Y
	<i>Viola eminens</i>	Tall Violet		Y
	<i>Viola hederacea sensu Entwisle (1996)</i>	Ivy-leaf Violet	Y	Y
	<i>Wahlenbergia</i> spp.	Bluebell	Y	Y
	<i>Wahlenbergia stricta</i> subsp. <i>stricta</i>	Tall Bluebell		Y
P	<i>Xanthorrhoea minor</i> subsp. <i>lutea</i>	Small Grass-tree		Y
	<i>Xanthosia dissecta</i> s.l.	Cut-leaf Xanthosia	Y	Y
	<i>Xanthosia tridentata</i>	Hill Xanthosia		Y
	<i>Zieria arborescens</i> subsp. <i>arborescens</i>	Stinkwood	Y	Y
<b>Introduced species</b>				
	<i>Acacia decurrens</i>	Early Black-wattle		Y
	<i>Acacia elata</i>	Cedar Wattle		Y
	<i>Acer negundo</i>	Box-elder Maple		Y
	<i>Agrostis capillaris</i>	Brown-top Bent		Y
	<i>Aira elegantissima</i>	Delicate Hair-grass		Y
	<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass	Y	Y
	<i>Arctotheca calendula</i>	Cape Weed	Y	
R	<i>Asparagus scandens</i>	Asparagus Fern	Y	Y
	<i>Briza maxima</i>	Large Quaking-grass		Y
	<i>Briza minor</i>	Lesser Quaking-grass		Y
	<i>Cardamine hirsuta</i> s.l.	Common Bitter-cress		Y
	<i>Centaureum erythraea</i>	Common Centaury		Y
	<i>Cerastium glomeratum</i> s.l.	Common Mouse-ear Chickweed		Y
	<i>Cestrum elegans</i>	Elegant Poison-berry		Y
RC	<i>Cirsium vulgare</i>	Spear Thistle	Y	Y
RC	<i>Conium maculatum</i>	Hemlock	Y	
	<i>Crepis capillaris</i>	Smooth Hawksbeard		Y
	<i>Cyperus eragrostis</i>	Drain Flat-sedge		Y
	<i>Digitalis purpurea</i>	Foxglove	Y	Y
	<i>Ehrharta erecta</i>	Panic Veldt-grass		Y
	<i>Galium aparine</i>	Cleavers	Y	Y
	<i>Gamochaeta</i> spp.	American Cudweed		Y
	<i>Hedera helix</i>	English Ivy		Y
	<i>Holcus lanatus</i>	Yorkshire Fog		Y
RC	<i>Hypericum androsaemum</i>	Tutsan		Y
	<i>Hypochaeris glabra</i>	Smooth Cat's-ear	Y	
	<i>Hypochaeris radicata</i>	Flatweed	Y	Y
	<i>Ilex aquifolium</i>	English Holly	Y	Y
	<i>Lonicera japonica</i>	Japanese Honeysuckle	Y	
	<i>Lysimachia arvensis</i>	Pimpernel		Y

Status Adv/F FG	Scientific name	Common name	Recorded by Practical Ecology (2019)	Recorded by Biosis (2020/21)
	<i>Malus pumila</i>	Apple		Y
	<i>Myosotis sylvatica</i>	Wood Forget-me-not	Y	
	<i>Pinus radiata</i>	Radiata Pine		Y
	<i>Plantago coronopus</i>	Buck's-horn Plantain	Y	
	<i>Plantago lanceolata</i>	Ribwort	Y	
	<i>Plantago major</i>	Greater Plantain		Y
	<i>Poa annua s.s.</i>	Annual Meadow-grass		Y
	<i>Potentilla indica</i>	Indian Strawberry		Y
	<i>Prunella vulgaris</i>	Self-heal		Y
	<i>Ranunculus repens</i>	Creeping Buttercup		Y
RC	<i>Rubus anglocandicans</i>	Common Blackberry		Y
RC	<i>Rubus laciniatus</i>	Cut-leaf Bramble		Y
RC	<i>Senecio jacobaea</i>	Ragwort	Y	Y
	<i>Solanum mauritianum</i>	Wild Tobacco Tree	Y	Y
	<i>Taraxacum officinale</i> spp. agg.	Garden Dandelion		Y
	<i>Trifolium repens</i> var. <i>repens</i>	White Clover		Y
	<i>Trifolium</i> spp.	Clover	Y	Y
	<i>Veronica peregrina</i> subsp. <i>xalapensis</i>	Wandering Speedwell		Y
	<i>Viola riviniana</i>	Common Dog-violet		Y
	<i>Zantedeschia aethiopica</i>	White Arum-lily	Y	

## A2.2 Listed flora species

The following table includes the listed flora species that have potential to occur within the project area. The list of species is sourced from the VBA and PMST (accessed on 20 May 2021). Where years are specified for the most recent database records, these refer to records from the VBA unless otherwise specified. Where no year is specified, the PMST has predicted that the species has potential to occur. A proportion of the flora habitat descriptions have been reproduced with permission from the Royal Botanic Gardens Victoria (RBGV 2020).

**Table A2.2 Listed flora species recorded or predicted to occur within 10 km of the project area**

Scientific name	Common name	Conservation status				Most recent database record	Other records	Habitat description	Likely occurrence in project area	Rationale for likelihood ranking
		EPBC	VIC Adv	FFG Protected	FFG					
<b>National significance</b>										
<i>Amphibromus fluitans</i>	River Swamp Wallaby-grass	VU			I		PMST	Swampy areas, mainly along the Murray River between Wodonga and Echuca with scattered records from southern Victoria.	<b>Negligible</b>	No suitable habitat within project area. No records within 10 km of project area.



Scientific name	Common name	Conservation status				Most recent database record	Other records	Habitat description	Likely occurrence in project area	Rationale for likelihood ranking
		EPBC	VIC Adv	FFG Protected	FFG					
<i>Astelia australiana</i>	Tall Astelia	VU	v	P	L cr	2019	PMST, HIM	Cool temperate rainforest in gullies on undulating, upland plateaus; typically in association with Myrtle Beech <i>Nothofagus cunninghamii</i> . Confined to a few gully-heads and stream margins in the Powelltown-Beenak district (upper Latrobe and Bunyip River catchments, Tomahawk Creek), and a similar site near Lavers Hill in the Otways.	<b>Medium</b>	Suitable rainforest habitat within project area however not known from Mount Donna Buang. The three recent records (2016 & 2019) are all over 9 km from the project area. The closest record (1980) is 7.5 km from the project area.
<i>Callitris oblonga</i> subsp. <i>oblonga</i>	Dwarf Cypress-pine	EN				2008		Records for Victoria are introductions.	<b>Negligible</b>	Records for Victoria are introductions.

Scientific name	Common name	Conservation status				Most recent database record	Other records	Habitat description	Likely occurrence in project area	Rationale for likelihood ranking
		EPBC	VIC Adv	FFG Protected	FFG					
<i>Dianella amoena</i>	Matted Flax-lily	EN	e	P	L cr	2006	PMST	Lowland grassland and grassy woodland, on well-drained to seasonally waterlogged fertile sandy loam soils to heavy cracking clays.	<b>Negligible</b>	No suitable lowland grassy woodland habitat within project area as most native vegetation is wet forest and foothill forest habitat. Single record (2006) over 3 km from edge of project area.
<i>Eucalyptus crenulata</i>	Buxton Gum	EN	e	P	L e		PMST	Confined to swampy sites in foothills just north and south of the Great Dividing Range, near Buxton, Narbethong and Yarra Glen.	<b>Negligible</b>	Project area outside known range of the species.
<i>Eucalyptus strzeleckii</i>	Strzelecki Gum	VU	v	P	L cr		PMST	Ridges, slopes and along the banks of streams on deep, fertile loam soils that are seasonally waterlogged; less commonly found on undulating or flat terrain.	<b>Negligible</b>	Project area outside known distribution. Species apparently restricted to western section of Strzelecki Range with isolated records from the Otway Ranges (Brooker & Slee 1996). No records within 10 km of project area.
<i>Glycine latrobeana</i>	Clover Glycine	VU	v	P	L v		PMST	Grasslands and grassy woodlands, particularly those dominated by Kangaroo Grass.	<b>Negligible</b>	No suitable habitat within project area. No records within 10 km of project area.

Scientific name	Common name	Conservation status				Most recent database record	Other records	Habitat description	Likely occurrence in project area	Rationale for likelihood ranking
		EPBC	VIC Adv	FFG Protected	FFG					
<i>Nematolepis wilsonii</i>	Shiny Nematolepis	VU	v	P	L cr		PMST	Endemic in Victoria, known from only two populations between Cambarville (near Lake Mountain) and Warburton, in ecotones between <i>Eucalyptus regnans</i> forest and <i>Nothofagus cunninghamii</i> cool temperate rainforest.	<b>Low</b>	Suitable habitat present but species has extremely restricted distribution and no records within 10 km of the project area.
<i>Pomaderris vacciniifolia</i>	Round-leaf Pomaderris	CR	e	P	L cr	2012	PMST, HIM	Endemic in Victoria. Largely confined to moist forest and scrubs in the upper catchment of the Yarra, Plenty and Yea Rivers in an area bounded by Healesville, Marysville and Whittlesea, but also in the Tyers-Walhalla areas.	<b>High</b>	Three recent records (2011 & 2012) within 500 m of project area. Practical Ecology recorded ten individuals at one location outside of assessment corridor but within 5 km of the project area (PE 2019).
<i>Prasophyllum frenchii</i>	Maroon Leek-orchid	EN	e	P	L e		PMST	Occurs in grassland, heathland and open forest on well-drained or water-retentive sand or clay loams.	<b>Negligible</b>	No suitable habitat within project area. No records within 10 km of project area.

Scientific name	Common name	Conservation status				Most recent database record	Other records	Habitat description	Likely occurrence in project area	Rationale for likelihood ranking
		EPBC	VIC Adv	FFG Protected	FFG					
<i>Prasophyllum morganii</i>	Mignonette Leek-orchid	VU	x	P	L x		PMST	Known from only one location near Cobungra in Snow Gum open forest at about 1000 m ASL. Presumed to be extinct.	<b>Negligible</b>	No suitable habitat within project area. No records within 10 km of project area.
<i>Pterostylis chlorogramma</i>	Green-striped Greenhood	VU	v	P	L e		PMST	Grows in moist areas of heathy and shrubby forest, on well-drained soils.	<b>Low</b>	Small areas of suitable habitat may be present on western slopes of Mt Bride near Hey Hey My My mountain bike trail. No records of the species within 10 km of the project area.
<i>Senecio psilocarpus</i>	Swamp Fireweed	VU	v	P			PMST	Seasonally inundated herb-rich swamps, growing on peaty soils or volcanic clays.	<b>Negligible</b>	No suitable habitat within project area. No records within 10 km of project area.
<i>Xerochrysum palustre</i>	Swamp Everlasting	VU	v	P	L cr		PMST	Sedge-swamps and shallow freshwater marshes and swamps in lowlands, on black cracking clay soils.	<b>Negligible</b>	No suitable habitat within project area. No records within 10 km of project area.

Scientific name	Common name	Conservation status				Most recent database record	Other records	Habitat description	Likely occurrence in project area	Rationale for likelihood ranking
		EPBC	VIC Adv	FFG Protected	FFG					
<b>State significance</b>										
<i>Abrodictyum caudatum</i>	Jungle Bristle-fern		r	P	Le	2015	HIM	Rainforest environments where it grows on the trunks of tree ferns, particularly <i>Cyathea australis</i> .	<b>High</b>	Three recent records between 2012 and 2015 within the project area.
<i>Acacia howittii</i>	Sticky Wattle		r	P	Lv	2015		Moist forest. Natural occurrences are confined to South Gippsland and Central Highlands.	<b>Negligible</b>	Project area is well outside natural range for the species. Commonly planted as an ornamental and is naturalising in some areas of Victoria including the Yarra Ranges (VicFlora 2018b).
<i>Acacia leprosa</i> var. <i>uninervia</i>	Large-leaf Cinnamon-wattle		r	P	Le	2011	HIM	Eucalyptus forest in ranges northeast of Melbourne and near Mt Buffalo, with scattered occurrences west toward Ballarat.	<b>Medium</b>	Suitable habitat present. Fifty seven recent records within 10 km of project area. The closest record (2011) is 3 km from project area.

Scientific name	Common name	Conservation status				Most recent database record	Other records	Habitat description	Likely occurrence in project area	Rationale for likelihood ranking
		EPBC	VIC Adv	FFG Protected	FFG					
<i>Acacia nanodealbata</i>	Dwarf Silver-wattle		r	P	L v	1972		A range of vegetation communities including wet forests, dry forests, heathy woodlands and grassy woodlands.	<b>Medium</b>	Suitable habitat present and the species is known from forests in the Healesville-Warburton area (VicFlora 2020). No records of the species within the project area. The closest, and most recent, record (1972) is over 8 km from the project area.
<i>Acacia stictophylla</i>	Dandenong Wattle		r	P	L e	2018		Hillsides in tall Eucalyptus forest or open woodlands on sandy loam or clay soils and sometimes in wet riparian vegetation.	<b>Negligible</b>	Restricted to the Dandenong Ranges (VicFlora 2018c).
<i>Acrobolbus cinerascens</i>	Grey Pouchwort		v		L cr		HIM	Epiphytic or log-dwelling rainforest liverwort with shoots scarcely over 1mm wide (UTAS 2019a).	<b>Medium</b>	Suitable rainforest habitat present. The species is tiny and easily overlooked so absence of local database records does not necessarily support low likelihood of occurrence.

Scientific name	Common name	Conservation status				Most recent database record	Other records	Habitat description	Likely occurrence in project area	Rationale for likelihood ranking
		EPBC	VIC Adv	FFG Protected	FFG					
<i>Adelanthus bisetulus</i>	Twin-tooth Featherwort		r		L e	1987		Species to favours twigs in wet forest and can be a rather inconspicuous species (UTAS 2019b).	<b>Medium</b>	Suitable habitat present. Single record within 10 km of the project area (1987) is 9 km south east of project area.
<i>Asterolasia asteriscophora</i> subsp. <i>albiflora</i>	White Star-bush		e	P	L cr		HIM	Scattered dry woodlands, shrublands and moist to wet heathy open-forests. Usually in foothill to montane districts.	<b>Negligible</b>	Well outside known range as species is extremely geographically restricted to Emerald-Monbulk area of the southern Dandenong Ranges (VicFlora 2017).
<i>Asterophora mirabilis</i>	Grey Jockey		r		L e	1986		Only found on old, blackened fruit-bodies of agarics in the family Russulaceae, in the cool temperate rainforests of Victoria and Tasmania (Fungimap 2018a).	<b>Low</b>	No records within 10 km of the project area since 1986.
<i>Austrostipa rudis</i> subsp. <i>australis</i>	Veined Spear-grass		r		L e	2005	HIM	Cooler areas of moderate altitude, in open-forest on sandy or sandstone derived soils.	<b>High</b>	Suitable habitat present. Two records (2005) within the project area.

Scientific name	Common name	Conservation status				Most recent database record	Other records	Habitat description	Likely occurrence in project area	Rationale for likelihood ranking
		EPBC	VIC Adv	FFG Protected	FFG					
<i>Banksia canei</i>	Mountain Banksia		r		L cr		HIM	Scattered sporadically through higher parts (mostly 1000–1500 m) of eastern Victoria and sometimes locally plentiful. Found mostly on dry, rocky ridges, in open-forest or subalpine Mallee scrubs.	<b>Negligible</b>	No suitable habitat within project area. No records within 10 km of project area.
<i>Billardiera scandens</i> s.s.	Velvet Apple-berry		r		L e	1987		Apparently uncommon in Victoria, occurring chiefly in dry open-forests and woodlands in the north-east (Beechworth, Whitfield etc.), with isolated occurrences near Mt Macedon, Eltham-Hurstbridge area, Eildon and Orbost.	<b>Low</b>	Only two records from 1987, both of which are in the project area.
<i>Bossiaea cordigera</i>	Wiry Bossiaea		r		L e	2007	HIM	Moist habitats in heathland, heathy woodland and open-forest.	<b>High</b>	Three recent records between 2005 and 2007 all of which are within the project area.



Scientific name	Common name	Conservation status				Most recent database record	Other records	Habitat description	Likely occurrence in project area	Rationale for likelihood ranking
		EPBC	VIC Adv	FFG Protected	FFG					
<i>Bossiaea riparia</i>	River Leafless Bossiaea		r		L e	1900		Grows on streambanks and in moist and dry situations in dry sclerophyll forest, often at fairly high altitudes.	<b>Low</b>	No records within 10 km of project area since 1900.
<i>Caladenia flavovirens</i>	Christmas Spider-orchid		r	P	L cr	2016		Heathy woodland and moist foothill forest.	<b>Medium</b>	Suitable habitat present. Recent record (2016) within 4 km of project area.
<i>Calochilus imberbis</i>	Naked Beard-orchid		r	P	L cr	1980		Mainly found in heath, heathy woodlands and lowland forests. Coextensive with <i>C. robertsonii</i> .	<b>Medium</b>	Suitable habitat present and a cryptic species. Single record within project area from 1980.
<i>Calypstrochaeta brownii</i>	Brown's Mitre-moss		r		L e	2010	HIM	Uncommon in wet-sclerophyll forest and cool-temperate rainforest in the Otways, the Yarra Ranges and near Mount Baw Baw.	<b>Medium</b>	Suitable wet sclerophyll forest habitat present. A total of seven records within 10 km of project area including one recent record (2010) over 9 km from project area.
<i>Carex alsophila</i>	Forest Sedge		r		L e	2016	HIM	Endemic in Victoria, occurring in mountain gullies and swamps.	<b>High</b>	Five recent records between 2012 and 2016 within project area.

Scientific name	Common name	Conservation status				Most recent database record	Other records	Habitat description	Likely occurrence in project area	Rationale for likelihood ranking
		EPBC	VIC Adv	FFG Protected	FFG					
<i>Chiastocaulon biserialis</i>	Olive Featherwort		r		L cr	1953		A small leafy liverwort often growing epiphytically in clumps on rainforest trees.	<b>Low</b>	No records within 10 km of the project area since 1953.
<i>Chiloglottis jeansii</i>	Mountain Bird-orchid		r	P	L v	2016	HIM	Fern gullies and wet sclerophyll forests. Often grows with <i>Chiloglottis cornuta</i> and <i>C. valida</i> .	<b>Recorded</b>	Recorded by Biosis during November 2020 field investigations (Trail 49 and 51 area). Recent record from 2016 within project area.
<i>Chlorovibrissea bicolor</i>	Two-tone Vibrissea		r		L e	1990		On logs in running water in wet forests of south-eastern Australia (Fungimap 2018b).	<b>Medium</b>	Suitable habitat present. Single record within project area from 1990.
<i>Correa reflexa</i> var. <i>lobata</i>	Powelltown Correa		r	P	L e	2019	HIM	Endemic to Victoria, where locally common in moist, often heathy, open-forest from the Dandenong Ranges to near Powelltown, with an isolated occurrence in Cranbourne.	<b>Medium</b>	Suitable habitat present. One recent record (2019) within 4 km of project area. Remaining five local records from 1979-80.

Scientific name	Common name	Conservation status				Most recent database record	Other records	Habitat description	Likely occurrence in project area	Rationale for likelihood ranking
		EPBC	VIC Adv	FFG Protected	FFG					
<i>Corybas aconitiflorus</i>	Spurred Helmet-orchid		r	P	L e	2008		Localized and uncommon in southern parts of eastern Victoria with isolated westerly occurrences near Portland and Edenhope. Colonies grow in sheltered positions, often on damp sand under ferns or shrubs. Found in coastal scrubs, heath, heathy woodland and moist foothill forest in damp, shady sites.	<b>Medium</b>	Suitable habitat present. Recent record (2008) is 7.2 km north-west of project area at Coranderrk Nature Conservation Reserve.
<i>Corybas grumulus</i>	Mountain Helmet-orchid		r	P	L e	2004		Found in mountain forests of eastern Victoria, often in fern gullies and wet sclerophyll forests growing in rich mountain loam or on rotting logs or treefern trunks.	<b>Medium</b>	Suitable habitat present. Single record from 2004 within 3 km of project area.

Scientific name	Common name	Conservation status				Most recent database record	Other records	Habitat description	Likely occurrence in project area	Rationale for likelihood ranking
		EPBC	VIC Adv	FFG Protected	FFG					
<i>Cyathea cunninghamii</i>	Slender Tree-fern		v	P	L cr	1989	HIM	Deep loamy humus soils on the banks of sheltered gullies in wet, hilly regions.	<b>Medium</b>	Two records (1981) within project area though, as deep gullies are uncommon, it is likely there are only a few individuals present. The species takes between 25 - 30 years to reach a mature height of between 7 - 8 m (DPIPWE 2006). The species has been recorded up to 20 m tall so the individuals in recorded in the project area are likely to still be present (FPA 2011).

Scientific name	Common name	Conservation status				Most recent database record	Other records	Habitat description	Likely occurrence in project area	Rationale for likelihood ranking
		EPBC	VIC Adv	FFG Protected	FFG					
<i>Cyathea x marcescens</i>	Skirted tree-fern		v	P		N/A (see rationale)		Wet, sheltered gullies. Thought to be a sterile hybrid between <i>C. australis</i> and <i>C. cunninghamii</i>	<b>Low</b>	Could be present due to presence of <i>C. australis</i> and <i>C. cunninghamii</i> within project area however deep gullies, which may support <i>C. cunninghamii</i> are uncommon and thus opportunities for hybridisation would be rare. Closest records to project area are more than 20 km south-west around Mt Dandenong. Practical Ecology (2019) determined Moderate based on suitable habitat and records within 5 km of their study site (which must have been a much broader area though it is not geographically defined in their report).
<i>Dicranoloma platycaulon</i>	Wavy Fork-moss		r		L e	2011	HIM	Grows primarily as an epiphyte on rainforest or wet forest trees.	<b>High</b>	Five recent records (2011) all within project area.

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<i>Distichophyllum crispulum</i>	Crisped Mitre-moss		r		L e	2011	HIM	Occurs in tropical and temperate rainforest, wet-sclerophyll forests, generally in shaded moist areas, and especially on tree ferns, rocks, rotting wood, tree roots, and creek and earth banks (Streimann 2012).	<b>High</b>	Sixteen recent records (2011) all within project area.
<i>Diuris punctata</i> var. <i>punctata</i>	Purple Diuris		v	P	L e	1892		Fertile, loamy soils and periodically wet areas in lowland grasslands, grassy woodlands, heathy woodlands and open heathlands.	<b>Negligible</b>	No suitable habitat within project area. No records within 10 km of project area since 1892.
<i>Echinodium hispidum</i>	Madeira Moss		r		L v	1966		Confined to the Australasian region where found in south-eastern Australia, New Zealand and New Caledonia where the species grows in southern temperate rainforests to semi-tropical forests (Stech et al. 2008).	<b>Medium</b>	Suitable habitat present. Two records (1908 & 1966) both approximately 7 km outside of project area.

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		EPBC	VIC Adv	FFG Protected	FFG					
<i>Epacris rhombifolia</i>	Mountain Coral Heath		r	P	L e		HIM	Known in Victoria from subalpine wet heaths near Lake Mountain (Mt Bullfight, Blue Range), Mt Baw Baw and surrounds, and the Snowy Range north of Licola.	<b>Negligible</b>	No suitable habitat within project area. No records within 10 km of project area.
<i>Eucalyptus</i> aff. <i>camphora</i> (Upper Yarra)	Upper Yarra Swamp-gum		e			2007		In mountainous country east and north from Melbourne. Known to occur around Yarra Junction.	<b>High</b>	Recorded three times within the project area between 2005 to 2007.
<i>Eucalyptus cypellocarpa</i> x <i>goniocalyx</i> [ <i>Eucalyptus</i> aff. <i>goniocalyx</i> (Dandenong Ranges)]	Tremont Bundy		v				HIM	A naturally occurring hybrid between <i>Eucalyptus goniocalyx</i> and <i>E. cypellocarpa</i> found in the Tremont area of the Dandenong Ranges.	<b>Negligible</b>	Outside known range as species is geographically restricted to Tremont area of the southern Dandenong Ranges (YRSC 2021b).

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		EPBC	VIC Adv	FFG Protected	FFG					
<i>Eucalyptus denticulata</i>	Errinundra Shining Gum		r		L e		HIM	Chiefly in well-watered ranges in east Gippsland, e.g. on the Errinundra Plateau, Mt Kaye, Mt Tennyson. Other populations occur within the distribution of Shining Gum <i>Eucalyptus nitens</i> .	<b>Low</b>	Suitable habitat may be present in the project area but no records within 10 km of project area and project area outside known range of the species.
<i>Eucalyptus fulgens</i>	Green Scentbark		r		L e	2019	HIM	Forests and woodlands of the Gippsland Plain and adjacent foothills.	<b>High</b>	Five recent records between 2005-2017 within project area.
<i>Eucalyptus ignorabilis</i> s.s.	Grey Scentbark		r		L v	2005		Occurring sporadically, east from Erica, mainly on sandy, well-watered soils. .	<b>Medium</b>	Suitable habitat present. Recorded in 2005 6.5 km south of project area in Damp Forest (EVC 29) on the northern slopes of Mount Beenak west of Powelltown.
<i>Fissidens dealbatus</i>	Nerveless Pocket-moss		r		L e	1965		Semi-aquatic on rocks or terrestrial in damp places (Seppelt & Stone 2016).	<b>Low</b>	No records within 10 km of the project area since 1965.



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<i>Gahnia grandis</i>	Brickmaker's Sedge		v		L e		HIM	Found in damp shaded sites beside streams and swamps, but recorded in Victoria only from Gembrook-Beenak area and the northern part of Wilsons Promontory.	<b>Low</b>	Suitable habitat may be present in small sections of the project area but no records within 10 km of project area and project area outside known range of the species.
<i>Goodia pubescens</i>	Silky Golden-tip		r		L e	2016	HIM	Wet and dry sclerophyll forests.	<b>High</b>	Suitable habitat present. One recent record (2016) within project area.
<i>Grevillea repens</i>	Creeping Grevillea		r	P	L e	1906		Rather rare, with disjunct occurrences in mountains north-east and north-west of Melbourne: i.e. between Mt Disappointment and Healesville (Mt Slide form), and near Daylesford. Grows in moist to well-drained situations in shallow clayey soils in dry sclerophyll forest.	<b>Low</b>	Suitable habitat present on some lower slopes of project area. Species known from two disjunct locations. Most recent record of species within 10 km of the project area is from 1906.
<i>Hampeella alaris</i>	Arc Moss		r		L e	1982		In cool-temperate rainforest in the Otways, Yarra Ranges and Strzelecki Ranges.	<b>Medium</b>	Suitable habitat present. Single record (1982) 7 km from project area.

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		EPBC	VIC Adv	FFG Protected	FFG					
<i>Hypocreopsis amplexans</i>	Clasping Hypocreopsis		v	P	L cr	2018		On dead and living branches of tea-tree, paperbark and banksia in long-unburnt stands in Victoria (Fungimap 2018c).	<b>Medium</b>	Three recent records from 2017-2018 within 4 km of project area.
<i>Isolepis wakefieldiana</i>	Tufted Club-sedge		r		L e	1979	HIM	Scattered in cooler areas.	<b>Low</b>	No records within 10 km of the project area since 1979.
<i>Lastreopsis hispida</i>	Bristly Shield-fern		r	P	L e	1977	HIM	Shaded, wet mountain gullies occurring on deep loamy and organic soils or rotting logs.	<b>Low</b>	No records within 10 km of the project area since 1977.
<i>Leionema bilobum</i> subsp. <i>serrulatum</i>	Toothed Leionema		r			2016	HIM	Woodlands on sandstone-derived soils in the Grampians, and in the east of Melbourne on loamy granitic soils in mountain forests.	<b>Recorded</b>	Recorded by Biosis during November 2020 field investigations. Two recent records from 2012 & 2015 within project area.

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		EPBC	VIC Adv	FFG Protected	FFG					
<i>Lindsaea microphylla</i>	Lacy Wedge-fern		r	P	L e	1993	HIM	Relatively widely distributed in East Gippsland, it is rare and localized throughout the rest of its Victorian range. It grows naturally in heath and open-forest, but also in man-made excavations, and is often hidden and perhaps supported by undergrowth.	<b>Medium</b>	Suitable habitat present. Single record from 1993 within the project area.
<i>Mitrasacme polymorpha</i>	Varied Mitrewort		r		L e	1979	HIM	Restricted in Victoria, but locally common in near-coastal heaths in the far east (Mallacoota area), apparently also at Wilsons Promontory.	<b>Low</b>	No records within 10 km of the project area since 1979.
<i>Notogrammitis angustifolia</i> subsp. <i>nothofagei</i>	Beech Finger-fern		v	P	L e	1999	HIM	Wet forests in sheltered mountain gullies. Grows on rocks, logs or trunks of trees and shrubs (but rarely on tree ferns).	<b>Medium</b>	Suitable habitat present. Single record from 1999 within the project area.

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		EPBC	VIC Adv	FFG Protected	FFG					
<i>Oxalis magellanica</i>	Snowdrop Wood-sorrel		r	P	L e	1987		Rare in Victoria where recorded from tall mountain forests, cool-temperate rainforest and <i>Eucalyptus pauciflora</i> woodlands.	<b>Low</b>	Suitable habitat present. Two records within 10 km of project area. 1987 record is 3 km from project area and 1972 record is within the project area.
<i>Ozothamnus rogersianus</i>	Nunniong Everlasting		r	P	L e	2006	HIM	Moist foothill forests, and subalpine woodlands or shrublands. Known from only 4 geographically and ecologically disjunct areas-moist foothill forests of the western Otway Range and East Warburton area, and subalpine woodlands or shrublands of Mt Wellington and the Nunniong Plateau.	<b>Medium</b>	Suitable habitat may be present in small sections of the project area. In the Yarra Ranges the species occurs in areas of Montane Damp Forest (EVC 38) dominated by Narrow-leaf Peppermint <i>Eucalyptus radiata</i> (YRSC 2021a). A total of five records within 10 km of the project area with one recent record (2006) 7.5 km from project area.

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<i>Persoonia arborea</i>	Tree Geebung		v		L e	2021	HIM	Confined to wet montane forests of the Yarra, Thomson, Latrobe and Bunyip River watersheds and sometimes locally common.	<b>Recorded</b>	Practical Ecology (2019) encountered this species numerous times nearby, but not within, the assessment corridor. Five database records within the project area from 2006 - 2015. Biosis also recorded this species in November 2020/July 2021 between Mount Donna Buang, Mount Victoria, Ben Cairn areas.
<i>Phebalium squamulosum</i> subsp. <i>squamulosum</i>	Forest Phebalium		r		L e	1998	HIM	Scattered in foothill to montane forests from Healesville area eastwards to the New South Wales border, often on shallow rocky soils.	<b>Recorded</b>	Recorded by Practical Ecology (2019) and Biosis during November 2020 field investigations (Trail 42 area).
<i>Pittosporum bicolor</i> x <i>undulatum</i>	Hybrid Pittosporum		r			2019		Wet forests and coastal scrubs.	<b>Medium</b>	Suitable habitat present. Three records in total within 10 km of project area with one recent (2019) 6 km from project area.

Scientific name	Common name	Conservation status				Most recent database record	Other records	Habitat description	Likely occurrence in project area	Rationale for likelihood ranking
		EPBC	VIC Adv	FFG Protected	FFG					
<i>Platylobium reflexum</i>	Victorian Flat-pea		r		L e	2019		Common in tall wet forest in ranges east of Melbourne and the in the Otways.	<b>Recorded</b>	Recorded by Biosis during November 2020 field investigations. Twenty recent records from 2008 to 2021 within 10 km of project area. Highly abundant in the Yarra State Forest area.
<i>Pomaderris pilifera</i> subsp. <i>pilifera</i>	Striped Pomaderris		r		L e	2003		Occurs in hill country woodlands and open forests on well-drained clay loams.	<b>High</b>	Suitable habitat present. Single recent record (2003) within project area.
<i>Pteris epaleata</i>	Netted Brake		r	P	L e	N/A (see rationale)		Although restricted in distribution in Victoria, it is often locally abundant and conspicuous, favouring seepages, stream banks and damp flats in shady forests (e.g. Beech Forest in the Otway Range, Dandenong Ranges where rare, Wilsons Promontory, etc.)	<b>Low</b>	Small areas of suitable habitat may be present. Closest records to project area are more than 20 km south-west around Mt Dandenong. Practical Ecology (2019) rated likelihood as moderate based on partially suitable habitat and 11 records (Mt Dandenong) within their much broader study site up to 2000.

Scientific name	Common name	Conservation status				Most recent database record	Other records	Habitat description	Likely occurrence in project area	Rationale for likelihood ranking
		EPBC	VIC Adv	FFG Protected	FFG					
<i>Pterostylis X ingens</i>	Sharp Greenhood		r	P	L v	1974		Moist areas in open forest e.g. around swamps and stream banks on heavy soils. A sporadic natural hybrid between <i>Pterostylis nutans</i> and <i>P. falcata</i> , forming clonal colonies.	<b>Medium</b>	Suitable habitat present around major drainage lines in project area. Both parent species have been recorded within the project area.
<i>Pultenaea juniperina</i> s.s.	Prickly Beauty		r		L e	1904		Confined to heathland or heathy understorey in moist forest in the Grampians, with disjunct occurrence near Tonimbuk.	<b>Low</b>	No records within 10 km of the project area since 1904.
<i>Pultenaea weindorferi</i>	Swamp Bush-pea		r	P	L e	1903		Occurs in Kinglake National Park, the Dandenong Ranges and north-west of Melbourne in southern Victoria.	<b>Low</b>	No records within 10 km of the project area since 1903.
<i>Senecio campylocarpus</i>	Floodplain Fireweed		r	P	L e	2008	HIM	Clay loam soils in forests and woodlands, typically in areas that are seasonally inundated.	<b>Medium</b>	Small areas of suitable habitat may be present around the Yarra River and lower reaches of tributaries. Single recent record (2008) from Coranderrk Nature Conservation Reserve over 7 km from project area.

Scientific name	Common name	Conservation status				Most recent database record	Other records	Habitat description	Likely occurrence in project area	Rationale for likelihood ranking
		EPBC	VIC Adv	FFG Protected	FFG					
<i>Senecio distalilobatus</i>	Distal-lobe Fireweed		r	P	L v		HIM	Grows in loam soils in wet sclerophyll forests usually at altitudes over 800 m in the Great Dividing Range from the Yarra Ranges eastwards.	<b>Medium</b>	Suitable habitat present through much of project area. Closest record is over 20 km north-east of the project area near Marysville.
<i>Sticherus tener s.s.</i>	Tasman Fan-fern		r	P	L e	2015		Deep loamy soils of gullies, riverbanks and shaded, mountain slopes. Also disturbed sites, such as road cuttings and eroded banks in wetter areas.	<b>High</b>	Suitable habitat. Two recent records (2015): one in project area, the other within 2 km of the project area.
<i>Tetradlea stenocarpa</i>	Long Pink-bells		r		L e	2011	HIM	Localized near Healesville and Gembrook, on French Island and in the Pyrete Ranges north of Melton. Grows in open-forests and tall mountain forests.	<b>Recorded</b>	Recorded by Practical Ecology (2019) within HZ 45 & 52. Four recent database records within 4 km of project area.
<i>Tetradlea subaphylla</i>	Leafless Pink-bells		r		L e		HIM	Confined in Victoria to the eastern half of the State, mostly in East Gippsland where it favours rocky hillsides in tall eucalypt forest.	<b>Medium</b>	Suitable habitat present in drier sections of Shrubby Foothill Forest (EVC 45). Recent record (2012) of the species in Shrubby Foothill Forest approximately 19 km east of project area.



Scientific name	Common name	Conservation status				Most recent database record	Other records	Habitat description	Likely occurrence in project area	Rationale for likelihood ranking
		EPBC	VIC Adv	FFG Protected	FFG					
<i>Thismia rodwayi</i>	Fairy Lanterns		v	P	L e	2014	HIM	Damp humus and leaf-litter in deeply shaded tall forests and fern gullies.	<b>Medium</b>	Suitable habitat present. Four recent records within 10 km of project area. The closest record is within 4 km of project area (2002).
<i>Tmesipteris ovata</i>	Oval Fork-fern		r	P	L e	2012	HIM	An epiphytic fern growing on tree ferns <i>Cyathea</i> spp. in wet and damp forests, often on rainforest margins.	<b>Recorded</b>	Suitable habitat present. Seven recent records within 10 km of project area the closest of which is within 4 km of project area (2012). Biosis recorded this species in a wet gully in the headwaters of Edwardstown Creek (Trail 55).
<i>Tmesipteris parva</i>	Small Fork-fern		r	P	L e	2019	HIM	On tree ferns.	<b>High</b>	Suitable habitat present. Six recent records within 10 km of project area, including one from 2012 within project area.

Scientific name	Common name	Conservation status				Most recent database record	Other records	Habitat description	Likely occurrence in project area	Rationale for likelihood ranking
		EPBC	VIC Adv	FFG Protected	FFG					
<i>Utricularia gibba</i>	Floating Bladderwort		v		L e	2007		Known in Vic from a freshwater swamp and a small man-made reservoir, both in the Frankston area, where possibly introduced.	<b>High</b>	Suitable habitat present. Two records from 2007 within 500 m of project area. The origin of this species in Victoria is contentious (VicFlora 2019).
<i>Westringia senifolia</i>	Alpine Westringia		r		L e	2006	HIM	Subalpine woodlands.	<b>High</b>	Suitable habitat present. Two recent records from 2000 & 2006 within project area.
<i>Wittsteinia vacciniacea</i>	Baw Baw Berry		r		L v	1996	HIM	Locally plentiful in rainforest margins, sheltered subalpine woodland and shrubland, particularly against tree trunks and large boulders.	<b>High</b>	Suitable habitat present. Seven records all within the project area.
<i>Xanthosia leiophylla</i>	Parsley Xanthosia		r		L e		HIM	Sandy heathland and heathy woodland.	<b>Negligible</b>	No suitable habitat.

## A2.3 Threatened ecological communities

The following table includes the threatened ecological communities that have potential to occur within the project area. The list of threatened ecological communities has been compiled with reference to characteristics of FFG Act threatened communities (SAC 2013) and predictive output from the PMST (accessed on 20 May 2021).

**Table A2.3 Threatened ecological communities predicted to occur within 5 km of the project area.**

Ecological community	Status	Comments
<b>Alpine Sphagnum Bogs and Associated Fens</b>	EPBC Act endangered	Suitable sub-alpine and alpine landscape settings and vegetation communities do not occur in the project area.
<b>Alpine Bogs, Snowpatch, Fen (Bog Pool) and <i>Caltha introloba</i> communities</b>	FFG Act	
<b>Cool Temperate Rainforest</b>	FFG Act listed	Recorded in the project area.
<b>Cool Temperate Mixed Forest</b>	FFG Act listed	Recorded in the project area.

## Appendix 3 Fauna

The following abbreviations and symbols are relevant to this Appendix:

Code	Meaning	Reference
<b>National listings (EPBC Act)</b>		
EX	Extinct	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act)
CR	Critically endangered	
EN	Endangered	
VU	Vulnerable	
NT	Near threatened	
CD	Conservation dependent	
PMST	Protected Matters Search Tool	
<b>State listings (FFG Act)</b>		
ex	Extinct	Victorian <i>Flora and Fauna Guarantee Act 1988</i> (FFG Act), noting these status levels have been updated from DELWP's Advisory Lists of Threatened Fauna in Victoria (DSE 2009a; DSE 2013). Advisory lists are still used in the Guidelines.
cr	Critically endangered	
en	Endangered	
vu	Vulnerable	
HIM	Habitat importance maps	
<b>Pest animal status (CaLP Act)</b>		
PS	Declared pest animal	Victorian <i>Catchment and Land Protection Act 1994</i> (CaLP Act)
<b>Other</b>		
*	Introduced species	Victorian Biodiversity Atlas (VBA)

## A3.1 Fauna species recorded from the project area

**Table A3.1 Vertebrate fauna recorded from the project area by Biosis in November 2020 and February 2021**

Status	Common name	Scientific name
<b>Birds</b>		
	Australian Wood Duck	<i>Chenonetta jubata</i>
	Pacific Black Duck	<i>Anas superciliosa</i>
	Wedge-tailed Eagle	<i>Aquila audax</i>
	Southern Boobook	<i>Ninox boobook</i>
	Yellow-tailed Black-Cockatoo	<i>Calyptorhynchus funereus</i>
	Gang-gang Cockatoo	<i>Callocephalon fimbriatum</i>
	Sulphur-crested Cockatoo	<i>Cacatua galerita</i>
	Little Corella	<i>Cacatua sanguinea</i>
	Australian King-Parrot	<i>Alisterus scapularis</i>
	Crimson Rosella	<i>Platycercus elegans</i>
	Tawny Frogmouth	<i>Podargus strigoides</i>
	Laughing Kookaburra	<i>Dacelo novaeguineae</i>
	Sacred Kingfisher	<i>Todiramphus sanctus</i>
	Fan-tailed Cuckoo	<i>Cacomantis flabelliformis</i>
	Horsfield's Bronze-Cuckoo	<i>Chrysococcyx basalis</i>
	Shining Bronze-Cuckoo	<i>Chrysococcyx lucidus</i>
	Superb Lyrebird	<i>Menura novaehollandiae</i>
	Grey Fantail	<i>Rhipidura albiscapa</i>
	Rufous Fantail	<i>Rhipidura rufifrons</i>
	Satin Flycatcher	<i>Myiagra cyanoleuca</i>
	Flame Robin	<i>Petroica phoenicea</i>
	Eastern Yellow Robin	<i>Eopsaltria australis</i>
	Golden Whistler	<i>Pachycephala pectoralis</i>
	Rufous Whistler	<i>Pachycephala rufiventris</i>
	Olive Whistler	<i>Pachycephala olivacea</i>
	Grey Shrike-thrush	<i>Colluricincla harmonica</i>
	Eastern Whipbird	<i>Psophodes olivaceus</i>
	Black-faced Cuckoo-shrike	<i>Coracina novaehollandiae</i>
	Brown Thornbill	<i>Acanthiza pusilla</i>
	White-browed Scrubwren	<i>Sericornis frontalis</i>
	Pilotbird	<i>Pycnoptilus floccosus</i>
	Superb Fairy-wren	<i>Malurus cyaneus</i>
	White-throated Treecreeper	<i>Cormobates leucophaea</i>
	Spotted Pardalote	<i>Pardalotus punctatus</i>
	Striated Pardalote	<i>Pardalotus striatus</i>

Status	Common name	Scientific name
	Silvereye	<i>Zosterops lateralis</i>
	Eastern Spinebill	<i>Acanthorhynchus tenuirostris</i>
	Lewin's Honeyeater	<i>Meliphaga lewinii</i>
	Yellow-faced Honeyeater	<i>Caligavis chrysops</i>
	White-eared Honeyeater	<i>Nesoptilotis leucotis</i>
	Crescent Honeyeater	<i>Phylidonyris pyrrhopterus</i>
	Red Wattlebird	<i>Anthochaera carunculata</i>
	Satin Bowerbird	<i>Ptilonorhynchus violaceus</i>
	Pied Currawong	<i>Strepera graculina</i>
	Grey Currawong	<i>Strepera versicolor</i>
	Grey Butcherbird	<i>Cracticus torquatus</i>
	Australian Magpie	<i>Gymnorhina tibicen</i>
	Little Raven	<i>Corvus mellori</i>
*	Domestic Pigeon	<i>Columba livia</i>
*	Common Blackbird	<i>Turdus merula</i>
<b>Mammals</b>		
	Yellow-bellied Glider	<i>Petaurus australis</i>
	Koala	<i>Phascolarctos cinereus</i>
	Bare-nosed Wombat	<i>Vombatus ursinus</i>
	Black-tailed Wallaby	<i>Wallabia bicolor</i>
*	Sambar Deer	<i>Cervus unicolor</i>
*	Domestic Cat (feral)	<i>Felis catus</i>
*	Red Fox	<i>Vulpes vulpes</i>
<b>Reptiles</b>		
	Tiger Snake	<i>Notechis scutatus</i>
	Lowland Copperhead	<i>Austrelaps superbus</i>
<b>Frogs</b>		
	Victorian Smooth Froglet	<i>Geocrinia victoriana</i>
	Southern Brown Tree Frog	<i>Litoria ewingii</i>

## A3.2 Listed fauna species

The following table includes a list of the listed fauna species that have potential to occur within the project search area. The list of species is sourced from the VBA and PMST (accessed on 20 May 2021). Where years are specified for the most recent database records, these refer to records from the VBA unless otherwise specified. Where no year is specified, the PMST has predicted that the species has potential to occur.

**Table A3.2 Listed fauna species recorded or predicted to occur within 10 km of the project search area**

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in project area	Rationale for likelihood ranking
		EPBC	FFG					
<b>National significance</b>								
<i>Rostratula australis</i>	Australian Painted-snipe	EN	cr		PMST	Shallows of well-vegetated freshwater wetlands.	<b>Negligible</b>	No suitable habitat present and no previous local records
<i>Botaurus poiciloptilus</i>	Australasian Bittern	EN	cr	2005	PMST	Shallow freshwater and brackish wetlands with abundant emergent aquatic vegetation.	<b>Negligible</b>	No suitable habitat present
<i>Falco hypoleucos</i>	Grey Falcon	VU	vu		PMST	Lightly timbered plains and Acacia scrub.	<b>Negligible</b>	No suitable habitat present and no previous local records
<i>Lathamus discolor</i>	Swift Parrot	CR	cr	2019	PMST	A range of forests and woodlands, especially those supporting nectar-producing tree species. Also well-treed urban areas.	<b>Medium</b>	Suitable habitat present, however species is wide-ranging and unlikely to make regular use of the project area.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in project area	Rationale for likelihood ranking
		EPBC	FFG					
<i>Hirundapus caudacutus</i>	White-throated Needletail	VU	vu	2019	PMST, HIM	An almost exclusively aerial species within Australia, occurring over most types of habitat, particularly wooded areas.	<b>Medium</b>	Suitable habitat present and recently recorded, however species is wide-ranging and unlikely to make regular use of the project area.
<i>Numenius madagascariensis</i>	Eastern Curlew	CR	cr		PMST	Large intertidal sandflats, banks, mudflats, estuaries, inlets, sewage farms, saltworks, harbours, coastal lagoons and bays.	<b>Negligible</b>	No suitable habitat present.
<i>Calidris ferruginea</i>	Curlew Sandpiper	CR	cr		PMST	Large intertidal sandflats, banks, mudflats, estuaries, inlets, sewage farms, saltworks, harbours, coastal lagoons and bays.	<b>Negligible</b>	No suitable habitat present.
<i>Grantiella picta</i>	Painted Honeyeater	VU	vu		PMST	Dry open woodlands and forests. Typically forages for fruit and nectar in mistletoes and in tree canopies.	<b>Low</b>	Outside current species range, no previous local records.
<i>Anthochaera phrygia</i>	Regent Honeyeater	CR	cr	1985	PMST	A range of dry woodlands and forests dominated by nectar-producing tree species.	<b>Low</b>	Outside current species range, no recent local records.



Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in project area	Rationale for likelihood ranking
		EPBC	FFG					
<i>Lichenostomus melanops cassidix</i>	Helmeted Honeyeater	CR	cr	1997		Riparian forest at Yellingbo Nature Conservation Reserve, and an introduced colony occurs in Bunyip State Park	<b>Negligible</b>	Species is restricted to Yellingbo NCR and Bunyip State Park.
<i>Potorous tridactylus tridactylus</i>	Long-nosed Potoroo (SE mainland)	VU	vu		PMST	Forest, heathy woodlands and heathlands.	<b>Negligible</b>	Outside current species range, no previous local records.
<i>Dasyurus maculatus maculatus</i>	Spot-tailed Quoll	EN	en	2006	PMST, HIM	Rainforest and wet and dry sclerophyll forests and woodlands.	<b>Medium</b>	Suitable habitat present, however very few previous local records.
<i>Antechinus minimus maritimus</i>	Swamp Antechinus	VU	vu		PMST	Dense wet heath and heathy woodland, sedgeland and dense tussock grassland.	<b>Negligible</b>	No suitable habitat present and no previous local records.
<i>Petauroides volans</i>	Southern Greater Glider	VU	vu	2019	PMST, HIM	Wet and damp sclerophyll forest with large hollow-bearing trees.	<b>High</b>	Suitable habitat throughout the project area, numerous recent local records.
<i>Gymnobelideus leadbeateri</i>	Leadbeater's Possum	CR	cr	2020	PMST, HIM	Montane ash forest, sub-alpine Snow Gum <i>Eucalyptus pauciflora</i> woodland and lowland swamp forest in Victoria's Central Highlands.	<b>High</b>	Suitable habitat throughout the project area, numerous recent local records.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in project area	Rationale for likelihood ranking
		EPBC	FFG					
<i>Mastacomys fuscus mordicus</i>	Broad-toothed Rat	VU	vu	1991	PMST, HIM	Sub-alpine Woodland, Heathland, Sedgeland, and sedge-dominated areas within forest.	<b>Low</b>	Assessment of the project area determined that no suitable habitat is present and species is unlikely to occur.
<i>Pseudomys fumeus</i>	Smoky Mouse	EN	en		PMST, HIM	Coastal heath and heathy woodland, wet forest, sub-alpine heath and dry sclerophyll forest.	<b>Medium</b>	Suitable habitat elements present in shrubby foothill forest dominated by a diverse heathy understorey, recent records within 25 km
<i>Isoodon obesulus obesulus</i>	Southern Brown Bandicoot	EN	en	1972	PMST	Heathland, shrubland, sedgeland, heathy open forest and woodland; also exotic vegetation, such as blackberry thickets and rank grasses where native vegetation has been removed.	<b>Medium</b>	Suitable habitat present in heathy dry vegetation; some previous records to the south and west of the project area
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	VU	vu	2014	PMST, HIM	Rainforest, wet and dry sclerophyll forest, woodland and urban areas.	<b>Medium</b>	Suitable foraging habitat present, which is likely to be used on occasion by this wide-ranging species.
<i>Litoria raniformis</i>	Growling Grass Frog	VU	vu	1979	PMST	Still or slow-flowing waterbodies and surrounding terrestrial vegetation.	<b>Low</b>	No habitat present

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in project area	Rationale for likelihood ranking
		EPBC	FFG					
<i>Mixophyes balbus</i>	Southern Barred Frog	VU	cr		HIM	Permanent streams and riparian areas in temperate and sub-tropical rainforest, wet sclerophyll and forest.	<b>Negligible</b>	Only known from far East Gippsland, over 300 km from the project area.
<i>Prototroctes maraena</i>	Australian Grayling	VU	en	1995	PMST, HIM	Adults inhabit cool, clear, freshwater streams.	<b>Medium</b>	Previously recorded in the Yarra River downstream of Warburton.
<i>Galaxias rostratus</i>	Flat-headed Galaxias	CR	vu		PMST	Still or slow-moving waters of rivers, billabongs, lakes and swamps.	<b>Negligible</b>	Outside known species range, no previous local records
<i>Galaxiella pusilla</i>	Dwarf Galaxias	VU	en		PMST	Slow-flowing or still freshwater wetlands such as swamps, drains and backwaters of streams.	<b>Negligible</b>	No suitable habitat and no previous records from this catchment.
<i>Maccullochella macquariensis</i>	Trout Cod	EN	en		PMST	Streams characterised by a high abundance of large woody debris.	<b>Negligible</b>	Not within natural range and no records within the upper Yarra catchment.
<i>Maccullochella peelii</i>	Murray Cod	VU	en	1981	PMST	A diverse range of stream habitats in the Murray-Darling basin; principally the main channels of rivers and their major tributaries.	<b>Medium</b>	Populations have been successfully established in the Yarra River Catchment and may occur within the project area.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in project area	Rationale for likelihood ranking
		EPBC	FFG					
<i>Macquaria australasica</i>	Macquarie Perch	EN	en	2012	PMST	Streams with clear water and deep, rocky holes with abundant cover.	<b>Medium</b>	Populations have been successfully established in the Yarra River Catchment and may occur within the project area.
<i>Synemon plana</i>	Golden Sun Moth	CR	vu		PMST	Natural temperate grassland, grassy woodland and pasture supporting spear grasses and wallaby grasses and exotic grassland dominated by Chilean needle grass.	<b>Negligible</b>	No suitable habitat and no previous local records
<i>Thaumatoperla alpina</i>	Alpine Stonefly	EN	en	1962	HIM	In and around steep, stony and cool alpine streams.	<b>Low</b>	Project area outside current known distribution.
State significance								
<i>Synoicus chinensis</i>	King Quail		en	1981		Swampy grassland, sedgeland and heathland.	<b>Low</b>	No recent local records, species now believed to be mostly confined to French Island
<i>Geopelia cuneata</i>	Diamond Dove		vu	1981		Drier woodlands and scrub, spinifex and mulga.	<b>Negligible</b>	No recent local records, rarely recorded south of the divide
<i>Lewinia pectoralis</i>	Lewin's Rail		vu	1997		Swamps, dense riparian vegetation and saltmarsh.	<b>Low</b>	No recent local records, limited habitat present

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in project area	Rationale for likelihood ranking
		EPBC	FFG					
<i>Ardeotis australis</i>	Australian Bustard		cr	1847		Grassland, open dry woodlands of Mallee and mulga, arid heathland saltbush and bluebush.	<b>Negligible</b>	No suitable habitat and well outside species current distribution.
<i>Egretta garzetta</i>	Little Egret		en	1994		Swamps, billabongs, floodplain pools, mudflats, mangroves and channels.	<b>Medium</b>	Suitable habitat present only on Yarra River floodplain.
<i>Ardea alba modesta</i>	Eastern Great Egret		vu	2019		Flooded crops, pasture, swamps, lagoons, saltmarsh, sewage ponds, estuaries, dams, roadside ditches.	<b>Medium</b>	Suitable habitat present only on Yarra River floodplain.
<i>Aythya australis</i>	Hardhead		vu	2011		Large, deep freshwater environments with abundant aquatic vegetation, including slow moving areas of rivers.	<b>Low</b>	No suitable habitat present
<i>Oxyura australis</i>	Blue-billed Duck		vu	2018		Open or densely vegetated wetlands.	<b>Low</b>	No suitable habitat present
<i>Biziura lobata</i>	Musk Duck		vu	1992		Large, permanent swamps, lakes and estuaries with abundant aquatic vegetation.	<b>Low</b>	Limited suitable habitat and no recent local records
<i>Accipiter novaehollandiae</i>	Grey Goshawk		en	2018	HIM	Rainforest, gallery forest, tall wet forest and woodland. Also partially cleared agricultural land.	<b>High</b>	Suitable habitat present

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in project area	Rationale for likelihood ranking
		EPBC	FFG					
<i>Hieraaetus morphnoides</i>	Little Eagle		vu	2012		Woodland and open areas. Rabbits are a key component of their diet. Nesting occurs in mature trees in open woodland or riparian vegetation.	<b>Low</b>	Unlikely to occur over tall forest, however may occur over more open country around Warburton and more open areas of the Yarra Valley to the west of the project area.
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle		en	2011		Coastal areas such as beaches and estuaries, inland wetlands and major inland streams.	<b>Low</b>	Limited suitable habitat present, may traverse project area on occasion.
<i>Lophoictinia isura</i>	Square-tailed Kite		vu	2018	HIM	Eucalypt woodlands, open forest and partially cleared farmland.	<b>Low</b>	Limited habitat present and no recent local records.
<i>Falco subniger</i>	Black Falcon		cr	1999		Woodlands, open country and around terrestrial wetlands areas, including rivers and creeks. Primarily occurs in arid and semi-arid zones in the north, north-west and west of Victoria.	<b>Low</b>	No suitable habitat and few local records
<i>Ninox connivens</i>	Barking Owl		cr	2001		Eucalypt forests and woodlands.	<b>Medium</b>	Limited local records however some potential to occur in areas of drier, more open woodland and forest.
<i>Ninox strenua</i>	Powerful Owl		vu	2020	HIM	Eucalypt forests and woodlands, well-treed urban areas.	<b>High</b>	Known to occur within the local area; suitable habitat present.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in project area	Rationale for likelihood ranking
		EPBC	FFG					
<i>Tyto novaehollandiae</i>	Masked Owl		cr			A variety of lowland forests and woodlands.	<b>Medium</b>	Suitable habitat present, though no local records and few regional records
<i>Tyto tenebricosa</i>	Sooty Owl		en	2019	HIM	Tall, wet eucalypt forest and rainforest.	<b>High</b>	Known to occur within the local area; suitable habitat present.
<i>Neophema pulchella</i>	Turquoise Parrot		vu	2018		Woodlands and associated grasslands.	<b>Low</b>	Project area largely outside regular distribution, with the exception of recent records at Yellingbo. Limited suitable habitat within project area.
<i>Actitis hypoleucos</i>	Common Sandpiper		vu		PMST	Inhabits a wide variety of coastal and inland wetlands with muddy margins before departing north in March.	<b>Negligible</b>	No suitable habitat and no previous local records
<i>Tringa nebularia</i>	Common Greenshank		en		PMST	A variety of ephemeral and permanent inland wetlands and sheltered coastal wetlands.	<b>Negligible</b>	No suitable habitat and no local records
<i>Melanodryas cucullata</i>	Hooded Robin		vu	1976		Woodlands of eucalypt, Mallee, semi-cleared farmland.	<b>Low</b>	More commonly associated with drier woodland communities, not likely to occur within wet/damp forests. No recent local records.
<i>Pomatostomus temporalis</i>	Grey-crowned Babbler		vu	1958		Open forests and woodlands.	<b>Negligible</b>	No suitable habitat and no recent local records

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in project area	Rationale for likelihood ranking
		EPBC	FFG					
<i>Pyrrholaemus sagittatus</i>	Speckled Warbler		en	1896		Eucalypt woodland with rocky gullies, ridges, tussock grasses and a sparse shrub understorey.	<b>Low</b>	Outside current range and no recent local records.
<i>Climacteris affinis</i>	White-browed Treecreeper		en	2014		Tall shrubland and low woodland dominated by acacias in arid and semi-arid regions.	<b>Negligible</b>	No suitable habitat
<i>Stagonopleura guttata</i>	Diamond Firetail		vu	1980		Open forests and woodlands with a grassy ground layer.	<b>Low</b>	Lack of suitable habitat and limited local records
<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale		vu	1998		Drier sclerophyll forests and woodlands.	<b>Medium</b>	Suitable habitat present, though few local records
<i>Sminthopsis leucopus</i>	White-footed Dunnart		vu	1978		Lowland heathy woodland and forest, coastal scrub and coastal grasslands.	<b>Low</b>	Lack of suitable habitat and limited local records
<i>Ornithorhynchus anatinus</i>	Platypus		vu	2013		A variety of freshwater waterbodies, particularly those with stable banks suitable for burrows, and shallow waters for foraging.	<b>High</b>	Suitable habitat present and several previous records from the Yarra River in and around Warburton
<i>Rhinolophus megaphyllus megaphyllus</i>	Eastern Horseshoe Bat		en	1998	HIM	A variety of forests and woodlands; requires caves and mines for roosting.	<b>High</b>	Suitable habitat present, likely to forage over the project area.



Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in project area	Rationale for likelihood ranking
		EPBC	FFG					
<i>Miniopterus orianae oceanensis</i>	Common Bent-wing Bat (eastern ssp.)		cr	2000		A variety of treed and treeless habitats. Roosts in caves and man-made structures.	<b>High</b>	Suitable habitat present
<i>Varanus varius</i>	Lace Monitor		en	2006	HIM	A variety of wooded habitats, including woodlands; shelters in hollow trunks, limbs and logs.	<b>High</b>	Suitable habitat present, several local records in similar habitat
<i>Lissolepis coventryi</i>	Swamp Skink		en	1995		Densely vegetated swamps and associated watercourses, and adjacent wet heaths, sedgelands and saltmarshes.	<b>Low</b>	Limited suitable habitat present
<i>Pseudophryne bibronii</i>	Brown Toadlet		en	1962		A wide variety of woodland, forest and grassland habitats.	<b>Low</b>	On edge of species known range and over 40 years since last local record.
<i>Pseudophryne semimarmorata</i>	Southern Toadlet		en	1972		A variety of habitats such as open forests, lowland woodlands and heathlands where adults shelter beneath leaf litter and other debris in moist soaks and depressions.	<b>Low</b>	Limited habitat present, few local records from forested habitats.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in project area	Rationale for likelihood ranking
		EPBC	FFG					
<i>Riekoperla darlingtoni</i>	Mt Donna Buang Wingless Stonefly		cr	1999		Small ephemeral streams in montane wet forest dominated by Alpine Ash and Shining Gum with cool temperate rainforest patches of Myrtle Beech.	<b>High</b>	Known to occur within suitable habitat in the vicinity of Mount Donna Buang
<i>Engaeus curvisuturus</i>	Curve-tail Burrowing Crayfish		en	1983		Grey clay and silty soils on flood-plains in a restricted area between Mount Baw Baw and Warbuton, Victoria.	<b>High</b>	Previously recorded on the Yarra River floodplain east of Warburton, and suitable habitat exists in similar areas. Multiple species of Engaeus are likely to occur within the project area.
<i>Engaeus tuberculatus</i>	Tubercle Burrowing Crayfish		en	1963		Flood-beds and clay-dominated hill-slopes of Mountain Ash forest where there is an abundance of ferns at ground level.	<b>Medium</b>	Multiple species of Engaeus are likely to occur within the project area.

### A3.3 Migratory species (EPBC Act listed)

**Table A3.3 Migratory fauna species recorded or predicted to occur within the project search area**

Scientific name	Common name	Most recent record
<i>Gallinago hardwickii</i>	Latham's Snipe	2019
<i>Hirundapus caudacutus</i>	White-throated Needletail	2019
<i>Apus pacificus</i>	Fork-tailed Swift	2000
<i>Pandion haliaetus</i>	Osprey	PMST
<i>Numenius madagascariensis</i>	Eastern Curlew	PMST
<i>Actitis hypoleucos</i>	Common Sandpiper	PMST
<i>Calidris ferruginea</i>	Curlew Sandpiper	PMST
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	PMST
<i>Calidris melanotos</i>	Pectoral Sandpiper	PMST
<i>Motacilla flava</i>	Yellow Wagtail	PMST
<i>Rhipidura rufifrons</i>	Rufous Fantail	recorded
<i>Myiagra cyanoleuca</i>	Satin Flycatcher	recorded
<i>Monarcha melanopsis</i>	Black-faced Monarch	1998

## A3.4 Aquatic species

**Table A3.4 All aquatic species (amphibians, fishes, mussels, decapod crustacean and aquatic invertebrates) recorded within 10 kilometres of the project area**

Scientific name	Common name	No of records	Most recent record
<b>Amphibians</b>			
<i>Pseudophryne bibronii</i>	Brown Toadlet	4	1962
<i>Crinia signifera</i>	Common Froglet	118	2019
<i>Litoria raniformis</i>	Growling Grass Frog	14	1982
<i>Litoria lesueuri</i>	Lesueur's Frog	2	1988
<i>Litoria peronii</i>	Peron's Tree Frog	4	1988
<i>Litoria ewingii</i>	Southern Brown Tree Frog	133	2019
<i>Limnodynastes dumerillii</i>	Southern Bullfrog	59	2009
<i>Pseudophryne semimarmorata</i>	Southern Toadlet	35	1980
<i>Limnodynastes tasmaniensis</i>	Spotted Marsh Frog	18	2013
<i>Limnodynastes peronii</i>	Striped Marsh Frog	11	2009
<i>Litoria verreauxii</i> (ssp. unknown)	Unknown Tree Frog	3	1979
<i>Litoria verreauxii verreauxii</i>	Verreaux's Tree Frog	16	1999
<i>Geocrinia victoriana</i>	Victorian Smooth Froglet	114	2018
<b>Fishes</b>			
<i>Percalates novemaculeatus</i>	Australian Bass	3	1995
<i>Prototroctes maraena</i>	Australian Grayling	5	2000
<i>Retropinna semoni</i>	Australian Smelt	114	2012
<i>Acanthopagrus butcheri</i>	Black Bream	2	1981
<i>Salmo trutta</i>	Brown Trout	370	2019
<i>Oncorhynchus tshawytscha</i>	Chinook Salmon	2	1877
<i>Galaxias brevipinnis</i>	Climbing Galaxias	8	1998
<i>Galaxias maculatus</i>	Common Galaxias	12	2012
<i>Gambusia holbrooki</i>	Eastern Gambusia	8	2007
<i>Percalates colonorum</i>	Estuary Perch	1	1981
<i>Cyprinus carpio</i>	European Carp	15	2008
<i>Philypnodon grandiceps</i>	Flatheaded Gudgeon	1	2012
<i>Galaxias</i> spp.	Galaxias	1	1969
<i>Carassius auratus</i>	Goldfish	8	1985
cla. <i>Petromyzontida</i> ord. <i>Petromyzontiformes</i>	Lampreys	18	1995
<i>Macquaria australasica</i>	Macquarie Perch	6	2012
<i>Galaxias olidus</i>	Mountain Galaxias	5	2006
ord. <i>Mugiliformes</i> fam. <i>Mugilidae</i>	Mullets	1	1981
<i>Maccullochella peelii</i>	Murray Cod	4	1981
<i>Misgurnus anguillicaudatus</i>	Oriental Weatherloach	4	1993
<i>Galaxias ornatus</i>	Ornate Galaxias	265	2019
<i>Geotria australis</i>	Pouched Lamprey	39	2016

Scientific name	Common name	No of records	Most recent record
<i>Oncorhynchus mykiss</i>	Rainbow Trout	20	2009
<i>Perca fluviatilis</i>	Redfin	43	2011
<i>Gadopsis marmoratus</i>	River Blackfish	339	2013
<i>Rutilus rutilus</i>	Roach	76	2012
fam. <i>Arripidae</i> gen. <i>Arripis</i>	Salmon	1	1981
ord. <i>Salmoniformes</i> fam. <i>Salmonidae</i>	Salmon, Trout, Charr	5	2006
<i>Mordacia mordax</i>	Shorthead Lamprey	49	2012
<i>Nannoperca australis</i>	Southern Pygmy Perch	73	2011
<i>Anguilla australis</i>	Southern Shortfin Eel	249	2019
<i>Galaxias truttaceus</i>	Spotted Galaxias	15	2009
<i>Tinca tinca</i>	Tench	3	1915
<i>Gadopsis bispinosus</i>	Two-spined Blackfish	1	2009
<i>Aldrichetta forsteri</i>	Yellow-eye Mullet	1	1981
<b>Mussels, decapod crustacea</b>			
phy. <i>Mollusca</i> cla. <i>Bivalvia</i>	Bivalves	2	1995
<i>Engaeus</i> spp.	Burrowing Crayfish	9	2015
<i>Engaeus affinis</i>	Central Highlands Burrowing Crayfish	22	1983
<i>Euastacus woiwuru</i>	Central Highlands Spiny Crayfish	73	2019
<i>Paratya australiensis</i>	Common Freshwater Shrimp	53	2012
<i>Cherax destructor destructor</i>	Common Yabby	1	2012
supo. <i>Eucarida</i> ord. <i>Decapoda</i>	crayfish, crabs, lobsters, prawns and shrimp	1	2018
<i>Engaeus curvisuturus</i>	Curve-tail Burrowing Crayfish	4	1983
<i>Parastacidae</i> spp.	Freshwater Crayfishes	1	1997
supf. <i>Parastacoidea</i> fam. <i>Parastacidae</i>	Freshwater Crayfishes	3	2010
fam. <i>Hyriidae</i> gen. <i>Hyridella</i>	Freshwater Hyridella Mussel	2	1997
<i>Hyridella (Hyridella) drapeta</i>	Freshwater Mussel	6	2016
<i>Hyriidae</i> spp.	Freshwater Mussels	3	1998
supf. <i>Unionoidea</i> fam. <i>Hyriidae</i>	Freshwater Mussels	1	2002
fam. <i>Atyidae</i> gen. <i>Paratya</i>	Freshwater Shrimps	3	1996
supf. <i>Atyoidea</i> fam. <i>Atyidae</i>	Freshwater Shrimps	10	2010
<i>Engaeus hemircirratulus</i>	Gippsland Burrowing Crayfish	1	1963
<i>Euastacus kershawi</i>	Gippsland Spiny Crayfish	45	2012
<i>Engaeus cunicularius</i>	Granular Burrowing Crayfish	3	1962
<i>Hyridella narracanensis</i>	Narracan Corrugated Mussel	6	2016
supf. <i>Corbiculoidea</i> fam. <i>Sphaeriidae</i>	Pea Clams & Pea Shells	9	2012
<i>Velesunio ambiguus</i>	Slow Water Mussel	1	2016
<i>Euastacus yarraensis</i>	Southern Victorian Spiny Crayfish	75	2012
<i>Euastacus</i> spp.	Spiny Crayfish	6	2012
<i>Engaeus tuberculatus</i>	Tubercle Burrowing Crayfish	1	1963
<b>Aquatic invertebrates</b>			
<i>Pseudomoera fontana</i>	amphipod	15	1997

Scientific name	Common name	No of records	Most recent record
<i>supf. Talitroidea fam. Ceinidae</i>	Amphipod	1	2009
<i>supf. Crangonyctoidea fam. Paramelitidae</i>	Amphipods	1	2007
<i>supf. Eusiroidea fam. Eusiridae</i>	Amphipods	20	2012
<i>supf. Notonectioidea fam. Notonectidae</i>	Back Swimmers	4	2009
<i>supf. Chironomoidea fam. Ceratopogonidae</i>	Biting Midges	19	2012
<i>supf. Planorboidea fam. Physidae</i>	Bladder snails	6	2010
<i>supf. Ephydroidea fam. Ephydriidae</i>	Brine Flies	1	2007
<i>fam. Calamoceratidae gen. Anisocentropus</i>	Caddisfly	5	1996
<i>fam. Helicophidae gen. Alloecella</i>	Caddisfly	14	1997
<i>Boeckella nyoraensis</i>	Calanoid copepod	2	1910
<i>Austroargiolestes icteromelas</i>	Common Flatwing	19	2019
<i>supf. Tipuloidea fam. Tipulidae</i>	Crane Flies	36	2012
<i>supf. Empidoidea fam. Empididae</i>	Dance Flies	5	2009
<i>Sternopriscus meadfootii</i>	diving beetle	3	1995
<i>Limbodessus compactus</i>	Diving beetle	1	1995
<i>ord. Megaloptera fam. Corydalidae</i>	Dobsonflies and fishflies	11	2009
<i>fam. Austroperlidae gen. Acruroperla</i>	fam. Austroperlidae gen. Acruroperla	3	1997
<i>fam. Chironomidae gen. Apsectrotanypus</i>	fam. Chironomidae gen. Apsectrotanypus	6	1997
<i>fam. Chironomidae gen. Paraheptagyia</i>	fam. Chironomidae gen. Paraheptagyia	2	1997
<i>fam. Culicidae gen. Culiseta</i>	fam. Culicidae gen. Culiseta	1	1995
<i>fam. Eusiridae gen. Pseudomoera</i>	fam. Eusiridae gen. Pseudomoera	8	1997
<i>fam. Hydraenidae gen. Gymnochthebius</i>	fam. Hydraenidae gen. Gymnochthebius	1	2000
<i>fam. Hydrophilidae gen. Anacaena</i>	fam. Hydrophilidae gen. Anacaena	10	1997
<i>supf. Geoplanoidea fam. Dugesiiidae</i>	Flatworms	6	2010
<i>subf. Planorbinae trib. Ancyliidae</i>	Freshwater air-breathing limpets	11	2012
<i>supf. Planorboidea fam. Planorbidae</i>	Freshwater, Air-breathing limpets	1	2000
<i>ord. Gordeia fam. Gordiidae</i>	Gordian knot worms	3	2007
<i>supf. Talitroidea fam. Talitridae</i>	Landhoppers and sand fleas	1	2012
<i>supf. Empidoidea fam. Dolichopodidae</i>	Long-legged flies	1	1995
<i>subo. Hirudiniformes fam. Hirudinidae</i>	Medicinal Leeches	1	2000
<i>supf. Culicoidea fam. Dixidae</i>	Meniscus midges	16	2012
<i>Polypedilum (Pentapedilum) leei</i>	midge	10	1996
<i>Hydraena luridipennis</i>	minute moss beetle	2	2000
<i>Anopheles (Anopheles) pseudostigmaticus</i>	mosquito	1	1996
<i>supf. Culicoidea fam. Culicidae</i>	Mosquitoes	3	2012
<i>supf. Risssooidea fam. Hydrobiidae</i>	Mud snails	3	2000

Scientific name	Common name	No of records	Most recent record
<i>info. Blephariceromorpha</i> fam. <i>Blephariceridae</i>	Net-Winged Midges	5	2012
fam. <i>Chironomidae</i> subf. <i>Aphroteniinae</i>	Non-biting midge	7	2007
fam. <i>Chironomidae</i> subf. <i>Orthocladiinae</i>	Non-biting midge	44	2012
fam. <i>Chironomidae</i> subf. <i>Podonominae</i>	Non-biting midge	4	2007
fam. <i>Chironomidae</i> subf. <i>Tanypodinae</i>	Non-biting midge	37	2012
<i>Orthocladiinae</i> spp.	Non-biting midge	3	1997
fam. <i>Chironomidae</i> subf. <i>Chironominae</i>	Non-biting Midge	41	2012
subf. <i>Chironominae</i> trib. <i>Chironomini</i>	Non-biting Midge	2	1994
supf. <i>Chironomoidea</i> fam. <i>Chironomidae</i>	Non-biting Midge	19	2012
supf. <i>Osmyoidea</i> fam. <i>Osmylidae</i>	Osmylids	6	2008
supf. <i>Caraboidea</i> fam. <i>Dytiscidae</i>	Predacious Diving Beetles	13	2012
<i>info. Ptychopteromorph</i> fam. <i>Tanyderidae</i>	Primitive crane flies	1	1997
<i>Ferrissia (Pettancyclus) petterdi</i>	ramshorn snail	2	1995
<i>Austrolimnius (Limnelmis) messa</i>	Riffle beetle	20	1997
<i>Austrolimnius (Telmatelmis) metasternalis</i>	Riffle beetle	4	1996
<i>Austrolimnius (Telmatelmis) sulmo</i>	Riffle beetle	2	1995
<i>Austrolimnius</i> spp.	Riffle beetle	2	1997
fam. <i>Elmidae</i> gen. <i>Austrolimnius</i>	Riffle beetle	2	1997
<i>Notriolus maculata</i>	Riffle beetle	4	1995
<i>Notriolus simsoni</i>	Riffle beetle	8	1997
<i>Notriolus</i> spp.	Riffle beetle	1	1997
<i>Simsonia hopsoni</i>	Riffle beetle	1	1995
<i>Simsonia wilsoni</i>	Riffle beetle	1	1997
supf. <i>Byrrhoidea</i> fam. <i>Elmidae</i>	Riffle Beetles	38	2012
<i>Microvelia (Austromicrovelia) peramoena</i>	riffle bug	6	1996
<i>Microvelia (Pacifcovelia) oceanica</i>	riffle bug	1	1994
<i>Microvelia childi</i>	riffle bug	2	1996
supf. <i>Hydrophiloidea</i> fam. <i>Hydrophilidae</i>	Scavenger Water Beetles	10	2012
ord. <i>Mecoptera</i> fam. <i>Nannochoristidae</i>	Scorpionflies	1	2002
supf. <i>Gerroidea</i> fam. <i>Veliidae</i>	Small Water Striders	25	2012
supf. <i>Chironomoidea</i> fam. <i>Thaumaleidae</i>	Solitary midges	1	1997
subc. <i>Neophora</i> ord. <i>Temnocephalidea</i>	Temnocephala worms	2	2006
<i>Edwardsina (Tonnoirina) pilosa</i>	torrent midge	2	1997
<i>Micronecta robusta</i>	water boatman	2	1995
supf. <i>Corixoidea</i> fam. <i>Corixidae</i>	Water Boatmen	12	2010
supf. <i>Hydrometroidea</i> fam. <i>Hydrometridae</i>	Water Measurers	1	2010
supf. <i>Byrrhoidea</i> fam. <i>Psephenidae</i>	Water Pennies	18	2012
supf. <i>Gerroidea</i> fam. <i>Gerridae</i>	Water Striders	6	2009
<i>Sclerocyphon fuscus</i>	Water-penny beetle	4	1997

Scientific name	Common name	No of records	Most recent record
<i>Sclerocyphon spp.</i>	Water-penny beetle	3	1997
<i>Sclerocyphon zwicki</i>	Water-penny beetle	2	1996
<i>Macrogyrus (Australogyrus) oblongus</i>	whirligig beetle	4	1996
<i>supf. Caraboidea fam. Gyrinidae</i>	Whirligig Beetles	4	2012



## Appendix 4 Photos of the project area

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**Plate 1** EVC 16 Lowland Forest, VQA 202, HZ 216, Lower section of trail 44



**Plate 2** EVC 18 Riparian Forest near the proposed Yarra River bridge crossing



To be inserted

**Plate 3 EVC 23 Herb-rich Foothill Forest**



**Plate 4 EVC 29 Damp Forest- VQA 204, HZ4, Trail 44 below Mount Bride Road**



**Plate 5    EVC 30 Wet Forest, HZ 9, Trail 41 Mount Bride Track**





**Plate 6 EVC 31 Cool Temperate Rainforest (pure CTR) along the upper drainage lines of Mount Donna Buang**



**Plate 7** Cool Temperate Mixed Forest (CTMF) on the upper slopes of Mount Donna Buang





**Plate 8 EVC 39 Montane Wet Forest on the eastern slopes of Mount Donna Buang**



**Plate 9** EVC 45 Shrubby Foothill Forest – WHZ 34, Trail 40 Mount Bride track





**Plate 10 EVC 127 Valley Heathy Forest - Trail 44, VQA 203**





**Plate 11 Modified area**



**Plate 12 Rocky outcrops**





**Plate 13** Typical waterway in a forested gully below Mount Bride



**Plate 14** High quality Leadbeater's Possum montane thicket habitat near Mount Donna Buang, with high stem density and lateral stems to facilitate movement. Such areas are to be avoided.

## Appendix 5 Vegetation quality assessment results (Practical Ecology and Biosis)

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Source		Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology		
Habitat Zone		1	2	3	4	5	6	7	8	9	10	11		
Bioregion		VALP	VALP	VALP	VALP	VALP	VALP	VALP	HSF	VALP	HSF	HSF		
EVC abbreviation		CTR	MWF	CTR	MWF	CTR	CTR	MWF	CTR	WF	WF	WF		
EVC Bioregional Conservation Status		E	LC	E	LC	E	E	LC	E	LC	LC	LC		
		Max Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score		
Site Condition	Large Old Trees	10	5	9	6	10	10	4	5	4	7	5	5	
	Canopy Cover	5	4	4	4	4	4	4	4	5	4	2	4	
	Lack of Weeds	15	13	15	13	13	15	13	13	13	15	13	13	
	Understorey	25	20	20	20	20	15	20	20	20	25	20	20	
	Recruitment	10	3	6	3	3	6	6	6	6	6	10	6	
	Organic Matter	5	5	5	5	5	5	5	5	5	5	5	5	
	Logs	5	5	5	5	5	5	5	5	5	5	5	5	
	<b>Total Site Score</b>			55	64	56	60	60	57	58	58	67	60	58
	EVC standardiser (x 75/55)			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Adjusted Site Score			55	64	56	60	60	57	58	58	67	60	58
Landscape Value	Patch Size	10	8	8	8	8	8	8	8	8	8	8	8	
	Neighbourhood	10	7	7	7	7	7	7	7	7	6	7	7	
	Distance to Core	5	4	4	4	4	4	4	4	4	4	4	4	
	<b>Total Landscape Score</b>			19	19	19	19	19	19	19	19	18	19	19
HABITAT SCORE			100	74	83	75	79	79	76	77	77	85	79	77

Source		Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology		
Habitat Zone		12	13	14	15	16	17	18	19	20	21	22		
Bioregion		HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF		
EVC abbreviation		WF	WF	WF	WF	WF	WF	WF	WF	WF	WF	WF		
EVC Bioregional Conservation Status		LC	LC	LC	LC	LC	LC	LC	LC	LC	LC	LC		
		Max Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score		
Site Condition	Large Old Trees	10	2	3	2	3	5	5	3	2	0	0	5	
	Canopy Cover	5	2	5	3	4	2	4	3	2	2	0	4	
	Lack of Weeds	15	13	13	13	13	13	13	13	7	7	0	15	
	Understorey	25	25	25	20	20	20	20	15	20	20	15	20	
	Recruitment	10	6	3	3	6	6	6	3	6	6	5	6	
	Organic Matter	5	5	5	5	5	5	5	5	5	5	4	5	
	Logs	5	5	5	5	5	5	5	5	3	3	2	5	
	<b>Total Site Score</b>			58	59	51	56	56	58	47	45	43	26	60
	EVC standardiser (x 75/55)			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Adjusted Site Score			58	59	51	56	56	58	47	45	43	26	60
Landscape Value	Patch Size	10	8	8	8	8	8	8	8	8	8	8	8	
	Neighbourhood	10	7	7	7	7	7	7	7	7	7	7	7	
	Distance to Core	5	4	4	4	4	4	4	4	4	4	4	4	
	<b>Total Landscape Score</b>			19	19	19	19	19	19	19	19	19	19	19
HABITAT SCORE			100	77	78	70	75	75	77	66	64	62	45	79

Source		Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology		
Habitat Zone		23	24	25	26	27	28	29	30	31	32	33		
Bioregion		HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF		
EVC abbreviation		DF	SSF	WF	WF	WF	WF	SFF	DF	DF	DF	SFF		
EVC Bioregional Conservation Status		LC	LC	LC	LC	LC	LC	LC	LC	LC	LC	LC		
		Max Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score		
Site Condition	Large Old Trees	10	2	8	7	2	3	7	5	3	3	5	0	
	Canopy Cover	5	4	4	4	2	2	2	2	2	2	4	2	
	Lack of Weeds	15	15	15	15	7	13	7	11	13	13	13	13	
	Understorey	25	15	15	25	15	20	20	15	20	20	25	15	
	Recruitment	10	10	5	6	6	6	6	3	6	6	6	3	
	Organic Matter	5	5	5	5	5	5	5	5	5	5	5	5	
	Logs	5	5	5	5	5	5	5	5	5	5	5	5	
	<b>Total Site Score</b>			56	57	67	42	54	52	46	54	54	63	43
	EVC standardiser (x 75/55)			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Adjusted Site Score			56	57	67	42	54	52	46	54	54	63	43
Landscape Value	Patch Size	10	8	8	8	8	8	8	8	8	8	8	8	
	Neighbourhood	10	7	7	7	7	7	7	6	6	6	6	6	
	Distance to Core	5	4	4	4	4	4	4	4	4	4	4	4	
	<b>Total Landscape Score</b>			19	19	19	19	19	19	18	18	18	18	18
HABITAT SCORE		100	75	76	86	61	73	71	64	72	72	81	61	

Source		Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology		
Habitat Zone		34	35	36	37	38	39	40	41	42	43	44		
Bioregion		HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF		
EVC abbreviation		DF	DF	HHRFF	SFF	SFF	SFF	DF	DF	LF	SFF	DF		
EVC Bioregional Conservation Status		LC	LC	LC	LC	LC	LC	LC	LC	LC	LC	LC		
		Max Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score		
Site Condition	Large Old Trees	10	4	5	1	0	5	3	7	9	3	5	7	
	Canopy Cover	5	2	4	3	4	4	4	4	5	2	2	4	
	Lack of Weeds	15	13	7	13	13	15	15	15	15	15	15	15	
	Understorey	25	20	15	15	15	20	20	25	20	20	25	20	
	Recruitment	10	10	6	3	6	6	6	10	6	3	10	6	
	Organic Matter	5	5	5	5	5	5	5	5	5	5	5	5	
	Logs	5	5	5	5	5	5	5	5	5	4	4	5	
	<b>Total Site Score</b>			59	47	45	48	60	58	71	65	52	66	62
	EVC standardiser (x 75/55)			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Adjusted Site Score			59	47	45	48	60	58	71	65	52	66	62
Landscape Value	Patch Size	10	8	8	8	8	8	8	8	8	8	8	8	
	Neighbourhood	10	6	6	6	6	6	6	6	6	6	6	6	
	Distance to Core	5	4	4	4	4	4	4	4	4	4	4	4	
	<b>Total Landscape Score</b>			18	18	18	18	18	18	18	18	18	18	18
HABITAT SCORE			100	77	65	63	66	78	76	89	83	70	84	80



Source		Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology		
Habitat Zone		45	46	47	48	49	50	51	52	53	54	55		
Bioregion		HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF		
EVC abbreviation		SFF	SFF	DF	SFF	DF	DF	DF	SFF	SFF	SFF	SFF		
EVC Bioregional Conservation Status		LC	LC	LC	LC	LC	LC	LC	LC	LC	LC	LC		
		Max Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score		
Site Condition	Large Old Trees	10	3	9	8	8	5	3	6	10	10	3	3	
	Canopy Cover	5	4	4	5	5	2	4	5	5	5	5	5	
	Lack of Weeds	15	15	15	15	13	15	15	15	15	13	13	13	
	Understorey	25	25	25	20	20	25	20	20	20	20	20	15	
	Recruitment	10	10	10	6	10	10	6	10	10	10	10	6	
	Organic Matter	5	5	5	5	5	5	5	5	5	5	5	5	
	Logs	5	5	5	5	5	5	5	5	5	5	5	5	
	<b>Total Site Score</b>			67	73	64	66	67	58	66	70	68	61	52
	EVC standardiser (x 75/55)			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Adjusted Site Score			67	73	64	66	67	58	66	70	68	61	52
Landscape Value	Patch Size	10	8	8	8	8	8	8	8	8	8	8	8	
	Neighbourhood	10	7	7	7	7	7	7	7	7	7	7	7	
	Distance to Core	5	4	4	4	4	4	4	4	4	4	4	4	
	<b>Total Landscape Score</b>			19	19	19	19	19	19	19	19	19	19	19
HABITAT SCORE		100	86	92	83	85	86	77	85	89	87	80	71	



Source		Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology	Practical Ecology		
Habitat Zone		56	57	58	59	60	61	62	63	64	65	66		
Bioregion		HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF		
EVC abbreviation		SFF	WF	SFF	DF	SFF	DF	DF	SFF	SFF	DF	SFF		
EVC Bioregional Conservation Status		LC	LC	LC	LC	LC	LC	LC	LC	LC	LC	LC		
		Max Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score		
Site Condition	Large Old Trees	10	4	9	10	9	10	6	5	7	8	9	6	
	Canopy Cover	5	5	5	5	5	5	5	4	4	5	4	5	
	Lack of Weeds	15	13	15	13	15	13	13	15	13	15	13	15	
	Understorey	25	20	15	20	15	20	15	20	20	20	20	20	
	Recruitment	10	10	6	10	1	10	1	1	10	10	3	10	
	Organic Matter	5	5	5	5	5	5	5	5	5	5	5	5	
	Logs	5	5	5	5	5	5	5	5	5	5	5	5	
	<b>Total Site Score</b>			62	60	68	55	68	50	55	64	68	59	66
	EVC standardiser (x 75/55)			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Adjusted Site Score			62	60	68	55	68	50	55	64	68	59	66
Landscape Value	Patch Size	10	8	8	8	8	8	8	8	8	8	8	8	
	Neighbourhood	10	7	7	7	7	7	7	7	7	7	7	7	
	Distance to Core	5	4	4	4	4	4	4	4	4	4	4	4	
	<b>Total Landscape Score</b>			19	19	19	19	19	19	19	19	19	19	19
HABITAT SCORE		100	81	79	87	74	87	69	74	83	87	78	85	

Source		Practical Ecology	Practical Ecology	Practical Ecology		
Habitat Zone		67	68	69		
Bioregion		HSF	HSF	HSF		
EVC abbreviation		SFF	SFF	SFF		
EVC Bioregional Conservation Status		LC	LC	LC		
		Max Score	Score	Score	Score	
Site Condition	Large Old Trees	10	8	10	0	
	Canopy Cover	5	5	5	5	
	Lack of Weeds	15	15	15	15	
	Understorey	25	20	20	20	
	Recruitment	10	10	10	10	
	Organic Matter	5	5	5	5	
	Logs	5	5	5	5	
	<b>Total Site Score</b>			68	70	60
	EVC standardiser (x 75/55)			NA	NA	NA
	Adjusted Site Score			68	70	60
Landscape Value	Patch Size	10	8	8	8	
	Neighbourhood	10	7	7	7	
	Distance to Core	5	4	4	4	
	<b>Total Landscape Score</b>			19	19	19
<b>HABITAT SCORE</b>		100	87	89	79	

Source		Biosis	Biosis	Biosis	Biosis	Biosis	Biosis		
Habitat Zone		Lowland Forest_Mod quality condition state	Damp Forest_Mod quality state	Damp Forest_High quality condition state	Wet Forest_Mod quality condition state	Wet Forest_High quality condition state	Shrubby Foothill Forest_High quality condition state		
Bioregion		HSF	HSF	HSF	HSF	HSF	HSF		
EVC abbreviation		LF	DF (state 1)	DF (state 2)	WF (state 1)	WF (state 2)	SFF		
EVC Bioregional Conservation Status		LC	LC	LC	LC	LC	LC		
		Max Score	Score	Score	Score	Score	Score		
Site Condition	Large Old Trees	10	5	4	10	8	10	10	
	Canopy Cover	5	2	3	5	3	3	5	
	Lack of Weeds	15	15	9	15	11	11	15	
	Understorey	25	15	20	20	15	25	15	
	Recruitment	10	6	10	6	6	10	6	
	Organic Matter	5	5	5	5	5	5	5	
	Logs	5	4	5	5	5	5	5	
	<b>Total Site Score</b>			52	56	66	53	69	61
	EVC standardiser (x 75/55)			NA	NA	NA	NA	NA	NA
	Adjusted Site Score			52	56	66	53	69	61
Landscape Value	Patch Size	10	8	8	8	8	8	8	
	Neighbourhood	10	5	5	7	6	7	6	
	Distance to Core	5	4	4	4	4	4	4	
	<b>Total Landscape Score</b>			17	17	19	18	19	18
HABITAT SCORE		100	69	73	85	71	88	79	

Source		Biosis	Biosis	Biosis	Biosis	Biosis		
Habitat Zone		Valley Heathy Forest_High quality condition state	Lowland Forest_High quality condition state	Montane Wet Forest	Cool Temperate Mixed Forest	Wet Forest_Very high quality condition state		
Bioregion		HSF	HSF	VALP	VALP/HSF	VALP		
EVC abbreviation		VHF	LF	MWF	CTMF (CTR)	WF (state 3)		
EVC Bioregional Conservation Status		V	LC	LC	E	LC		
		Max Score	Score	Score	Score	Score		
Site Condition	Large Old Trees	10	5	8	4	8	10	
	Canopy Cover	5	2	5	5	5	5	
	Lack of Weeds	15	15	13	11	11	15	
	Understorey	25	15	20	15	20	25	
	Recruitment	10	5	10	5	10	10	
	Organic Matter	5	5	5	5	5	5	
	Logs	5	5	4	5	5	5	
	<b>Total Site Score</b>			52	65	50	64	75
	EVC standardiser (x 75/55)			NA	NA	NA	NA	NA
	Adjusted Site Score			52	65	50	64	75
Landscape Value	Patch Size	10	8	8	8	8	8	
	Neighbourhood	10	5	6	8	8	8	
	Distance to Core	5	4	4	4	4	4	
	<b>Total Landscape Score</b>			17	18	20	20	20
HABITAT SCORE		100	69	83	70	84	95	

Source		Biosis	Biosis	Biosis		
Habitat Zone		Riparian Forest_Low quality condition state	Damp Forest_Mod quality state	Damp Forest_High quality condition state		
Bioregion		HSF	HSF	HSF		
EVC abbreviation		RF (state 1)	DF (state 3)	DF (state 4)		
EVC Bioregional Conservation Status		LC	LC	LC		
		Max Score	Score	Score	Score	
Site Condition	Large Old Trees	10	9	9	5	
	Canopy Cover	5	3	2	2	
	Lack of Weeds	15	0	15	4	
	Understorey	25	10	20	15	
	Recruitment	10	3	6	1	
	Organic Matter	5	2	5	5	
	Logs	5	0	5	5	
	<b>Total Site Score</b>			27	62	37
	EVC standardiser (x 75/55)			NA	NA	NA
	Adjusted Site Score			27	62	37
Landscape Value	Patch Size	10	1	8	8	
	Neighbourhood	10	2	5	5	
	Distance to Core	5	3	4	4	
	<b>Total Landscape Score</b>			6	17	17
HABITAT SCORE		100	33	79	54	

## Appendix 6 Named waterways

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## A6.1 Named waterways in the project area

Name	Hierarchy (L - low, M - medium, H - high)
ANDERSON CREEK	L
ANDERSONS CREEK	L
BACK - STAIRS CREEK	L
BACKSTAIRS CREEK	L
BADGER CREEK	M
BALLARAT GULLY	L
BIG PATS CREEK	L
BLUE NOSE CREEK DRAIN	L
BRIDE CREEK	L
BRISBANE CREEK	L
BRITANNIA CREEK	L
CALDER CREEK	L
CEMENT CREEK	L
CEMETERY CREEK	L
COLLAS CREEK	L
CORANDERRK CREEK	M
DEE RIVER	L
DIRT GULLY CREEK	L
DIRTY GULLY	L
DON RIVER	M
EDWARDSTOWN CREEK	L
ELY CREEK	L
FOUR MILE CREEK	L
FRENCHMANS CREEK	L
GRACE BURN CREEK	L
HARRISON CREEK	L
HEARSE CREEK	L
INSPIRATION CREEK	L
JUSTICE GULLY	L

Name	Hierarchy (L – low, M – medium, H – high)
KENNEDY CREEK	L
KILN CREEK	L
KING CREEK	L
LITTLE MICK CREEK	L
LITTLE YARRA RIVER	M
MANN CREEK	L
MARTIN GULLY	L
MCKENZIE CREEK	L
MINAH CREEK	L
MORRIS GULLY	L
MYRTLE CREEK	L
NUMBER THREE CREEK	L
OSHANNASSY AQUEDUCT	L
PAINTERS GULLY	L
PHEASANT CREEK	L
PLATTS CREEK	L
POSTMAN CREEK	L
PRINCESS CREEK	L
ROCKY CREEK	L
ROSS GULLY	L
SANDYS CREEK	L
SCOTCHMANS CREEK	L
SKULL CREEK	L
STARLING CREEK	L
STOCKDALES CREEK	L
TUGWELL CREEK	L
TUNGSTEN CREEK	L
TWO BOB CREEK	L
WALKER CREEK	L
WALKERS CREEK	L



Name	Hierarchy (L – low, M – medium, H – high)
WOLFRAM CREEK	L
YANKEE JIM CREEK	L
YANKEE JIMS CREEK	L
YARRA RIVER	H
YTHAN CREEK	L

## A7.2 Named waterways in the assessment corridor

Name	Hierarchy (L - low, M - medium, H - high)
ANDERSON CREEK	L
BALLARAT GULLY	L
CALDER CREEK	L
CEMETERY CREEK	L
DEE RIVER	L
DIRT GULLY CREEK	L
FOUR MILE CREEK	L
FRENCHMANS CREEK	M
HARRISON CREEK	L
KENNEDY CREEK	L
MANN CREEK	L
MCKENZIE CREEK	L
OSHANNASSY AQUEDUCT	L
ROCKY CREEK	L
SCOTCHMANS CREEK	L
TUGWELL CREEK	L
WALKERS CREEK	L
YTHAN CREEK	L

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## Appendix 7 EPBC Significant Impact Criteria assessments

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**Round-leaf Pomaderris *Pomaderris vacciniifolia* (critically endangered)**

**Table 44 Round-leaf Pomaderris: self-assessment against Significant Impact Criteria (CoA 2013)**

Significant impact criteria	Likelihood of significant impact	Justification
<p><b>Lead to a long-term decrease in the size of a population</b></p>	<p>Unlikely</p>	<p>The project area supports some suitable lower slopes forest habitat for this species and a population of several plants occurs in East Warburton just outside the project area. This local population was visited during site assessments to ascertain local habitat conditions and familiarise ecologists with identification of this species. On the basis of a local population being present the species was considered to have some likelihood of occur in the project area and along the trail assessment corridor, particularly in lower slopes forests adjacent to the Yarra River floodplain. However, most of the trail network is in higher elevation montane or foothill landscape settings and these areas are generally considered unsuitable habitat for this species. Although no direct targeted searches were undertaken for this species, suitable lower slopes habitats were all walked during field surveys between 2019 and 2021 and the species was not detected. This large and distinctive shrub species is likely to have been readily detected in lower slopes forest communities along the assessment corridor if it were present. Therefore, the project is considered unlikely to lead to the long-term decrease in the size of an important population as no populations were detected. In the unlikely event of undetected populations occurring in the trail assessment corridor (i.e. locations where project impacts will occur) the implementation of pre-construction micro-siting by an ecologist within key lower slopes areas will ensure any undetected populations are avoided.</p>

Significant impact criteria	Likelihood of significant impact	Justification
<p><b>Reduce the area of occupancy of the species</b></p>	<p>Unlikely</p>	<p>No Round-leaf Pomaderris populations were detected in lower slopes vegetation communities during field assessments and all occurrences of this habitat type were inspected. Therefore, the project is considered unlikely to reduce the area of occupancy of this species as no populations were detected. In the unlikely event of undetected populations occurring in the trail assessment corridor (i.e. locations where project impacts will occur) the implementation of pre-construction micro-siting by an ecologist within key lower slopes habitats will ensure any undetected populations are avoided and their area of occupancy is not reduced.</p>
<p><b>Fragment an existing population into two or more populations</b></p>	<p>Unlikely</p>	<p>No Round-leaf Pomaderris populations were detected in lower slopes vegetation communities during field assessments and all occurrences of this habitat type were inspected. The local population of this species in East Warburton is outside of the project area. Therefore, the project is considered unlikely to fragment an existing population into two or more populations as no populations were detected and the local population will remain undisturbed by the project. In the unlikely event of undetected populations occurring in the trail assessment corridor (i.e. locations where project impacts will occur) the implementation of pre-construction micro-siting by an ecologist within key lower slopes habitat will ensure any undetected populations are not fragmented by trail construction.</p>
<p><b>Adversely affect habitat critical to the survival of the species</b></p>	<p>Unlikely</p>	<p>Small areas of suitable lower slopes forest habitat occurs for this species in the project area and trail assessment corridor. These forest communities will be impacted by trail construction through soil disturbance and understorey vegetation removal. No populations of this species were detected in this suitable habitat and therefore the impacts from the project are considered unlikely to adversely affect habitat critical to the survival of the species. Habitat for the local population at East Warburton is outside of the project area and will not be impacted by the project.</p>

Significant impact criteria	Likelihood of significant impact	Justification
<p><b>Disrupt the breeding cycle of a population</b></p>	<p>Unlikely</p>	<p>No Round-leaf Pomaderris populations were detected in lower slopes vegetation communities during field assessments and all occurrences of this habitat type were inspected. The local population of this species in East Warburton is also outside of the project area. Therefore, the project is considered unlikely to disrupt the breeding cycle of the species as no populations were detected were detected in the project area, and the known local population is outside of the project area. In the unlikely event of undetected populations occurring in the trail assessment corridor (i.e. locations where project impacts will occur) the implementation of pre-construction micro-siting by an ecologist within key lower slopes habitat will ensure the breeding cycle of any undetected populations is not disrupted.</p>
<p><b>Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</b></p>	<p>Unlikely</p>	<p>Suitable habitat for Round-leaf Pomaderris in the form of small areas of lower slopes forest vegetation communities occurs in the project area and trail assessment corridor. These forest communities will be impacted by trail construction through soil disturbance and understorey vegetation removal. No populations of this species were detected in this suitable habitat and therefore the impacts from the project are considered unlikely to modify, destroy or remove occupied habitat or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. Habitat for the local population at East Warburton is outside of the project area and will not be impacted by the project.</p>
<p><b>Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat</b></p>	<p>Unlikely</p>	<p>Suitable habitat for Round-leaf Pomaderris in the form of small areas of lower slopes forest vegetation communities occurs in the project area and trail assessment corridor. These forest communities will be impacted by trail construction through soil disturbance and understorey vegetation removal. No populations of this species were detected in this suitable habitat and therefore the impacts from the project are considered unlikely to result in invasive species that are harmful to this critically endangered species becoming established in habitat where populations of this species occur. Habitat for the local population at East Warburton is outside of the project area and will not be impacted by the project.</p>

Significant impact criteria	Likelihood of significant impact	Justification
<p><b>Introduce disease that may cause the species to decline</b></p>	<p>Unlikely</p>	<p>Suitable habitat for Round-leaf Pomaderris in the form of small areas of lower slopes forest vegetation communities occurs in the project area and trail assessment corridor. These forest communities will be impacted by trail construction through soil disturbance and understorey vegetation removal. Some Pomaderris species are known to be susceptible to <i>Phytophthora</i> (e.g. Hook 2011) although the EPBC Listing and Conservation Advices for this species do not identify <i>Phytophthora</i> as a known threat. There is little information about the presence of <i>Phytophthora</i> in the project area but Dunstan et al (2016) documented this soil pathogen in forests between Sugarloaf Reservoir and Glenburn to the north of the project area. No populations of this species were detected in this suitable habitat and therefore the impacts from the project are considered unlikely to result in disease being introduced to known habitat for this critically endangered species. Habitat for the local population at East Warburton is outside of the project area and will not be impacted by the project and risk of disease spread to this area is considered negligible as a result of the project.</p>
<p><b>Interfere with the recovery of a species</b></p>	<p>Unlikely</p>	<p>There is no national Recovery Plan for this species and one is not required as the approved conservation advice for the species provides sufficient direction to implement priority actions and mitigate against key threats. The EPBC Conservation Advice identifies the main threats as inappropriate fire regimes, weed invasion by woody weeds and damage by Sambar Deer. Other threats include browsing by wallabies and grazing by livestock, road maintenance and associated fire management and suppression activities including construction and regular slashing of fire breaks. No populations of this species were detected in suitable habitat and therefore the impacts from the project are considered unlikely to contribute to the main threats to populations of this species. Habitat for the local population at East Warburton is outside of the project area so threats to this population will not be exacerbated as a result of the project.</p>



### **Conclusion for Round-leaf Pomaderris**

The project is considered unlikely to result in a significant impact on Round-leaf Pomaderris based on an assessment against the significant impact criteria for critically endangered species. This conclusion has been reached on the basis that no populations of this readily detectable species were recorded in lower slopes forest habitat. Furthermore, the known local population of this species at East Warburton is outside of the project area and will not be impacted by the project. In the unlikely event of undetected populations occurring in the trail assessment corridor (i.e. locations where project impacts will occur) the implementation of pre-construction micro-siting by an ecologist within small areas of lower slopes forest habitat will ensure unanticipated significant impacts do not occur on this species.

## Tall Astelia *Astelia australiana* (vulnerable)

**Table 45 Tall Astelia: self-assessment against Significant Impact Criteria (CoA 2013)**

Significant impact criteria	Likelihood of significant impact	Justification
<p><b>Lead to a long-term decrease in the size of an important population of a species</b></p>	<p>Unlikely</p>	<p>The project area has suitable rainforest habitat for this species and populations occur 10 km to the south of Warburton in the Powelltown-Beenak area of the Central Highlands (Yugovic 1991). On the basis of suitable rainforest habitat being present in the project area and the presence of nearby populations, the species was considered to have some likelihood of occurring in the project area. However, no Tall Astelia populations were detected in CTR or CTMF vegetation communities during field assessments and all occurrences of this habitat type were inspected. This naturally restricted, large and highly distinctive species would have been easily detected in these communities along trail assessment corridor within the project area if it were present. Therefore, the project is considered unlikely to lead to the long-term decrease in the size of an important population as no populations were detected. In the unlikely event of undetected populations occurring in the trail assessment corridor (i.e. locations where project impacts will occur) the implementation of pre-construction micro-siting by an ecologist within rainforest habitats will ensure any undetected populations are avoided.</p>
<p><b>Reduce the area of occupancy of an important population</b></p>	<p>Unlikely</p>	<p>No Tall Astelia populations were detected in CTR or CTMF vegetation communities during field assessments and all occurrences of this habitat type were inspected. Therefore, the project is considered unlikely to reduce the area of occupancy of an important population as no populations were detected. In the unlikely event of undetected populations occurring in the trail assessment corridor (i.e. locations where project impacts will occur) the implementation of pre-construction micro-siting by an ecologist within rainforest habitats will ensure any undetected populations are avoided and their area of occupancy is not reduced.</p>

Significant impact criteria	Likelihood of significant impact	Justification
<b>Fragment an existing important population into two or more populations</b>	Unlikely	<p>No Tall Astelia populations were detected in CTR or CTMF vegetation communities during field assessments and all occurrences of this habitat type were inspected. Therefore, the project is considered unlikely to fragment an existing important population into two or more populations as no populations were detected. In the unlikely event of undetected populations occurring in the trail assessment corridor (i.e. locations where project impacts will occur) the implementation of pre-construction micro-siting by an ecologist within rainforest habitats will ensure any undetected populations are not fragmented by trail construction.</p>
<b>Adversely affect habitat critical to the survival of the species</b>	Unlikely	<p>Suitable habitat for Tall Astelia in the form of CTR and CTMF vegetation communities occurs in the project area and trail assessment corridor. These rainforest communities will be impacted by trail construction through soil disturbance and understorey vegetation removal. No populations of this species were detected in this suitable rainforest habitat and therefore the impacts from the project are considered unlikely to adversely affect habitat critical to the survival of the species.</p>
<b>Disrupt the breeding cycle of an important population</b>	Unlikely	<p>No Tall Astelia populations were detected in CTR or CTMF vegetation communities during field assessments and all occurrences of this habitat type were inspected. Therefore, the project is considered unlikely to disrupt the breeding cycle of the species as no populations were detected. In the unlikely event of undetected populations occurring in the trail assessment corridor (i.e. locations where project impacts will occur) the implementation of pre-construction micro-siting by an ecologist within rainforest habitats will ensure the breeding cycle of any undetected populations is not disrupted.</p>

Significant impact criteria	Likelihood of significant impact	Justification
<p><b>Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</b></p>	<p>Unlikely</p>	<p>Suitable habitat for Tall Astelia in the form of CTR and CTMF vegetation communities occurs in the project area and trail assessment corridor. These rainforest communities will be impacted by trail construction through soil disturbance and understorey vegetation removal. No populations of this species were detected in this suitable rainforest habitat and therefore the impacts from the project are considered unlikely to modify, destroy or remove occupied habitat or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.</p>
<p><b>Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat</b></p>	<p>Unlikely</p>	<p>Suitable habitat for Tall Astelia in the form of CTR and CTMF vegetation communities occurs in the project area and trail assessment corridor. These rainforest communities will be impacted by trail construction through soil disturbance and understorey vegetation removal. No populations of this species were detected in this suitable rainforest habitat and therefore the impacts from the project are considered unlikely to result in invasive species that are harmful to a vulnerable species becoming established in habitat where populations of this vulnerable species occur.</p>
<p><b>Introduce disease that may cause the species to decline</b></p>	<p>Unlikely</p>	<p>Suitable habitat for Tall Astelia in the form of CTR and CTMF vegetation communities occurs in the project area and trail assessment corridor. These rainforest communities will be impacted by trail construction through soil disturbance and understorey vegetation removal. No populations of this species were detected in this suitable rainforest habitat and therefore the impacts from the project are considered unlikely to result in introduction of diseases into habitats where populations of this vulnerable species occur. More broadly, Myrtle Wilt is an indigenous plant disease known to impact rainforest habitat and this disease risk will be managed through minimising machinery impacts in rainforest communities by hand building trails and through treating and monitoring any wounding of Myrtle Beech trees.</p>

Significant impact criteria	Likelihood of significant impact	Justification
<b>Interfere substantially with the recovery of a species</b>	Unlikely	The national recovery plan (Cutler and Murphy 2010) identifies fire, weed invasion, forestry in State Forests, altered hydrology and disease (Myrtle Wilt) as key threats to the species. No populations of this species were detected in suitable rainforest habitat and therefore the impacts from the project are considered unlikely to interfere with general and site specific recovery objectives outlined in the national recovery plan.

### Conclusion for Tall Astelia

The project is considered unlikely to result in a significant impact on Tall Astelia based on an assessment against the significant impact criteria for vulnerable species. This conclusion has been reached on the basis that no populations of the obvious species were detected in rainforest habitat that will be impacted by the project. In the unlikely event of undetected populations occurring in the trail assessment corridor (i.e. locations where project impacts will occur) the implementation of pre-construction micro-siting by an ecologist within rainforest habitats will ensure unanticipated significant impacts do not occur on important populations of this species.

## Swift Parrot *Lathamus discolor* (critically endangered)

**Table 46 Swift Parrot: self-assessment against Significant Impact Criteria (CoA 2013)**

Significant impact criteria	Likelihood of significant impact	Justification
<b>Lead to a long-term decrease in the size of a population</b>	Unlikely	The project area contains potential foraging habitat within the secondary range of the species (BirdLife Australia, undated), however no preferred foraging trees naturally occur within the project area, and the project is not within an area identified as priority habitat for conservation management of Swift Parrot (Saunders and Tzaros 2011). The eucalypt canopy within the project area will largely be unaffected by avoiding the removal of large trees and canopy trees during trail construction and maintenance. The project area also does not contain breeding habitat, and the project will not result in the construction of any structures that could present a collision risk. The project therefore has no capacity to lead to a population decrease or reduce the area of occupancy for the species.
<b>Reduce the area of occupancy of the species</b>	Unlikely	
<b>Fragment an existing population into two or more populations</b>	Unlikely	The Swift Parrot occurs as a single, migratory population (Saunders & Tzaros 2011) and as such the project has no capacity to result in fragmentation of the population.
<b>Adversely affect habitat critical to the survival of the species</b>	Unlikely	The project area does not occur within an area identified as priority habitat for conservation management of Swift Parrot (Saunders and Tzaros 2011). The project will avoid the removal of canopy trees and is therefore not expected to result in the removal of any potential foraging habitat.
<b>Disrupt the breeding cycle of a population</b>	Unlikely	Swift Parrots only breed in eastern and south-eastern Tasmania and do not breed on mainland Australia. The project therefore has no capacity to disrupt the breeding cycle of Swift Parrots.

Significant impact criteria	Likelihood of significant impact	Justification
<b>Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</b>	Unlikely	The project area contains potential foraging habitat within the secondary range of the species (BirdLife Australia, undated), however no preferred foraging trees naturally occur within the project area, and the project is not within an area identified as priority habitat for conservation management of Swift Parrot (Saunders and Tzaros 2011). The eucalypt canopy within the project area will largely be unaffected by avoiding the removal of large trees and canopy trees during trail construction and maintenance. It is therefore considered highly unlikely that the project will result in any changes to availability or quality of habitat that could result in species decline.
<b>Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat</b>	Unlikely	The project will not result in the establishment or introduction of an invasive species or disease that could cause the species to decline.
<b>Introduce disease that may cause the species to decline</b>	Unlikely	
<b>Interfere with the recovery of a species</b>	Unlikely	The project does not conflict with the objectives or actions outlined in the recovery plan for the species (Saunders and Tzaros 2011). This species was recognised as having 10% to 30% of its habitat burned in the 2019-20 bushfires in south-eastern Australia (DEE 2020). Given the project will not contribute to habitat loss for this species the project is not considered to compound the impacts of recent bushfires on this species.

### Conclusion for Swift Parrot

The project is considered unlikely to result in a significant impact on Swift Parrot based on an assessment against the significant impact criteria for endangered and critically endangered species. This conclusion has been reached on the basis that the project area is within the secondary range of the species and that no foraging habitat (large trees or canopy trees) will be impacted by the project.

**Leadbeater's Possum *Gymnobelideus leadbeateri* (critically endangered)**

**Table 47 Leadbeater's Possum: self-assessment against Significant Impact Criteria (CoA 2013)**

Significant impact criteria	Likelihood of significant impact	Justification
<p><b>Lead to a long-term decrease in the size of a population</b></p>	<p>Unlikely</p>	<p>Leadbeater's Possum are known to occur within the project area and broader local area. Key features within the project area for the species include hollow-bearing trees, artificial nest boxes and areas with high stem densities of mid-storey species, such as Mountain Tea-tree, Lemon Bottlebrush, Myrtle Beech and associated occurrences of emergent eucalypts. These areas of high stem density typically occur over wet substrates in dense montane thickets in the Yarra Ranges National Park, and trails have been realigned in consultation with species experts to avoid impacts to these thicket areas. In the Yarra State Forest to the south, habitat is typically taller and more open, with the sub-canopy dominated by taller Silver Wattles in areas that have been logged as recently as between the 1970s and late 1980s. In these areas, trails can avoid removal of dense stands of sub-canopy stems and therefore avoid impacts to the species. The project will also avoid removal of hollow-bearing trees, artificial nest boxes and removal of dense stands of sub-canopy stems that provide movement opportunities for this species. If any treatment of large or hollow-bearing trees that are deemed hazardous is required then this will be done in consultation with the land manager, an ecologist and arboricultural specialist. With these important avoidance and impact minimisation measures applied to trail design and appropriate mitigation, the project is considered unlikely to result in the long-term decrease in size of the Leadbeater's Possum population.</p>



Significant impact criteria	Likelihood of significant impact	Justification
<p><b>Reduce the area of occupancy of the species</b></p>	<p>Unlikely</p>	<p>As outlined above, the project will avoid key habitat features utilised by the species in the broader local area. The overall area of occupancy of the species will therefore remain unchanged during construction and operation, as the habitat in which the trails are situated will remain suitable for this species (i.e. retention of undisturbed thickets, retention of hollow-bearing trees and maintenance of sub-canopy connectivity). If any treatment of large or hollow-bearing trees that are deemed hazardous is required then this will be done in consultation with the land manager, an ecologist and arboricultural specialist. Key areas where trails could not be constructed without impacts to key features (e.g. thickets with high stem densities) have been avoided.</p>
<p><b>Fragment an existing population into two or more populations</b></p>	<p>Unlikely</p>	<p>Key areas where structural fragmentation of dense montane thickets and the sub-canopy layer in wet forests and rainforests may have occurred have been completely avoided through realignments in the Mount Donna Buang and Ben Cairn areas of the Yarra Ranges National Park. While such fragmentation would not have resulted in a population becoming isolated and fragmented into two populations, such structural fragmentation was considered particularly important to avoid due to impacts associated with disturbance, increased predation and energetic costs to animals in the area. The project will therefore not result in fragmentation of a population, nor will it result in structural fragmentation of important habitat facilitating movement of the species.</p> <p>It is also important to note that habitat for the species is already fragmented by roads and tracks throughout the project area and by areas of naturally unsuitable forest types or previously logged or burned forests that may now lack suitable habitat elements.</p>

Significant impact criteria	Likelihood of significant impact	Justification
<b>Adversely affect habitat critical to the survival of the species</b>	Unlikely	As outlined above, direct impacts on habitat elements and features critical to the survival of the species in the broader project area including montane thickets, hollow-bearing trees, nest boxes and areas of high sub-canopy stem densities will be avoided. If any treatment of large or hollow-bearing trees that are deemed hazardous is required then this will be done in consultation with the land manager, an ecologist and arboricultural specialist. The project is therefore unlikely to adversely affect habitat critical to the survival of the species.
<b>Disrupt the breeding cycle of a population</b>	Unlikely	Trail construction and operation are unlikely to affect breeding or dispersal as key habitat and connectivity for these activities will still be available and the trails will not act as a barrier that would interrupt gene flow between individuals or populations.
<b>Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</b>	Unlikely	Key habitat features within the broader project area (hollow-bearing trees, nest boxes and dense thickets with high density of sub-canopy stems) will be avoided and the structural connectivity of sub-canopy and canopy habitat will not be fragmented by the proposed trails. If any treatment of large or hollow-bearing trees that are deemed hazardous is required then this will be done in consultation with the land manager, an ecologist and arboricultural specialist. The habitat in the project area will therefore not be modified or destroyed to the point that the species is likely to decline.
<b>Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat</b>	Unlikely	Invasive fauna species are already present within the project area (e.g. cats). To address the potential risk of the project increasing opportunities for the movement and dispersal of introduced fauna species, the project will support existing pest animal programs targeting foxes, cats and deer conducted by public land managers (e.g. DELWP and Parks Victoria). The project CEMP will also specifically deal with controlling the introduction and spread of weed species and pathogens. With the above measures in place, it is unlikely that an invasive species harmful to Leadbeater's Possum will become established within the project area.

Significant impact criteria	Likelihood of significant impact	Justification
<p><b>Introduce disease that may cause the species to decline</b></p>	<p>Unlikely</p>	<p>The project will not result in the introduction of a disease that is harmful to Leadbeater’s Possum. The draft National Recovery Plan does not mention any known diseases in the ‘causes of mortality’ section of the plan (CoA 2016).</p>
<p><b>Interfere with the recovery of a species</b></p>	<p>Unlikely</p>	<p>The first national recovery plan for the Leadbeater’s Possum was approved in 1998 (Macfarlane et al.1997), and a revision is currently being drafted. An Action Statement has also been prepared (DEPI 2014b). Key threats identified in these published documents include wildfire, timber harvesting, habitat fragmentation and declines in habitat quality and extent. As outlined above, the project will avoid impacts to key habitat features and will not result in fragmentation and declines in the extent and quality of habitat. An existing recovery action for the species that is relevant to the project area is the translocation of individuals to recipient sites in and around Mount Donna Buang and Ben Cairn, including locations that were previously within or immediately adjacent to the proposed Trail 1 alignment below Mount Donna Buang and on the Donna Buang Road near Ben Cairn. Trail 1 has now, however, been realigned after consultation with species experts to avoid direct impacts on these recipient sites and the associated high quality habitat present at these locations. Suitable buffers have also been applied to research sites off the Donna Buang Road near Ben Cairn. As such, the project is considered unlikely to interfere with the recovery actions and objectives for Leadbeater’s Possum.</p> <p>This species was not recognised as having a significant percentage of its habitat burned in the 2019-20 bushfires in south-eastern Australia in the list prepared by DEE (2020).</p>

### Conclusion for Leadbeater’s Possum

The project is considered unlikely to result in a significant impact on Leadbeater’s Possum based on an assessment against the significant impact criteria for endangered and critically endangered species. This conclusion has been reached on the basis of avoidance and minimisation strategies and implementation of effective mitigation measures, including:

- Highly quality montane thicket habitats with high stem densities between Mount Donna Buang and Ben Cairn will not be fragmented by the proposed trails. Very minor pruning of several Lemon Bottlebrush shrubs may be required for Trail 1 below Ben Cairn but this is not considered a significant source of habitat loss or fragmentation.

- All hollow-bearing trees and large trees will be avoided by the project with no direct removal required to build the trails. If any treatment of large or hollow-bearing trees, that are deemed hazardous, is required then this will be done in consultation with the land manager, an ecologist and arboricultural specialist.
- Impacts on areas of dense sub-canopy stems in non-thicket habitat (e.g. wet forest communities) can be minimised by micro-siting trails around these areas and avoiding fragmentation of sub-canopy connectivity.
- Translocation recipient sites and monitoring areas will not be directly impacted by the project as these areas are considered critical to the survival and recovery of the species and have been avoided through trail design.

**Spot-tailed Quoll *Dasyurus maculatus maculatus* (endangered)**

**Table 48 Spot-tailed Quoll: self-assessment against Significant Impact Criteria (CoA 2013)**

Significant impact criteria	Likelihood of significant impact	Justification
<p><b>Lead to a long-term decrease in the size of a population</b></p>	<p>Unlikely</p>	<p>Depending on the trail design scenario, the project proposes to permanently remove / disturb up to 37 hectares of understorey vegetation across a range of forest types. The habitat to be removed is within a large contiguous area of high quality native forest within the broader area and region. The resultant understorey disturbance will be a permeable narrow track in discrete locations. This level of disturbance is unlikely to affect foraging, dispersal or gene flow of Spot-tailed Quoll, given this species' dispersal ability and large home ranges and as extensive habitat will still be available during and post construction for these activities to occur in. Given the relatively small linear construction footprint in the context of available habitat in the broader area and region, the proposed trails will not lead to a long term decline in the size of a population of this species.</p>
<p><b>Reduce the area of occupancy of the species</b></p>	<p>Unlikely</p>	<p>While the project will result in the removal of native understorey vegetation that may constitute habitat for this species, the overall area of occupancy of the species will remain unchanged during and post construction, as the habitat in which the trails are situated will still be suitable for this species.</p>
<p><b>Fragment an existing population into two or more populations</b></p>	<p>Unlikely</p>	<p>The habitat in the project area will not be fragmented by the proposed works and any resultant disturbance will consist of permeable narrow trails in discrete locations that will not affect physical or functional connectivity between populations or breeding individuals.</p>

Significant impact criteria	Likelihood of significant impact	Justification
<b>Adversely affect habitat critical to the survival of the species</b>	Unlikely	<p>The national recovery plan for Spot-tailed Quoll describes critical habitat as large patches of forest with adequate denning resources and relatively high densities of medium-sized mammalian prey (DELWP 2016d). The understorey vegetation to be disturbed for construction and operation of the project includes high quality montane and foothill vegetation that under the definition above contains elements critical to this species survival. However, the extent of permanent vegetation removal/disturbance required for the trail development will not jeopardise the long term survival of this species given the quantity of similar high quality contiguous habitat remaining within, and immediately adjacent to, the project area.</p>
<b>Disrupt the breeding cycle of a population</b>	Unlikely	<p>Given the large home range and dispersal ability of Spot-tailed Quoll, trail construction activities are unlikely to affect dispersal or gene flow as extensive habitat will still be available during and post construction for these activities to occur in and the trails will not act as a barrier that would interrupt gene flow between individuals or populations.</p>
<b>Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</b>	Unlikely	<p>The habitat in the project area will not be fragmented by the proposed works and any resultant disturbance will consist of permeable narrow tracks in discrete locations that will not affect physical or functional connectivity between populations or breeding individuals. The habitat in the project area will not be modified or destroyed to the point that the species is likely to decline, given the extent and quality of adjacent habitats.</p>

Significant impact criteria	Likelihood of significant impact	Justification
<p><b>Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat</b></p>	<p>Unlikely</p>	<p>Invasive fauna species are already present within the project area (e.g. cats and foxes). To address the potential risk of the project increasing opportunities for the movement and dispersal of introduced fauna species, the project will support existing pest animal programs targeting foxes, cats and deer conducted by public land managers (e.g. DELWP and Parks Victoria). Invasive weeds species can modify or simplify vegetation structure that may indirectly influence Spot-tailed Quoll as the habitat becomes unsuitable for preferred prey species. Soil disturbance and subsequent weed invasion will be minimised through construction management and follow up weed control. The project CEMP will specifically deal with controlling the introduction and spread of weed species. With the above effective mitigation measures in place, it is highly unlikely that an invasive species harmful to Spot-tailed Quoll will become established within the project area.</p>
<p><b>Introduce disease that may cause the species to decline</b></p>	<p>Unlikely</p>	<p>The project will not result in the introduction of a disease that is harmful to Spot-tailed Quoll.</p>
<p><b>Interfere with the recovery of a species</b></p>	<p>Unlikely</p>	<p>The national recovery plan for Spot-tailed Quoll (DELWP 2016d) describes a number of threats and management actions, and while the removal of understorey vegetation that provides foraging or dispersal resources is counter to those management actions, the extent and type of vegetation removal required for the trail development is unlikely to interfere with the national recovery of the species. This species was recognised as having 10% to 30% of its habitat burned in the 2019-20 bushfires in south-eastern Australia (DEE 2020). Given the project will only contribute to small areas of potential habitat loss and will not create significant barriers to movement or dispersal, the project is not considered to compound the impacts of recent bushfires on this species.</p>

### Conclusion for Spot-tailed Quoll

The project is considered unlikely to result in a significant impact on Spot-tailed Quoll based on an assessment against the significant impact criteria for endangered and critically endangered species. This conclusion has been reached on the basis that:

- Large areas of suitable forest habitat will remain within, and adjacent to, the project area.

- 
- The trail network only impacts understorey vegetation and will not create large or hostile barriers to the movement and dispersal of this species.
  - Effective mitigation measures, including a pest animal programs targeting foxes, cats and deer will be supported by the project and implemented by land managers for the entire life of the project. These measures will assist in addressing potential changes to local movements of pest animals and their potential impacts on this species.



## Smoky Mouse *Pseudomys fumeus* (endangered)

**Table 49 Smoky Mouse: self-assessment against Significant Impact Criteria (CoA 2013)**

Significant impact criteria	Likelihood of significant impact	Justification
<p><b>Lead to a long-term decrease in the size of a population</b></p>	<p>Unlikely</p>	<p>The national recovery plan for Smoky Mouse describes any vegetation with a diversity of heath and bush-pea species, combined with potential shelter sites in the form of woody debris or rocks as being potential habitat within the species range (Menkhorst and Broome 2006). Given these broad habitat requirements and the cryptic nature of this species, it could be reasonably assumed that if a population of the species was present within or adjacent to the trail alignment, the population would utilise the extensive areas of available habitat adjacent to the development (e.g. Shrubby Foothill Forest dominated by bush peas). Approximately 12 ha of Shrubby Foothill Forest understorey will be disturbed by the project and not all of this area is dominated by suitable heath and bush pea species that provides potential habitat for Smoky Mouse. Under this assumption the removal of suitable habitat from within a large, contiguous, patch would not lead to a direct decline in the size of a population as extensive habitat would still be available for critical activities to occur in. Predation from introduced carnivores is a key threatening process to the species. Cats and foxes are already present throughout the project area and the construction of new trails is unlikely to increase the current predation threat from introduced carnivores, given that the local area currently has a level of predator activity.</p>
<p><b>Reduce the area of occupancy of the species</b></p>	<p>Unlikely</p>	<p>The permanent removal of potentially suitable habitat will reduce the area of available habitat within the study area, however habitat surrounding and within the trail may still be utilised by Smoky Mouse, should they be present. As such the overall area of occupancy will remain unchanged post construction.</p>

Significant impact criteria	Likelihood of significant impact	Justification
<b>Fragment an existing population into two or more populations</b>	Unlikely	The habitat in the project area will not be fragmented by the proposed works and any resultant disturbance will consist of permeable narrow trails in discrete locations that will not affect physical or functional connectivity between populations or breeding individuals. Previous studies by Macak and Menkhorst (2017) on the impact of large fire breaks suggest the construction of narrow MTB trails as proposed are unlikely to significantly impact the species or fragment its habitat.
<b>Adversely affect habitat critical to the survival of the species</b>	Unlikely	There is no declared critical habitat for the Smoky Mouse.
<b>Disrupt the breeding cycle of a population</b>	Unlikely	Impacts likely to disrupt the breeding cycle of Smoky Mouse include direct mortality, disturbance to breeding sites, loss of breeding and sheltering habitat, loss and fragmentation of foraging habitat and fragmentation of movement corridors. The proposal will directly remove some potentially suitable habitat on dry slopes where Shrubby Foothill Forest is dominated by bush peas. The habitat to be removed is within a large patch of vegetation within Yarra State Forest. It is likely that if the species uses the study area for foraging, breeding and sheltering then the local population would use the entire patch of habitat.
<b>Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</b>	Unlikely	The habitat in the project area will not be fragmented by the proposed works and any resultant disturbance will consist of permeable narrow trails in discrete locations that will not affect physical or functional connectivity between populations or breeding individuals. The habitat in the project area will not be modified or destroyed to the point that the species is likely to decline, given the extent and quality of adjacent habitats.

Significant impact criteria	Likelihood of significant impact	Justification
<p><b>Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat</b></p>	<p>Unlikely</p>	<p>Invasive fauna species are already present within the project area (e.g. cats and foxes). To address the potential risk of the project increasing opportunities for the movement and dispersal of introduced fauna species, the project will support existing pest animal programs targeting foxes, cats and deer conducted by public land managers (e.g. DELWP and Parks Victoria). Invasive weeds species can modify or simplify vegetation structure that may indirectly influence Smoky Mouse persistence. Soil disturbance and subsequent weed invasion will be minimised through construction management and follow up weed control. The project CEMP will specifically deal with controlling the introduction and spread of weed species. With the above effective mitigation measures in place, it is unlikely that an invasive species harmful to Smoky Mouse will become established within the project area.</p>
<p><b>Introduce disease that may cause the species to decline</b></p>	<p>Unlikely</p>	<p>The project will not result in the introduction of a disease that is harmful to Smoky Mouse.</p>
<p><b>Interfere with the recovery of a species</b></p>	<p>Unlikely</p>	<p>The removal of suitable habitat is counter to the recovery of this species, however, the extent and nature of the vegetation removal in the context of available suitable habitat within the broader Yarra State Forest will not interfere with the recovery of this species. Previous studies by Macak and Menkhorst (2017) on the impact of large fire breaks suggest the construction of narrow MTB trails is unlikely to significantly impact the species or fragment its habitat should it be present in the project area. This species was recognised as having 10% to 30% of its habitat burned in the 2019-20 bushfires in south-eastern Australia (DEE 2020). Given the project will only contribute to small areas of potential habitat loss and will not create significant barriers to movement or dispersal, the project is not considered to compound the impacts of recent bushfires on this species.</p>

### Conclusion for Smoky Mouse

The project is considered unlikely to result in a significant impact on Smoky Mouse based on an assessment against the significant impact criteria for endangered and critically endangered species. This conclusion has been reached on the basis that there is a medium likelihood of this species occurring in the project area, most forest types that will be impacted are too wet and unsuitable for this species and the nearest records are 11 kilometres to the east of the project area. If the species is present in the project area in suitable bush pea dominated Shrubby Foothill Forest it is considered unlikely that construction of minor trails will fragment

suitable habitat as this species has been demonstrated to cross large fire breaks in similar forested habitats in the Central Highlands of Victoria (Macak and Menkhorst 2017). Effective mitigation measures, including supporting public land managers to implement pest animal programs targeting foxes, cats and deer will be implemented for the entire life of the project. These measures will assist in addressing potential changes to local movements of pest animals and their potential impacts on this species.

## Southern Brown Bandicoot *Isodon obesulus obesulus* (endangered)

**Table 50 Southern Brown Bandicoot: self-assessment against Significant Impact Criteria (CoA 2013)**

Significant impact criteria	Likelihood of significant impact	Justification
<b>Lead to a long-term decrease in the size of a population</b>	Unlikely	Within the project area, Southern Brown Bandicoot is considered to have some potential to occur in drier forest types located in the southern sections of the project area, particularly around Wesburn (e.g. Lowland Forest and Valley Heathy Forest). The species is not likely to be present in other parts of the project area. It can be reasonably assumed that if a population of the species was present within or adjacent to the trail alignment, the population would utilise the extensive areas of available habitat adjacent to the development. Under this assumption the removal of 0.81 hectares of suitable understorey habitat in Lowland Forest and Valley Heathy Forest from within a large, contiguous patch would not lead to a direct decline in the size of a population as extensive habitat would still be available for critical activities to occur in. Predation from introduced carnivores is a key threatening process to Southern Brown Bandicoot (TSSC 2016). Cats and foxes are likely to be present throughout the project area and the construction of new trails is unlikely to increase the current predation threat from introduced carnivores, given that the local area currently has a level of predator activity and Lowland Forest and Valley Heathy Forest already have an extensive network of forest tracks and trails near Wesburn (Figure 16).
<b>Reduce the area of occupancy of the species</b>	Unlikely	The permanent removal of potentially suitable habitat (0.81 ha of understorey vegetation) will reduce the area of available habitat within the study area, however habitat surrounding and within the trail corridors may still be utilised by Southern Brown Bandicoot, should they be present. As such the overall area of occupancy will remain unchanged post construction.
<b>Fragment an existing population into two or more populations</b>	Unlikely	The habitat in the project area will not be extensively fragmented by the proposed works and any resultant disturbance will consist of permeable narrow trails in discrete locations that will not affect physical or functional connectivity between populations or breeding individuals.

Significant impact criteria	Likelihood of significant impact	Justification
<b>Adversely affect habitat critical to the survival of the species</b>	Unlikely	There is no declared critical habitat for Southern Brown Bandicoot.
<b>Disrupt the breeding cycle of a population</b>	Unlikely	<p>Impacts likely to disrupt the breeding cycle of Southern Brown Bandicoot include direct mortality, disturbance to breeding sites, loss of breeding and sheltering habitat, loss and fragmentation of foraging habitat and fragmentation of movement corridors.</p> <p>The proposal will directly remove some potentially suitable habitat. The habitat to be removed is within a large patch of vegetation. It is likely that if the species uses the study area for foraging, breeding and sheltering then the local population would use the entire patch of habitat and any habitat removal is unlikely to disrupt the breeding cycle.</p>
<b>Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</b>	Unlikely	The habitat in the project area will not be extensively fragmented by the proposed trails and any resultant disturbance will consist of permeable narrow trails in discrete locations that will not affect physical or functional connectivity between populations or breeding individuals. The habitat in the project area will not be modified or destroyed to the point that the species is likely to decline, given the extent and quality of adjacent habitats.
<b>Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat</b>	Unlikely	<p>Invasive fauna species are already present within the project area (e.g. cats and foxes). To address the potential risk of the project increasing opportunities for the movement and dispersal of introduced fauna species, the project will support existing pest animal programs targeting foxes, cats and deer conducted by public land managers (e.g. DELWP and Parks Victoria).</p> <p>Invasive weeds species can modify or simplify vegetation structure that may indirectly influence Southern Brown Bandicoot persistence. Soil disturbance and subsequent weed invasion will be minimised through construction management and follow up weed control. The project CEMP will specifically deal with controlling the introduction and spread of weed species. With the above effective mitigation measures in place, it is highly unlikely that an invasive species harmful to Southern Brown Bandicoot will become established within the project area.</p>

Significant impact criteria	Likelihood of significant impact	Justification
<b>Introduce disease that may cause the species to decline</b>	Unlikely	The project will not result in the introduction of a disease that is harmful to Southern Brown Bandicoot.
<b>Interfere with the recovery of a species</b>	Unlikely	The removal of suitable habitat is counter to the recovery of this species, however, the extent and nature of the vegetation removal in the context of available suitable habitat within the broader local area will not interfere with the recovery of this species. This species was recognised as having 10% to 30% of its habitat burned in the 2019-20 bushfires in south-eastern Australia (DEE 2020). Given the project will only contribute to small areas of potential habitat loss and will not create significant barriers to movement or dispersal, the project is not considered to compound the impacts of recent bushfires on this species.

### Conclusion for Southern Brown Bandicoot

The project is considered unlikely to result in a significant impact on Southern Brown Bandicoot based on an assessment against the significant impact criteria for endangered and critically endangered species. This conclusion has been reached on the basis that there is a medium likelihood of this species occurring in the project area, most forest types that will be impacted are not suitable habitat and the presence of one 1999 record on the lower slopes of Mount Littlejoe in the project area. If the species is present in the project area in suitable Lowland Forest or Valley Heathy Forest habitat it is considered unlikely that construction of minor trails and removal of 0.8 hectares of understorey vegetation in these forest types will significantly impact this species. Effective mitigation measures, including pest animal programs targeting foxes, cats and deer will be implemented by public land managers and supported by the project. These measures will assist in addressing potential changes to local movements of pest animals and their potential impacts on this species.

## Macquarie Perch *Macquaria australasica* (endangered)

**Table 51 Macquarie Perch: self-assessment against Significant Impact Criteria (CoA 2013)**

Significant impact criteria	Likelihood of significant impact	Justification
<b>Lead to a long-term decrease in the size of a population</b>	Unlikely	This species has been recorded within the Yarra River Basin and has been translocated to this part of southern Victoria. The development of trails is not expected to lead to a long term decrease in the size of a population of Macquarie Perch. This is considering the small area of potential impact associated with the Yarra River and the small extent of available habitat and level of impact along Yarra River tributaries within the project area.
<b>Reduce the area of occupancy of the species</b>	Unlikely	The species is considered to have some likelihood of occurrence in small numbers within the project area. The proposed works would result in a narrow trail in discrete locations and would not reduce the area of occupancy for the species in the unlikely event they are found to be present within the project area. Measures will be implemented in the project CEMP to avoid impacts to the Yarra River and associated tributaries.
<b>Fragment an existing population into two or more populations</b>	Unlikely	The proposed works would result in a narrow trail in discrete locations and would not present a major barrier for the movement of the species, retaining population scale connectivity. All bridges across waterways will be single span and will not cause barriers to fish movement.
<b>Adversely affect habitat critical to the survival of the species</b>	Unlikely	The current area of occupancy of the species in the Yarra River is noted in the Recovery Plan (CoA 2018a) as critical habitat. The proposed works would result in a narrow trail in discrete locations, constructed in a manner in which stream and river connectivity remains undisturbed. Habitat will not be adversely affected.
<b>Disrupt the breeding cycle of a population</b>	Unlikely	The proposed works would result in a narrow trail in discrete locations, constructed in a manner in which stream and river connectivity remains undisturbed. Breeding cycles will not be adversely affected.



Significant impact criteria	Likelihood of significant impact	Justification
<b>Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</b>	Unlikely	The proposed works would result in a narrow trail in discrete locations, constructed in a manner in which stream and river connectivity remains undisturbed. The availability and/or quality of habitat will not be affected.
<b>Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat</b>	Unlikely	The type and scale of potential impacts associated with the project construction and operation are not anticipated to favour the establishment of invasive species. Hygiene controls to reduce the risk of the spread or introduction of aquatic weeds, pathogens and predators will be included in the project CEMP / OEMP.
<b>Introduce disease that may cause the species to decline</b>	Unlikely	The project will not result in the introduction of a disease that is harmful to Macquarie Perch.
<b>Interfere with the recovery of a species</b>	Unlikely	CoA (2018a) lists threats to the species as: habitat degradation, introduced fish species, barriers to fish movement, altered flow and thermal regimes, disease and parasites, illegal/incidental capture, chemical water pollution and climate change. The project is not considered likely to substantially interfere with the recovery of the species due to the localised area of potential impacts and extent of available adjacent habitat. This species was recognised as having 30% to 50% of its habitat (catchments) burned in the 2019-20 bushfires in south-eastern Australia (DEE 2020). Given the project impacts to waterways is minimal and indirect impacts such as sedimentation can be readily managed, the project is not considered to compound the impacts of recent bushfires on this species.

### Conclusion for Macquarie Perch

The project is considered unlikely to result in a significant impact on Macquarie Perch based on an assessment against the significant impact criteria for endangered and critically endangered species. This conclusion has been reached on the basis that no aquatic habitats will be significantly altered, no barriers to fish movement will be introduced and that sources of indirect impact (e.g. waterway sedimentation) will be managed through effective and proven sediment/erosion control measure for MTB trail construction and operation.

## White-throated Needletail *Hirundapus caudacutus* (vulnerable species)

**Table 52 White-throated Needletail: self-assessment against Significant Impact Criteria (CoA 2013)**

Significant impact criteria	Likelihood of significant impact	Justification
<b>Lead to a long-term decrease in the size of an important population of a species</b>	Unlikely	White-throated Needletails are considered to function as one single migratory population when present in Australia, therefore the entire population is considered to be an important population for the purpose of this assessment. White-throated Needletails are almost exclusively aerial when present in Australia, however some birds have been recorded roosting in hollows and canopy foliage of tall trees in forest and woodland (DAWE 2021). The species may therefore occasionally utilise tall trees in the project area for roosting. The use of roosting habitat in Australia is not well understood. Despite this, the project will not remove canopy trees and therefore the project is highly unlikely to result in a decrease in size of the population, nor reduce the area of occupancy for the species.
<b>Reduce the area of occupancy of an important population</b>	Unlikely	White-throated Needletails are almost exclusively aerial when present in Australia, however some birds have been recorded roosting in hollows and canopy foliage of tall trees in forest and woodland (DAWE 2021). The species may therefore occasionally utilise tall trees in the project area for roosting. The use of roosting habitat in Australia is not well understood. Despite this, the project will not remove canopy trees and therefore the project is highly unlikely to result in a decrease in size of the population, nor reduce the area of occupancy for the species.
<b>Fragment an existing important population into two or more populations</b>	Unlikely	The White-throated Needletail occurs as a single, migratory non-breeding population when present in Australia (DAWE 2021), and as such the project has no capacity to result in fragmentation of the population.
<b>Adversely affect habitat critical to the survival of the species</b>	Unlikely	White-throated Needletails are almost exclusively aerial when present in Australia, however they may utilise tall trees within the project area for roosting on occasions. The project will not result in the removal of any canopy trees and therefore will not result in impacts that could affect habitat critical to the survival of the species.
<b>Disrupt the breeding cycle of an important population</b>	Unlikely	White-throated Needletails do not breed in Australia, and the project will not result in impacts (e.g. via impacts to migration or mortality of adults) that could affect breeding success elsewhere. The project therefore has no capacity to disrupt the breeding cycle of White-throated Needletails.
<b>Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</b>	Unlikely	White-throated Needletails may utilise tall trees within the project area for roosting on occasions, however the project will avoid removal of all canopy trees. It is therefore considered highly unlikely that the project will result in any changes to availability or quality of habitat that could result in species decline.
<b>Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat</b>	Unlikely	The project will not result in the establishment or introduction of an invasive species or disease that could cause the species to decline.

Significant impact criteria	Likelihood of significant impact	Justification
<b>Introduce disease that may cause the species to decline</b>	Unlikely	
<b>Interfere substantially with the recovery of a species</b>	Unlikely	<p>The project does not conflict with information regarding key threats to the species (DAWE 2021, DoE 2015). The species is described as having few threats in Australia or elsewhere. Collisions with tall structures such as overhead wires, buildings and wind farms are the only listed threats in Australia (DAWE 2021) and are not applicable to the this project. This species was recognised as having 10% to 30% of its habitat burned in the 2019-20 bushfires in south-eastern Australia (DEE 2020). Given the project will not contribute to habitat loss for this species the project is not considered to compound the impacts of recent bushfires on this species.</p>

### Conclusion for White-throated Needle-tail

The project is considered unlikely to result in a significant impact on White-throated Needle-tail based on an assessment against the significant impact criteria for this vulnerable species. This conclusion has been reached on the basis of the predominantly aerial nature of this species and that potential roosting trees in forested areas will not be impacted by the project.

## Southern Greater Glider *Petauroides volans* (vulnerable)

**Table 53 Southern Greater Glider: self-assessment against Significant Impact Criteria (CoA 2013)**

Significant impact criteria	Likelihood of significant impact	Justification
<b>Lead to a long-term decrease in the size of an important population of a species</b>	Unlikely	Southern Greater Glider are known to occur within the project area and broader local area. In the absence of specific information on what constitutes an important population of Southern Greater Glider, it is assumed that important populations are present within the project area and adjacent contiguous habitat. Impacts associated with the project are to be restricted to understorey vegetation, therefore it is unlikely that this impact would lead to a broader decline in the population. Furthermore, all hollow-bearing trees will be avoided and as such breeding habitat will not be directly impacted. If any treatment of large or hollow-bearing trees that are deemed hazardous is required then this will be done in consultation with the land manager, an ecologist and arboricultural specialist.
<b>Reduce the area of occupancy of an important population</b>	Unlikely	The area of occupancy for Southern Greater Glider will remain unchanged as the trail alignments will be a discrete narrow disturbance and the canopy will remain effectively contiguous in the context of this species dispersal and movement patterns.
<b>Fragment an existing important population into two or more populations</b>	Unlikely	The disturbance associated with trail construction will be a discrete narrow disturbance that will not act as a barrier for dispersal for this species as the canopy will remain effectively contiguous in the context of this species dispersal and movement patterns.
<b>Adversely affect habitat critical to the survival of the species</b>	Unlikely	Impacts associated with the project will be restricted to mostly understorey vegetation, therefore it is unlikely that this impact would lead to impacts that would adversely affect the survival of the species. Furthermore, all hollow-bearing trees will be avoided and as such critical breeding habitat will not be impacted. If any treatment of large or hollow-bearing trees that are deemed hazardous is required then this will be done in consultation with the land manager, an ecologist and arboricultural specialist.
<b>Disrupt the breeding cycle of an important population</b>	Unlikely	The project will remove understorey vegetation only, and will avoid direct impacts to breeding sites by avoiding removal of hollow-bearing trees during construction. Operation of the trails in Yarra Ranges NP and high quality forest habitats near Mount Bride in Yarra State Forest will be restricted to daylight hours, therefore avoiding potential for disturbance from noise and lighting at night, when the species is active. It is therefore unlikely that impacts of the trail construction and operation will disrupt the breeding cycle of Southern Greater Gliders. If any treatment of large or hollow-bearing trees that are deemed

Significant impact criteria	Likelihood of significant impact	Justification
		hazardous is required then this will be done in consultation with the land manager, an ecologist and arboricultural specialist.
<b>Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</b>	Unlikely	The project will remove understorey vegetation only, and will avoid direct impacts to breeding sites by avoiding removal of hollow-bearing trees during construction. This level of disturbance in the context of available habitat will not lead to a broader species decline. If any treatment of large or hollow-bearing trees that are deemed hazardous is required then this will be done in consultation with the land manager, an ecologist and arboricultural specialist.
<b>Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat</b>	Unlikely	Invasive fauna species are already present within the project area (e.g. cates and foxes). To address the potential risk of the project increasing opportunities for the movement and dispersal of introduced fauna species, the project will support existing pest animal programs targeting foxes, cats and deer conducted by public land managers (e.g. DELWP and Parks Victoria). The project CEMP will specifically deal with controlling the introduction and spread of weed species. With the above effective mitigation measures in place, it is highly unlikely that an invasive species harmful to Southern Greater Glider will become established within the project area.
<b>Introduce disease that may cause the species to decline</b>	Unlikely	The project will not result in the introduction of a disease that is harmful to the Greater Glider.
<b>Interfere substantially with the recovery of a species</b>	Unlikely	<p>There is no accepted or adopted recovery plan associated with Greater Glider.</p> <p>The conservation advice (TSSC 2016a) gives priority to the following conservation actions.</p> <ol style="list-style-type: none"> <li>1 Reduce the frequency and intensity of prescribed burns.</li> <li>2. Identify appropriate levels of patch retention, habitat tree retention, and logging rotation in hardwood production.</li> <li>3. Protect and retain hollow-bearing trees, suitable habitat and habitat connectivity</li> </ol> <p>Considering the above factors, the project will not interfere with the recovery of Southern Greater Glider.</p> <p>This species was recognised as having 10% to 30% of its habitat burned in the 2019-20 bushfires in south-eastern Australia (DEE 2020). Given the project will not contribute to direct habitat loss for this species (i.e. hollow-bearing trees and forest canopy to be retained) the project is not considered to compound the impacts of recent bushfires on this species.</p>

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### **Conclusion for Southern Greater Glider**

The project is considered unlikely to result in a significant impact on Southern Greater Glider based on an assessment against the significant impact criteria for vulnerable species. This conclusion has been reached on the basis that vegetation removal in forested areas will be restricted to understorey species only and all hollow-bearing trees will be avoided. If any treatment of large or hollow-bearing trees, that are deemed hazardous, is required then this will be done in consultation with the land manager, an ecologist and arboricultural specialist.

## Broad-toothed Rat *Mastacomys fuscus mordicus* (vulnerable)

**Table 54 Broad-toothed Rat: self-assessment against Significant Impact Criteria (CoA 2013)**

Significant impact criteria	Likelihood of significant impact	Justification
<b>Lead to a long-term decrease in the size of an important population of a species</b>	Unlikely	No areas of suitable Broad-toothed Rat habitat have been identified within the project area based on habitat surveys undertaken in early 2021, and the species is considered to have a low likelihood of occurrence. The project is therefore considered unlikely to result in the decrease in size of a Broad-toothed Rat population.
<b>Reduce the area of occupancy of an important population</b>	Unlikely	No areas of suitable Broad-toothed Rat habitat have been identified within the project area, and the species is considered to have a low likelihood of occurrence. Despite this, the proposed works would result in a network of narrow trails in discrete locations and would not reduce the area of occupancy for the species in the unlikely event they are found to be present within the project area.
<b>Fragment an existing important population into two or more populations</b>	Unlikely	No areas of suitable Broad-toothed Rat habitat have been identified within the project area, and the species is considered to have a low likelihood of occurrence. Despite this, the proposed works would result in a network of narrow trails in discrete locations and would not present a major barrier for the movement of the species in the unlikely event they are found to be present within the project area. Whisson et al. (2015) demonstrates that Broad-toothed Rats in alpine environments freely disperse through and around significantly fragmented and disturbed landscapes and utilises drains, pipes and introduced vegetation to move through inhospitable landscapes. If a population were present in the project area, its habitat will not be fragmented by the trails and any resultant disturbance will be a permeable narrow barrier in a discrete location or elevated structures that will not affect physical or functional connectivity between populations or breeding individuals.
<b>Adversely affect habitat critical to the survival of the species</b>	Unlikely	No areas of suitable Broad-toothed Rat habitat have been identified within the project area, and the species is considered to have a low likelihood of occurrence. It is therefore considered unlikely that the project will adversely affect habitat critical to the survival of Broad-toothed Rat.
<b>Disrupt the breeding cycle of an important population</b>	Unlikely	No areas of suitable Broad-toothed Rat habitat have been identified within the project area, and the species is considered to have a low likelihood of occurrence. The project is therefore considered unlikely to disrupt the breeding cycle of a Broad-toothed Rat population. The proposed works will result in a network of narrow trails that would not affect the movement or dispersal of the species, should this occur due to the presence of

Significant impact criteria	Likelihood of significant impact	Justification
		any unknown populations in proximity of the project area.
<b>Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</b>	Unlikely	No areas of suitable Broad-toothed Rat habitat have been identified within the project area, and the species is considered to have a low likelihood of occurrence. The project is therefore considered unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
<b>Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat</b>	Unlikely	Invasive fauna species are already present within the project area, and Broad-toothed Rats are known to be particularly prone to selective predation by foxes (Green 2002), and their habitat is particularly sensitive to damage by deer. To address the potential risk of the project increasing opportunities for the movement and dispersal of introduced fauna species, the project will support existing pest animal programs targeting foxes, cats and deer conducted by public land managers (e.g. DELWP and Parks Victoria). Invasive weeds species can modify or simplify vegetation structure that may indirectly influence Broad-toothed Rat habitat through altered structure and/or hydrology. Soil disturbance and subsequent weed invasion will be minimised through construction management and follow up weed control. The project CEMP will specifically deal with controlling the introduction and spread of weed species. With the above effective mitigation measures in place, it is highly unlikely that an invasive species harmful to Broad-toothed Rat will become established within the project area.
<b>Introduce disease that may cause the species to decline</b>	Unlikely	The project will not result in the introduction of a disease that is harmful to Broad-toothed Rat.



Significant impact criteria	Likelihood of significant impact	Justification
<p><b>Interfere substantially with the recovery of a species</b></p>	<p>Unlikely</p>	<p>The Conservation Advice for the species (TSSC 2016b) identifies the key threats to Broad-toothed Rat to include predation, fire, climate change, habitat loss and fragmentation and the reduction in the extent and quality of habitat due to weeds, die-back and damage caused by livestock and feral herbivores. Key conservation actions are identified as controlling predators and maintaining and protecting habitat. No areas of suitable Broad-toothed Rat habitat have been identified within the project area, and the species is considered to have a low likelihood of occurrence. The project is not identified as a threat, and the proposed works do not conflict with the primary conservation actions identified for the species (TSSC 2016b). The project CEMP / OEMP will include requirements to manage feral predators and deer, which are listed as recovery actions in the Conservation Advice. The project will therefore not interfere with the recovery of the species.</p> <p>This species was recognised as having 10% to 30% of its habitat burned in the 2019-20 bushfires in south-eastern Australia (DEE 2020). Given the species has low potential to occur in the project area or be impacted by trail construction, the project is not considered to compound the impacts of recent bushfires on this species.</p>

### Conclusion for Broad-toothed Rat

The project is considered unlikely to result in a significant impact on Broad-toothed Rat based on an assessment against the significant impact criteria for vulnerable species. This conclusion has been reached based on the species being considered to have a low likelihood of occurrence in the project area due to a lack of suitable habitat. Surveys for suitable habitat were undertaken in early 2021 and no suitable sedge/grass-dominated drainage line habitat was identified. If undetected habitat or populations do occur in the project area or along the assessment corridor, it is still considered that trail construction is unlikely to lead to a significant impact based on the species' ability to use modified vegetation (as demonstrated in ski resort environments by Whisson et al 2015), the narrow footprint of the impact and the environmental controls that will be implemented.

## Grey-headed Flying-fox *Pteropus poliocephalus* (vulnerable)

**Table 55 Grey-headed Flying-fox: self-assessment against Significant Impact Criteria (CoA 2013)**

Significant impact criteria	Likelihood of significant impact	Justification
<b>Lead to a long-term decrease in the size of an important population of a species</b>	Unlikely	The closest camp of Grey-headed Flying-fox is located in Yarra Bend Park approximately 55 km south-east of the project area. Another camp is also located in Doveton approximately 45 km south-west of the project area.
<b>Reduce the area of occupancy of an important population</b>	Unlikely	Grey-headed Flying-fox have been recorded rarely utilising the local area. It is not expected that the habitat present is a critical food source for the survival of the species. No canopy tree removal is proposed for the project and therefore the project is unlikely to lead to a long-term decrease in the size of any population, reduce the area of occupancy or fragment any population. There is a large expanse of suitable food trees for the species in the broader surrounding area and the regional population is not reliant on potential food sources located within the Warburton area.
<b>Fragment an existing important population into two or more populations</b>	Unlikely	
<b>Adversely affect habitat critical to the survival of the species</b>	Unlikely	Whilst the species may visit the project area on occasion, suitable trees located within the project area are unlikely to provide habitat critical to the survival of the species given the large extent of other available food sources for the species in the broader region.
<b>Disrupt the breeding cycle of an important population</b>	Unlikely	The closest known breeding colony is located at least 45 km from the project area in Doveton. No breeding population occurs within the project area, and the project will not result in the disruption of the species during their breeding period.
<b>Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</b>	Unlikely	The potential habitat located within the project area is not critical to the survival of the species and no removal of canopy trees will occur within the project area. Therefore, the project will not cause a decline in the species.
<b>Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat</b>	Unlikely	The project will not result in the establishment or introduction of an invasive species or disease that could cause the species to decline.
<b>Introduce disease that may cause the species to decline</b>	Unlikely	The project will not introduce disease that may cause any impact on the species.
<b>Interfere substantially with the recovery of a species</b>	Unlikely	The removal of suitable habitat is counter to the recovery of this species, however, the extent and nature of the vegetation removal (i.e. understorey only) in the context of available suitable habitat within the broader region will not interfere with

Significant impact criteria	Likelihood of significant impact	Justification
		<p>the recovery of this species.</p> <p>This species was recognised as having 10% to 30% of its habitat burned in the 2019-20 bushfires in south-eastern Australia (DEE 2020). Given the project will not result in loss of canopy trees that provide potential foraging habitat, the project is not considered to compound the impacts of recent bushfires on this species.</p>

### Conclusion for Grey-headed Flying-fox

The project is considered unlikely to result in a significant impact on Grey-headed Flying-fox based on an assessment against the significant impact criteria for vulnerable species. This conclusion has been reached on the basis that this species is highly mobile and forages across large tracts of urban, rural and forest habitat. Vegetation removal in forested areas will be restricted to understorey species only and all potential canopy feed trees for this species will be avoided. Furthermore, there are no known roost sites or breeding colonies of this species in the project area with the nearest colony being located 45 kilometres away.

## Australian Grayling *Prototroctes maraena* (vulnerable)

**Table 56 Australian Grayling: self-assessment against Significant Impact Criteria (CoA 2013)**

Significant impact criteria	Likelihood of significant impact	Justification
<b>Lead to a long-term decrease in the size of an important population of a species</b>	Unlikely	This species has been recorded within the Yarra River Basin. The development of trails is not expected to lead to a long term decrease in the size of a population of Australian Grayling. This is considering the small area of potential impact associated with the Yarra River and the small extent of available habitat and level of impact along Yarra River tributaries within the project area.
<b>Reduce the area of occupancy of an important population</b>	Unlikely	Backhouse, Jackson, & O'Connor (2008) note the Yarra River as supporting an important population. The species is considered to have some likelihood of occasional occurrence within the project area. The proposed works would result in a narrow trail network in discrete locations and would not reduce the area of occupancy for the species within the project area. Proven effective measures will be implemented in the project CEMP to avoid impacts to the Yarra River and associated tributaries (e.g. single span bridges, sustainable trail design and sediment controls).
<b>Fragment an existing important population into two or more populations</b>	Unlikely	The proposed works would will result in a narrow trail network in discrete locations and would not present a major barrier for the movement of the species, retaining population scale connectivity.
<b>Adversely affect habitat critical to the survival of the species</b>	Unlikely	Critical habitat is not defined to particular locations. Backhouse, Jackson, & O'Connor (2008) note that it is not practical to specify habitat that is critical to survival as all habitat where Australian Grayling potentially occur, but due to the species diadromous nature, some limited habitats important for certain life stage are critical. Habitat will not be adversely affected by trail construction in the project area as river and creek systems will not be altered and indirect impacts through sedimentation will be managed appropriately.
<b>Disrupt the breeding cycle of an important population</b>	Unlikely	The proposed works would result in a narrow trail network in discrete locations, constructed in a manner in which stream and river connectivity remains undisturbed. Breeding cycles will not be adversely affected by the project.
<b>Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</b>	Unlikely	The proposed works would result in a narrow trail network in discrete locations, constructed in a manner in which stream and river connectivity remains undisturbed. The availability and/or quality of habitat will not be affected.

Significant impact criteria	Likelihood of significant impact	Justification
<b>Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat</b>	Unlikely	The type and scale of potential impacts associated with the project construction and operation are not anticipated to favour the establishment of invasive species. Hygiene controls to reduce the risk of the spread or introduction of aquatic weeds, pathogens and predators will be included in the project CEMP.
<b>Introduce disease that may cause the species to decline</b>	Unlikely	The project will not result in the introduction of a disease that is harmful to Australian Grayling.
<b>Interfere substantially with the recovery of a species</b>	Unlikely	Backhouse, Jackson, & O'Connor (2008) list the species threats as: barriers to movements, river regulation, poor water quality, siltation, impact of introduced fish, climate change, disease and fishing, angling and whitebaiting. The project is not considered likely to substantially interfere with the recovery of the species due to the localised area of potential impacts and extent of available adjacent habitat.

### Conclusion for Australian Grayling

The project is considered unlikely to result in a significant impact on Australian Grayling based on an assessment against the significant impact criteria for vulnerable species. This conclusion has been reached on the basis that no aquatic habitats will be significantly altered, no barriers to fish movement will be introduced and that sources of indirect impact (e.g. waterway sedimentation) will be managed through effective and proven sediment/erosion control measure for MTB trail construction and operation.

## Murray Cod *Maccullochella peelii* (vulnerable)

**Table 57 Murray Cod: self-assessment against Significant Impact Criteria (CoA 2013)**

Significant impact criteria	Likelihood of significant impact	Justification
<b>Lead to a long-term decrease in the size of an important population of a species</b>	Unlikely	This species has been recorded within the Yarra River Basin (translocated population), however the Yarra population is not noted as an important population (Koehn and Clunie 2010). The development of trails is not expected to lead to a long term decrease in the size of a population of Murray Cod. This is considering the small area of potential impact associated with the Yarra River and the small extent of available habitat and level of impact along Yarra River tributaries within the project area.
<b>Reduce the area of occupancy of an important population</b>	Unlikely	The Yarra population is not noted as an important population (Koehn and Clunie 2010). The species is considered to have some likelihood of occurrence in small numbers within the project area within the Yarra River. The proposed works would result in a narrow trail network in discrete locations and would not reduce the area of occupancy for the species within the project area. Proven effective measures will be implemented in the project CEMP to avoid impacts to the Yarra River and associated tributaries (e.g. single span bridges, sustainable trail design and sediment controls).
<b>Fragment an existing important population into two or more populations</b>	Unlikely	Yarra population is not noted as an important population (Koehn and Clunie 2010). The proposed works would result in a narrow trail network in discrete locations and would not present a major barrier for the movement of the species, retaining population scale connectivity.
<b>Adversely affect habitat critical to the survival of the species</b>	Unlikely	Critical habitat is not defined for the species. The proposed works would result in a narrow trail network in discrete locations, constructed in a manner in which stream and river connectivity remains undisturbed. Habitat will not be adversely affected by the project.
<b>Disrupt the breeding cycle of an important population</b>	Unlikely	Yarra population is not noted as an important population (Koehn and Clunie 2010). The proposed works would result in a narrow trail in discrete locations, constructed in a manner in which stream and river connectivity remains undisturbed. Breeding cycles will not be adversely affected.
<b>Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</b>	Unlikely	The proposed works would result in a narrow trail network in discrete locations, constructed in a manner in which stream and river connectivity remains undisturbed. The availability and/or quality of habitat will not be affected.

Significant impact criteria	Likelihood of significant impact	Justification
<b>Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat</b>	Unlikely	The type and scale of potential impacts associated with the project construction and operation are not anticipated to favour the establishment of invasive species. Hygiene controls to reduce the risk of the spread or introduction of aquatic weeds, pathogens and predators will be included in the project CEMP.
<b>Introduce disease that may cause the species to decline</b>	Unlikely	The project will not result in the introduction of a disease that is harmful to Murray Cod.
<b>Interfere substantially with the recovery of a species</b>	Unlikely	Koehn and Clunie (2010) lists threats to the species as: flow regulation, habitat degradation, lowered water quality, barriers, alien species, commercial fishing, recreational fishing, illegal fishing, stocking and translocations, genetic issues, disease and climate change. The project is not considered likely to substantially interfere with the recovery of the species due to the localised area of potential impacts and extent of available adjacent habitat.

### Conclusion for Murray Cod

The project is considered unlikely to result in a significant impact on Murray Cod based on an assessment against the significant impact criteria for vulnerable species. This conclusion has been reached on the basis that no aquatic habitats will be significantly altered, no barriers to fish movement will be introduced and that sources of indirect impact (e.g. waterway sedimentation) will be managed through effective and proven sediment/erosion control measure for MTB trail construction and operation.

## Migratory species

**Table 58 Migratory species: self-assessment against Significant Impact Criteria (CoA 2013)**

Significant impact criteria	Likelihood of significant impact	Justification
<p><b>Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species</b></p>	<p>Unlikely</p>	<p>Four migratory species have been identified as having a medium or higher likelihood of occurrence within the Project area, White-throated Needletail, Fork-tailed Swift, Rufous Fantail and Satin Flycatcher. Two of these species, White-throated Needletail and Fork-tailed Swift, are almost exclusively aerial and the construction of a network of trails in discrete locations will not affect their potential presence or use of the Project area. Rufous Fantail and Satin Flycatcher are likely to breed and nest in the broader project area, however the construction of a network of narrow trails is unlikely to affect their use of the project area. The project area is not identified as important habitat for any of these migratory species, and the project will not substantially modify, destroy or isolate any of the potential habitat that is present.</p> <p>Rufous Fantail and Satin Flycatcher were recognised as having 10% to 30% of their habitat burned in the 2019-20 bushfires in south-eastern Australia (DEE 2020). Given the project will only result in minor loss of understorey habitat in areas of wet forest habitat, the project is not considered to compound the impacts of recent bushfires on these species.</p>
<p><b>Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species</b></p>		<p>Invasive fauna species are already present within the project area (e.g. cats and foxes). To address the potential risk of the project increasing opportunities for the movement and dispersal of introduced fauna species, which is only likely to present a potential risk to nesting Rufous Fantails and Satin Flycatchers, the project will support existing pest animal programs targeting foxes, cats and deer conducted by public land managers (e.g. DELWP and Parks Victoria). Invasive weeds species can modify or simplify vegetation structure that may indirectly influence nesting resources and habitat for Rufous Fantail and Satin Flycatcher. Soil disturbance and subsequent weed invasion will be minimised through construction management and follow up weed control. The project CEMP will specifically deal with controlling the introduction and spread of weed species. With the above effective mitigation measures in place, it is highly unlikely that an invasive species harmful to a migratory species will become established in the broader Project area.</p>
<p><b>Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species</b></p>		<p>White-throated Needletail and Fork-tailed Swift are non-breeding migratory visitors to the local area, and are almost exclusively aerial. The project has no capacity to result in serious disruptions to these species, and the project area is unlikely to support an ecologically significant proportion of their</p>



Significant impact criteria	Likelihood of significant impact	Justification
		<p>populations.</p> <p>Rufous Fantail and Satin Flycatcher are likely to breed within the broader project area. Satin Flycatchers typically breed in tall trees, which will not be impacted by the proposed works, however Rufous Fantails have been documented breeding in shrubs. Both species are described as common and secure (DAWE 2020), and the project area is unlikely to support an ecologically significant proportion of their populations. The construction of permeable narrow trails in discrete locations may disrupt breeding and nesting resources for a relatively small number of Rufous Fantails, however this would not represent an ecologically significant proportion of the population of this otherwise stable and secure species. Potential resources for breeding and nesting would remain available throughout the broader project area.</p>

### Conclusion for migratory species

The project is considered unlikely to result in a significant impact on a migratory species based on an assessment against the significant impact criteria for four migratory species that are considered to have a medium or higher likelihood of occurrence within the Project area (White-throated Needletail, Fork-tailed Swift, Rufous Fantail and Satin Flycatcher). This conclusion has been reached on the basis of the predominantly aerial nature of White-throated Needletail and Fork-tailed Swift, and that the project is unlikely to impact on an ecologically significant proportion of Rufous Fantail or Satin Flycatcher. Suitable resources for breeding, foraging and resting of Rufous Fantail and Satin Flycatcher will remain available in the broader project area during construction and operation, and both species are described as being common and secure.

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## Appendix 8 Arborists assessment method statement

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25 March 2021

## **FINAL Method statement version 2- aboricultural assessment for the Warburton Mountain Bike Destination Project**

**Our ref: Matter 33805**

Prepared by Matt Looby, Lachlan Milne, Lucy Wilson (Biosis) and Andrew Traczynski (Treelogic)

### **Background**

Biosis Pty Ltd is working with Aecom and Yarra Ranges Council on the Warburton Mountain Bike Destination project Environmental Effects Statement (EES). A key requirement of the EES scoping requirements is documentation and consideration of impacts on large trees along the proposed trail alignments. Biosis has engaged Treelogic to provide expert advice on tree impacts, specifically related to assessment of Tree Protection Zone (TPZ) and Structural Root Zone (SRZ) encroachment likely to result from minor earthworks for trail construction.

The intent of this method statement is to outline how existing conditions for trees and tree impacts, particularly for large trees, will be documented in the EES. The method statement has been compiled after consultation with the EES Technical Reference Group (TRG) members from DELWP and Parks Victoria through circulation of Draft 1 of the method statement in November 2020, a one day site meeting on 19 February 2021 and circulation of final version 01 on 5 March 2021.

The one day site meeting was attended by:

- Simon Denby (DELWP)
- Bernadette Schmidt (Parks Victoria)
- Matt Tresidder (Parks Victoria)
- Matt Harrington (Yarra Ranges Council)
- Andrew Traczynski (Treelogic)
- Matt Looby (Biosis)

The EES scoping document makes the following specific references to large trees:

*Key issue:*

- Direct loss of native vegetation (including large old trees) and any associated listed threatened flora and fauna species and communities known or likely to occur in or adjacent to the project works.

*Existing environment:*

- Characterise the type, distribution and condition of native vegetation (including large old trees), terrestrial and aquatic habitat and habitat corridors or linkages that could be impacted by the project.

*Mitigation measures:*

- Identify potential and proposed design options and measures that could avoid, minimise, mitigate or manage significant direct and indirect effects on native vegetation (including large old trees) and any listed ecological communities or flora and fauna species and their habitat within or adjacent to the project area.

*Likely effects:*

- Assess likely direct and indirect effects of the project and feasible alternatives on native vegetation (including large old trees), ecological communities and habitats for protected fauna and flora species, in particular any species listed under the EPBC Act, FFG Act or DELWP advisory lists.

The intent of the project is to avoid direct removal of all large trees and to avoid impacts on high density stands of sub-canopy trees that provide habitat for threatened fauna. Indirect impacts are to be managed through design responses, such as set-backs from large trees during construction, and other measures that will be informed through expert guidance by the project arborist. Mountain bike trail construction only requires minor earthworks with small machinery or hand tools and the impact area, in terms of soil and understorey vegetation disturbance, averages 2 metres wide depending on slope. Flat areas require a smaller construction footprint and sloping areas require a wider construction footprint to create a trail bench.

The *Guidelines for the removal, destruction or lopping of native vegetation* and supporting *Assessor's Handbook* (DELWP 2018) require that assumed loss of native vegetation be considered for planning applications or native vegetation impact assessments. Encroachment into TPZs or SRZs by trail construction could be considered an assumed loss of native vegetation. According to DELWP, unless an arborist report indicates otherwise, a tree, or trees will be deemed lost if the encroachment (by compaction and excavation) into the TPZ is greater than 10 per cent, or is inside the SRZ (DELWP 2018). Given the density of forest trees along the proposed trail alignments, consideration of TPZ and SRZ encroachment is critical to the project.

In addition to the guidance in the *Assessor's Handbook*, DELWP has provided more general policy advice regarding assessment of tree impacts for tracks and trails. This policy guidance was released in November 2019 (DELWP 2019) and is summarised in the text box on the following page. This guidance is relevant to planning permit applications but as a DELWP policy position it is also relevant to tree impact assessment for projects subject to other regulatory assessment processes such as an EES.

### **DELWP guidance on “Approach for arborist assessment for TPZ impacts” (DELWP 2019)**

*Where a long and linear development (e.g. mountain bike path or walking trail) is proposed through an area with lots of trees it may be impractical for an arborist to individually assess every tree where more than 10 per cent of the TPZ is impacted. In these cases, an arborist can assess the proposal (rather than assessing each tree) and its likely impact on trees to determine whether they will persist or should be deemed lost based on impacts in the TPZ.*

*This assessment must consider the likely impact from the proposed construction including consideration of:*

- Current state of study area (e.g. Is the track proposed an existing compacted surface or?).
- Extent and depth of proposed excavation and likely impacts on trees considering the species of trees.
- Level of proposed compaction/permeability after construction
- Ongoing use and expected future consequential losses to address safety issues (e.g. need to adjust corners).

*This approach can only be undertaken when:*

- The vegetation type is forest, woodland or mallee, with a very high density of trees (for example, the bioregional EVC large tree count benchmark is 20 or higher) and is generally consistent along the route.
- The proposed impact is generally consistent along the route.
- An arborist agrees that the approach is appropriate considering site-specific conditions.

*When the vegetation type or the impact varies along the length of the proposal, a more targeted assessment of individual trees will be required.*

This method statement outlines how an arborist assessment will be undertaken to respond to DELWP policy requirements and the EES scoping document. This method statement addresses the following:

- Proposed methods for collecting data to describe the existing conditions for trees, especially large trees, and approaches to avoiding direct impacts.
- Proposed methods for quantifying impacts on forest trees, particularly large trees using the arborist’s advice, to determine whether large trees will require offsetting based on assumed losses (i.e. TPZ and SRZ encroachment).

The methods used to calculate native vegetation losses and offsets will be fully articulated in the EES Biodiversity Technical Report impact assessment chapter. In general it is proposed to apply a 2 metre wide clearing footprint across the entire proposed trail network to account for understorey vegetation loss. In accordance with the *Assessor’s Handbook*, a partial clearing score will be applied (i.e. half the habitat score for each habitat zone impacted) as only understorey site condition components will be removed/disturbed

(i.e. large trees and canopy trees will be retained and logs and litter will be redistributed into the forest or used in rehabilitation along the trails).

## Proposed approach

A method is required to allow the project arborist to determine existing conditions for trees and to document possible impacts. It is not considered viable to assess every tree along the proposed extensive trail network. This position is acknowledged by DELWP's current policy position for long linear low impact projects, such as tracks and trails (see above text box). The project area meets DELWP's policy criteria for applying a general arborist assessment as the vegetation types for the following reasons:

- Vegetation impacts will occur in forest EVCs with high benchmark densities of large trees (i.e. 20 large trees per hectare, Table 1).
- The impact will be consistent along the trail construction footprint with an average disturbance width of 2 metres depending on slope
- The project arborist has undertaken an initial inspection of forest vegetation and agrees that a general assessment or sampling approach is appropriate.

Other recent EES study programs have incorporated full surveys of every tree in or near a project footprint (e.g. Yan Yean Road EES). This approach is useful to document the existing conditions for trees in urban environments, highly fragmented areas or narrow road reserves where the project footprint is discreet and the proposed works are high impact (e.g. for road construction, creation of impermeable surfaces or deep excavation). However, in a forested environment where the age-classes and spatial distribution of trees can be readily sampled and the nature of the impacts is minor earthworks and disturbance to the upper soil profile there is little value in measuring each tree to document existing conditions and potential impacts. A sampling approach can be used to infer tree TPZ/SRZ profiles, tree demographics, tree health and habitat values.

## Existing large tree and EVC conditions

Data collected to date by project ecologists demonstrates the average benchmark large tree density for bioregional EVCs across the 20 metre wide project assessment corridor along each trail (Table 1). The data in Table 1 is expressed for habitat zones that contain a large trees and also for all habitat zones regardless of whether a large tree is present or not. The reason for presenting an average for only habitat zones that contain a large tree is to account for data variability between assessor (i.e. Biosis data and Practical Ecology data) and to remove outlying data related to small habitat zones with no large trees. This is effectively a sub-sample of the full dataset. Raw data can be viewed in Appendix 1.

The standard deviations presented in Table 1 indicate that variation occurs amongst EVCs. This is most likely a result of land use history (e.g. logging and fire management) in the sub-sample dataset for habitat zones that contain a large tree. Across all forest EVCs in the assessment corridor, where a large tree was recorded in a habitat zone (sub-sample), the average benchmark large tree density is 20 trees per hectare. This sub-sample density aligns with expected benchmark tree density for the forest EVCs present. If habitat zones that do not contain a large tree are removed from the data set, the average large tree density is 16. This is still 80% of the expected EVC large tree density and in a Vegetation Quality Assessment these zones would receive the second highest score for the large tree component where trees are also healthy.

**Table 1 Average large tree density per bioregional EVC within the assessment corridor**

EVC	Benchmark large tree density/ha	Mean large trees / ha observed in habitat zones with large trees recorded	Standard deviation observed in habitat zones with large trees recorded	Mean large trees / ha observed in all habitat zones	Standard deviation observed in all habitat zones
HSF_0016 – Lowland Forest	20	12	6	12	6
HSF_0029 – Damp Forest	20	15	11	12	11
HSF_0030 – Wet Forest	20	11	11	8	11
HSF_0031 – Cool Temperate Rainforest	20	-	-	0	0
HSF_0045 – Shrubby Foothill Forest	20	22	14	19	15
HSF_0127 – Heathy Valley Forest	20	15	13	15	13
VAIp0030 – Wet Forest	20	20	6	17	9
VAIp0031 – Cool Temperate Rainforest	20	35	20	25	23
VAIp0039 – Montane Wet Forest	20	26	13	22	16
<b>Average across assessment corridor</b>	<b>20</b>	<b>20</b>	<b>15</b>	<b>16</b>	<b>16</b>

The area and proportion of EVCs within the assessment corridor are summarised in Table 2 and this shows that EVC 29, EVC 30 and EVC 45 occupy the majority of the assessment corridor (89.1% combined across bioregions).

**Table 2 Summary of EVC areas and proportion in 20 m wide assessment corridor.**

EVC	Area (ha)	%
HSF_0016	5.22	1.6
HSF_0029	78.70	24.3
HSF_0030	99.71	30.8
HSF_0031	1.54	0.5
HSF_0045	92.41	28.6
HSF_0127	0.86	0.3
VAIp0030	17.52	5.4
VAIp0031	17.47	5.4

EVC	Area (ha)	%
VAIp0039	10.24	3.2
<b>Total</b>	323.67	100.0

### Stratification and sampling approach

A sample-based assessment of the trail alignments will be carried out by Treelogic arborists in order to provide guidance on the likely impact new mountain bike trail construction will have on TPZs and SRZs within the assessment corridor. Total avoidance of TPZs and SRZs is virtually impossible, thus a more proactive and fluid approach must be used to protect trees during trail construction and from trail-use related impacts.

A number of options were considered to stratify the assessment corridor for tree data collection and it was determined that EVC and slope were the most appropriate and readily definable ways to subdivide the assessment corridor for sampling. These two factors are considered the most useful as they represent the natural variability in forest vegetation and capture the terrain profiles that trail designers have used to locate and design trails in the landscape. An assessment of possible stratification options is provided in Table 3.

**Table 3 Stratification options considered**

Stratifier	Data availability	Rationale
<b>EVC</b>	Site level mapping	Reliable site level mapping in habitat zones
<b>Slope</b>	Reliable site level DTM	Slope classes established with reference to design categories set by trail designers.
<b>Soil</b>	No small scale data available/accessible, soil type mapping is 1:100,000 to 1:250,000 scale - Victorian Soil Type Mapping Data Source:	We have reviewed the geotechnical report (GHD 2020) and it identifies eight soil types based on broad land systems. The geotechnical report states “Whilst no specific soils have been identified as being significantly more prone to erosion, all exposed soils will have the potential to erode”. Therefore the ability to stratify by soils driven by erosion risk is limited. If PV and DELWP can provide local soil mapping we are happy to consider this.
<b>Aspect</b>	Digital terrain model with aspect classes (N, E, S, W)	Aspect has not been considered as the eight EVCs in the assessment corridor are naturally correlated to aspect. Including aspect in the GIS model would duplicate the stratification variables. For example, Shrubby Foothill Forest occurs on northern aspects, Damp and Wet Forest occur on southern and eastern aspects.
<b>Large tree density</b>	Large tree mapping is available with some limitations as stated above	We will not use this as a stratifying factor but will categorise all potential sample sites prior to allocation of sample plots on the basis of: <ul style="list-style-type: none"> <li>• zero values</li> <li>• &lt;40% EVC benchmark</li> <li>• 40% to 100% EVC benchmark</li> <li>• greater than EVC benchmark.</li> </ul> This will be done to ensure sample placement does not bias low density or atypical habitat zones based on large tree density.



Data will be collected using a stratified approach across the EVCs and various terrain profiles (slope classes) that occur in the project area. A GIS model of EVC-slope scenarios has been built to determine stratification units for sampling in the project assessment corridor. Habitat zone mapping (EVC mapping) undertaken across the entire assessment corridor has been combined with three slope classes to derive the stratification units and the area in each unit. The three slope classes were derived from a digital elevation model and include:

- 0-50% (i.e. 0 to 22.5 degrees)
- 51-99% (22.5 to 45 degrees)
- Greater than or equal 100% (>45 degrees).

The raw outputs from the EVC-slope stratification units are provided below for the entire assessment corridor and this shows the proportion (percentage) of the trail network in each unit (Table 4). These results are shown as a proportion as the GIS model uses line features to avoid overlaps in the assessment corridor driven by closely aligned trails and stacked switch-backs. This shows that of the potential 24 stratification units (i.e. eight EVCs x three slope classes), only 16 units have an EVC-slope combination in the assessment corridor. The lack of EVC-slope combinations in slope class 3 (>45% degrees slope) reinforces the trail design principle of avoiding steep slopes.

Therefore, there are 16 potential stratification units that could be sampled. Of these several occupy a very small proportion of the assessment corridor and have also been excluded from sampling, while others that are of interest in sensitive environments have been retained (Montane Wet Forest in slope class 2 where it only occupies 0.04%). The excluded units are all in State Forest and include (Table 4):

- Damp Forest in slope class 3 as it only occupies 0.01%
- Herb-rich Foothill Forest in slope class 1 as it only occupies 0.18%
- Lowland Forest in slope class 2 as it only occupies 0.19%

After the exclusion of low occupancy stratification units this leaves 13 stratification units.

**Table 4 EVC-slope GIS analysis results for entire assessment corridor, proportion of trail network in each stratification unit – stratification units to be excluded from sampling are underlined**

EVC	Slope class 1		Slope class 2		Slope class 3	
	0-50% slopes (0-22.5 degrees)	Description of excluded unit	50-100% slopes (22.5-45 degrees)	Description of excluded unit	>50% slopes (>45 degrees)	Description of excluded unit
Cool Temperate Rainforest	4.78%	n/a	0.73%	n/a	<u>0.00%</u>	Does not occur in assessment corridor
Damp Forest	18.44%	n/a	5.34%	n/a	<u>0.01%</u>	30 m length of track in state forest near Groom Hill
Herb-rich Foothill Forest	<u>0.18%</u>	Short sections of trail in state forest just south of Hooks Road	0.71%	n/a	<u>0.00%</u>	Does not occur in assessment corridor
Lowland Forest	1.44%	n/a	<u>0.19%</u>	Short sections of trail in state forest near Yarra Silvan Conduit Trk	<u>0.00%</u>	Does not occur in assessment corridor
Montane Wet Forest	3.02%	n/a	0.04%	n/a	<u>0.00%</u>	Does not occur in assessment corridor
Shrubby Foothill Forest	22.98%	n/a	6.12%	n/a	<u>0.00%</u>	Does not occur in assessment corridor
Valley Heathy Forest	0.27%	n/a	<u>0.00%</u>	Does not occur in assessment corridor	<u>0.00%</u>	Does not occur in assessment corridor
Wet Forest	31.01%	n/a	4.73%	n/a	<u>0.00%</u>	Does not occur in assessment corridor

The sample sites within each of the remaining 13 stratification units will be placed via GIS within 150 metres of a vehicle track to facilitate access and survey efficiency for the project arborists. Placing sampling sites within 150 metres of vehicle track also acknowledges that the forest and national park estate has a significant network of existing vehicle tracks and walking trails. We have calculated that 46% of the designed trail network occurs within 150 metres of an existing trafficable vehicle track. This excludes existing walking trails and MTB trails and if these were included the proportion of the designed trail network with 150 metres of an existing track/trail would be significantly higher. The proportion of stratification units in each of the 13 EVC-slope scenarios to be sampled within 150 metres of a vehicle track is summarised in Table 5. This shows that all 13 potential scenarios from Table 4 (i.e. the entire trail network) can be captured by sampling within 150 metres of a vehicle track, except one unit Montane Wet Forest in slope class 2 where a longer site walk in will be required.

**Table 5 EVC-slope GIS analysis results for stratification units with 150 m of an existing vehicle track – stratification units to be excluded from sampling are marked n/a with proportional allocation of 30 plots across units to be sampled.**

EVC	Slope class 1		Slope class 2		Slope class 3	
	0-50% slopes (0-22.5 degrees)	Plot allocation	50-100% slopes (22.5-45 degrees)	Plot allocation	>50% slopes (>45 degrees)	Plot allocation
<b>Cool Temperate Rainforest</b>	6.75%	2	1.47%	1	n/a	0
<b>Damp Forest</b>	20.85%	6	4.92%	1	n/a	0
<b>Herb-rich Foothill Forest</b>	n/a	0	1.49%	1	n/a	0
<b>Lowland Forest</b>	3.02%	1	n/a	0	n/a	0
<b>Montane Wet Forest</b>	1.76%	1	TBC*	1	n/a	0
<b>Shrubby Foothill Forest</b>	27.36%	7	7.17%	2	n/a	0
<b>Valley Heathy Forest</b>	0.46%	1	n/a	0	n/a	0
<b>Wet Forest</b>	21.66%	5	2.50%	1	n/a	0

\*May be more than 150 m from a track and will require longer walk-in.

Plots could be proportionally allocated based on a set number of 30 plots and this is also shown in Table 5, with some subjective allocation made where stratification units occupy a small area but are still of interest. The sample sites are proposed to be 30 metres long by 30 metres wide (i.e. 15 metres either side of the trail centreline) and will be placed via GIS within 150 metres of a vehicle track to facilitate access and survey efficiency. Prior to final site allocation we will ensure sample placement does not bias low density or atypical habitat zones based on large tree density.

Within each sampling site the tree data in Table 6 will be collected by a team of arborists. At sampling commencement tree health in different EVC-slope class scenarios will be inspected with a project ecologist from Biosis.

**Table 6 Tree variables to be collected**

Descriptor	Notes
<b>Tree location</b>	A tree location point is to be estimated using both on site track indicators (flagging tape), and GPS within the data capture tablet (Panasonic ToughPad).
<b>Species / Common name</b>	<i>Eucalyptus baxteri</i> , <i>Eucalyptus cephalocarpa</i> , <i>Eucalyptus cypellocarpa</i> , <i>Eucalyptus delegatensis</i> subsp. <i>delegatensis</i> , <i>Eucalyptus goniocalyx</i> , <i>Eucalyptus nitens</i> , <i>Eucalyptus obliqua</i> , <i>Eucalyptus ovata</i> , <i>Eucalyptus radiata</i> , <i>Eucalyptus regnans</i> , <i>Eucalyptus sieberi</i> , <i>Eucalyptus viminalis</i>
<b>Tree condition</b> (Health/structure)	Health noted as Good, Fair, Fair to Poor, Dead
<b>TPZ calculation</b> (DBH)	Based on measuring DBH at 1.4 m from ground as per the AS4970 method. Measurements are estimated (includes multiple stems) <20, 25 ,30, 40, 50, 60, 70, 80 ,90, 100, 125, 150, 200, 300, >300 (at 125 cm DBH TPZ becomes capped at 15.0 m radius) *Trees within the 30 m spread (15 m either side) from the proposed path but whose TPZ is unlikely to intersect with the path will <b>not</b> be captured.
<b>SRZ calculation</b> (basal)	Based on measuring just above root flare as per AS4970 method. Measurements are estimated. <20, 25 ,30, 40, 50, 60, 70, 80 ,90, 100, 125, 150, 200, 300, >300
<b>Height and Canopy spread</b>	Estimated in metres
<b>Comments</b>	Where an assessor deems comments are required then the assessor will include some brief information

Trees below 20 centimetres DBH and within the sample sites will not be captured unless the tree is inside the proposed track footprint (i.e. between centreline flagging tapes in the 2 metre wide direct impact corridor). This is driven by the 2 metre wide impact footprint which means trees at 20 centimetres DBH have a TPZ of 2.40 metres as per AS4970. Therefore, only capturing trees of this small size class within the impact footprint would reasonably allow disturbance to small trees to be characterised. Small shrubs will not be captured.

To provide further information on each tree in the sample sites, a second table will be included that estimates the number of stems of each species and their DBH size ranges (e.g. Myrtle Beech *Nothofagus cunninghamii* 30 – 40 specimens – DBH range of 20 cm to 120 cm, Mountain Ash *Eucalyptus regnans* 20 – 30 specimens – DBH range 120 cm – 250 cm). For this tabulated information, more trees would be counted than the trees individually plotted with dimensions captured for a given sample site. This table will provide further nuance as to the surrounding environment and help describe tree density, including sub-canopy species.

## Data interpretation

It is intended to use the sampling approach and tree data outlined to define the following:

- Density of tree stems and species in various DBH classes across EVC-slope scenarios
- Density of large trees in various EVC-slope scenarios, further building on ecological data available.
- An assessment of the likely impacts on trees, particularly large trees, from trail construction within TPZs and SRZs
- Conclusions whether trees should be included in the assumed native vegetation losses and offset requirements for the project as a result on TPZ or SRZ encroachment. If required, development of appropriate formulas to apply to native vegetation removal scenarios.
- Tree management guidelines for the construction process.

## References

DELWP 2019. *The Native Vegetation Newsletter Update on the implementation of the 2017 native vegetation removal regulations and Guidelines for the removal, destruction or lopping of native vegetation – November 2019*. Victorian Government Department of Land, Water and Planning, Melbourne (November 2019).

DELWP 2018. *Assessor's handbook – Applications to remove destroy or lop native vegetation*. Victorian Government Department of Land, Water and Planning, Melbourne (October 2018).

GHD 2020. *Warburton Mountain Bike Destination Project Surface water, groundwater and geotechnical impact assessment. Report to Yarra Ranges Shire Council*.

## Appendix 1 – Raw data for habitat zones

HabZone	HH_EVC	Surveyor	LOT_No	LOT_per_Ha	Area (ha)	Trail_ID
<b>HZ300</b>	HSF_0030	Biosis	10	4	2.514088	48
<b>HZ301</b>	HSF_0030	Biosis	4	12	0.339608	50
<b>HZ302</b>	HSF_0030	Biosis	16	12	1.314018	57
<b>HZ303</b>	HSF_0029	Biosis	21	19	1.08441	56
<b>HZ304</b>	HSF_0029	Biosis	1	5	0.194674	56
<b>HZ305</b>	HSF_0030	Biosis	14	23	0.612746	56
<b>HZ306</b>	HSF_0029	Biosis	11	37	0.297534	56
<b>HZ307a</b>	HSF_0045	Biosis	4	11	0.379481	54
<b>HZ307b</b>	HSF_0045	Biosis	0	0	0.312214	35
<b>HZ307c</b>	HSF_0045	Biosis	0	0	0.325493	27
<b>HZ308a</b>	HSF_0045	Biosis	0	0	0.35108	66
<b>HZ308b</b>	HSF_0045	Biosis	0	0	0.195328	55
<b>HZ309a</b>	HSF_0029	Biosis	1	5	1.08626	55
<b>HZ309a</b>	HSF_0029	Biosis	1	5	0.21602	66
<b>HZ310</b>	HSF_0030	Biosis	1	5	0.220542	55
<b>HZ311</b>	HSF_0029	Biosis	8	7	1.097436	55
<b>HZ312</b>	HSF_0045	Biosis	12	24	0.510277	55
<b>HZ313</b>	HSF_0029	Biosis	0	0	0.042302	55
<b>HZ314</b>	HSF_0045	Biosis	3	13	0.22489	55
<b>HZ315</b>	HSF_0016	Biosis	4	10	0.393565	55
<b>HZ316</b>	HSF_0029	Biosis	0	0	0.02997	55
<b>HZ317</b>	HSF_0045	Biosis	4	14	0.286331	55
<b>HZ318</b>	HSF_0045	Biosis	2	4	0.459111	64
<b>HZ319</b>	HSF_0029	Biosis	16	14	1.145497	64
<b>HZ320</b>	HSF_0045	Biosis	17	26	0.642534	63
<b>HZ321a</b>	HSF_0029	Biosis	6	6	0.938733	63
<b>HZ321b</b>	HSF_0029	Biosis	1	11	0.088592	63
<b>HZ322a</b>	HSF_0045	Biosis	1	7	0.148858	63
<b>HZ322b</b>	HSF_0045	Biosis	10	34	0.292948	63

HabZone	HH_EVC	Surveyor	LOT_No	LOT_per_Ha	Area (ha)	Trail_ID
HZ322c	HSF_0045	Biosis	22	27	0.822576	63
HZ323a	HSF_0016	Biosis	6	6	1.021359	62
HZ323f	HSF_0016	Biosis	2	22	0.092376	63
HZ323g	HSF_0016	Biosis	6	10	0.603623	63
HZ324	HSF_0029	Biosis	5	14	0.365178	62
HZ325	VAIp0039	Biosis	4	7	0.561818	46
HZ326	VAIp0031	Biosis	43	35	1.229413	46
HZ327	VAIp0039	Biosis	12	15	0.785196	46
HZ328	VAIp0031	Biosis	5	52	0.095469	46
HZ329	VAIp0031	Biosis	2	26	0.077373	46
HZ330	VAIp0031	Biosis	3	58	0.052112	46
HZ331	VAIp0031	Biosis	4	75	0.053129	46
HZ332	VAIp0031	Biosis	3	49	0.061636	46
HZ333	VAIp0039	Biosis	24	32	0.751326	46
HZ334	VAIp0031	Biosis	0	0	0.018543	46
HZ335	VAIp0031	Biosis	6	61	0.098088	46
HZ336	VAIp0039	Biosis	39	22	1.783399	46
HZ337	VAIp0031	Biosis	2	23	0.086206	46
HZ338	VAIp0031	Biosis	1	64	0.015519	46
HZ339	VAIp0031	Biosis	0	0	0.044073	46
HZ340	VAIp0030	Biosis	85	26	3.306584	46
HZ341	VAIp0030	Biosis	6	23	0.265434	47
HZ342	VAIp0031	Biosis	16	31	0.520215	47
HZ343	VAIp0030	Biosis	3	10	0.303737	47
HZ344	VAIp0030	Biosis	197	23	8.596405	47
HZ345	HSF_0045	Biosis	10	23	0.43722	37
HZ346	HSF_0029	Biosis	4	18	0.227668	37
HZ347	HSF_0045	Biosis	5	36	0.13877	37
HZ348	HSF_0029	Biosis	117	30	3.947968	51
HZ349	HSF_0045	Biosis	5	12	0.403501	51
HZ350	HSF_0029	Biosis	7	17	0.401456	51
HZ351	HSF_0045	Biosis	9	19	0.473147	51

HabZone	HH_EVC	Surveyor	LOT_No	LOT_per_Ha	Area (ha)	Trail_ID
<b>HZ352</b>	VAIp0039	Biosis	4	29	0.135762	1
<b>HZ353</b>	VAIp0039	Biosis	0	0	0.007813	1
<b>HZ354</b>	VAIp0031	Biosis	8	15	0.529886	1
<b>HZ356</b>	VAIp0031	Biosis	0	0	0.075213	1
<b>HZ357a</b>	VAIp0031	Biosis	0	0	0.452253	1
<b>HZ357b</b>	VAIp0031	Biosis	1	30	0.03363	1
<b>HZ358</b>	VAIp0031	Biosis	11	18	0.597478	1
<b>LDM_7</b>	VAIp0039	Biosis	5	21	0.242382	46
<b>200</b>	HSF_0030	Biosis	5	3	1.451807	49
<b>201</b>	HSF_0030	Biosis	7	3	2.188723	49
<b>202</b>	HSF_0030	Biosis	7	3	2.652562	50
<b>203</b>	HSF_0029	Biosis	14	8	1.78985	49
<b>204</b>	HSF_0045	Biosis	3	7	0.423984	49
<b>205</b>	HSF_0029	Biosis	1	2	0.432125	49
<b>206</b>	HSF_0045	Biosis	6	13	0.44478	49
<b>207</b>	HSF_0029	Biosis	5	7	0.67744	49
<b>208</b>	HSF_0045	Biosis	1	14	0.071663	49
<b>209</b>	HSF_0030	Biosis	5	3	1.645683	50
<b>210</b>	HSF_0031	Biosis	0	0	0.071054	50
<b>211</b>	HSF_0030	Biosis	1	1	0.742108	50
<b>212</b>	HSF_0029	Biosis	11	11	1.007267	49
<b>213</b>	HSF_0045	Biosis	26	53	0.493263	65
<b>214</b>	HSF_0029	Biosis	5	7	0.694491	65
<b>215</b>	HSF_0045	Biosis	25	17	1.480299	65
<b>216</b>	VAIp0039	Biosis	4	9	0.437322	45
<b>217</b>	VAIp0031	Biosis	24	35	0.68003	45
<b>218</b>	VAIp0039	Biosis	3	6	0.46533	45
<b>219</b>	VAIp0031	Biosis	0	0	0.038541	45
<b>220</b>	VAIp0031	Biosis	9	25	0.364217	45
<b>221</b>	VAIp0039	Biosis	7	34	0.207051	45
<b>222</b>	VAIp0031	Biosis	7	47	0.148954	45
<b>223</b>	VAIp0039	Biosis	13	40	0.326456	45



HabZone	HH_EVC	Surveyor	LOT_No	LOT_per_Ha	Area (ha)	Trail_ID
224	VAIp0031	Biosis	2	28	0.07049	45
225	VAIp0039	Biosis	3	48	0.0628	45
226	VAIp0031	Biosis	2	23	0.08536	45
227	VAIp0039	Biosis	25	30	0.846821	45
228	VAIp0031	Biosis	2	12	0.163156	45
229	VAIp0039	Biosis	2	18	0.111639	45
230	VAIp0031	Biosis	3	25	0.117672	45
231	VAIp0039	Biosis	3	17	0.173457	45
232	VAIp0031	Biosis	17	25	0.676661	45
233	VAIp0039	Biosis	0	0	0.071147	45
234	VAIp0031	Biosis	4	22	0.179305	45
235	VAIp0039	Biosis	8	24	0.332413	45
236	VAIp0031	Biosis	5	33	0.152716	45
237	VAIp0039	Biosis	2	26	0.076704	45
238	VAIp0030	Biosis	52	20	2.573426	45
239	HSF_0045	Biosis	16	27	0.591209	52
240	HSF_0029	Biosis	22	22	0.989322	52
241	HSF_0030	Biosis	3	4	0.720823	52
242a	HSF_0045	Biosis	13	23	0.568932	52
242b	HSF_0045	Biosis	85	31	2.702483	53
243c	HSF_0029	Biosis	3	12	0.244847	52
Bio_1G	VAIp0031	Biosis	11	9	1.211412	CTR_3
Bio_201	HSF_0045	Biosis	5	18	0.280859	43
Bio_202	HSF_0029	Biosis	17	31	0.551203	43
Bio_203	HSF_0045	Biosis	7	12	0.571875	43
Bio_204	HSF_0029	Biosis	9	16	0.559434	43
Bio_205	HSF_0030	Biosis	10	12	0.818865	43
Bio_206	HSF_0029	Biosis	11	14	0.795157	43
Bio_208	HSF_0045	Biosis	38	20	1.879925	44
Bio_209	HSF_0127	Biosis	3	30	0.100482	44
Bio_210	HSF_0029	Biosis	5	27	0.182278	44
Bio_211	HSF_0029	Biosis	7	41	0.17155	44

HabZone	HH_EVC	Surveyor	LOT_No	LOT_per_Ha	Area (ha)	Trail_ID
<b>Bio_212</b>	HSF_0045	Biosis	17	26	0.6654	44
<b>Bio_213</b>	HSF_0029	Biosis	1	5	0.195282	44
<b>Bio_214</b>	HSF_0045	Biosis	1	14	0.074017	44
<b>Bio_215</b>	HSF_0127	Biosis	4	11	0.371975	44
<b>Bio_216a</b>	HSF_0127	Biosis	2	5	0.384923	44
<b>Bio_216b</b>	HSF_0016	Biosis	6	15	0.402892	44
<b>Bio_218</b>	HSF_0030	Biosis	70	19	3.603099	9
<b>Bio_219</b>	HSF_0030	Biosis	29	6	4.944171	10
<b>Bio_1</b>	HSF_0029	Biosis	8	37	0.214907	17
<b>Bio_10a</b>	HSF_0045	Biosis	20	23	0.871007	53
<b>Bio_10b</b>	HSF_0045	Biosis	27	37	0.730358	41
<b>Bio_11</b>	HSF_0029	Biosis	5	15	0.342614	41
<b>Bio_12</b>	HSF_0045	Biosis	7	13	0.520165	41
<b>Bio_13</b>	HSF_0029	Biosis	0	0	0.239182	41
<b>Bio_14</b>	HSF_0045	Biosis	12	18	0.656276	41
<b>Bio_15</b>	HSF_0029	Biosis	0	0	0.178463	41
<b>Bio_16</b>	HSF_0045	Biosis	15	20	0.752337	41
<b>Bio_17</b>	HSF_0029	Biosis	14	16	0.893142	41
<b>Bio_18</b>	HSF_0045	Biosis	2	4	0.445341	18
<b>Bio_18_b</b>	HSF_0045	Biosis	0	0	0.082676	33
<b>Bio_19</b>	HSF_0029	Biosis	2	9	0.230418	41
<b>Bio_2</b>	HSF_0045	Biosis	51	38	1.352531	17
<b>Bio_20</b>	HSF_0045	Biosis	10	20	0.487969	41
<b>Bio_21</b>	HSF_0045	Biosis	7	25	0.277434	42
<b>Bio_22</b>	HSF_0029	Biosis	15	12	1.244865	42
<b>Bio_220</b>	HSF_0030	Biosis	10	46	0.217055	42
<b>Bio_221</b>	HSF_0029	Biosis	6	37	0.161646	42
<b>Bio_222</b>	HSF_0030	Biosis	7	28	0.249334	42
<b>Bio_223</b>	HSF_0029	Biosis	25	26	0.953854	42
<b>Bio_224</b>	HSF_0030	Biosis	2	5	0.399176	42
<b>Bio_225</b>	HSF_0029	Biosis	1	5	0.18889	42

HabZone	HH_EVC	Surveyor	LOT_No	LOT_per_Ha	Area (ha)	Trail_ID
<b>Bio_226</b>	HSF_0030	Biosis	0	0	0.099615	42
<b>Bio_227</b>	HSF_0029	Biosis	13	17	0.783306	42
<b>Bio_228</b>	HSF_0030	Biosis	2	12	0.168077	42
<b>Bio_229</b>	HSF_0029	Biosis	2	7	0.292905	42
<b>Bio_23</b>	HSF_0045	Biosis	11	46	0.239939	42
<b>Bio_230</b>	HSF_0030	Biosis	1	4	0.252401	42
<b>Bio_231</b>	HSF_0029	Biosis	3	16	0.185775	42
<b>Bio_232</b>	HSF_0045	Biosis	16	36	0.449942	42
<b>Bio_233</b>	HSF_0029	Biosis	12	13	0.89027	42
<b>Bio_24</b>	HSF_0029	Biosis	1	9	0.113253	42
<b>Bio_25</b>	HSF_0030	Biosis	10	15	0.688411	42
<b>Bio_26</b>	HSF_0029	Biosis	26	18	1.408662	42
<b>Bio_27</b>	HSF_0045	Biosis	6	32	0.185473	42
<b>Bio_28</b>	HSF_0030	Biosis	33	33	1.002475	42
<b>Bio_29</b>	HSF_0029	Biosis	4	27	0.149008	42
<b>Bio_3</b>	HSF_0029	Biosis	40	8	4.797674	17
<b>Bio_30</b>	HSF_0045	Biosis	9	18	0.4979	42
<b>Bio_31</b>	HSF_0029	Biosis	10	23	0.437096	42
<b>Bio_32</b>	HSF_0045	Biosis	28	32	0.880901	42
<b>Bio_33</b>	HSF_0029	Biosis	4	15	0.267288	42
<b>Bio_34</b>	HSF_0045	Biosis	5	9	0.528669	42
<b>Bio_35</b>	HSF_0029	Biosis	4	9	0.447057	41
<b>Bio_36</b>	HSF_0045	Biosis	7	20	0.357047	41
<b>Bio_37</b>	HSF_0045	Biosis	12	27	0.449122	40
<b>Bio_38</b>	HSF_0029	Biosis	10	28	0.360673	40
<b>Bio_39</b>	HSF_0045	Biosis	46	50	0.925817	40
<b>Bio_40</b>	HSF_0029	Biosis	1	10	0.103333	40
<b>Bio_4a</b>	HSF_0030	Biosis	18	11	1.627154	52
<b>Bio_4b</b>	HSF_0030	Biosis	27	20	1.336028	41
<b>Bio_5a</b>	HSF_0029	Biosis	9	8	1.136715	52
<b>Bio_5b</b>	HSF_0029	Biosis	29	23	1.274795	41
<b>Bio_6</b>	HSF_0045	Biosis	9	64	0.140835	41

HabZone	HH_EVC	Surveyor	LOT_No	LOT_per_Ha	Area (ha)	Trail_ID
<b>Bio_7</b>	HSF_0029	Biosis	18	31	0.572517	41
<b>Bio_8</b>	HSF_0045	Biosis	26	56	0.463505	41
<b>Bio_9</b>	HSF_0030	Biosis	5	5	0.957859	41
<b>Bio_91</b>	VAIp0039	Biosis	0	0	0.410271	1
<b>Bio_92</b>	VAIp0039	Biosis	19	25	0.767498	1
<b>Bio_93</b>	VAIp0039	Biosis	6	11	0.545483	1
<b>Bio_94</b>	VAIp0031	Biosis	47	28	1.702098	1
<b>Bio_95</b>	VAIp0031	Biosis	0	0	1.012788	1
<b>Bio_96</b>	VAIp0031	Biosis	0	0	0.576654	1
<b>LDM_1</b>	VAIp0039	Biosis	0	0	0.015592	46
<b>LDM_2</b>	VAIp0039	Biosis	5	53	0.094853	46
<b>LDM_3</b>	VAIp0039	Biosis	5	34	0.145494	46
<b>LDM_4</b>	VAIp0039	Biosis	2	16	0.12183	46
<b>LDM_5</b>	VAIp0039	Biosis	11	51	0.217704	46
<b>LDM_6</b>	VAIp0039	Biosis	19	35	0.541998	46
<b>PE_10</b>	HSF_0030	Practical Ecology	4	1	3.333306	1
<b>PE_11</b>	HSF_0030	Practical Ecology	0	0	2.287715	1
<b>PE_12</b>	HSF_0030	Practical Ecology	0	0	2.460182	1
<b>PE_13</b>	HSF_0030	Practical Ecology	0	0	2.429845	1
<b>PE_14</b>	HSF_0030	Practical Ecology	0	0	0.025646	1
<b>PE_15</b>	HSF_0030	Practical Ecology	0	0	3.347451	1
<b>PE_16</b>	HSF_0030	Practical Ecology	8	6	1.400741	1
<b>PE_17</b>	HSF_0030	Practical Ecology	2	1	1.975913	1
<b>PE_18_a</b>	HSF_0030	Practical Ecology	0	0	3.419337	2
<b>PE_18_b</b>	HSF_0030	Practical Ecology	11	3	3.315635	1
<b>PE_19_a</b>	HSF_0030	Practical Ecology	0	0	1.384023	2

HabZone	HH_EVC	Surveyor	LOT_No	LOT_per_Ha	Area (ha)	Trail_ID
PE_19_b	HSF_0030	Practical Ecology	0	0	4.203526	3
PE_1a	VAlp0031	Practical Ecology	0	0	0.016638	1
PE_1b	VAlp0031	Practical Ecology	0	0	0.352253	1
PE_1c	VAlp0031	Practical Ecology	9	8	1.079165	1
PE_20_a	HSF_0030	Practical Ecology	10	2	5.531864	1
PE_20_b	HSF_0030	Practical Ecology	0	0	0.147678	4
PE_20_c	HSF_0030	Practical Ecology	11	3	4.109613	2
PE_21_a	HSF_0030	Practical Ecology	0	0	1.030924	5
PE_21_b	HSF_0030	Practical Ecology	0	0	1.476601	7
PE_22_a	HSF_0030	Practical Ecology	31	3	8.978822	6
PE_22_b	HSF_0030	Practical Ecology	26	27	0.965554	5
PE_23	HSF_0029	Practical Ecology	4	2	2.326707	5
PE_24	HSF_0045	Practical Ecology	46	7	6.523509	5
PE_25	HSF_0030	Practical Ecology	67	14	4.869879	7
PE_26	HSF_0030	Practical Ecology	0	0	1.627624	7
PE_27	HSF_0030	Practical Ecology	1	0	5.134343	8
PE_28	HSF_0030	Practical Ecology	42	9	4.559744	8
PE_29	HSF_0045	Practical Ecology	8	12	0.666268	11
PE_30	HSF_0029	Practical Ecology	4	3	1.5575	11
PE_31_a	HSF_0029	Practical Ecology	0	0	0.601599	19

HabZone	HH_EVC	Surveyor	LOT_No	LOT_per_Ha	Area (ha)	Trail_ID
PE_31_b	HSF_0029	Practical Ecology	0	0	1.104457	20
PE_31_c	HSF_0029	Practical Ecology	0	0	0.017362	18
PE_32_a	HSF_0029	Practical Ecology	0	0	0.41605	15
PE_32_b	HSF_0029	Practical Ecology	0	0	0.195079	11
PE_32_c	HSF_0029	Practical Ecology	5	4	1.258575	11
PE_32_d	HSF_0029	Practical Ecology	0	0	0.535815	11
PE_32_e	HSF_0029	Practical Ecology	9	11	0.828387	21
PE_33_a	HSF_0045	Practical Ecology	0	0	0.656088	14
PE_33_b	HSF_0045	Practical Ecology	0	0	0.212997	16
PE_33_c	HSF_0045	Practical Ecology	0	0	3.149785	15
PE_34	HSF_0029	Practical Ecology	2	1	2.549689	16
PE_35	HSF_0029	Practical Ecology	32	12	2.750422	11
PE_36a	HSF_0029	Practical Ecology	7	3	2.016514	11
PE_36b	HSF_0029	Practical Ecology	0	0	0.933677	11
PE_37	HSF_0045	Practical Ecology	0	0	1.303401	14
PE_38	HSF_0045	Practical Ecology	21	13	1.569728	14
PE_39_a	HSF_0045	Practical Ecology	3	2	1.806364	13
PE_39_b	HSF_0045	Practical Ecology	25	5	5.493541	12
PE_39_c	HSF_0045	Practical Ecology	0	0	0.104593	11
PE_39_d	HSF_0045	Practical Ecology	24	11	2.219671	13

HabZone	HH_EVC	Surveyor	LOT_No	LOT_per_Ha	Area (ha)	Trail_ID
PE_3a	VAlp0031	Practical Ecology	3	5	0.598546	1
PE_3b	VAlp0031	Practical Ecology	5	89	0.055904	1
PE_3c	VAlp0031	Practical Ecology	6	56	0.107182	1
PE_4	VAlp0031	Practical Ecology	46	33	1.388162	1
PE_40	HSF_0029	Practical Ecology	12	6	2.117391	14
PE_41_a	HSF_0029	Practical Ecology	8	4	1.882595	13
PE_41_b	HSF_0029	Practical Ecology	9	3	3.316143	14
PE_42	HSF_0016	Practical Ecology	22	8	2.708068	13
PE_43	HSF_0045	Practical Ecology	14	9	1.487246	25
PE_44a	HSF_0029	Practical Ecology	5	10	0.511982	25
PE_44b	HSF_0029	Practical Ecology	4	8	0.529862	25
PE_45_a	HSF_0045	Practical Ecology	7	3	2.339618	27
PE_45_b	HSF_0045	Practical Ecology	1	7	0.135865	35
PE_46	HSF_0045	Practical Ecology	19	21	0.908183	35
PE_47_a	HSF_0029	Practical Ecology	1	5	0.185905	36
PE_47_b	HSF_0029	Practical Ecology	22	19	1.144613	35
PE_47_c	HSF_0029	Practical Ecology	7	23	0.306044	28
PE_48	HSF_0045	Practical Ecology	13	18	0.705733	28
PE_49	HSF_0029	Practical Ecology	25	6	4.448804	28
PE_5	VAlp0031	Practical Ecology	0	0	1.052643	1

HabZone	HH_EVC	Surveyor	LOT_No	LOT_per_Ha	Area (ha)	Trail_ID
PE_50	HSF_0029	Practical Ecology	7	3	2.714277	28
PE_51_a	HSF_0029	Practical Ecology	38	9	4.136015	30
PE_51_b	HSF_0029	Practical Ecology	0	0	0.157375	30
PE_51_c	HSF_0029	Practical Ecology	0	0	0.030741	32
PE_52_a	HSF_0045	Practical Ecology	12	33	0.368549	32
PE_52_b	HSF_0045	Practical Ecology	9	19	0.484606	32
PE_52_c	HSF_0045	Practical Ecology	22	20	1.095429	33
PE_52_d	HSF_0045	Practical Ecology	4	28	0.144332	32
PE_53	HSF_0045	Practical Ecology	15	22	0.673328	33
PE_54_a	HSF_0045	Practical Ecology	47	4	10.50068	27
PE_54_b	HSF_0045	Practical Ecology	1	2	0.509577	38
PE_55	HSF_0045	Practical Ecology	5	6	0.905835	38
PE_56	HSF_0045	Practical Ecology	9	5	1.675026	38
PE_57	HSF_0030	Practical Ecology	28	30	0.924865	39
PE_58	HSF_0045	Practical Ecology	47	38	1.241245	39
PE_59	HSF_0029	Practical Ecology	41	55	0.740923	39
PE_6	VAIp0031	Practical Ecology	0	0	1.594903	1
PE_60	HSF_0045	Practical Ecology	26	29	0.888881	39
PE_61	HSF_0029	Practical Ecology	7	12	0.576173	39
PE_62	HSF_0029	Practical Ecology	4	13	0.313047	39



HabZone	HH_EVC	Surveyor	LOT_No	LOT_per_Ha	Area (ha)	Trail_ID
PE_63	HSF_0045	Practical Ecology	56	22	2.54882	39
PE_64_a	HSF_0045	Practical Ecology	26	11	2.320559	39
PE_64_b	HSF_0045	Practical Ecology	18	20	0.881213	24
PE_64_c	HSF_0045	Practical Ecology	31	25	1.236459	22
PE_64_d	HSF_0045	Practical Ecology	26	29	0.904988	23
PE_65_a	HSF_0029	Practical Ecology	34	37	0.923535	23
PE_65_b	HSF_0029	Practical Ecology	0	0	0.037846	24
PE_66	HSF_0045	Practical Ecology	0	0	2.06368	24
PE_67_a	HSF_0045	Practical Ecology	63	18	3.55761	22
PE_67_b	HSF_0045	Practical Ecology	10	23	0.443758	23
PE_67_c	HSF_0045	Practical Ecology	14	18	0.77961	24
PE_67_d	HSF_0045	Practical Ecology	3	52	0.057372	23
PE_68_a	HSF_0045	Practical Ecology	22	30	0.73156	28
PE_68_b	HSF_0045	Practical Ecology	23	31	0.748125	35
PE_68_c	HSF_0045	Practical Ecology	6	68	0.087759	36
PE_69	HSF_0045	Practical Ecology	0	0	0.329108	31
PE_70	HSF_0029	Practical Ecology	1	5	0.21547	18
PE_8	HSF_0031	Practical Ecology	0	0	1.472144	1
PE_9a	VAIp0030	Practical Ecology	0	0	0.001686	1
PE_9b	VAIp0030	Practical Ecology	43	17	2.474699	1

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## Appendix 9 Arborist report on tree conditions and impacts

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Arboricultural  
assessment and report

Warburton Mountain Bike  
Destination Project

28 July 2021  
Treelogic Ref. 011071

Prepared for      Biosis Pty Ltd.  
Prepared by      Andrew Traczynski  
                            Consultant Arborist



## Contents

Objectives .....	2
Site summary .....	2
Method .....	2
Observations .....	4
<i>Provenance and species</i> .....	4
<i>Tree condition (health and structure)</i> .....	5
<i>Dead trees</i> .....	5
Proposed works .....	5
Discussion.....	6
<i>Tree roots</i> .....	6
<i>Pruning of tree roots</i> .....	7
Tree protection.....	8
<i>The Australian Standard for protection of trees on development sites (AS4970 - 2020)</i> .....	8
<i>Potential impacts to individual trees</i> .....	9
<i>General tree protection measures</i> .....	10
<i>Prohibited activities</i> .....	11
<i>Illustrative guidance</i> .....	11
Images .....	15
Appendix 1 A: Assessed tree details .....	22
Appendix 1 B: Section data on all trees within each site.....	23
Appendix 2 A: Mapping - Sample site locations .....	24
Appendix 2 B: Mapping - Approximate tree locations with TPZ and SRZ projections .....	26
Appendix 3: Arboricultural Descriptors (January 2019).....	41
Appendix 4: Tree protection zones (2015) .....	46
Appendix 5:.....	53

## Objectives

Treelogic was engaged by Biosis to conduct tree assessments in thirty predetermined sample sites across various locations of the proposed “Warburton Mountain Bike Destination Project”.

The tree assessments were made to determine the dimensions of the tree population within each site to help inform tree protection measures so that impacts to trees is minimised and managed appropriately.

The site inspections assess only trees whose TPZ is likely to enter the works footprint, identifying the tree species, collecting information on tree dimensions and condition.

Tree dimensions were used to allocate **tree protection zones** (TPZ) and **structural root zones** (SRZ), as outlined in the Australian Standard for protection of trees on development sites (AS4970 – 2020) to each assessed tree. This helps inform guidance and recommendations regarding protection measures.

## Site summary

The proposed trail location is located within the Shire of the Yarra Ranges and is subject to either a Public Conservation and Resource Zone (PCRZ) or Rural Conservation Zone (RCZ).

The samples sites were located across several different Ecological Vegetation Classes (EVC) and slope classes that were determined by Biosis. All areas were populated with trees and understorey vegetation and located on various elevations, soil types, slopes, and aspects. Please refer to Appendix 2 A for an overview of all the sample site locations.

Supplied were mapping files used directly into QGIS software package with aerial imagery sourced from Nearmap.com.

## Method

The tree assessment was carried out on the 14<sup>th</sup>, 15<sup>th</sup>, 21<sup>st</sup> and 22<sup>nd</sup> of April 2021 by Treelogic staff, Andrew Traczynski, David Phillips, Harry Webb, and Kirsten Raynor. The trees were inspected from the ground and observations were made of the growing environment and surrounding areas.

The trees were not climbed, and no samples of the tree or site soil were taken. The detail tree assessment method was developed by Biosis and Treelogic in consultation with DELWP and Parks Victoria. This tree method statement is contained in the Biosis Biodiversity Technical Report for the Environmental Effects Statement.

Trees where the works footprint appeared to be outside their TPZ were not included in this assessment and report. However, all Myrtle Beech trees within the sample sites were captured.

Trees below 20 centimetres DBH and within the sample sites were not captured unless the tree was inside the proposed track footprint (i.e., between centreline flagging tapes in the approximate two-metre-wide direct impact corridor). This is driven by the approximate two-

metre-wide impact footprint which means trees at 20 centimetres DBH have a TPZ of 2.40 metres as per AS4970. Therefore, only capturing trees of this small size class within the impact footprint would reasonably allow disturbance to small trees to be characterised. Small shrubs were not captured.

The determination of which trees to include in the assessment were those of a species that was able to attain a height of at least 8 metres.

The DELWP Guidelines for the removal, destruction or lopping of native vegetation (page 6, DELWP 2017) define a canopy tree as “A native canopy tree is a mature tree (i.e. it is able to flower) that is greater than 3 metres in height and is normally found in the upper layer of the relevant vegetation type”. The DELWP Handbook (page 38, DELWP 2018) goes on to expand this definition as “...EVC descriptions provide a list of typical canopy species, but a native vegetation assessor should determine (using site-based information, EVC descriptions and other published scientific papers and information) whether a particular species is a native canopy tree in a particular location. If there is doubt, assume the tree is a native canopy tree.

On this basis - canopy or sub-canopy forming species from EVC benchmarks were used to determine which species to focus the assessment on.

Smaller shrub material and tree ferns were not captured as they are not considered trees. The definition for trees utilised was obtained from the Royal Botanic Gardens Flora of Victoria website that defines a tree as “a woody plant, usually with a single stem and more than c. 8 m high”, <[www.vicflora.rbg.vic.gov.au/flora/glossary](http://www.vicflora.rbg.vic.gov.au/flora/glossary)> (site accessed April 2021).

Assessment details of individual trees are listed in the Tree Assessment Table in Appendix 1. Tree locations, along with tree protection zones can be seen in Appendix 2. The assessed trees were located within 30 predetermined sample plots of 900 square metres in area each.

Observations were made of the trees and include:

- Identify the tree species,
- Estimate **Diameter at breast height** (DBH at 1.4 m from ground) and basal (just above root flare) in predetermined centimetre increments of <20, 25, 30, 40, 50, 60, 70, 80, 90, 100, 125, 150, 200, 300, >300.
- Estimated heights and canopy spread in metres,
- General condition (health / structure) noted as good, fair, fair to poor, dead,
- Make brief comments where the assessor deems required.
- Dead trees were included in the assessment that were within the path, as dead trees with a greater than 40 cm DBH whose TPZ appear to intersect the proposed trail.
- Trees were located as a point estimated both by on-site indicators (flagging tape) and the GPS within the data capture device (Panasonic ToughPad FZ-G1).
- To provide further information on each tree in the sample sites, a second table was included that estimates the number of stems of each species and their DBH size ranges (e.g., Myrtle Beech 30 – 40 specimens – DBH range of 20 cm to 120 cm, Eucalyptus

species 20 – 30 specimens – DBH range 120 cm – 250 cm). For this tabulated information, more trees were counted than the trees individually plotted with dimensions captured for a given sample site. This table provides further nuance as to the surrounding environment and helps describe tree density, including the sub-canopy species.

Photographs of assessed trees and site conditions were taken for further reference and inclusion in the report.

The assessed trees have been allocated TPZ and indicative SRZ as described in AS4970. This method provides a TPZ and an SRZ that addresses both the stability and growing requirements of a tree. TPZ distances are measured as a radius, from the centre of the trunk at (or near) ground level. All TPZ and SRZ measurements for assessed trees are provided in Appendix 1.

## Observations

All the the trees within the sample sites were of an indigenous origin.

In total there were 675 trees assessed and included in this assessment. Please see in the below table of a breakdown of the numbers of trees assessed for each sample site.

Sample site #	No. of trees	Sample site #	No. of trees	Sample site #	No. of trees
1	46	11	19	21	20
2	31	12	24	22	29
3	48	13	21	23	14
4	18	14	18	24	12
5	17	15	21	25	14
6	11	16	42	26	19
7	9	17	15	27	17
8	10	18	18	28	29
9	42	19	12	29	14
10	20	20	22	30	43

The total number of dead trees assessed was 34. This included 29 dead Eucalyptus species and five dead Acacia species. Some of the dead specimens were less than 40 cm DBH and included in the assessment as they were either within or on the periphery of the proposed track footprint.

### Provenance and species

All assessed trees were of an indigenous species. None appeared to have been of planted origin.

Please see below a breakdown of the species and their number of live trees included in the assessment.

Species	No. of trees	Species	No. of trees
<i>Acacia sp.</i>	5	<i>Eucalyptus obliqua</i>	60
<i>Acacia dealbata</i>	48	<i>Eucalyptus ovata</i>	2
<i>Acacia melanoxylon</i>	5	<i>Eucalyptus radiata</i>	2
<i>Acacia obliquinerva</i>	1	<i>Eucalyptus regnans</i>	56
<i>Bedfordia arborescens</i>	3	<i>Eucalyptus sieberi</i>	156
<i>Eucalyptus baxteri</i>	24	<i>Eucalyptus sp.</i>	30
<i>Eucalyptus cephalocarpa</i>	8	<i>Eucalyptus viminalis</i>	4
<i>Eucalyptus cypellocarpa</i>	17	<i>Kunzea ericoides</i>	4
<i>Eucalyptus delegatensis</i>	58	<i>Nothofagus cunninghamii</i>	125
<i>Eucalyptus dives</i>	8	<i>Polyscias sambucifolia</i>	2
<i>Eucalyptus gonicalyx</i>	12	<i>Pomaderris aspera</i>	23
<i>Eucalyptus nitens</i>	22		

### Tree condition (health and structure)

A combined general tree condition was attributed to each assessed tree. This general condition considers species, location, health, and structure.

Health considerations include foliage colour, size, shoot initiation and elongation as well as overall canopy density, decay, and dying or dead parts.

Structure considerations include tree form, unions and branch attachments, root anchorage, dead parts and epicormic growth.

The majority of the assessed trees were considered to be in the fair category (378), with 24 good, 168 fair – poor, 47 poor, eight very poor, twelve senescent, and four hazardous.

Hazardous trees can be included as poor trees, but the assessor was of the opinion that the tree was in a state of failure. There were also 34 dead trees included in the assessment.

### Dead trees

There were several dead trees within the sample sites that data was collected for. Only dead trees whose TPZ was likely to intersect the trail was collected. Dead trees with a smaller than 40 cm DBH were collected that were either on or very close to the proposed trail.

Trail alignments may need to be micro-sited around trees found to be hazardous or a suitable treatment applied to these trees in consultation with the relevant land manager. Treatments to dead trees to reduce hazards include 'habitat' pruning, part removal or part reduction for parts with an elevated risk of failure over the proposed trail. Please refer to the tables in Appendix 1. Dead trees in a state of failure would need to be dealt with appropriately, such as habitat pruning. It is recommended to leave any logs or tree parts from removed from dead trees on site for habitat opportunities.

## Proposed works

The arboricultural inspection report provides planners and designers with information on the measures required to protect trees.



Avoiding tree impacts is the best approach as it is almost impossible to rectify damage to trees that has occurred during construction activities. Tree protection cannot be achieved without a proactive approach. Similarly, a basic understanding of how trees grow and develop is needed. The planning and design stages of any construction project will determine the success of tree preservation.

The hierarchy of principles for tree protection are:

*Avoid damage to trees*

or

*Minimise damage to trees*

or

*Replace trees and improve the landscape (as a last resort)*

The proposal is for the creation of a mountain bike trail. It is expected that minimal changes to the soil levels would be needed. However, there may be rare circumstances where changes in soil levels may be greater than anticipated due to the landform, rocks, vegetation, and slope.

As the final product is a mountain bike trail that is made from the local soil, very little, if any, imported materials will be used. Some exceptions maybe some tree protection items to help protect roots. Soil and other material on site is to be used for the construction of the trail.

The trail will be cleared of leaf litter and humus and some minor land forming works will be made to both shape the trail and to lightly compact and form the trail elements, such as berms, rises and falls, and small jumps. The leaf litter and humus will be reused alongside the track for recruitment of smaller under storey vegetation.

It is understood that the angle of the trail will be limited to a maximum of 10° with rises and falls to help redirect rain fall run off appropriately. No long downhill sections are proposed where runoff can potentially erode the soil.

It is understood that the type of equipment used will be hand tools and a compact excavator. Due to the terrain, larger scale powered equipment would not be suitable, and the compact excavator would be lighter, more manoeuvrable, and workable amongst the trees, vegetation, and terrain.

Please see “Appendix 2: Approximate tree locations with TPZ and SRZ projections” of each sample site for an indication of the extent of the TPZ projections over the proposed trail location.

## Discussion

### Tree roots

Various functions of tree roots include anchorage, structural support and stability, absorption of soil moisture including water and minerals, storage of energy (carbohydrates) and they produce hormones that help regulate the growth of the tree. The roots of many tree species also have

bacterial or fungal associations that are mutually beneficial and help extend the root zone and the ability of the tree to draw upon a much greater amount of moisture and minerals.

To help illustrate a more representative view of the extent of tree roots please see figure 1 below. As can be seen in figure 1, the root extent is far greater than most people realise and that the root depth is usually shallower than people expect. In addition, most of the finer absorbing and ephemeral roots are in the top 20 cm of soil.

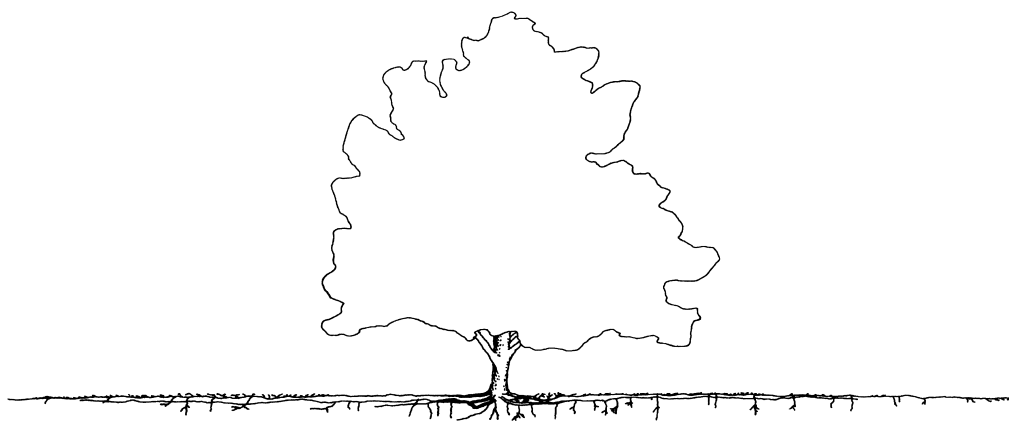


Figure 1: An example of a typical root zone of a tree taken from “An Illustrated Guide to Pruning by Edward Gilman 2002)

It must be noted that in most situations, the proposed trail line will be on a slope of varying degrees and so the roots would likely not be exactly like the above example. Roots on the up slope may be shorter in length and less prolific as compared to the downward slope side of the root extent. There are other influences on root location and depth also that include type of soil, other trees, rocks, soil moisture and air levels, temperature, pH, and landslips.

As tree roots are vital to both the stability and viability post works, efforts must be made to ensure damage is minimised. Tree protection and impact reduction measures must be incorporated into the methodology of the proposed works. These methods must be understood by all those working on the project to ensure that impacts are minimised.

Please see below table to see a guide as to the sizing of ‘significant’ roots.

**Table 1: Estimated significant root sizes outside SRZ.**

Height of tree	Diameter of root
Less than 5m	≥ 30mm
Between 5m - 15m	≥ 50mm
More than 15m	≥ 70mm

As most of the trees are in a tall forest environment, all roots >70 mm are likely to be significant.

### Pruning of tree roots

If the pruning of significant roots is required, then this must be done under the guidance of the project arborist. These works must be performed with clean and sharp tools with cuts

perpendicular to the direction of the root ensuring the smallest possible cut. Painting of wounds is not recommended. These works must also be done in accordance with the Australian Standard for the pruning of amenity trees (AS4373).

Roots smaller than those deemed significant should also be pruned provided they are cut with clean and sharp tools also in accordance with AS4373. These cuts can be performed by those making the trail.

Endeavours need to be made to reduce the need for root pruning, however, it is understood that in the cases it is unavoidable. Care is to be taken in performing these works. If unsure, contact the project arborist for confirmation and clarification.

Given the susceptibility of Myrtle Beech trees to the fungal disease Myrtle Beech Wilt (*Chalara australis*), all works related activities must be carried out in a manner that reduces the risk of introduction or that fosters conditions that encourage the growth of this pathogen to these sensitive areas. All activities must be controlled near Myrtle Beech tree populations, including that all equipment, tools, boots, and clothing are to be cleaned appropriately, and that material used is to be local to that site.

When dealing with Myrtle Beech trees, the pruning of above or below ground parts is to be avoided where alternatives or modifications to the trail can be made. Any pruning of Myrtle Beech trees is to be undertaken by or under the supervision of an arborist and wounding managed appropriately.

## Tree protection

The most important consideration for the successful retention of trees is to allow appropriate above and below ground space for the trees to continue to grow. This requires the allocation of TPZ and indicative SRZ for all retained trees.

### **The Australian Standard for protection of trees on development sites (AS4970 - 2020)**

The Australian Standard for protection of trees on development sites (AS4970) has been used as the method for calculating a TPZ and the indicative SRZ. The TPZ and SRZ defines an area in which construction activity is either avoided, or at least controlled, to successfully sustain a tree. The indicative SRZ is the minimal area required for a tree to remain upright. Works are not permitted inside the SRZ without the consultation and guidance by the project arborist. These measurements are provided in the tree assessment data in Appendix 1. Tree locations with TPZ and indicative SRZ is included in Appendix 2.

A **minor encroachment** is where the proposed works occupy up to 10% of the TPZ. This is generally permissible provided encroachment is compensated for the recruitment and protection of an equivalent area of land contiguous with the TPZ.

A **major encroachment** is where the proposed works either occupy more than 10% of the TPZ and/or intrude into the SRZ of a retained tree. AS4970 requires the site arborist to show that where there is a major encroachment that the retained trees are not adversely affected by the proposal.

For this project, it can be demonstrated that by using construction methods and materials sympathetic to tree roots, and through modifications to the trail footprint during final trail mark-out, that minor and major encroachments of TPZ's and SRZ's is unlikely to lead to tree decline.

### **Potential impacts to individual trees**

As expected, the tree assessments at each of the sample sites shows that almost the entire trail will intersect a TPZ and even be within multiple SRZ's. The trail, at times will need to be diverted around trees where the trail line either intersects or is extremely close to a tree and its buttress roots.

Although the vast majority of these works are considered a major encroachment under the strict definition of AS4970, provided methodologies can be used that are sympathetic to tree roots, no live trees would need to be removed or be adversely impacted by the trail.

Sympathetic mitigation measures include:

- The project arborist must provide a tree protection and health presentation and induction for all contractors working on the project to outline sympathetic mitigation measures and pruning techniques.
- Trail diversions and minor realignments can be done at the pre-construction phase as part of the micro-siting process.
- Trails are to be diverted to avoid trees and provide the biggest buffer possible, especially near large significant ones.
- Preference is to locate the trail on the up-slope side of a tree where feasible.
- Do not heap soil against the trunk of a tree.
- If creating a berm or other trail feature near the trunk base, ensure that roots are protected, and that the feature is at least 300 mm from the trunk base or buttress roots.
- Do not undermine the trunk of a tree.
- Where the trail runs close to the lateral roots with buttressing, then additional soil is to be placed over the root to prevent direct contact from mountain bikes. This may also include a plastic mesh (i.e. Tensar® TriAx® (TX) Geogrid) portions pegged into the soil as a layer over and under additional soil to help provide additional longer term root protection. Place approximately 50 mm of soil over an exposed root, place the mesh over and peg down, then place an additional layer of approximately 50 mm of soil that can be compacted lightly.
- Utilise hand digging where significant roots are exposed naturally or by the works, to minimise root injury by machinery.
- When using powered excavation equipment members of the crew are to spot and alert the operator to ensure that no part of the equipment collides with a tree part.
- Ensure that the trail is constructed in a way that erosion is managed where run off is diverted at regular locations along the trail.
- No long fall-line sections.

- The “O-horizon” or organic layer of the soil profile is reused at the edges of the trail to allow for natural recruitment and help enforce to the trail users where the trail is.
- Use of soil and organic materials should be local to each site. No foreign soil or material is used or brought in unless for a specially constructed section or necessary.
- For certain areas of the trail that pose specific and undefined challenges regarding trees, that a suitably qualified arborist be used to both supervise and provide guidance and recommendations.
- Significant roots are to be avoided and worked around or over in a way that minimises impacts.
- Exposed roots are to be covered as soon as possible. Where roots need to be exposed for periods of greater than two hours (one hour on dry and warm days), then moist hessian or other suitable material is to be placed on exposed roots and kept moist until the soil is reinstated.
- Careful manoeuvring of powered equipment must be always made, reducing the amount of Slewling, swivelling, or twisting actions with movements ideally forwards and backwards only. This helps reducing soil compaction and root damage.
- Powered equipment must be used as sensitive to roots as possible, gently scraping away the surface soil and only to a depth required.
- Any pruning of Myrtle Beech trees is to be undertaken under the guidance of the project arborist.
- Myrtle Beech trees within proximity of the trail must be monitored for any signs of Myrtle Wilt infection.

### **General tree protection measures**

A project arborist (AQF level V or higher) is recommended to be appointed who is to attend the site during times where the excavation works are known or expected to have a higher possibility of tree impacts.

Construction methodology that is sympathetic to tree roots and must be utilised throughout the project. These procedures are to attempt to reduce the impacts to trees and their roots.

Prior to any works commencing and if applicable, locations are to be chosen for storage of materials and equipment appropriate to each site. This includes the parking of vehicles, equipment, sheds/portable toilets, and materials.

Those working on the site must be made aware of the importance of tree protection requirements and measures through regular discussions, as part of site meetings and included in ‘Toolbox Talks’ where this information can be easily disseminated. The information is to include avoiding collision with tree parts, working under branches, and reducing damage to tree roots.

Information can be relatively simple and procedural, such as looking out for collision with a tree part, the use of spotters and to go over the tree protection requirements as laid out in this

document. The *site supervisors* should be made aware of this document and to ensure that all those working on the site are aware of tree protection.

Avoiding mechanical impact damage to trunks and limbs that could result from the slewing action of powered equipment should be addressed with the operator considering the positioning of powered equipment with caution to avoid occurrence of such impacts.

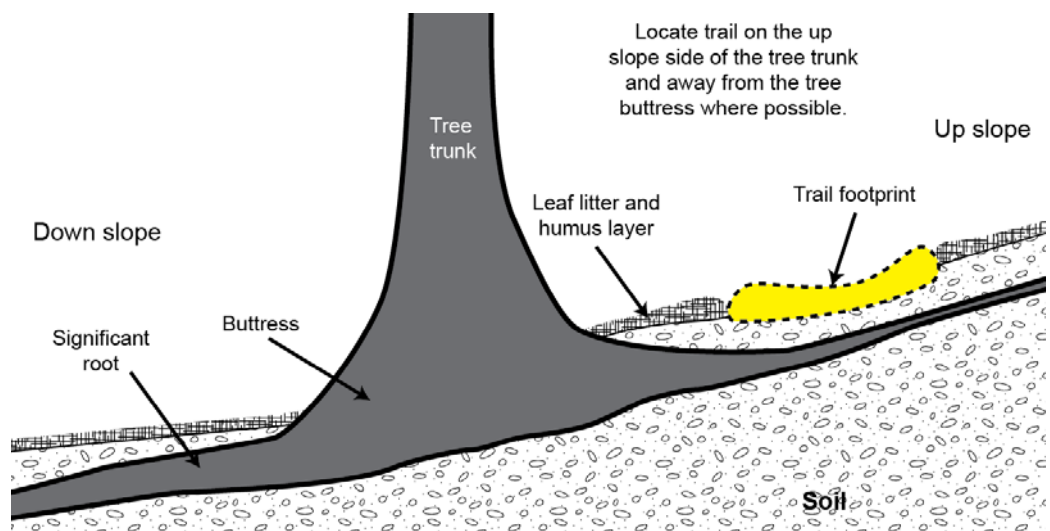
### Prohibited activities

Prohibited activities within the TPZ or proximity of an above ground tree part of any retained tree includes but is not limited to:

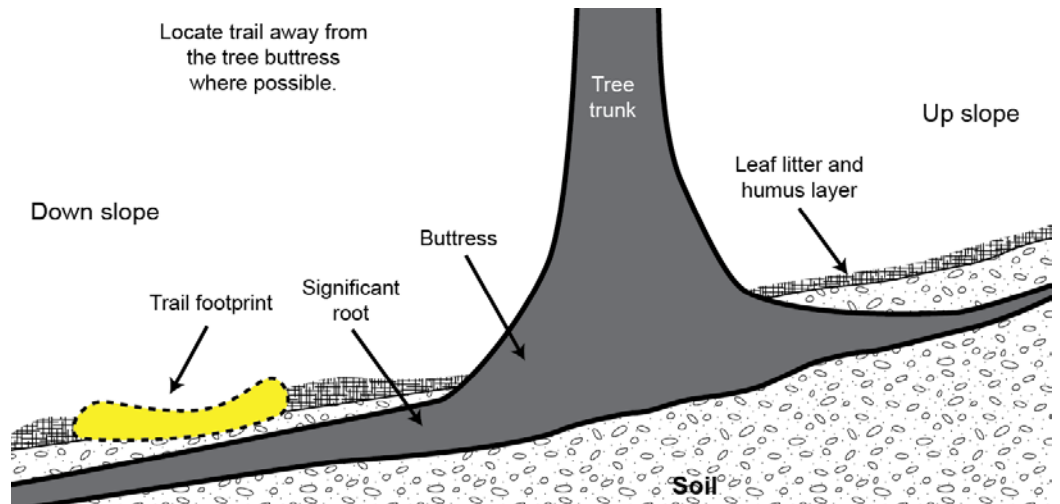
- the storage or parking of equipment, vehicles, toilets, materials, fill, soil, chemicals, seating,
- the preparation of chemicals, including preparation of cement products,
- the cleaning of equipment, personnel, materials,
- existing soil grades must remain unaltered except for the construction footprint,
- refuelling,
- dumping of waste,
- lighting of fires,
- attaching temporary or permanent utilities and signs to tree parts,
- physical damage to the tree.

### Illustrative guidance

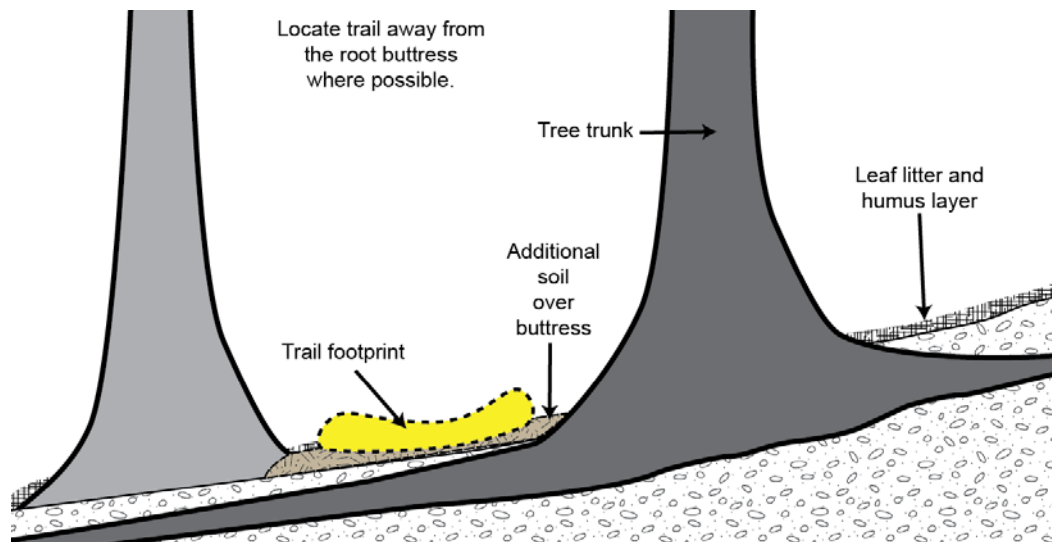
Please see below some illustrative examples of trail placement and guidance on root protection for significant roots.



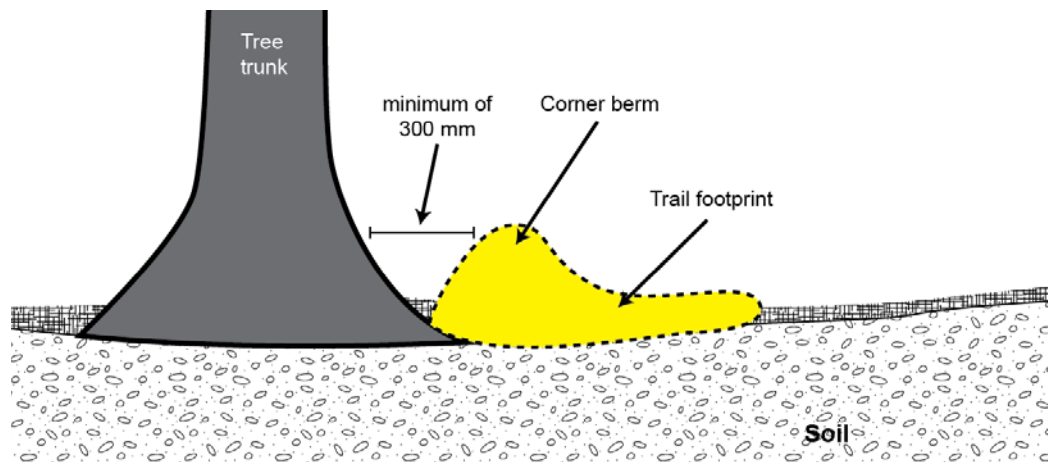
*Scenario 1: Ideally, locate the path on the up-slope side of a tree that the path get close to and away from the buttress or exposed significant roots.*



Scenario 2: Where it is not feasible to locate the path on the up-slope side, locate the path away from the buttress or exposed significant roots.



Scenario 3: Where the path threads between two trees, place the path away from the buttress as far as possible and ensure that any exposed significant roots are covered appropriately.



Scenario 4: Where creating a berm near the trunk base, ensure that roots are protected, and that the berm is at least 300 mm from the trunk base or buttress roots.



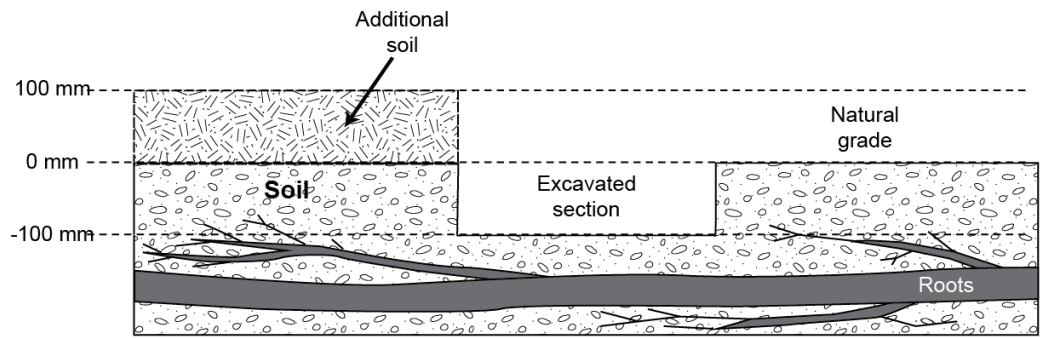


Figure 2: An example of a cutaway section showing depth of excavation or additional soil.

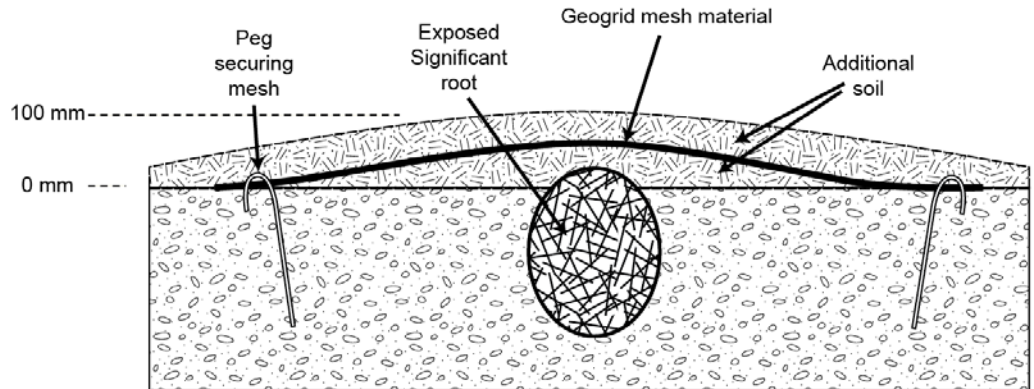


Figure 3: An example of a cutaway section showing an exposed significant tree root where the trail traverses over. An additional 50 mm of soil is to be placed over the root, a layer of mesh (i.e. Tensar® TriAx® (TX) Geogrid) pegged securely and topped with an additional layer of 50 mm of soil.



I am available to answer any questions arising from this report.

No part of this report is to be reproduced unless in full.



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### References:

Australian Standard (4970-2020), *Protection of Trees on development sites*.  
Standards Australia, Sydney, NSW, Australia.

Standards Australia (2007), Australian Standard (4373-2007) - *Pruning of amenity trees*,  
Standards Australia, Sydney, NSW, Australia.

Clark, J.R. & Matheny, N.P. (1998), *Trees and Development: A technical guide to preservation of trees during land development*. I.S.A., Champaign, Illinois.

Royal Botanic Gardens Flora of Victoria (2020), Royal Botanic Gardens, Melbourne, Victoria  
website, <[www.vicflora.rbg.vic.gov.au/flora/glossary](http://www.vicflora.rbg.vic.gov.au/flora/glossary)> (site accessed April 2021).

DELWP (2019), *The Native Vegetation Newsletter Update on the implementation of the 2017 native vegetation removal regulations and Guidelines for the removal, destruction or lopping of native vegetation – November 2019*. Victorian Government Department of Land, Water and Planning, Melbourne.

DELWP (2018), *Assessor's handbook – Applications to remove destroy or lop native vegetation*,  
Victorian Government Department of Land, Water and Planning, Melbourne.

## Images.



Image 1: Shows a panorama view of **Site 1**.



Image 2: Shows a panorama view of **Site 2**.



Image 3: Shows a panorama view of **Site 3**.



Image 4: Shows a panorama view of **Site 4**.





Image 5: Shows a panorama view of **Site 5**.



Image 6: Shows a panorama view of **Site 6**.



Image 7: Shows a panorama view of **Site 7**.



Image 8: Shows a panorama view of **Site 8**.





Image 9: Shows a panorama view of **Site 9**.



Image 10: Shows a panorama view of **Site 10**.



Image 11: Shows a panorama view of **Site 11**.



Image 12: Shows a panorama view of **Site 12**.





Image 13: Shows a panorama view of **Site 13**.



Image 14: Shows a panorama view of **Site 14**.



Image 15: Shows a panorama view of **Site 15**.



Image 16: Shows a panorama view of **Site 16**.





Image 17: Shows a panorama view of **Site 17**.



Image 18: Shows a panorama view of **Site 18**.



Image 19: Shows a panorama view of **Site 19**.



Image 20: Shows a panorama view of **Site 20**.



Image 21: Shows a panorama view of **Site 21**.





Image 22: Shows a panorama view of **Site 22**.



Image 23: Shows a panorama view of **Site 23**.



Image 24: Shows a panorama view of **Site 24**.



Image 25: Shows a panorama view of **Site 25**.



Image 26: Shows a panorama view of **Site 26**.





Image 27: Shows a panorama view of **Site 27**.



Image 28: Shows a panorama view of **Site 28**.



Image 29: Shows a panorama view of **Site 29**.

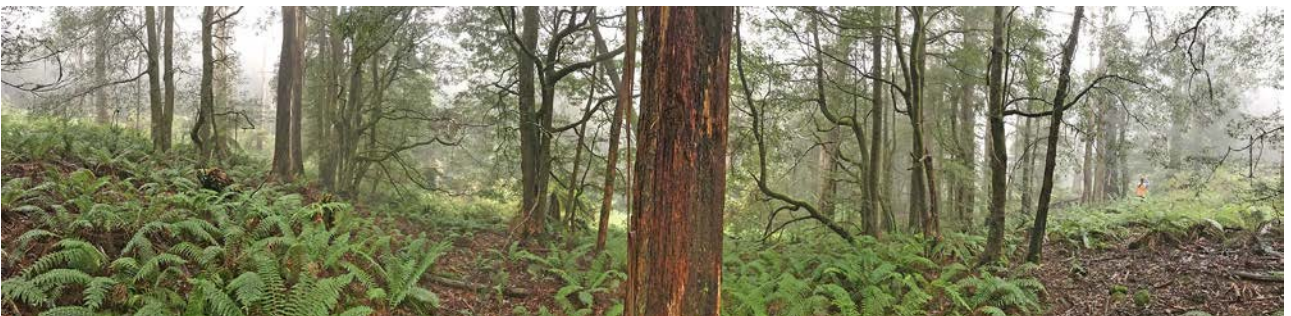


Image 30: Shows a panorama view of **Site 30**.



## Appendix 1 A: Assessed tree details.

**DBH** = diameter at breast height (estimated in centimetres at 1.4 m above ground). **TPZ** = tree protection zone (metre radius). **SRZ** = structural root zone. Radius distances measured in metres from the centre of trunk. **ULE** = useful life expectancy. For tree locations and numbering refer Appendix 2. See Appendix 3 for tree descriptors.

Only dead trees were assessed if their TPZ was impacted and that had a DBH of 40 cm or greater or were directly in the path and would require removal or path modification. Measurements estimated in ranges with DBH in cm, and height / canopy spreads in metres.

The Tree data tables in attached in the following pages have been divided up per sample site.



Sample site 01

Tree No.	Species (Common name)	Est. DBH	Est. Height range	Est. Canopy Spread	Condition	Path Conflict	Comments / recommendations	TPZ	SRZ	Est. path dist.	AS4970 encroachment	Can tree be retained
1	Eucalyptus delegatensis (Alpine Ash)	70	20 to 30	12	fair - poor			8.40	3.31	2	> 10%	Yes sympathetic measures
2	Eucalyptus delegatensis (Alpine Ash)	100	30 to 40	12	fair - poor			12.00	3.63	2	> 10%	Yes sympathetic measures
3	Eucalyptus delegatensis (Alpine Ash)	80	30 to 40	12	fair			9.60	3.31	3	> 10%	Yes sympathetic measures
4	Eucalyptus delegatensis (Alpine Ash)	70	30 to 40	10	fair			8.40	3.01	8	< 10%	Yes
5	Eucalyptus delegatensis (Alpine Ash)	80	40 to 50	10	fair - poor			9.60	3.31	8	< 10%	Yes
6	Eucalyptus delegatensis (Alpine Ash)	40	30 to 40	10	fair - poor			4.80	2.47	5	None	Yes
7	Eucalyptus delegatensis (Alpine Ash)	80	40 to 50	12	fair			9.60	3.31	8	< 10%	Yes
8	Eucalyptus delegatensis (Alpine Ash)	100	40 to 50	15	fair - poor	tree on path	modify path	12.00	3.63	1	> 10%	Yes sympathetic measures
9	Eucalyptus delegatensis (Alpine Ash)	50	20 to 30	7	fair - poor			6.00	2.85	6	None	Yes
10	Eucalyptus delegatensis (Alpine Ash)	100	30 to 40	12	fair			12.00	3.63	6	> 10%	Yes sympathetic measures
11	Eucalyptus delegatensis (Alpine Ash)	50	20 to 30	7	fair			6.00	2.67	2	> 10%	Yes sympathetic measures
12	Eucalyptus delegatensis (Alpine Ash)	60	30 to 40	10	poor			7.20	2.67	6	< 10%	Yes
13	Eucalyptus delegatensis (Alpine Ash)	100	30 to 40	15	fair			12.00	3.31	8	> 10%	Yes sympathetic measures
14	Eucalyptus delegatensis (Alpine Ash)	80	30 to 40	15	fair - poor			9.60	3.01	2	> 10%	Yes sympathetic measures
15	Eucalyptus delegatensis (Alpine Ash)	100	30 to 40	20	fair			12.00	3.31	5	> 10%	Yes sympathetic measures
16	Eucalyptus delegatensis (Alpine Ash)	80	30 to 40	15	fair			9.60	3.01	5	> 10%	Yes sympathetic measures
17	Eucalyptus delegatensis (Alpine Ash)	40	20 to 30	7	poor			4.80	2.25	5	None	Yes
18	Nothofagus cunninghamii (Myrtle Beech)	40	15 to 20	12	good	root flare in path, branches in path	remove branches in path, root sympathetic path construction	4.80	2.47	1	> 10%	Yes sympathetic measures
19	Nothofagus cunninghamii (Myrtle Beech)	40	10 to 15	7	poor			4.80	2.47	6	None	Yes
20	Nothofagus cunninghamii (Myrtle Beech)	40	10 to 15	10	fair - poor			4.80	2.67	6	None	Yes
21	Nothofagus cunninghamii (Myrtle Beech)	30	10 to 15	10	fair - poor			3.60	2.25	15	None	Yes
22	Nothofagus cunninghamii (Myrtle Beech)	20	10 to 15	5	fair - poor			2.40	1.68	1	> 10%	Yes sympathetic measures
23	Nothofagus cunninghamii (Myrtle Beech)	30	7 to 10	7	fair			3.60	2.00	3	< 10%	Yes
24	Nothofagus cunninghamii (Myrtle Beech)	30	10 to 15	7	fair			3.60	2.00	3	< 10%	Yes
25	Nothofagus cunninghamii (Myrtle Beech)	10	5 to 7	5	fair			2.00	1.68	5	None	Yes
26	Nothofagus cunninghamii (Myrtle Beech)	30	10 to 15	7	fair			3.60	2.00	12	None	Yes
27	Nothofagus cunninghamii (Myrtle Beech)	30	10 to 15	7	fair - poor	tree on path	modify path	3.60	2.47	1	> 10%	Yes sympathetic measures
28	Nothofagus cunninghamii (Myrtle Beech)	40	10 to 15	12	fair			4.80	2.47	5	None	Yes
29	Nothofagus cunninghamii (Myrtle Beech)	10	7 to 10	5	fair			2.00	1.68	5	None	Yes
30	Nothofagus cunninghamii (Myrtle Beech)	20	10 to 15	7	fair			2.40	1.68	6	None	Yes
31	Nothofagus cunninghamii (Myrtle Beech)	20	10 to 15	10	fair			2.40	2.00	15	None	Yes
32	Nothofagus cunninghamii (Myrtle Beech)	20	10 to 15	7	fair			2.40	2.00	12	None	Yes
33	Nothofagus cunninghamii (Myrtle Beech)	70	10 to 15	12	fair			8.40	3.31	8	< 10%	Yes
34	Nothofagus cunninghamii (Myrtle Beech)	20	10 to 15	5	fair	branches in path	remove branches in path	2.40	2.00	2	< 10%	Yes
35	Nothofagus cunninghamii (Myrtle Beech)	20	10 to 15	5	fair			2.40	2.00	2	< 10%	Yes
36	Nothofagus cunninghamii (Myrtle Beech)	40	10 to 15	7	good			4.80	2.25	6	None	Yes
37	Nothofagus cunninghamii (Myrtle Beech)	40	7 to 10	10	fair			4.80	2.47	10	None	Yes
38	Nothofagus cunninghamii (Myrtle Beech)	20	7 to 10	5	good			2.40	1.68	5	None	Yes
39	Nothofagus cunninghamii (Myrtle Beech)	30	7 to 10	5	fair			3.60	2.47	3	< 10%	Yes
40	Nothofagus cunninghamii (Myrtle Beech)	40	7 to 10	5	fair	root flare in path	root sympathetic path construction	4.80	2.25	1	> 10%	Yes sympathetic measures
41	Nothofagus cunninghamii (Myrtle Beech)	30	5 to 7	5	poor	root flare in path	root sympathetic path construction	3.60	2.25	1	> 10%	Yes sympathetic measures
42	Nothofagus cunninghamii (Myrtle Beech)	60	7 to 10	7	fair			7.20	2.67	4	> 10%	Yes sympathetic measures
43	Nothofagus cunninghamii (Myrtle Beech)	40	7 to 10	7	poor			4.80	2.47	15	None	Yes
44	Nothofagus cunninghamii (Myrtle Beech)	50	10 to 15	10	good			6.00	2.47	12	None	Yes
45	Eucalyptus sp.	40 to 50	15 to 20	5	dead		retain	5.40	N/A	4	< 10%	Yes
46	Eucalyptus sp.	40 to 50	10 to 15	3	dead		retain	5.40	N/A	4	< 10%	Yes

Sample site 02

Tree No.	Species (Common name)	Est. DBH	Est. Height range	Est. Canopy Spread	Condition	Path Conflict	Comments / recommendations	TPZ	SRZ	Est. path dist.	AS4970 encroachment	Can tree be retained
1	Eucalyptus delegatensis (Alpine Ash)	80	20 to 30	10	fair - poor			9.60	3.31	6	> 10%	Yes sympathetic measures
2	Eucalyptus delegatensis (Alpine Ash)	60	30 to 40	10	fair			7.20	3.01	6	< 10%	Yes
3	Eucalyptus delegatensis (Alpine Ash)	70	20 to 30	10	fair - poor			8.40	3.01	5	> 10%	Yes sympathetic measures
4	Eucalyptus delegatensis (Alpine Ash)	70	30 to 40	10	fair - poor			8.40	3.01	4	> 10%	Yes sympathetic measures
5	Eucalyptus delegatensis (Alpine Ash)	30	7 to 10	5	poor			3.60	2.00	6	None	Yes
6	Eucalyptus delegatensis (Alpine Ash)	80	30 to 40	12	fair	root flare in path	root sympathetic path construction	9.60	3.31	2	> 10%	Yes sympathetic measures
7	Eucalyptus delegatensis (Alpine Ash)	50	20 to 30	7	fair - poor			6.00	2.67	2	> 10%	Yes sympathetic measures
8	Eucalyptus delegatensis (Alpine Ash)	80	20 to 30	15	fair - poor			9.60	3.31	3	> 10%	Yes sympathetic measures
9	Eucalyptus delegatensis (Alpine Ash)	70	30 to 40	12	fair			8.40	3.31	6	< 10%	Yes
10	Eucalyptus delegatensis (Alpine Ash)	60	20 to 30	10	fair			7.20	2.85	2	> 10%	Yes sympathetic measures
11	Eucalyptus delegatensis (Alpine Ash)	60	20 to 30	10	fair - poor	root flare in path	root sympathetic path construction	7.20	3.01	1	> 10%	Yes sympathetic measures
12	Nothofagus cunninghamii (Myrtle Beech)	40	10 to 15	10	fair - poor			4.80	2.67	5	None	Yes
13	Nothofagus cunninghamii (Myrtle Beech)	30	10 to 15	7	fair			3.60	2.00	8	None	Yes
14	Nothofagus cunninghamii (Myrtle Beech)	10	5 to 7	3	fair			2.00	1.50	4	None	Yes
15	Nothofagus cunninghamii (Myrtle Beech)	30	10 to 15	12	fair			3.60	2.25	6	None	Yes
16	Nothofagus cunninghamii (Myrtle Beech)	40	10 to 15	10	fair			4.80	2.47	6	None	Yes
17	Nothofagus cunninghamii (Myrtle Beech)	20	7 to 10	7	fair			2.40	1.68	8	None	Yes
18	Nothofagus cunninghamii (Myrtle Beech)	10	7 to 10	5	fair			2.00	1.68	8	None	Yes
19	Nothofagus cunninghamii (Myrtle Beech)	30	10 to 15	10	fair - poor			3.60	2.25	5	None	Yes
20	Nothofagus cunninghamii (Myrtle Beech)	10	7 to 10	7	fair - poor			2.00	1.68	4	None	Yes
21	Nothofagus cunninghamii (Myrtle Beech)	20	7 to 10	5	fair			2.40	1.68	5	None	Yes
22	Nothofagus cunninghamii (Myrtle Beech)	20	7 to 10	5	fair - poor			2.40	1.68	6	None	Yes
23	Nothofagus cunninghamii (Myrtle Beech)	20	7 to 10	5	fair - poor			2.40	1.68	15	None	Yes
24	Nothofagus cunninghamii (Myrtle Beech)	60	10 to 15	10	fair - poor			7.20	3.01	15	None	Yes
25	Nothofagus cunninghamii (Myrtle Beech)	30	10 to 15	7	good			3.60	2.47	1	> 10%	Yes sympathetic measures
26	Nothofagus cunninghamii (Myrtle Beech)	30	7 to 10	7	good			3.60	2.25	2	> 10%	Yes sympathetic measures
27	Nothofagus cunninghamii (Myrtle Beech)	30	7 to 10	7	fair			3.60	2.25	4	None	Yes
28	Nothofagus cunninghamii (Myrtle Beech)	20	7 to 10	3	fair			2.40	2.00	2	< 10%	Yes
29	Nothofagus cunninghamii (Myrtle Beech)	20	7 to 10	5	fair			2.40	2.00	2	< 10%	Yes
30	Nothofagus cunninghamii (Myrtle Beech)	20	7 to 10	5	poor		tree failed	2.40	2.00	10	None	Yes
31	Eucalyptus sp.	< 40	15 to 20	3	dead		retain	4.80	N/A	2	> 10%	Yes

Sample site 03

Tree No.	Species (Common name)	Est. DBH	Est. Height range	Est. Canopy Spread	Condition	Path Conflict	Comments / recommendations	TPZ	SRZ	Est. path dist.	AS4970 encroachment	Can tree be retained
1	Eucalyptus regnans (Mountain Ash)	60	50 to 60	15	fair			7.20	2.85	10	None	Yes
2	Eucalyptus regnans (Mountain Ash)	80	50 to 60	20	fair			9.60	3.31	12	None	Yes
3	Eucalyptus regnans (Mountain Ash)	70	50 to 60	20	fair			8.40	3.01	6	< 10%	Yes
4	Eucalyptus regnans (Mountain Ash)	60	40 to 50	15	fair			7.20	3.01	8	None	Yes
5	Eucalyptus regnans (Mountain Ash)	100	50 to 60	20	fair			12.00	3.63	6	> 10%	Yes sympathetic measures
6	Eucalyptus regnans (Mountain Ash)	80	50 to 60	15	fair	root flare in path	root sympathetic path construction	9.60	3.31	1	> 10%	Yes sympathetic measures
7	Eucalyptus nitens (Shining gum)	80	50 to 60	15	fair - poor			9.60	3.31	6	> 10%	Yes sympathetic measures
8	Eucalyptus regnans (Mountain Ash)	80	50 to 60	20	fair			9.60	3.31	6	> 10%	Yes sympathetic measures
9	Nothofagus cunninghamii (Myrtle Beech)	30	10 to 15	10	good	root flare in path	root sympathetic path construction	3.60	2.25	1	> 10%	Yes sympathetic measures
10	Nothofagus cunninghamii (Myrtle Beech)	30	10 to 15	7	fair			3.60	2.00	8	None	Yes
11	Nothofagus cunninghamii (Myrtle Beech)	20	10 to 15	5	fair			2.40	2.00	10	None	Yes
12	Nothofagus cunninghamii (Myrtle Beech)	30	15 to 20	7	fair			3.60	2.25	1	> 10%	Yes sympathetic measures
13	Nothofagus cunninghamii (Myrtle Beech)	30	10 to 15	7	fair			3.60	2.00	6	None	Yes
14	Nothofagus cunninghamii (Myrtle Beech)	20	5 to 7	1	Senescent			2.40	1.68	6	None	Yes
15	Nothofagus cunninghamii (Myrtle Beech)	20	15 to 20	10	fair			2.40	2.00	12	None	Yes
16	Nothofagus cunninghamii (Myrtle Beech)	20	7 to 10	7	fair			2.40	2.00	5	None	Yes
17	Nothofagus cunninghamii (Myrtle Beech)	10	7 to 10	5	fair			2.00	1.50	12	None	Yes
18	Nothofagus cunninghamii (Myrtle Beech)	10	10 to 15	3	fair			2.00	1.50	12	None	Yes
19	Nothofagus cunninghamii (Myrtle Beech)	10	10 to 15	5	fair			2.00	1.50	15	None	Yes
20	Nothofagus cunninghamii (Myrtle Beech)	20	10 to 15	7	fair			2.40	1.68	12	None	Yes
21	Nothofagus cunninghamii (Myrtle Beech)	10	10 to 15	5	fair			2.00	1.68	12	None	Yes
22	Nothofagus cunninghamii (Myrtle Beech)	20	10 to 15	5	fair			2.40	1.68	15	None	Yes
23	Nothofagus cunninghamii (Myrtle Beech)	10	10 to 15	5	fair			2.00	1.68	15	None	Yes
24	Nothofagus cunninghamii (Myrtle Beech)	20	10 to 15	5	fair			2.40	1.68	15	None	Yes
25	Nothofagus cunninghamii (Myrtle Beech)	20	10 to 15	10	fair			2.40	1.68	15	None	Yes
26	Nothofagus cunninghamii (Myrtle Beech)	20	15 to 20	10	fair			2.40	2.00	15	None	Yes
27	Nothofagus cunninghamii (Myrtle Beech)	40	10 to 15	12	good			4.80	2.47	3	> 10%	Yes sympathetic measures
28	Nothofagus cunninghamii (Myrtle Beech)	40	10 to 15	10	fair			4.80	2.25	8	None	Yes
29	Nothofagus cunninghamii (Myrtle Beech)	20	15 to 20	7	fair			2.40	2.00	8	None	Yes
30	Nothofagus cunninghamii (Myrtle Beech)	20	10 to 15	7	fair			2.40	1.68	8	None	Yes
31	Nothofagus cunninghamii (Myrtle Beech)	20	10 to 15	5	fair			2.40	1.68	5	None	Yes
32	Nothofagus cunninghamii (Myrtle Beech)	30	10 to 15	10	fair			3.60	2.25	4	None	Yes
33	Nothofagus cunninghamii (Myrtle Beech)	30	15 to 20	10	fair			3.60	2.00	8	None	Yes
34	Nothofagus cunninghamii (Myrtle Beech)	10	10 to 15	5	fair			2.00	1.68	10	None	Yes
35	Nothofagus cunninghamii (Myrtle Beech)	10	10 to 15	5	fair			2.00	1.68	15	None	Yes
36	Nothofagus cunninghamii (Myrtle Beech)	10	10 to 15	7	fair			2.00	1.68	15	None	Yes
37	Nothofagus cunninghamii (Myrtle Beech)	20	7 to 10	3	fair			2.40	2.00	2	< 10%	Yes
38	Nothofagus cunninghamii (Myrtle Beech)	40	10 to 15	7	good			4.80	2.47	5	None	Yes
39	Nothofagus cunninghamii (Myrtle Beech)	20	10 to 15	5	fair			2.40	2.00	1	> 10%	Yes sympathetic measures
40	Nothofagus cunninghamii (Myrtle Beech)	20	10 to 15	5	fair			2.40	2.00	3	< 10%	Yes
41	Nothofagus cunninghamii (Myrtle Beech)	30	10 to 15	5	fair			3.60	2.25	1	> 10%	Yes sympathetic measures
42	Nothofagus cunninghamii (Myrtle Beech)	40	15 to 20	10	good			4.80	2.47	1	> 10%	Yes sympathetic measures
43	Nothofagus cunninghamii (Myrtle Beech)	10	7 to 10	5	good			2.00	1.68	10	None	Yes
44	Nothofagus cunninghamii (Myrtle Beech)	30	10 to 15	7	good			3.60	2.25	1	> 10%	Yes sympathetic measures
45	Nothofagus cunninghamii (Myrtle Beech)	30	10 to 15	7	fair			3.60	2.25	5	None	Yes
46	Nothofagus cunninghamii (Myrtle Beech)	30	7 to 10	5	fair			3.60	2.25	5	None	Yes
47	Acacia dealbata (Silver Wattle)	40	20 to 30	15	fair			4.80	2.47	1	> 10%	Yes sympathetic measures
48	Eucalyptus sp.	< 40	< 5m	1	dead		retain	4.20	N/A	2	> 10%	Yes sympathetic measures

Sample site 04

Tree No.	Species (Common name)	Est. DBH	Est. Height range	Est. Canopy Spread	Condition	Path Conflict	Comments / recommendations	TPZ	SRZ	Est. path dist.	AS4970 encroachment	Can tree be retained
1	Eucalyptus obliqua (Messmate Stringybark)	40	20 to 30	10	fair - poor			4.80	2.47	3	> 10%	Yes sympathetic measures
2	Eucalyptus obliqua (Messmate Stringybark)	< 20	7 to 10	1	Senescent			2.00	1.50	2	< 10%	Yes
3	Eucalyptus obliqua (Messmate Stringybark)	80	20 to 30	20	fair			9.60	3.31	8	< 10%	Yes
4	Eucalyptus obliqua (Messmate Stringybark)	40	15 to 20	7	fair - poor			4.80	2.47	6	None	Yes
5	Eucalyptus sieberi (Silvertop ash)	100	30 to 40	15	fair	root flare in path	root sympathetic path construction	12.00	3.63	1	> 10%	Yes sympathetic measures
6	Eucalyptus sieberi (Silvertop ash)	80	20 to 30	12	fair - poor			9.60	3.31	3	> 10%	Yes sympathetic measures
7	Eucalyptus sieberi (Silvertop ash)	< 20	5 to 7	2	fair			2.00	1.50	1	> 10%	Yes sympathetic measures
8	Eucalyptus obliqua (Messmate Stringybark)	60	30 to 40	10	fair			7.20	3.01	4	> 10%	Yes sympathetic measures
9	Eucalyptus sieberi (Silvertop ash)	30	10 to 15	7	fair - poor			3.60	2.25	2	> 10%	Yes sympathetic measures
10	Eucalyptus obliqua (Messmate Stringybark)	50	15 to 20	10	fair	root flare in path	root sympathetic path construction	6.00	2.67	1	> 10%	Yes sympathetic measures
11	Eucalyptus sieberi (Silvertop ash)	50	15 to 20	7	fair			6.00	2.67	2	> 10%	Yes sympathetic measures
12	Eucalyptus sieberi (Silvertop ash)	20	< 5	1	Senescent	narrow path	consider removal	2.40	2.00	1	> 10%	Yes sympathetic measures
13	Eucalyptus sieberi (Silvertop ash)	80	20 to 30	15	fair			9.60	3.01	2	> 10%	Yes sympathetic measures
14	Eucalyptus sieberi (Silvertop ash)	50	20 to 30	12	fair			6.00	2.67	4	> 10%	Yes sympathetic measures
15	Eucalyptus sieberi (Silvertop ash)	50	20 to 30	15	fair			6.00	2.67	6	None	Yes
16	Eucalyptus sieberi (Silvertop ash)	40	20 to 30	7	fair			4.80	2.47	3	> 10%	Yes sympathetic measures
17	Eucalyptus sieberi (Silvertop ash)	60	20 to 30	12	fair			7.20	2.85	2	> 10%	Yes sympathetic measures
18	Eucalyptus obliqua (Messmate Stringybark)	50	15 to 20	12	fair			6.00	2.67	2	> 10%	Yes sympathetic measures

Sample site 05

Tree No.	Species (Common name)	Est. DBH	Est. Height range	Est. Canopy Spread	Condition	Path Conflict	Comments / recommendations	TPZ	SRZ	Est. path dist.	AS4970 encroachment	Can tree be retained
1	Eucalyptus regnans (Mountain Ash)	20	15 to 20	5	fair	tree on path	modify path	2.40	2.00	on path	> 10%	Yes sympathetic measures
2	Eucalyptus regnans (Mountain Ash)	100	40 to 50	20	good	root flare in path	root sympathetic path construction	12.00	3.63	1	> 10%	Yes sympathetic measures
3	Eucalyptus regnans (Mountain Ash)	40	20 to 30	12	fair			4.80	2.47	6	None	Yes
4	Eucalyptus regnans (Mountain Ash)	30	10 to 15	5	fair - poor			3.60	2.25	4	None	Yes
5	Eucalyptus regnans (Mountain Ash)	60	30 to 40	10	fair - poor			7.20	3.01	2	> 10%	Yes sympathetic measures
6	Eucalyptus regnans (Mountain Ash)	30	20 to 30	10	fair - poor			3.60	2.25	3	< 10%	Yes
7	Eucalyptus regnans (Mountain Ash)	70	40 to 50	15	fair	root flare in path	root sympathetic path construction	8.40	3.01	2	> 10%	Yes sympathetic measures
8	Eucalyptus regnans (Mountain Ash)	70	30 to 40	12	fair			8.40	3.01	5	> 10%	Yes sympathetic measures
9	Eucalyptus regnans (Mountain Ash)	80	40 to 50	20	fair	root flare in path	root sympathetic path construction	9.60	3.31	3	> 10%	Yes sympathetic measures
10	Eucalyptus regnans (Mountain Ash)	50	20 to 30	10	fair			6.00	2.67	8	None	Yes
11	Eucalyptus regnans (Mountain Ash)	50	40 to 50	15	fair			6.00	2.67	5	< 10%	Yes
12	Eucalyptus regnans (Mountain Ash)	50	30 to 40	12	fair - poor			6.00	2.67	1	> 10%	Yes sympathetic measures
13	Pomaderris aspera (Hazel Pomaderris)	< 20	7 to 10	5	fair			2.00	1.50	2	None	Yes
14	Pomaderris aspera (Hazel Pomaderris)	< 20	7 to 10	3	fair			2.00	1.50	1	> 10%	Yes sympathetic measures
15	Pomaderris aspera (Hazel Pomaderris)	< 20	10 to 15	7	fair			2.00	1.68	2	None	Yes
16	Pomaderris aspera (Hazel Pomaderris)	20	10 to 15	7	fair	root flare in path	root sympathetic path construction	2.40	1.68	1	> 10%	Yes sympathetic measures
17	Acacia dealbata (Silver Wattle)	20	15 to 20	7	fair			2.40	1.68	5	None	Yes

# Sample site 06

Tree No.	Species (Common name)	Est. DBH	Est. Height range	Est. Canopy Spread	Condition	Path Conflict	Comments / recommendations	TPZ	SRZ	Est. path dist.	AS4970 encroachment	Can tree be retained
1	Eucalyptus radiata (Narrow-leaved Peppermint)	30	5 to 7	5	poor	root flare in path, branches in path	consider removal, prune branches, root sympathetic path construction	3.60	2.25	1	> 10%	Yes sympathetic measures
2	Eucalyptus cephalocarpa (Mealy Stringybark)	70	20 to 30	10	fair			8.40	3.01	4	> 10%	Yes sympathetic measures
3	Eucalyptus cephalocarpa (Mealy Stringybark)	80	30 to 40	20	fair			9.60	3.31	8	< 10%	Yes
4	Eucalyptus cephalocarpa (Mealy Stringybark)	< 20	5 to 7	1	fair - poor			2.00	1.50	3	None	Yes
5	Eucalyptus obliqua (Messmate Stringybark)	40	15 to 20	10	fair			4.80	2.47	5	None	Yes
6	Eucalyptus cephalocarpa (Mealy Stringybark)	60	20 to 30	10	fair - poor			7.20	3.01	2	> 10%	Yes sympathetic measures
7	Eucalyptus sieberi (Silvertop ash)	30	10 to 15	7	fair - poor			3.60	2.00	4	None	Yes
8	Eucalyptus cypellocarpa (Mountain Grey Gum)	60	15 to 20	7	fair	tree on path	modify path	7.20	2.85	on path	> 10%	Yes sympathetic measures
9	Eucalyptus obliqua (Messmate Stringybark)	40	15 to 20	7	fair			4.80	2.25	4	< 10%	Yes
10	Eucalyptus ovata (Swamp Gum)	20	7 to 10	7	HAZARDOUS	tree on path	Remove. tree partially failed. hazard to walking path	2.40	2.00	on path	> 10%	No
11	Eucalyptus ovata (Swamp Gum)	< 20	7 to 10	5	fair - poor	tree on path	modify path	2.00	1.50	on path	> 10%	Yes sympathetic measures



## Sample site 07

Tree No.	Species (Common name)	Est. DBH	Est. Height range	Est. Canopy Spread	Condition	Path Conflict	Comments / recommendations	TPZ	SRZ	Est. path dist.	AS4970 encroachment	Can tree be retained
1	Eucalyptus sieberi (Silvertop ash)	40	15 to 20	7	fair - poor			4.80	2.47	3	> 10%	Yes sympathetic measures
2	Eucalyptus radiata (Narrow-leaved Peppermint)	60	10 to 15	7	fair - poor			7.20	2.85	4	> 10%	Yes sympathetic measures
3	Eucalyptus sp. (Gum Tree)	20	10 to 15	3	Senescent			2.40	2.00	2	< 10%	Yes
4	Eucalyptus cypellocarpa (Mountain Grey Gum)	60	30 to 40	12	fair			7.20	2.67	1	> 10%	Yes sympathetic measures
5	Eucalyptus cypellocarpa (Mountain Grey Gum)	80	30 to 40	15	fair			9.60	3.01	6	> 10%	Yes sympathetic measures
6	Eucalyptus cypellocarpa (Mountain Grey Gum)	150	30 to 40	20	fair			15.00	3.92	5	> 10%	Yes sympathetic measures
7	Eucalyptus sp.	80 to 100	10 to 15	1	dead	tree on path	modify path	10.80	N/A	1	> 10%	Yes sympathetic measures
8	Eucalyptus sp.	40 to 50	10 to 15	1	dead		retain	5.40	N/A	1	> 10%	Yes sympathetic measures
9	Eucalyptus sp.	100 to 150	5 to 10	1	dead	HAZARDOUS, branches in path	remove failed tree parts or remove	15.00	N/A	15	None	Yes

# Sample site 08

Tree No.	Species (Common name)	Est. DBH	Est. Height range	Est. Canopy Spread	Condition	Path Conflict	Comments / recommendations	TPZ	SRZ	Est. path dist.	AS4970 encroachment	Can tree be retained
1	Eucalyptus obliqua (Messmate Stringybark)	70	30 to 40	15	fair			8.40	3.01	6	< 10%	Yes
2	Eucalyptus viminalis (Manna Gum)	80	30 to 40	15	fair			9.60	3.31	6	> 10%	Yes sympathetic measures
3	Eucalyptus viminalis (Manna Gum)	30	15 to 20	5	fair			3.60	2.00	2	> 10%	Yes sympathetic measures
4	Eucalyptus viminalis (Manna Gum)	100	40 to 50	20	fair			12.00	3.31	10	< 10%	Yes
5	Eucalyptus cypellocarpa (Mountain Grey Gum)	125	40 to 50	20	fair			15.00	3.92	8	> 10%	Yes sympathetic measures
6	Eucalyptus cypellocarpa (Mountain Grey Gum)	150	40 to 50	20	good			15.00	4.43	12	< 10%	Yes
7	Eucalyptus obliqua (Messmate Stringybark)	80	20 to 30	15	fair			9.60	3.31	6	> 10%	Yes sympathetic measures
8	Eucalyptus nitens (Shining gum)	60	20 to 30	15	fair			7.20	2.67	6	< 10%	Yes
9	Eucalyptus viminalis (Manna Gum)	50	20 to 30	20	fair	tree on path	modify path	6.00	2.67	on path	> 10%	Yes sympathetic measures
10	Pomaderris aspera (Hazel Pomaderris)	< 20	7 to 10	5	good			2.00	1.50	2	None	Yes

Sample site 09

Tree No.	Species (Common name)	Est. DBH	Est. Height range	Est. Canopy Spread	Condition	Path Conflict	Comments / recommendations	TPZ	SRZ	Est. path dist.	AS4970 encroachment	Can tree be retained
1	Eucalyptus obliqua (Messmate Stringybark)	60	20 to 30	10	fair			7.20	2.85	6	< 10%	Yes
2	Eucalyptus obliqua (Messmate Stringybark)	50	20 to 30	10	fair			6.00	2.67	4	> 10%	Yes sympathetic measures
3	Eucalyptus obliqua (Messmate Stringybark)	30	20 to 30	5	fair			3.60	2.00	3	< 10%	Yes
4	Eucalyptus obliqua (Messmate Stringybark)	40	20 to 30	10	fair			4.80	2.47	4	< 10%	Yes
5	Eucalyptus obliqua (Messmate Stringybark)	50	20 to 30	12	fair			6.00	2.67	4	> 10%	Yes sympathetic measures
6	Eucalyptus obliqua (Messmate Stringybark)	200	20 to 30	15	poor		fire damage	15.00	4.43	10	> 10%	Yes sympathetic measures
7	Eucalyptus obliqua (Messmate Stringybark)	50	20 to 30	12	fair			6.00	2.67	2	> 10%	Yes sympathetic measures
8	Eucalyptus obliqua (Messmate Stringybark)	150	30 to 40	20	fair			15.00	4.43	6	> 10%	Yes sympathetic measures
9	Eucalyptus obliqua (Messmate Stringybark)	150	30 to 40	20	fair			15.00	4.43	10	> 10%	Yes sympathetic measures
10	Eucalyptus obliqua (Messmate Stringybark)	60	30 to 40	15	fair			7.20	2.85	5	> 10%	Yes sympathetic measures
11	Eucalyptus obliqua (Messmate Stringybark)	70	30 to 40	20	fair			8.40	3.31	10	None	Yes
12	Eucalyptus obliqua (Messmate Stringybark)	100	30 to 40	15	fair			12.00	3.63	6	> 10%	Yes sympathetic measures
13	Eucalyptus obliqua (Messmate Stringybark)	70	30 to 40	15	fair	root in path, root flare in path	root sympathetic path construction	8.40	3.01	on path	> 10%	Yes sympathetic measures
14	Eucalyptus obliqua (Messmate Stringybark)	80	30 to 40	20	fair			9.60	3.31	2	> 10%	Yes sympathetic measures
15	Eucalyptus obliqua (Messmate Stringybark)	200	30 to 40	25	fair			15.00	4.86	10	> 10%	Yes sympathetic measures
16	Eucalyptus obliqua (Messmate Stringybark)	80	30 to 40	20	fair			9.60	3.31	3	> 10%	Yes sympathetic measures
17	Eucalyptus obliqua (Messmate Stringybark)	60	30 to 40	15	fair			7.20	2.85	8	None	Yes
18	Pomaderris aspera (Hazel Pomaderris)	< 20	7 to 10	3	fair			2.00	1.50	1	> 10%	Yes sympathetic measures
19	Pomaderris aspera (Hazel Pomaderris)	< 20	5 to 7	3	fair			2.00	1.50	1	> 10%	Yes sympathetic measures
20	Pomaderris aspera (Hazel Pomaderris)	< 20	5 to 7	3	fair			2.00	1.50	1	> 10%	Yes sympathetic measures
21	Pomaderris aspera (Hazel Pomaderris)	< 20	5 to 7	3	fair			2.00	1.50	1	> 10%	Yes sympathetic measures
22	Pomaderris aspera (Hazel Pomaderris)	< 20	5 to 7	3	fair			2.00	1.50	1	> 10%	Yes sympathetic measures
23	Pomaderris aspera (Hazel Pomaderris)	< 20	5 to 7	3	fair			2.00	1.50	1	> 10%	Yes sympathetic measures
24	Pomaderris aspera (Hazel Pomaderris)	< 20	5 to 7	3	Senescent			2.00	1.50	1	> 10%	Yes sympathetic measures
25	Pomaderris aspera (Hazel Pomaderris)	< 20	5 to 7	2	fair			2.00	1.50	1	> 10%	Yes sympathetic measures
26	Pomaderris aspera (Hazel Pomaderris)	< 20	5 to 7	2	fair	tree on path	modify path	2.00	1.50	on path	> 10%	Yes sympathetic measures
27	Pomaderris aspera (Hazel Pomaderris)	< 20	5 to 7	3	fair	tree on path	modify path	2.00	1.50	on path	> 10%	Yes sympathetic measures
28	Pomaderris aspera (Hazel Pomaderris)	< 20	5 to 7	2	fair	narrow path		2.00	1.50	1	> 10%	Yes sympathetic measures
29	Pomaderris aspera (Hazel Pomaderris)	< 20	7 to 10	2	fair	tree on path	modify path	2.00	1.50	on path	> 10%	Yes sympathetic measures
30	Pomaderris aspera (Hazel Pomaderris)	< 20	7 to 10	2	fair	tree on path	Potentially remove	2.00	1.50	on path	Tree may be impacted by path construction	
31	Pomaderris aspera (Hazel Pomaderris)	< 20	7 to 10	5	fair	tree on path	Potentially remove	2.00	1.50	on path	Tree may be impacted by path construction	
32	Pomaderris aspera (Hazel Pomaderris)	< 20	7 to 10	2	fair	tree on path	Potentially remove	2.00	1.50	on path	Tree may be impacted by path construction	
33	Pomaderris aspera (Hazel Pomaderris)	< 20	7 to 10	3	fair			2.00	1.50	1	> 10%	Yes sympathetic measures
34	Acacia dealbata (Silver Wattle)	20	7 to 10	5	fair			2.40	1.68	1	> 10%	Yes sympathetic measures
35	Acacia dealbata (Silver Wattle)	20	10 to 15	5	fair	narrow path; root flare in path		2.40	1.68	1	> 10%	Yes sympathetic measures
36	Acacia dealbata (Silver Wattle)	20	10 to 15	5	fair	root in path		2.40	2.00	1	> 10%	Yes sympathetic measures
37	Acacia dealbata (Silver Wattle)	30	10 to 15	5	fair			2.40	1.68	1	> 10%	Yes sympathetic measures
38	Acacia dealbata (Silver Wattle)	20	10 to 15	7	fair			2.40	2.00	1	> 10%	Yes sympathetic measures
39	Acacia dealbata (Silver Wattle)	20	10 to 15	7	fair			2.40	1.68	1	> 10%	Yes sympathetic measures
40	Acacia dealbata (Silver Wattle)	< 20	10 to 15	10	fair - poor	tree on path (remove)		2.00	1.68	on path	Tree may be impacted by path construction	
41	Acacia sp.	< 40	10 to 15	3	dead		retain	4.20	N/A	1	> 10%	Yes sympathetic measures
42	Acacia sp.	< 40	10 to 15	2	dead		retain	4.20	N/A	1	> 10%	Yes sympathetic measures

Sample site 10

Tree No.	Species (Common name)	Est. DBH	Est. Height range	Est. Canopy Spread	Condition	Path Conflict	Comments / recommendations	TPZ	SRZ	Est. path dist.	AS4970 encroachment	Can tree be retained
1	Eucalyptus cephalocarpa (Mealy Stringybark)	70	30 to 40	15	fair	root flare in path	root sympathetic path construction	8.40	3.01	2	> 10%	Yes sympathetic measures
2	Eucalyptus sieberi (Silvertop ash)	80	30 to 40	15	fair			9.60	3.31	8	< 10%	Yes
3	Eucalyptus sieberi (Silvertop ash)	60	30 to 40	12	fair - poor			7.20	2.85	5	> 10%	Yes sympathetic measures
4	Eucalyptus sieberi (Silvertop ash)	70	30 to 40	12	fair - poor			8.40	3.01	10	None	Yes
5	Eucalyptus cephalocarpa (Mealy Stringybark)	70	30 to 40	12	fair - poor			8.40	3.01	3	> 10%	Yes sympathetic measures
6	Eucalyptus sieberi (Silvertop ash)	80	30 to 40	12	fair - poor			9.60	3.31	12	None	Yes
7	Eucalyptus cypellocarpa (Mountain Grey Gum)	50	30 to 40	15	fair - poor			6.00	2.67	1	> 10%	Yes sympathetic measures
8	Eucalyptus cypellocarpa (Mountain Grey Gum)	60	30 to 40	15	fair	root flare in path	root sympathetic path construction	7.20	2.85	1	> 10%	Yes sympathetic measures
9	Pomaderris aspera (Hazel Pomaderris)	< 20	5 to 7	3	fair			2.00	1.50	1	> 10%	Yes sympathetic measures
10	Pomaderris aspera (Hazel Pomaderris)	< 20	7 to 10	5	fair			2.00	1.50	2	< 10%	Yes
11	Acacia dealbata (Silver Wattle)	20	10 to 15	7	fair	tree on path (modify path)		3.60	2.00	1	> 10%	Yes sympathetic measures
12	Acacia dealbata (Silver Wattle)	< 20	10 to 15	7	Senescent	narrow path		2.00	1.50	on path	Tree may be impacted by path construction	
13	Acacia dealbata (Silver Wattle)	30	15 to 20	7	fair - poor			3.60	2.25	4	None	Yes
14	Acacia dealbata (Silver Wattle)	30	15 to 20	7	fair - poor			3.60	2.25	1	> 10%	Yes sympathetic measures
15	Acacia dealbata (Silver Wattle)	20	15 to 20	10	fair			2.40	2.00	2	< 10%	Yes
16	Acacia dealbata (Silver Wattle)	20	15 to 20	10	fair - poor	tree on path (modify path)		2.40	2.00	on path	Tree may be impacted by path construction	
17	Acacia dealbata (Silver Wattle)	30	15 to 20	10	fair - poor			3.60	2.25	2	> 10%	Yes sympathetic measures
18	Eucalyptus sp.	< 40	5 to 10	1	dead		retain	4.20	N/A	2	> 10%	Yes sympathetic measures
19	Eucalyptus sp.	< 40	5 to 10	2	dead		retain	4.20	N/A	2	> 10%	Yes sympathetic measures
20	Acacia sp.	< 40	5 to 10	3	dead		retain	4.20	N/A	2	> 10%	Yes sympathetic measures

Sample site 11

Tree No.	Species (Common name)	Est. DBH	Est. Height range	Est. Canopy Spread	Condition	Path Conflict	Comments / recommendations	TPZ	SRZ	Est. path dist.	AS4970 encroachment	Can tree be retained
1	Eucalyptus sieberi (Silvertop ash)	20	15 to 20	7	fair			2.40	2.00	2	< 10%	Yes
2	Eucalyptus sieberi (Silvertop ash)	40	15 to 20	10	fair			4.80	2.47	5	None	Yes
3	Eucalyptus goniocalyx (Long-leaved Box)	40	10 to 15	10	HAZARDOUS	other	Remove, leaning over path. Fire damage in basal cavity.	4.80	2.47	4	Arborist to make a determination on level of hazard pruning	
4	Eucalyptus sieberi (Silvertop ash)	< 20	7 to 10	5	fair - poor			2.00	1.50	2	< 10%	Yes
5	Eucalyptus sieberi (Silvertop ash)	40	20 to 30	12	fair	narrow path		4.80	2.47	1	> 10%	Yes sympathetic measures
6	Eucalyptus sieberi (Silvertop ash)	30	15 to 20	7	fair	narrow path		3.60	2.00	1	> 10%	Yes sympathetic measures
7	Eucalyptus sieberi (Silvertop ash)	20	15 to 20	5	fair	narrow path		2.40	2.00	1	> 10%	Yes sympathetic measures
8	Eucalyptus cypellocarpa (Mountain Grey Gum)	40	15 to 20	7	fair - poor			4.80	2.47	6	None	Yes
9	Eucalyptus sieberi (Silvertop ash)	30	20 to 30	7	fair			3.60	2.25	3	< 10%	Yes
10	Eucalyptus sieberi (Silvertop ash)	20	15 to 20	5	fair			2.40	2.00	1	> 10%	Yes sympathetic measures
11	Eucalyptus sieberi (Silvertop ash)	20	10 to 15	2	fair			2.40	2.00	1	> 10%	Yes sympathetic measures
12	Eucalyptus sieberi (Silvertop ash)	< 20	7 to 10	2	fair	tree on path	modify path	2.00	1.50	on path	> 10%	Yes sympathetic measures
13	Eucalyptus sieberi (Silvertop ash)	< 20	10 to 15	2	fair			2.00	1.50	on path	> 10%	Yes sympathetic measures
14	Eucalyptus goniocalyx (Long-leaved Box)	< 20	7 to 10	3	fair			2.00	1.50	2	< 10%	Yes
15	Eucalyptus sieberi (Silvertop ash)	20	10 to 15	5	fair			2.40	2.00	2	< 10%	Yes
16	Eucalyptus cypellocarpa (Mountain Grey Gum)	20	7 to 10	5	poor	tree on path	burnt out stump, epicormics from base new stems, modify path	2.40	2.00	on path	> 10%	Yes sympathetic measures
17	Eucalyptus sieberi (Silvertop ash)	20	10 to 15	7	fair	tree on path	modify path	2.40	2.00	on path	> 10%	Yes sympathetic measures
18	Eucalyptus goniocalyx (Long-leaved Box)	< 20	7 to 10	2	poor			2.00	1.50	1	> 10%	Yes sympathetic measures
19	Eucalyptus sp.	< 40	5 to 10	1	dead	tree on path	modify path or remove	4.20	N/A	on path	> 10%	Yes sympathetic measures

Sample site 12

Tree No.	Species (Common name)	Est. DBH	Est. Height range	Est. Canopy Spread	Condition	Path Conflict	Comments / recommendations	TPZ	SRZ	Est. path dist.	AS4970 encroachment	Can tree be retained
1	Eucalyptus sieberi (Silvertop ash)	30	15 to 20	5	fair			3.60	2.25	2	> 10%	Yes sympathetic measures
2	Eucalyptus sieberi (Silvertop ash)	40	15 to 20	7	fair			4.80	2.47	2	> 10%	Yes sympathetic measures
3	Eucalyptus sieberi (Silvertop ash)	20	10 to 15	2	Senescent			2.40	2.00	1	> 10%	Yes sympathetic measures
4	Eucalyptus sieberi (Silvertop ash)	40	15 to 20	7	fair			4.80	2.47	5	None	Yes
5	Eucalyptus sieberi (Silvertop ash)	40	20 to 30	7	fair			4.80	2.47	1	> 10%	Yes sympathetic measures
6	Eucalyptus sieberi (Silvertop ash)	40	20 to 30	10	fair			4.80	2.47	6	None	Yes
7	Eucalyptus sieberi (Silvertop ash)	40	15 to 20	7	fair - poor			4.80	2.47	5	None	Yes
8	Eucalyptus sieberi (Silvertop ash)	60	20 to 30	10	fair - poor	root flare in path	root sympathetic path construction	7.20	2.85	2	> 10%	Yes sympathetic measures
9	Eucalyptus sieberi (Silvertop ash)	70	20 to 30	10	fair	root flare in path	root sympathetic path construction	8.40	3.01	1	> 10%	Yes sympathetic measures
10	Eucalyptus sieberi (Silvertop ash)	40	30 to 40	7	fair			4.80	2.47	1	> 10%	Yes sympathetic measures
11	Eucalyptus sieberi (Silvertop ash)	30	15 to 20	5	poor			3.60	2.25	1	> 10%	Yes sympathetic measures
12	Eucalyptus obliqua (Messmate Stringybark)	30	15 to 20	5	fair - poor			3.60	2.25	5	None	Yes
13	Eucalyptus sieberi (Silvertop ash)	30	20 to 30	7	fair			3.60	2.25	5	None	Yes
14	Eucalyptus sieberi (Silvertop ash)	40	30 to 40	12	fair			4.80	2.47	1	> 10%	Yes sympathetic measures
15	Eucalyptus sieberi (Silvertop ash)	40	20 to 30	10	fair			4.80	2.47	1	> 10%	Yes sympathetic measures
16	Eucalyptus obliqua (Messmate Stringybark)	40	20 to 30	12	fair - poor			4.80	2.47	8	None	Yes
17	Eucalyptus sieberi (Silvertop ash)	20	20 to 30	7	fair - poor			2.40	2.00	3	None	Yes
18	Eucalyptus sieberi (Silvertop ash)	40	30 to 40	12	fair			4.80	2.47	6	None	Yes
19	Eucalyptus obliqua (Messmate Stringybark)	20	20 to 30	5	fair - poor			2.40	2.00	2	< 10%	Yes
20	Eucalyptus sieberi (Silvertop ash)	40	20 to 30	10	fair - poor	tree on path	modify path	4.80	2.47	1	> 10%	Yes sympathetic measures
21	Eucalyptus sieberi (Silvertop ash)	40	30 to 40	12	fair			4.80	2.47	8	None	Yes
22	Eucalyptus sieberi (Silvertop ash)	60	30 to 40	15	fair - poor			7.20	2.85	1	> 10%	Yes sympathetic measures
23	Eucalyptus sieberi (Silvertop ash)	30	30 to 40	10	fair			3.60	2.25	4	None	Yes
24	Eucalyptus sieberi (Silvertop ash)	40	30 to 40	12	fair			4.80	2.47	3	> 10%	Yes sympathetic measures

Sample site 13

Tree No.	Species (Common name)	Est. DBH	Est. Height range	Est. Canopy Spread	Condition	Path Conflict	Comments / recommendations	TPZ	SRZ	Est. path dist.	AS4970 encroachment	Can tree be retained
1	Eucalyptus delegatensis (Alpine Ash)	60	15 to 20	7	fair - poor	narrow path		7.20	2.85	1	> 10%	Yes sympathetic measures
2	Eucalyptus delegatensis (Alpine Ash)	80	30 to 40	12	fair - poor	narrow path, root flare in path	root sympathetic path construction	9.60	3.31	1	> 10%	Yes sympathetic measures
3	Eucalyptus delegatensis (Alpine Ash)	40	15 to 20	5	poor			4.80	2.47	4	< 10%	Yes
4	Eucalyptus delegatensis (Alpine Ash)	30	15 to 20	5	poor			3.60	2.25	2	> 10%	Yes sympathetic measures
5	Eucalyptus delegatensis (Alpine Ash)	100	30 to 40	10	fair - poor			12.00	3.63	4	> 10%	Yes sympathetic measures
6	Eucalyptus delegatensis (Alpine Ash)	30	15 to 20	5	fair - poor	tree on path	modify path	3.60	2.25	1	> 10%	Yes sympathetic measures
7	Eucalyptus delegatensis (Alpine Ash)	50	15 to 20	7	fair - poor			6.00	2.67	3	> 10%	Yes sympathetic measures
8	Eucalyptus delegatensis (Alpine Ash)	80	30 to 40	15	fair - poor			9.60	3.31	6	> 10%	Yes sympathetic measures
9	Eucalyptus delegatensis (Alpine Ash)	60	30 to 40	10	fair - poor			7.20	2.85	3	> 10%	Yes sympathetic measures
10	Eucalyptus delegatensis (Alpine Ash)	80	30 to 40	10	fair			9.60	3.31	4	> 10%	Yes sympathetic measures
11	Eucalyptus delegatensis (Alpine Ash)	50	15 to 20	10	fair - poor			6.00	2.67	6	None	Yes
12	Eucalyptus delegatensis (Alpine Ash)	70	20 to 30	15	fair	tree on path	modify path	8.40	3.01	on path	> 10%	Yes sympathetic measures
13	Eucalyptus delegatensis (Alpine Ash)	40	20 to 30	12	fair - poor			4.80	2.47	5	None	Yes
14	Eucalyptus delegatensis (Alpine Ash)	40	30 to 40	10	fair - poor			4.80	2.67	3	> 10%	Yes sympathetic measures
15	Eucalyptus delegatensis (Alpine Ash)	70	30 to 40	12	fair			8.40	3.01	4	> 10%	Yes sympathetic measures
16	Eucalyptus delegatensis (Alpine Ash)	30	30 to 40	7	fair - poor			3.60	2.25	3	< 10%	Yes
17	Nothofagus cunninghamii (Myrtle Beech)	30	10 to 15	7	good			3.60	2.25	10	None	Yes
18	Nothofagus cunninghamii (Myrtle Beech)	30	10 to 15	7	good			3.60	2.25	8	None	Yes
19	Nothofagus cunninghamii (Myrtle Beech)	30	10 to 15	7	fair			3.60	2.25	12	None	Yes
20	Nothofagus cunninghamii (Myrtle Beech)	30	7 to 10	7	good			3.60	2.25	2	> 10%	Yes sympathetic measures
21	Acacia melanoxylon (Blackwood)	< 20	5 to 7	3	fair			2.00	1.50	1	> 10%	Yes sympathetic measures



Sample site 14

Tree No.	Species (Common name)	Est. DBH	Est. Height range	Est. Canopy Spread	Condition	Path Conflict	Comments / recommendations	TPZ	SRZ	Est. path dist.	AS4970 encroachment	Can tree be retained
1	Eucalyptus sieberi (Silvertop ash)	100	15 to 20	12	fair - poor			12.00	3.63	6	> 10%	Yes sympathetic measures
2	Eucalyptus sieberi (Silvertop ash)	60	15 to 20	10	fair	root in path, root flare in path	root sympathetic path construction	7.20	2.85	1	> 10%	Yes sympathetic measures
3	Eucalyptus sieberi (Silvertop ash)	50	15 to 20	7	fair			6.00	2.67	8	None	Yes
4	Eucalyptus sieberi (Silvertop ash)	60	20 to 30	10	fair	root in path, root flare in path	root sympathetic path construction	7.20	2.85	1	> 10%	Yes sympathetic measures
5	Eucalyptus sieberi (Silvertop ash)	50	15 to 20	10	fair			6.00	2.67	4	> 10%	Yes sympathetic measures
6	Eucalyptus sieberi (Silvertop ash)	30	10 to 15	5	fair - poor			3.60	2.25	2	> 10%	Yes sympathetic measures
7	Eucalyptus sieberi (Silvertop ash)	40	10 to 15	7	fair			4.80	2.25	3	> 10%	Yes sympathetic measures
8	Eucalyptus sieberi (Silvertop ash)	40	15 to 20	10	fair - poor			4.80	2.47	1	> 10%	Yes sympathetic measures
9	Eucalyptus sieberi (Silvertop ash)	30	20 to 30	7	fair - poor			3.60	2.25	3	< 10%	Yes
10	Eucalyptus sieberi (Silvertop ash)	30	20 to 30	7	fair - poor			3.60	2.25	3	< 10%	Yes
11	Eucalyptus sieberi (Silvertop ash)	30	20 to 30	5	fair - poor			3.60	2.25	3	< 10%	Yes
12	Eucalyptus sieberi (Silvertop ash)	30	15 to 20	7	fair			3.60	2.25	1	> 10%	Yes sympathetic measures
13	Eucalyptus sieberi (Silvertop ash)	30	15 to 20	5	fair - poor			3.60	2.25	3	< 10%	Yes
14	Eucalyptus sieberi (Silvertop ash)	40	20 to 30	10	fair			4.80	2.47	3	> 10%	Yes sympathetic measures
15	Eucalyptus sieberi (Silvertop ash)	30	20 to 30	5	fair - poor			3.60	2.25	1	> 10%	Yes sympathetic measures
16	Eucalyptus sieberi (Silvertop ash)	40	20 to 30	10	fair - poor			4.80	2.47	2	> 10%	Yes sympathetic measures
17	Eucalyptus sieberi (Silvertop ash)	30	15 to 20	5	poor			3.60	2.25	2	> 10%	Yes sympathetic measures
18	Eucalyptus sieberi (Silvertop ash)	50	20 to 30	12	fair	root in path	root sympathetic path construction	6.00	2.85	1	> 10%	Yes sympathetic measures

Sample site 15

Tree No.	Species (Common name)	Est. DBH	Est. Height range	Est. Canopy Spread	Condition	Path Conflict	Comments / recommendations	TPZ	SRZ	Est. path dist.	AS4970 encroachment	Can tree be retained
1	Eucalyptus obliqua (Messmate Stringybark)	80	20 to 30	12	fair			9.60	3.31	8	< 10%	Yes
2	Eucalyptus cephalocarpa (Mealy Stringybark)	80	20 to 30	10	fair - poor			9.60	3.31	5	> 10%	Yes sympathetic measures
3	Eucalyptus sieberi (Silvertop ash)	40	15 to 20	7	fair - poor			4.80	2.47	3	> 10%	Yes sympathetic measures
4	Eucalyptus sieberi (Silvertop ash)	30	10 to 15	5	Senescent			3.60	2.00	1	> 10%	Yes sympathetic measures
5	Eucalyptus cephalocarpa (Mealy Stringybark)	30	7 to 10	1	HAZARDOUS	tree on path	Remove	3.60	2.00	1	Arborist to make a determination on level of hazard pruning	
6	Eucalyptus obliqua (Messmate Stringybark)	40	15 to 20	10	fair - poor			4.80	2.25	1	> 10%	Yes sympathetic measures
7	Eucalyptus obliqua (Messmate Stringybark)	70	20 to 30	10	fair			8.40	3.01	6	< 10%	Yes
8	Eucalyptus obliqua (Messmate Stringybark)	40	10 to 15	5	Senescent			4.80	2.25	1	> 10%	Yes sympathetic measures
9	Eucalyptus baxteri (Brown Stringybark)	60	20 to 30	10	fair			7.20	2.85	2	> 10%	Yes sympathetic measures
10	Eucalyptus obliqua (Messmate Stringybark)	40	15 to 20	10	poor			4.80	2.47	1	> 10%	Yes sympathetic measures
11	Eucalyptus obliqua (Messmate Stringybark)	80	20 to 30	15	fair - poor	root flare in path	root sympathetic path construction	9.60	3.31	1	> 10%	Yes sympathetic measures
12	Eucalyptus obliqua (Messmate Stringybark)	50	15 to 20	10	poor			6.00	2.67	3	> 10%	Yes sympathetic measures
13	Eucalyptus obliqua (Messmate Stringybark)	60	15 to 20	12	poor	root flare in path	root sympathetic path construction	7.20	2.85	1	> 10%	Yes sympathetic measures
14	Eucalyptus obliqua (Messmate Stringybark)	80	20 to 30	15	fair			9.60	3.31	1	> 10%	Yes sympathetic measures
15	Eucalyptus obliqua (Messmate Stringybark)	30	15 to 20	7	poor			3.60	2.25	3	< 10%	Yes
16	Eucalyptus obliqua (Messmate Stringybark)	60	20 to 30	12	fair - poor			7.20	2.85	1	> 10%	Yes sympathetic measures
17	Eucalyptus obliqua (Messmate Stringybark)	80	20 to 30	20	fair			9.60	3.31	6	> 10%	Yes sympathetic measures
18	Kunzea ericoides (Burgan)	< 20	5 to 7	5	fair			2.00	1.68	3	< 10%	Yes
19	Kunzea ericoides (Burgan)	< 20	< 5	2	fair			2.00	1.50	1	< 10%	Yes
20	Acacia dealbata (Silver Wattle)	< 20	7 to 10	5	fair			2.00	1.68	1	> 10%	Yes sympathetic measures
21	Eucalyptus sp.	< 40	10 to 15	2	dead		retain	4.20	N/A	3	< 10%	Yes

Sample site 16

Tree No.	Species (Common name)	Est. DBH	Est. Height range	Est. Canopy Spread	Condition	Path Conflict	Comments / recommendations	TPZ	SRZ	Est. path dist.	AS4970 encroachment	Can tree be retained
1	Eucalyptus sieberi (Silvertop ash)	30	15 to 20	7	fair - poor			3.60	2.25	3	< 10%	Yes
2	Eucalyptus sieberi (Silvertop ash)	< 20	10 to 15	3	fair			2.00	1.50	1	> 10%	Yes sympathetic measures
3	Eucalyptus sieberi (Silvertop ash)	< 20	7 to 10	1	Senescent			2.00	1.50	1	> 10%	Yes sympathetic measures
4	Eucalyptus sieberi (Silvertop ash)	80	20 to 30	12	fair - poor			9.60	3.31	2	> 10%	Yes sympathetic measures
5	Eucalyptus sieberi (Silvertop ash)	< 20	5 to 7	1	poor			2.00	1.50	1	> 10%	Yes sympathetic measures
6	Eucalyptus sieberi (Silvertop ash)	< 20	5 to 7	1	fair - poor	narrow path		2.00	1.50	1	> 10%	Yes sympathetic measures
7	Eucalyptus sieberi (Silvertop ash)	< 20	5 to 7	1	fair - poor	narrow path		2.00	1.50	1	> 10%	Yes sympathetic measures
8	Eucalyptus sieberi (Silvertop ash)	< 20	7 to 10	2	fair - poor			2.00	1.50	2	< 10%	Yes
9	Eucalyptus sieberi (Silvertop ash)	< 20	7 to 10	2	very poor	tree on path	modify path	2.00	1.50	on path	> 10%	Yes sympathetic measures
10	Eucalyptus sieberi (Silvertop ash)	30	20 to 30	7	fair			3.60	2.00	2	> 10%	Yes sympathetic measures
11	Eucalyptus sieberi (Silvertop ash)	< 20	10 to 15	2	fair			2.00	1.50	1	> 10%	Yes sympathetic measures
12	Eucalyptus sieberi (Silvertop ash)	< 20	10 to 15	1	fair - poor	tree on path	modify path	2.00	1.50	on path	> 10%	Yes sympathetic measures
13	Eucalyptus sieberi (Silvertop ash)	20	10 to 15	3	fair - poor			2.40	2.00	2	< 10%	Yes
14	Eucalyptus sieberi (Silvertop ash)	< 20	7 to 10	1	fair - poor			2.00	1.50	2	< 10%	Yes
15	Eucalyptus sieberi (Silvertop ash)	< 20	15 to 20	2	fair - poor			2.00	1.50	3	None	Yes
16	Eucalyptus sieberi (Silvertop ash)	70	10 to 15	7	poor			8.40	3.01	12	None	Yes
17	Eucalyptus sieberi (Silvertop ash)	80	20 to 30	15	fair			9.60	3.31	12	None	Yes
18	Eucalyptus obliqua (Messmate Stringybark)	50	15 to 20	10	fair	root flare in path	root sympathetic path construction	6.00	2.67	1	> 10%	Yes sympathetic measures
19	Eucalyptus sieberi (Silvertop ash)	< 20	7 to 10	1	poor			2.00	1.50	1	> 10%	Yes sympathetic measures
20	Eucalyptus sieberi (Silvertop ash)	20	10 to 15	5	fair			2.40	2.00	1	> 10%	Yes sympathetic measures
21	Eucalyptus obliqua (Messmate Stringybark)	20	15 to 20	5	fair			2.40	2.00	2	< 10%	Yes
22	Eucalyptus obliqua (Messmate Stringybark)	30	10 to 15	3	very poor			3.60	2.25	1	> 10%	Yes sympathetic measures
23	Eucalyptus sieberi (Silvertop ash)	60	20 to 30	15	fair	root flare in path	root sympathetic path construction	7.20	2.85	1	> 10%	Yes sympathetic measures
24	Eucalyptus obliqua (Messmate Stringybark)	40	20 to 30	15	fair - poor			4.80	2.47	3	> 10%	Yes sympathetic measures
25	Eucalyptus sieberi (Silvertop ash)	< 20	10 to 15	3	fair			2.00	1.50	1	> 10%	Yes sympathetic measures
26	Eucalyptus obliqua (Messmate Stringybark)	< 20	7 to 10	1	fair - poor			2.00	1.50	1	> 10%	Yes sympathetic measures
27	Eucalyptus sieberi (Silvertop ash)	< 20	7 to 10	2	fair - poor			2.00	1.50	1	> 10%	Yes sympathetic measures
28	Eucalyptus sieberi (Silvertop ash)	20	15 to 20	3	fair			2.40	2.00	1	> 10%	Yes sympathetic measures
29	Eucalyptus sieberi (Silvertop ash)	< 20	10 to 15	3	fair			2.00	1.50	2	< 10%	Yes
30	Eucalyptus sieberi (Silvertop ash)	< 20	10 to 15	2	fair - poor			2.00	1.50	1	> 10%	Yes sympathetic measures
31	Eucalyptus sieberi (Silvertop ash)	< 20	10 to 15	2	fair			2.00	1.50	2	< 10%	Yes
32	Eucalyptus sieberi (Silvertop ash)	20	15 to 20	3	fair			2.40	2.00	3	None	Yes
33	Eucalyptus sieberi (Silvertop ash)	< 20	10 to 15	2	fair			2.00	1.50	1	> 10%	Yes sympathetic measures
34	Eucalyptus sieberi (Silvertop ash)	< 20	10 to 15	2	fair - poor	tree on path	modify path	2.00	1.50	on path	> 10%	Yes sympathetic measures
35	Acacia obliquinerva (Mountain Hickory Wattle)	< 20	< 5	1	fair			2.00	1.50	on path	Tree may be impacted by path construction	
36	Eucalyptus sp.	< 40	< 5m	1	dead	HAZARDOUS	remove	4.20	N/A	on path	Arborist to make a determination on level of hazard pruning	
37	Eucalyptus sp.	< 40	< 5m	1	dead	tree on path	modify path	4.20	N/A	on path	> 10%	Yes sympathetic measures
38	Eucalyptus sp.	80 to 100	< 5m	1	dead		retain	10.80	N/A	1	> 10%	Yes sympathetic measures
39	Eucalyptus sp.	< 40	5 to 10	1	dead	HAZARDOUS	remove	4.20	N/A	1	Arborist to make a determination on level of hazard pruning	
40	Eucalyptus sp.	< 40	5 to 10	1	dead	HAZARDOUS	remove	4.20	N/A	1	Arborist to make a determination on level of hazard pruning	
41	Eucalyptus sp.	< 40	5 to 10	1	dead	HAZARDOUS, tree on path	modify path and prune or remove	4.20	N/A	on path	Arborist to make a determination on level of hazard pruning	
42	Eucalyptus sp.	< 40	5 to 10	1	dead		modify path	4.20	N/A	on path	> 10%	Yes sympathetic measures

# Sample site 17

Tree No.	Species (Common name)	Est. DBH	Est. Height range	Est. Canopy Spread	Condition	Path Conflict	Comments / recommendations	TPZ	SRZ	Est. path dist.	AS4970 encroachment	Can tree be retained
1	Eucalyptus sieberi (Silvertop ash)	80	30 to 40	12	fair			9.60	3.31	3	> 10%	Yes sympathetic measures
2	Eucalyptus sieberi (Silvertop ash)	< 20	7 to 10	1	poor			2.00	1.50	1	> 10%	Yes sympathetic measures
3	Eucalyptus sieberi (Silvertop ash)	60	20 to 30	10	fair - poor	root flare in path	root sympathetic path construction	7.20	3.01	3	> 10%	Yes sympathetic measures
4	Eucalyptus sieberi (Silvertop ash)	60	20 to 30	7	fair			7.20	2.85	5	> 10%	Yes sympathetic measures
5	Eucalyptus sieberi (Silvertop ash)	80	30 to 40	15	fair			9.60	3.31	8	< 10%	Yes
6	Eucalyptus sieberi (Silvertop ash)	80	30 to 40	15	fair			9.60	3.31	3	> 10%	Yes sympathetic measures
7	Eucalyptus obliqua (Messmate Stringybark)	50	10 to 15	7	fair - poor	narrow path, root flare in path	root sympathetic path construction	6.00	2.67	1	> 10%	Yes sympathetic measures
8	Eucalyptus obliqua (Messmate Stringybark)	< 20	< 5	1	poor			2.00	1.50	2	< 10%	Yes
9	Eucalyptus sieberi (Silvertop ash)	50	20 to 30	15	poor			6.00	2.67	5	< 10%	Yes
10	Eucalyptus sieberi (Silvertop ash)	< 20	< 5	1	fair	tree on path	modify path	2.00	1.50	on path	> 10%	Yes sympathetic measures
11	Eucalyptus sieberi (Silvertop ash)	20	10 to 15	3	poor			2.40	2.00	2	< 10%	Yes
12	Eucalyptus sieberi (Silvertop ash)	80	20 to 30	20	poor			9.60	3.31	4	> 10%	Yes sympathetic measures
13	Eucalyptus obliqua (Messmate Stringybark)	40	20 to 30	10	poor	narrow path		4.80	2.47	1	> 10%	Yes sympathetic measures
14	Eucalyptus obliqua (Messmate Stringybark)	40	20 to 30	12	fair - poor	narrow path		4.80	2.47	1	> 10%	Yes sympathetic measures
15	Eucalyptus sp.	< 40	< 5m	1	dead	tree on path	modify path	4.20	N/A	on path	> 10%	Yes sympathetic measures

Sample site 18

Tree No.	Species (Common name)	Est. DBH	Est. Height range	Est. Canopy Spread	Condition	Path Conflict	Comments / recommendations	TPZ	SRZ	Est. path dist.	AS4970 encroachment	Can tree be retained
1	Eucalyptus sieberi (Silvertop ash)	60	20 to 30	15	fair	root flare in path	root sympathetic path construction	7.20	2.85	1	> 10%	Yes sympathetic measures
2	Eucalyptus sieberi (Silvertop ash)	30	15 to 20	7	fair			3.60	2.00	1	> 10%	Yes sympathetic measures
3	Eucalyptus sieberi (Silvertop ash)	40	15 to 20	15	fair - poor			4.80	2.47	3	> 10%	Yes sympathetic measures
4	Eucalyptus sieberi (Silvertop ash)	40	20 to 30	7	fair			4.80	2.47	6	None	Yes
5	Eucalyptus sieberi (Silvertop ash)	30	15 to 20	5	fair - poor			3.60	2.00	2	> 10%	Yes sympathetic measures
6	Eucalyptus sieberi (Silvertop ash)	40	20 to 30	12	fair	root flare in path	root sympathetic path construction	4.80	2.47	1	> 10%	Yes sympathetic measures
7	Eucalyptus sieberi (Silvertop ash)	< 20	10 to 15	3	fair	tree on path	modify path	2.00	1.50	on path	> 10%	Yes sympathetic measures
8	Eucalyptus sieberi (Silvertop ash)	< 20	10 to 15	2	fair			2.00	1.50	1	> 10%	Yes sympathetic measures
9	Eucalyptus baxteri (Brown Stringybark)	< 20	10 to 15	2	fair			2.00	1.50	1	> 10%	Yes sympathetic measures
10	Eucalyptus sieberi (Silvertop ash)	< 20	10 to 15	2	fair			2.00	1.50	1	> 10%	Yes sympathetic measures
11	Eucalyptus sieberi (Silvertop ash)	40	15 to 20	10	poor			4.80	2.67	4	< 10%	Yes
12	Eucalyptus sieberi (Silvertop ash)	40	20 to 30	15	fair			4.80	2.47	3	> 10%	Yes sympathetic measures
13	Eucalyptus sieberi (Silvertop ash)	30	15 to 20	3	poor			3.60	2.25	2	> 10%	Yes sympathetic measures
14	Eucalyptus sieberi (Silvertop ash)	50	20 to 30	15	fair			6.00	2.67	1	> 10%	Yes sympathetic measures
15	Eucalyptus sieberi (Silvertop ash)	< 20	15 to 20	3	fair			2.00	1.50	1	> 10%	Yes sympathetic measures
16	Eucalyptus sieberi (Silvertop ash)	< 20	10 to 15	2	fair - poor			2.00	1.50	1	> 10%	Yes sympathetic measures
17	Eucalyptus sieberi (Silvertop ash)	40	15 to 20	15	good			4.80	2.47	3	> 10%	Yes sympathetic measures
18	Eucalyptus sp.	< 40	10 to 15	1	dead		retain	4.20	N/A	2	> 10%	Yes sympathetic measures

# Sample site 19

Tree No.	Species (Common name)	Est. DBH	Est. Height range	Est. Canopy Spread	Condition	Path Conflict	Comments / recommendations	TPZ	SRZ	Est. path dist.	AS4970 encroachment	Can tree be retained
1	Eucalyptus obliqua (Messmate Stringybark)	50	20 to 30	10	fair - poor			6.00	2.67	1	> 10%	Yes sympathetic measures
2	Eucalyptus obliqua (Messmate Stringybark)	50	20 to 30	12	fair			6.00	2.67	3	> 10%	Yes sympathetic measures
3	Eucalyptus obliqua (Messmate Stringybark)	60	15 to 20	10	very poor		trunk cavity with fire damage. reduce to ~8m stump	7.20	2.67	1	> 10%	Yes sympathetic measures
4	Eucalyptus sieberi (Silvertop ash)	100	20 to 30	15	fair			12.00	3.63	10	< 10%	Yes
5	Eucalyptus obliqua (Messmate Stringybark)	100	20 to 30	15	fair			12.00	3.63	4	> 10%	Yes sympathetic measures
6	Eucalyptus obliqua (Messmate Stringybark)	40	10 to 15	7	fair - poor			4.80	2.47	2	> 10%	Yes sympathetic measures
7	Eucalyptus obliqua (Messmate Stringybark)	60	20 to 30	15	fair			7.20	3.01	1	> 10%	Yes sympathetic measures
8	Eucalyptus sieberi (Silvertop ash)	70	30 to 40	20	fair			8.40	3.01	2	> 10%	Yes sympathetic measures
9	Bedfordia arborescens (Blanket-leaf)	< 20	5 to 7	3	fair			2.00	1.68	1	< 10%	Yes
10	Bedfordia arborescens (Blanket-leaf)	< 20	5 to 7	5	fair - poor			2.00	2.00	1	< 10%	Yes
11	Bedfordia arborescens (Blanket-leaf)	< 20	5 to 7	2	fair			2.00	1.68	1	< 10%	Yes
12	Eucalyptus sp.	60 to 80	20 to 30	12	dead		retain	8.40	N/A	1	> 10%	Yes sympathetic measures

Sample site 20

Tree No.	Species (Common name)	Est. DBH	Est. Height range	Est. Canopy Spread	Condition	Path Conflict	Comments / recommendations	TPZ	SRZ	Est. path dist.	AS4970 encroachment	Can tree be retained
1	Eucalyptus baxteri (Brown Stringybark)	100	30 to 40	15	fair - poor			12.00	3.63	4	> 10%	Yes sympathetic measures
2	Eucalyptus baxteri (Brown Stringybark)	80	20 to 30	15	fair - poor			9.60	3.31	3	> 10%	Yes sympathetic measures
3	Eucalyptus baxteri (Brown Stringybark)	40	10 to 15	7	fair - poor			4.80	2.47	5	None	Yes
4	Eucalyptus baxteri (Brown Stringybark)	80	20 to 30	12	fair - poor			9.60	3.31	8	< 10%	Yes
5	Eucalyptus baxteri (Brown Stringybark)	60	15 to 20	12	fair - poor			7.20	3.01	3	> 10%	Yes sympathetic measures
6	Eucalyptus baxteri (Brown Stringybark)	80	20 to 30	12	fair - poor	root flare in path	root sympathetic path construction	9.60	3.31	2	> 10%	Yes sympathetic measures
7	Eucalyptus baxteri (Brown Stringybark)	80	15 to 20	12	poor			9.60	3.31	5	> 10%	Yes sympathetic measures
8	Eucalyptus baxteri (Brown Stringybark)	70	20 to 30	12	fair			8.40	3.01	6	< 10%	Yes
9	Eucalyptus baxteri (Brown Stringybark)	80	20 to 30	10	fair			9.60	3.31	5	> 10%	Yes sympathetic measures
10	Eucalyptus baxteri (Brown Stringybark)	70	20 to 30	12	fair - poor			8.40	3.01	4	> 10%	Yes sympathetic measures
11	Eucalyptus baxteri (Brown Stringybark)	60	20 to 30	10	fair - poor			7.20	2.85	3	> 10%	Yes sympathetic measures
12	Eucalyptus baxteri (Brown Stringybark)	30	10 to 15	5	fair - poor			3.60	2.25	3	< 10%	Yes
13	Eucalyptus baxteri (Brown Stringybark)	50	15 to 20	10	fair			6.00	2.47	2	> 10%	Yes sympathetic measures
14	Eucalyptus baxteri (Brown Stringybark)	100	15 to 20	12	fair			12.00	3.31	10	< 10%	Yes
15	Eucalyptus cypellocarpa (Mountain Grey Gum)	30	15 to 20	7	fair			3.60	2.25	1	> 10%	Yes sympathetic measures
16	Eucalyptus cypellocarpa (Mountain Grey Gum)	60	30 to 40	12	fair			7.20	2.85	8	None	Yes
17	Eucalyptus cypellocarpa (Mountain Grey Gum)	60	30 to 40	12	fair			7.20	2.85	3	> 10%	Yes sympathetic measures
18	Eucalyptus baxteri (Brown Stringybark)	50	20 to 30	12	fair			6.00	2.47	4	> 10%	Yes sympathetic measures
19	Kunzea ericoides (Burgan)	< 20	5 to 7	5	fair			2.00	2.25	2	< 10%	Yes
20	Kunzea ericoides (Burgan)	< 20	< 5	3	fair			2.00	1.50	on path	Tree may be impacted by path construction	
21	Acacia dealbata (Silver Wattle)	< 20	7 to 10	3	fair			2.00	1.50	2	< 10%	Yes
22	Acacia dealbata (Silver Wattle)	< 20	7 to 10	7	fair			2.00	1.50	2	< 10%	Yes



Sample site 21

Tree No.	Species (Common name)	Est. DBH	Est. Height range	Est. Canopy Spread	Condition	Path Conflict	Comments / recommendations	TPZ	SRZ	Est. path dist.	AS4970 encroachment	Can tree be retained
1	Eucalyptus dives (Broad-leaved Peppermint)	< 20	5 to 7	2	fair - poor	tree on path	modify path	2.00	1.50	on path	> 10%	Yes sympathetic measures
2	Eucalyptus dives (Broad-leaved Peppermint)	< 20	< 5	2	very poor	tree on path	modify path	2.00	1.50	1	> 10%	Yes sympathetic measures
3	Eucalyptus baxteri (Brown Stringybark)	60	10 to 15	7	fair - poor			7.20	2.85	12	None	Yes
4	Eucalyptus sieberi (Silvertop ash)	50	15 to 20	10	fair - poor			6.00	2.67	5	< 10%	Yes
5	Eucalyptus baxteri (Brown Stringybark)	50	10 to 15	7	fair - poor			6.00	2.67	2	> 10%	Yes sympathetic measures
6	Eucalyptus dives (Broad-leaved Peppermint)	< 20	< 5	2	poor			2.00	1.50	2	< 10%	Yes
7	Eucalyptus baxteri (Brown Stringybark)	< 20	7 to 10	2	fair			2.00	1.50	1	> 10%	Yes sympathetic measures
8	Eucalyptus dives (Broad-leaved Peppermint)	30	10 to 15	5	poor	tree on path	modify path	3.60	2.25	1	> 10%	Yes sympathetic measures
9	Eucalyptus dives (Broad-leaved Peppermint)	40	10 to 15	10	poor			4.80	2.47	2	> 10%	Yes sympathetic measures
10	Eucalyptus dives (Broad-leaved Peppermint)	20	7 to 10	10	poor			2.40	2.00	3	None	Yes
11	Eucalyptus baxteri (Brown Stringybark)	40	15 to 20	12	fair - poor			4.80	2.47	4	< 10%	Yes
12	Eucalyptus sieberi (Silvertop ash)	20	10 to 15	5	fair			2.40	2.00	1	> 10%	Yes sympathetic measures
13	Eucalyptus baxteri (Brown Stringybark)	20	7 to 10	7	poor			2.40	2.00	4	None	Yes
14	Eucalyptus dives (Broad-leaved Peppermint)	30	10 to 15	7	poor			3.60	2.25	2	> 10%	Yes sympathetic measures
15	Eucalyptus sieberi (Silvertop ash)	70	20 to 30	15	good			8.40	3.01	8	< 10%	Yes
16	Eucalyptus dives (Broad-leaved Peppermint)	< 20	< 5	1	fair - poor			2.00	1.50	2	< 10%	Yes
17	Eucalyptus baxteri (Brown Stringybark)	< 20	< 5	1	poor			2.00	1.50	2	< 10%	Yes
18	Eucalyptus baxteri (Brown Stringybark)	< 20	< 5	1	very poor			2.00	1.50	1	> 10%	Yes sympathetic measures
19	Eucalyptus sieberi (Silvertop ash)	50	20 to 30	15	good			6.00	2.67	4	> 10%	Yes sympathetic measures
20	Eucalyptus sp.	40 to 50	10 to 15	5	dead		retain, habitat prune	5.40	N/A	4	< 10%	Yes

Sample site 22

Tree No.	Species (Common name)	Est. DBH	Est. Height range	Est. Canopy Spread	Condition	Path Conflict	Comments / recommendations	TPZ	SRZ	Est. path dist.	AS4970 encroachment	Can tree be retained
1	Eucalyptus regnans (Mountain Ash)	40	30 to 40	7	fair			4.80	2.47	4	< 10%	Yes
2	Eucalyptus regnans (Mountain Ash)	50	30 to 40	10	fair			6.00	2.67	3	> 10%	Yes sympathetic measures
3	Eucalyptus regnans (Mountain Ash)	20	15 to 20	5	fair - poor			2.40	1.68	1	> 10%	Yes sympathetic measures
4	Eucalyptus regnans (Mountain Ash)	30	20 to 30	5	fair			3.60	2.00	1	> 10%	Yes sympathetic measures
5	Eucalyptus regnans (Mountain Ash)	< 20	10 to 15	5	fair - poor	narrow path		2.00	1.50	1	> 10%	Yes sympathetic measures
6	Eucalyptus regnans (Mountain Ash)	40	30 to 40	10	fair			4.80	2.47	6	None	Yes
7	Eucalyptus regnans (Mountain Ash)	40	30 to 40	7	fair			4.80	2.25	1	> 10%	Yes sympathetic measures
8	Eucalyptus regnans (Mountain Ash)	30	20 to 30	10	fair			3.60	2.25	3	< 10%	Yes
9	Eucalyptus regnans (Mountain Ash)	40	20 to 30	12	fair			4.80	2.67	1	> 10%	Yes sympathetic measures
10	Eucalyptus regnans (Mountain Ash)	40	30 to 40	10	fair			4.80	2.47	1	> 10%	Yes sympathetic measures
11	Eucalyptus regnans (Mountain Ash)	30	30 to 40	10	fair			3.60	2.25	4	None	Yes
12	Eucalyptus regnans (Mountain Ash)	40	20 to 30	15	fair			4.80	2.47	5	None	Yes
13	Eucalyptus regnans (Mountain Ash)	40	20 to 30	12	fair			4.80	2.47	6	None	Yes
14	Eucalyptus regnans (Mountain Ash)	20	20 to 30	3	very poor			2.40	2.00	4	None	Yes
15	Eucalyptus regnans (Mountain Ash)	20	15 to 20	5	fair - poor			2.40	2.25	3	None	Yes
16	Eucalyptus regnans (Mountain Ash)	40	30 to 40	10	fair			4.80	2.47	2	> 10%	Yes sympathetic measures
17	Eucalyptus regnans (Mountain Ash)	20	20 to 30	7	fair			2.40	2.00	4	None	Yes
18	Eucalyptus regnans (Mountain Ash)	40	30 to 40	12	fair			4.80	2.47	2	> 10%	Yes sympathetic measures
19	Eucalyptus regnans (Mountain Ash)	< 20	15 to 20	2	very poor			2.00	1.50	1	> 10%	Yes sympathetic measures
20	Eucalyptus regnans (Mountain Ash)	50	30 to 40	12	fair			6.00	2.67	5	< 10%	Yes
21	Eucalyptus regnans (Mountain Ash)	< 20	15 to 20	5	fair - poor			2.00	1.50	1	> 10%	Yes sympathetic measures
22	Eucalyptus regnans (Mountain Ash)	50	30 to 40	15	fair			6.00	2.67	1	> 10%	Yes sympathetic measures
23	Eucalyptus regnans (Mountain Ash)	30	20 to 30	7	fair			3.60	2.25	1	> 10%	Yes sympathetic measures
24	Eucalyptus regnans (Mountain Ash)	50	30 to 40	20	fair			6.00	2.67	8	None	Yes
25	Polyscias sambucifolia (Elderberry Panax)	< 20	5 to 7	3	fair	tree on path, narrow path	modify path	2.00	1.50	1	> 10%	Yes sympathetic measures
26	Acacia dealbata (Silver Wattle)	20	15 to 20	5	fair	tree on path (remove)		2.40	2.00	on path	Tree may be impacted by path construction	
27	Acacia dealbata (Silver Wattle)	20	10 to 15	5	poor			2.40	2.00	2	< 10%	Yes
28	Eucalyptus sp.	< 40	10 to 15	2	dead	HAZARDOUS, tree on path	remove	4.20	N/A	on path	Arborist to make a determination on level of hazard pruning	
29	Eucalyptus sp.	< 40	10 to 15	1	dead		retain	4.20	N/A	1	> 10%	Yes sympathetic measures

# Sample site 23

Tree No.	Species (Common name)	Est. DBH	Est. Height range	Est. Canopy Spread	Condition	Path Conflict	Comments / recommendations	TPZ	SRZ	Est. path dist.	AS4970 encroachment	Can tree be retained
1	Eucalyptus delegatensis (Alpine Ash)	250	50 to 60	15	fair - poor	root flare in path	root sympathetic path construction	15.00	5.25	3	> 10%	Yes sympathetic measures
2	Eucalyptus delegatensis (Alpine Ash)	125	50 to 60	12	fair - poor			15.00	3.92	8	> 10%	Yes sympathetic measures
3	Eucalyptus regnans (Mountain Ash)	125	50 to 60	15	fair - poor			15.00	3.92	4	> 10%	Yes sympathetic measures
4	Eucalyptus regnans (Mountain Ash)	200	50 to 60	20	fair - poor			15.00	4.86	12	< 10%	Yes
5	Eucalyptus regnans (Mountain Ash)	200	50 to 60	15	fair - poor			15.00	4.86	15	None	Yes
6	Eucalyptus regnans (Mountain Ash)	125	40 to 50	15	fair			15.00	3.92	8	> 10%	Yes sympathetic measures
7	Nothofagus cunninghamii (Myrtle Beech)	30	7 to 10	7	fair			3.60	2.00	8	None	Yes
8	Nothofagus cunninghamii (Myrtle Beech)	30	10 to 15	7	fair			3.60	2.00	8	None	Yes
9	Nothofagus cunninghamii (Myrtle Beech)	40	10 to 15	10	fair			4.80	2.47	10	None	Yes
10	Nothofagus cunninghamii (Myrtle Beech)	30	10 to 15	7	fair			3.60	2.25	15	None	Yes
11	Nothofagus cunninghamii (Myrtle Beech)	150	15 to 20	15	fair	root flare in path	root sympathetic path construction	15.00	4.43	2	> 10%	Yes sympathetic measures
12	Nothofagus cunninghamii (Myrtle Beech)	40	10 to 15	7	good			4.80	2.47	10	None	Yes
13	Nothofagus cunninghamii (Myrtle Beech)	20	7 to 10	7	fair			2.40	2.00	10	None	Yes
14	Polyscias sambucifolia (Elderberry Panax)	20	15 to 20	10	fair			2.40	1.68	3	< 10%	Yes

Sample site 24

Tree No.	Species (Common name)	Est. DBH	Est. Height range	Est. Canopy Spread	Condition	Path Conflict	Comments / recommendations	TPZ	SRZ	Est. path dist.	AS4970 encroachment	Can tree be retained
1	Eucalyptus regnans (Mountain Ash)	80	40 to 50	15	fair			9.60	3.31	12	None	Yes
2	Eucalyptus regnans (Mountain Ash)	80	40 to 50	15	fair			9.60	3.31	6	> 10%	Yes sympathetic measures
3	Eucalyptus nitens (Shining gum)	60	20 to 30	12	fair - poor			7.20	2.85	12	None	Yes
4	Eucalyptus regnans (Mountain Ash)	80	30 to 40	15	fair - poor			9.60	3.31	10	None	Yes
5	Eucalyptus regnans (Mountain Ash)	80	40 to 50	15	fair			9.60	3.31	2	> 10%	Yes sympathetic measures
6	Eucalyptus regnans (Mountain Ash)	80	40 to 50	20	fair	root flare in path	root sympathetic path construction	9.60	3.31	1	> 10%	Yes sympathetic measures
7	Eucalyptus nitens (Shining gum)	80	30 to 40	15	fair - poor	root flare in path	root sympathetic path construction	9.60	3.31	1	> 10%	Yes sympathetic measures
8	Acacia dealbata (Silver Wattle)	30	10 to 15	7	fair			3.60	2.25	4	None	Yes
9	Acacia dealbata (Silver Wattle)	30	10 to 15	5	fair - poor			3.60	2.00	5	None	Yes
10	Acacia melanoxylon (Blackwood)	40	15 to 20	7	fair	root flare in path		4.80	2.25	1	> 10%	Yes sympathetic measures
11	Acacia dealbata (Silver Wattle)	20	15 to 20	12	poor	root flare in path		2.40	2.00	1	> 10%	Yes sympathetic measures
12	Acacia dealbata (Silver Wattle)	30	10 to 15	7	fair - poor			3.60	2.25	1	> 10%	Yes sympathetic measures

# Sample site 25

Tree No.	Species (Common name)	Est. DBH	Est. Height range	Est. Canopy Spread	Condition	Path Conflict	Comments / recommendations	TPZ	SRZ	Est. path dist.	AS4970 encroachment	Can tree be retained
1	Eucalyptus nitens (Shining gum)	80	40 to 50	10	fair	root flare in path	root sympathetic path construction	9.60	3.31	1	> 10%	Yes sympathetic measures
2	Eucalyptus nitens (Shining gum)	40	30 to 40	7	fair - poor			4.80	2.47	4	< 10%	Yes
3	Eucalyptus nitens (Shining gum)	50	30 to 40	7	fair	root flare in path	root sympathetic path construction	6.00	2.85	1	> 10%	Yes sympathetic measures
4	Eucalyptus nitens (Shining gum)	70	40 to 50	10	fair	root flare in path	root sympathetic path construction	8.40	3.01	2	> 10%	Yes sympathetic measures
5	Eucalyptus nitens (Shining gum)	40	40 to 50	7	fair - poor			4.80	2.47	1	> 10%	Yes sympathetic measures
6	Eucalyptus nitens (Shining gum)	80	50 to 60	12	fair			9.60	3.31	4	> 10%	Yes sympathetic measures
7	Eucalyptus regnans (Mountain Ash)	30	20 to 30	12	fair			3.60	2.25	3	< 10%	Yes
8	Eucalyptus nitens (Shining gum)	40	50 to 60	15	fair			4.80	2.47	6	None	Yes
9	Eucalyptus nitens (Shining gum)	50	30 to 40	10	fair			6.00	2.67	1	> 10%	Yes sympathetic measures
10	Eucalyptus cypellocarpa (Mountain Grey Gum)	50	20 to 30	15	fair			6.00	2.67	5	< 10%	Yes
11	Acacia dealbata (Silver Wattle)	< 20	7 to 10	3	fair			2.00	1.50	3	None	Yes
12	Acacia dealbata (Silver Wattle)	< 20	10 to 15	5	fair			2.00	1.50	2	< 10%	Yes
13	Acacia dealbata (Silver Wattle)	20	10 to 15	7	fair			2.40	1.68	5	None	Yes
14	Acacia dealbata (Silver Wattle)	20	10 to 15	10	fair			2.40	2.00	1	> 10%	Yes sympathetic measures

Sample site 26

Tree No.	Species (Common name)	Est. DBH	Est. Height range	Est. Canopy Spread	Condition	Path Conflict	Comments / recommendations	TPZ	SRZ	Est. path dist.	AS4970 encroachment	Can tree be retained
1	Eucalyptus regnans (Mountain Ash)	70	40 to 50	20	good			8.40	3.01	10	None	Yes
2	Acacia dealbata (Silver Wattle)	30	20 to 30	7	fair	tree on path either remove or modify path		3.60	2.00	on path	Tree may be impacted by path construction	
3	Acacia dealbata (Silver Wattle)	40	20 to 30	7	fair			4.80	2.25	1	> 10%	Yes sympathetic measures
4	Acacia dealbata (Silver Wattle)	20	20 to 30	5	fair - poor			2.40	1.68	2	< 10%	Yes
5	Acacia dealbata (Silver Wattle)	< 20	20 to 30	5	fair			2.00	1.68	on path	Tree may be impacted by path construction	
6	Acacia dealbata (Silver Wattle)	30	20 to 30	7	fair			3.60	2.00	5	None	Yes
7	Acacia dealbata (Silver Wattle)	30	20 to 30	7	fair			3.60	2.00	1	> 10%	Yes sympathetic measures
8	Acacia dealbata (Silver Wattle)	30	20 to 30	7	fair			3.60	2.00	2	> 10%	Yes sympathetic measures
9	Acacia dealbata (Silver Wattle)	30	20 to 30	5	fair			3.60	2.00	2	> 10%	Yes sympathetic measures
10	Acacia dealbata (Silver Wattle)	20	20 to 30	7	fair	tree on path (modify path)		2.40	2.00	on path	Tree may be impacted by path construction	
11	Acacia dealbata (Silver Wattle)	30	20 to 30	3	fair			3.60	2.47	3	< 10%	Yes
12	Acacia dealbata (Silver Wattle)	40	30 to 40	15	fair			4.80	2.47	3	> 10%	Yes sympathetic measures
13	Acacia dealbata (Silver Wattle)	20	30 to 40	10	fair			2.40	2.00	1	> 10%	Yes sympathetic measures
14	Acacia dealbata (Silver Wattle)	40	30 to 40	12	fair			4.80	2.47	4	< 10%	Yes
15	Acacia dealbata (Silver Wattle)	30	30 to 40	12	fair			3.60	2.25	3	< 10%	Yes
16	Acacia dealbata (Silver Wattle)	30	30 to 40	10	fair			3.60	2.25	2	> 10%	Yes sympathetic measures
17	Acacia dealbata (Silver Wattle)	30	30 to 40	10	fair			3.60	2.25	6	None	Yes
18	Acacia dealbata (Silver Wattle)	30	30 to 40	12	fair			3.60	2.25	1	> 10%	Yes sympathetic measures
19	Acacia sp.	< 40	20 to 30	5	dead		retain	4.20	N/A	5	None	Yes

Sample site 27

Tree No.	Species (Common name)	Est. DBH	Est. Height range	Est. Canopy Spread	Condition	Path Conflict	Comments / recommendations	TPZ	SRZ	Est. path dist.	AS4970 encroachment	Can tree be retained
1	Eucalyptus nitens (Shining gum)	70	40 to 50	12	fair - poor			8.40	3.01	2	> 10%	Yes sympathetic measures
2	Eucalyptus regnans (Mountain Ash)	70	40 to 50	12	fair - poor			8.40	3.01	5	> 10%	Yes sympathetic measures
3	Eucalyptus regnans (Mountain Ash)	70	40 to 50	12	fair - poor			8.40	3.01	4	> 10%	Yes sympathetic measures
4	Eucalyptus nitens (Shining gum)	60	30 to 40	15	fair - poor			7.20	3.01	6	< 10%	Yes
5	Eucalyptus nitens (Shining gum)	60	40 to 50	12	fair - poor			7.20	2.85	4	> 10%	Yes sympathetic measures
6	Eucalyptus nitens (Shining gum)	70	40 to 50	12	fair - poor			8.40	3.01	6	< 10%	Yes
7	Eucalyptus nitens (Shining gum)	40	30 to 40	7	fair			4.80	2.47	1	> 10%	Yes sympathetic measures
8	Eucalyptus nitens (Shining gum)	60	30 to 40	10	fair - poor			7.20	2.85	4	> 10%	Yes sympathetic measures
9	Eucalyptus nitens (Shining gum)	60	30 to 40	12	fair	root in path	root sympathetic path construction	7.20	3.01	1	> 10%	Yes sympathetic measures
10	Eucalyptus nitens (Shining gum)	70	50 to 60	15	fair			8.40	3.01	3	> 10%	Yes sympathetic measures
11	Eucalyptus nitens (Shining gum)	70	50 to 60	15	fair - poor			8.40	3.01	3	> 10%	Yes sympathetic measures
12	Eucalyptus nitens (Shining gum)	50	30 to 40	12	fair - poor	root in path	root sympathetic path construction	6.00	2.67	1	> 10%	Yes sympathetic measures
13	Acacia dealbata (Silver Wattle)	20	15 to 20	7	fair - poor			2.40	2.00	2	< 10%	Yes
14	Acacia melanoxylon (Blackwood)	40	10 to 15	7	fair - poor	root flare in path		4.80	2.47	2	> 10%	Yes sympathetic measures
15	Acacia dealbata (Silver Wattle)	< 20	7 to 10	5	fair - poor			2.00	1.68	2	< 10%	Yes
16	Acacia melanoxylon (Blackwood)	< 20	7 to 10	5	fair - poor	tree on path (remove)		2.00	1.68	2	< 10%	Yes
17	Acacia melanoxylon (Blackwood)	< 20	< 5	1	poor	tree on path (remove)		2.00	1.50	on path	Tree may be impacted by path construction	



Sample site 28

Tree No.	Species (Common name)	Est. DBH	Est. Height range	Est. Canopy Spread	Condition	Path Conflict	Comments / recommendations	TPZ	SRZ	Est. path dist.	AS4970 encroachment	Can tree be retained
1	Eucalyptus sieberi (Silvertop ash)	30	15 to 20	5	fair			3.60	2.00	2	> 10%	Yes sympathetic measures
2	Eucalyptus sieberi (Silvertop ash)	20	10 to 15	5	fair			2.40	1.68	2	< 10%	Yes
3	Eucalyptus goniocalyx (Long-leaved Box)	< 20	5 to 7	5	poor			2.00	1.50	2	< 10%	Yes
4	Eucalyptus goniocalyx (Long-leaved Box)	< 20	5 to 7	2	poor	tree on path (modify path), narrow path		2.00	1.50	on path	> 10%	Yes sympathetic measures
5	Eucalyptus sieberi (Silvertop ash)	30	15 to 20	10	fair			3.60	2.25	1	> 10%	Yes sympathetic measures
6	Eucalyptus sieberi (Silvertop ash)	< 20	7 to 10	3	fair - poor			2.00	1.50	1	> 10%	Yes sympathetic measures
7	Eucalyptus sieberi (Silvertop ash)	30	15 to 20	7	fair			3.60	2.25	1	> 10%	Yes sympathetic measures
8	Eucalyptus sieberi (Silvertop ash)	20	15 to 20	5	fair	narrow path		2.40	1.68	1	> 10%	Yes sympathetic measures
9	Eucalyptus goniocalyx (Long-leaved Box)	< 20	< 5	3	Senescent	tree on path	Consider removal, if retained then modify path	2.00	1.50	on path	> 10%	Yes sympathetic measures
10	Eucalyptus sieberi (Silvertop ash)	30	15 to 20	7	fair	tree on path	modify path	3.60	2.00	on path	> 10%	Yes sympathetic measures
11	Eucalyptus goniocalyx (Long-leaved Box)	20	7 to 10	5	fair - poor			2.40	2.00	1	> 10%	Yes sympathetic measures
12	Eucalyptus sieberi (Silvertop ash)	< 20	10 to 15	2	fair			2.00	1.50	2	< 10%	Yes
13	Eucalyptus sieberi (Silvertop ash)	< 20	7 to 10	3	fair			2.00	1.50	1	> 10%	Yes sympathetic measures
14	Eucalyptus sieberi (Silvertop ash)	20	10 to 15	2	fair			2.40	2.00	1	> 10%	Yes sympathetic measures
15	Eucalyptus sieberi (Silvertop ash)	20	10 to 15	3	fair	tree on path	modify path	2.40	2.00	on path	> 10%	Yes sympathetic measures
16	Eucalyptus sieberi (Silvertop ash)	20	7 to 10	3	fair	tree on path	modify path	2.40	2.00	on path	> 10%	Yes sympathetic measures
17	Eucalyptus goniocalyx (Long-leaved Box)	50	15 to 20	12	fair	narrow path, root flare in path	root sympathetic path construction	6.00	2.85	on path	> 10%	Yes sympathetic measures
18	Eucalyptus goniocalyx (Long-leaved Box)	30	7 to 10	5	poor			3.60	2.25	3	< 10%	Yes
19	Eucalyptus sieberi (Silvertop ash)	< 20	10 to 15	3	fair - poor			2.00	1.50	1	> 10%	Yes sympathetic measures
20	Eucalyptus sieberi (Silvertop ash)	30	10 to 15	7	fair			3.60	2.25	2	> 10%	Yes sympathetic measures
21	Eucalyptus goniocalyx (Long-leaved Box)	< 20	10 to 15	5	fair			2.00	1.50	2	< 10%	Yes
22	Eucalyptus goniocalyx (Long-leaved Box)	60	15 to 20	7	fair	narrow path		7.20	3.01	1	> 10%	Yes sympathetic measures
23	Eucalyptus goniocalyx (Long-leaved Box)	< 20	5 to 7	5	very poor	tree on path	Consider removal or modify path	2.00	1.50	on path	> 10%	Yes sympathetic measures
24	Eucalyptus sieberi (Silvertop ash)	20	15 to 20	10	fair	tree on path	modify path	2.40	2.25	on path	> 10%	Yes sympathetic measures
25	Eucalyptus sieberi (Silvertop ash)	20	10 to 15	5	fair			2.40	2.00	1	> 10%	Yes sympathetic measures
26	Eucalyptus sp.	< 40	5 to 10	1	dead	HAZARDOUS, tree on path	remove	4.20	N/A	on path	Arborist to make a determination on level of hazard pruning	
27	Eucalyptus sp.	< 40	5 to 10	1	dead	HAZARDOUS, tree on path	remove	4.20	N/A	on path	Arborist to make a determination on level of hazard pruning	
28	Eucalyptus sp.	< 40	5 to 10	1	dead	HAZARDOUS, tree on path	remove	4.20	N/A	on path	Arborist to make a determination on level of hazard pruning	
29	Eucalyptus sp.	40 to 50	10 to 15	5	dead		retain	5.40	N/A	4	< 10%	Yes

Sample site 29

Tree No.	Species (Common name)	Est. DBH	Est. Height range	Est. Canopy Spread	Condition	Path Conflict	Comments / recommendations	TPZ	SRZ	Est. path dist.	AS4970 encroachment	Can tree be retained
1	Eucalyptus sieberi (Silvertop ash)	80	30 to 40	15	fair			9.60	3.31	6	> 10%	Yes sympathetic measures
2	Eucalyptus sieberi (Silvertop ash)	60	30 to 40	12	fair			7.20	2.85	4	> 10%	Yes sympathetic measures
3	Eucalyptus sieberi (Silvertop ash)	50	30 to 40	12	fair			6.00	2.67	6	None	Yes
4	Eucalyptus cypellocarpa (Mountain Grey Gum)	20	10 to 15	5	fair			2.40	1.68	1	> 10%	Yes sympathetic measures
5	Eucalyptus sieberi (Silvertop ash)	40	30 to 40	10	fair			4.80	2.47	4	< 10%	Yes
6	Eucalyptus sieberi (Silvertop ash)	70	30 to 40	15	fair			8.40	3.01	2	> 10%	Yes sympathetic measures
7	Eucalyptus cypellocarpa (Mountain Grey Gum)	100	20 to 30	15	fair - poor	root flare in path	root sympathetic path construction	12.00	3.31	1	> 10%	Yes sympathetic measures
8	Eucalyptus sieberi (Silvertop ash)	60	20 to 30	12	fair			7.20	2.85	1	> 10%	Yes sympathetic measures
9	Eucalyptus obliqua (Messmate Stringybark)	40	20 to 30	5	fair - poor	tree on path	modify path	4.80	2.47	on path	> 10%	Yes sympathetic measures
10	Eucalyptus sieberi (Silvertop ash)	50	30 to 40	12	fair			6.00	2.67	2	> 10%	Yes sympathetic measures
11	Eucalyptus sieberi (Silvertop ash)	20	10 to 15	7	fair			2.40	2.00	2	< 10%	Yes
12	Eucalyptus obliqua (Messmate Stringybark)	50	30 to 40	15	fair			6.00	2.67	4	> 10%	Yes sympathetic measures
13	Eucalyptus cypellocarpa (Mountain Grey Gum)	80	20 to 30	10	fair - poor			9.60	2.85	10	None	Yes
14	Acacia sp.	< 40	10 to 15	2	dead	HAZARDOUS	remove	4.20	N/A	1	Arborist to make a determination on level of hazard pruning	

Sample site 30

Tree No.	Species (Common name)	Est. DBH	Est. Height range	Est. Canopy Spread	Condition	Path Conflict	Comments / recommendations	TPZ	SRZ	Est. path dist.	AS4970 encroachment	Can tree be retained
1	Eucalyptus delegatensis (Alpine Ash)	80	40 to 50	20	fair			9.60	3.31	8	< 10%	Yes
2	Eucalyptus delegatensis (Alpine Ash)	80	40 to 50	15	fair - poor			9.60	3.31	10	None	Yes
3	Eucalyptus delegatensis (Alpine Ash)	60	30 to 40	7	fair - poor			7.20	2.85	2	> 10%	Yes sympathetic measures
4	Eucalyptus delegatensis (Alpine Ash)	50	30 to 40	10	poor			6.00	2.67	2	> 10%	Yes sympathetic measures
5	Eucalyptus delegatensis (Alpine Ash)	80	40 to 50	15	Senescent			9.60	3.31	3	> 10%	Yes sympathetic measures
6	Eucalyptus delegatensis (Alpine Ash)	60	30 to 40	12	fair - poor			7.20	2.85	8	None	Yes
7	Eucalyptus delegatensis (Alpine Ash)	40	30 to 40	7	fair			4.80	2.47	10	None	Yes
8	Eucalyptus delegatensis (Alpine Ash)	100	40 to 50	20	fair			12.00	3.92	2	> 10%	Yes sympathetic measures
9	Eucalyptus delegatensis (Alpine Ash)	100	40 to 50	20	fair			12.00	3.63	5	> 10%	Yes sympathetic measures
10	Eucalyptus delegatensis (Alpine Ash)	40	30 to 40	10	HAZARDOUS		Remove or habitat prune	4.80	2.47	4	Arborist to make a determination on level of hazard pruning	
11	Eucalyptus delegatensis (Alpine Ash)	40	30 to 40	10	poor			4.80	2.47	5	None	Yes
12	Eucalyptus delegatensis (Alpine Ash)	100	40 to 50	20	very poor			12.00	3.63	8	> 10%	Yes sympathetic measures
13	Nothofagus cunninghamii (Myrtle Beech)	30	10 to 15	7	fair - poor			3.60	2.25	6	None	Yes
14	Nothofagus cunninghamii (Myrtle Beech)	20	7 to 10	5	fair - poor			2.40	2.00	4	None	Yes
15	Nothofagus cunninghamii (Myrtle Beech)	20	10 to 15	5	fair			2.40	1.68	8	None	Yes
16	Nothofagus cunninghamii (Myrtle Beech)	30	15 to 20	7	fair			3.60	2.25	6	None	Yes
17	Nothofagus cunninghamii (Myrtle Beech)	40	15 to 20	10	good			4.80	2.47	8	None	Yes
18	Nothofagus cunninghamii (Myrtle Beech)	30	15 to 20	7	fair			3.60	2.25	8	None	Yes
19	Nothofagus cunninghamii (Myrtle Beech)	40	10 to 15	7	fair - poor			4.80	2.25	15	None	Yes
20	Nothofagus cunninghamii (Myrtle Beech)	10	5 to 7	5	fair			2.00	1.68	8	None	Yes
21	Nothofagus cunninghamii (Myrtle Beech)	30	10 to 15	7	fair			3.60	2.25	8	None	Yes
22	Nothofagus cunninghamii (Myrtle Beech)	30	10 to 15	7	fair			3.60	2.00	6	None	Yes
23	Nothofagus cunninghamii (Myrtle Beech)	30	10 to 15	7	poor			3.60	2.00	5	None	Yes
24	Nothofagus cunninghamii (Myrtle Beech)	30	7 to 10	5	fair			3.60	2.00	4	None	Yes
25	Nothofagus cunninghamii (Myrtle Beech)	20	10 to 15	5	fair - poor			2.40	1.68	6	None	Yes
26	Nothofagus cunninghamii (Myrtle Beech)	50	10 to 15	10	fair			6.00	2.67	8	None	Yes
27	Nothofagus cunninghamii (Myrtle Beech)	70	10 to 15	7	fair - poor			8.40	2.85	8	< 10%	Yes
28	Nothofagus cunninghamii (Myrtle Beech)	80	15 to 20	10	fair			9.60	3.31	15	None	Yes
29	Nothofagus cunninghamii (Myrtle Beech)	30	10 to 15	7	fair - poor			3.60	2.25	5	None	Yes
30	Nothofagus cunninghamii (Myrtle Beech)	50	15 to 20	10	fair			6.00	2.67	4	> 10%	Yes sympathetic measures
31	Nothofagus cunninghamii (Myrtle Beech)	40	15 to 20	10	fair			4.80	2.47	5	None	Yes
32	Nothofagus cunninghamii (Myrtle Beech)	40	10 to 15	7	fair			4.80	2.47	6	None	Yes
33	Nothofagus cunninghamii (Myrtle Beech)	50	10 to 15	10	fair			6.00	2.67	1	> 10%	Yes sympathetic measures
34	Nothofagus cunninghamii (Myrtle Beech)	30	10 to 15	7	fair			3.60	2.25	3	< 10%	Yes
35	Nothofagus cunninghamii (Myrtle Beech)	10	5 to 7	3	fair			2.00	1.68	2	None	Yes
36	Nothofagus cunninghamii (Myrtle Beech)	40	10 to 15	7	fair			4.80	2.47	2	> 10%	Yes sympathetic measures
37	Nothofagus cunninghamii (Myrtle Beech)	10	5 to 7	5	fair - poor			2.00	1.68	5	None	Yes
38	Nothofagus cunninghamii (Myrtle Beech)	60	15 to 20	10	fair			7.20	2.85	8	None	Yes
39	Nothofagus cunninghamii (Myrtle Beech)	60	15 to 20	10	fair			7.20	2.85	10	None	Yes
40	Nothofagus cunninghamii (Myrtle Beech)	40	10 to 15	7	fair			4.80	2.47	15	None	Yes
41	Nothofagus cunninghamii (Myrtle Beech)	40	10 to 15	7	fair			4.80	2.47	1	> 10%	Yes sympathetic measures
42	Nothofagus cunninghamii (Myrtle Beech)	100	15 to 20	12	fair			12.00	3.63	4	> 10%	Yes sympathetic measures
43	Eucalyptus sp.	< 40	5 to 10	2	dead	HAZARDOUS	remove	4.20	N/A	1	Arborist to make a determination on level of hazard pruning	

## Appendix 1 B: Section data on all trees within each site

Trees included in these section data tables are the estimated number of stems within each individual study area.

**DBH** = diameter at breast height (estimated within ranges as indicated). Trees with multiple stems had their DBH estimated.

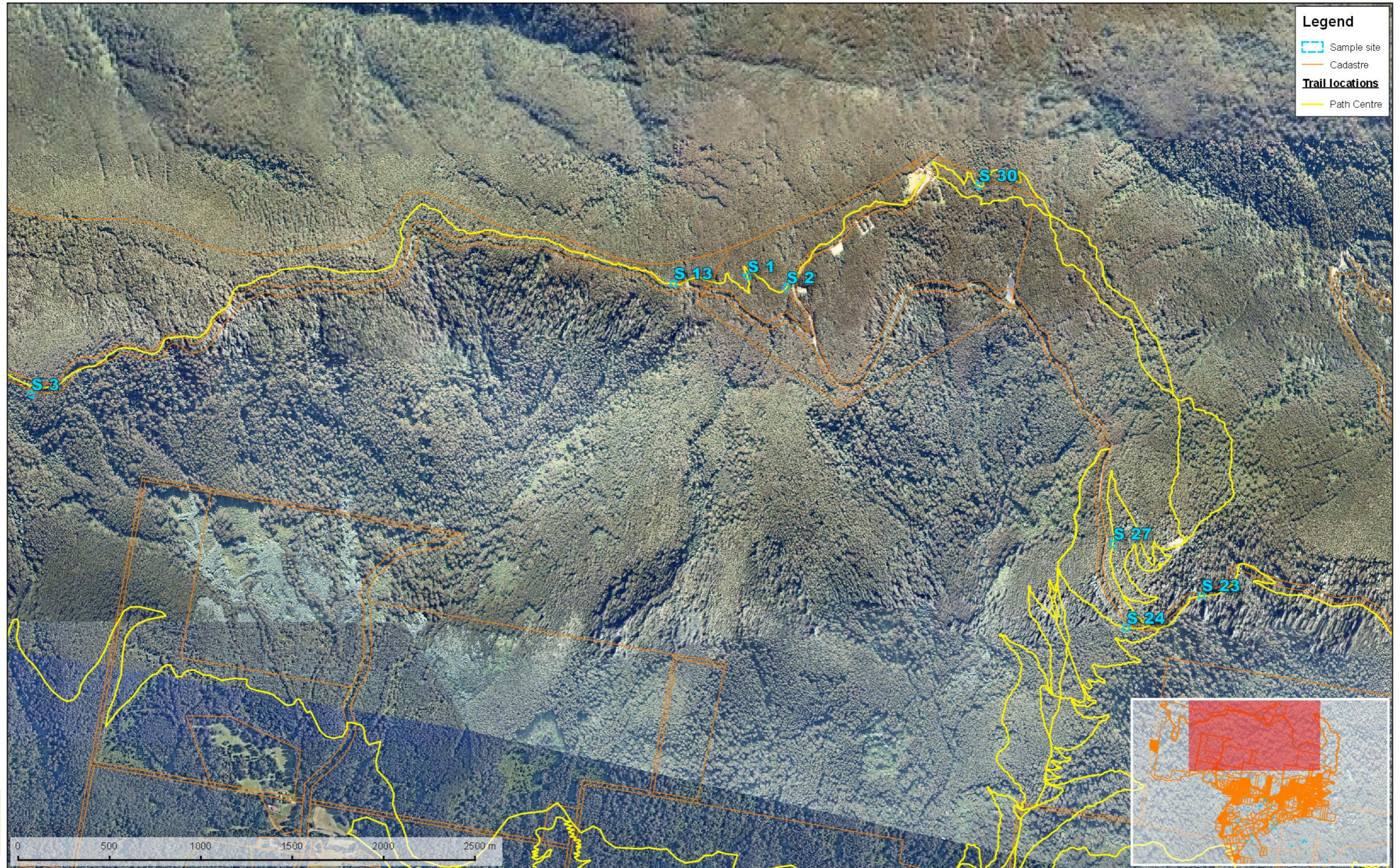
Mixed species are those trees that are of the genus *Eucalyptus*, *Acacia* or *Nothofagus* and include species such as Hazel Pomaderris (*Pomaderris aspera*), Burgan (*Kunzea ericoides*), Blanket-leaf (*Bedfordia arborescens*) and Elderberry Panax (*Polyscias sambucifolia*).

Section No.	Eucalypt specimen count range						Wattle specimen count range					
	DBH range (cm)						DBH range (cm)					
	< 20	20 - 40	40 to 60	60 to 100	100 to 150	> 150	< 20	20 - 40	40 to 60	60 to 100	100 to 150	> 150
Site 01		6 to 10	1 to 5	1 to 5	6 to 10							
Site 02	1 to 5	6 to 10	6 to 10	6 to 10								
Site 03	1 to 5	1 to 5	11 to 20	11 to 20					1 to 5			
Site 04	21 to 30	11 to 20	1 to 5	1 to 5								
Site 05	31 to 40	11 to 20	11 to 20	6 to 10			6 to 10	1 to 5				
Site 06	1 to 5	1 to 5	1 to 5	1 to 5			1 to 5					
Site 07	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5		1 to 5					
Site 08	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5		1 to 5					
Site 09	6 to 10	1 to 5	6 to 10	1 to 5		1 to 5	11 to 20	6 to 10				
Site 10	6 to 10	11 to 20	11 to 20	6 to 10			1 to 5	1 to 5				
Site 11	51 to 60	21 to 30	1 to 5									
Site 12	1 to 5	11 to 20	11 to 20	1 to 5			1 to 5					
Site 13	1 to 5	1 to 5	1 to 5	6 to 10			1 to 5					
Site 14	6 to 10	21 to 30	6 to 10	1 to 5			1 to 5					
Site 15	6 to 10	6 to 10	6 to 10	6 to 10			1 to 5					
Site 16	41 to 50	11 to 20	21 to 30	11 to 20			1 to 5					
Site 17	21 to 30	11 to 20	1 to 5	6 to 10			6 to 10					
Site 18	76 to 100	21 to 30	1 to 5									
Site 19	1 to 5	1 to 5	11 to 20	1 to 5			1 to 5					
Site 20	1 to 5	6 to 10	6 to 10	6 to 10			6 to 10					
Site 21	21 to 30	11 to 20	11 to 20	1 to 5			1 to 5					
Site 22	21 to 30	11 to 20	6 to 10				6 to 10	1 to 5				
Site 23		1 to 5	1 to 5	1 to 5	1 to 5	1 to 5						
Site 24		1 to 5	1 to 5	6 to 10	6 to 10		21 to 30	11 to 20				
Site 25		6 to 10	11 to 20				1 to 5	1 to 5				
Site 26		1 to 5	1 to 5	1 to 5			21 to 30	31 to 40				
Site 27		1 to 5	6 to 10	6 to 10			6 to 10	6 to 10				
Site 28	76 to 100	11 to 20	1 to 5									
Site 29	6 to 10	1 to 5	1 to 5	1 to 5			1 to 5	1 to 5				
Site 30	1 to 5	1 to 5	6 to 10	6 to 10	1 to 5							

Section No.	Mixed species specimen count range						Beech specimen count range					
	DBH range (cm)						DBH range (cm)					
	< 20	20 - 40	40 to 60	60 to 100	100 to 150	> 150	< 20	20 - 40	40 to 60	60 to 100	100 to 150	> 150
Site 01	1 to 5						6 to 10	11 to 20	1 to 5	1 to 5		
Site 02							6 to 10	6 to 10	1 to 5			
Site 03							21 to 30	11 to 20				
Site 04	6 to 10											
Site 05	31 to 40											
Site 06	1 to 5											
Site 07	1 to 5											
Site 08	21 to 30											
Site 09	> 100	6 to 10										
Site 10	11 to 20											
Site 11												
Site 12	41 to 50											
Site 13	1 to 5	1 to 5						1 to 5				
Site 14												
Site 15	11 to 20	1 to 5										
Site 16												
Site 17	21 to 30											
Site 18												
Site 19	11 to 20											
Site 20	21 to 30	1 to 5										
Site 21												
Site 22	6 to 10											
Site 23	21 to 30	11 to 20					1 to 5	1 to 5				1 to 5
Site 24	31 to 40	21 to 30	1 to 5									
Site 25	21 to 30											
Site 26	1 to 5											
Site 27	31 to 40	1 to 5										
Site 28												
Site 29	1 to 5											
Site 30							6 to 10	11 to 20	1 to 5	1 to 5	1 to 5	



Appendix 2 A: Mapping - Sample site locations

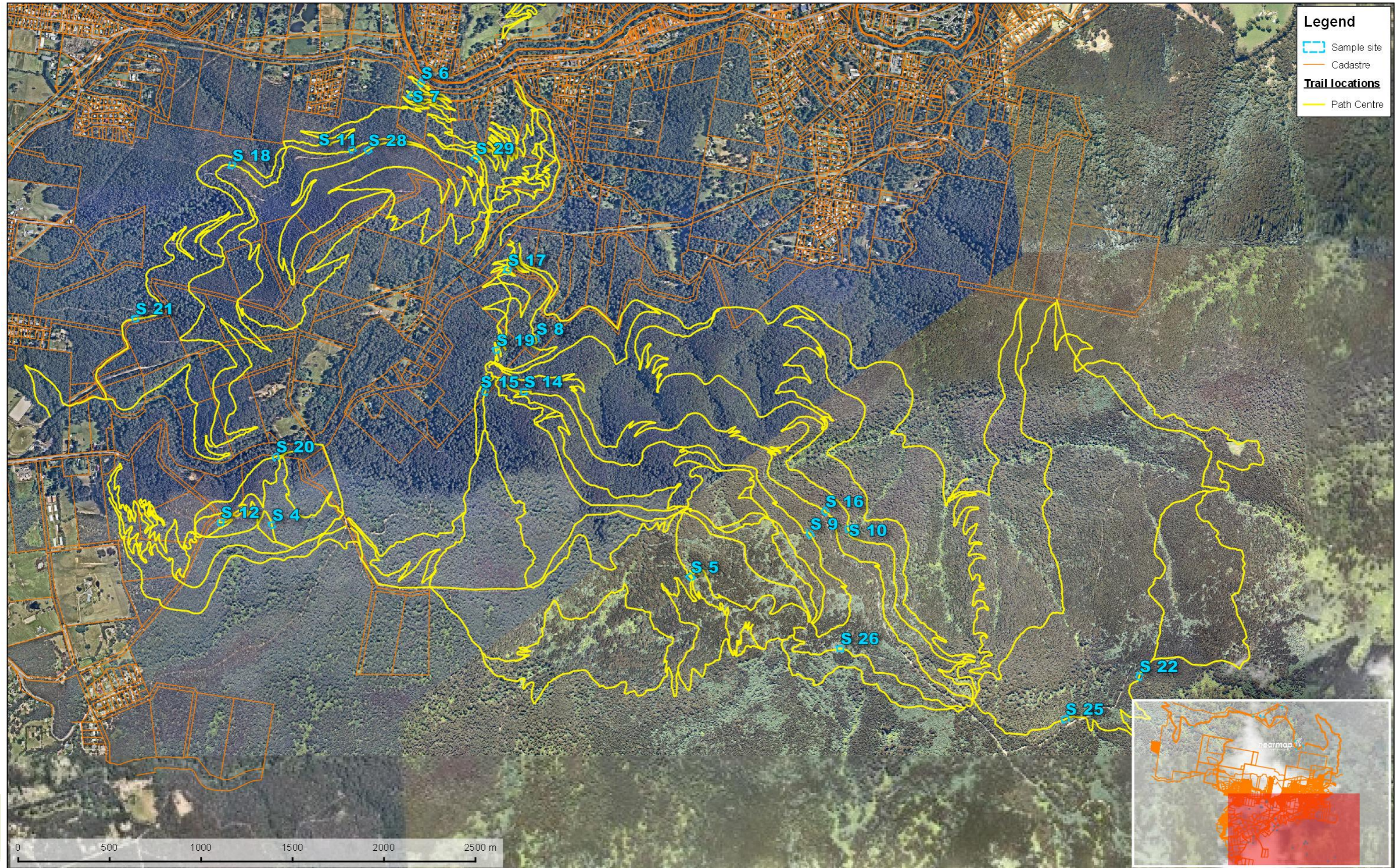


Appendix 2 A -  
Warburton Mountain Bike Destination Project  
Locations of the sample sites

Co-ordinate System:  
GDA 1994 MGA Zone 55  
Projection: Transverse Mercator  
Datum: GDA 1994







**Appendix 2 A -  
Warburton Mountain Bike Destination Project  
Locations of the sample sites**

Co-ordinate System:  
GDA 1994 MGAZone 55  
Projection: Transverse Mercator  
Datum: GDA 1994





Appendix 2 B: Mapping - Approximate tree locations with TPZ and SRZ projections



Client: Biosis  
Map Source: NearMap  
Date: 22/04/2021

**Appendix 2 B - Warburton Mountain Bike Destination Project**  
Tree locations in current site context  
with TPZ and SRZ projections



**Sample site:**  
1



Client: Biosis  
Map Source: NearMap  
Date: 22/04/2021

**Appendix 2 B - Warburton Mountain Bike Destination Project**  
Tree locations in current site context  
with TPZ and SRZ projections



**Sample site:**  
2



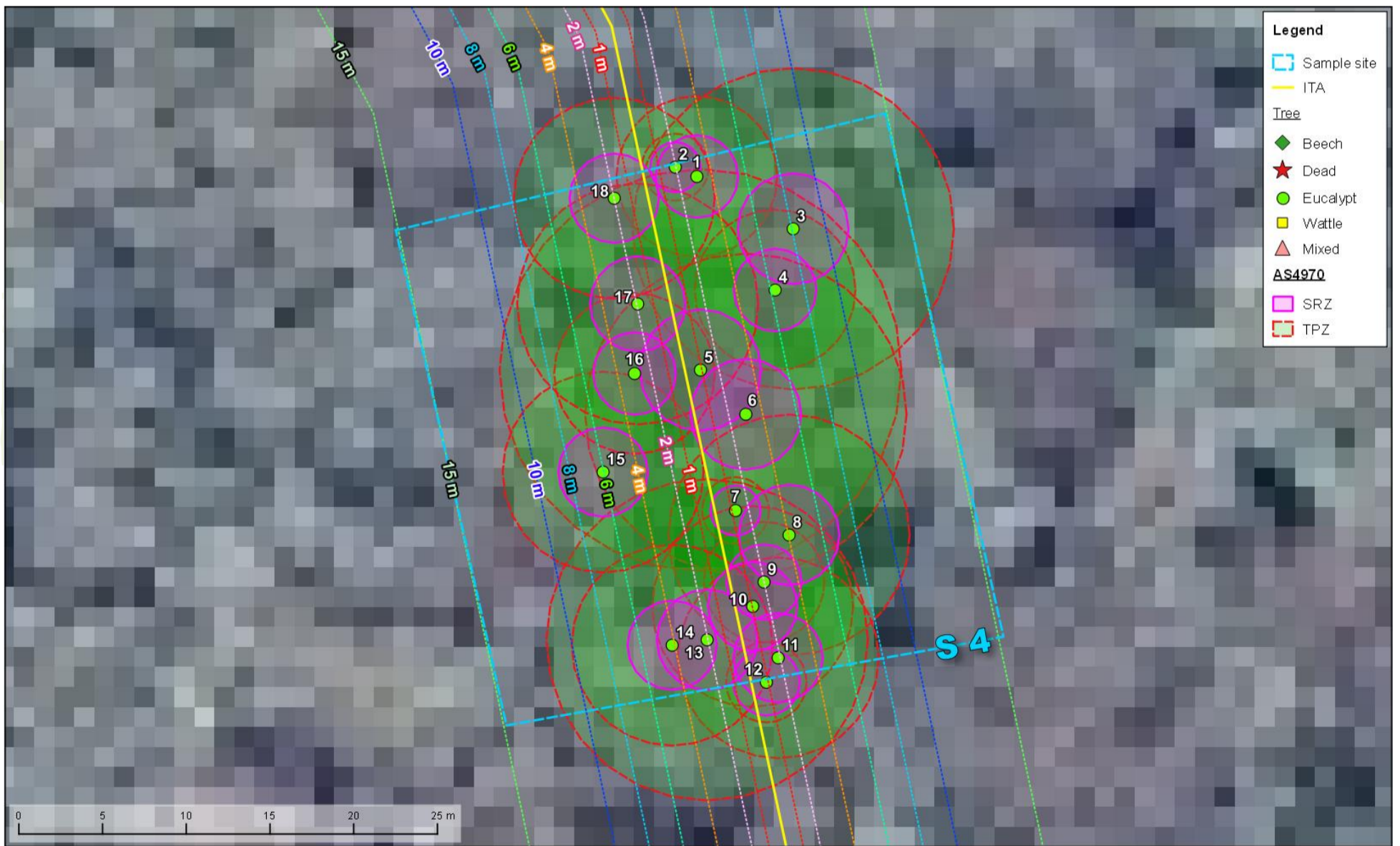


Client: Biosis  
Map Source: NearMap  
Date: 22/04/2021

**Appendix 2 B - Warburton Mountain Bike Destination Project**  
**Tree locations in current site context**  
**with TPZ and SRZ projections**



**Sample site:**  
**3**



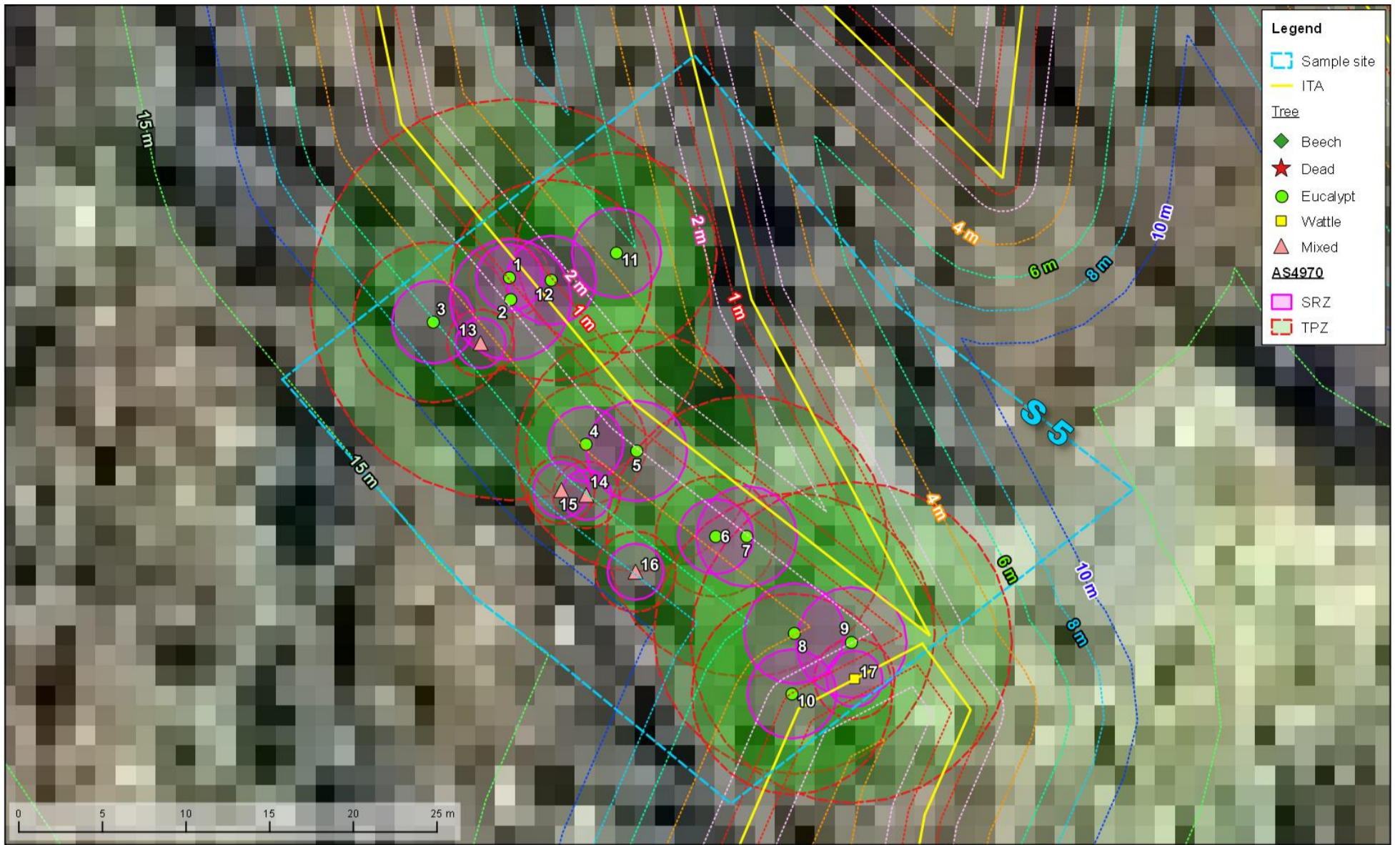
Client: Biosis  
Map Source: NearMap  
Date: 22/04/2021

**Appendix 2 B - Warburton Mountain Bike Destination Project**  
**Tree locations in current site context**  
**with TPZ and SRZ projections**



**Sample site:**  
**4**



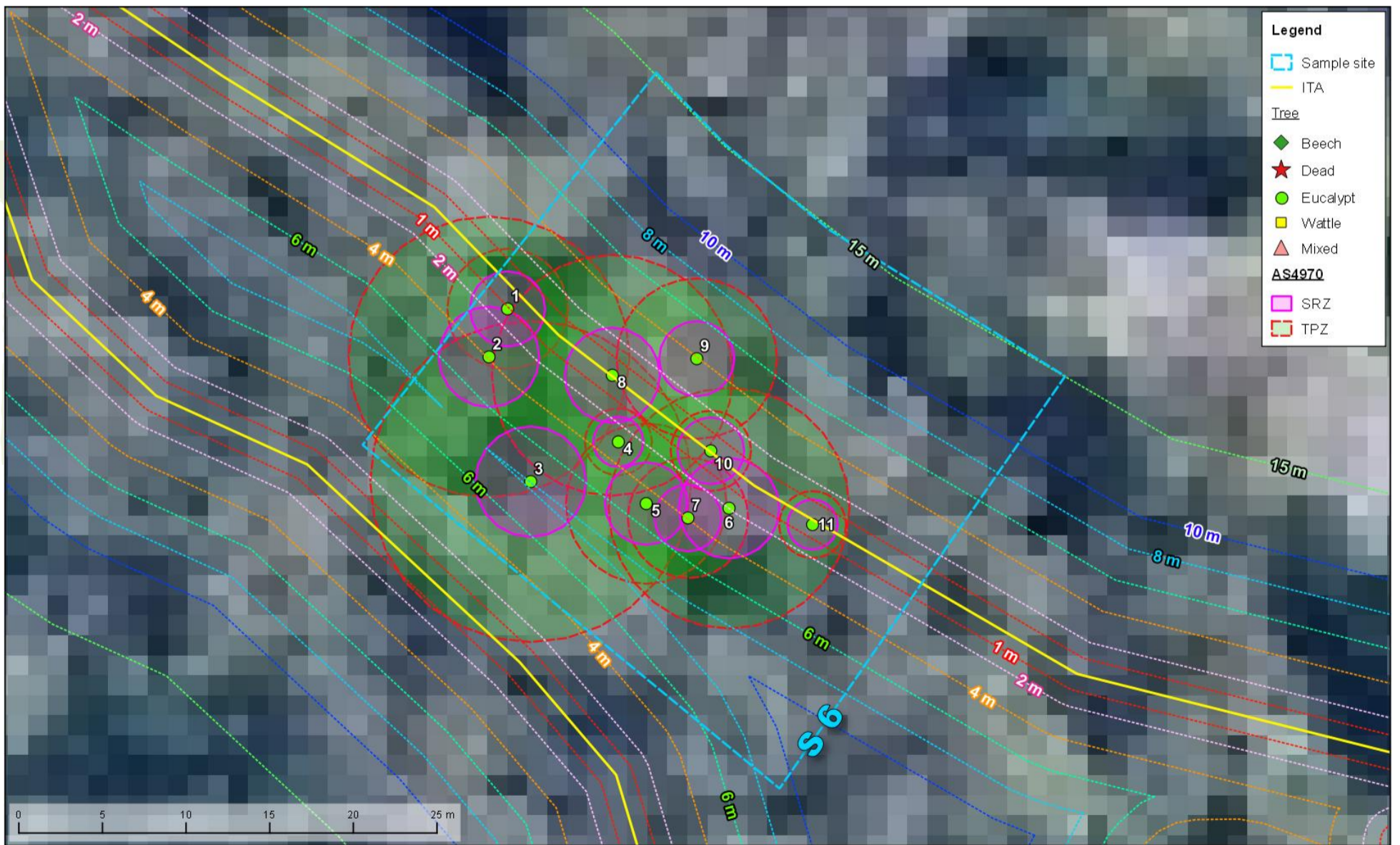


Client: Biosis  
Map Source: NearMap  
Date: 22/04/2021

**Appendix 2 B - Warburton Mountain Bike Destination Project**  
**Tree locations in current site context**  
**with TPZ and SRZ projections**



**Sample site:**  
**5**



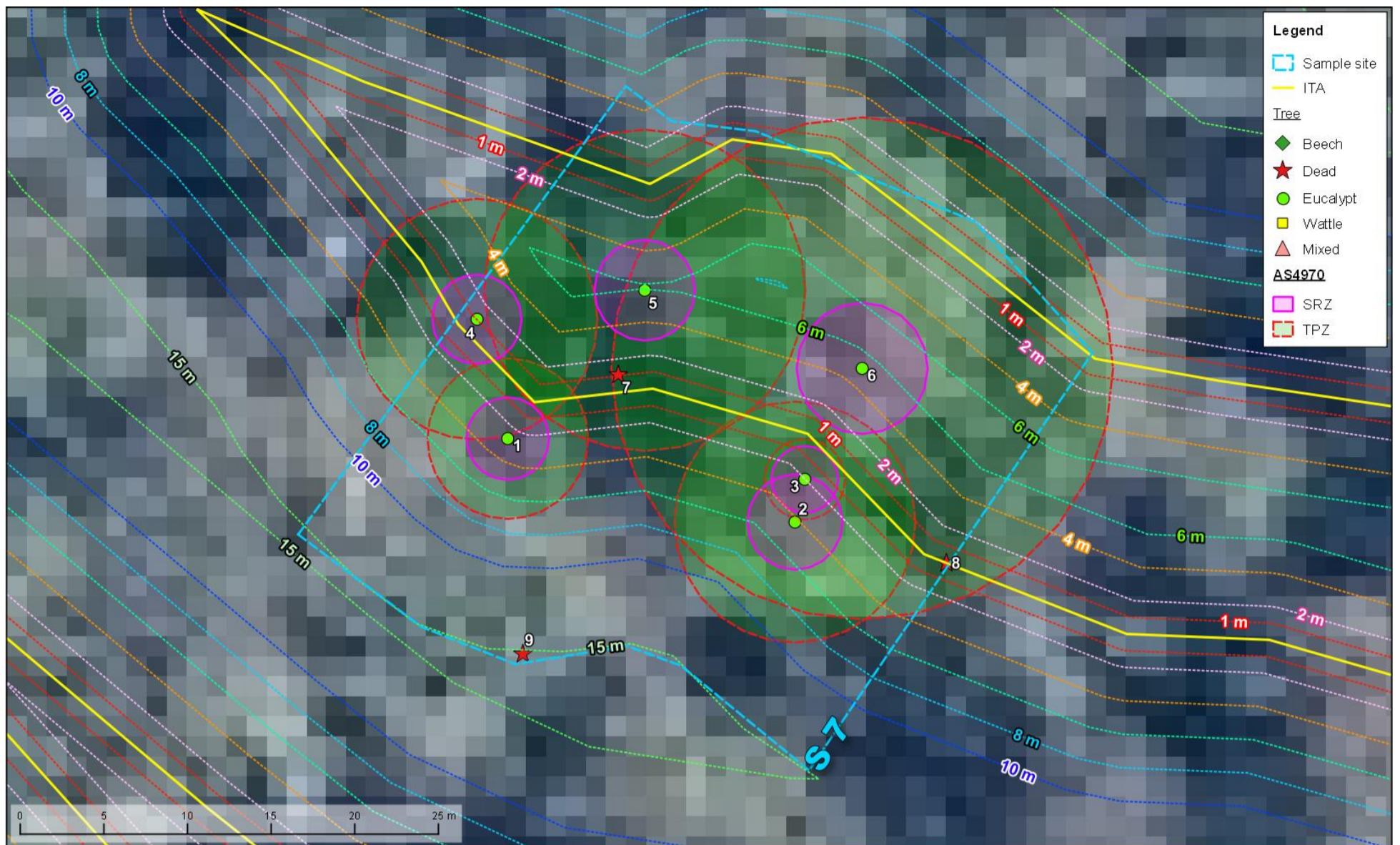
Client: Biosis  
Map Source: NearMap  
Date: 22/04/2021

**Appendix 2 B - Warburton Mountain Bike Destination Project**  
**Tree locations in current site context**  
**with TPZ and SRZ projections**



**Sample site:**  
**6**



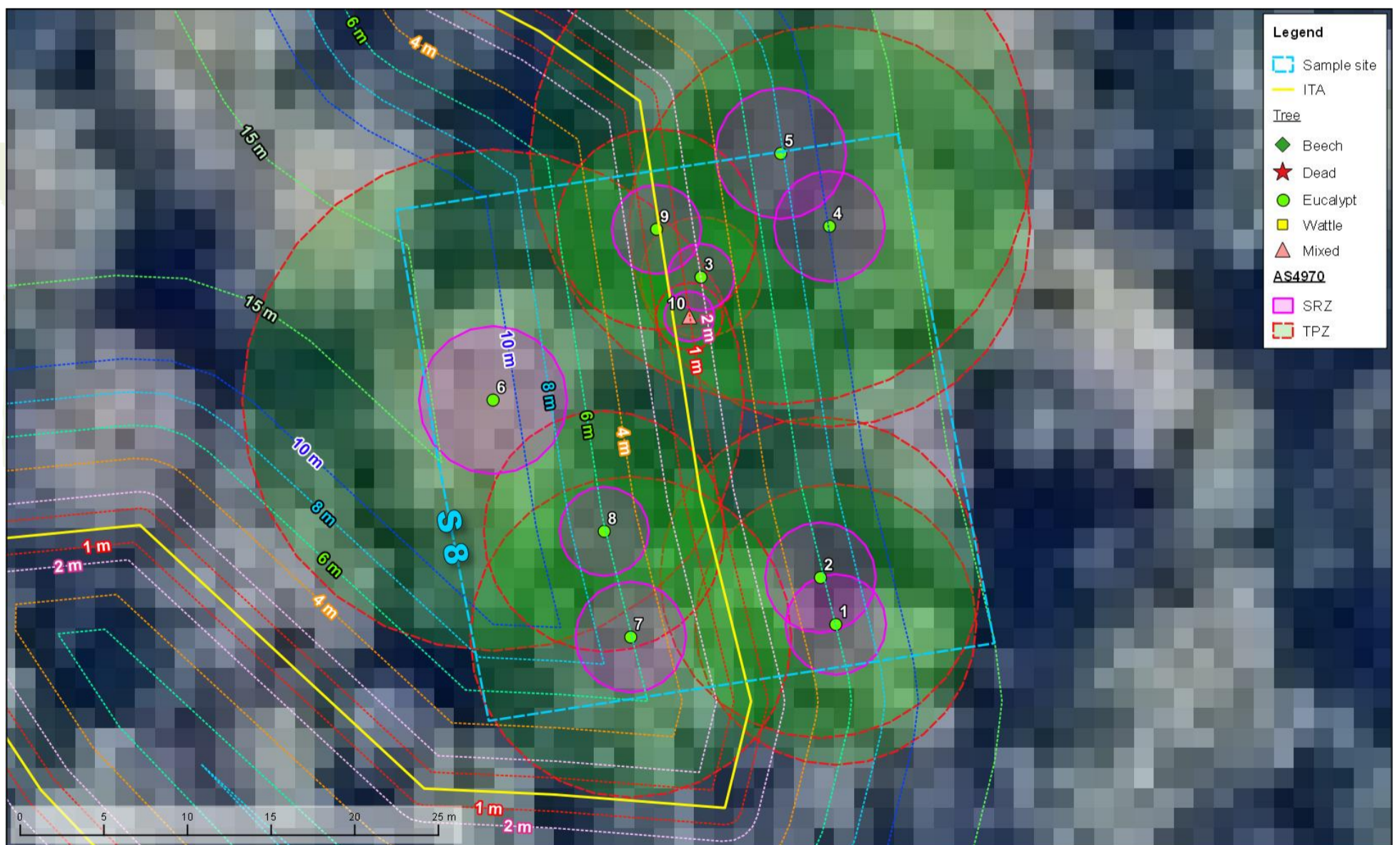


Client: Biosis  
Map Source: NearMap  
Date: 22/04/2021

**Appendix 2 B - Warburton Mountain Bike Destination Project**  
**Tree locations in current site context**  
**with TPZ and SRZ projections**



**Sample site:**  
**7**



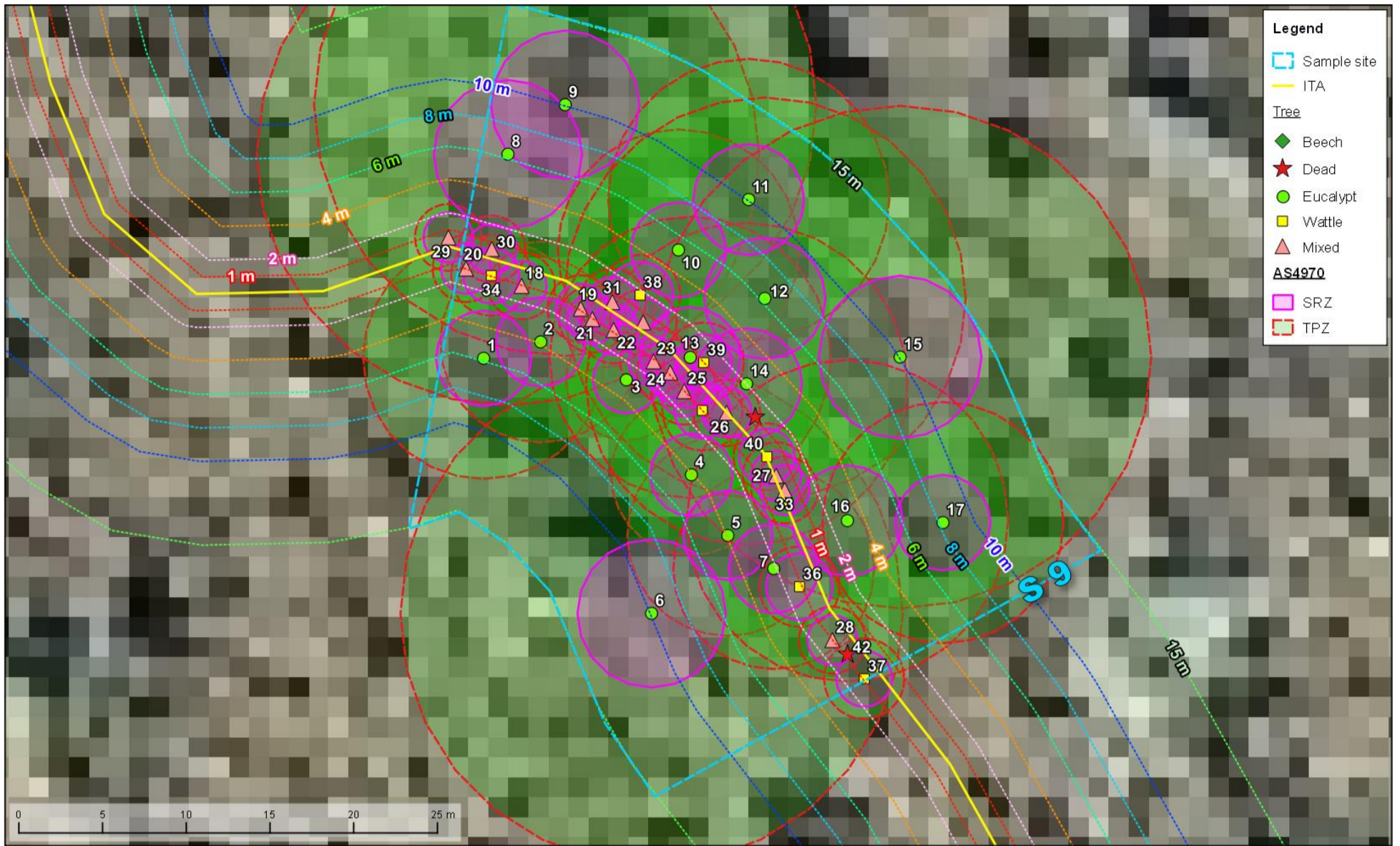
Client: Biosis  
Map Source: NearMap  
Date: 22/04/2021

**Appendix 2 B - Warburton Mountain Bike Destination Project**  
**Tree locations in current site context**  
**with TPZ and SRZ projections**



**Sample site:**  
**8**



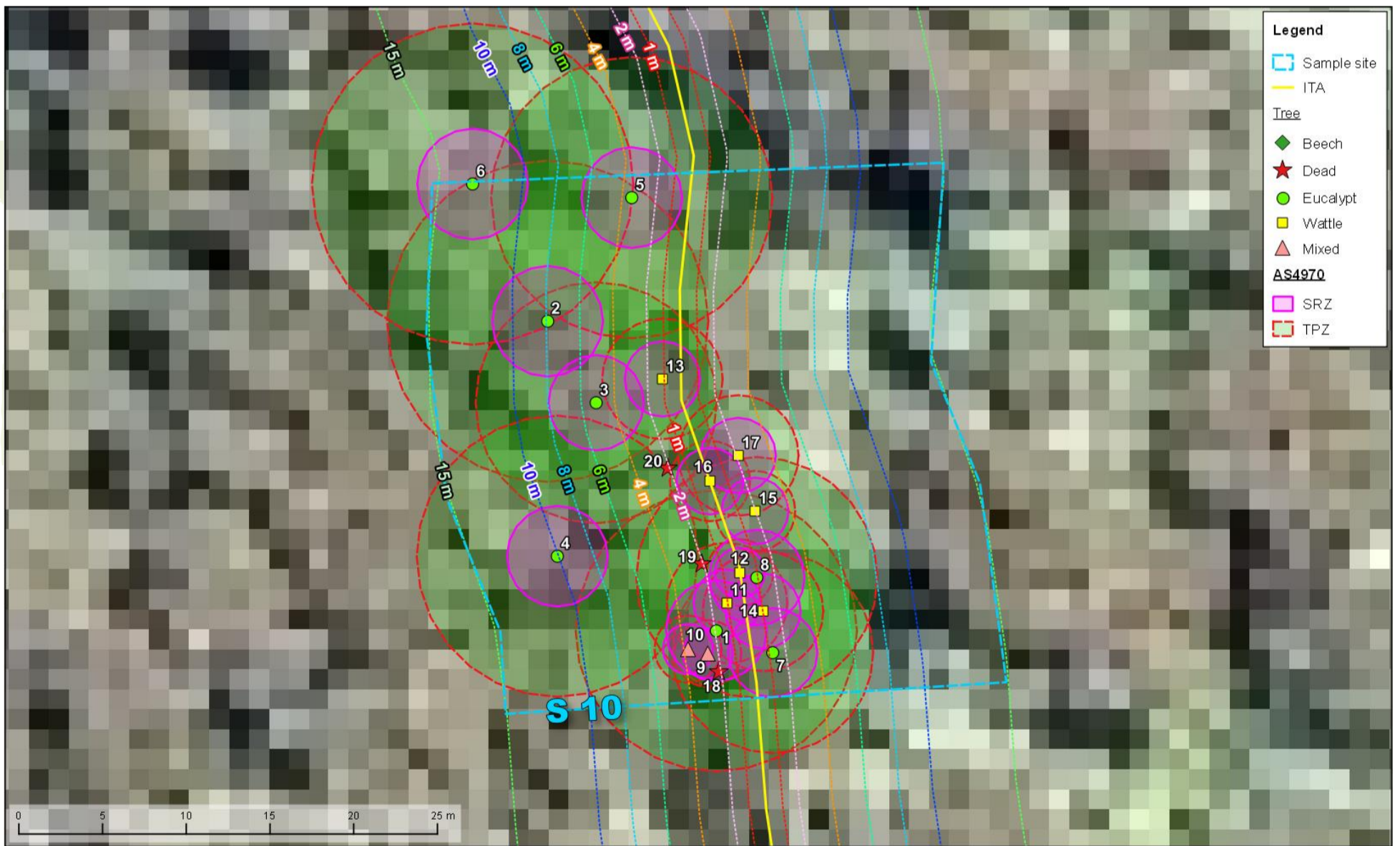


Client: Biosis  
Map Source: NearMap  
Date: 22/04/2021

**Appendix 2 B - Warburton Mountain Bike Destination Project**  
**Tree locations in current site context**  
**with TPZ and SRZ projections**



**Sample site:**  
**9**



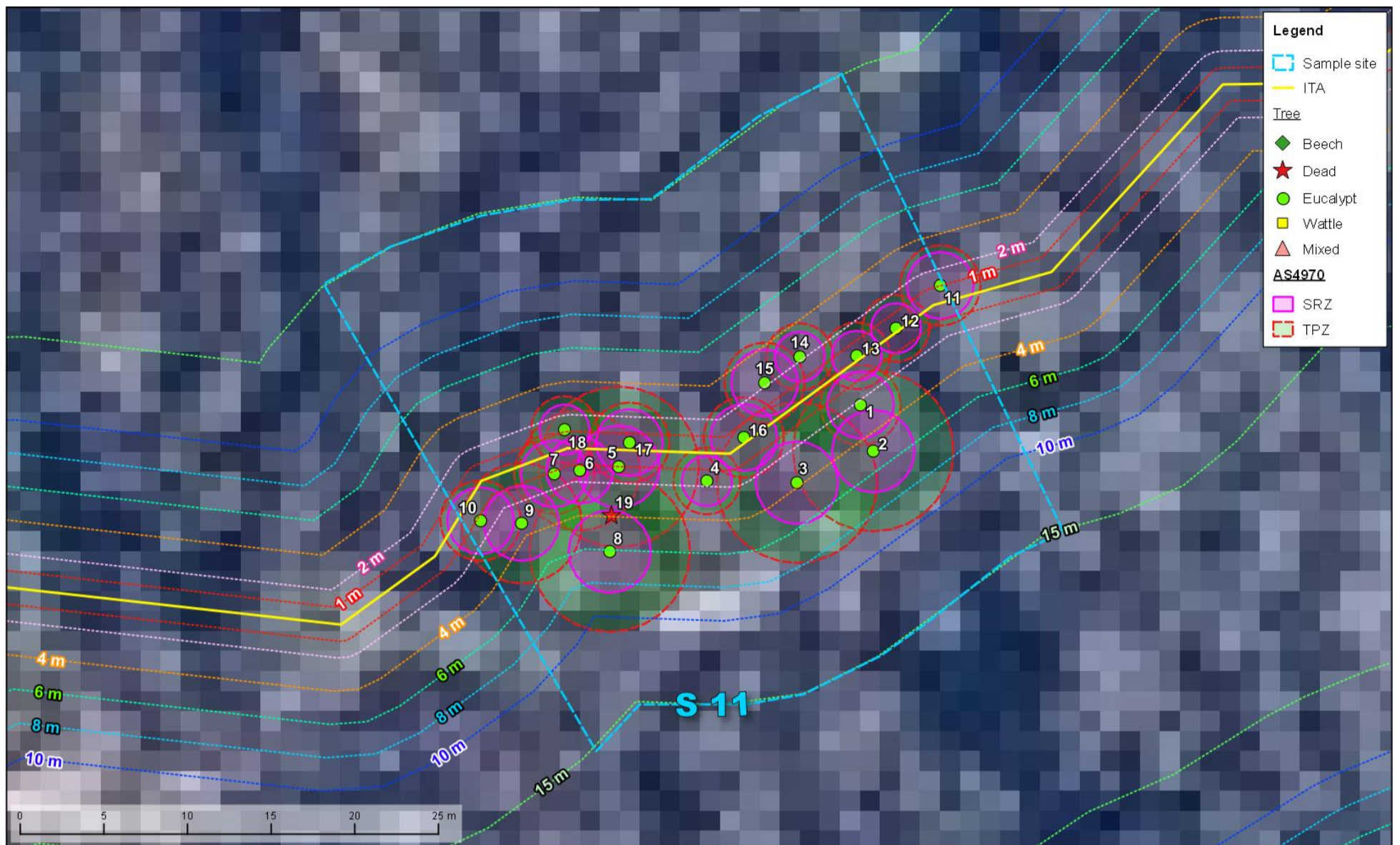
Client: Biosis  
Map Source: NearMap  
Date: 22/04/2021

**Appendix 2 B - Warburton Mountain Bike Destination Project**  
**Tree locations in current site context**  
**with TPZ and SRZ projections**



**Sample site:**  
**10**



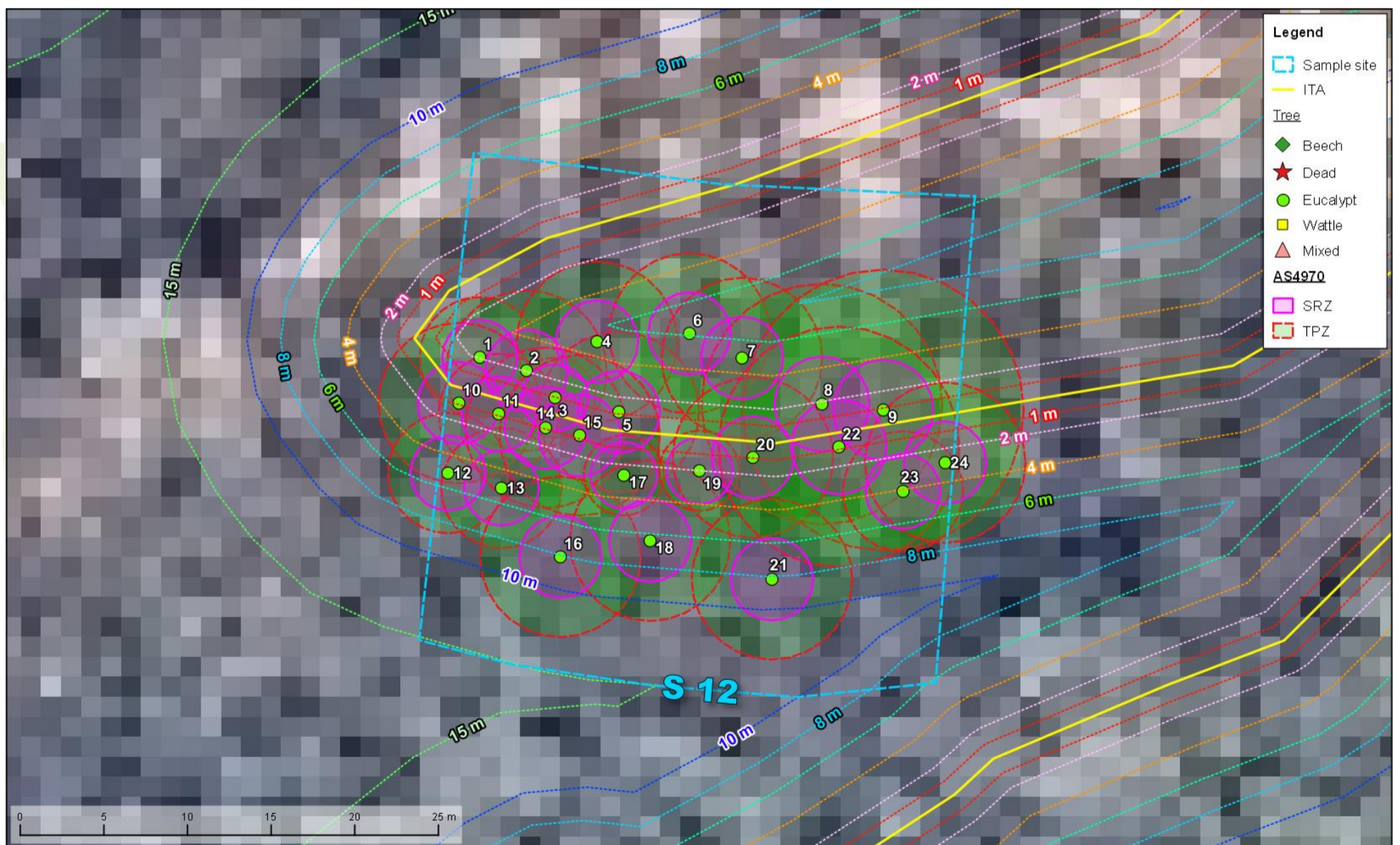


Client: Biosis  
Map Source: NearMap  
Date: 22/04/2021

**Appendix 2 B - Warburton Mountain Bike Destination Project**  
**Tree locations in current site context**  
**with TPZ and SRZ projections**



**Sample site:**  
**11**



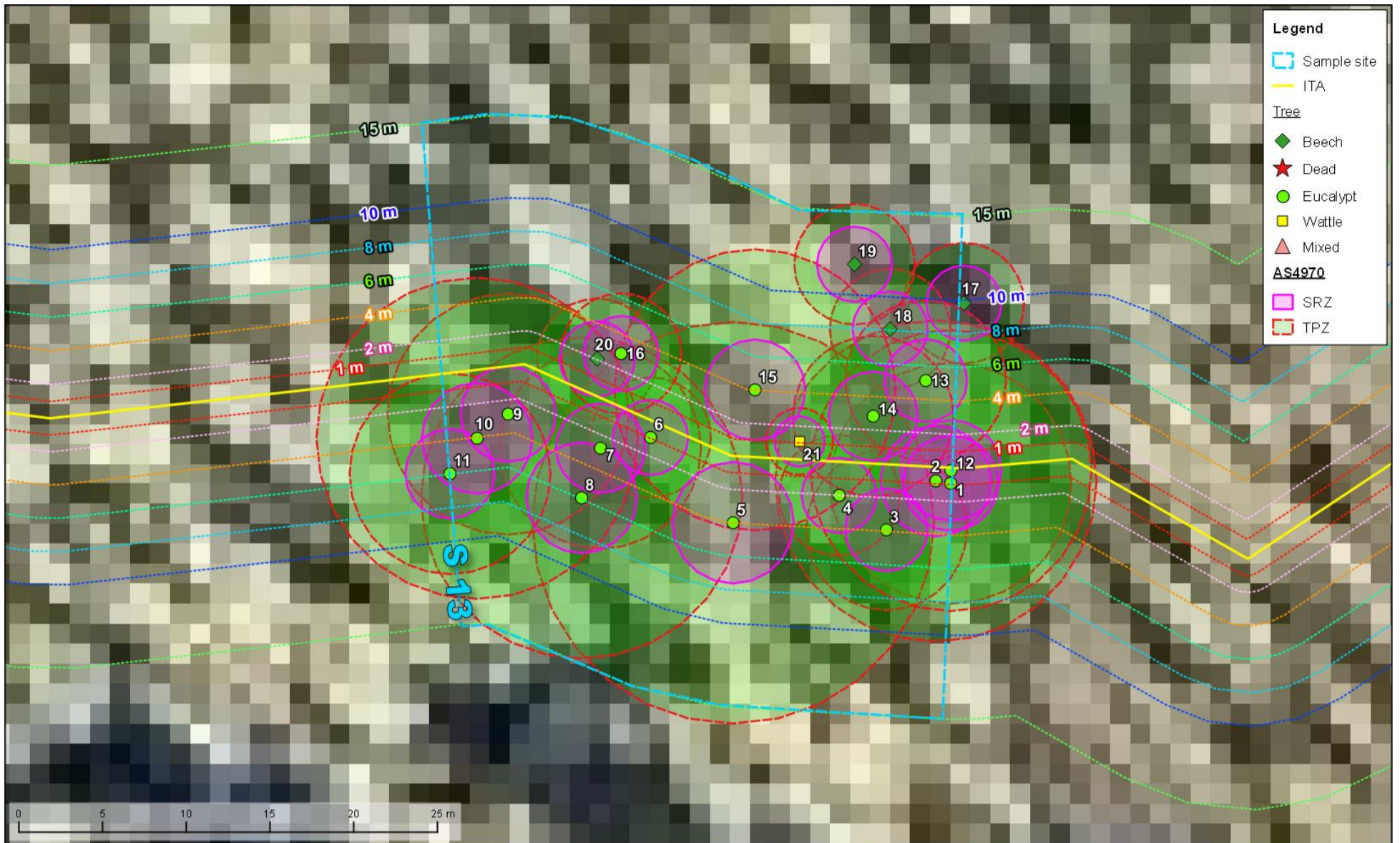
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Map Source: NearMap  
Date: 22/04/2021

**Appendix 2 B - Warburton Mountain Bike Destination Project**  
**Tree locations in current site context**  
**with TPZ and SRZ projections**



**Sample site:**  
**12**



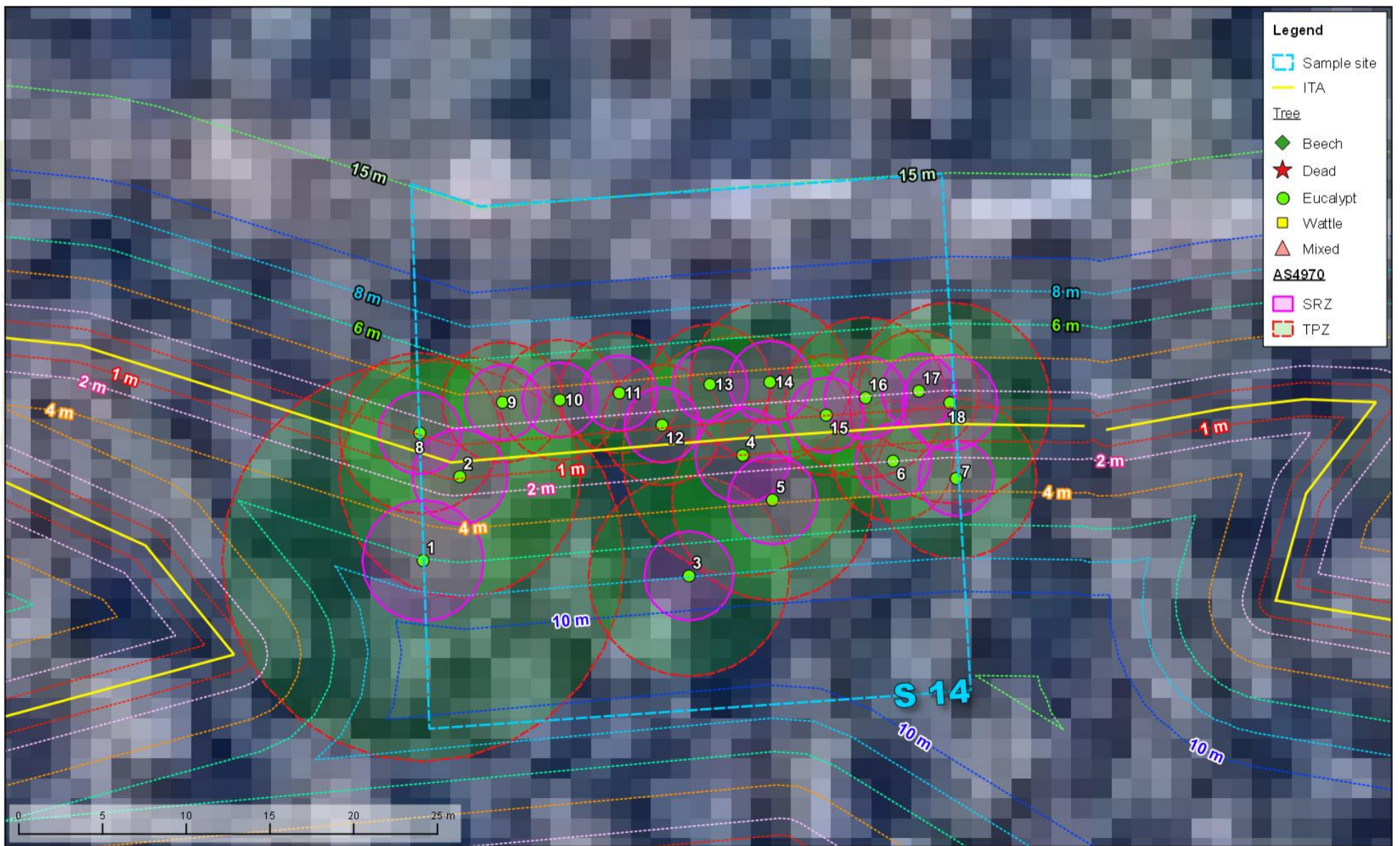


Client: Biosis  
Map Source: NearMap  
Date: 22/04/2021

**Appendix 2 B - Warburton Mountain Bike Destination Project**  
**Tree locations in current site context**  
**with TPZ and SRZ projections**



**Sample site:**  
**13**



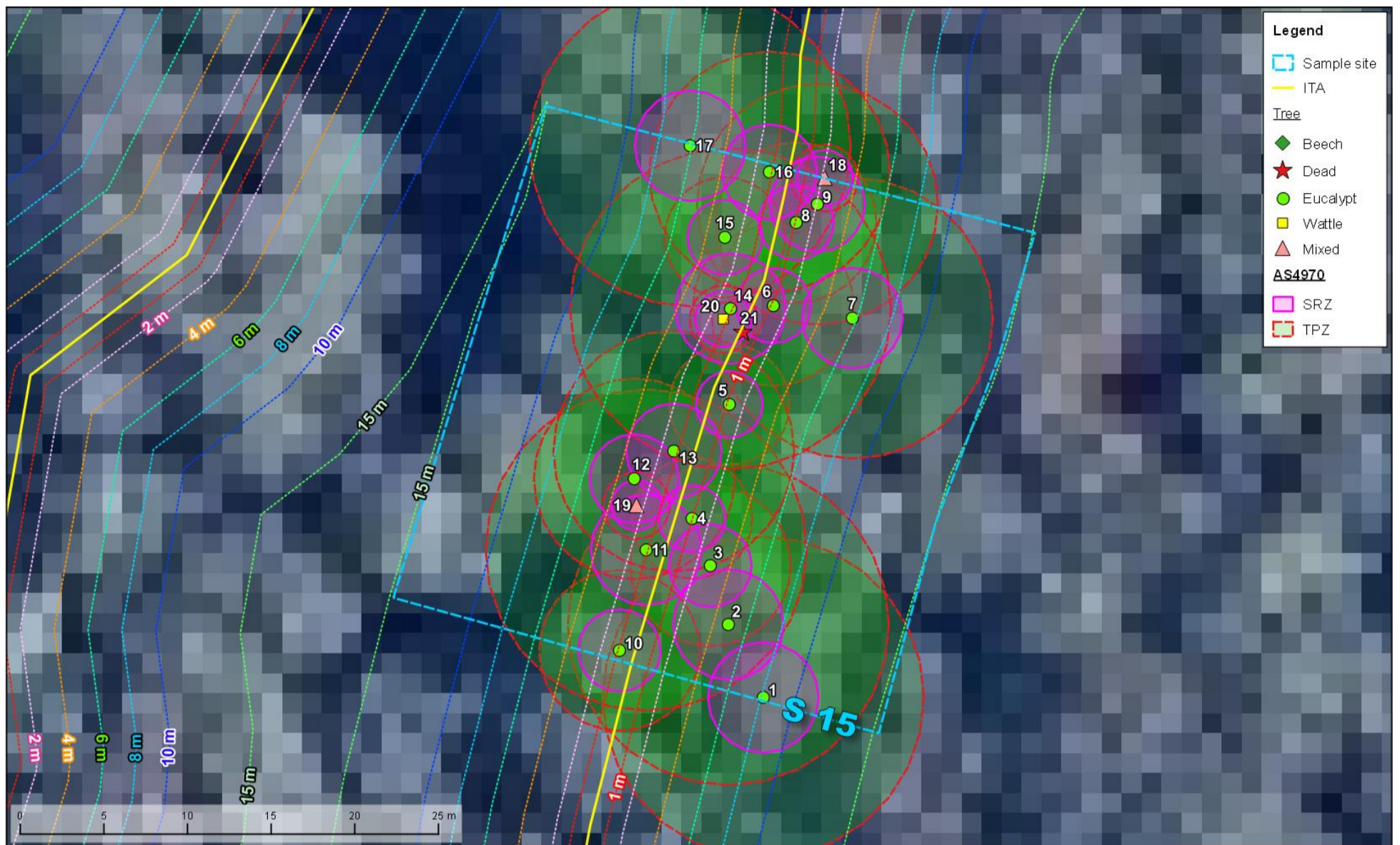
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Map Source: NearMap  
Date: 22/04/2021

**Appendix 2 B - Warburton Mountain Bike Destination Project**  
**Tree locations in current site context**  
**with TPZ and SRZ projections**



**Sample site:**  
**14**



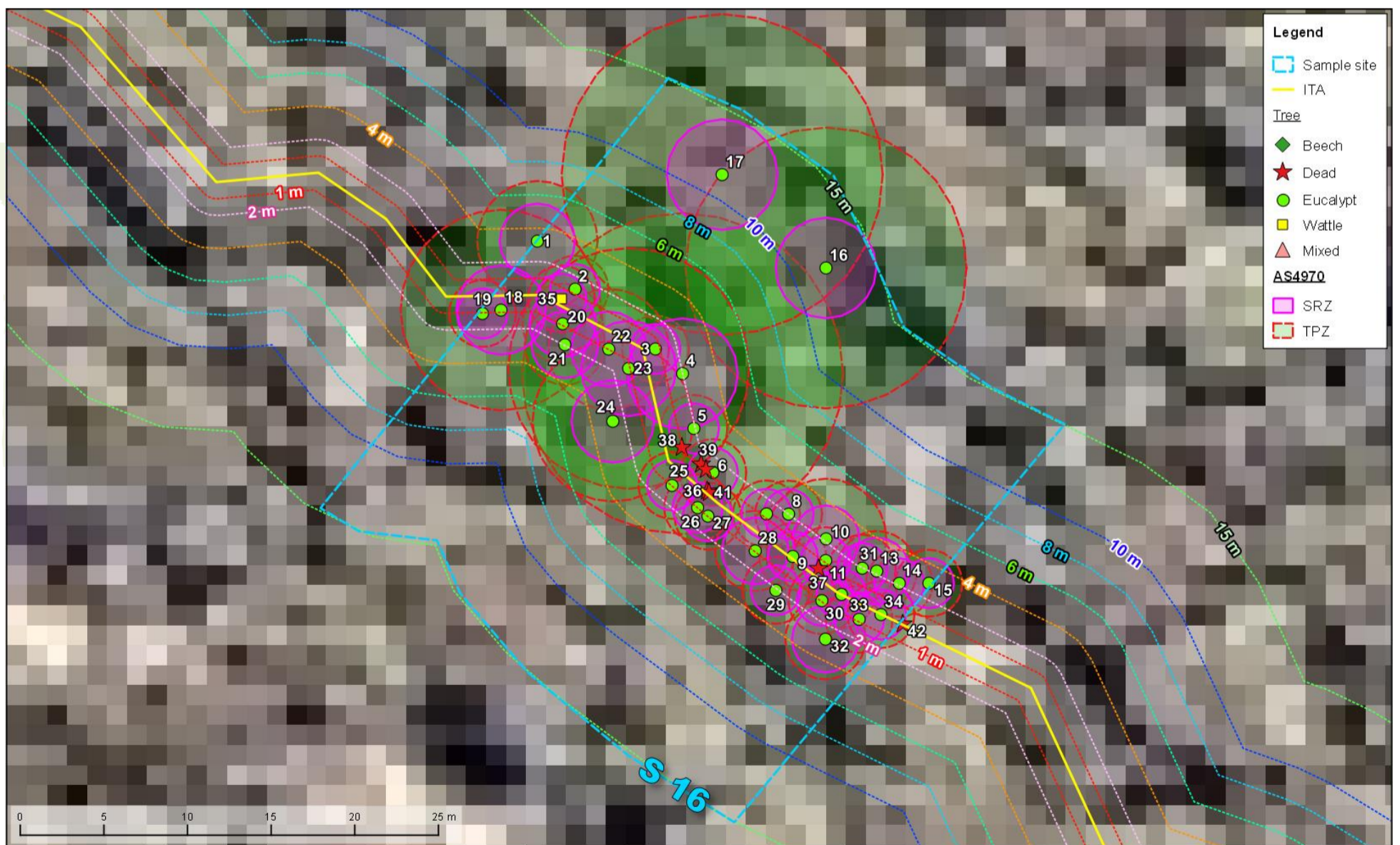


Client: Biosis  
Map Source: NearMap  
Date: 22/04/2021

**Appendix 2 B - Warburton Mountain Bike Destination Project**  
**Tree locations in current site context**  
**with TPZ and SRZ projections**



**Sample site:**  
**15**



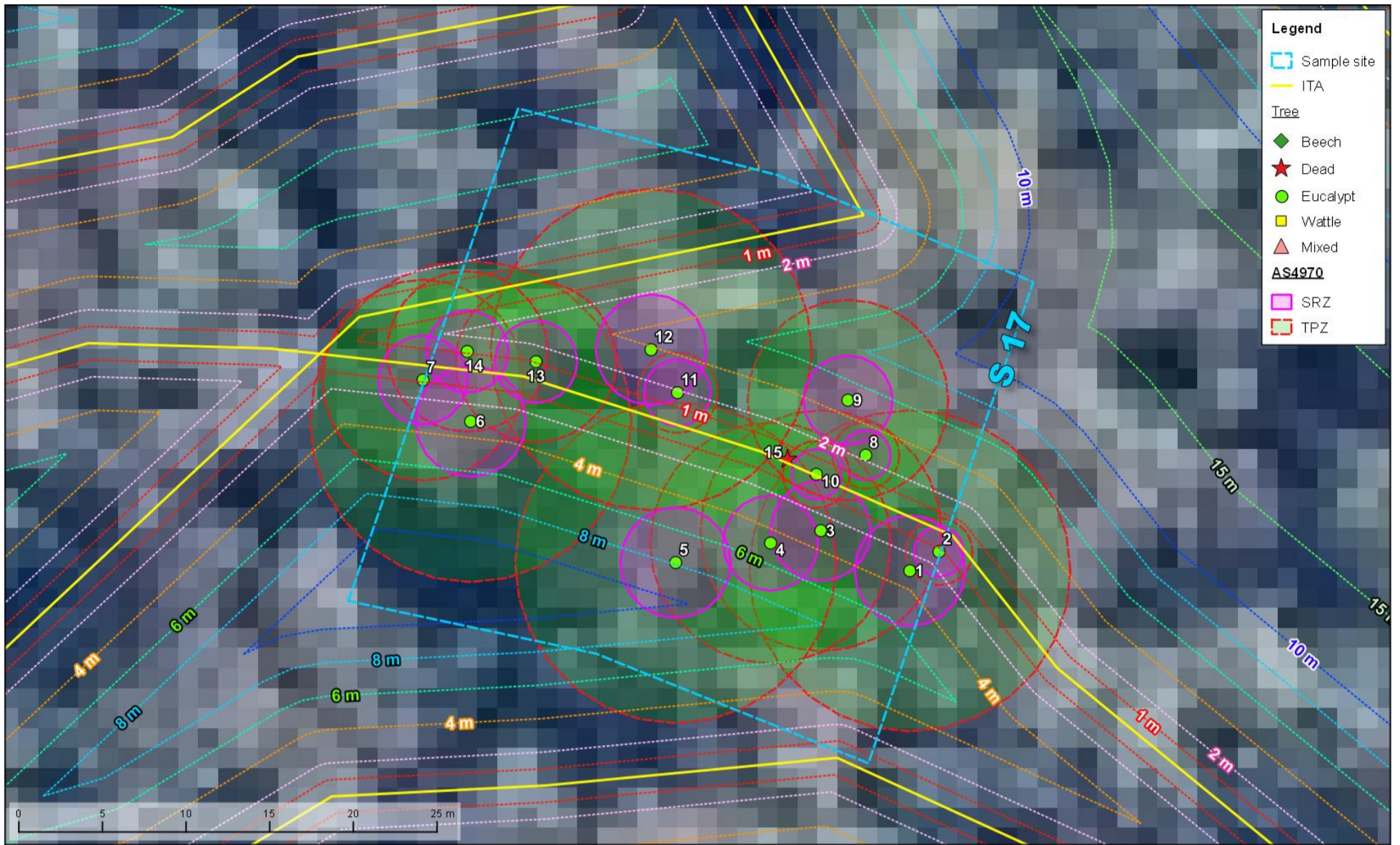
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Map Source: NearMap  
Date: 22/04/2021

**Appendix 2 B - Warburton Mountain Bike Destination Project**  
**Tree locations in current site context**  
**with TPZ and SRZ projections**



**Sample site:**  
**16**



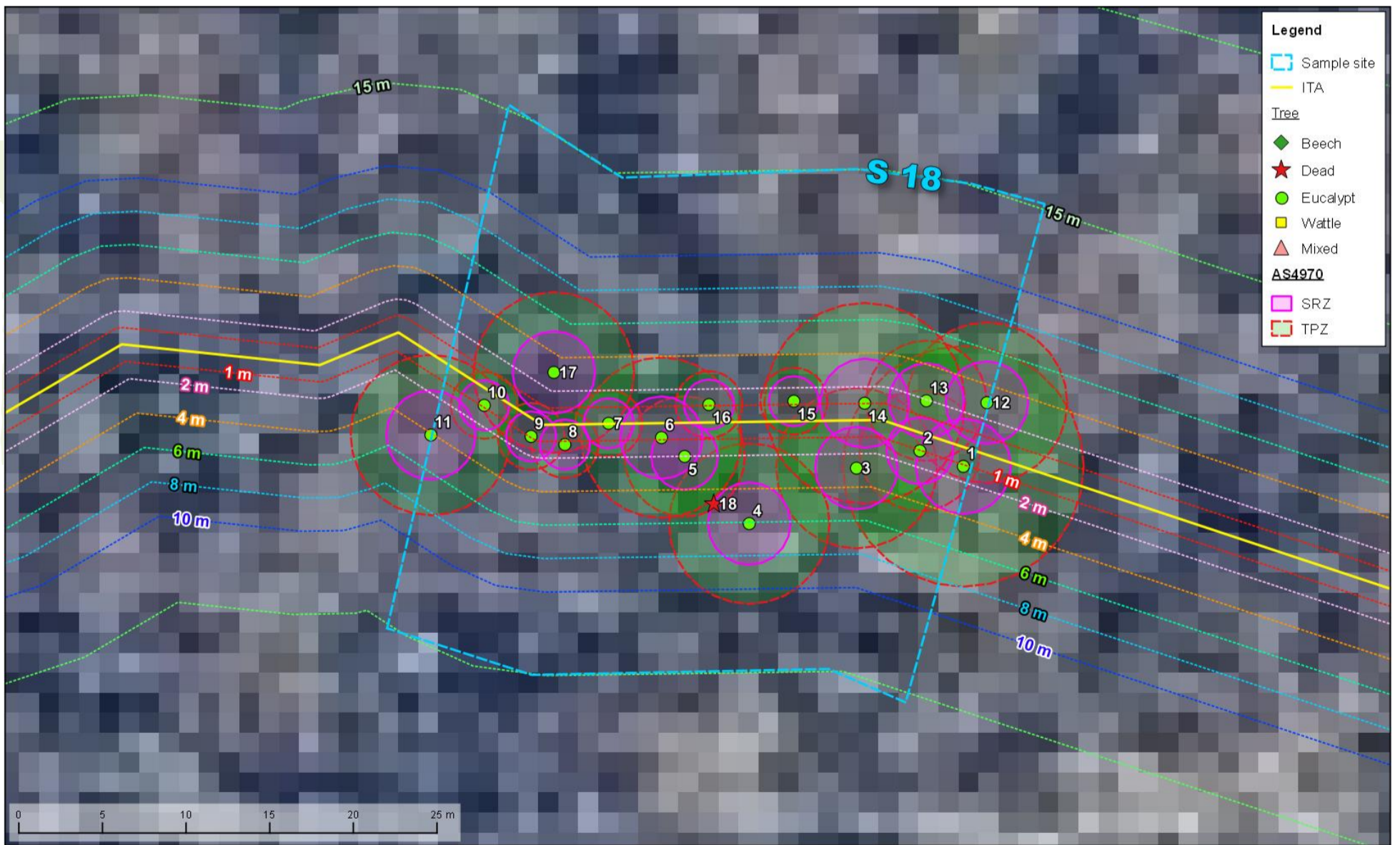


Client: Biosis  
 Map Source: NearMap  
 Date: 22/04/2021

**Appendix 2 B - Warburton Mountain Bike Destination Project**  
**Tree locations in current site context**  
**with TPZ and SRZ projections**



**Sample site:**  
**17**



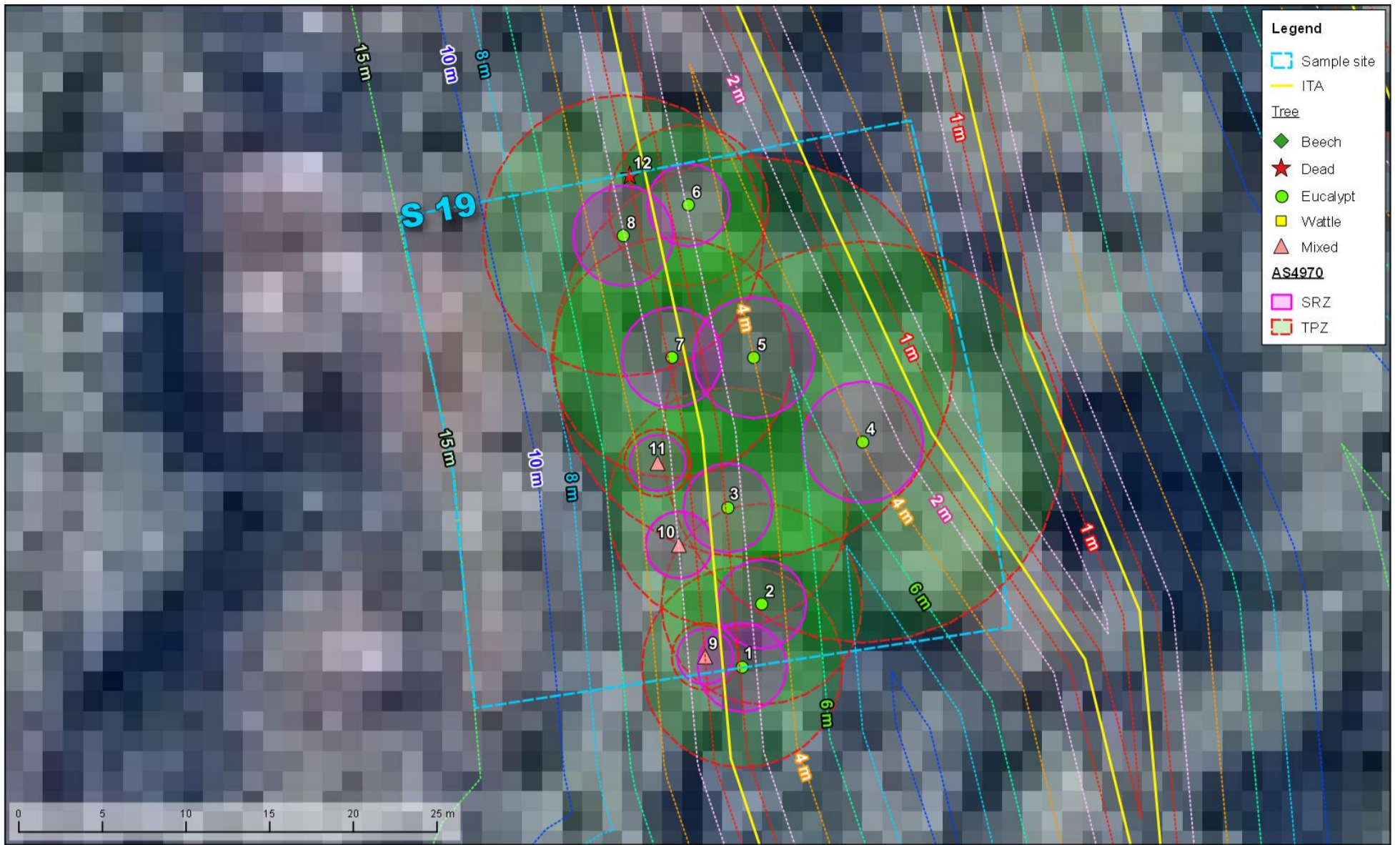
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 Date: 22/04/2021

**Appendix 2 B - Warburton Mountain Bike Destination Project**  
**Tree locations in current site context**  
**with TPZ and SRZ projections**



**Sample site:**  
**18**



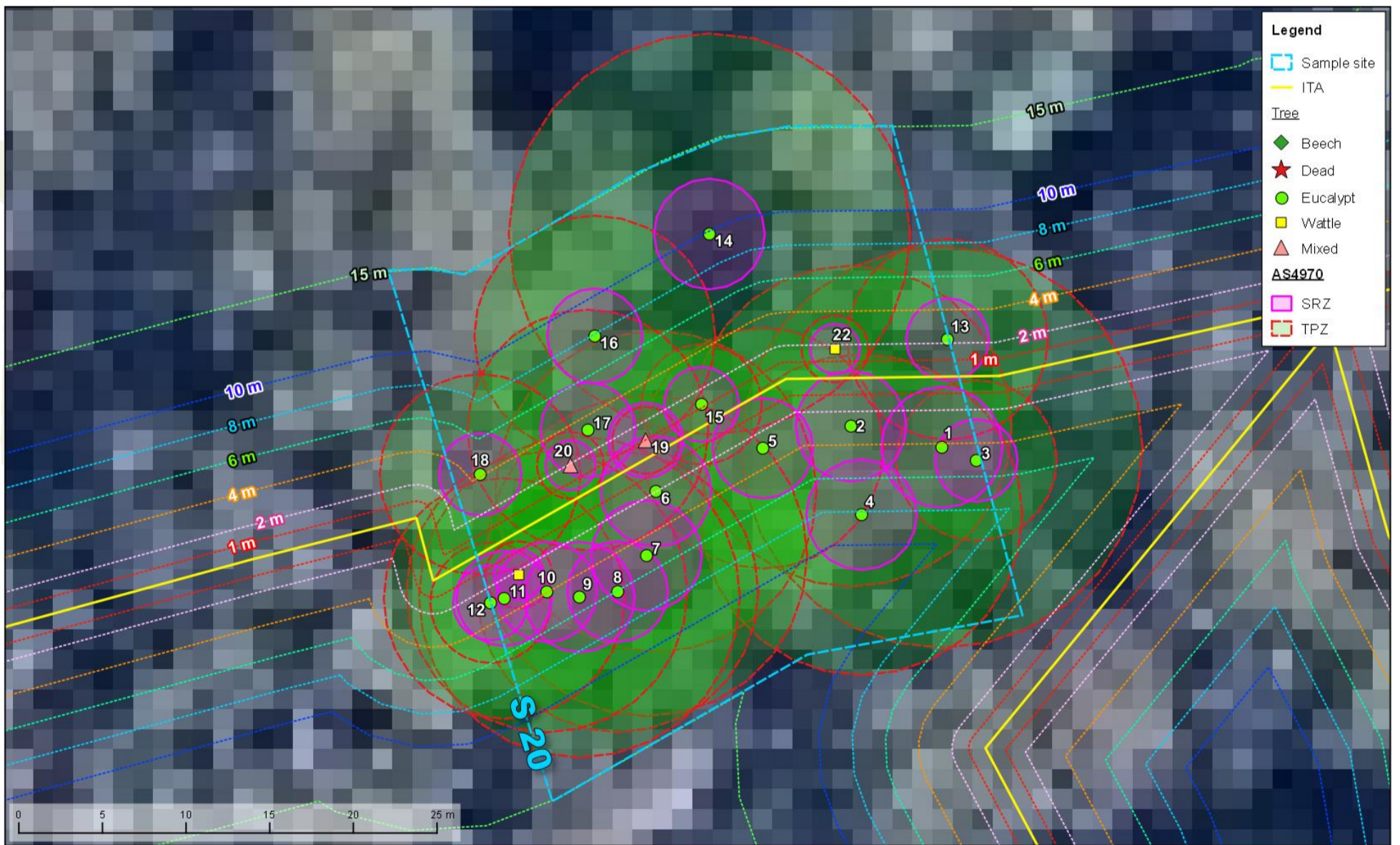


Client: Biosis  
Map Source: NearMap  
Date: 22/04/2021

**Appendix 2 B - Warburton Mountain Bike Destination Project**  
**Tree locations in current site context**  
**with TPZ and SRZ projections**



**Sample site:**  
**19**



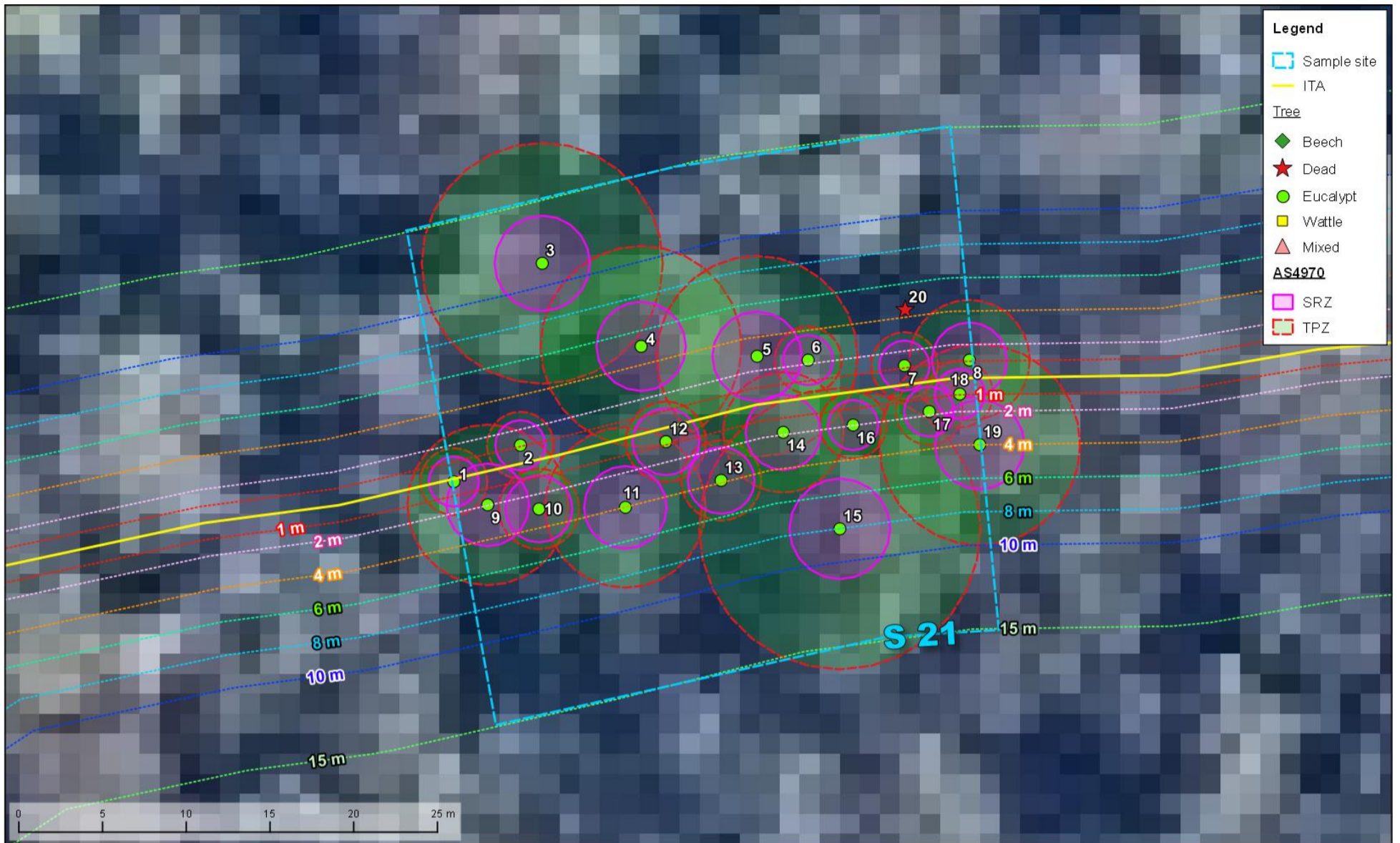
Client: Biosis  
Map Source: NearMap  
Date: 22/04/2021

**Appendix 2 B - Warburton Mountain Bike Destination Project**  
**Tree locations in current site context**  
**with TPZ and SRZ projections**



**Sample site:**  
**20**





Client: Biosis  
Map Source: NearMap  
Date: 22/04/2021

**Appendix 2 B - Warburton Mountain Bike Destination Project**  
Tree locations in current site context  
with TPZ and SRZ projections



**Sample site:**  
21



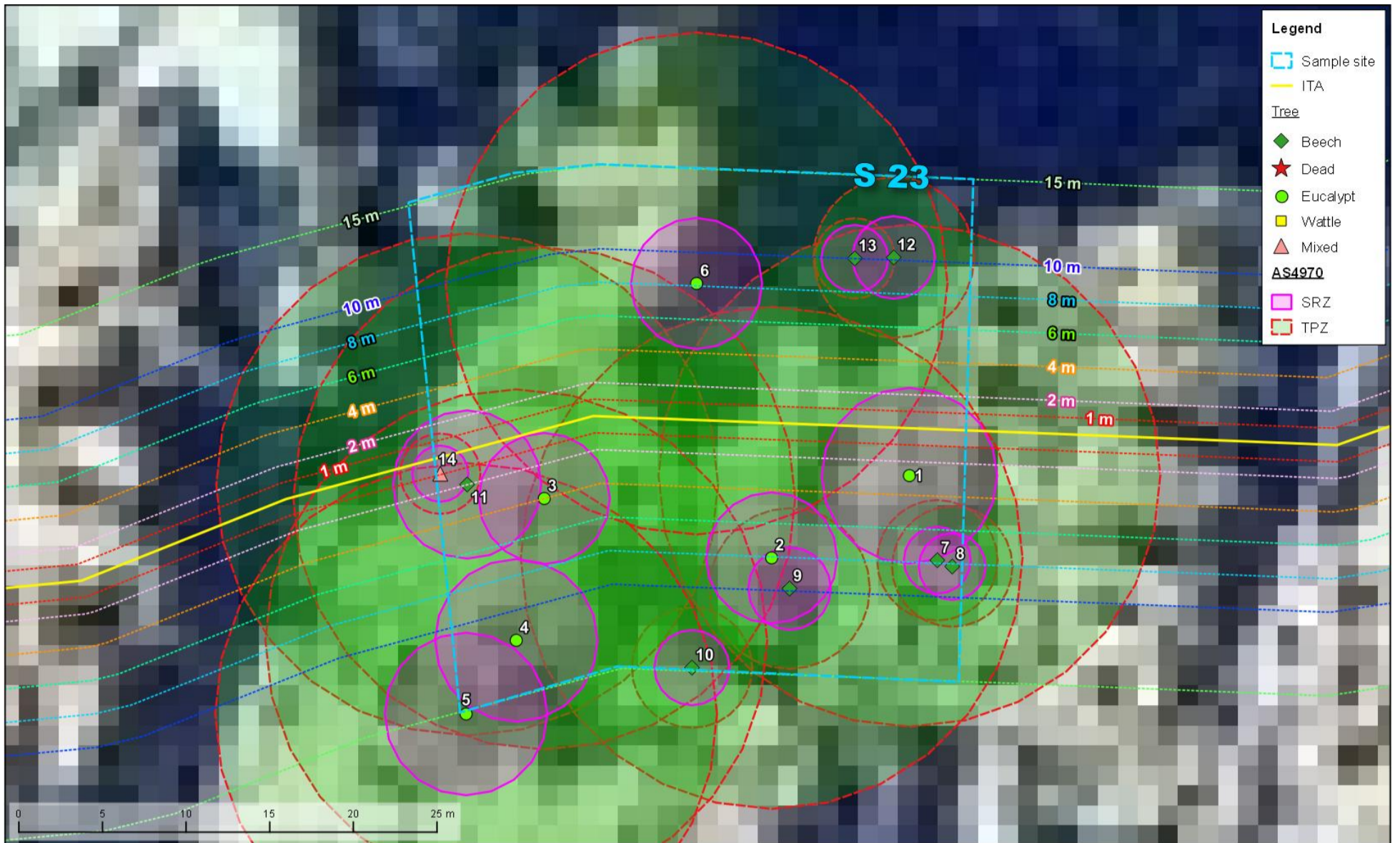
Client: Biosis  
Map Source: NearMap  
Date: 22/04/2021

**Appendix 2 B - Warburton Mountain Bike Destination Project**  
Tree locations in current site context  
with TPZ and SRZ projections



**Sample site:**  
22



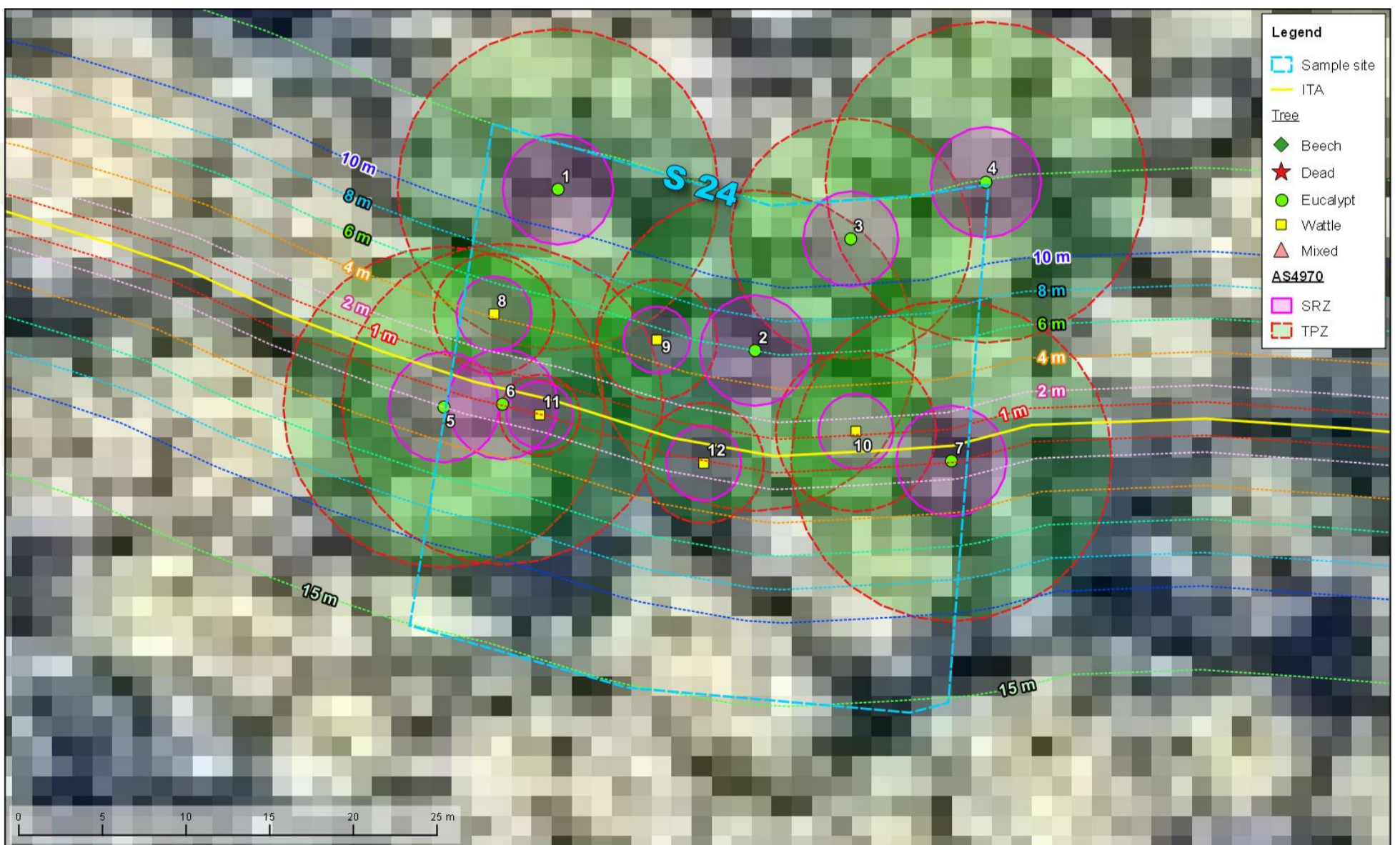


Client: Biosis  
Map Source: NearMap  
Date: 22/04/2021

**Appendix 2 B - Warburton Mountain Bike Destination Project**  
**Tree locations in current site context**  
**with TPZ and SRZ projections**



**Sample site:**  
**23**



Client: Biosis  
Map Source: NearMap  
Date: 22/04/2021

**Appendix 2 B - Warburton Mountain Bike Destination Project**  
**Tree locations in current site context**  
**with TPZ and SRZ projections**



**Sample site:**  
**24**



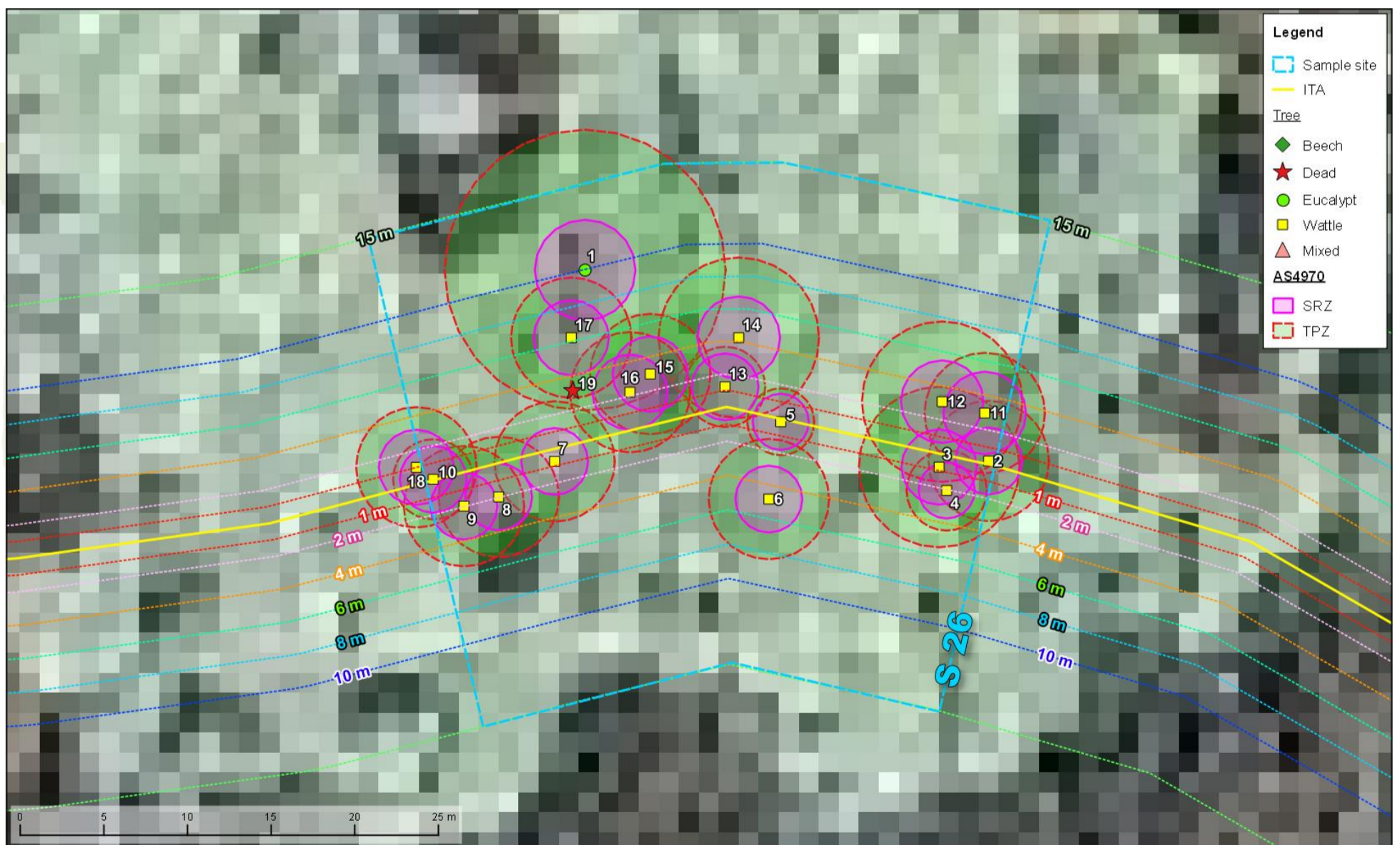


Client: Biosis  
Map Source: NearMap  
Date: 22/04/2021

**Appendix 2 B - Warburton Mountain Bike Destination Project**  
**Tree locations in current site context**  
**with TPZ and SRZ projections**



**Sample site:**  
**25**



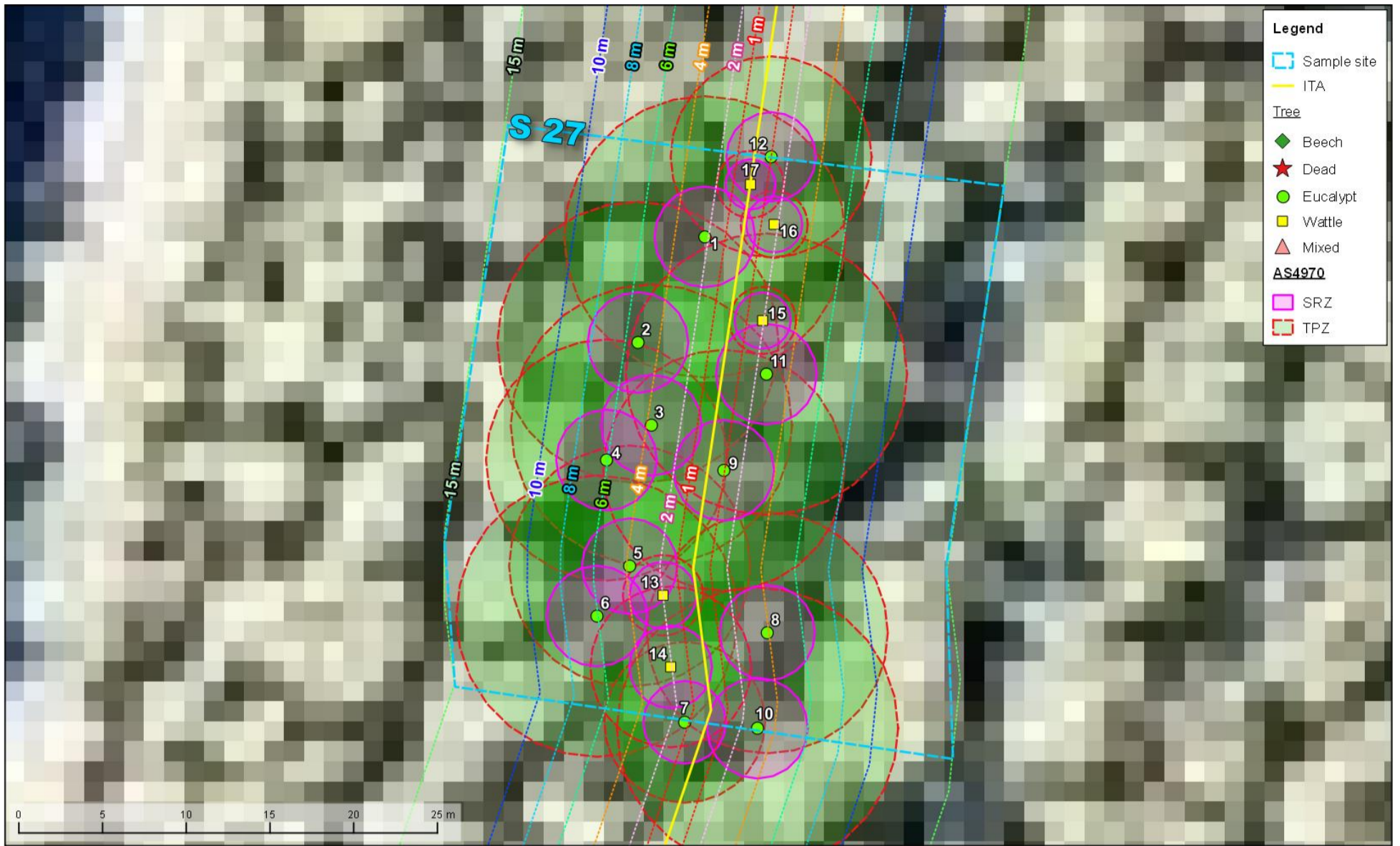
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Map Source: NearMap  
Date: 22/04/2021

**Appendix 2 B - Warburton Mountain Bike Destination Project**  
**Tree locations in current site context**  
**with TPZ and SRZ projections**



**Sample site:**  
**26**



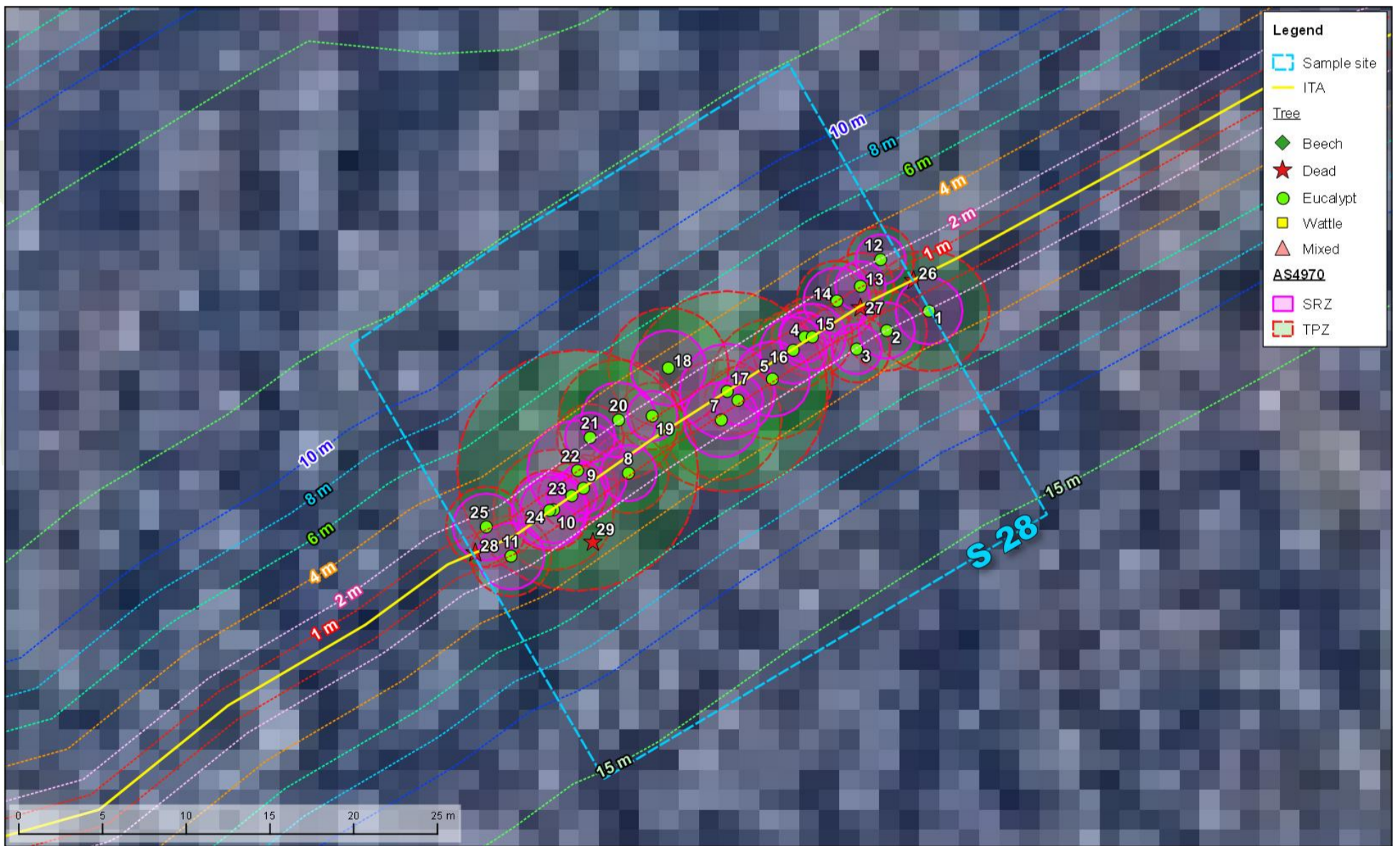


Client: Biosis  
Map Source: NearMap  
Date: 22/04/2021

**Appendix 2 B - Warburton Mountain Bike Destination Project**  
**Tree locations in current site context**  
**with TPZ and SRZ projections**



**Sample site:**  
**27**



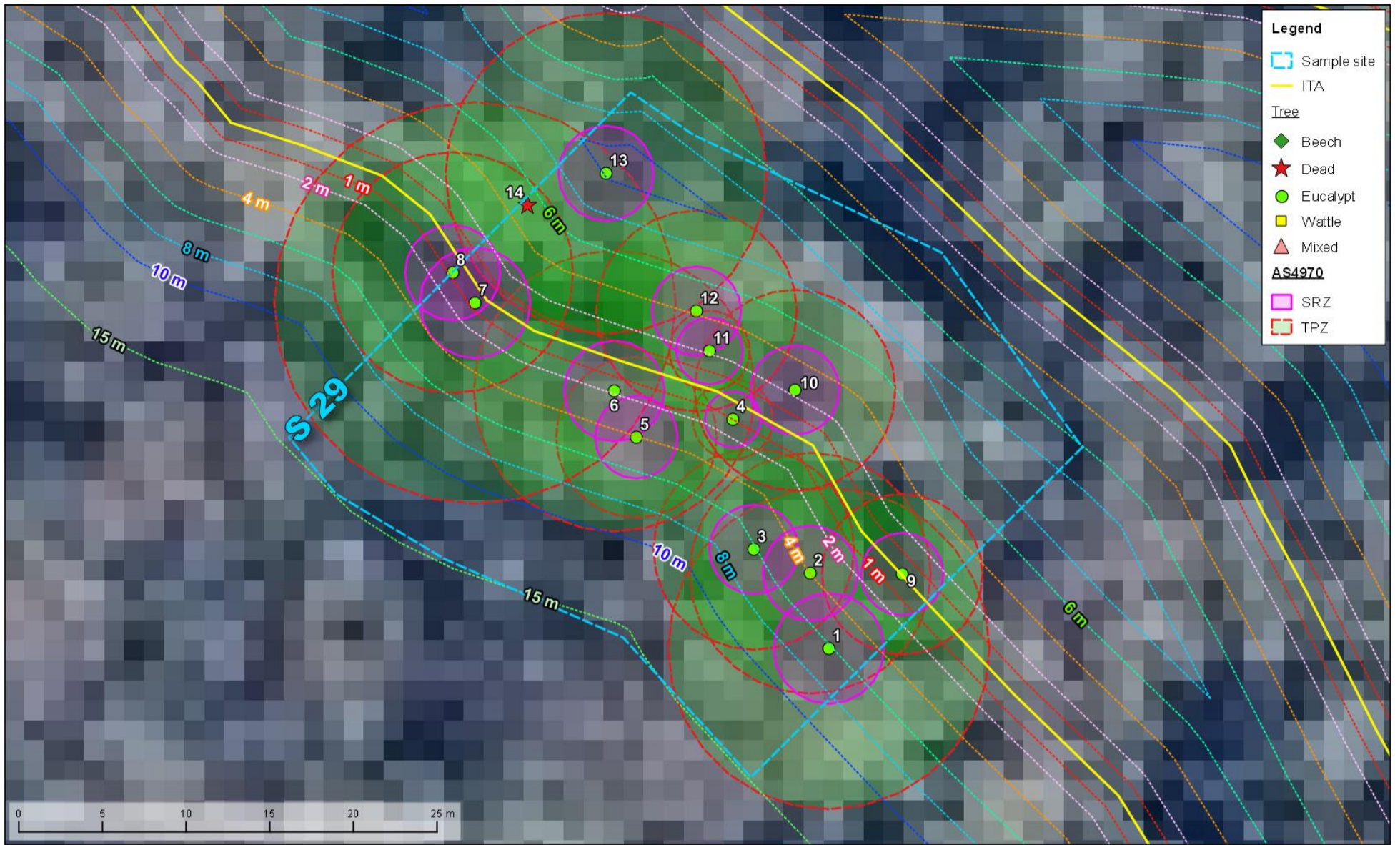
Client: Biosis  
Map Source: NearMap  
Date: 22/04/2021

**Appendix 2 B - Warburton Mountain Bike Destination Project**  
**Tree locations in current site context**  
**with TPZ and SRZ projections**



**Sample site:**  
**28**





Client: Biosis  
Map Source: NearMap  
Date: 22/04/2021

**Appendix 2 B - Warburton Mountain Bike Destination Project**  
Tree locations in current site context  
with TPZ and SRZ projections



**Sample site:**  
29



Client: Biosis  
Map Source: NearMap  
Date: 22/04/2021

**Appendix 2 B - Warburton Mountain Bike Destination Project**  
Tree locations in current site context  
with TPZ and SRZ projections



**Sample site:**  
30

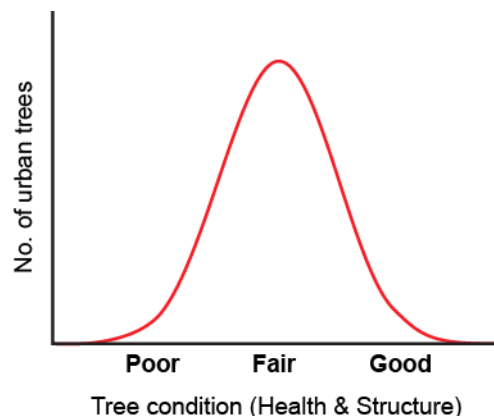


## Appendix 3: Arboricultural Descriptors (January 2019)

Note that not all of the described tree descriptors may be used in a tree assessment and report. The assessment is undertaken with regard to contemporary arboricultural practices and consists of a visual inspection of external and above-ground tree parts.

### 1. Tree Condition

The assessment of tree condition evaluates factors of health and structure. The descriptors of health and structure attributed to a tree evaluate the individual specimen to what could be considered typical for that species growing in its location under current climatic conditions. For example, some species can display inherently poor branching architecture, such as multiple acute branch attachments with included bark. Whilst these structural defects may technically be considered arboriculturally poor, they are typical for the species and may not constitute an increased risk of failure. These trees may be assigned a structural rating of fair-poor (rather than poor) at the discretion of the assessor.



**Diagram 1:** Indicative normal distribution curve for tree condition

Diagram 1 provides an indicative distribution curve for tree condition to illustrate that within a normal tree population the majority of specimens are centrally located within the condition range (normal distribution curve). Furthermore, that those individual trees with an assessed condition approaching the outer ends of the spectrum occur less often.

### 2. Tree Name

Provides botanical name, (genus, species, variety and cultivar) according to accepted international code of taxonomic classification, and common name.

### 3. Tree Type

Describes the general geographic origin of the species and its type e.g. deciduous or evergreen.

Category	Description
Indigenous	Occurs naturally in the area or region of the subject site. Remnant.
Victorian native	Occurs naturally within some part of the State of Victoria (not exclusively) but is not indigenous (component of EVC benchmark). Could be planted indigenous trees.
Australian native	Occurs naturally within Australia but is not a Victorian native or indigenous
Exotic deciduous	Occurs outside of Australia and typically sheds its leaves during winter
Exotic evergreen	Occurs outside of Australia and typically holds its leaves all year round
Exotic conifer	Occurs outside of Australia and is classified as a gymnosperm
Native conifer	Occurs naturally within Australia and is classified as a gymnosperm
Native Palm	Occurs naturally within Australia. Woody monocotyledon
Exotic Palm	Occurs outside of Australia. Woody monocotyledon

### 4. Height and Width

Indicates height and width of the individual tree; dimensions are expressed in metres. Crown heights are measured with a height meter where possible. Due to the topography of some sites and/or the density of vegetation it may not be possible to do this for every tree. Tree heights may be estimated in line with previous height meter readings in conjunction with assessor's

experience. Crown widths are generally paced (estimated) at the widest axis or can be measured on two axes and averaged. In some instances, the crown width can be measured on the four cardinal direction points (North, South, East and West).

Crown height and crown spread are generally recorded to the nearest half metre (crown spread would be rounded up) for dimensions up to 10 m and the nearest whole metre for dimensions over 10 m. Estimated dimensions (e.g. for off-site or otherwise inaccessible trees where accurate data cannot be recovered) shall be clearly identified in the assessment data.

## 5. Trunk diameters

The position where trunk diameters are captured may vary dependent on the requirements of the specific assessment and an individual tree specific characteristics. DBH is the typical trunk diameter captured as it relates to the allocation of tree protection distances. The basal trunk diameter assists in the allocation of a structural root zone. Some municipalities require trunk diameters be captured at different heights, with 1.0 m above grade being a common requirement. The specific planning schemes will be checked to ascertain requirements.

Stem diameters shall be recorded in centimetres, rounded to the nearest 1 cm (0.01 m).

### ***Diameter at Breast Height (DBH)***

Indicates the trunk diameter (expressed in centimetres) of an individual tree measured at 1.4m above the existing ground level or where otherwise indicated, multiple leaders are measured individually. Plants with multiple leader habit may be measured at the base. The range of methods to suit particular trunk shapes, configurations and site conditions can be seen in Appendix A of Australian Standard AS 4970-2009 *Protection of trees on development sites*. Measurements undertaken using foresters tape or builders tape.

### ***Basal trunk diameter***

The basal dimension is the trunk diameter measured at the base of the trunk or main stem(s) immediately above the root buttress. Used to ascertain the Structural Root Zone (SRZ) as outlined in AS4970.

## 6. Health

Assesses various attributes to describe the overall health and vigour of the tree.

Category	Vigour, Extension growth	Decline symptoms, Deadwood, Dieback	Foliage density, colour, size, intactness	Pests and or disease
<b>Good</b>	Above typical. Excellent. Full canopy density	Negligible	Better than typical	Negligible
<b>Fair</b>	Typical vigour. >80% canopy density	Minor or expected. Little or no dead wood	Typical. Minor deficiencies or defects could be present.	Minor, within damage thresholds
<b>Fair to Poor</b>	Below typical - low vigour	More than typical. Small sub-branch dieback	Exhibiting deficiencies. Could be thinning, or smaller	Exceeds damage thresholds
<b>Poor</b>	Minimal - declining	Excessive, large and/or prominent amount & size of dead wood	Exhibiting severe deficiencies. Thinning foliage, generally smaller or deformed	Extreme and contributing to decline
<b>Dead</b>	N/A	N/A	N/A	N/A



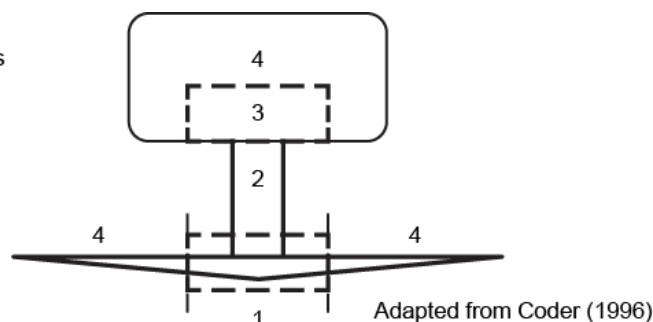
## 7. Structure

Assesses principal components of tree structure (Diagram 2).

Descriptor	Zone 1 Root plate & lower stem	Zone 2 Trunk	Zone 3 Primary branch support	Zone 4 Outer crown and roots
<b>Good</b>	No obvious damage, disease or decay; obvious basal flare / stable in ground	No obvious damage, disease or decay; well tapered	Well formed, attached, spaced and tapered. No history of failure.	No obvious damage, disease, decay or structural defect. No history of failure.
<b>Fair</b>	Minor damage or decay. Basal flare present.	Minor damage or decay	Generally, well attached, spaced and tapered branches. Minor structural deficiencies may be present or developing. No history of branch failure.	Minor damage, disease or decay; minor branch end-weight or over-extension. No history of branch failure.
<b>Fair to Poor</b>	Moderate damage or decay; minimal basal flare.	Moderate damage or decay; approaching recognised thresholds	Weak, decayed or with acute branch attachments; previous branch failure evidence.	Moderate damage, disease or decay; moderate branch end-weight or over-extension. Minor branch failure evident.
<b>Poor</b>	Major damage, disease or decay; fungal fruiting bodies present. Excessive lean placing pressure on root plate	Major damage, disease or decay; exceeds recognised thresholds; fungal fruiting bodies present. Acute lean. Stump re-sprout	Decayed, cavities or has acute branch attachments with included bark; excessive compression flaring; failure likely. Evidence of major branch failure.	Major damage, disease or decay; fungal fruiting bodies present; major branch end-weight or over-extension. Branch failure evident.
<b>Very Poor</b>	Excessive damage, disease or decay; unstable / loose in ground; altered exposure; failure probable	Excessive damage, disease or decay; cavities. Excessive lean. Stump re-sprout	Decayed, cavities or branch attachments with active split; failure imminent. History of major branch failure.	Excessive damage, disease or decay; excessive branch end-weight or over-extension. History of branch failure.

**Diagram 2:** Tree structure zones

1. Root plate & lower stem
2. Trunk
3. Primary branch support
4. Outer crown & roots



Structure ratings will also take into account general branching architecture, stem taper, live crown ratio, crown symmetry (bias or lean) and crown position such as tree being suppressed amongst more dominant trees.

The lowest or worst descriptor assigned to the tree in any column could generally be the overall rating assigned to the tree. The assessment for structure is limited to observations of external

and above ground tree parts. It does not include any exploratory assessment of underground or internal tree parts unless this is requested as part of the investigation. Trees are assessed and then given a rating for a point in time. Generally, trees with a poor or very poor structure are beyond the benefit of practical arboricultural treatments.

The management of trees in the urban environment requires appropriate arboricultural input and consideration of risk. Risk potential will take into account the combination of likelihood of failure and impact, including the perceived importance of the target(s).

## 8. Age class

Relates to the physiological stage of the tree's life cycle.

Category	Description
Young	Sapling tree and/or recently planted. Approximately 5 or less years in location.
Semi-mature	Tree increasing in size and yet to achieve expected size in situation. Primary developmental stage.
Early-mature	Tree established, generally growing vigorously. > 50% of attainable age/size.
Mature	Specimen approaching expected size in situation, with reduced incremental growth.
Over-mature	Mature full-size with a retrenching crown. Tree is senescent and in decline. Significant decay generally present.

## 9. Useful life expectancy

Assessment of useful life expectancy provides an indication of health and tree appropriateness and involves an estimate of how long a tree is likely to remain in the landscape based on species, stage of life (cycle), health, amenity, environmental services contribution, conflicts with adjacent infrastructure and risk to the community. It would enable tree managers to develop long-term plans for the eventual removal and replacement of existing trees in the public realm. It is not a measure of the biological life of the tree within the natural range of the species. It is more a measure of the health status and the trees positive contribution to the urban landscape.

Within an urban landscape context, particularly in relation to street trees, it could be considered a point where the costs to maintain the asset (tree) outweigh the benefits the tree is returning.

The assessment is based on the site conditions not being significantly altered and that any prescribed maintenance works are carried out (site conditions are presumed to remain relatively constant and the tree would be maintained under scheduled maintenance programs).

Useful Life Expectancy (ULE)	Typical characteristics
<1 year (No remaining ULE)	Tree may be dead or mostly dead. Tree may exhibit major structural faults. Tree may be an imminent failure hazard. Excessive infrastructure damage with high risk potential that cannot be remedied.
1-5 years (Transitory, Brief)	Tree is exhibiting severe chronic decline. Crown is likely to be less than 50% typical density. Crown may be mostly epicormic growth. Dieback of large limbs is common (large deadwood may have been pruned out). Tree may be over-mature and senescing. Infrastructure conflicts with heightened risk potential. Tree has outgrown site constraints.

6-10 years (Short)	Tree is exhibiting chronic decline. Crown density will be less than typical and epicormic growth is likely to present. The crown may still be mostly entire, but some dieback is likely to be evident. Dieback may include large limbs.  Over-mature and senescing or early decline symptoms in short-lived species.  Early infrastructure conflicts with potential to increase regardless of management inputs.
11-20 years (Moderate)	Tree not showing symptoms of chronic decline, but growth characteristics are likely to be reduced (bud development, extension growth etc.). Tree may be over-mature and beginning to senesce.  Potential for infrastructure conflicts regardless of management inputs.
21-40 years (Moderately long)	Trees displaying normal growth characteristics, but vigour is likely to be reduced (bud development, extension growth etc.). Tree may be growing in restricted environment (e.g. streetscapes) or may be in late maturity. Semi-mature and mature trees exhibiting normal growth characteristics. Juvenile trees in streetscapes.
>40 years (Long)	Generally juvenile and semi-mature trees exhibiting normal growth characteristics within adequate spaces to sustain growth, such as in parks or open space. Could also pertain to maturing, long-lived trees.  Tree well suited to the site with negligible potential for infrastructure conflicts.

Note that ULE may change for a tree dependent on the prevailing climatic conditions, sudden changes to a tree's growing environment creating an acute stress or impact by pathogens.

The ULE may not be applicable for trees that are manipulated, such as topiary, or grown for specific horticultural purposes, such as fruit trees.

There may be instances where remedial tree maintenance could extend a tree's ULE.

## Appendix 4: Tree protection zones (2015)

### Introduction

- In order to sustain trees on a development site consideration must be given to the establishment of tree protection zones.
- The physical dimensions of tree protection zones can sometimes be difficult to define. The projection of a tree's crown can provide a guide but is by no means the definitive measure. The unpredictable nature of roots and their growth, differences between species and their tolerances, and observable and hidden changes to the trees growing environment, as a result of development, are variables that must be considered.
- Most vigorous, broad canopied trees survive well if the area within the drip-line of the canopy is protected. Fine root density is usually greater beneath the canopy than beyond (Gilman, 1997). If few to no roots over 3cm in diameter are encountered and severed during excavation the tree will probably tolerate the impact and root loss. A healthy tree can sustain a loss of between 30% and 50% of absorbing roots (Harris, Clark, Matheny, 1999), however encroachment into the structural root system of a tree may be problematic.
- The structural root system of a tree is responsible for ensuring the stability of the entire tree structure in the ground. A tree could not sustain loss of structural root system and be expected to survive let alone stand up to average annual wind loads upon the crown.

### Allocation of tree protection zone (TPZ)

The method of allocating a TPZ to a particular tree will be influenced by site factors, the tree species, its age and developed form.

Once it has been established, through an arboricultural assessment, which trees and Tree Groups are to be retained, the next step will require careful management through the development process to minimise any impacts on the designated trees. The successful retention of trees on any particular site will require the commitment and understanding of all parties involved in the development process. The most important activity, after determining the trees that will be retained is the implementation of a TPZ.

The intention of tree protection zones is to:

- mitigate tree hazards;
- provide adequate root space to sustain the health and aesthetics of the tree into the future;
- minimise changes to the trees growing environment, which is particularly important for mature specimens;
- minimise physical damage to the root system, canopy and trunk; and
- define the physical alignment of the tree protection fencing

### Tree protection

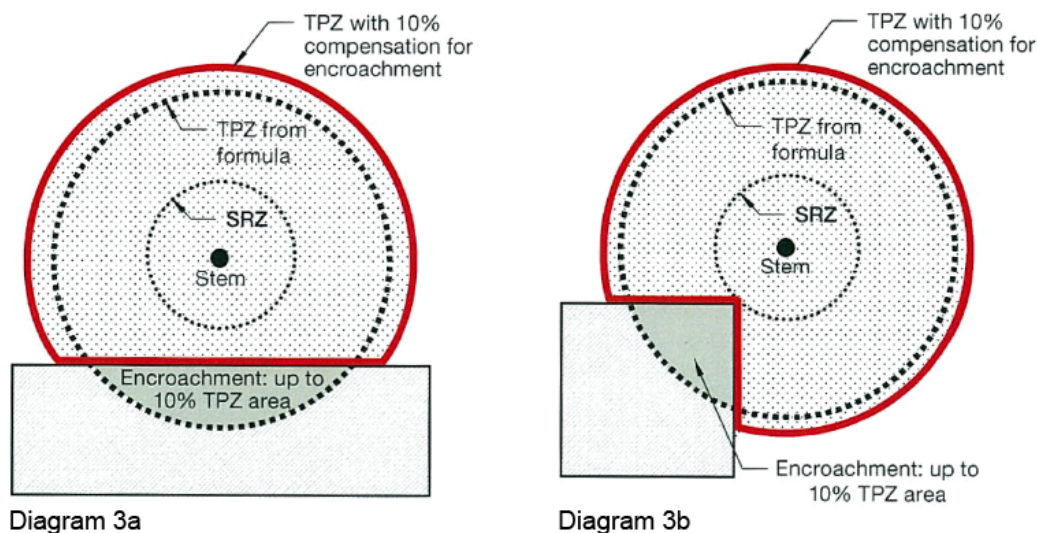
The most important consideration for the successful retention of trees is to allow appropriate above and below ground space for the trees to continue to grow. This requires the allocation of tree protection zones for retained trees.



The Australian Standard AS 4970-2009 Protection of trees on development sites has been used as a guide in the allocation of TPZs for the assessed trees.

The TPZ for individual trees is calculated based on trunk (stem) diameter (DBH), measured at 1.4 metres up from ground level. The radius of the TPZ is calculated by multiplying the trees DBH by 12. The method provides a TPZ that addresses both the stability and growing requirements of a tree. TPZ distances are measured as a radius from the centre of the trunk at (or near) ground level. The minimum TPZ should be no less than 2m and the maximum no more than 15m radius. The TPZ of palms should be not less than 1.0m outside the crown projection.

Encroachment into the TPZ is permissible under certain circumstances though is dependent on both site conditions and tree characteristics. Minor encroachment, up to 10% of the TPZ, is generally permissible provided encroachment is compensated for by recruitment of an equal area contiguous with the TPZ. Examples are provided in Diagram 1. Encroachment greater than 10% is considered major encroachment under AS4970-2009 and is only permissible if it can be demonstrated that after such encroachment the tree would remain viable.



**Diagram 3: Examples of Minor encroachment into TPZ,**  
(Extract from : AS4970-2009, Appendix D, P30 of 32)

The 10% encroachment on one side equates to approximately  $\frac{1}{3}$  radial distance. Tree root growth is opportunistic and occurs where the essentials to life (primarily air and water) are present. Heterogeneous soil conditions, existing barriers, hard surfaces and buildings may have inhibited the development of a symmetrically radiating root system.

Existing infrastructure around some trees may be within the TPZ or root plate radius. The roots of some trees may have grown in response to the site conditions and therefore if existing hard surfaces and building alignments are utilised in new designs the impacts on the trees should be minimal. The most reliable way to estimate root disturbance is to find out where the roots are in relation to the demolition, excavation or construction works that will take place (Matheny & Clark, 1998). Exploratory excavation prior to commencement of construction can help establish the extent of the root system and where it may be appropriate to excavate or build.

The TPZ should also give consideration to the canopy and overall form of the tree. If the canopy requires severe pruning in order to accommodate a building and in the process the form of the tree is diminished it may be worthwhile considering altering the design or removing the tree.

## **General tree protection guidelines**

The most important factors are:

- Prior to construction works the trees nominated for tree works should be pruned to remove larger dead wood. Pruning works may also identify other tree hazards that require remedial works.
- Installation of tree protection fencing. Once the tree protection zones have been determined the next step is to mulch the zone with woodchip and erect tree protection fencing. This must be completed prior to any materials being brought on-site, erection of temporary site facilities or demolition/earth works. The protection fencing must be sturdy and withstand winds and construction impacts. The protection fence should only be moved with approval of the site supervisor. Other root zone protection methods can be incorporated if the TPZ area needs to be traversed.
- Appropriate signage is to be fixed to the fencing to alert people as to importance of the tree protection zone.
- The importance of tree preservation must be communicated to all relevant parties involved with the site.
- Inspection of trees during excavation works.

## **Exploratory excavation**

The most reliable way to estimate root disturbance is to find out where the roots are in relation to the demolition, excavation or construction works that will take place (Matheny & Clark, 1998).

Exploratory excavation prior to commencement of construction can help establish the extent of the root system and where it may be appropriate to excavate or build. This also allows management decisions to be made and allows time for redesign works if required.

Any exploratory excavation within the allocated TPZ is to be undertaken with due care of the roots. Minor exploration is possible with hand tools. More extensive exploration may require the use of high pressure water or air excavation techniques. Either hydraulic or pneumatic excavation techniques will safely expose tree roots; both have specific benefits dependent on the situation and soil type. An arborist is to be consulted on which system is best suited for the site conditions.

Substantial roots are to be exposed and left intact.

Once roots are exposed decisions can be made regarding the management of the tree. Decisions will be dependent on the tree species, its condition, its age, its relative tolerance to root loss, and the amount of root system exposed and requiring pruning.

Other alternative measures to encroaching the TPZ may include boring or tunnelling.

## How to determine the diameter of a substantial root

The size of a substantial root will vary according to the distance of the exposed root to the trunk of the tree. The further away from the trunk of a tree that a root is, the less significant the root is likely to be to the tree's health and stability.

The determination of what is a substantial root is often difficult because the form, depth and spread of roots will vary between species and sites. However, because smaller roots are connected to larger roots in a framework, there can be no doubt that if larger roots are severed, the smaller roots attached to them will die. Therefore, the larger the root, the more significant it may be.

Gilman (1997) suggests that trees may contain 4-11 major lateral roots and that the five largest lateral roots account (act as a conduit) for 75% of the total root system.

These large lateral roots quickly taper within a distance to the tree, this distance is identified as the Structural Root Zone (SRZ). Within the SRZ distance, all roots and the soil surrounding the roots are deemed significant.

No root or soil disturbance is permitted within the SRZ.

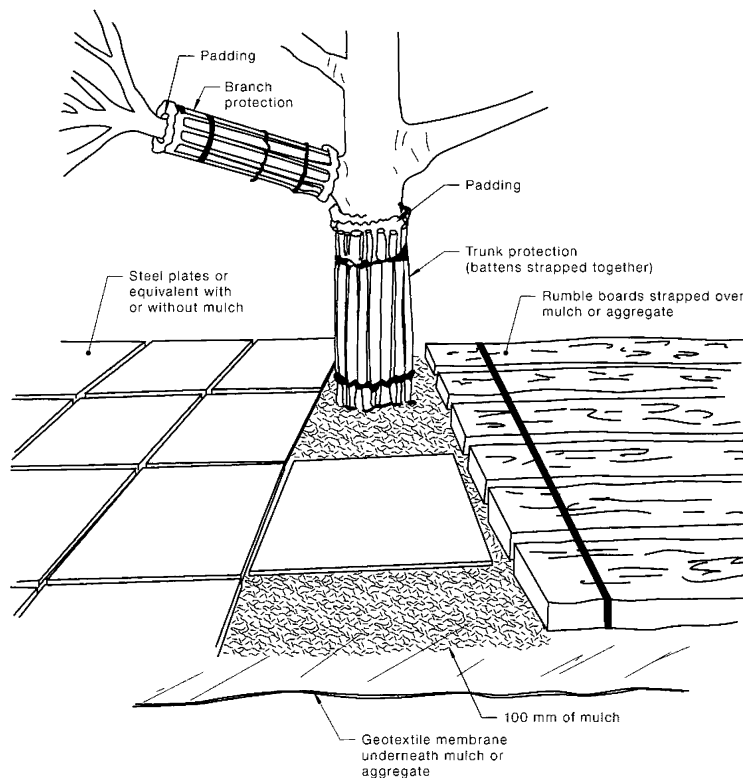
In the area outside the SRZ the tree may tolerate the loss of one or a number of roots. The table below indicates the size of tree roots, outside the SRZ that would be deemed substantial for various tree heights. The assessment of combined root loss within the TPZ would need to be undertaken by an arborist on an individual basis because the location of the tree, its condition and environment would need to be assessed.

**Table 1: Estimated significant root sizes outside SRZ**

Height of tree	Diameter of root
Less than 5m	≥ 30mm
Between 5m - 15m	≥ 50mm
More than 15m	≥ 70mm

## Ground buffering

Where works are required to be undertaken within the Tree root zone without penetration of the surface, ground buffering and trunk and limb protection must be provided to minimise the potential for soil to become compacted and avoid potential for impact wounds to occur to surface roots, trunk or limbs. Refer below.



**NOTES:**

- 1 For trunk and branch protection use boards and padding that will prevent damage to bark. Boards are to be strapped to trees, not nailed or screwed.
- 2 Rumble boards should be of a suitable thickness to prevent soil compaction and root damage.

**Diagram 4:** Examples of ground buffering and trunk and limb protection.

### Construction Guidelines

The following are guidelines that must be implemented to minimise the impact of the proposed construction works on the retained trees.

- The Tree Protection Zone (TPZ) is fenced and clearly marked at all times. The actual fence specifications should be a minimum of 1.2 - 1.5 metres of chain mesh or like fence with 1.8 meter posts (e.g. treated pine or star pickets) or like support every 3-4 metres and a top line of high visibility plastic hazard tape. The posts should be strong enough to sustain knocks from on site excavation equipment. This fence will deter the placement of building materials, entry of heavy equipment and vehicles and also the entry of workers and/or the public into the TPZ. Note: There are many different variations on the construction type and material used for TPZ fences, suffice to say that the fence should satisfy the responsible authority.
- Contractors and site workers should receive written and verbal instruction as to the importance of tree protection and preservation within the site. Successful tree preservation occurs when there is a commitment from all relevant parties involved in designing, constructing and managing a development project. Members of the project team need to interact with each other to minimise the impacts to the trees, either through design decisions or construction practices. The importance of tree preservation must be communicated to all relevant parties involved with the site.



- The consultant arborist is on-site to supervise excavation works around the existing trees where the TPZ will be encroached.
- A layer of organic mulch (woodchips) to a depth of no more than 100mm should be placed over the root systems within the TPZ of trees, which are to be retained so as to assist with moisture retention and to reduce the impact of compaction.
- No persons, vehicles or machinery to enter the TPZ without the consent of the consulting arborist or site manager.
- Where machinery is required to operate inside the TPZ it must be a small skid drive machine (i.e Dingo or similar) operating only forwards and backwards in a radial direction facing the tree trunk and not altering direction whilst inside the TPZ to avoid damaging, compacting or scuffing the roots.
- Any underground service installations within the allocated TPZ should be bored and utility authorities should common trench where possible.
- No fuel, oil dumps or chemicals shall be allowed in or stored on the TPZ and the servicing and re-fuelling of equipment and vehicles should be carried out away from the root zones.
- No storage of material, equipment or temporary building should take place over the root zone of any tree.
- Nothing whatsoever should be attached to any tree including temporary services wires, nails, screws or any other fixing device.
- Supplementary watering should be provided to all trees through any dry periods during and after the construction process. Proper watering is the most important maintenance task in terms of successfully retaining the designated trees. The areas under the canopy drip lines should be mulched with woodchip to a depth of no more than 100mm. The mulch will help maintain soil moisture levels. Testing with a soil probe in a number of locations around the tree will help ascertain soil moisture levels and requirements to irrigate. Water needs to be applied slowly to avoid runoff. A daily watering with 5 litres of water for every 30 mm of trunk calliper may provide the most even soil moisture level for roots (Watson & Himelick, 1997), however light frequent irrigations should be avoided. Irrigation should wet the entire root zone and be allowed to dry out prior to another application. Watering should continue from October until April.

## References

Bernatzky, A. 1978. Tree Ecology and Preservation. New York: Elsevier Publishing.

British Standard 5837. 1991. Guide for Trees in relation to construction. British Standards Institute.

Gilman, E. F. 1997. Trees for Urban and Suburban Landscapes. Delmar.

Harris, R. W, Clark J.R. & Matheny N.P. 1999. Arboriculture: Integrated Management of Landscape Trees, Shrubs and Vines, Third Edition. Prentice - Hall, New Jersey.

Helliwell, D. R. 1985. Trees on Development Sites. Arboricultural Association UK.

Matheny, N. & Clark, J. R. 1998. Trees and development – A technical guide to preservation of trees during land development. International Society of Arboriculture, Publishers.

Mattheck, C. & Breloer, H. 1994. The Body Language of Trees HMSO

Mattheck C. 2002. Tree Mechanics, Forschungszentrum Karlsruhe GMBH

Tattar, T. A. 1989. Diseases of Shade Trees, 2nd ed. San Diego: Academic Press.

Watson, G. W. & Himelick, E. B. 1997. Principals and Practices of Planting Trees and Shrubs. International Society of Arboriculture.

## Appendix 5:

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## Appendix 10 Mount Donna Buang Wingless Stonefly surveys (2019 & 2021)

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# Survey of the Wingless Donna Buang Stonefly *Riekoperla darlingtoni* in relation to the proposed Warburton mountain bike trail.

By Eddie Tsyrlin



The juvenile (left) and the adult (right) of *Riekoperla darlingtoni*



## Introduction

Mt Donna Buang stonefly, *Riekoperla darlingtoni* (Illies 1968), is one of the two species of wingless stoneflies found in Australia and the only wingless species of stoneflies found in Victoria. *R. darlingtoni* is a cryptic species from family Gripopterygidae, order Plecoptera (stoneflies). Federally, the species is listed as “critically endangered” (Department of the Environment, 2018) and in Victoria, as “threatened” (DELWP, 2018) with recommendation to be listed as “critically endangered” (DSE 2009). Additionally, the species is in the IUCN Red List of Threatened Species (IUCN 2017) due to its extremely limited range of distribution and “a continuing decline in the number of mature individuals, observed from 2005 to 2012” (IUCN, 2017).

Wingless Stoneflies are found within a 1km radius from the summit of Mt Donna Buang. Its suitable habitat includes springs and trickles found down to 900m above sea level within the Yarra Ranges National Park. This species requires high quality of water and habitat. It is likely to be extremely sensitive to any amount of water pollution, sedimentation and any forms of habitat alteration.

Melbourne Water has conducted surveys of the species every August from 2005 to 2016 which showed a significant decline in numbers of (at least 90%) since 2006 (Melbourne Water and DELWP unpublished data). This dataset provided ample evidence and warranted listing this species under the EPBC act.

Apart from the conservation significance stemming from its extremely limited distribution range, the stonefly is an example of an “island species” intricately linked to a narrow range of environmental conditions, such as slow flowing ephemeral springs trickles in forested areas at altitudes above 900 meters. The species has an unusually long life cycle. It takes two to three years for its juvenile aquatic stage (nymph) to develop into the adults. During this time it lives in springs and trickles and digs into moist ground when the springs dry up during the Summer months (Hynes & Hynes 1975). The wingless adults are usually found within 1-2 meters of a stream edge, mostly in rolled pieces of mountain ash bark (Hynes, 1974, personal obs.).

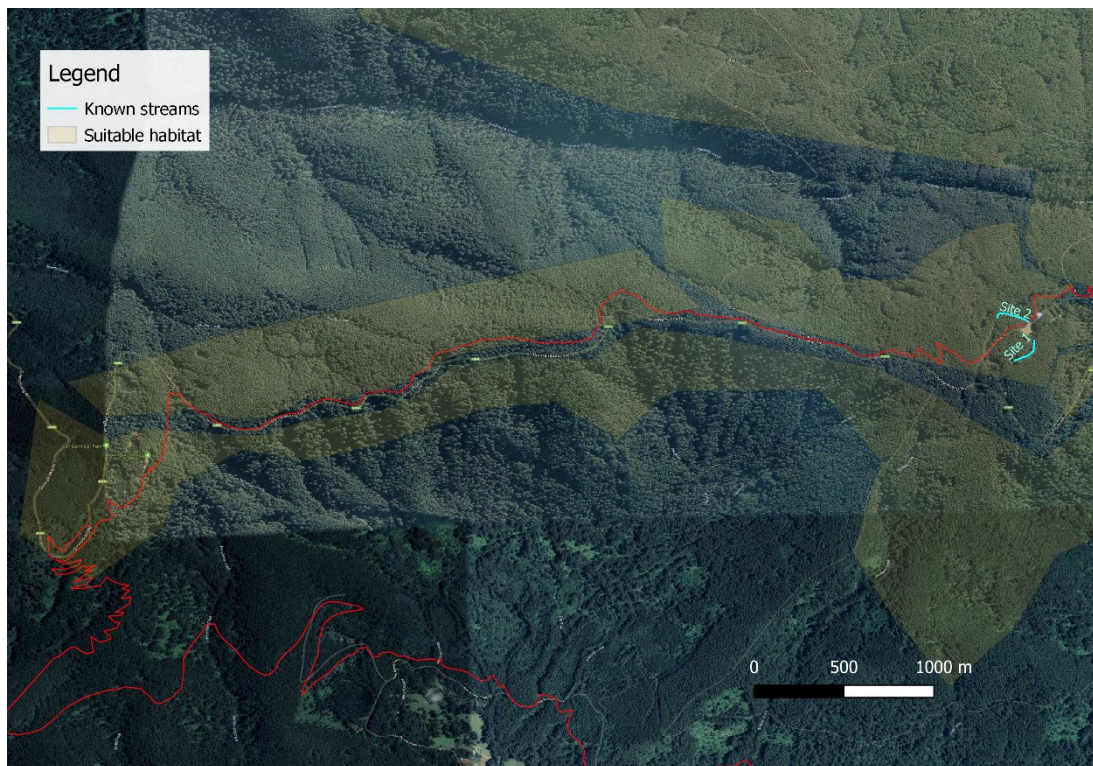
The Yarra Ranges Shire Council sought to investigate the presence / absence of the critically endangered Donna Buang stonefly to address a possible risk posed by the

construction, maintenance and use of a mountain bike trail proposed for the Mt Donna Buang area.

## Methods

### Study Site

The main study was conducted in the area downstream of the proposed mountain bike trail (Map 1). Ecological Vegetation Community of this area is classified as Montane wet forest dominated by Alpine Ash *Eucalyptus delegatensis* and Shining Gum *E. vnitens*, with cool temperate rainforest patches characterised by Myrtle Beech *Nothofagus cunninghamii* (Ahern, Tsyrlin & Myers 2003).



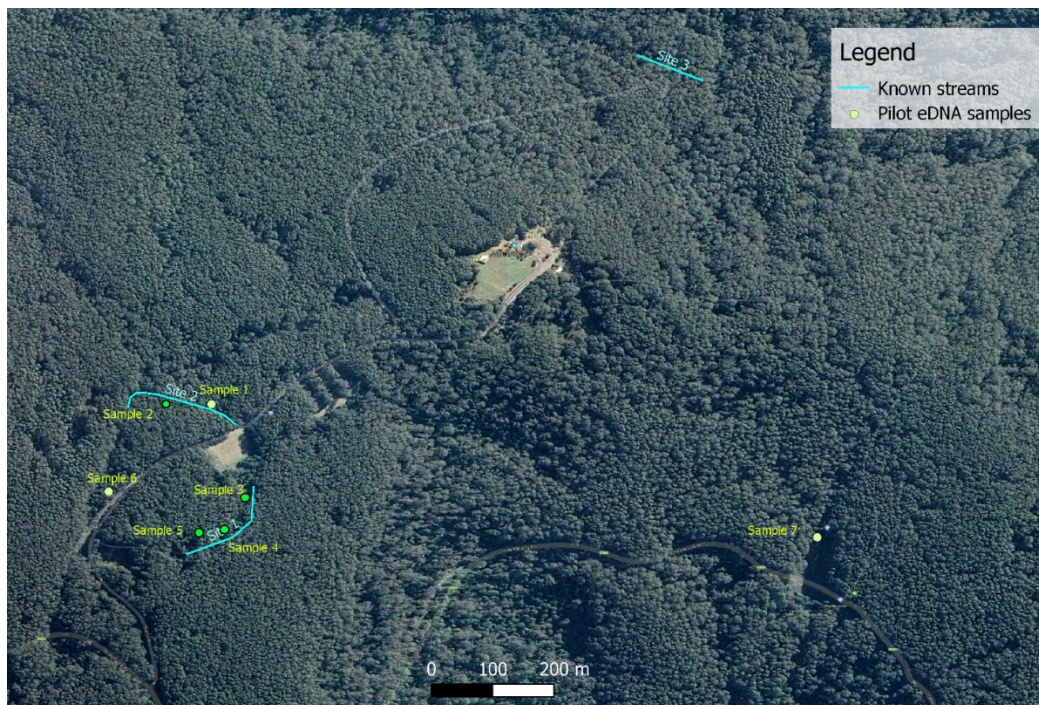
Map 1. The proposed mountain bike trail in relation to the probable stonefly area of distribution of *R. darlingtoni*.

### eDNA Methodology

Using an environmental DNA (eDNA) approach has been suggested for efficient detection of the stonefly over the brief period of two months in the difficult terrain of Mt Donna Buang. eDNA is an emerging tool for detecting organisms from environmental samples like soil, sediments, marine and fresh waters (Thomsen & Willerslev 2015). This method relies on capturing DNA that an organism sheds into its environment. This DNA is detected using primers and probes unique to the target species. The approach allows detection of cryptic

and rare species without having to physically catch them. It offers an advantage of being sensitive, non-invasive and safe for the operators in the field as they don't need to enter a water body (Griffiths et al. 2016).

Our study had two stages. The first stage was a pilot study (Map 2) to verify the performance of the species-specific primers and probe by sampling habitats where the stonefly is known to occur and habitats where stonefly is known to be absent. Once we were satisfied with the sensitivity and reliability of our methods, we undertook the main survey to locate sites near the proposed trail where the stonefly could be present.



Map 2. Pilot e DNA sites. Bright green circles (Samples 2, 3, 4 and 5) indicate detection of *R. darlingtoni* DNA. Samples 8 and 9 – Cement creek and Sample 10 – Yarra River are outside of this map. “Known streams” refer to water bodies where larvae have been observed previously. In case of Site 2, the stream continues downstream to point 6 and further but we did not observe larvae beyond the range indicated on the map.

## DNA Collection and Extraction

For the pilot study, water samples were collected from 10 different locations (Map 2) on 8 July 2019. For the main study, water samples were collected between 10 and 26 September 2019 on four separate occasions, with additional sampling on the 3<sup>rd</sup> October 2019 to verify the species present at two sites. The samples were stored for 48 hours at 4C prior to the analysis. To extract DNA from water, we filtered between 400 and 600mL of water using



60mL syringes and Sterivex® 0.22 µm filter unit (Merck, Germany). The filters were stored at -20C until DNA extraction. The Qiagen DNeasy Blood & Tissue Kit was used for DNA extraction with modifications described by Lugg et al. (2017).

## Primer Design, And Taqman® qPCR Assays

The marker and probe unique to *R. darlingtoni* were based on the available COI region of mitochondrial DNA sequenced earlier. We used Primer 3 module (version 2.3.7) Geneious program (Geneious Prime® 2019.2.1 n.d.) for the probe and primer design. The uniqueness of the probe and primers was assessed using primer BLAST (Ye et al. 2012). The eDNA primers and probe used for the study were as follows:

Probe: TCACCTCGCCGGAGTCTCCTCGA

Forward primer: CATGCCGGAGCCTCAGTAG

Reverse primer (original sequence): CAAGAGTTATACCGGTGGATCG

## eDNA Lab Analysis

“Real-time TaqMan® PCR assays were conducted using a Roche LightCycler 480 system in a 384-well format. 10 µL reactions containing 5 µL of 2 × Qiagen multiplex PCR Master Mix (Qiagen), 0.5 µL 20× TaqMan® Gene Expression Assay, 2.5 µL ddH<sub>2</sub>O and 2 µL of DNA were prepared in triplicate. These triplicates are used to minimise pipetting and other technical errors during the PCR essays. After initial testing, we used KAPA Taq enzyme for all PCR essays to overcome the issue of PCR inhibitors present in the water (Wong et al. 2014).

All extractions and qPCR analysis were undertaken in a room that is dedicated to low-quantity DNA sources. Negative controls were included at all stages (DNA extraction, qPCR) so that contamination issues could be identified if present. (Lugg et al. 2017).

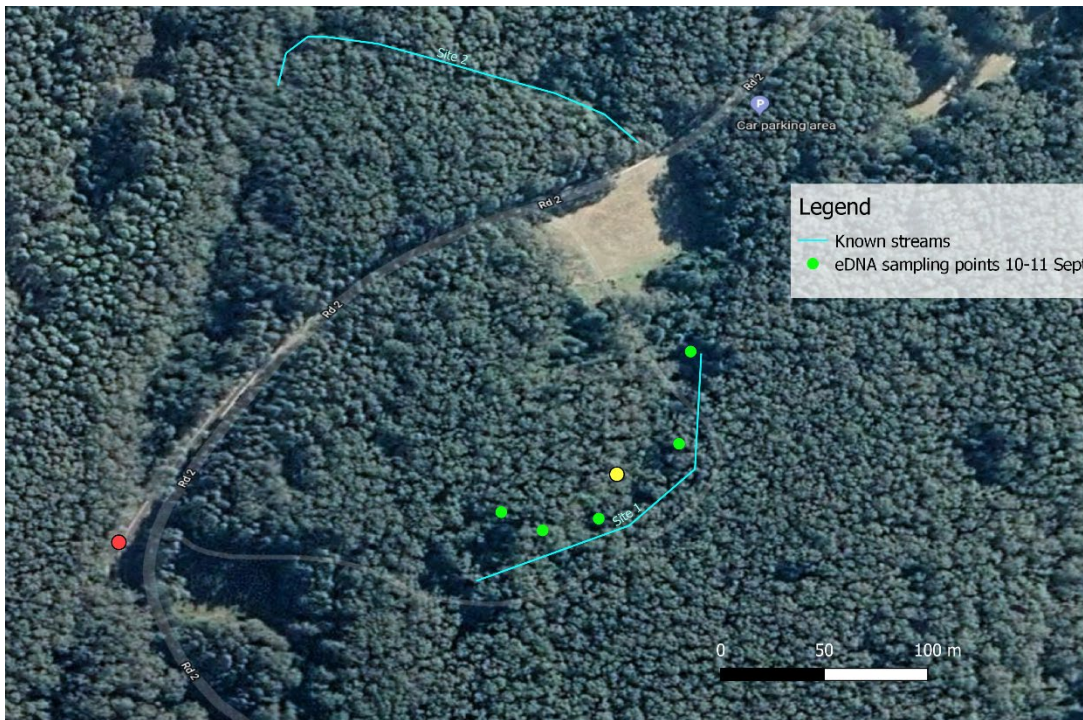
# Results

## Pilot study

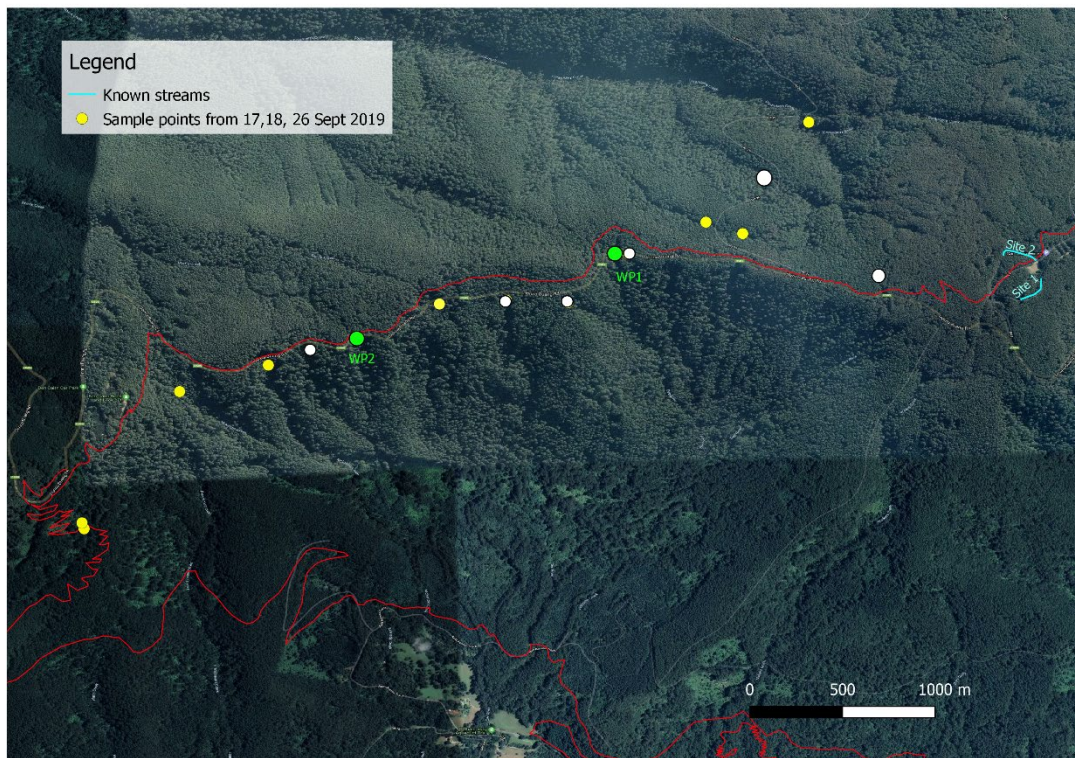
During the pilot study, the target eDNA was successfully detected at Sites 1 and 2 – samples 2, 3, 4, 5 (Map 2) and but not at sites outside of the probable distribution range of the species (Map 1). Results from Samples 6 and 1 were uncertain with one DNA detection out of three replicate vials.

## The Main study

We detected stonefly eDNA at all sampling points at Site 1 with one sampling point returning a positive result in two out of three technical replicates (Map 3).



Map 3. eDNA sampling points 10-11 September. Green circles – positive detections, yellow – less certain detection, red – no detection.





Map 4. eDNA sampling points from 17-26 September 2019. White circles indicate absence of water. WP1 and WP2 are points of probable stonefly occupancy.

We also detected *R. darlingtoni* DNA at WP1 and WP2 (Map 4) with one and two out of three technical replicates respectively. An additional sampling round on the 3<sup>rd</sup> October 2019 produced only one successful DNA amplification out of three technical replicates at WP2. No juveniles or adults of *R. darlingtoni* were observed on 18<sup>th</sup> September or 3<sup>rd</sup> October 2019 despite a deliberate search.

## Discussion and Recommendations

The results of the study showed that eDNA is a valid and sensitive method for detection of *R. darlingtoni*.

The pilot study results were positive within the known occupancy range at Site 1 and negative in stream where we did not expect them. The fact that we had ambiguous results at sample point 6 is of interest as it shows that larvae can be detected only over a short range of 100m from the point where they were observed (Map 2).

Although, we did not get amplification in all three replicate vials, the results of the main survey suggest that it is highly likely that the species occupies sites WP1 and WP2. However, an observation of the larvae or adults would be desirable to significantly expand the known distribution range of this restricted stonefly with certainty.

Additionally, we have collected another rare *Riekoperla cornuta* at WP1. Because the DNA sequence of *R. conuta* is not yet available, we can not ensure the complete uniqueness of our primers and probe. As such, a small possibility of our DNA marker detecting this species instead of *R. darlingtoni* exists for the time being. Sequencing of *Riekoperla cornuta* is currently in progress.

### Recommendations

To the best of available knowledge the proposed trail would not directly cross any waterways where *R. darlingtoni* is present or is likely to be present. However, due to high porosity of the soil, all springs in the area are well connected to their catchment. This means that any of the effluent generated during the building and usage of the trail is likely to affect the quality of water and habitat immediately downstream.

Therefore, it is recommended to build and use the trail in the way that:

- Eliminates any pollution that can be soaked into the soil

- Eliminates coarse and fine sediment carried into permanent or ephemeral (occasionally flowing) water bodies
- Does not in any way interrupt the flow rate of the ground waters
- Does not increase sediment from the Donna Buang road flowing into the adjacent springs downstream of the road.

As a way of improvement of the species chance of survival:

- Decrease sediment generated by car park 2 (see Tsyrlin, 2018)
- Decrease the sediment generated from Donna Buang Rd, especially near WP1 and WP2 by installing sediment traps and other appropriate measures. More detailed sediment control actions are similar to those listed in a recent report to Parks Victoria (Tsyrlin, 2018). These actions should involve a road engineer or a similarly qualified specialist working closely with Parks Victoria staff and consultants appointed by the Council.
- Avoid chemical weed control in the vicinity of WP1 and WP2
- Carry out a survey in August 2020 at WP1 and WP2 to confirm the species presence
- Repeat eDNA sampling and analysis at nearby streams in August 2020
- Monitor population size of the species at Site 2 (potentially affected) and Sites 1 and 3 (as a control) to prove that the trail building and use does not result in population size decrease
- Carry out additional eDNA surveys within the species distribution range to identify other potential locations.

## Acknowledgements

I would like to thank the Yara Ranges Shire Council for commissioning and facilitating this study. Tarryn Elverd provided the special data on the proposed bike trail and made useful suggestions to improve this report. Huge thanks go to Dr Katie Robertson for helping with the lab work and to Nick Bell, Mengija Liu, and Véronique Paris for helping in the field. I am particularly grateful to Sarah Matthews from Park Victoria for her undying enthusiasm, useful suggestions for this study and courageously braving the icy water for too many hours in the field.

## References

DELWP (2018) Flora and Fauna Guarantee Act 1988 Threatened List. Taxa and Communities of Flora and Fauna which are Threatened. April 2018

Department of the Environment (2018) *Riekoperla darlingtoni* in Species Profile and Threats , Department of the Environment, Canberra. Available from: <http://www.environment.gov.au/sprat>. Accessed Wed, 4 Jul 2018

DSE (2009). Advisory List of Threatened Invertebrate Fauna in Victoria - 2009. Department of Sustainability and Environment, East Melbourne, Victoria.

Ahern, LD, Tsyrlin, E & Myers, R 2003, 'Mount Donna Buang Wingless Stonefly *Riekoperla darlingtoni*', Action Statement, no. 125.

*Geneious Prime*® 2019.2.1 Biomatters development team, accessed from <[www.geneious.com](http://www.geneious.com)>.

Griffiths, J, Weeks, A, Tngley, R & Coleman, R 2016, 'eDNA: the future of aquatic biodiversity monitoring?', in *Proceedings of the 8th Australian Stream Management Conference*, accessed January 23, 2017

Hynes, HBN 1974, 'Comments on the taxonomy of Australian Austroperlidae and Gripopterygidae (Plecoptera)', *Australian Journal of Zoology Supplementary Series*, vol. 22, no. 29, pp. 1–52.

Hynes, HBN & Hynes, ME 1975, 'The life histories of many of the stoneflies (Plecoptera) of south-eastern mainland Australia, The life histories of many of the stoneflies (Plecoptera) of south-eastern mainland Australia', *Marine and Freshwater Research, Marine and Freshwater Research*, vol. 26, no. 2, pp. 113–153, 153.

IUCN (2017) The IUCN Red List of Threatened Species. Version 2017-3. <[www.iucnredlist.org](http://www.iucnredlist.org)>. Downloaded on 04 July 2018.

Lugg, WH, Griffiths, J, Rooyen, AR van, Weeks, AR & Tingley, R 2017, 'Optimal survey designs for environmental DNA sampling', *Methods in Ecology and Evolution*, vol. 9, no. 4, pp. 1049–1059.

Thomsen, PF & Willerslev, E 2015, 'Environmental DNA – An emerging tool in conservation for monitoring past and present biodiversity', *Biological Conservation*, vol. 183, pp. 4–18.

Tsyrlin, E (2018) The assessment of potential threats from car park 2 to Mt Donna Buang stonefly (*Riekoperla darlingtoni*). A report to Parks Victoria.

Wong, WH, Tay, YC, Puniamoorthy, J, Balke, M, Cranston, PS & Meier, R 2014, “Direct PCR” optimization yields a rapid, cost-effective, nondestructive and efficient method for obtaining DNA barcodes without DNA extraction’, *Molecular Ecology Resources*, vol. 14, no. 6, pp. 1271–1280.

Ye, J, Coulouris, G, Zaretskaya, I, Cutcutache, I, Rozen, S & Madden, TL 2012, ‘Primer-BLAST: a tool to design target-specific primers for polymerase chain reaction’, *BMC bioinformatics*, vol. 13, p. 134.



# Survey of *Riekoperla darlingtoni* (Illies 1968) east of the Mt Donna Buang for the Warburton Mountain Bike Destination project.

by Eddie Tsyrlin, July 2021



The juvenile (top) and the adult female (bottom) of *Riekoperla darlingtoni*

## Introduction

The Mt Donna Buang stonefly, *Riekoperla darlingtoni* (Illies 1968), is a cryptic stonefly species from the family Gripopterygidae (Fig. 1). The slow-moving nymphs lack wing pads and adults are completely wingless. It is one of two species of wingless stoneflies found in Australia and the only wingless stonefly species found in Victoria. The species has previously only been found within a 1 km radius of the summit of Mt Donna Buang.

Apart from being wingless, *R. darlingtoni* has several unique characteristics for a stonefly, such as a life cycle that spans 2.5 to 3 years, compared to the maximum of 14-15 months for the other *Riekoperla* species (Hynes and Hynes 1975). Unlike other Australian stoneflies, the nymphs of *R. darlingtoni* survive by digging into the moist bed of springs from November to April when the springs normally dry up. Also, the eggs are thought to survive desiccation (Hynes and Hynes 1975).

In Victoria, *R. darlingtoni* is listed as critically endangered (DELWP, 2021). The species is also on the IUCN Red List of Threatened Species (Suter 2013) due to its extremely limited distribution and “a continuing decline in the number of mature individuals, observed from 2005 to 2012” (Suter 2013).

The species occurs at a very narrow range of environmental conditions, typically in montane trickles from the point of origin to less than 500 metres downstream, where the channel begins to form (per. obs.). The species has an unusually long lifecycle. It takes two to three years for its juvenile aquatic stage (nymph) to develop into the adults. Nymphs can be observed in the surface water trickles from May to October. They dig into moist ground when the trickles dry up during the summer months (Hynes & Hynes 1975). The wingless adults are usually found within 1-2 meters of a stream edge, mostly in rolled pieces of mountain ash bark (Hynes 1974), (personal obs.).

The scope of this study was to survey springs originating from the ridge east of Mt Donna Buang (Fig. 1) to determine presence of *R. darlingtoni* and potential impacts to its habitat from the construction and operation of the proposed Warburton Mountain Bike Trail Destination project and to provide recommendations to avoid or mitigate the possible impacts. The areas assessed were part of investigating alternative trail alignments for the project between Mt Donna Buang and Mt Victoria.



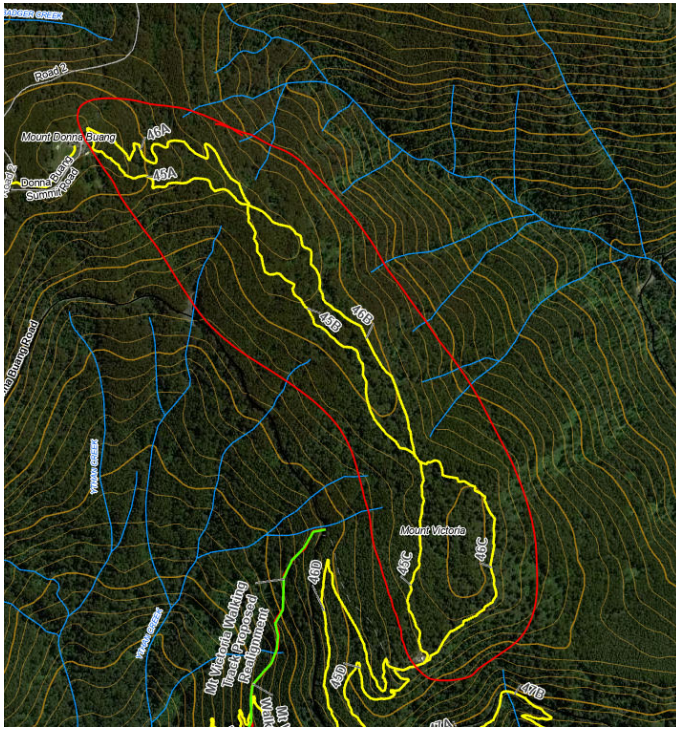


Figure 1. The survey area is outlined by the red line. The yellow lines indicate different options for the proposed alternative trails between Mt Donna Buang and Mt Victoria.

## METHODS

### Study Site

The Ecological Vegetation Class of this area is Montane Wet Forest dominated by alpine ash (*Eucalyptus delegatensis*) and shining gum (*Eucalyptus nitens*), with cool temperate rainforest or cool temperate mixed forest patches characterised by the presence of myrtle beech (*Nothofagus cunninghamii*) (Ahern et al. 2003) (Fig.2). The area receives regular snowfalls between June and August.



Figure 2. Montane Wet Forest near a tributary of Cement Creek

## DNA Collection, Extraction and Analysis

Environmental DNA was chosen as the main method of surveys. The recent development of environmental DNA (eDNA) survey methods, that rely on water samples containing DNA that an organism sheds into its environment, allows detection of rare aquatic species such as platypus (e.g. Griffiths et al. 2016), fish (e.g. Tingley et al. 2021), frogs (e.g. Ficetola et al. 2008) and insects (e.g. Thomsen et al. 2012; Doi et al. 2017), without having to catch and handle animals.

Water samples were collected between 27 April and 6 May 2021 on five separate occasions at 15 sites (Fig. 3). To extract DNA from water, we filtered between 400 and 600 mL of water per sample using 60 mL syringes and a Sterivex® 0.22 µm filter unit (Merck, Germany). Filters were stored at -20 °C until DNA extraction. A DNeasy Blood & Tissue Kit (Qiagen, Germany) was used for DNA extraction with modifications described by Lugg et al. (2017).

Quantitative TaqMan® PCR assays were conducted using a Roche Light Cycler 480 system in a 384-well format (Roche Molecular Systems, USA). We used the KAPA Plant DNA polymerase for all PCR assays to overcome the issue of PCR inhibitors present in the water (Wong et al. 2014). This approach has been successfully trailed during the earlier survey (Tsyrlin 2019).

The likely impacts of the proposed mountain bike trail were sourced from the literature (Marion and Wimpey 2007).

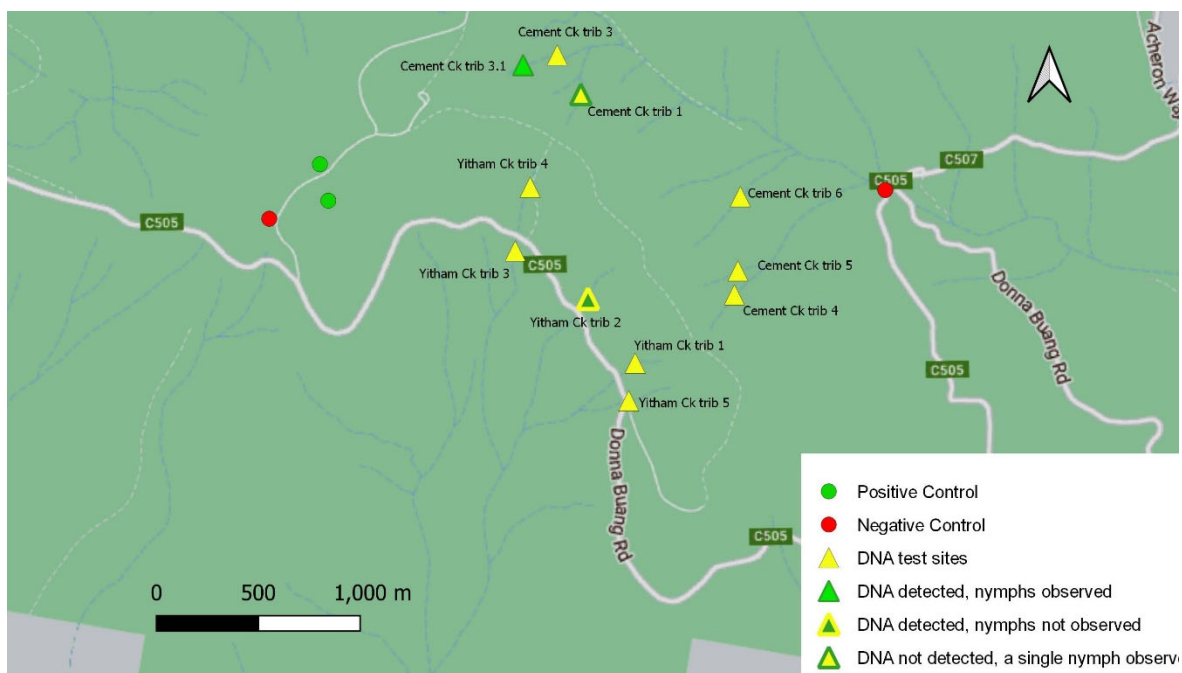


Figure 3. The map of the survey sites and findings.

## RESULTS

### Survey results

The survey findings are summarised in Fig. 3. We detected two new localities for *Riekoperla darlingtoni* using eDNA and one new locality by a visual observation (Table 1).

Table 1 The coordinates of the survey sites and findings.

Name	Date	Latitude	Longitude	Findings
Cement creek trib. 3	27/04/2021	-37.705	145.6892467	No eDNA detected, no nymphs observed
<b>Cement creek trib. 1</b>	27/04/2021	-37.7067	145.6905341	A single nymph observed, DNA not detected.
Positive control 1	27/04/2021	-37.7116	145.6764579	eDNA detected, nymphs observed
Positive control 2	27/04/2021	-37.7095	145.675385	eDNA detected, nymphs observed
Negative control 1	27/04/2021	-37.7121	145.6871009	No eDNA detected, no nymphs observed
Negative control 2	27/04/2021	-37.712	145.6729603	No eDNA detected, no nymphs observed
Cement creek trib. 6	28/04/2021	-37.7114	145.6993318	No eDNA detected, no nymphs observed
Cement creek trib. 5	28/04/2021	-37.7146	145.6991386	No eDNA detected, no nymphs observed
Cement creek trib. 4	28/04/2021	-37.7157	145.6989241	No eDNA detected, no nymphs observed
Ythan creek trib. 4	28/04/2021	-37.7108	145.6876373	No eDNA detected, no nymphs observed
<b>Yithan creek trib. 2</b>	3/05/2021	-37.7158	145.6907701	DNA detected but no nymphs observed
Ythan creek trib. 1	3/05/2021	-37.7186	145.6933451	No eDNA detected, no nymphs observed
<b>Cement trib. 3.1</b>	5/05/2021	-37.7054	145.6873369	eDNA detected, nymphs observed
Yitham creek trib. 3	5/05/2021	-37.7136	145.6867576	No eDNA detected, no nymphs observed
Yitham creek trib.5	6/05/2021	-37.7203	145.6929588	No eDNA detected, no nymphs observed

### Habitat Condition

The nymphs of the stonefly were found within a few meters of the spring origin where the water slowly trickles out of the saturated ground (Fig. 4). The substratum of the trickles consisted of mostly silt and fine sand and the trickles are often covered by coarse woody debris. The trickles at this stage have not formed a defined channel as there is too little water energy for the channel formation. The ground around the trickles was extremely loose and extreme care had to be taken not to disturb and smother these springs by silt. Similarly, the soil was very loose within the catchment of the springs. It is expected this part of the stream is ephemeral with ground water drying up during the warmer time of the year.





Figure 4. Cement Creek tributary 1 (A) and Cement Creek tributary 3.1 (B)

## DISCUSSION AND RECOMMENDATIONS

The results of this study extend the distribution of *R. darlingtoni* by over 1200 meters in the south-eastern direction (Fig. 3). Importantly, the species was found in the Western branch of the Cement Creek for the first time. The species eDNA has not been detected at Cement Ck tributary 3, only 180 meters downstream of the newly found population at Cement Ck tributary 3.1 (Fig. 3). This confirms the earlier finding (Tsyrlin 2019) that the species occupies an extremely narrow ephemeral habitat from the point of the spring origin to approximately 300 meters downstream where the flow volume usually increases, and the spring becomes more permanent. Similarly to the previous survey (Tsyrlin 2019), less than 10 nymphs were observed in the trickles indicating a very low abundance and the fragile state of the populations. While eDNA is an extremely sensitive method of detecting a species, it has its detection limits when the density of specimens in a stream is very low. For example, eDNA has not been detected in Cement ck trib. 1 despite a definitive observation of the species. It is possible that the species is also present at other test sites but at very low densities beyond the detection limits of the eDNA analysis.

The possible impacts from mountain bike trail construction and operation have been reviewed by Marion and Wimpey (2007) and are assessed against the risks relevant to *Riekoperla darlingtoni*. These risks and possible mitigation actions are listed in Table 2.

Table 2 Threats and mitigation actions relevant to *R. darlingtoni*

Threat	Risk of impact to the stonefly	Preferred management action	Alternative mitigation measures.
1. Soil compaction and erosion during the construction and operation of the trail.	High risk to the species populations as their survival is directly impacted by changes in hydrology and sedimentation of the water in montane trickles.	Avoid building and operating trails in the stream catchment or in close proximity to the stonefly habitat where an impact on the species is probable.	A trail design that can demonstrate zero impact on the ground including compaction and erosion within the local catchments of the tributaries during construction and operation. This could be achieved by creating a raised platform that does not result in soil compaction or erosion for the sections of the trail within the assessed area.
2. Off-trail travel (e.g. rogue trails, accidental falls or rescue operations)	High risk from impacting the ground in close proximity to springs or directly impacting the springs		Ensure that riders do not (can not) get off the trail.

## REFERENCES

DELWP (2021) Flora and Fauna Guarantee Act 1988 Threatened List. Taxa and Communities of Flora and Fauna which are Threatened. January 2021

[https://www.environment.vic.gov.au/\\_\\_data/assets/pdf\\_file/0015/515103/2021-03-03-FFG-Threatened-List.pdf](https://www.environment.vic.gov.au/__data/assets/pdf_file/0015/515103/2021-03-03-FFG-Threatened-List.pdf)

Ahern LD, Tsyrlin E, Myers R (2003) Mount Donna Buang Wingless Stonefly *Riekoperla darlingtoni*. Action Statement.

[https://www.environment.vic.gov.au/\\_\\_data/assets/pdf\\_file/0012/32520/Mt\\_Donna\\_Buang\\_Wingless\\_Stonefly\\_Riekoperla\\_darlingtoni.pdf](https://www.environment.vic.gov.au/__data/assets/pdf_file/0012/32520/Mt_Donna_Buang_Wingless_Stonefly_Riekoperla_darlingtoni.pdf)

Doi H, Katano I, Sakata Y, et al (2017) Detection of an endangered aquatic heteropteran using environmental DNA in a wetland ecosystem. *Royal Society Open Science* 4:170568. <https://doi.org/10.1098/rsos.170568>

Ficetola GF, Miaud C, Pompanon F, Taberlet P (2008) Species detection using environmental DNA from water samples. *Biology Letters* 4:423–425. <https://doi.org/10.1098/rsbl.2008.0118>

Griffiths J, Weeks A, Tingley R, Coleman R (2016) eDNA: the future of aquatic biodiversity monitoring? In: Proceedings of the 8th Australian Stream Management Conference

Hynes HBN (1974) Comments on the taxonomy of Australian Austroperlidae and Gripopterygidae (Plecoptera). *Aust J Zoo Supps* 22:1–52. <https://doi.org/10.1071/ajzs029>

Hynes HBN, Hynes ME (1975) The life histories of many of the stoneflies (Plecoptera) of south-eastern mainland Australia, The life histories of many of the stoneflies (Plecoptera) of south-eastern mainland Australia. *Mar Freshwater Res*, *Mar Freshwater Res* 26, 26:113, 113–153, 153. <https://doi.org/10.1071/MF9750113>, [10.1071/MF9750113](https://doi.org/10.1071/MF9750113)

Lugg WH, Griffiths J, Rooyen AR van, et al (2017) Optimal survey designs for environmental DNA sampling. *Methods in Ecology and Evolution* 9:1049–1059. <https://doi.org/10.1111/2041-210X.12951>

Marion J, Wimpey J (2007) Environmental impacts of mountain biking: science review and best practices. In: *Managing mountain biking: IMBA's guide to providing great riding*. International Mountain Bicycling Association

Suter P (2013) *Riekoperla darlingtoni*. The IUCN Red List of Threatened Species 2014: e.T19730A21426325i

Thomsen PF, Kielgast J, Iversen LL, et al (2012) Monitoring endangered freshwater biodiversity using environmental DNA. *Molecular Ecology* 21:2565–2573. <https://doi.org/10.1111/j.1365-294X.2011.05418.x>

Tingley R, Coleman R, Gecse N, et al (2021) Accounting for false positive detections in occupancy studies based on environmental DNA: A case study of a threatened freshwater fish (*Galaxiella pusilla*). *Environmental DNA* 3:388–397. <https://doi.org/10.1002/edn3.124>

Tsyrlin E (2019) Survey of the Wingless Donna Buang Stonefly *Riekoperla darlingtoni* in relation to the proposed Warburton mountain bike trail. Melbourne, Australia

Wong WH, Tay YC, Puniamoorthy J, et al (2014) 'Direct PCR' optimization yields a rapid, cost-effective, nondestructive and efficient method for obtaining DNA barcodes without DNA extraction. *Mol Ecol Resour* 14:1271–1280. <https://doi.org/10.1111/1755-0998.12275>

## Appendix 11 Native Vegetation Removal Reports for two project scenarios

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This report provides information to support an application to remove, destroy or lop native vegetation in accordance with the *Guidelines for the removal, destruction or lopping of native vegetation*. The report is **not an assessment by DELWP** of the proposed native vegetation removal. Native vegetation information and offset requirements have been determined using spatial data provided by the applicant or their consultant.

Date of issue: 07/09/2021

Report ID: BIO\_2021\_085

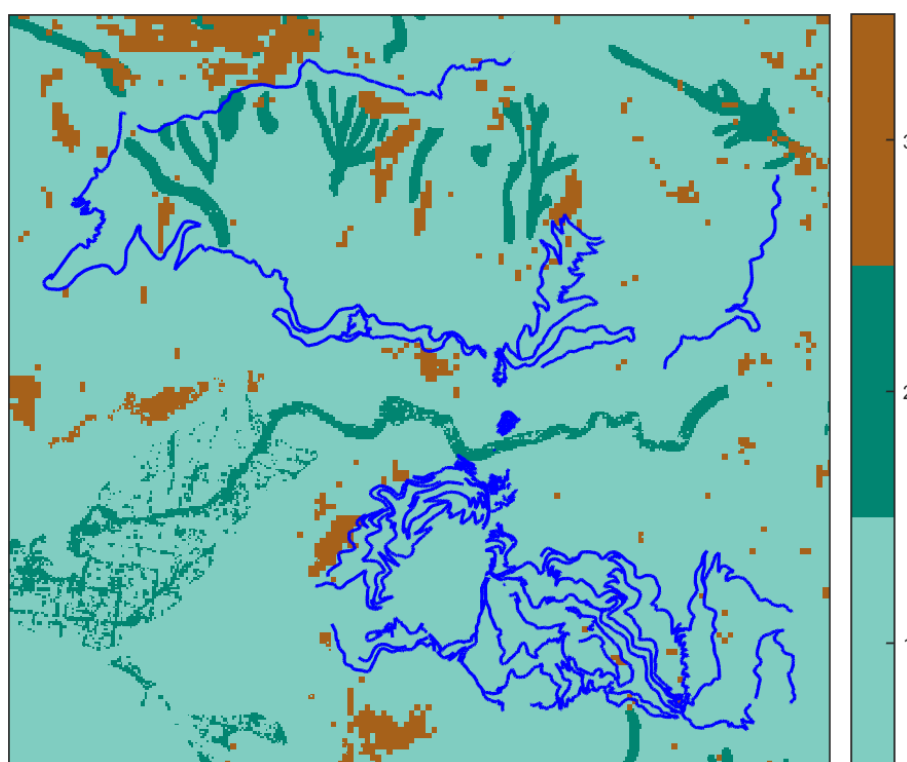
Time of issue: 12:52 am

Project ID	B33805_S1_VegeLoss_GDA94_VicGrid_20210905
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## Assessment pathway

Assessment pathway	Detailed Assessment Pathway
Extent including past and proposed	37.047 ha
Extent of past removal	0.000 ha
Extent of proposed removal	37.047 ha
No. Large trees proposed to be removed	0
Location category of proposed removal	Location 3 The native vegetation is in an area where the removal of less than 0.5 hectares could have a significant impact on habitat for one or more rare or threatened species. The native vegetation is also in an area mapped as an endangered Ecological Vegetation Class (as per the statewide EVC map); and a wetland listed in the Directory of Important Wetlands of Australia.

### 1. Location map



## Total offset requirements if a permit is granted

Any approval granted will include a condition to obtain an offset that meets the following requirements:

<b>Species offset amount<sup>1</sup></b>	<p>21.107 species units of habitat for Leadbeater's Possum, <i>Gymnobelideus leadbeateri</i></p> <p>20.684 species units of habitat for Smoky Mouse, <i>Pseudomys fumeus</i></p> <p>19.073 species units of habitat for Tall Astelia, <i>Astelia australiana</i></p> <p>25.214 species units of habitat for Brickmaker's Sedge, <i>Gahnia grandis</i></p> <p>26.076 species units of habitat for Nunniong Everlasting, <i>Ozothamnus rogersianus</i></p> <p>20.620 species units of habitat for Jungle Bristle-fern, <i>Cephalomanes caudatum</i></p> <p>19.885 species units of habitat for Tree Geebung, <i>Persoonia arborea</i></p> <p>26.023 species units of habitat for Long Pink-bells, <i>Tetratheca stenocarpa</i></p> <p>15.210 species units of habitat for Fairy Lanterns, <i>Thismia rodwayi</i></p> <p>9.342 species units of habitat for Mountain Bird-orchid, <i>Chiloglottis jeanesii</i></p> <p>25.858 species units of habitat for Powelltown Correa, <i>Correa reflexa var. lobata</i></p> <p>23.128 species units of habitat for Toothed Leionema, <i>Leionema bilobum subsp. serrulatum</i></p> <p>11.417 species units of habitat for White Star-bush, <i>Asterolasia asteriscophora subsp. albiflora</i></p>
Large trees	0 trees

NB: values within tables in this document may not add to the totals shown above due to rounding

Appendix 1 includes information about the native vegetation to be removed

Appendix 2 includes information about the rare or threatened species mapped at the site.

Appendix 3 includes maps showing native vegetation to be removed and extracts of relevant species habitat importance maps

<sup>1</sup> The species offset amount(s) required is the sum of all species habitat units in Appendix 1.

## Offset requirements if a permit is granted – Stage 1

Any approval granted will include a condition to obtain an offset that meets the following requirements:

<b>Species offset amount</b>	<p>12.885 species units of habitat for Leadbeater's Possum, <i>Gymnobelideus leadbeateri</i></p> <p>13.543 species units of habitat for Smoky Mouse, <i>Pseudomys fumeus</i></p> <p>11.559 species units of habitat for Tall Astelia, <i>Astelia australiana</i></p> <p>16.588 species units of habitat for Brickmaker's Sedge, <i>Gahnia grandis</i></p> <p>17.081 species units of habitat for Nunniong Everlasting, <i>Ozothamnus rogersianus</i></p> <p>12.629 species units of habitat for Jungle Bristle-fern, <i>Cephalomanes caudatum</i></p> <p>11.839 species units of habitat for Tree Geebung, <i>Persoonia arborea</i></p> <p>17.082 species units of habitat for Long Pink-bells, <i>Tetralochea stenocarpa</i></p> <p>8.515 species units of habitat for Fairy Lanterns, <i>Thismia rodwayi</i></p> <p>6.479 species units of habitat for Mountain Bird-orchid, <i>Chiloglottis jeansii</i></p> <p>17.083 species units of habitat for Powelltown Correa, <i>Correa reflexa</i> var. <i>lobata</i></p> <p>14.989 species units of habitat for Toothed Leionema, <i>Leionema bilobum</i> subsp. <i>serrulatum</i></p> <p>6.826 species units of habitat for White Star-bush, <i>Asterolasia asteriscophora</i> subsp. <i>albiflora</i></p>
Large trees	0 trees

## Offset requirements if a permit is granted – Stage 2

Any approval granted will include a condition to obtain an offset that meets the following requirements:

<b>Species offset amount</b>	<p>8.222 species units of habitat for Leadbeater's Possum, <i>Gymnobelideus leadbeateri</i></p> <p>7.141 species units of habitat for Smoky Mouse, <i>Pseudomys fumeus</i></p> <p>7.514 species units of habitat for Tall Astelia, <i>Astelia australiana</i></p> <p>8.626 species units of habitat for Brickmaker's Sedge, <i>Gahnia grandis</i></p> <p>8.995 species units of habitat for Nunniong Everlasting, <i>Ozothamnus rogersianus</i></p> <p>7.991 species units of habitat for Jungle Bristle-fern, <i>Cephalomanes caudatum</i></p> <p>8.046 species units of habitat for Tree Geebung, <i>Persoonia arborea</i></p> <p>8.941 species units of habitat for Long Pink-bells, <i>Tetralochea stenocarpa</i></p> <p>6.695 species units of habitat for Fairy Lanterns, <i>Thismia rodwayi</i></p> <p>2.863 species units of habitat for Mountain Bird-orchid, <i>Chiloglottis jeansii</i></p> <p>8.775 species units of habitat for Powelltown Correa, <i>Correa reflexa</i> var. <i>lobata</i></p> <p>8.139 species units of habitat for Toothed Leionema, <i>Leionema bilobum</i> subsp. <i>serrulatum</i></p> <p>4.591 species units of habitat for White Star-bush, <i>Asterolasia asteriscophora</i> subsp. <i>albiflora</i></p>
Large trees	0 trees

## Next steps

Any proposal to remove native vegetation must meet the application requirements of the Detailed Assessment Pathway and it will be assessed under the Detailed Assessment Pathway.

If you wish to remove the mapped native vegetation you are required to apply for a permit from your local council. Council will refer your application to DELWP for assessment, as required. **This report is not a referral assessment by DELWP.**

This *Native vegetation removal report* must be submitted with your application for a permit to remove, destroy or lop native vegetation.

Refer to the *Guidelines for the removal, destruction or lopping of native vegetation* (the Guidelines) for a full list of application requirements. This report provides information that meets the following application requirements:

- The assessment pathway and reason for the assessment pathway
- A description of the native vegetation to be removed (partly met)
- Maps showing the native vegetation and property (partly met)
- Information about the impacts on rare or threatened species.
- The offset requirements determined in accordance with section 5 of the Guidelines that apply if approval is granted to remove native vegetation.

Additional application requirements must be met including:

- Topographical and land information
- Recent dated photographs
- Details of past native vegetation removal
- An avoid and minimise statement
- A copy of any Property Vegetation Plan that applies
- A defensible space statement as applicable
- A statement about the Native Vegetation Precinct Plan as applicable
- A site assessment report including a habitat hectare assessment of any patches of native vegetation and details of trees
- An offset statement that explains that an offset has been identified and how it will be secured.

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Obtaining this publication does not guarantee that an application will meet the requirements of Clauses 52.16 or 52.17 of the Victoria Planning Provisions and Victorian planning schemes or that a permit to remove native vegetation will be granted.

Notwithstanding anything else contained in this publication, you must ensure that you comply with all relevant laws, legislation, awards or orders and that you obtain and comply with all permits, approvals and the like that affect, are applicable or are necessary to undertake any action to remove, lop or destroy or otherwise deal with any native vegetation or that apply to matters within the scope of Clauses 52.16 or 52.17 of the Victoria Planning Provisions and Victorian planning schemes.

## Appendix 1: Description of native vegetation to be removed

The species-general offset test was applied to your proposal. This test determines if the proposed removal of native vegetation has a proportional impact on any rare or threatened species habitats above the species offset threshold. The threshold is set at 0.005 per cent of the mapped habitat value for a species. When the proportional impact is above the species offset threshold a species offset is required. This test is done for all species mapped at the site. Multiple species offsets will be required if the species offset threshold is exceeded for multiple species.

Where a zone requires species offset(s), the species habitat units for each species in that zone is calculated by the following equation in accordance with the Guidelines:

$$\text{Species habitat units} = \text{extent} \times \text{condition} \times \text{species landscape factor} \times 2, \text{ where the species landscape factor} = 0.5 + (\text{habitat importance score}/2)$$

The species offset amount(s) required is the sum of all species habitat units per zone

Where a zone does not require a species offset, the general habitat units in that zone is calculated by the following equation in accordance with the Guidelines:

$$\text{General habitat units} = \text{extent} \times \text{condition} \times \text{general landscape factor} \times 1.5, \text{ where the general landscape factor} = 0.5 + (\text{strategic biodiversity value score}/2)$$

The general offset amount required is the sum of all general habitat units per zone.

### Native vegetation to be removed

Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Information provided by or on behalf of the applicant in a GIS file			Information calculated by EnSym				
						Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type	

Refer to accompanying Excel spreadsheet, which must be included with this report in any application – 'Native Veg to be removed' tab



## Appendix 2: Information about impacts to rare or threatened species' habitats on site

This table lists all rare or threatened species' habitats mapped at the site.

Species common name	Species scientific name	Species number	Conservation status	Group	Habitat impacted	% habitat value affected
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*Refer to accompanying Excel spreadsheet, which must be included with this report in any application – 'Impacts on VROTS habitat' tab*

### Habitat group

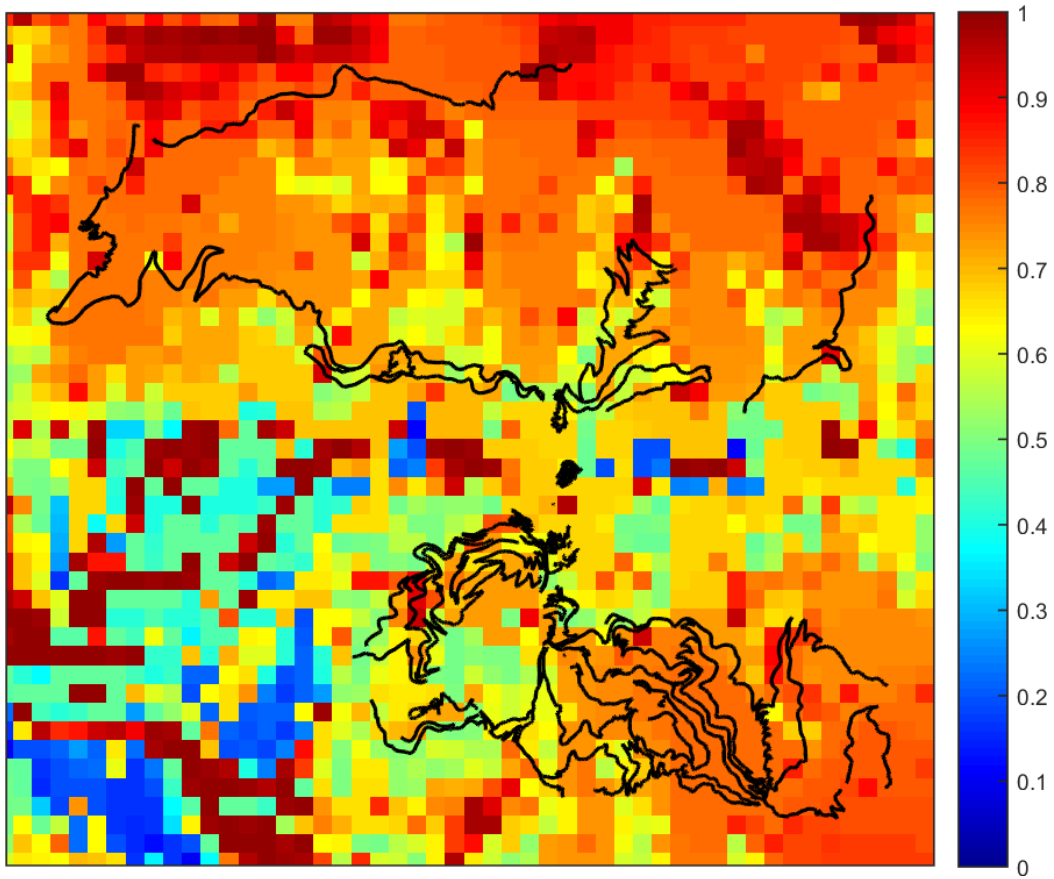
- Highly localised habitat means there is 2000 hectares or less mapped habitat for the species
- Dispersed habitat means there is more than 2000 hectares of mapped habitat for the species

### Habitat impacted

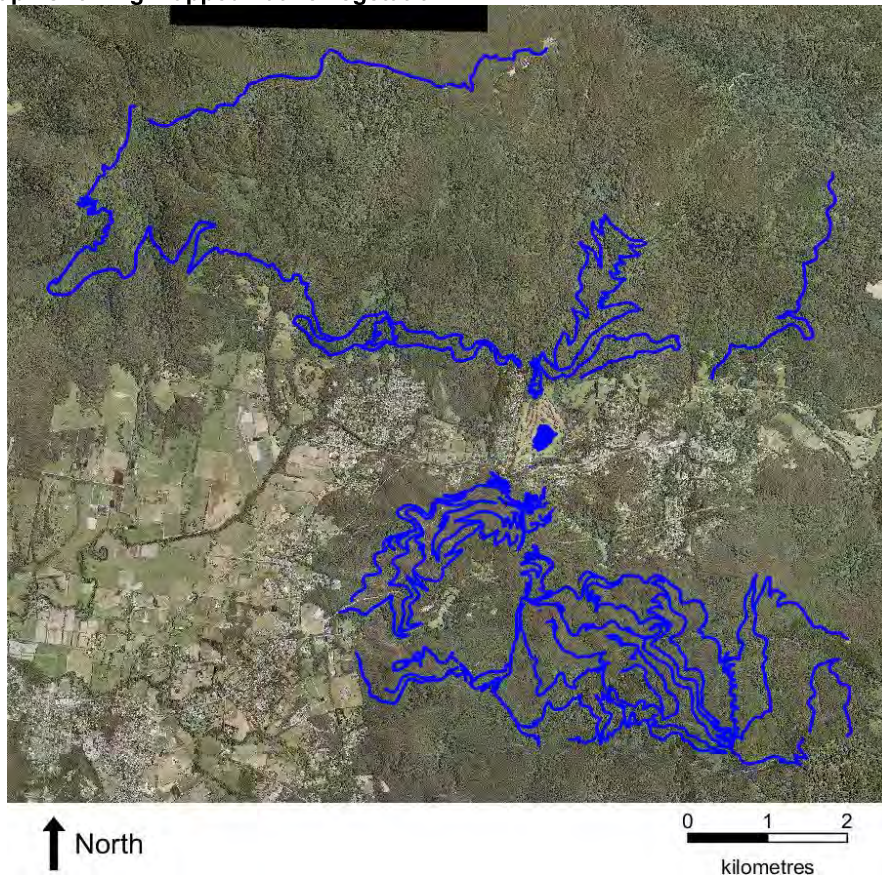
- Habitat importance maps are the maps defined in the Guidelines that include all the mapped habitat for a rare or threatened species
- Top ranking maps are the maps defined in the Guidelines that depict the important areas of a dispersed species habitat, developed from the highest habitat importance scores in dispersed species habitat maps and selected VBA records
- Selected VBA record is an area in Victoria that represents a large population, roosting or breeding site etc.

# Appendix 3 – Images of mapped native vegetation

## 2. Strategic biodiversity values map

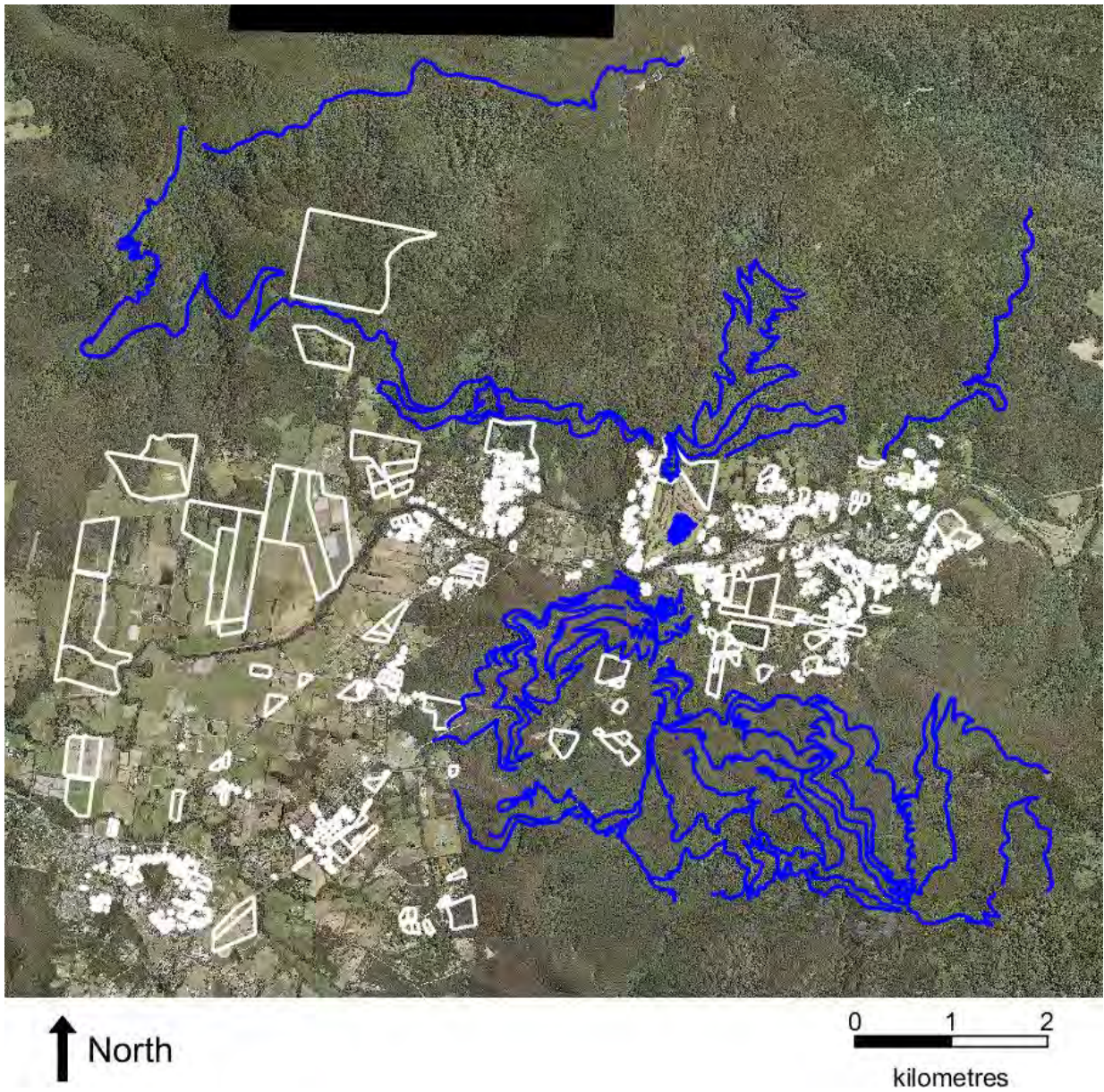


## 3. Aerial photograph showing mapped native vegetation





#### 4. Map of the property in context



Yellow boundaries denote areas of proposed native vegetation removal.

Blue boundaries denote zones of partial removal with a halved condition score.

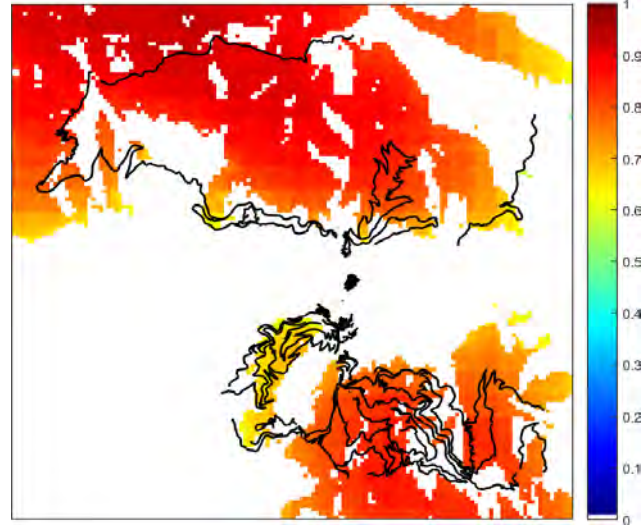


#### 4. Habitat importance maps

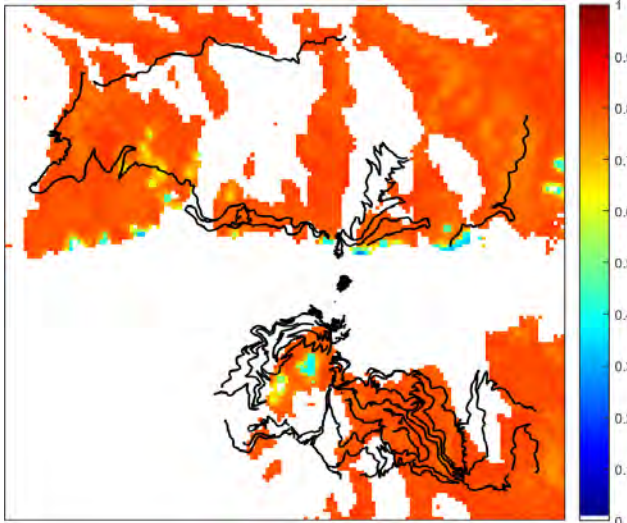
Leadbeater's Possum  
*Gymnobelideus leadbeateri*  
11141



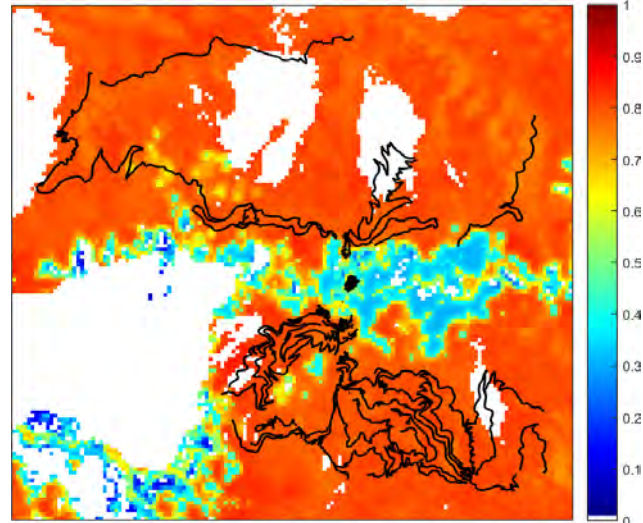
Smoky Mouse  
*Pseudomys fumeus*  
11458



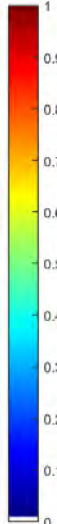
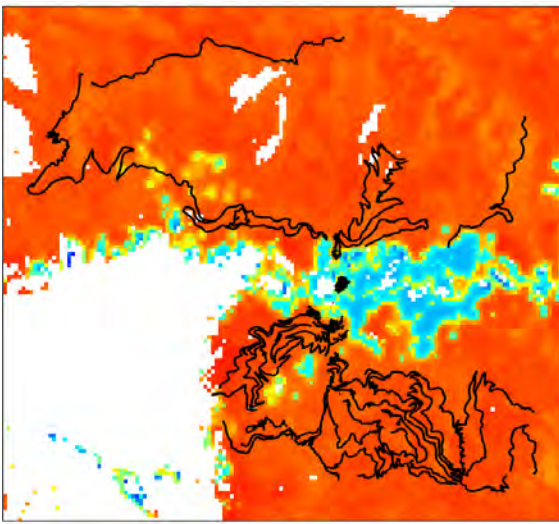
Tall Astelia  
*Astelia australiana*  
500296



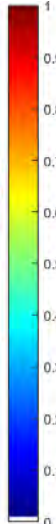
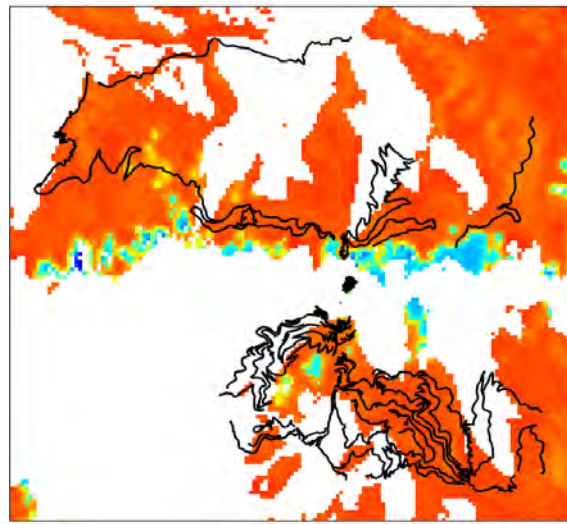
Brickmaker's Sedge  
*Gahnia grandis*  
501390



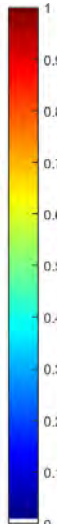
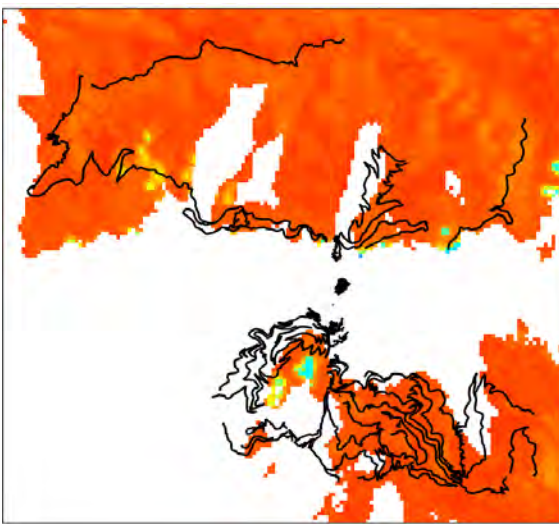
Nunniang Everlasting  
*Ozothamnus rogersianus*  
501623



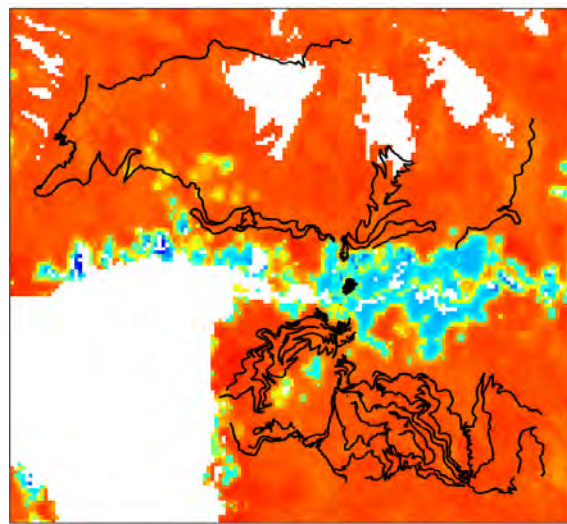
Jungle Bristle-fern  
*Cephalomanes caudatum*  
502094



Tree Geebung  
*Persoonia arborea*  
502459

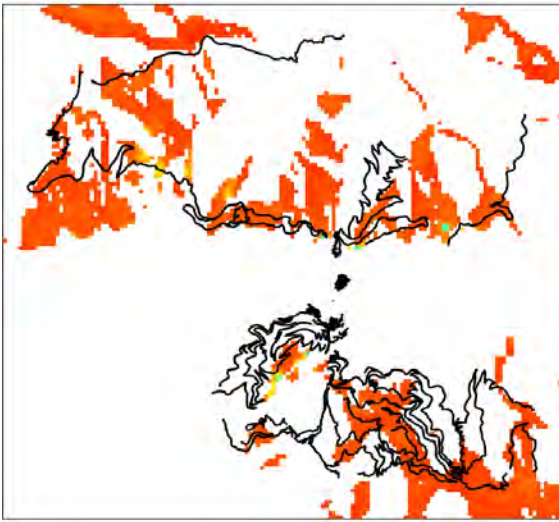


Long Pink-bells  
*Tetratheca stenocarpa*  
503354

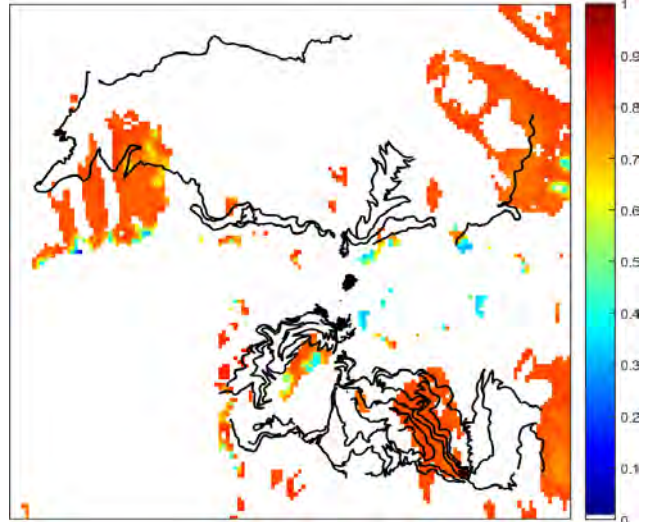




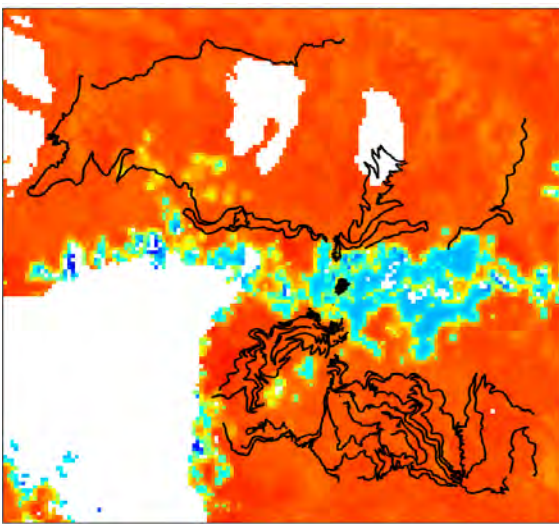
Fairy Lanterns  
*Thismia rodwayi*  
503390



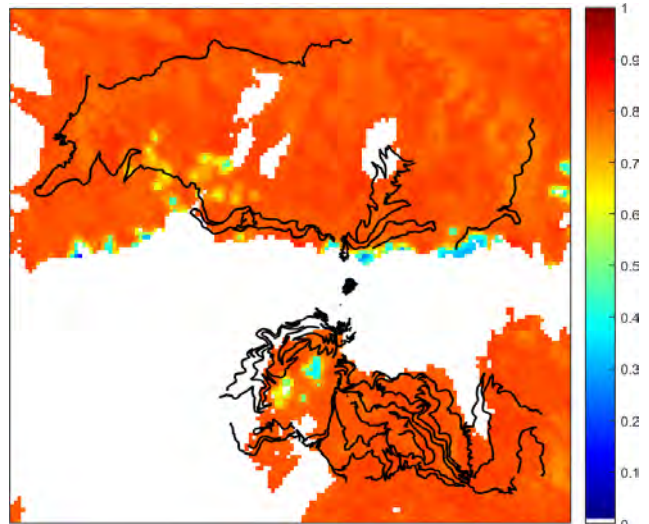
Mountain Bird-orchid  
*Chiloglottis jeanesii*  
504499



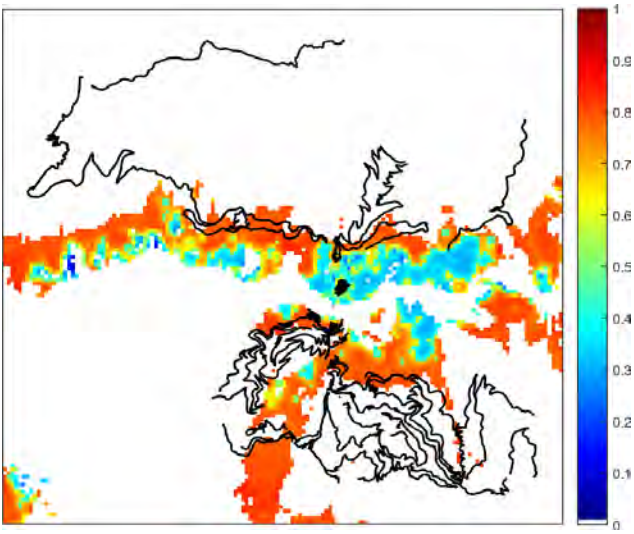
Powelltown Correa  
*Correa reflexa* var. *lobata*  
505404



Toothed Leonema  
*Leonema bilobum* subsp. *serrulatum*  
505480



White Star-bush  
*Asterolasia asteriscophora* subsp. *albiflora*  
505647



This report provides information to support an application to remove, destroy or lop native vegetation in accordance with the *Guidelines for the removal, destruction or lopping of native vegetation*. The report is **not an assessment by DELWP** of the proposed native vegetation removal. Native vegetation information and offset requirements have been determined using spatial data provided by the applicant or their consultant.

Date of issue: 07/09/2021

Report ID: BIO\_2021\_086

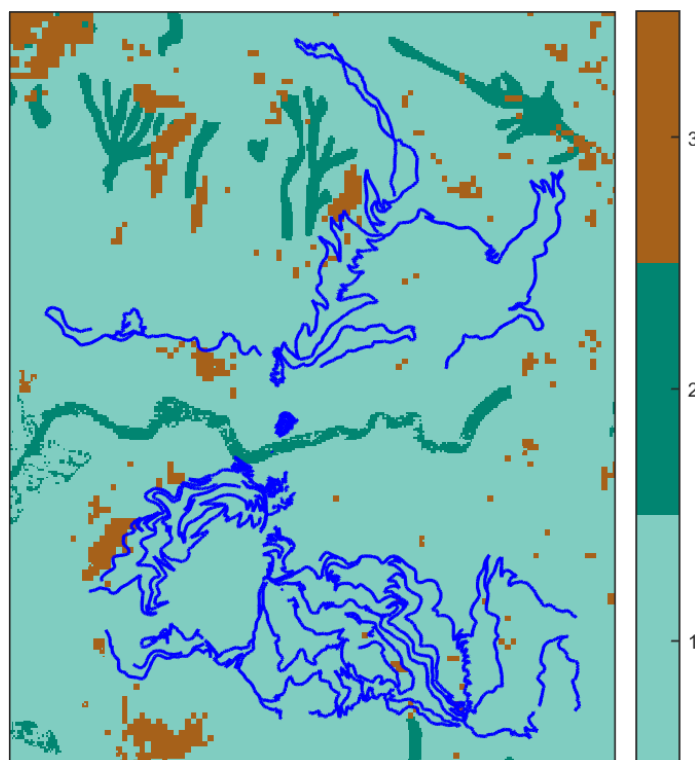
Time of issue: 6:28 pm

Project ID	B33805_S2_VegeLoss_GDA94_VicGrid_20210905
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## Assessment pathway

Assessment pathway	Detailed Assessment Pathway
Extent including past and proposed	35.754 ha
Extent of past removal	0.000 ha
Extent of proposed removal	35.754 ha
No. Large trees proposed to be removed	0
Location category of proposed removal	Location 3 The native vegetation is in an area where the removal of less than 0.5 hectares could have a significant impact on habitat for one or more rare or threatened species. The native vegetation is also in an area mapped as a wetland listed in the Directory of Important Wetlands of Australia.

### 1. Location map



## Total offset requirements if a permit is granted

Any approval granted will include a condition to obtain an offset that meets the following requirements:

<b>Species offset amount<sup>1</sup></b>	<p>19.410 species units of habitat for Smoky Mouse, <i>Pseudomys fumeus</i></p> <p>18.027 species units of habitat for Tall Astelia, <i>Astelia australiana</i></p> <p>24.584 species units of habitat for Brickmaker's Sedge, <i>Gahnia grandis</i></p> <p>25.342 species units of habitat for Nunning Everlasting, <i>Ozothamnus rogersianus</i></p> <p>19.387 species units of habitat for Jungle Bristle-fern, <i>Cephalomanes caudatum</i></p> <p>19.182 species units of habitat for Tree Geebung, <i>Persoonia arborea</i></p> <p>25.345 species units of habitat for Long Pink-bells, <i>Tetratheca stenocarpa</i></p> <p>13.528 species units of habitat for Fairy Lanterns, <i>Thismia rodwayi</i></p> <p>8.830 species units of habitat for Mountain Bird-orchid, <i>Chiloglottis jeansii</i></p> <p>25.125 species units of habitat for Powelltown Correa, <i>Correa reflexa var. lobata</i></p> <p>22.394 species units of habitat for Toothed Leionema, <i>Leionema bilobum subsp. serrulatum</i></p> <p>10.430 species units of habitat for White Star-bush, <i>Asterolasia asteriscophora subsp. albiflora</i></p> <p>8.503 species units of habitat for Wavy Fork-moss, <i>Dicranoloma platycaulon</i></p>
Large trees	0 trees

NB: values within tables in this document may not add to the totals shown above due to rounding

Appendix 1 includes information about the native vegetation to be removed

Appendix 2 includes information about the rare or threatened species mapped at the site.

Appendix 3 includes maps showing native vegetation to be removed and extracts of relevant species habitat importance maps

<sup>1</sup> The species offset amount(s) required is the sum of all species habitat units in Appendix 1.



## Offset requirements if a permit is granted – Stage 1

Any approval granted will include a condition to obtain an offset that meets the following requirements:

<b>Species offset amount</b>	<p>13.542 species units of habitat for Smoky Mouse, <i>Pseudomys fumeus</i></p> <p>11.558 species units of habitat for Tall Astelia, <i>Astelia australiana</i></p> <p>16.588 species units of habitat for Brickmaker's Sedge, <i>Gahnia grandis</i></p> <p>17.081 species units of habitat for Nunniong Everlasting, <i>Ozothamnus rogersianus</i></p> <p>12.628 species units of habitat for Jungle Bristle-fern, <i>Cephalomanes caudatum</i></p> <p>11.840 species units of habitat for Tree Geebung, <i>Persoonia arborea</i></p> <p>17.082 species units of habitat for Long Pink-bells, <i>Tetratheca stenocarpa</i></p> <p>8.515 species units of habitat for Fairy Lanterns, <i>Thismia rodwayi</i></p> <p>6.480 species units of habitat for Mountain Bird-orchid, <i>Chiloglottis jeansii</i></p> <p>17.082 species units of habitat for Powelltown Correa, <i>Correa reflexa var. lobata</i></p> <p>14.989 species units of habitat for Toothed Leionema, <i>Leionema bilobum subsp. serrulatum</i></p> <p>6.826 species units of habitat for White Star-bush, <i>Asterolasia asteriscophora subsp. albiflora</i></p> <p>4.715 species units of habitat for Wavy Fork-moss, <i>Dicranoloma platycaulon</i></p>
Large trees	0 trees

## Offset requirements if a permit is granted – Stage 2

Any approval granted will include a condition to obtain an offset that meets the following requirements:

<b>Species offset amount</b>	<p>5.868 species units of habitat for Smoky Mouse, <i>Pseudomys fumeus</i></p> <p>6.469 species units of habitat for Tall Astelia, <i>Astelia australiana</i></p> <p>7.996 species units of habitat for Brickmaker's Sedge, <i>Gahnia grandis</i></p> <p>8.261 species units of habitat for Nunniong Everlasting, <i>Ozothamnus rogersianus</i></p> <p>6.759 species units of habitat for Jungle Bristle-fern, <i>Cephalomanes caudatum</i></p> <p>7.342 species units of habitat for Tree Geebung, <i>Persoonia arborea</i></p> <p>8.263 species units of habitat for Long Pink-bells, <i>Tetratheca stenocarpa</i></p> <p>5.013 species units of habitat for Fairy Lanterns, <i>Thismia rodwayi</i></p> <p>2.350 species units of habitat for Mountain Bird-orchid, <i>Chiloglottis jeansii</i></p> <p>8.043 species units of habitat for Powelltown Correa, <i>Correa reflexa var. lobata</i></p> <p>7.405 species units of habitat for Toothed Leionema, <i>Leionema bilobum subsp. serrulatum</i></p> <p>3.604 species units of habitat for White Star-bush, <i>Asterolasia asteriscophora subsp. albiflora</i></p> <p>3.788 species units of habitat for Wavy Fork-moss, <i>Dicranoloma platycaulon</i></p>
Large trees	0 trees

## Next steps

Any proposal to remove native vegetation must meet the application requirements of the Detailed Assessment Pathway and it will be assessed under the Detailed Assessment Pathway.

If you wish to remove the mapped native vegetation you are required to apply for a permit from your local council. Council will refer your application to DELWP for assessment, as required. **This report is not a referral assessment by DELWP.**

This *Native vegetation removal report* must be submitted with your application for a permit to remove, destroy or lop native vegetation.

Refer to the *Guidelines for the removal, destruction or lopping of native vegetation* (the Guidelines) for a full list of application requirements. This report provides information that meets the following application requirements:

- The assessment pathway and reason for the assessment pathway
- A description of the native vegetation to be removed (partly met)
- Maps showing the native vegetation and property (partly met)
- Information about the impacts on rare or threatened species.
- The offset requirements determined in accordance with section 5 of the Guidelines that apply if approval is granted to remove native vegetation.

Additional application requirements must be met including:

- Topographical and land information
- Recent dated photographs
- Details of past native vegetation removal
- An avoid and minimise statement
- A copy of any Property Vegetation Plan that applies
- A defensible space statement as applicable
- A statement about the Native Vegetation Precinct Plan as applicable
- A site assessment report including a habitat hectare assessment of any patches of native vegetation and details of trees
- An offset statement that explains that an offset has been identified and how it will be secured.

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This publication may be of assistance to you but the State of Victoria and its employees do not guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaims all liability for any error, loss or other consequence which may arise from you relying on any information in this publication.

Obtaining this publication does not guarantee that an application will meet the requirements of Clauses 52.16 or 52.17 of the Victoria Planning Provisions and Victorian planning schemes or that a permit to remove native vegetation will be granted.

Notwithstanding anything else contained in this publication, you must ensure that you comply with all relevant laws, legislation, awards or orders and that you obtain and comply with all permits, approvals and the like that affect, are applicable or are necessary to undertake any action to remove, lop or destroy or otherwise deal with any native vegetation or that apply to matters within the scope of Clauses 52.16 or 52.17 of the Victoria Planning Provisions and Victorian planning schemes.

## Appendix 1: Description of native vegetation to be removed

The species-general offset test was applied to your proposal. This test determines if the proposed removal of native vegetation has a proportional impact on any rare or threatened species habitats above the species offset threshold. The threshold is set at 0.005 per cent of the mapped habitat value for a species. When the proportional impact is above the species offset threshold a species offset is required. This test is done for all species mapped at the site. Multiple species offsets will be required if the species offset threshold is exceeded for multiple species.

Where a zone requires species offset(s), the species habitat units for each species in that zone is calculated by the following equation in accordance with the Guidelines:

$$\text{Species habitat units} = \text{extent} \times \text{condition} \times \text{species landscape factor} \times 2, \text{ where the species landscape factor} = 0.5 + (\text{habitat importance score}/2)$$

The species offset amount(s) required is the sum of all species habitat units per zone

Where a zone does not require a species offset, the general habitat units in that zone is calculated by the following equation in accordance with the Guidelines:

$$\text{General habitat units} = \text{extent} \times \text{condition} \times \text{general landscape factor} \times 1.5, \text{ where the general landscape factor} = 0.5 + (\text{strategic biodiversity value score}/2)$$

The general offset amount required is the sum of all general habitat units per zone.

### Native vegetation to be removed

Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Information provided by or on behalf of the applicant in a GIS file			Information calculated by EnSym					
					Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type	

Refer to accompanying Excel spreadsheet, which must be included with this report in any application – 'Native Veg to be removed' tab

## Appendix 2: Information about impacts to rare or threatened species' habitats on site

This table lists all rare or threatened species' habitats mapped at the site.

Species common name	Species scientific name	Species number	Conservation status	Group	Habitat impacted	% habitat value affected
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*Refer to accompanying Excel spreadsheet, which must be included with this report in any application – 'Impacts on VROTS habitat' tab*

### Habitat group

- Highly localised habitat means there is 2000 hectares or less mapped habitat for the species
- Dispersed habitat means there is more than 2000 hectares of mapped habitat for the species

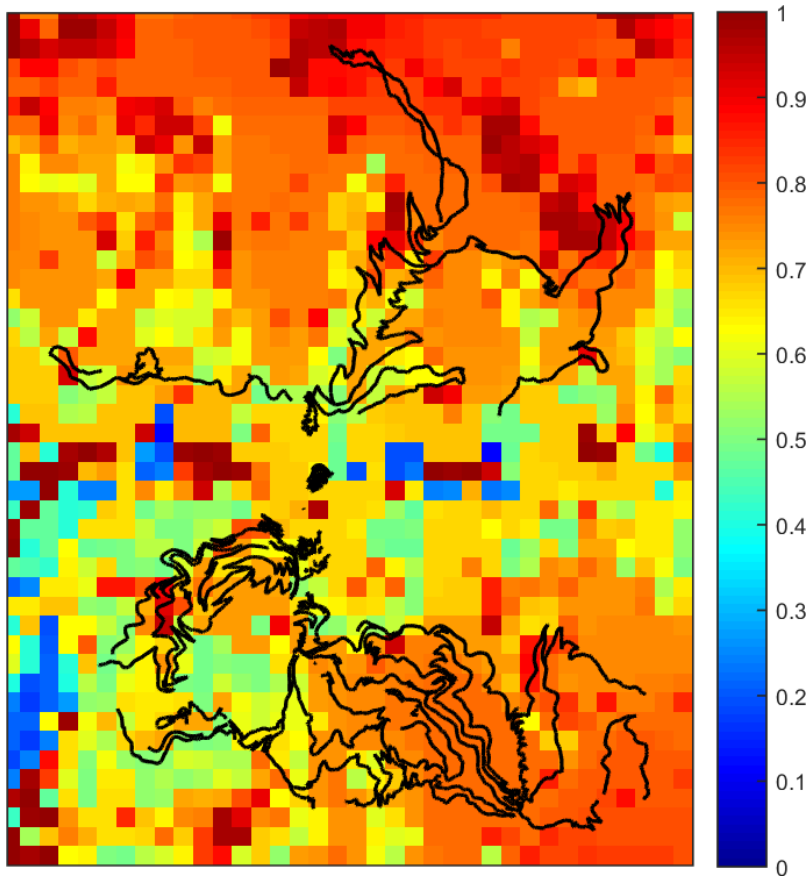
### Habitat impacted

- Habitat importance maps are the maps defined in the Guidelines that include all the mapped habitat for a rare or threatened species
- Top ranking maps are the maps defined in the Guidelines that depict the important areas of a dispersed species habitat, developed from the highest habitat importance scores in dispersed species habitat maps and selected VBA records
- Selected VBA record is an area in Victoria that represents a large population, roosting or breeding site etc.

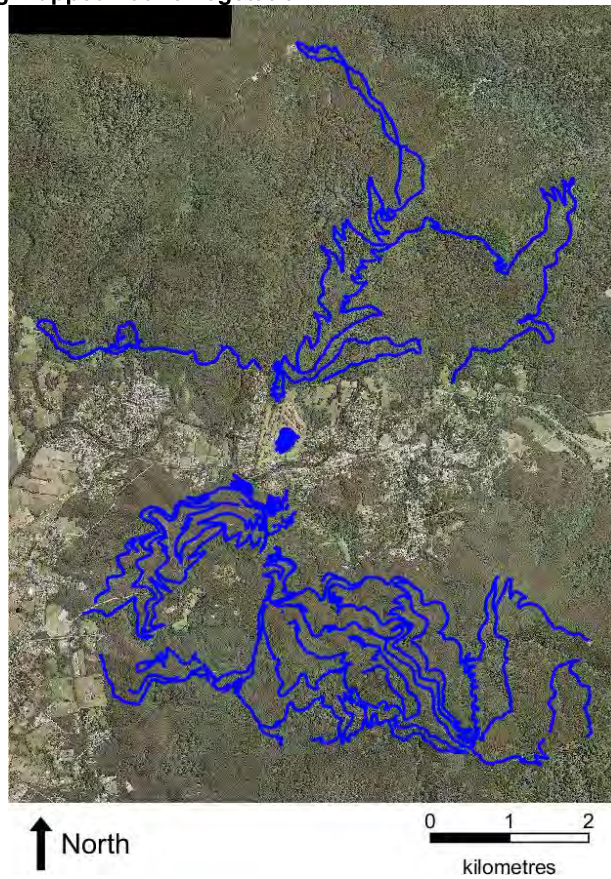


# Appendix 3 – Images of mapped native vegetation

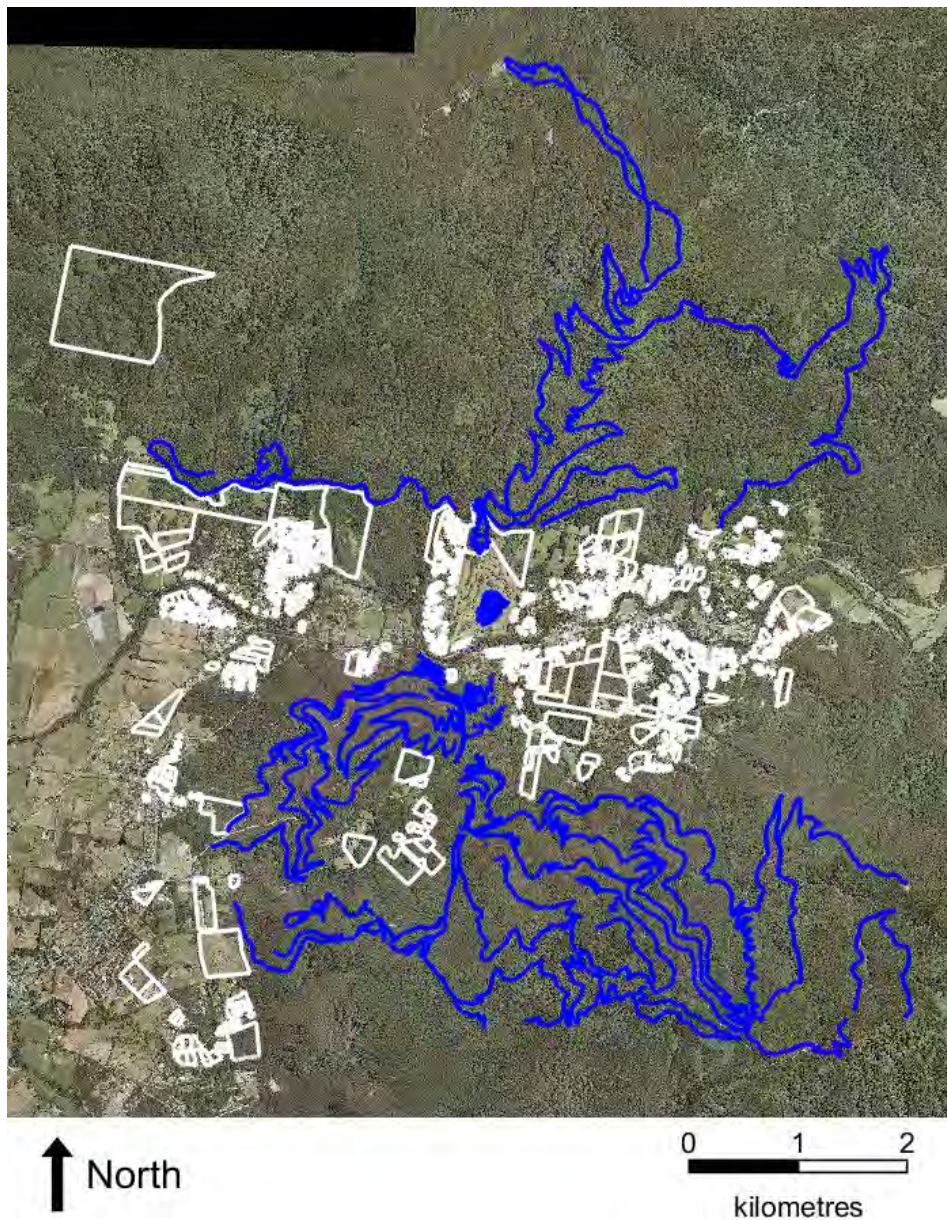
## 2. Strategic biodiversity values map



## 3. Aerial photograph showing mapped native vegetation



#### 4. Map of the property in context



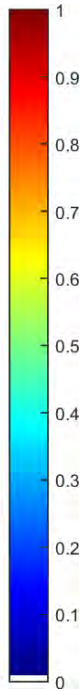
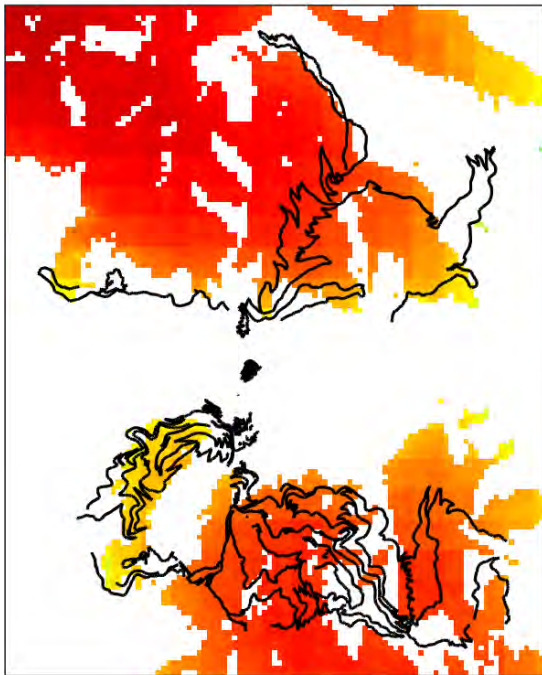
Yellow boundaries denote areas of proposed native vegetation removal.

Blue boundaries denote zones of partial removal with a halved condition score.

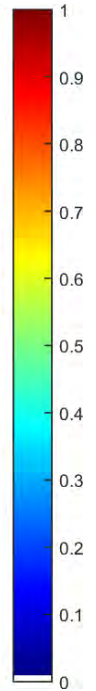
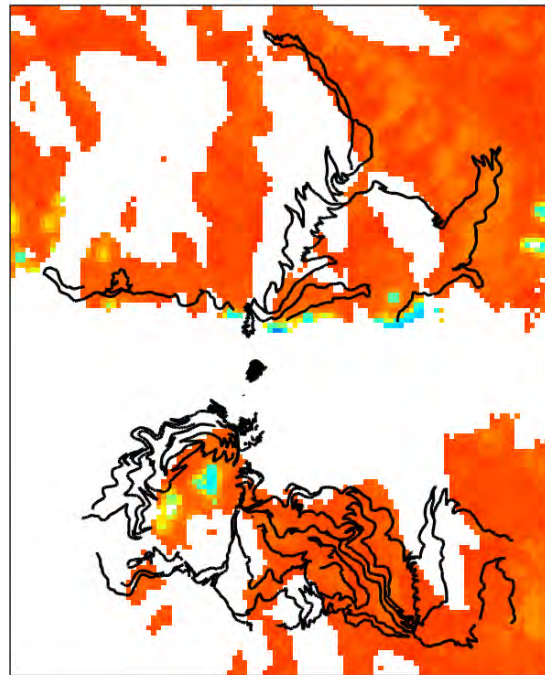


#### 4. Habitat importance maps

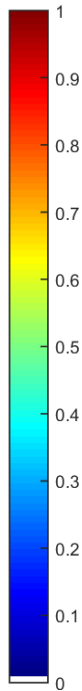
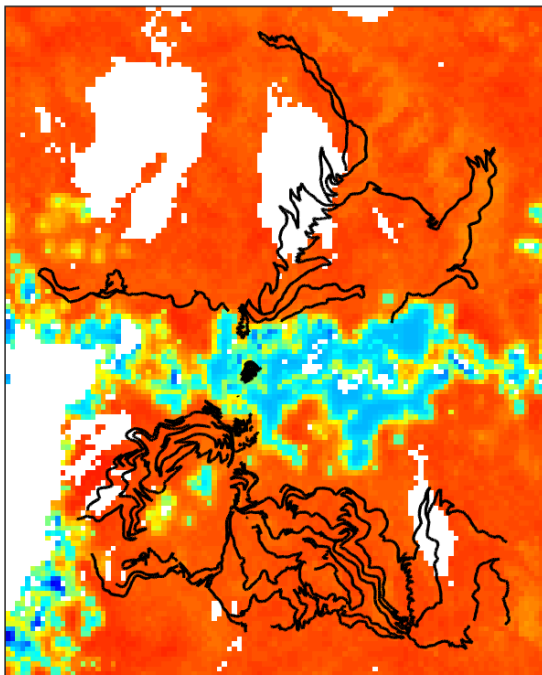
Smoky Mouse  
*Pseudomys fumeus*  
11458



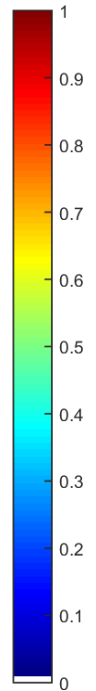
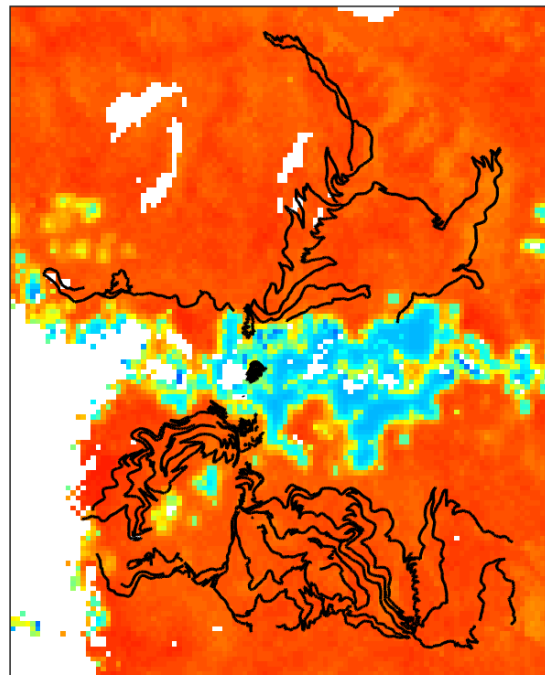
Tall Astelia  
*Astelia australiana*  
500296



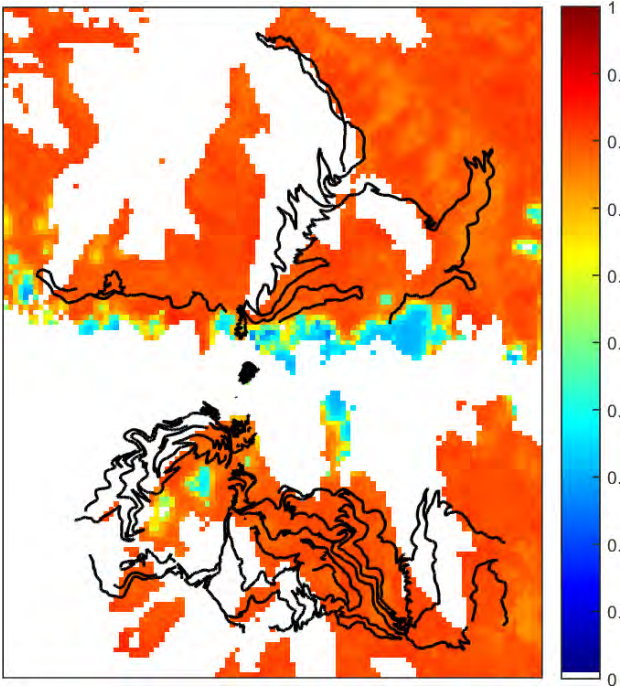
Brickmaker's Sedge  
*Gahnia grandis*  
501390



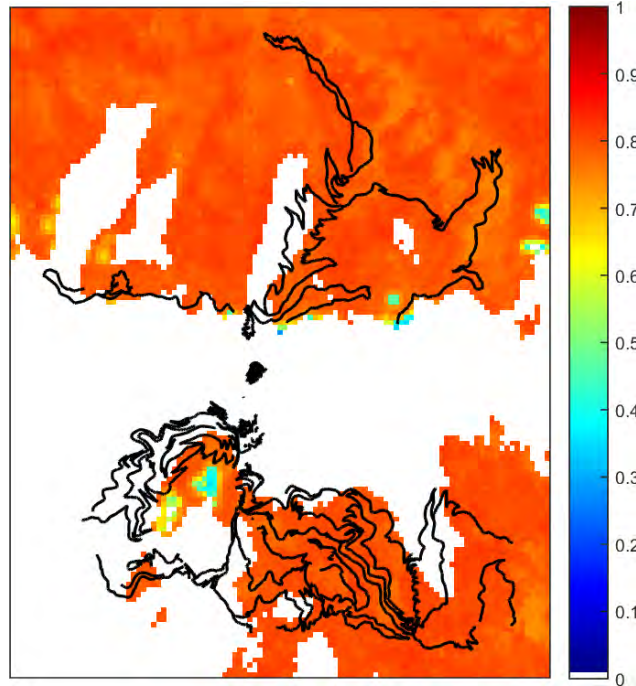
Nunniong Everlasting  
*Ozothamnus rogersianus*  
501623



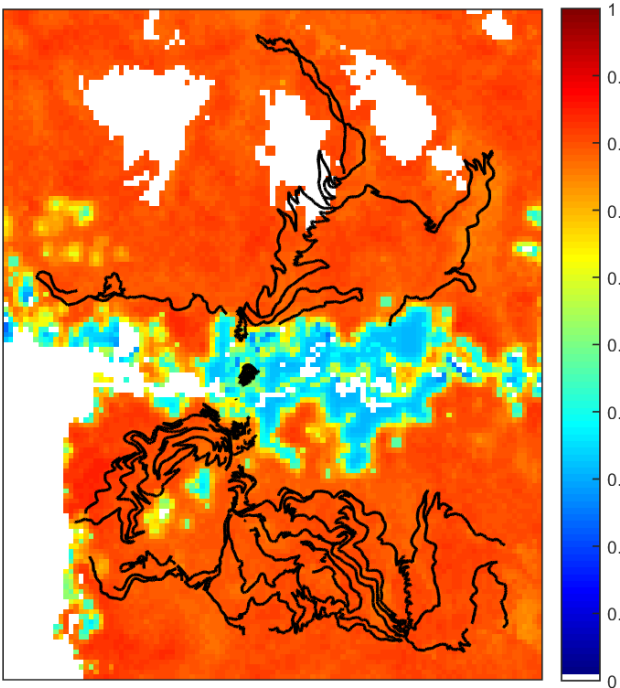
Jungle Bristle-fern  
*Cephalomanes caudatum*  
502094



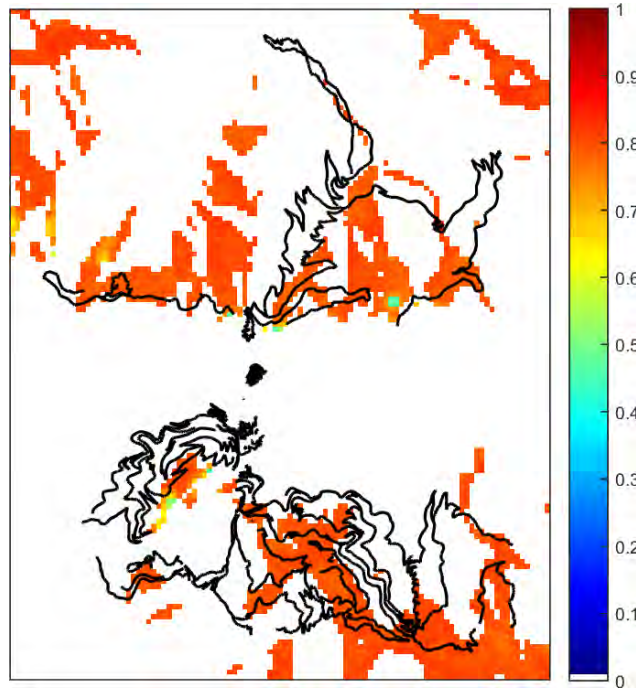
Tree Geebung  
*Persoonia arborea*  
502459



Long Pink-bells  
*Tetratheca stenocarpa*  
503354

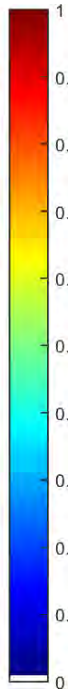
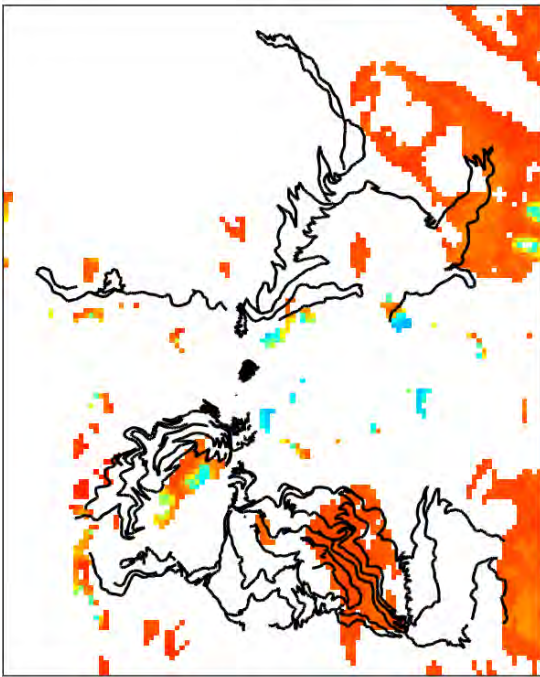


Fairy Lanterns  
*Thismia rodwayi*  
503390

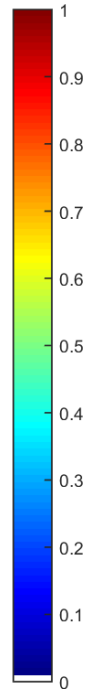
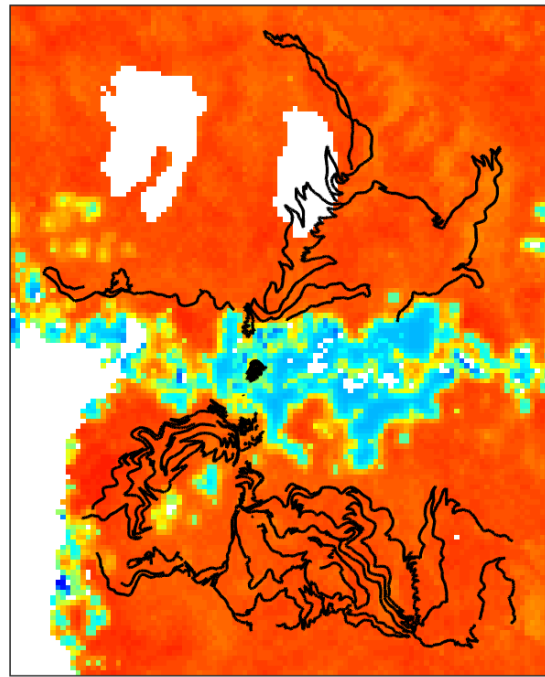




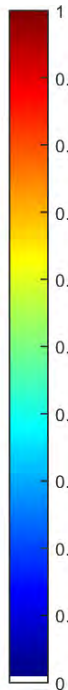
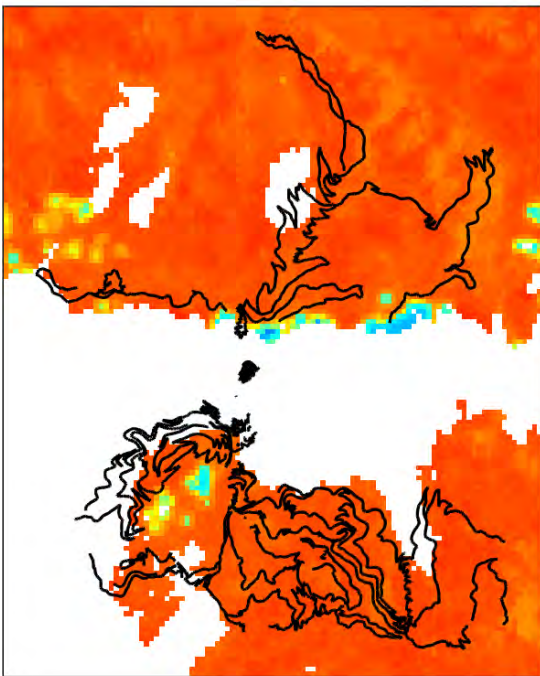
Mountain Bird-orchid  
*Chiloglottis jeansii*  
504499



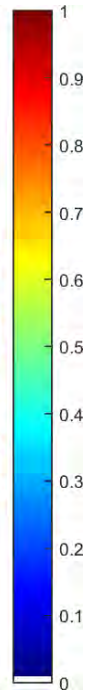
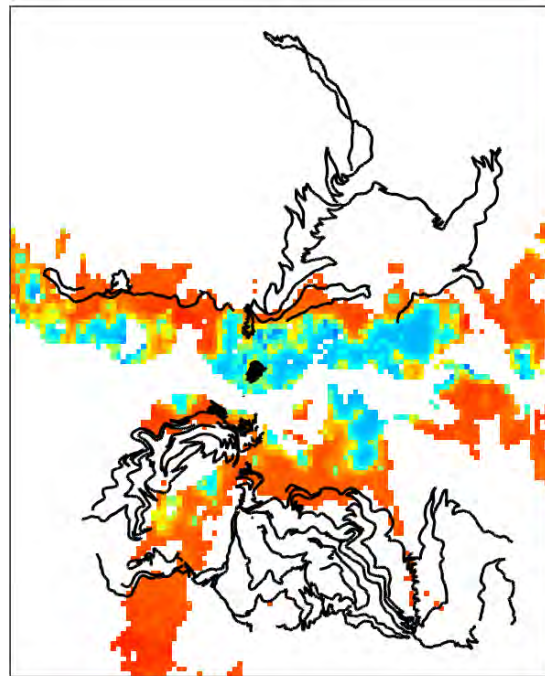
Powelltown Correa  
*Correa reflexa* var. *lobata*  
505404



Toothed Leionema  
*Leionema bilobum* subsp. *serrulatum*  
505480



White Star-bush  
*Asterolasia asteriscophora* subsp. *albiflora*  
505647





Wavy Fork-moss  
*Dicranoloma platycaulon*  
506754

