Appendix B. Ecological Vegetation Classes (EVCs) mapping in the construction footprint (based on Bennetts 2014)

Appendix B EVCs in construction at Gunbower National Park (Desktop Assessment), Page 1 of 10

VMFRP

Legend

- Area of Investigation

Vegetation Sumary - Construction Footprint

- Riverine Chenopod Woodland (EVC 103)
- Riverine Swamp Forest (EVC 814)
- Riverine Swampy Woodland (EVC 815)
- Minor Road
- Waterbody
- Wetland Swamp
- Cadastre

Public Land Management

- NATIONAL PARK

IS297705

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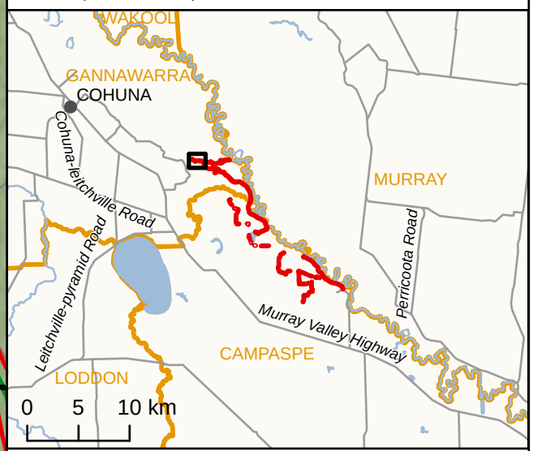
Metres



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Appendix B EVCs in construction at Gunbower National Park (Desktop Assessment), Page 2 of 10

VMFRP

Spur Creek

Broken Axle Track

GUNBOWER
NATIONAL PARK

Broken Axle Creek

Tickells Track

Legend

- Area of Investigation
- Inundation Area

Vegetation Sumary - Construction Footprint

- Drainage Line Aggregate (EVC 168)
- Plains Woodland (EVC 803)
- Riverine Chenopod Woodland (EVC 103)
- Riverine Swamp Forest (EVC 814)
- Riverine Swampy Woodland (EVC 815)
- Sedgy Riverine Forest (EVC 816)
- Minor Road
- Waterbody
- Cadastre

Public Land Management

- NATIONAL PARK

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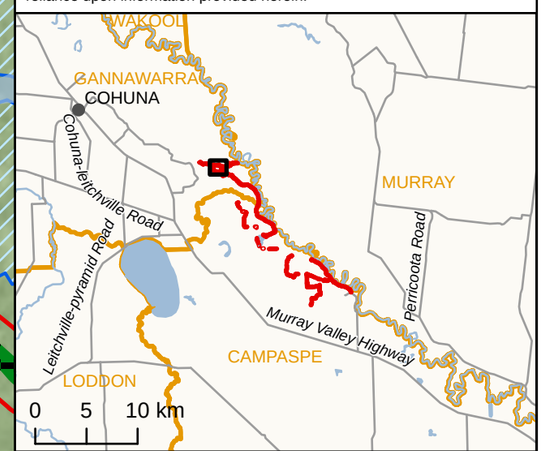

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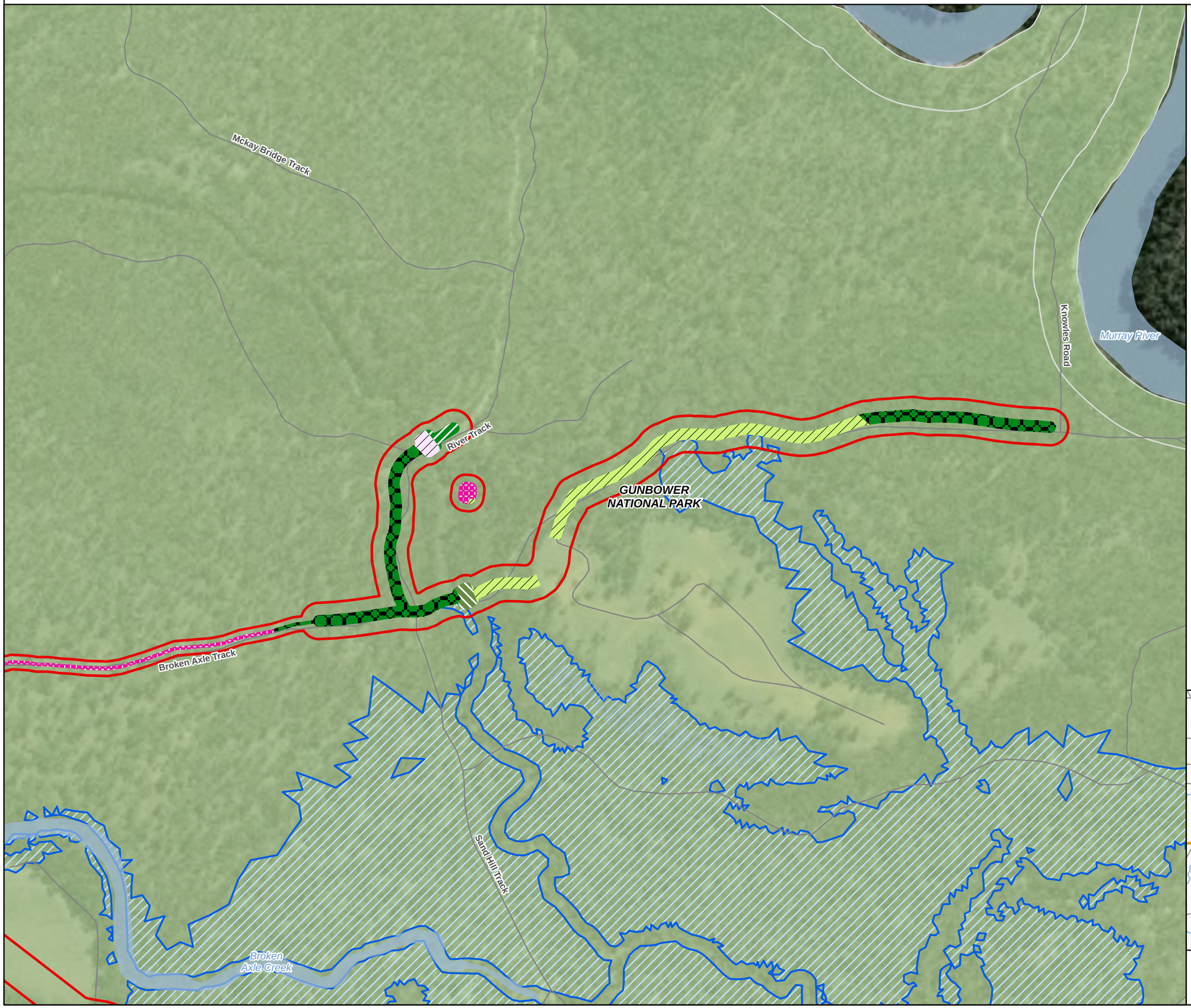


Legend

- Area of Investigation
- Inundation Area

Vegetation Sumary - Construction Footprint

- Grassy Riverine Forest (EVC 106)
- Plains Woodland (EVC 803)
- Riverine Swamp Forest (EVC 814)
- Riverine Swampy Woodland (EVC 815)
- Sedgy Riverine Forest (EVC 816)
- Sedgy Riverine Woodland
- Minor Road
- Waterbody
- Wetland Swamp
- Cadastre

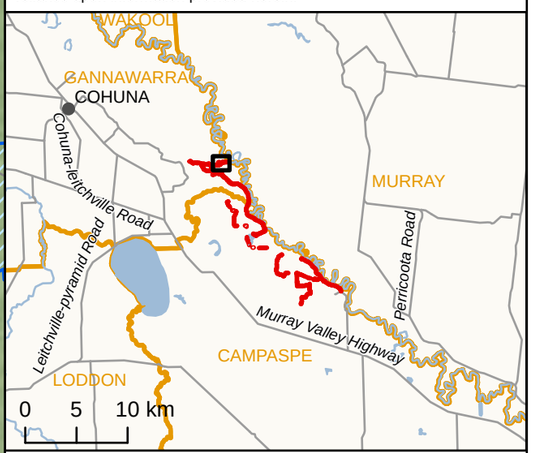
Public Land Management

- NATIONAL PARK

IS297705

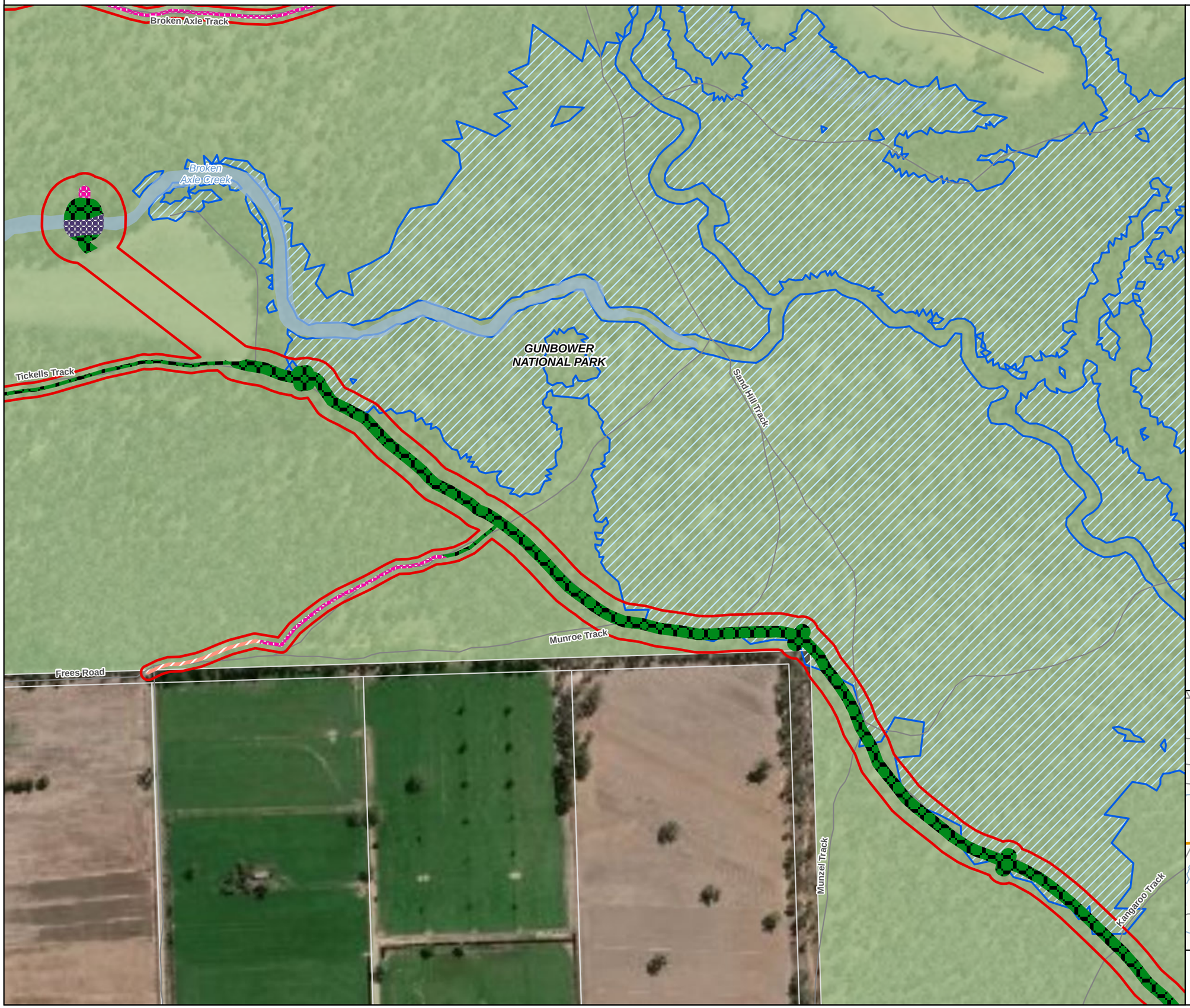
0 100 200
Metres

DATA SOURCES
© Commonwealth of Australia (Geoscience Australia) 2006 Geodata Topo 250k Series 3; Vicmap Data, DELWP © State of Victoria 2019; Jacobs & GHD 2019-2020.



Appendix B EVCs in construction at Gunbower National Park (Desktop Assessment), Page 4 of 10

VMFRP



Legend

- Area of Investigation
- Inundation Area

Vegetation Sumary - Construction Footprint

- Drainage Line Aggregate (EVC 168)
- Plains Woodland (EVC 803)
- Riverine Chenopod Woodland (EVC 103)
- Riverine Swampy Woodland (EVC 815)
- Minor Road
- Waterbody
- Wetland Swamp
- Cadastre

Public Land Management

- NATIONAL PARK

IS297705

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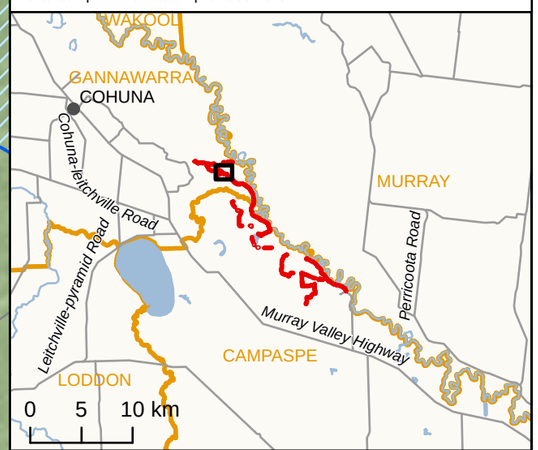
Metres



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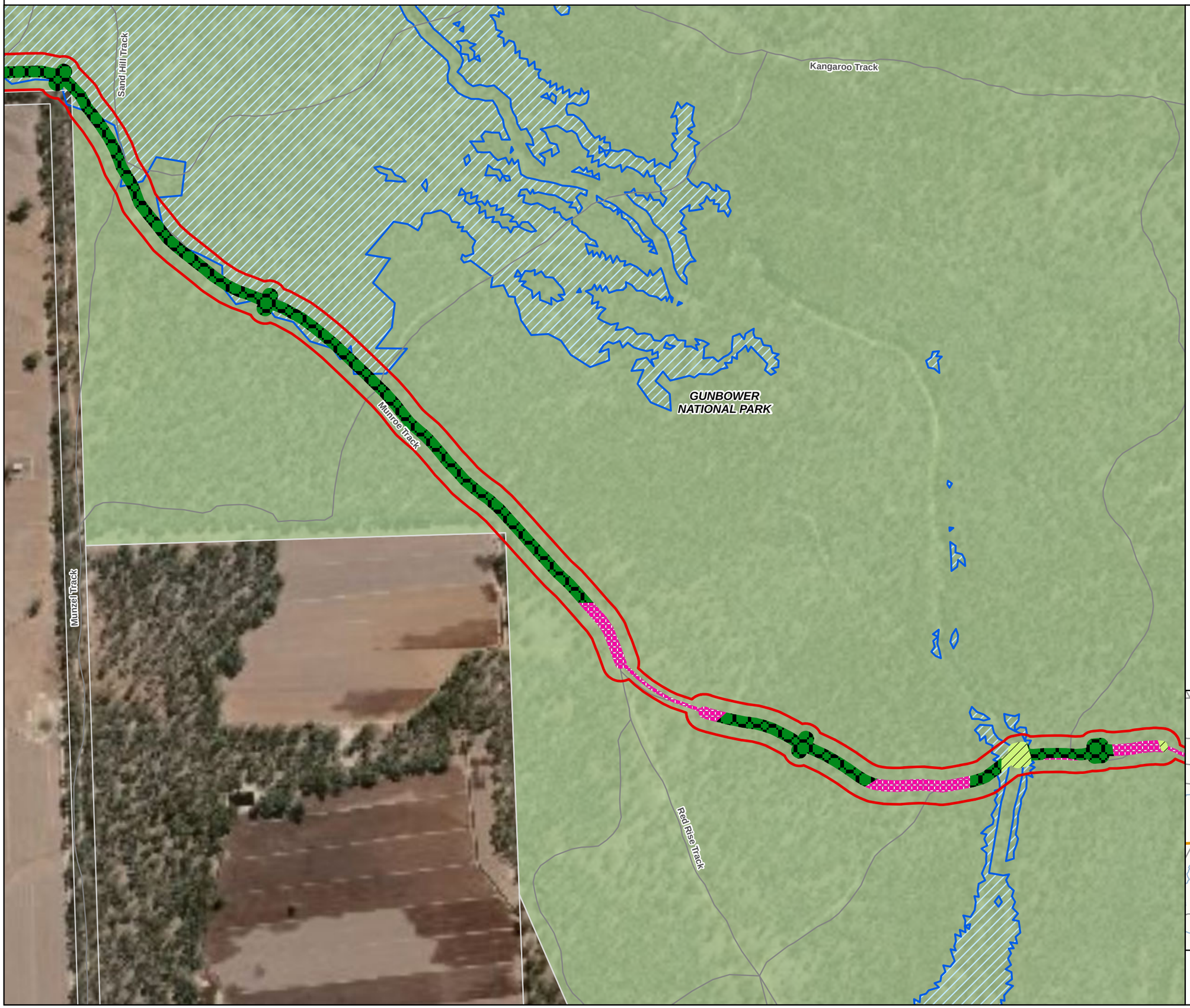

Legend

- Area of Investigation
- Inundation Area

Vegetation Sumary - Construction Footprint

- Plains Woodland (EVC 803)
- Riverine Swampy Woodland (EVC 815)
- Sedgy Riverine Forest (EVC 816)
- Minor Road
- Cadastre

Public Land Management

- NATIONAL PARK

IS297705

0 100 200
Metres

DATA SOURCES
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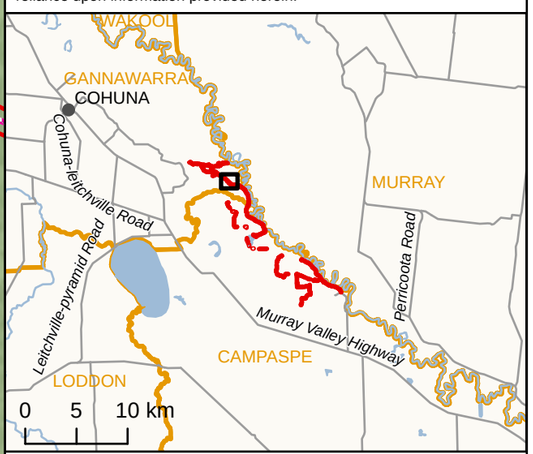

R8

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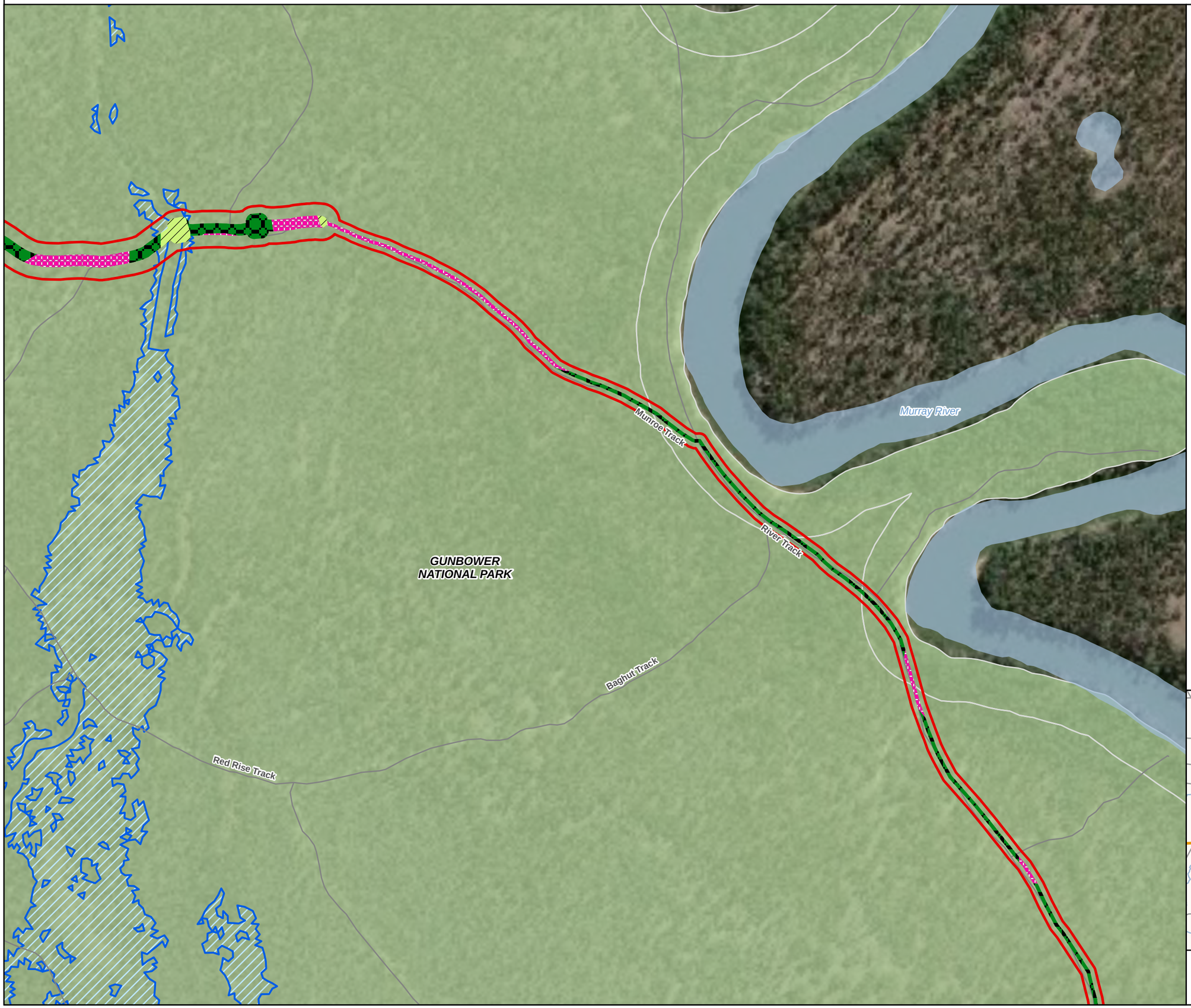

Legend

- Area of Investigation
- Inundation Area

Vegetation Sumary - Construction Footprint

- Plains Woodland (EVC 803)
- Riverine Swampy Woodland (EVC 815)
- Sedgy Riverine Forest (EVC 816)
- Minor Road
- Waterbody
- Cadastre

Public Land Management

- NATIONAL PARK

IS297705

0 100 200
Metres

DATA SOURCES
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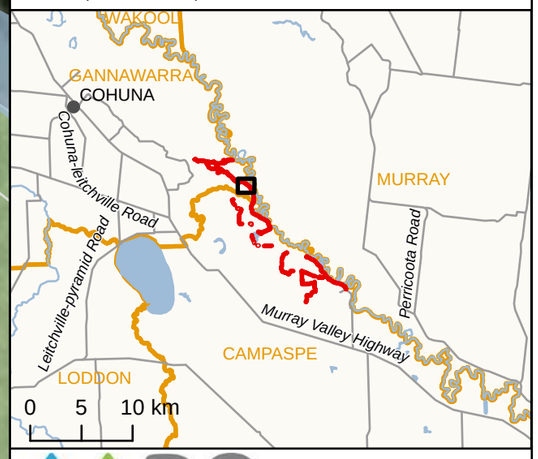


R8

Appendix B EVCs in construction at Gunbower National Park (Desktop Assessment), Page 7 of 10

VMFRP

Legend

- Area of Investigation
- Inundation Area

Vegetation Sumary - Construction Footprint

- Grassy Riverine Forest (EVC 106)
- Plains Woodland (EVC 803)
- Riverine Grassy Woodland (EVC 295)
- Riverine Swampy Woodland (EVC 815)
- Minor Road
- Waterbody
- Cadastre

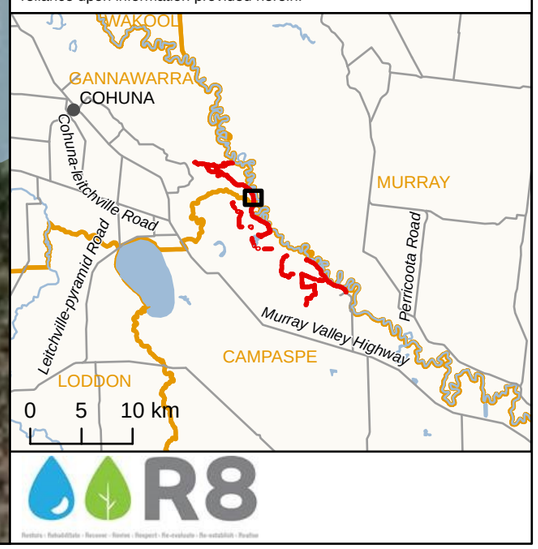
Public Land Management

- NATIONAL PARK

IS297705

0 100 200

Metres



R8

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Legend

- Area of Investigation
- Inundation Area

Vegetation Sumary - Construction Footprint

- Grassy Riverine Forest (EVC 106)
- Plains Woodland (EVC 803)
- Riverine Grassy Woodland (EVC 295)
- Riverine Swampy Woodland (EVC 815)
- Sedgy Riverine Forest (EVC 816)
- Minor Road
- Waterbody
- Cadastre

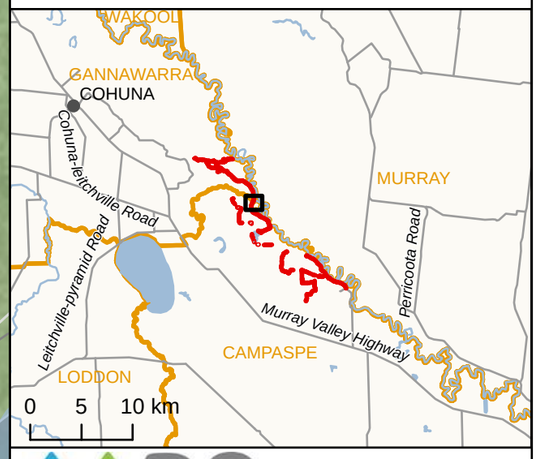
Public Land Management

- NATIONAL PARK

IS297705

0 100 200
Metres

DATA SOURCES
© Commonwealth of Australia (Geoscience Australia) 2006 Geodata Topo 250k Series 3; Vicmap Data, DELWP © State of Victoria 2019; Jacobs & GHD 2019-2020.



R8

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Legend

- Area of Investigation
- Inundation Area

Vegetation Sumary - Construction Footprint

- Riverine Chenopod Woodland (EVC 103)
- Riverine Swampy Woodland (EVC 815)
- Sedgy Riverine Forest (EVC 816)
- Minor Road
- Waterbody
- Cadastre

Public Land Management

- NATIONAL PARK

IS297705

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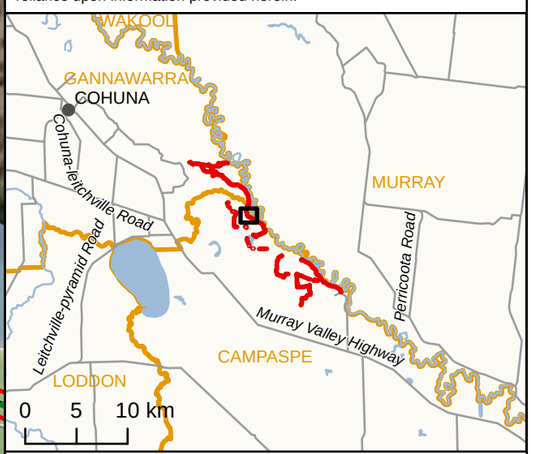
Metres



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River Track

Murray River

GUNBOWER
NATIONAL PARK

Breretons Road

46
51
52
45
48
50
42
56
53

Legend

- Area of Investigation
- Inundation Area
- Large Old Trees, GHD

Vegetation Sumary - Construction Footprint

- Floodplain Riparian Woodland (EVC 56)
- Riverine Swampy Woodland (EVC 815)
- Minor Road
- Waterbody
- Cadastre

Public Land Management

- NATIONAL PARK

IS297705

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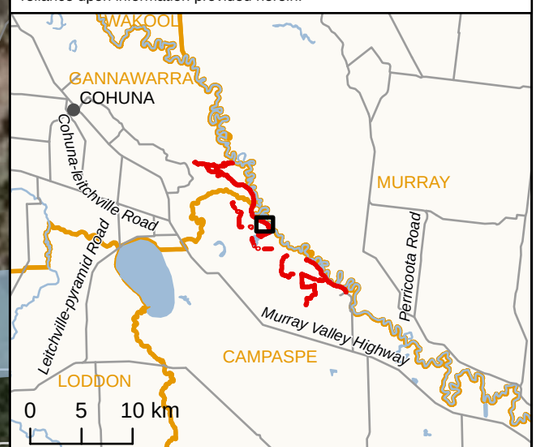
Metres



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Appendix C. Summary of previous ecological studies

Report	Methods	Key findings	Recommendations
Bennetts and Cook (2020) Threatened Flora Monitoring Gunbower Forest Ramsar Site Spring 2019. Report prepared for the North Central Catchment Management Authority.	▪ Targeted field surveys for EPBC listed threatened flora at previously recorded locations and suitable habitat within Gunbower Forest Ramsar site (October 2019 to March 2020)	▪ River Swamp Wallaby-grass was present at 16 wetland and regularly flooding Red Gum forest sites. All populations were observed with low cover, except for those protected from physical disturbance (e.g. wire cages). Within the Gunbower National Park project area, six locations were surveyd with two populations recorded, Dry Tree Lagoon and Dalley Bend (both outside of the construction and inundation areas) ▪ Winged Peppercress was present at 6 previously recorded locations with populations ranging from 98 to over 1,000 individuals. Five of these locations are clustered in the Lower Gunbower Forest approximately 30 km downstream of the project area, however one population exists in the upper reaches of the Lower Gunbower Forest approximately 7 km from the project area. 13 other locations were surveyed within the project area that did not record the species. ▪ Floodplain Rustyhood was present at one location with 70 individuals recorded. The species was only recorded in Gunbower Forest in 2015 and has declined from a total of 95 individuals. This population occurs on Spur Island, approximately 1.5 km north of the project area of Middle Gunbower Forest (downstream of Deep Creek) ▪ The presence of the species suggest that they remained within the associated Limits of Acceptable Change drafted for the Ramsar site. Nonetheless, when surveyed in 2019, there was evidence of impacts such as grazing, low rainfall, altered hydrology, carp and off-road vehicles threatening the species.	▪ Actions implemented to minimise these threats include regularly delivery of environmental water (to the River Swamp Wallaby-grass habitat) and physical protection (vehicle/herbivore barriers). The positive outcomes resulting from these actions suggest that they should be continued. ▪ Assessment of the species' health and predicted trajectories in Gunbower Forest would benefit greatly from systematically collected monitoring data. Monitoring plans should be developed and implemented for each of the three species.
Stuart (2020). Upper Gunbower Creek Fish Management Plan. Unpublished Client Report to North Central CMA. Arthur Rylah Institute for Environmental Research, Department of Environment, Land, Water and Planning.	▪ Review of existing information ▪ Desktop study of Hall Road Lagoon	The plan sets out the following objectives: 1) Set clear ecological and management objectives for small-bodied native fish 2) Identify management actions for maintaining and improving small-bodied fish populations 3) Identify fish passage and flow criteria/requirements for small bodied fish in Cameron's Creek, Black Charlie Lagoon and Hall Road Lagoon, including species, fishway depths/velocities/timing 4) Provide conceptual and specific design inputs for fishway design at Cameron's Creek 5) Consider vegetation objectives and provide brief recommendations for aquatic vegetation management at the sites, to support small-bodied native fish populations and ecological objectives. 6) Briefly scope the potential for Hall Road Lagoon to be used as a breeding or translocation site for small-bodied native fish.	▪ Implement the contemporary permanent hydrological regime to support existing healthy submerged and emergent macrophyte and small-bodied native fish in the upper Cameron's Creek lagoons; ▪ Conduct a comprehensive survey of fish communities within Hall Road Lagoon, the lower Cameron's Creek lagoons, including Black Charlie lagoon; ▪ Where appropriate, drain degraded wetlands to remove carp, add physical habitat (i.e. rocks and snags) and re-establish local native macrophytes and common small-bodied fish by implementing the spring wetting and partial summer drawdown regime, which has been successful at other similar wetlands; ▪ Develop a detailed design for a cone fishway on Cameron's Creek ▪ Reintroduce threatened wetland specialist fish such as southern pygmy perch and possibly freshwater catfish; ▪ Monitor and evaluate outcomes for improved management of small-bodied native fish and macrophyte communities of these and similar wetlands in the Upper Gunbower landscape
Bennetts and Jolly (2005-2020). Wetland and Understorey Vegetation Condition Monitoring Gunbower Forest Autumn 2005-2019. Technical Reports for the North Central CMA.	▪ Field survey in Autumn as part of annual understorey monitoring from 2005-2019 ▪ 110 understorey quadrats and 15 wetland transects were sampled in accordance with the Manual of Field Procedures for Monitoring in Gunbower Forest (Crome 2004).	Results from the 2020 report: **Wetlands** ▪ Wetlands monitored in 2019 were delivered eWater in 2018 after a dry phase at all sites, except at Reedy Lagoon and Black Swamp, which were also delivered eWater in 2017, and the Little Gunbower Creek, which retained water from the 2016 natural flood. ▪ The vegetation response to the eWater appears to be somewhat wetland-specific, however, there was evidence in the 2019 monitoring results to support the following previously reported patterns:	Management recommendations: ▪ Time the delivery of environmental water based on positive climatic triggers (i.e. recorded or predicted higher than average rainfall). ▪ Avoid delivering water to the wetlands if the subsequent summer is predicted with above average temperatures and below average rainfall.

Report	Methods	Key findings	Recommendations
		▪ Low flora cover with successive dry years (e.g. as sampled in Autumn 2008) ▪ Low aquatic flora cover after natural flooding in 2010 (sampled Autumn 2011, particularly in wetlands connected to the Yarran Regulator) ▪ High flora cover following inundation after a dry phase (in most instances in most wetlands) **Forests and Woodlands** ▪ Twenty six of the 77 Red Gum monitoring sites and one Black Box site were inundated in the 2018 eWater event. When sampled in Autumn 2019, the Red Gum and Box monitoring sites were all dry and observed with relatively low cover and richness of characteristic flora. ▪ The Red Gum canopy results provide evidence to suggest that eWater delivered to Gunbower Forest has potentially aided the recovery of the trees. ▪ Flora cover continued to decline in the Box woodland monitoring sites after the peak recorded with natural flooding in 2016.	▪ Prioritise weed control works in areas unlikely to be flooded in the future, and in particular the Red Gum with flood-tolerant understorey WRC. Monitoring recommendations: ▪ Develop and initiate a water quality monitoring plan that includes the wetland monitoring sites, in order to clarify water quality influences on aquatic flora. ▪ Further investigate (through data analysis) patterns observed in wetland flora cover data (e.g. increased flora cover following inundation after a dry phase). ▪ Investigate the potential causes for differences observed in the wetland site data based on water source (e.g. regulators).
Seran BL&A (2018). Screening of the potential impacts on threatened species and communities associated with the construction and operation of Victoria's nine Basin Plan environmental works projects.	▪ Desktop assessment (VBA/PMST search) ▪ Review of existing information ▪ *Fire, Flood and Flora have been engaged by the North Central CMA to repeat wetland and understorey vegetation condition monitoring in Gunbower Forest as part of The Living Murray (TLM).* ▪	Listed ecological values identified as likely or potential to occur within Gunbower: **EPBC Act** ▪ Gunbower Forest Ramsar site ▪ Grey Box Grassy Woodland threatened community ▪ Threatened fauna: Murray Cod, Flat-headed Galaxias, Superb Parrot, Growling Grass Frog and South-eastern Long-eared Bat ▪ Threatened flora: River Swamp Wallaby-grass, Winged Peppercress, Stiff Groundsel and Slender Darling-pea ▪ Migratory species: Glossy Ibis **FFG Act** ▪ Victorian Temperate Woodland Bird community ▪ Threatened fauna: Barking Owl, Broad-shelled Turtle, Carpet Python, Diamond Firetail, Eastern Great Egret, Flat-headed Galaxias, Freshwater Catfish, Glossy Ibis, Grey-crowned Babbler, Growling Grass Frog, Hooded Robin, Intermediate Egret, Murray Cod, South-eastern Long-eared Bat, Squirrel Glider, Superb Parrot, Unspecked Hardyhead ▪ Threatened flora: Annual Buttons, Slender Darling-pea, Stiff Groundsel, Umbrella Wattle, Wavy Marshwort and Winged Peppercress Overall, the recommendation for a referral under the EPBC Act for potential impacts to the Grey Box Woodland community and the Gunbower Forest Ramsar site. In addition, a referral under the EE Act for the removal of >10 ha of native vegetation from an endangered EVC	▪ Targeted surveys are also recommended for: Stiff Groundsel (Jan-Apr), River Swamp Wallaby-grass (Nov-Feb), Winged Peppercress (Aug-Oct) and Slender Darling-pea (Aug-Oct) within suitable habitat in the project works areas to determine if the project will impact on this species.
GHD (2017). Gunbower National Park Flora and Fauna Assessment. Report prepared for the North Central Catchment Management Authority.	▪ Review of existing information ▪ EVC mapping ▪ Habitat Hectare assessment ▪ Large old trees (LOT) / large tree mapping ▪ Fauna surveys (February – March 2017) - Bird surveys - Bat surveys (Bat harp trapping and Anabat recording) - Active searching - Spotlight surveys	SDL Construction footprint contains: ▪ Four EVCs: Floodplain Riparian Woodland (EVC 56), Riverine Chenopod Woodland (EVC 106), Riverine Grassy Woodland (EVC 295) and Plains Woodland (EVC 803) ▪ One EPBC Act listed threatened ecological community, Grey Box (*Eucalyptus microcarpa*) Grassy Woodland and Derived Native Grasslands of South-eastern Australia ▪ 146 LOTs ▪ 86 flora species recorded (no listed threatened species) ▪ 52 terrestrial fauna species recorded ▪ 1 species of rare/threatened fauna: - Lace Monitor (*Varanus varius*, DELWP Advisory listed endangered)	▪ Avoid where possible, the threatened ecological community, Grey Box (*Eucalyptus microcarpa*) Grassy Woodland and Derived Native Grasslands of South-eastern Australia around the pump station

Report	Methods	Key findings	Recommendations
	- Remote sensing fauna cameras - Recording of incidental observations	▪ Victorian Temperate Woodland bird Community (VTWBC). ▪ 30 weed species	
North Central CMA (2015). Camerons Creek Vegetation survey, mapping and analysis.	▪ Field surveys (August) along Cameron's Creek ▪ EVC mapping using the Index of Wetland Condition methodology ▪ Floristic surveys	Eleven vegetation classes were considered present ▪ Floodplain Riparian Woodland (EVC 56), Riverine Chenopod Woodland (EVC 103), Billabong Wetland Aggregate (EVC 334), Aquatic Herbland (EVC 653), Plains Woodland (EVC 803), Riverine Swampy Woodland (EVC 815), Sedgy Riverine Forest (EVC 816), Spike-sedge Wetland (EVC 819), Tall Marsh (EVC 821), Submerged Aquatic Herbland (EVC 918), Dwarf Floating Aquatic Herbland (EVC 949) and open water ▪ Two threatened flora species - Floodplain Fireweed (*Senecio campylocarpus*) - Leek Flax-lily (*Dianella porracae*, formally known as *Dianella sp. aff longifolia* (Riverina) ▪ Long Eryngium (*Eryngium paludosum*)	▪ Hydrologic regime from human interference has affected the vegetation types along Cameron's Creek and produced a shift towards more aquatic vegetation types ▪ Future water management should avoid inundating Black Boxes for prolonged periods ▪ High invasion of weeds closer to agricultural areas, particularly Water Couch along waterways
Sharpe (2015). Autumn 2015 Fish surveys of Camerons Creek, Victoria, May 2015. Final Report for North Central CMA by CPS Enviro P/L.	▪ Fish surveys in Camerons Creek and Black Charlie Lagoon (autumn 2015) - Trapping, fyke netting and electrofishing	The same 10 species of fish (6 native and 4 exotic) were recorded in Camerons Creek and Black Charlie Lagoon, two of these are FFG Act listed threatened species: ▪ Un-specked Hardyhead (*Craterocephalus stercusmuscarum fulvus*) and Murray-Darling rainbowfish (*Melanotaenia fluviatilis*) The target species, Southern Pygmy Perch (*Nannoperca australis*) was not recorded during surveys	▪ "It is also recommended that future works, including changes to hydrology, be carefully assessed for potential impacts to the existing character and condition of submerged aquatic plant and littoral plant communities in Camerons Creek, which are key habitats for the suite of fish species present and for the future rehabilitation of locally extinct wetland specialist fish in Camerons Creek and more broadly, at Gunbower Island and the mid-Murray River region."
Sharpe (2014). Fish surveys of Camerons Creek, Victoria, September 2014. A summary of Findings Report for North Central CMA by CPS Environmental Research.	▪ Fish surveys in Camerons Creek (spring 2014) - Trapping, netting and electrofishing	A total of 10 species of fish (6 native and 4 exotic) were recorded in Camerons Creek, two of these are FFG Act listed threatened species: ▪ Un-specked Hardyhead (*Craterocephalus stercusmuscarum fulvus*) and Murray-Darling rainbowfish (*Melanotaenia fluviatilis*) The target species, Southern Pygmy Perch (*Nannoperca australis*) was not recorded during surveys	▪ "Maintaining the current condition of submerged aquatic plant and littoral plant communities in Camerons Creek is considered important to the future recovery of locally extinct wetland specialist fish species in the North Central CMA region."
Biosis (2014a). Flora and fauna assessment of the Gunbower National Park and Guttrum and Benwell State Forests. Report prepared for the North Central Catchment Management Authority.	▪ Review of existing information ▪ Field surveys of Gunbower NP and Guttrum and Benwell State Forests (July 2014) ▪ EVC mapping ▪ Habitat Hectare assessment ▪ Large old trees (LOT) / large tree mapping ▪ Fauna surveys - Bird surveys - Active searching - Spotlight surveys including the use of call-playback ▪ Recording of incidental observations	A total of 150 flora species and 70 fauna species were recorded across all three Forests. The following ecological values were recorded at Gunbower National Park ▪ Four EVCs: Riverine Chenopod Woodland (EVC 103), Plains Woodland (EVC 803), Riverine Swampy Woodland (EVC 815) and Sedgy Riverine Forest (EVC 816) ▪ One EPBC Act listed threatened ecological community, Grey Box (*Eucalyptus microcarpa*) Grassy Woodland and Derived Native Grasslands of South-eastern Australia ▪ Potential habitat for EPBC-listed species: River Swamp Wallaby-grass, Winged Peppercress, Stiff Groundsel, Growling Grass Frog and Superb Parrot ▪ Potential habitat for FFG-listed species: Wavy Marshwort, Squirrel Glider, White-bellied Sea-eagle, Grey-crowned Babbler, Diamond Firetail, Hooded Robin, Barking Owl, Bush-stone Curlew and Broad-shelled Turtle ▪ One species of rare/threatened fauna: - Broad-shelled Turtle (*Chelodina expansa,* FFG Act listed) ▪ FFG listed threatened fauna community, Victorian Temperate Woodland bird Community (VTWBC)	▪ Targeted surveys for threatened flora should be undertaken, in particular for EPBC-listed River Swamp Wallaby-grass and Winged Pepper-cress ▪ Targeted surveys recommended for Growling Grass Frog (October – November on nights with warm overnight temperatures) ▪ Targeted surveys for EPBC-listed River Swamp Wallaby-grass ▪ Avoid/minimise removal of terrestrial and/or aquatic habitat by designing to avoid or minimise instream works. ▪ Avoid hollow tree removal where possible. Supervised tree removal by a suitably qualified zoologist if stags are to be removed. ▪ Conduct tree removal during late summer and early autumn to avoid the breeding season of most fauna species.

Report	Methods	Key findings	Recommendations
Bennetts (2014). Vegetation Mapping in Upper Gunbower Forest. Report for the North Central Catchment Management Authority	▪ Field vegetation (EVC) mapping ▪ Delineates terrestrial woodland from woodland that tolerates periodic inundation in both Black Box and Grey Box vegetation in Upper Gunbower Forest ▪ Establishes baseline understorey species and % cover across three transects	▪ Provides a complete GIS layer of EVC mapping across Upper and Middle Gunbower Forest to facilitate the evaluation of proposed water related works ▪ Differentiates between Grey Box Woodland that resembles Plains Woodland (EVC 803) and is characteristic of the EPBC Act listed Grey Box (*Eucalyptus microcarpa*) Grassy Woodland and Derived Native Grasslands of South-eastern Australia threatened community, and Riverine Swampy Woodland (EVC 815)	▪ Vegetation map for the Upper Gunbower Forest incorporates these EVC variations and therefore has more Riverine Swampy Woodland and less Plains Woodland than the DELWP mapping ▪ Most areas DELWP mapped as Plains Woodland were identified as Riverine Swampy Woodland. There are still, however, a few small patches of Plains Woodland that may be inundated under the current flow proposal.
North Central Catchment Management Authority (2014). Gunbower National Park: Ecological Objectives and Hydrological Requirements	▪ Summarises the ecological values, objectives and targets of the Gunbower National Park Environmental Works Project ▪ Provides justification for the corresponding hydrological requirements	▪ Reports on and summarises the findings of Ecological Asscoates (2014) below	Three watering regimes to meet the ecological objectives are proposed: ▪ Scenario 1 – Permanent Wetland Watering - Frequency: 10 years in 10 - Duration of inundation: 12 months - Timing: Winter/spring - Depth: fluctuate over time, inundate to Full Supply Levels in some years ▪ Scenario 2 – River Red Gum Forest with flood-dependent understorey (Old Cohuna Channel) - Frequency: 6 years in 10 - Duration of inundation: 2-4 months - Timing: Winter/spring ▪ Scenario 3 – River Red Gum Forest with flood-dependent understorey (Camerons Creek) - Frequency: 6 years in 10 - Duration of inundation: up to 2 months - Timing: Winter/spring
Ecological Associates (2014). Ecological objectives and hydrological targets in Upper Gunbower Forest. Report prepared for the North Central Catchment Management Authority	▪ Desktop hydrological analysis of Gunbower National Park ▪ Flow analysis of the following scenarios: natural, benchmark and Basin Plan 2750	▪ Upper Gunbower Forest was classified into five different water regime classes: Scroll Bars and Riparian Billabongs, Seasonal Swamps, Red Gum Forest and Woodland, Flood-dependent Box Woodland, Terrestrial Box Woodland ▪ These water regime classes were used to set ecological objectives and hydrological targets	Recommended Flooding Regime: ▪ Scroll Bars and Riparian Billabongs: 3 to 4 months in spring and early summer in 9 years out of 10 ▪ Seasonal Swamps: 5 to 7.5 years in 10 for 1 to 4 months. ▪ Red Gum Forest and Woodland: 1 to 3 months duration 5 years in 10 with a maximum interval of 4 years. ▪ Flood-dependent Box Woodland: 2 months in 2.5 years in 10 with a maximum interval between events of 5 years.
North Central CMA (2012). Mapping Grey Box (Eucalyptus microcarpa) Grassy Woodland within Gunbower Forest. Unpublished report prepared for GMW	▪ Field survey (June 2012) ▪ 30 surveyed quadrats used to determine the presence of Grey Box Grassy Woodland community	From the data collected, three broad zones of the presence of Grey Box Grassy Woodland was mapped: ▪ High detail mapping, Medium detail mapping, Low detail mapping In total, approximately 1300 ha of Grey Box Grassy Woodland exists within Gunbower Forest, of that area 770 ha has been mapped to either a high (170 ha) or medium (600 ha) level of detail.	▪ Given the close proximity of the construction zone to the Grey Box Grassy Woodland it is recommended that during construction high visibility fencing be used to clearly delineate the Grey Box Grassy Woodlands area to ensure construction impacts do not occur to this community.
Bennetts, Jolly and Osler (2012). Targeted rare and threatened flora survey of Gunbower Forest summer 2011.	▪ Field survey (December 2011)	▪ A total of 52 populations of rare or threatened species were recorded in Gunbower Forest, from 19 rare or threatened species	Based on field observations made during the 2011 survey, the following actions are proposed for the maintenance and

Report	Methods	Key findings	Recommendations
Report for the Department of Sustainability and Environment (Swan Hill Regional Office), Fire, Flood and Flora, Cape Woolamai, Victoria.	▪ Targeted areas based on known or previous threatened species locations ▪ If rare or threatened species confirmed, a 200m radius around centrepoint was surveyed	▪ Two EPBC Act listed species, River Swamp Wallaby-grass and Winged Peppercress ▪ Four FFG Act listed species, Umbrella Wattle, Buloke, Winged Peppercress and Wavy Marshwort Species recorded within the Gunbower National Park include: ▪ Umbrella Wattle, Buloke, Blue Burr-daisy, Riverine Bitter-cress, Leek Flax-lily, Long Eryngium, Dwarf Brooklime, Smooth Minuria, Waterbush	monitoring of rare and threatened flora populations at Gunbower Forest: Allocasuarina luehmannii ▪ Fence populations from browsing herbivores ▪ Propagate locally sourced seeds and plant within existing populations ▪ Eliminate weeds and replant indigenous ground flora in the northern population ▪ Monitor population condition annually Eryngium paludosum, Myoporum montanum and Minuria integerrima (SE of Torrumbarry Weir) ▪ Restrict recreational vehicles from driving off-track and disturbing populations All species ▪ Increase the frequency and extent of flooding ▪ Monitor population condition every three years (unless stated more frequently above)

Appendix D. Likelihood of occurrence - threatened flora - construction footprint

Likelihood of occurrence:

Not all of the threatened species identified during this assessment are equally likely to occur in the project site, due to the geographic location or context of the site, or the habitat type and condition. For each species, the likelihood of occurrence was evaluated using the following rationale:

PRESENT – Species known to occur within the site, or detected during the site visit.

POSSIBLE – Potentially suitable habitat occurs within construction footprint and species' known range encompasses the construction footprint. Species recorded historically in the study area search, and generally within the last 30 years.

UNLIKELY – Species' known range encompasses the construction footprint, but suitable habitat does not occur within the construction footprint, or occurs within construction footprint but with generally low quality and quantity. Species recorded historically in the study area but generally not within the last 30 years.

HIGHLY UNLIKELY – No historical records of the species and/or no suitable habitat in the study area.

Construction footprint likelihood of occurrence for potential threatened flora species, based on VBA and PMST searches within a 10 km radius of the project area (the study area).

Scientific name	Common Name	EPBC	FFG	DELWP Advisory	Habitat	Source	Number and Most Recent Record	Likelihood of Occurrence
Acacia oswaldii	Umbrella Wattle		L	vu	Widespread but uncommon. Variety of low open forests, woodlands, mallee, mulga scrub. (Walsh and Entwisle 1996)	VBA	2 (2002)	**Present.** Individuals recorded during field assessment in high-quality Riverine Chenopod Woodland adjacent to the Cameron's Creek Mid Creek regulator. Occurrence possible in Middle Gunbower Forest (downstream)
Allocasuarina luehmannii	Buloke		L	en	Usually growing in woodland with *Eucalyptus microcarpa*, on non-calcareous soils. Mainly distributed north of Great Dividing Range throughout north-central and north-western Victoria, with a few sites on the western outskirts of Melbourne (Walsh and Entwisle 1996).	VBA	1 (1987)	**Possible.** A single individual recorded during field assessment in the area of investigation, but not within the construction footprint. Occurrence possible in Middle Gunbower Forest (downstream)
Amphibromus fluitans	River Swamp Wallaby-grass	VU			Largely confined to permanent swamps, principally along the Murray River between Wodonga and Echuca, uncommon to rare in the south (e.g. Casterton, Moe, Yarram), probably due to historic drainage of wetlands (RBGV 2016).	PMST	-	**Possible.** Cryptic species responding to inundation events, occurs in low lying areas. Recorded in dry Riverine Swamp Forest in area of investigation but not close to construction footprint. Occurrence possible in Middle Gunbower Forest (downstream)
Austrostipa trichophylla	Spear-grass			r	Relatively rare in Victoria where known from scattered sites in the west and north-west (Little Desert, Black Range near Stawell, Wedderburn, Gunbower, Ouyen, Mildura areas), and occurring in mallee and woodland formations. Flowers Nov.-Jan. (RBGV 2018)	VBA	2 (2010)	**Possible.** Recent records within 10 km of project area and suitable woodland habitat present
Austrostipa wakoolica	Spear-grass	VU			Grows on floodplains of the Murray River tributaries, in open woodland on grey, silty clay or sandy loam soils. Confined to the floodplains of the Murray River tributaries of central-western and south-western NSW (NSW OE&H 2020).	PMST		**Unlikely.** No previous records and although suitable habitat exists, species' known range is limited to NSW catchments

Scientific name	Common Name	EPBC	FFG	DELWP Advisory	Habitat	Source	Number and Most Recent Record	Likelihood of Occurrence
Brachyscome muelleroides	Mueller Daisy	VU	L	en	Extremely rare, in Victoria confined to floodplains of the Murray River and its tributaries, from Tocumwal east to the Ovens River. Flowers Sep-Nov. 3 (Walsh and Entwisle 1999)	PMST		**Unlikely.** No previous records and construction footprint provides limited suitable habitat.
Caladenia tensa	Greencomb Spider-orchid	EN		vu	Apparently confined to the Wimmera region growing in Yellow Gum and cypress pine woodland, heathy woodland and mallee. Flowers Sep to Nov. (Jeanes and Backhouse 2006)	PMST		**Highly unlikely.** No previous records. Suitable habitat not present within project area.
Calotis cuneifolia	Blue Burr-daisy			r	Scattered along the Murray River and its floodplain downstream from near Barmah, with occurrences away from the river at Kamarooka and Chiltern. Occurs chiefly on alluvial loam or clay soils, often associated with *Eucalyptus camaldulensis*. Flowers Aug – Feb (Walsh and Entwisle 1999)	VBA, Biosis 2014	2 (1987)	**Possible.** Species recorded at Deep Creek (Biosis 2014) and suitable floodplain habitat present in construction footprint.
Dianella porraceae – formally known as *Dianella sp af. longifolia (Riverina)*	Leek Flax-lily			vu	Largely confined to the north-west, mostly near the Murray River and rather rare, inhabiting sandy soils and silty alluvium. Closely allied to Dianella longifolia and formerly included within that species	Biosis 2014, GHD 2017		**Possible.** A few individuals were recorded during field assessment and in previous Biosis (2014) and GHD (2017) surveys in the area of investigation, but not within the construction footprint. Occurrence possible in Middle Gunbower Forest (downstream)
Digitaria divaricatissima var. divaricatissima	Umbrella Grass			vu	Rare in Victoria and collected in recent times only from Dimboola, Mildura, Charlton, Tocumwal, Mitiamo and Springhurst areas and Mt Arapiles. Mostly on heavier soils prone to occasional flooding. Flowers Nov-Jun. 1 (Walsh and Entwisle 1994)	VBA	1 (2010)	**Possible**. Records of this species occur within the study area and suitable riparian woodland habitat available in construction footprint.
Enneapogon gracilis	Slender Bottle-washers			vu	Confined in Victoria to dry, sandy soils in the vicinity of the upper reaches of the Snowy River and its tributaries (e.g. Willis at the NSW border, Suggan Buggan, near Mackillops Bridge between Tubbut and Wulgulmerang), with an isolated record near Patho in northern Victoria. Flowers Aug.–Mar. (RBGV 2017)	VBA	1 (2010)	**Possible**. Records of this species occur within the study area and suitable riparian woodland habitat available in construction footprint.

Scientific name	Common Name	EPBC	FFG	DELWP Advisory	Habitat	Source	Number and Most Recent Record	Likelihood of Occurrence
Eryngium paludosum	Long Eryngium			vu	Rare in Victoria, confined to heavy soils of lake margins and river floodplains in the north and north-west. Flowers Oct.-Jan. (Walsh and Entwisle 1999)	VBA, Biosis 2014	2 (1994)	**Present.** Individuals recorded during field assessment and by Biosis (2014) in high-quality Riverine Chenopod Woodland around the Gunbower Creek Mid Creek regulator. Occurrence possible in Middle Gunbower Forest (downstream)
Lepidium monoplocoides	Winged Peppercress	EN	L	en	Uncommon in north-western quarter of State, mostly on heavy soils near lakes and watercourses. Flowers mostly spring-summer. (Walsh and Entwisle 1996)	VBA, PMST, Bennetts 2012	1 (1983)	**Possible.** Records within the study area and potential habitat present in the outer areas of forest where Black Box chenopod vegetation occurs.
Maireana cheelii	Chariot Wheels	VU	L	vu	Occurs on seasonally wet, heavy red loam or clay soils. Fruits mostly Sep.-Nov. (Walsh and Entwisle 1996)	PMST		**Unlikely.** No previous records. Suitable habitat not present within project area.
Minuria integerrima	Smooth Minuria			r	In Victoria confined to heavy clay and alluvial silt on floodplains of the Murray River, from Barmah district to the South Australian border. Flowers Sep – Mar (Walsh and Entwisle 1999).	VBA, Bennetts 2012	1 (1987)	**Possible**. Recorded by Bennetts (2012) in project area and suitable floodplain habitat present in construction footprint.
Myoporum montanum	Waterbush			r	Scattered across northern Victoria, where it is uncommon to rare. Mostly in mallee and riparian woodland communities, but also in rocky gorges. Flowers mainly Jun.-Nov. (Walsh and Entwisle 1999)	VBA	2 (1997)	**Possible**. Records of this species occur within the study area and suitable riparian woodland habitat available in construction footprint.
Myriophyllum porcatum	Ridged Water-milfoil	VU	L	vu	Rare and restricted to northern and north-western Victoria where it has been recorded growing in temporary waterholes, lagoons, farm dams and rock holes, and on clay pans (Walsh and Entwisle 1996).	PMST		**Possible.** No records of this species occurs within 10 km, however suitable habitat present within construction footprint **.**
Nymphoides crenata	Wavy Marshwort		L	vu	Occurs in fresh, still to slow-flowing water to 1.5 m deep in swamps, lagoons, irrigation channels and streams, also frequent in temporarily inundated depressions.	Bennetts 2012		**Possible:** Previously recorded by Bennetts (2012) in project area and suitable aquatic habitat exists in construction footprint.

Scientific name	Common Name	EPBC	FFG	DELWP Advisory	Habitat	Source	Number and Most Recent Record	Likelihood of Occurrence
Pimelea spinescens subsp. spinescens	Spiny Rice-flower	CR	L	en	Grows in grasslands or open shrublands on basalt derived soils west of Melbourne. (Walsh and Entwisle 1996)	PMST		**Highly Unlikely.** No suitable grassland habitat present within project area.
Pterostylis cheraphila	Floodplain Rustyhood	VU	L	vu	Endemic to Victoria where localised and known only from the Little Desert area and near Murtoa in riverine *Eucalyptus largiflorens* woodland, growing amongst ephemerals on sandy loam or cracking silty soils. Recently recorded in Plains Woodland/Semi-arid Woodland in Gunbower Forest (Walsh and Entwisle 1994).	Bennetts and Cook 2020	2020	**Possible.** Species only recently recorded in terrestrial box woodland in Lower Gunbower Forest. Suitable habitat present within construction footprint.
Rorippa eustylis	Dwarf Bitter-cress			r	Restricted to scattered swamps and flood-plains near the Murray River	Bennetts 2012		**Possible.** Recorded by Bennetts (2012) in project area and suitable floodplain and swamp habitat present in construction footprint
Sclerolaena napiformis	Turnip Copperburr	EN	L	en	Known only from a few populations in remnant grassland on clay-loam soils in north-central Victoria in the Echuca-Nathalia area, and between Donald and Stawell in the west. Fruits Nov.-May. (Walsh and Entwisle 1996)	PMST		**Unlikely.** No previous records. Suitable habitat not present within project area.
Senecio behrianus	Stiff Groundsel	EN	L	en	Exceedingly rare in Victoria, and thought to be extinct until 1991 when rediscovered between Rochester and Stanhope, and Miners Rest near Ballarat in 2004. Apparently confined to heavy, winter-wet, clayey soils. Formerly known from Casterton, Swan Hill, Barham areas, with specimens from the 'Wimmera', and You Yangs near Lara of uncertain affinity, but closest to Senecio behrianus (RBGV 2018).	VBA	3 (2008)	**Possible.** Known from a few locations around Gunbower Forest, including along McGillivray Road (50 m from project area). Occurrence possible in Middle Gunbower Forest (downstream)
Senecio campylocarpus	Floodplain Fireweed			vu	In Victoria mostly throughout central Victoria and in the north-east in loam to clay soils in forest and woodland, usually in seasonally inundated areas.	Biosis 2014		**Possible.** Species recorded in project area (Biosis 2014) and suitable floodplain habitat present in construction footprint.

Scientific name	Common Name	EPBC	FFG	DELWP Advisory	Habitat	Source	Number and Most Recent Record	Likelihood of Occurrence
Swainsona murrayana	Slender Darling-pea	VU	L	en	Extremely rare in northern and western Victoria where usually found in seasonally inundated flats and around lakes. Flowers Aug.-Nov. (Walsh and Entwisle 1996)	VBA, Seran BL&A 2018	12 (2014)	**Possible.** Species recorded from nearby grasslands and lake margins. Limited suitable habitat present in construction footprint.
Swainsona plagiotropis	Red Swainson-pea	VU	L	en	Restricted to a few sites in north-central Vic. between Bendigo and the Murray River. Grows in grassland on heavy red soils and is now almost confined to roadside remnants. Flowers Aug-Nov. (Walsh and Entwisle 1996).	PMST		**Unlikely.** Populations limited in Victoria to the Riverina in seasonally inundated flats and grasslands.

[1] Commonwealth *Environment Protection and Biodiversity Convservation Act1999* categories: CR = Critically Endangered, E= Endangered, VU = Vulnerable, M = Migratory; [2]*Flora and Fauna Guarantee Act 1988* categories: L = Listed, N = Nominated; [3] Conservation Status in Victoria DEWLP Advisory List; cr = critically endangered, en = endangered, vu = vulnerable, nt = near threatened

Appendix E. Likelihood of occurrence - threatened flora - inundation area

This likelihood of occurrence for rare or threatened flora species has been based on a desktop assessment of the inundation area, and detailed assessments of the vegetation and habitat within the inundation area have not yet been undertaken.

Likelihood of occurrence:

Not all of the threatened species identified during this assessment are equally likely to occur in the project site, due to the geographic location or context of the site, or the habitat type and condition. For each species, the likelihood of occurrence was evaluated using the following rationale:

PRESENT – Species known to occur within the site, or detected during the site visit.

POSSIBLE – Potentially suitable habitat occurs within the inundation area and species' known range encompasses the inundation area. Species recorded historically in the study area , and generally within the last 30 years.

UNLIKELY – Species' known range encompasses the inundation area, but suitable habitat does not occur within the inundation area, or occurs within the inundation area but with generally low quality and quantity. Species recorded historically in the study area but generally not within the last 30 years.

HIGHLY UNLIKELY – No historical records of the species and/or no suitable habitat in the study area.

Inundation area likelihood of occurrence for potential threatened flora species, based on VBA and PMST searches within a 10 km radius of the project area (the study area).

Scientific name	Common Name	EPBC	FFG	DELWP Advisory	Habitat	Source	Number and Most Recent Record	Likelihood of Occurrence
Acacia oswaldii	Umbrella Wattle		L	vu	Widespread but uncommon. Variety of low open forests, woodlands, mallee, mulga scrub. (Walsh and Entwisle 1996)	VBA	2 (2002)	**Possible.** Recorded during field assessment in Riverine Chenopod Woodland and Plains Woodland in the area of investigation. These areas are not subject to inundation, but occurrence possible in Middle Gunbower Forest (downstream)
Allocasuarina luehmannii	Buloke		L	en	Usually growing in woodland with *Eucalyptus microcarpa*, on non-calcareous soils. Mainly distributed north of Great Dividing Range throughout north-central and north-western Victoria, with a few sites on the western outskirts of Melbourne (Walsh and Entwisle 1996).	VBA	1 (1987)	**Possible.** Recorded during field assessment in Riverine Chenopod Woodland and Plains Woodland in the area of investigation. These areas are not subject to inundation, but occurrence possible in Middle Gunbower Forest (downstream)
Amphibromus fluitans	River Swamp Wallaby-grass	VU			Largely confined to permanent swamps, principally along the Murray River between Wodonga and Echuca, uncommon to rare in the south (e.g. Casterton, Moe, Yarram), probably due to historic drainage of wetlands (RBGV 2016).	PMST	-	**Present.** Species recorded in Baggots Creek overflow. Cryptic species responding to inundation events, occurs in low lying areas. Occurrence possible in Middle Gunbower Forest (downstream)
Austrostipa trichophylla	Spear-grass			r	Relatively rare in Victoria where known from scattered sites in the west and north-west (Little Desert, Black Range near Stawell, Wedderburn, Gunbower, Ouyen, Mildura areas), and occurring in mallee and woodland formations. Flowers Nov.-Jan. (RBGV 2018)	VBA	2 (2010)	**Possible.** Recent records within the study area and suitable woodland habitat present in inundation area.
Austrostipa wakoolica	Spear-grass	VU			Grows on floodplains of the Murray River tributaries, in open woodland on grey, silty clay or sandy loam soils. Confined to the floodplains of the Murray River tributaries of central-western and south-western NSW (NSW OE&H 2020).	PMST		**Unlikely.** No previous records and although suitable habitat exists, species' known range is limited to NSW catchments

Scientific name	Common Name	EPBC	FFG	DELWP Advisory	Habitat	Source	Number and Most Recent Record	Likelihood of Occurrence
Brachyscome muelleroides	Mueller Daisy	VU	L	en	Extremely rare, in Victoria confined to floodplains of the Murray River and its tributaries, from Tocumwal east to the Ovens River. Flowers Sep-Nov. 3 (Walsh and Entwisle 1999)	PMST		**Possible.** No records within the study area but suitable floodplain habitat present in inundation area.
Caladenia tensa	Greencomb Spider-orchid	EN		vu	Apparently confined to the Wimmera region growing in Yellow Gum and cypress pine woodland, heathy woodland and mallee. Flowers Sep to Nov. (Jeanes and Backhouse 2006)	PMST		**Highly unlikely.** No previous records. Suitable habitat not present within project area.
Calotis cuneifolia	Blue Burr-daisy			r	Scattered along the Murray River and its floodplain downstream from near Barmah, with occurrences away from the river at Kamarooka and Chiltern. Occurs chiefly on alluvial loam or clay soils, often associated with *Eucalyptus camaldulensis*. Flowers Aug – Feb (Walsh and Entwisle 1999)	VBA, Biosis 2014	2 (1987)	**Possible.** Species recorded in inundation area and suitable floodplain habitat present in inundation area.
Dianella porraceae – formally known as *Dianella sp af. longifolia (Riverina)*	Leek Flax-lily			vu	Largely confined to the north-west, mostly near the Murray River and rather rare, inhabiting sandy soils and silty alluvium. Closely allied to Dianella longifolia and formerly included within that species	Biosis 2014, GHD 2017		**Possible.** Recorded during field assessment in Riverine Chenopod Woodland and Plains Woodland in the area of investigation. These areas are not subject to inundation, but occurrence possible in Middle Gunbower Forest (downstream)
Digitaria divaricatissima var. divaricatissima	Umbrella Grass			vu	Rare in Victoria and collected in recent times only from Dimboola, Mildura, Charlton, Tocumwal, Mitiamo and Springhurst areas and Mt Arapiles. Mostly on heavier soils prone to occasional flooding. Flowers Nov-Jun. 1 (Walsh and Entwisle 1994)	VBA	1 (2010)	**Possible**. Records of this species occur within the study area and suitable riparian woodland habitat available in inundation area.
Enneapogon gracilis	Slender Bottle-washers			vu	Confined in Victoria to dry, sandy soils in the vicinity of the upper reaches of the Snowy River and its tributaries (e.g. Willis at the NSW border, Suggan Buggan, near Mackillops Bridge between Tubbut and Wulgulmerang), with an isolated record near Patho in northern Victoria. Flowers Aug.–Mar. (RBGV 2017)	VBA	1 (2010)	**Possible**. Records of this species occur within the study area and suitable riparian woodland habitat available in inundation area.

Scientific name	Common Name	EPBC	FFG	DELWP Advisory	Habitat	Source	Number and Most Recent Record	Likelihood of Occurrence
Eryngium paludosum	Long Eryngium			vu	Rare in Victoria, confined to heavy soils of lake margins and river floodplains in the north and north-west. Flowers Oct.-Jan. (Walsh and Entwisle 1999)	VBA, Biosis 2014	2 (1994)	**Possible.** Recorded during field assessment in Riverine Chenopod Woodland and Plains Woodland in the area of investigation. These areas are not subject to inundation, but occurrence possible in Middle Gunbower Forest (downstream)
Lepidium monoplocoides	Winged Peppercress	EN	L	en	Uncommon in north-western quarter of State, mostly on heavy soils near lakes and watercourses. Flowers mostly spring-summer. (Walsh and Entwisle 1996)	VBA, PMST, Bennetts 2012	1 (1983)	**Possible.** Records within the study area and potential habitat present in Black Box chenopod dominated woodland present in inundation area.
Maireana cheelii	Chariot Wheels	VU	L	vu	Occurs on seasonally wet, heavy red loam or clay soils. Fruits mostly Sep.-Nov. (Walsh and Entwisle 1996)	PMST		**Unlikely.** No previous records. Suitable habitat not present within project area.
Minuria integerrima	Smooth Minuria			r	In Victoria confined to heavy clay and alluvial silt on floodplains of the Murray River, from Barmah district to the South Australian border. Flowers Sep – Mar (Walsh and Entwisle 1999).	VBA, Bennetts 2012	1 (1987)	**Possible**. Recorded by Bennetts (2012) in project area and suitable floodplain habitat present in inundation area.
Myoporum montanum	Waterbush			r	Scattered across northern Victoria, where it is uncommon to rare. Mostly in mallee and riparian woodland communities, but also in rocky gorges. Flowers mainly Jun.-Nov. (Walsh and Entwisle 1999)	VBA	2 (1997)	**Possible**. Records of this species occur within the study area and suitable riparian woodland habitat available in inundation area.
Myriophyllum porcatum	Ridged Water-milfoil	VU	L	vu	Rare and restricted to northern and north-western Victoria where it has been recorded growing in temporary waterholes, lagoons, farm dams and rock holes, and on clay pans (Walsh and Entwisle 1996).	PMST		**Possible.** No records of this species occurs within 10 km, however suitable habitat present within inundation area.
Nymphoides crenata	Wavy Marshwort		L	vu	Occurs in fresh, still to slow-flowing water to 1.5 m deep in swamps, lagoons, irrigation channels and streams, also frequent in temporarily inundated depressions.	Bennetts 2012		**Possible:** Previously recorded by Bennetts (2012) in project area and suitable aquatic habitat exists in inundation area.

Scientific name	Common Name	EPBC	FFG	DELWP Advisory	Habitat	Source	Number and Most Recent Record	Likelihood of Occurrence
Pimelea spinescens subsp. spinescens	Spiny Rice-flower	CR	L	en	Grows in grasslands or open shrublands on basalt derived soils west of Melbourne. (Walsh and Entwisle 1996)	PMST		**Highly Unlikely.** No suitable grassland habitat present within project area.
Pterostylis cheraphila	Floodplain Rustyhood	VU	L	vu	Endemic to Victoria where localised and known only from the Little Desert area and near Murtoa in riverine *Eucalyptus largiflorens* woodland, growing amongst ephemerals on sandy loam or cracking silty soils. Recently recorded in Plains Woodland/Semi-arid Woodland in Gunbower Forest (Walsh and Entwisle 1994)	Bennetts and Cook 2020	2020	**Possible.** Species only recently recorded in terrestrial box woodland in Lower Gunbower Forest. Suitable habitat present within inundation area.
Rorippa eustylis	Dwarf Bitter-cress			r	Restricted to scattered swamps and flood-plains near the Murray River	Bennetts 2012		**Possible.** Recorded by Bennetts (2012) in project area and suitable floodplain and swamp habitat present in inundation area.
Sclerolaena napiformis	Turnip Copperburr	EN	L	en	Known only from a few populations in remnant grassland on clay-loam soils in north-central Victoria in the Echuca-Nathalia area, and between Donald and Stawell in the west. Fruits Nov.-May. (Walsh and Entwisle 1996)	PMST		**Unlikely.** No previous records. Suitable habitat not present within project area.
Senecio behrianus	Stiff Groundsel	EN	L	en	Exceedingly rare in Victoria, and thought to be extinct until 1991 when rediscovered between Rochester and Stanhope, and Miners Rest near Ballarat in 2004. Apparently confined to heavy, winter-wet, clayey soils. Formerly known from Casterton, Swan Hill, Barham areas, with specimens from the 'Wimmera', and You Yangs near Lara of uncertain affinity, but closest to Senecio behrianus (RBGV 2018).	VBA	3 (2008)	**Possible.** Known from a few locations around Gunbower Forest, including along McGillivray Road (50 m from project area). Suitable habitat throughout inundation area, and Occurrence possible in Middle Gunbower Forest (downstream)
Senecio campylocarpus	Floodplain Fireweed			vu	In Victoria mostly throughout central Victoria and in the north-east in loam to clay soils in forest and woodland, usually in seasonally inundated areas.	Biosis 2014		**Possible.** Species recorded Red Gum floodplain in the project area with suitable habitat widespread in the inundation area

Scientific name	Common Name	EPBC	FFG	DELWP Advisory	Habitat	Source	Number and Most Recent Record	Likelihood of Occurrence
Swainsona murrayana	Slender Darling-pea	VU	L	en	Extremely rare in northern and western Victoria where usually found in seasonally inundated flats and around lakes. Flowers Aug.-Nov. (Walsh and Entwisle 1996)	PMST, Seran BL&A 2018	12 (2014)	**Possible.** Species not recorded in project area but suitable floodplain habitat present inundation area.
Swainsona plagiotropis	Red Swainson-pea	VU	L	en	Restricted to a few sites in north-central Vic. between Bendigo and the Murray River. Grows in grassland on heavy red soils and is now almost confined to roadside remnants. Flowers Aug-Nov. (Walsh and Entwisle 1996).	PMST		**Unlikely.** Populations limited in Victoria to the Riverina in seasonally inundated flats and grasslands.

[1] Commonwealth *Environment Protection and Biodiversity Convservation Act1999* categories: CR = Critically Endangered, E= Endangered, VU = Vulnerable, M = Migratory; [2]*Flora and Fauna Guarantee Act 1988* categories: L = Listed, N = Nominated; [3] Conservation Status in Victoria DEWLP Advisory List; cr = critically endangered, en = endangered, vu = vulnerable, nt = near threatened

Appendix F. Likelihood of occurrence - threatened fauna - construction footprint

Likelihood of occurrence:

Not all of the threatened species identified during this assessment are equally likely to occur in the project site, due to the geographic location or context of the site, or the habitat type and condition. For each species, the likelihood of occurrence was evaluated using the following rationale:

PRESENT – Species known to occur within the site, or detected during the site visit.

POSSIBLE – Potentially suitable habitat occurs within construction footprint and species' known range encompasses the construction footprint. Species recorded historically in the study area, and generally within the last 30 years.

UNLIKELY – Species' known range encompasses the construction footprint, but suitable habitat does not occur within construction footprint, or occurs within construction footprint but with generally low quality and quantity. Species recorded historically in the study area but generally not within the last 30 years.

HIGHLY UNLIKELY – No historical records of the species and/or no suitable habitat in the study area.

Construction footprint likelihood of occurrence for potential threatened fauna species, based on VBA and PMST searches within a 10 km radius of the project area (the study area).

Scientific name	Common Name	EPBC	FFG	DELWP Advisory	Habitat	Most Recent Record	Number of Records	Likelihood of Occurrence
Anilios proximus	Woodland Blind Snake	-	-	nt	Typical habitat includes a good cover of leaf litter, old large trees and fallen logs. In Victoria they have been found in Black Box, Grey Box and Red Gum woodlands and also within areas of intact roadside and streamside vegetation (SWIFFT 2018)	1993	7	**Possible.** Records within the study area and suitable Black Box/ Red Gum woodland habitat within the project area.
Antigone rubicunda	Brolga	-	L	vu	Freshwater swamps flooded grasslands, margins of billabongs, lagoons, dry floodplains, irrigated pastures; occasionally estuaries. (Pizzey and Knight 2012)	1999	2	**Unlikely.** Records within the study area, but only a limited area of wetland habitat within the construction footprint.
Ardea alba	Great Egret	-	L	vu	Shallows of rivers, estuaries, tidal mudflats, freshwater wetlands; sewage ponds, irrigation areas, larger dams etc. (Pizzey and Knight 2012)	2010	20	**Unlikely.** Records within the study area, but only a limited area of wetland habitat within the construction footprint.
Ardea intermedia plumifera	Plumed Egret	-	L	en	Freshwater wetlands, pastures and croplands, tidal mudflats, floodplains. (Pizzey and Knight 2012)	2017	4	**Unlikely.** Records within the study area, but only a limited area of wetland habitat within the construction footprint.
Aythya australis	Hardhead	-	-	vu	Deep, permanent wetlands, large open waters, brackish coastal swamps, farm dams, ornamental lakes , sewage ponds. (Pizzey and Knight 2012)	2004	1	**Unlikely.** Records within the study area, but only a limited area of wetland habitat within the construction footprint.
Bidyanus bidyanus	Silver Perch	CR	L	vu	Rivers, lakes and reservoirs, preferring areas of rapid flow. Swims near surface. (Allen et al. 2002)	PMST	-	**Present.** Species limited to main-channels of the Murray River and Gunbower Creek where it has been recorded in low densities .
Botaurus poiciloptilus	Australasian Bittern	EN	L	en	Root-festooned banks of fresh or tidal creeks, rivers and streams in rainforest, lakes, swamps, estuaries, mangroves. (Pizzey and Knight 2012)	1993	1	**Unlikely.** Records within the study area, but only a limited area of wetland habitat within the construction footprint.
Calidris ferruginea	Curlew Sandpiper	CR	-	en	Tidal mudlfats; saltmarsh, saltfields; fresh, brackish or saline wetlands; sewage ponds. (Pizzey and Knight 2012). When in Australia habitats they prefer include exposed tidal flat systems, but they will also use inland freshwater and	PMST	-	**Unlikely.** No records within the study area, and no suitable tidal mudflats or saltmarsh environments in construction footprint

Scientific name	Common Name	EPBC	FFG	DELWP Advisory	Habitat	Most Recent Record	Number of Records	Likelihood of Occurrence
					brackish wetlands (Geering et al. 2008; Menkhorst et al. 2017).			
Ceyx azureus	Azure Kingfisher	-	-	nt	Root-festooned banks of fresh or tidal creeks, rivers and streams in rainforest, lakes, swamps, estuaries, mangroves. (Pizzey and Knight 2012)	2017	23	**Possible.** Many records within the study area and suitable swamp forest habitat available throughout project area including construction footprint.
Chelodina expansa	Broad-shelled Turtle	-	L	en	Found in Murray/Darling River systems in SA, Vic, NSW and Qld. Inhabits permanent streams and waterholes throughout its range, but essentially a river tortoise. Lies concealed in debris on the bottom or among root mats in silty rivers, streams and waterholes (Wilson and Swan 2008).	2012	4	**Possible.** Recent records within the study area with habitat limited to the Murray River
Chlidonias hybrida	Whiskered Tern	-	-	nt	Vegetated and open wetlands; brackish, saline lakes; saltfields, irrigated lands, sewage ponds; occasionally offshore. (Pizzey and Knight 2012)	2008	3	**Unlikely.** Records within the study area, but only a limited area of wetland habitat within the construction footprint.
Climacteris picumnus	Brown Treecreeper	-	-	nt	Drier forests/woodlands/scrubs, with fallen branches; particularly River Red Gum lined water courses. (Pizzey and Knight 2012)	2019	179	**Present.** Species observed during field assessment and suitable habitat widespread in project area including construction footprint
Craterocephalus fluviatilis	Murray Hardyhead	EN	L	cr	This species inhabits the margins of slow, lowland rivers, and lakes, billabongs and backwaters. It is found amongst aquatic plants and over gravel beds in both fresh and highly saline waters (Allen et al. 2002).	PMST	-	**Unlikely.** No suitable habitat within construction footprint. Species known to occur in permanent saline lakes and wetlands which are not present in the project area.
Craterocephalus stercusmuscarum fulvus	Unspecked Hardyhead	-	L	-	Found around the margins of large, slow-flowing, lowland rivers, and in lakes, brackwaters and billabongs. It prefers slow-flowing or still habitats with aquatic vegetation and sand, gravel or mud substrates. (Allen et al. 2002).	2012	1	**Present.** Species recorded during recent surveys of Cameron's Creek and Black Charlie Lagoon (Sharp 2014, 2015) and during annual monitoring across Gunbower Forest between 2008-2017 (Bloink et al. 2018).

Scientific name	Common Name	EPBC	FFG	DELWP Advisory	Habitat	Most Recent Record	Number of Records	Likelihood of Occurrence
Crinia sloanei	Sloane's Froglet	EN	-	-	Periodically inundated areas of grassland, woodland and disturbed habitats across the Central-western plains of NSW from the Murray River and adjacent areas in Vic (Cogger 2014)	1993	3	**Possible.** Record within the study area and some wetland habitat in construction footprint
Delma impar	Striped Legless Lizard	VU	L	en	Intact native grassland areas, usually in or around stony rise country or deeply cracked earth. (Cogger 2014)	PMST	-	**Highly Unlikely**. No records within the study area and no suitable grassland habitat present in construction footprint
Dromaius novaehollandiae	Emu	-	-	nt	Found in plains, scrublands, open woodlands, coastal heaths, alpine pastures, semi-deserts, margins of lakes, pastoral and cereal growing areas. Mostly absent from closely settled parts, common in pastoral and cropping regions, state forests and national parks (Pizzey and Knight 2012).	1999	3	**Present**. Species recorded during field assessment and suitable woodland habitat in the construction footprint.
Egretta garzetta	Little Egret	-	L	en	Tidal mudflats, saltmarshes, mangroves, freshwater wetlands, sewage ponds. (Pizzey and Knight 2012)	1974	3	**Unlikely.** Records within the study area, but only a limited area of wetland habitat within the construction footprint.
Emydura macquarii	Murray River Turtle	-	-	vu	Restricted to larger rivers and associated large waterholes on the floodplains. (Cogger 2014)	2012	2	**Possible.** Recent records within the study area with habitat limited to the Murray River
Euastacus armatus	**Murray Crayfish**		L		Species seems to be tolerant of a wide variety of habitats, including deep flowing water proximal to clay banks, wood or rock cover, as well as tributary streams and shallow riparian habitats (for smaller individuals) (Fisheries Scientific Committee 2013). The Murray River in vicinity of project area has been mapped as possible habitat by NSW Fisheries (NSW DPI (accessed 2020). It is possible that individuals are present in the Murray River within and adjacent to the Project Area.			**Possible.** The Murray River in vicinity of project area has been mapped as possible habitat by NSW Fisheries (NSW DPI (accessed 2020). It is possible that individuals are present in the Murray River within and adjacent to the Project Area
Falco hypoleucos	Grey Falcon	-	L	en	Lightly treed inland plains, gibber deserts, sandridges, pastoral lands, timber watercourses; seldom in driest deserts. (Pizzey and Knight 2012)	1999	1	**Possible.** Recent record within the study area, and suitable woodland habitat in the construction footprint.

Scientific name	Common Name	EPBC	FFG	DELWP Advisory	Habitat	Most Recent Record	Number of Records	Likelihood of Occurrence
Falco subniger	Black Falcon	-	L	vu	Plains, grasslands, foothills, timbered watercourses, wetland environs; crops; occasionally over towns and cities. (Pizzey and Knight 2012)	2019	2	**Possible.** Recent records within the study area, and suitable woodland habitat in project area including the construction footprint.
Galaxias rostratus	Flat-headed Galaxias	CR	-	vu	Shoals in mid-water. Usually below 150 m altitude in Murray system in still or gently flowing waters, lakes, billabongs and backwaters. Depth 1 m, substrate of coarse sand and mud, and debris. (Allen et al. 2002).	PMST	-	**Unlikely.** Species not recorded during recent surveys of Cameron's Creek and Black Charlie Lagoon (Sharp 2014, 2015) or during annual monitoring across Gunbower Forest between 2008-2017 (Bloink et al. 2018). No records within last 30 years.
Grantiella picta	Painted Honeyeater	VU	L	vu	Mistletoes in eucalypt forests/woodlands; black box on watercourses; box-ironbark-yellow gum woodlands; paperbarks, Casuarinas; mulga, other acacias; trees on farmland; gardens. (Pizzey and Knight 2012)	PMST	-	**Possible.** No records within the study area, but suitable woodland habitat in construction footprint
Haliaeetus leucogaster	White-bellied Sea-Eagle	-	L	vu	Coasts, inlands, estuaries, inlets, large rivers, inland lakes, reservoirs. (Pizzey and Knight 2012)	2008	4	**Possible. Unlikely.** Records within the study area, but only a limited area of wetland habitat within the construction footprint.
Hirundapus caudacutus	White-throated Needletail	VU, M	L	vu	Airspace over forests, woodlands, farmlands, plains, lakes, coasts, towns, feeding companies frequency patrol back and forward along favoured hilltops and timbered ranges. (Pizzey and Knight 2012)	1980	1	**Possible.** Recent record within the study area, and suitable woodland habitat in the construction footprint.
Lathamus discolor	Swift Parrot	CR	L	en	Open grassy woodland, with dead trees, near permanent water and forested hills, coastal heaths, pastures with exotic grasses, weeds, roadsides, orchards. (Pizzey and Knight 2012)	PMST	-	**Unlikely**. No records within the study area and not known to support foraging Box-Ironbark habitat for the species
Leipoa ocellata	Malleefowl	VU	L	en	Mallee, acacia, paperback, she oak, and other scrubs; eucalypt woodland; coastal heaths; mostly on sandy or gravel soils. (Pizzey and Knight 2012)	PMST	-	**Highly Unlikely.** No records within the study area and no suitable mallee woodland habitat present in construction footprint

Scientific name	Common Name	EPBC	FFG	DELWP Advisory	Habitat	Most Recent Record	Number of Records	Likelihood of Occurrence
Litoria raniformis	Growling Grass Frog	VU	L	en	A largely aquatic species found among vegetation within or at the edges of permanent water – streams, swamps, lagoons, farm dams and ornamental ponds. Often found under debris on low, often flooded river flats. Frequently active by day. (Cogger 2014)	PMST	-	**Possible.** No records within the project area and some wetland habitat in construction footprint
Lophoictinia isura	Square-tailed Kite	-	L	vu	Heathlands, woodlands, forests, rainforest, timbered water courses, hills and gorges. (Pizzey and Knight 2012)	2005	1	**Possible.** Recent record within the study area, and suitable woodland habitat in the construction footprint.
Maccullochella peelii	Murray Cod	VU	L	vu	Slow flowing turbid water of rivers and streams at low elevations. Also fast-moving clear, rocky upland streams. Favours deeper water around boulders, longs, undercut banks and overhanging vegetation. (Allen et al. 2002).	1970	1	**Present.** Species limited to main-channels of the Murray River which intersects the construction footprint
Maccullochella macquariensis	Trout Cod	EN	L	cr	Inhabits a variety of flowing waters in the mid to upper reaches of rivers and streams with cover in the form of woody debris or boulders (Allen et al. 2002).			**Present.** Species limited to main-channels of the Murray River which intersects the construction footprint
Macquaria ambigua	Golden Perch	-		nt	Occurs in a variety of riverine habitats but prefers warm, slow moving turbid sections of streams. (Allen et al. 2002).	2012	1	**Present.** Species limited to main-channels of the Murray River which intersects the construction footprint
Macquaria australasica	Macquarie Perch	EN	L	en	Cool, clear water of rivers, lakes and reservoirs. Prefers slow-flowing, deep rocky pools. (Allen et al. 2002).	PMST	-	**Highly Unlikely.** The species is a main-channel specialist with suitable habitat limited to the Upper tributaries of the Murray River. Has not been recorded from the Murray River since 1970. Current records are from the upper Goulburn and Mitta Mitta catchments in Victoria and the Murrumbidgee catchment in NSW.
Melanotaenia fluviatilis	Murray-Darling Rainbowfish		L	vu	Preferred habitat is margins of slow flowing rivers, backwaters and wetlands. Has been recorded from Camerons Creek and Black Charlie Lagoon (Sharpe, 2014;2015).	Last 10 years		**Present.** Presence in the permanent wetlands of Upper Gunbower Forest including Camerons Creek and Black Charlie Lagoon has been confirmed

Scientific name	Common Name	EPBC	FFG	DELWP Advisory	Habitat	Most Recent Record	Number of Records	Likelihood of Occurrence
					Has also been recorded in low abundance in Gunbower Creek in the past 10 years (Mallen-Cooper et al., 2014).			
Melanodryas cucullata	Hooded Robin	-	L	nt	Drier Eucalypt forests, woodlands, scrubs with fallen logs, debris, mallee, Casuarina, cypress pine, mulga, cleared paddocks, Banksia dominated coastal scrubs. (Pizzey and Knight 2012)	2017	10	**Possible.** Recent record within the study area, and suitable woodland habitat in the construction footprint.
Morelia spilota	Carpet Python		L	en	Found under an enormous variety of conditions, from rainforest on the east and northeast coasts to a variety of semi-arid coastal and inland habitats. Often arboreal, but in many areas lives in burrows made by other animals (Cogger 2014)	NA	NA	**Possible.** No records within study area but Suitable habitat present within construction footprint
Nannoperca australis (Murray-Darling lineage)	Southern Pygmy Perch (Murray-Darling lineage)	-	-	vu	Slow-moving or still waters, such as pools in rivers and streams or in lakes. They prefer sites which have abundant submerged and emergent aquatic vegetation, sometimes with wood debris (Allen et al. 2002)	1997	3	**Possible.** Record within the study area and some wetland habitat in construction footprint
Ninox connivens	Barking Owl	-	L	en	Open forests, woodlands, dense scrubs, foothills, river red gums, other large trees near water courses, penetrating otherwise open country, and paperbark woodlands. (Pizzey and Knight 2012)	2008	3	**Possible.** Recent record within the study area, and suitable woodland habitat in the construction footprint.
Numenius madagascariensis	Eastern Curlew	CR	-	-	Estuaries, tidal mudflats, sandspits, saltmarshes, mangroves; occasionally fresh or brackish lakes; bare grasslands near water. (Pizzey and Knight 2012)	PMST	-	**Highly Unlikely.** No records within the study area, and no suitable tidal mudflats or saltmarsh environments in construction footprint
Nycticorax caledonicus	Nankeen Night-Heron	-	-	nt	Shallow margins of rivers, wetlands, mangrove-lined estuaries, offshore islands, floodwaters, garden trees. (Pizzey and Knight 2012)	2003	7	**Unlikely.** Records within the study area, but only a limited area of wetland habitat within the construction footprint.
Nyctophilus corbeni	South-eastern Long-eared Bat	VU	L	en	Inhabits a wide range of inland woodland vegetation types. These include box/ironbark/cypress pine woodlands, Buloke woodlands, river red gum woodlands. This species is more	PMST	-	**Possible.** No records within the study area, but suitable Box and Red Gum woodland in construction footprint.

Scientific name	Common Name	EPBC	FFG	DELWP Advisory	Habitat	Most Recent Record	Number of Records	Likelihood of Occurrence
					abundant in extensive stands of vegetation in comparison to smaller woodland patches. (Van Dyck and Strahan 2008)			
Pedionomus torquatus	Plains-wanderer	CR	L	cr	Sparse, treeless, lightly grazed native grasslands/herbfields with bare ground, old cereal crops, short Lucerne, sparse saltbush, low shrubland. (Pizzey and Knight 2012)	PMST	-	**Highly Unlikely.** No records within the study area, and no suitable grassland habitat in the project area
Peltohyas australis	Inland Dotterel	-	-	vu	Stony, sparsely vegetated plains and uplands, gibber, pasture, crops occasionally ploughed land. (Pizzey and Knight 2012)	2007	1	**Unlikely**. Record within the study area but no suitable plains or pasture land within construction footprint
Petaurus norfolcensis	Squirrel Glider	-	L	en	Dry eucalypt forests containing large old trees with hollows with Acacia understorey. (Van Dyck and Strahan 2008)	1996	2	**Possible.** Records within the study area and suitable Red Gum forest habitat in construction footprint
Pezoporus occidentalis	Night Parrot	EN	-	ex	Seeding spinifex on stony rises, breakaway country, sandy lowlands; shrubby glasswort, chenopods, succulents on flats around salt lakes; flooded claypans, saltbush, bluebush, bassia associations. (Pizzey and Knight 2012)	PMST	-	**Highly Unlikely.** No records within the study area, and no suitable arid/salt lake habitat in the project area
Phalacrocorax varius	Pied Cormorant	-	-	nt	Coastal waters with sloping shorelines; estuaries, bays, tidal inlets, large inland lakes and rivers, irrigation ponds, coastal mangroves and offshore islands. (Pizzey and Knight 2012)	2008	5	**Unlikely.** Records within the study area, but only a limited area of wetland habitat within the construction footprint.
Platalea regia	Royal Spoonbill	-	-	nt	Larger shallow waters, inland and coastal, well-vegetated shallow freshwater wetlands, saltfields, mangroves, islands, farm dams occasionally. (Pizzey and Knight 2012)	2019	5	**Unlikely.** Records within the study area, but only a limited area of wetland habitat within the construction footprint.
Plegadis falcinellus	Glossy Ibis	-	-	nt	Well vegetated wetlands, wet pastures, rice fields, floodwaters, floodplains, brackish or occasionally saline wetlands, mangroves, mudflats; occasionally dry grasslands. (Pizzey and Knight 2012)	1992	1	**Unlikely.** Records within the study area, but only a limited area of wetland habitat within the construction footprint.
Pogona barbata	Bearded Dragon	-	-	vu	Semi-arboreal, being seen during the day perched on fallen timber, stumps, fence posts or roadside verges where they forage for insects.	1992	4	**Possible.** Records within the study area and suitable woodland habitat within the construction footprint.

Scientific name	Common Name	EPBC	FFG	DELWP Advisory	Habitat	Most Recent Record	Number of Records	Likelihood of Occurrence
Polytelis swainsonii	Superb Parrot	VU	L	en	River red gums, black box, yellow box, river oak, mostly near rivers; mallee, stubbles, pastures, gardens. (Pizzey and Knight 2012)	1996	1	**Possible.** Record within the study area and suitable Red Gum habitat within the construction footprint
Pomatostomus temporalis	Grey-crowned Babbler	-	L	en	Live in open forest and woodland, acacia shrubland and adjoining farmland. (Pizzey and Knight 2012)	2007	4	**Present.** Species observed during field assessment in the area of investigation close to the construction footprint.
Rostratula australis	Australian Painted Snipe	EN	L	cr	Well-vegetated shallows and margins of wetlands, dams, sewage ponds; wet pastures, marshy areas, irrigation systems, lignum, tea-tree scrub, open timber (Pizzey and Knight 2012).	PMST	-	**Unlikely.** No records within the study area, and only a limited area of wetland habitat within the construction footprint.
Stagonopleura guttata	Diamond Firetail	-	L	nt	Open Eucalypt forests/woodlands; River Red Gum, Mallee, Buloke, Cypress Pine. (Pizzey and Knight 2012)	2010	36	**Present.** Species observed during field assessment in the area of investigation close to the construction footprint and suitable habitat present.
Tandanus tandanus	Freshwater Catfish	-	L	en	Swims close to sand or gravel bottoms in slow moving streams, lakes and ponds with fringing vegetation. More abundant in lakes than in flowing water. (Allen et al. 2002)	2012	1	**Present.** Presence in the permanent wetlands of Upper Gunbower Forest including Camerons Creek and Black Charlie Lagoon has been confirmed
Varanus varius	Lace Monitor	-	-	en	Coast, ranges, slopes and adjacent plains of eastern and south-eastern Australia. It feeds on insects, reptiles and small mammals, but is a major predator of nestling birds. Often forages on the ground, and in trees. Often lays eggs within the protection (Cogger 2014)	1998	12	**Present.** Species observed during field assessment in the area of investigation close to the construction footprint and suitable habitat present.

[1] Commonwealth *Environment Protection and Biodiversity Convservation Act1999* categories: CR = Critically Endangered, E= Endangered, VU = Vulnerable, M = Migratory; [2]*Flora and Fauna Guarantee Act 1988* categories: L = Listed, N = Nominated; [3] Conservation Status in Victoria DEWLP Advisory List; cr = critically endangered, en = endangered, vu = vulnerable, nt = near threatened

Appendix G. Likelihood of occurrence - threatened fauna – inundation area

Likelihood of occurrence:

Not all of the threatened species identified during this assessment are equally likely to occur in the project site, due to the geographic location or context of the site, or the habitat type and condition. For each species, the likelihood of occurrence was evaluated using the following rationale:

PRESENT – Species known to occur within the site, or detected during the site visit.

POSSIBLE – Potentially suitable habitat occurs within the inundation area and species' known range encompasses the the inundation area. Species recorded historically in the study area search, and generally within the last 30 years.

UNLIKELY – Species' known range encompasses the inundation area, but suitable habitat does not occur within the inundation area, or occurs within the inundation area but with generally low quality and quantity. Species recorded historically in the study area but generally not within the last 30 years.

HIGHLY UNLIKELY – No historical records of the species and/or no suitable habitat in the study area.

Inundation area likelihood of occurrence for potential threatened fauna species, based on VBA and PMST searches within a 10 km radius of the project area (the study area).

Scientific name	Common Name	EPBC	FFG	DELWP Advisory	Habitat	Most Recent Record	Number of Records	Likelihood of Occurrence
Anilios proximus	Woodland Blind Snake	-	-	nt	Typical habitat includes a good cover of leaf litter, old large trees and fallen logs. In Victoria they have been found in Black Box, Grey Box and Red Gum woodlands and also within areas of intact roadside and streamside vegetation (SWIFFT 2018)	1993	7	**Possible.** Records within study area and suitable Black Box/ Red Gum woodland habitat within the project area.
Antigone rubicunda	Brolga	-	L	vu	Freshwater swamps flooded grasslands, margins of billabongs, lagoons, dry floodplains, irrigated pastures; occasionally estuaries. (Pizzey and Knight 2012)	1999	2	**Possible.** Records within study area, and suitable wetland habitat present in the inundation area.
Ardea alba	Great Egret	-	L	vu	Shallows of rivers, estuaries, tidal mudflats, freshwater wetlands; sewage ponds, irrigation areas, larger dams etc. (Pizzey and Knight 2012)	2010	20	**Possible.** Records within study area, and suitable wetland habitat present in the inundation area.
Ardea intermedia plumifera	Plumed Egret	-	L	en	Freshwater wetlands, pastures and croplands, tidal mudflats, floodplains. (Pizzey and Knight 2012)	2017	4	**Possible.** Records within study area and suitable wetland habitat present in the inundation area.
Aythya australis	Hardhead	-	-	vu	Deep, permanent wetlands, large open waters, brackish coastal swamps, farm dams, ornamental lakes , sewage ponds. (Pizzey and Knight 2012)	2004	1	**Possible.** Records within study area, and suitable wetland habitat present in the inundation area.
Bidyanus bidyanus	Silver Perch	CR	L	vu	Rivers, lakes and reservoirs, preferring areas of rapid flow. Swims near surface. (Allen et al. 2002)	PMST	-	**Possible** May enter forest areas during inundation events, but seasonally inundated semi-permanent forest wetlands do not provide suitable long term habitat.
Botaurus poiciloptilus	Australasian Bittern	EN	L	en	Root-festooned banks of fresh or tidal creeks, rivers and streams in rainforest, lakes, swamps, estuaries, mangroves. (Pizzey and Knight 2012)	1993	1	**Possible.** Records within study area, and suitable wetland habitat present in the inundation area.
Calidris ferruginea	Curlew Sandpiper	CR	-	en	Tidal mudlfats; saltmarsh, saltfields; fresh, brackish or saline wetlands; sewage ponds. (Pizzey and Knight 2012)	PMST	-	**Highly Unlikely.** No records within study area, and no suitable tidal mudflats or

Scientific name	Common Name	EPBC	FFG	DELWP Advisory	Habitat	Most Recent Record	Number of Records	Likelihood of Occurrence
								saltmarsh environments in the inundation area.
Ceyx azureus	Azure Kingfisher	-	-	nt	Root-festooned banks of fresh or tidal creeks, rivers and streams in rainforest, lakes, swamps, estuaries, mangroves. (Pizzey and Knight 2012)	2017	23	**Possible.** Many records within study area and suitable swamp forest habitat available throughout inundation area.
Chelodina expansa	Broad-shelled Turtle	-	L	en	Found in Murray/Darling River systems in SA, Vic, NSW and Qld. Inhabits permanent streams and waterholes throughout its range, but essentially a river tortoise. Lies concealed in debris on the bottom or among root mats in silty rivers, streams and waterholes (Wilson and Swan 2008).	2012	4	**Possible.** Recent records within study area with habitat limited to the Murray River
Chlidonias hybrida	Whiskered Tern	-	-	nt	Vegetated and open wetlands; brackish, saline lakes; saltfields, irrigated lands, sewage ponds; occasionally offshore. (Pizzey and Knight 2012)	2008	3	**Possible.** Records within study area of project area, and suitable wetland habitat present in the inundation area.
Climacteris picumnus	Brown Treecreeper	-	-	nt	Drier forests/woodlands/scrubs, with fallen branches; particularly River Red Gum lined water courses. (Pizzey and Knight 2012)	2019	179	**Present.** Species observed during field assessment across the inundation area with suitable habitat widespread.
Craterocephalus fluviatilis	Murray Hardyhead	EN	L	cr	This species inhabits the margins of slow, lowland rivers, and lakes, billabongs and backwaters. It is found amongst aquatic plants and over gravel beds in both fresh and highly saline waters (Allen et al. 2002)	PMST	-	**Unlikely.** No suitable habitat within inundation area. Species known to occur in permanent saline lakes and wetlands which are not present in the project area.
Craterocephalus stercusmuscarum fulvus	Unspecked Hardyhead	-	L	-	Found around the margins of large, slow-flowing, lowland rivers, and in lakes, brackwaters and billabongs. It prefers slow-flowing or still habitats with aquatic vegetation and sand, gravel or mud substrates. (Allen et al. 2002)	2012	1	**Present.** Species recorded during recent surveys of Cameron's Creek and Black Charlie Lagoon (Sharp 2014, 2015) and during annual monitoring across Gunbower Forest between 2008-2017 (Bloink et al. 2018).

Scientific name	Common Name	EPBC	FFG	DELWP Advisory	Habitat	Most Recent Record	Number of Records	Likelihood of Occurrence
Crinia sloanei	Sloane's Froglet	EN	-	-	Periodically inundated areas of grassland, woodland and disturbed habitats across the Central-western plains of NSW from the Murray River and adjacent areas in Vic	1993	3	**Possible.** Records within study area and suitable wetland habitat present in inundation area.
Delma impar	Striped Legless Lizard	VU	L	en	Intact native grassland areas, usually in or around stony rise country or deeply cracked earth. (Cogger 2014)	PMST	-	**Highly Unlikely**. No records within study area and no suitable grassland habitat present in inundation area
Dromaius novaehollandiae	Emu	-	-	nt	Found in plains, scrublands, open woodlands, coastal heaths, alpine pastures, semi-deserts, margins of lakes, pastoral and cereal growing areas. Mostly absent from closely settled parts, common in pastoral and cropping regions, state forests and national parks (Pizzey and Knight 2012).	1999	3	**Present.** Species recorded during field assessment and suitable woodland habitat in the inundation area.
Egretta garzetta	Little Egret	-	L	en	Tidal mudflats, saltmarshes, mangroves, freshwater wetlands, sewage ponds. (Pizzey and Knight 2012)	1974	3	**Possible.** Records within study area, and suitable wetland habitat present in the inundation area.
Emydura macquarii	Murray River Turtle	-	-	vu	Restricted to larger rivers and associated large waterholes on the floodplains. (Cogger 2014)	2012	2	**Possible.** Recent records within study area with habitat limited to the Murray River
Euastacus armatus	**Murray Crayfish**		L		Species seems to be tolerant of a wide variety of habitats, including deep flowing water proximal to clay banks, wood or rock cover, as well as tributary streams and shallow riparian habitats (for smaller individuals) (Fisheries Scientific Committee 2013). The Murray River in vicinity of project area has been mapped as possible habitat by NSW Fisheries (NSW DPI (accessed 2020). It is possible that individuals are present in the Murray River within and adjacent to the Project Area.			**Possible.** Suitable floodplain/wetland habitat in inundation area may become present following natural flooding and the operating phase of the project.

Scientific name	Common Name	EPBC	FFG	DELWP Advisory	Habitat	Most Recent Record	Number of Records	Likelihood of Occurrence
Falco hypoleucos	Grey Falcon	-	L	en	Lightly treed inland plains, gibber deserts, sandridges, pastoral lands, timber watercourses; seldom in driest deserts. (Pizzey and Knight 2012)	1999	1	**Possible.** Recent record within study area, and suitable woodland habitat in the inundation area.
Falco subniger	Black Falcon	-	L	vu	Plains, grasslands, foothills, timbered watercourses, wetland environs; crops; occasionally over towns and cities. (Pizzey and Knight 2012)	2019	2	**Possible.** Recent records within study area, and suitable woodland habitat in the inundation area.
Galaxias rostratus	Flat-headed Galaxias	CR	-	vu	Shoals in mid-water. Usually below 150 m altitude in Murray system in still or gently flowing waters, lakes, billabongs and backwaters. Depth 1 m, substrate of coarse sand and mud, and debris. (Allen et al. 2002)	PMST	-	**Unlikely.** Species not recorded during recent surveys of Cameron's Creek and Black Charlie Lagoon (Sharp 2014, 2015) or during annual monitoring across Gunbower Forest between 2008-2017 (Bloink et al. 2018). No records within last 30 years.
Grantiella picta	Painted Honeyeater	VU	L	vu	Mistletoes in eucalypt forests/woodlands; black box on watercourses; box-ironbark-yellow gum woodlands; paperbarks, Casuarinas; mulga, other acacias; trees on farmland; gardens. (Pizzey and Knight 2012)	PMST	-	**Possible.** No records within study area, but suitable woodland habitat in inundation area.
Haliaeetus leucogaster	White-bellied Sea-Eagle	-	L	vu	Coasts, inlands, estuaries, inlets, large rivers, inland lakes, reservoirs. (Pizzey and Knight 2012)	2008	4	**Possible.** Records within study area, and suitable forest habitat along rivers in inundation area.
Hirundapus caudacutus	White-throated Needletail	VU	L	vu	Airspace over forests, woodlands, farmlands, plains, lakes, coasts, towns, feeding companies frequency patrol back and forward along favoured hilltops and timbered ranges. (Pizzey and Knight 2012)	1980	1	**Possible.** Record within study area, and suitable woodland habitat in the construction footprint.
Lathamus discolor	Swift Parrot	CR	L	en	Open grassy woodland, with dead trees, near permanent water and forested hills, coastal heaths, pastures with exotic grasses, weeds, roadsides, orchards. (Pizzey and Knight 2012)	PMST	-	**Unlikely**. No records within study area and no suitable foraging Box-Ironbark habitat in the inundation area.

Scientific name	Common Name	EPBC	FFG	DELWP Advisory	Habitat	Most Recent Record	Number of Records	Likelihood of Occurrence
Leipoa ocellata	Malleefowl	VU	L	en	Mallee, acacia, paperback, she oak, and other scrubs; eucalypt woodland; coastal heaths; mostly on sandy or gravel soils. (Pizzey and Knight 2012)	PMST	-	**Highly Unlikely.** No records within study area and no suitable mallee woodland habitat present in inundation area.
Litoria raniformis	Growling Grass Frog	VU	L	en	A largely aquatic species found among vegetation within or at the edges of permanent water – streams, swamps, lagoons, farm dams and ornamental ponds. Often found under debris on low, often flooded river flats. Frequently active by day. (Cogger 2014)	PMST	-	**Possible.** No records within study area but suitable wetland habitat in inundation area.
Lophoictinia isura	Square-tailed Kite	-	L	vu	Heathlands, woodlands, forests, rainforest, timbered water courses, hills and gorges. (Pizzey and Knight 2012)	2005	1	**Possible.** Recent record within study area, and suitable woodland habitat in the inundation area.
Maccullochella peelii	Murray Cod	VU	L	vu	Slow flowing turbid water of rivers and streams at low elevations. Also fast-moving clear, rocky upland streams. Favours deeper water around boulders, longs, undercut banks and overhanging vegetation. (Allen et al. 2002)	1970	1	**Possible.** May enter forest areas during inundation events, but seasonally inundated semi-permanent forest wetlands do not provide suitable long term habitat.
Maccullochella macquariensis	Trout Cod	EN	L	cr	Inhabits a variety of flowing waters in the mid to upper reaches of rivers and streams with cover in the form of woody debris or boulders (Allen et al. 2002)			**Possible.** May enter forest areas during inundation events, but seasonally inundated semi-permanent forest wetlands do not provide suitable long term habitat.
Macquaria ambigua	Golden Perch	-		nt	Occurs in a variety of riverine habitats but prefers warm, slow moving turbid sections of streams. (Allen et al. 2002)	2012	1	**Possible.** May enter forest areas during inundation events, but seasonally inundated semi-permanent forest wetlands do not provide suitable long term habitat.
Macquaria australasica	Macquarie Perch	EN	L	en	Cool, clear water of rivers, lakes and reservoirs. Prefers slow-flowing, deep rocky pools. (Allen et al. 2002)	PMST	-	**Highly Unlikely.** The species is a main-channel specialist with suitable habitat limited to the Upper tributaries of the Murray River. Has not been recorded from the Murray River since 1970. Current records are from the upper Goulburn and Mitta Mitta

Scientific name	Common Name	EPBC	FFG	DELWP Advisory	Habitat	Most Recent Record	Number of Records	Likelihood of Occurrence
								catchments in Victoria and the Murrumbidgee catchment in NSW.
Melanotaenia fluviatilis	Murray-Darling Rainbowfish		L	vu	Preferred habitat is margins of slow flowing rivers, backwaters and wetlands. Has been recorded from Camerons Creek and Black Charlie Lagoon (Sharpe, 2014;2015). Has also been recorded in low abundance in Gunbower Creek in the past 10 years (Mallen-Cooper et al., 2014).	Last 10 years		**Present.** Presence in the permanent wetlands of Upper Gunbower Forest including Camerons Creek and Black Charlie Lagoon has been confirmed
Melanodryas cucullata	Hooded Robin	-	L	nt	Drier Eucalypt forests, woodlands, scrubs with fallen logs, debris, mallee, Casuarina, cypress pine, mulga, cleared paddocks, Banksia dominated coastal scrubs. (Pizzey and Knight 2012)	2017	10	**Possible.** Recent records within study area, and suitable woodland habitat in the inundation area
Morelia spilota	Carpet Python		L	en	Found under an enormous variety of conditions, from rainforest on the east and northeast coasts to a variety of semi-arid coastal and inland habitats. Often arboreal, but in many areas lives in burrows made by other animals (Cogger 2014)	NA	NA	**Possible.** No records within study area but Suitable habitat present within inundation area.
Nannoperca australis (Murray-Darling lineage)	Southern Pygmy Perch (Murray-Darling lineage)	-	-	vu	Slow-moving or still waters, such as pools in rivers and streams or in lakes. They prefer sites which have abundant submerged and emergent aquatic vegetation, sometimes with wood debris (Allen et al. 2002)	1997	3	**Possible**. Record within study area and suitable wetland habitat in inundation area.
Ninox connivens	Barking Owl	-	L	en	Open forests, woodlands, dense scrubs, foothills, river red gums, other large trees near water courses, penetrating otherwise open country, and paperbark woodlands. (Pizzey and Knight 2012)	2008	3	**Possible**. Recent record within study area, and suitable woodland habitat in the inundation area.
Numenius madagascariensis	Eastern Curlew	CR	-	-	Estuaries, tidal mudflats, sandspits, saltmarshes, mangroves; occasionally fresh or brackish lakes; bare grasslands near water. (Pizzey and Knight 2012)	PMST	-	**Highly Unlikely**. No records within study area, and no suitable tidal mudflats or

Scientific name	Common Name	EPBC	FFG	DELWP Advisory	Habitat	Most Recent Record	Number of Records	Likelihood of Occurrence
								saltmarsh environments in the inundation area.
Nycticorax caledonicus	Nankeen Night-Heron	-	-	nt	Shallow margins of rivers, wetlands, mangrove-lined estuaries, offshore islands, floodwaters, garden trees. (Pizzey and Knight 2012)	2003	7	**Possible.** Records within study area, and suitable wetland habitat present in the inundation area.
Nyctophilus corbeni	South-eastern Long-eared Bat	VU	L	en	Inhabits a wide range of inland woodland vegetation types. These include box/ironbark/cypress pine woodlands, Buloke woodlands, river red gum woodlands. This species is more abundant in extensive stands of vegetation in comparison to smaller woodland patches. (Van Dyck and Strahan 2008)	PMST	-	**Possible**. No records within study area, but suitable Box and Red Gum woodland in the inundation area.
Pedionomus torquatus	Plains-wanderer	CR	L	cr	Sparse, treeless, lightly grazed native grasslands/herbfields with bare ground, old cereal crops, short Lucerne, sparse saltbush, low shrubland. (Pizzey and Knight 2012)	PMST	-	**Highly Unlikely**. No records within study area, and no suitable grassland habitat in the inundation area.
Peltohyas australis	Inland Dotterel	-	-	vu	Stony, sparsely vegetated plains and uplands, gibber, pasture, crops occasionally ploughed land. (Pizzey and Knight 2012)	2007	1	**Unlikely.** Record within study area but no suitable plains or pasture land within the inundation area.
Petaurus norfolcensis	Squirrel Glider	-	L	en	Dry eucalypt forests containing large old trees with hollows with Acacia understorey. (Van Dyck and Strahan 2008)	1996	2	**Possible**. Records within study area and suitable Red Gum forest habitat in the inundation area.
Pezoporus occidentalis	Night Parrot	EN	-	ex	Seeding spinifex on stony rises, breakaway country, sandy lowlands; shrubby glasswort, chenopods, succulents on flats around salt lakes; flooded claypans, saltbush, bluebush, bassia associations. (Pizzey and Knight 2012)	PMST	-	**Highly Unlikely**. No records within study area, and no suitable arid/salt lake habitat in the inundation area.
Phalacrocorax varius	Pied Cormorant	-	-	nt	Coastal waters with sloping shorelines; estuaries, bays, tidal inlets, large inland lakes and rivers,	2008	5	**Possible.** Records within study area, and suitable wetland habitat present in the inundation area.

Scientific name	Common Name	EPBC	FFG	DELWP Advisory	Habitat	Most Recent Record	Number of Records	Likelihood of Occurrence
					irrigation ponds, coastal mangroves and offshore islands. (Pizzey and Knight 2012)			
Platalea regia	Royal Spoonbill	-	-	nt	Larger shallow waters, inland and coastal, well-vegetated shallow freshwater wetlands, saltfields, mangroves, islands, farm dams occasionally. (Pizzey and Knight 2012)	2019	5	**Possible.** Records within study area, and suitable wetland habitat present in the inundation area.
Plegadis falcinellus	Glossy Ibis	Mi	-	nt	Well vegetated wetlands, wet pastures, rice fields, floodwaters, floodplains, brackish or occasionally saline wetlands, mangroves, mudflats; occasionally dry grasslands. (Pizzey and Knight 2012)	1992	1	**Possible.** Records within study area, and suitable wetland habitat present in the inundation area.
Pogona barbata	Bearded Dragon	-	-	vu	Semi-arboreal, being seen during the day perched on fallen timber, stumps, fence posts or roadside verges where they forage for insects.	1992	4	**Possible.** Records within study area and suitable woodland habitat within the inundation area.
Polytelis swainsonii	Superb Parrot	VU	L	en	River red gums, black box, yellow box, river oak, mostly near rivers; mallee, stubbles, pastures, gardens. (Pizzey and Knight 2012)	1996	1	**Possible.** Record within study area and suitable Red Gum habitat within the inundation area.
Pomatostomus temporalis	Grey-crowned Babbler	-	L	en	Live in open forest and woodland, acacia shrubland and adjoining farmland. (Pizzey and Knight 2012)	2007	4	**Present**. Species observed during field assessment in the inundation area and suitable habitat widespread.
Rostratula australis	Australian Painted Snipe	EN	L	cr	Well-vegetated shallows and margins of wetlands, dams, sewage ponds; wet pastures, marshy areas, irrigation systems, lignum, tea-tree scrub, open timber (Pizzey and Knight 2012).	PMST	-	**Possible.** Records within study area, and suitable wetland habitat present in the inundation area.
Stagonopleura guttata	Diamond Firetail	-	L	nt	Open Eucalypt forests/woodlands; River Red Gum, Mallee, Buloke, Cypress Pine. (Pizzey and Knight 2012)	2010	36	**Present.** Species observed during field assessment in the inundation area and suitable habitat present.
Tandanus tandanus	Freshwater Catfish	-	L	en	Swims close to sand or gravel bottoms in slow moving streams, lakes and ponds with fringing vegetation. More abundant in lakes than in flowing water. (Allen et al. 2002)	2012	1	**Present.** Presence in the permanent wetlands of Upper Gunbower Forest including Camerons Creek and Black Charlie Lagoon has been confirmed

Scientific name	Common Name	EPBC	FFG	DELWP Advisory	Habitat	Most Recent Record	Number of Records	Likelihood of Occurrence
Varanus varius	Lace Monitor	-	-	en	Coast, ranges, slopes and adjacent plains of eastern and south-eastern Australia. It feeds on insects, reptiles and small mammals, but is a major predator of nestling birds. Often forages on the ground, and in trees. Often lays eggs within the protection (Cogger 2014)	1998	12	**Present.** Species observed during field assessment in the inundation area and suitable habitat present.

[1] Commonwealth *Environment Protection and Biodiversity Convservation Act1999* categories: CR = Critically Endangered, E= Endangered, VU = Vulnerable, M = Migratory; [2]*Flora and Fauna Guarantee Act 1988* categories: L = Listed, N = Nominated; [3] Conservation Status in Victoria DEWLP Advisory List; cr = critically endangered, en = endangered, vu = vulnerable, nt = near threatened

Appendix H. Habitat Hectare (VQA) Assessment Results – Proposed native vegetation impacts – construction footprint

Habitat Zone			GB0012a	GB0012b	GB0012g	GB0012h	GB0012i	GB0012j	GB0012k	GB0012l	GB0015e	GB0017a	GB0017c	GB0017f	GB0017g	GB0017h
Bioregion			**MuF**	**MuF**	**MuF**	**MuF**	**MuF**	**MuF**	**MuF**	**MuF**	**MuF**	**MuF**	**MuF**	**MuF**	**MuF**	**MuF**
EVC #: Name			**103**	**103**	**103**	**103**	**103**	**103**	**103**	**103**	**821**	**803**	**803**	**803**	**803**	**803**
EVC Conservation Status		**Max Score**	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**E**
Site Condition	Large Old Trees	10	6	10	10	10	10	10	10	10	-	8	10	10	10	5
	Canopy Cover	5	5	5	5	5	5	5	5	5	-	5	5	5	5	5
	Understorey	25	20	20	15	20	20	20	20	15	10	15	15	15	15	15
	Lack of Weeds	15	9	9	9	15	9	9	9	9	6	6	6	6	6	6
	Recruitment	10	10	10	10	10	10	10	10	10	3	10	10	10	10	10
	Organic Litter	5	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Logs	5	5	5	5	3	3	3	3	3	-	0	0	0	0	0
	Standardiser	n/a									1.36					
	Total	75	58	62	57	66	60	60	60	55	29.92	47	49	49	49	44
Landscape Context	Patch size	10	8	8	8	8	8	8	8	8	8	8	8	8	8	8
	Neighbourhood	10	6	6	6	7	7	7	7	7	6	7	7	7	7	7
	Distance to Core	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Total	25	18	18	18	19	19	19	19	19	18	19	19	19	19	19
Habitat Score		**100**	**76**	**80**	**75**	**85**	**79**	**79**	**79**	**74**	**47.92**	**66**	**68**	**68**	**68**	**63**
Habitat points = #/100		1	0.76	0.80	0.75	0.85	0.79	0.79	0.79	0.74	0.48	0.66	0.68	0.68	0.68	0.63

Habitat Zone			GB0017i	GB0017l	GB0017m	GB0017n	GB0017o	GB0017p	GB0017u	GB0018a	GB0019c	GB0019d	GB0019e	GB0022
Bioregion			**MuF**	**MuF**	**MuF**	**MuF**	**MuF**	**MuF**	**MuF**	**MuF**	**MuF**	**MuF**	**MuF**	**MuF**
EVC #: Name			**803**	**803**	**803**	**803**	**803**	**803**	**803**	**816**	**816**	**816**	**816**	**56**
EVC Conservation Status		**Max Score**	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**D**	**D**	**D**	**D**	**D**
Site Condition	Large Old Trees	10	0	10	6	10	10	6	10	6	0	0	10	10
	Canopy Cover	5	5	5	5	5	5	5	5	5	3	3	5	5
	Understorey	25	15	25	15	15	15	20	20	25	20	20	20	15
	Lack of Weeds	15	6	6	6	6	6	6	6	6	4	4	4	7
	Recruitment	10	10	10	10	10	10	10	10	10	10	10	10	10
	Organic Litter	5	3	3	3	3	3	3	3	3	3	3	3	3
	Logs	5	0	0	0	0	0	0	0	3	0	0	0	0
	Standardiser	n/a												
	Total	75	39	59	45	49	49	50	54	58	40	40	52	50
Landscape Context	Patch size	10	8	8	8	8	8	8	8	8	8	8	8	8
	Neighbourhood	10	7	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	4
	Total	25	19	19	19	19	19	19	19	18	18	18	18	18
Habitat Score		**100**	**58**	**78**	**64**	**68**	**68**	**69**	**73**	**76**	**58**	**58**	**70**	**68**
Habitat points = #/100		1	0.58	0.78	0.64	0.68	0.68	0.69	0.73	0.76	0.58	0.58	0.70	0.68

Appendix I. Flora species recorded during surveys (2019)

Summary of the flora species recorded during surveys by R8 ecologists between October – December 2019.

Key:

VU – EPBC Act listed Vulnerable

L – FFG Act listed threatened

P – FFG Act listed protected

en – DELWP Advisory listed endnagered

vu – DELWP Advisory listed vulnerable

r – DELWP Advisory listed rare

k – poorly known

Status	Scientific Name	Species Name	Biosis 2014	GHD 2017	R8 2019
	Acacia acinacea s.s.	Gold-dust Wattle	Yes	Yes	Yes
P	Acacia brachybotrya	Grey Mulga	Yes		
P	Acacia dealbata	Silver Wattle	Yes	Yes	Yes
vu, L, P	Acacia oswaldii	Umbrella Wattle			Yes
	Acetosella vulgaris	Sheep Sorrel			Yes
	Alisma plantago-aquatica	Water Plantain	Yes		
	Alisma lanceolatum	Water Plantain			Yes
en, L	Allocasuarina luehmannii	Buloke			Yes
	Alternanthera denticulata s.s.	Lesser Joyweed	Yes	Yes	Yes
VU	Amphibromus fluitans	River Swamp Wallaby-grass			Yes
	Amphibromus nervosus	Common Swamp Wallaby-grass	Yes		Yes
	Amyema miquelii	Box Mistletoe	Yes		
	Anthosachne scabra s.l.	Common Wheat-grass	Yes		Yes
	Aphanes australiana	Australian Piert	Yes		
	Asperula conferta	Common Woodruff			Yes
	Atriplex leptocarpa	Slender-fruit Saltbush	Yes		Yes
	Atriplex nummularia subsp. nummularia	Old-man Saltbush	Yes		
	Atriplex semibaccata	Berry Saltbush	Yes	Yes	Yes
	Austrostipa elegantissima	Feather Spear-grass			Yes
	Austrostipa nodosa	Knotty Spear-grass	Yes	Yes	
	Austrostipa scabra	Rough Spear-grass			Yes
P	Azolla pinnata	Ferny Azolla	Yes		Yes

Status	Scientific Name	Species Name	Biosis 2014	GHD 2017	R8 2019
P	Brachyscome paludicola	Woodland Swamp-daisy	Yes	Yes	Yes
	Calandrinia calyptrata	Pink Purslane	Yes		
	Callitriche sonderi	Matted Water-starwort	Yes		
P	Calocephalus sonderi	Pale Beauty-heads			Yes
r, P	Calotis cuneifolia	Blue Burr-daisy	Yes		
r	Cardamine moirensis	Riverina Bitter-cress	Yes		
	Carex bichenoviana	Plains Sedge			Yes
	Carex inversa	Knob Sedge	Yes	Yes	Yes
	Carex tereticaulis	Poong'ort	Yes	Yes	Yes
	Carex sp.	Sedge		Yes	
P	Cassinia sifton	Drooping Cassinia	Yes		Yes
P	Centipeda cunninghamii	Common Sneezeweed	Yes	Yes	Yes
P	Centipeda minima s.l.	Spreading Sneezeweed	Yes	Yes	
r	Chenopodium desertorum subsp. desertorum	Frosted Goosefoot	Yes		
	Chenopodium desertorum subsp. microphyllum	Small-leaf Goosefoot	Yes		Yes
	Chenopodium pumilio	Clammy Goosefoot		Yes	
P	Cotula australis	Common Cotula	Yes		
	Crassula helmsii	Swamp Crassula	Yes		
	Crassula peduncularis	Purple Crassula	Yes		
	Crassula sieberiana s.l.	Sieber Crassula	Yes	Yes	
P	Cymbonotus preissianus	Austral Bear's-ear	Yes		
	Daucus glochidiatus	Australian Carrot	Yes		
	Dianella admixta	Black-anther Flax-lily	Yes	Yes	
v	Dianella porracea, previously Dianella sp. aff. longifolia (Riverina)	Pale Flax-lily	Yes		Yes
	haloragis heterophylla	Wedge-leaf Hop-bush			Yes
	Duma florulenta	Tangled Lignum	Yes	Yes	Yes
	Dysphania pumilio	Clammy Goosefoot	Yes		
P	Eclipta platyglossa	Yellow Twin-heads	Yes		
	Einadia hastata	Saloop	Yes		Yes
	Einadia nutans	Nodding Saltbush	Yes	Yes	Yes
	Eleocharis acuta	Common Spike-sedge	Yes	Yes	Yes
	Enchylaena tomentosa var. tomentosa	Ruby Saltbush	Yes	Yes	Yes
	Enteropogon acicularis	Spider Grass	Yes	Yes	Yes
	Epilobium billardierianum subsp. billardierianum	Smooth Willow-herb	Yes	Yes	
	Epilobium hirtigerum	Hairy Willow-herb	Yes		
	Eremophila glabra subsp. glabra	Common Emu-bush			Yes
	Erodium crinitum	Blue Heron's-bill	Yes		

Status	Scientific Name	Species Name	Biosis 2014	GHD 2017	R8 2019
vu	Eryngium paludosum	Long Eryngium			Yes
	Eucalyptus camaldulensis	River Red-gum	Yes	Yes	Yes
	Eucalyptus largiflorens	Black Box	Yes	Yes	Yes
	Eucalyptus melliodora	Yellow Box			Yes
	Eucalyptus microcarpa	Grey Box	Yes	Yes	Yes
P	Euchiton involucratus s.s.	Common Cudweed	Yes		
P	Euchiton sphaericus	Annual Cudweed	Yes	Yes	Yes
	Euphorbia drummondii	Flat Spurge	Yes	Yes	Yes
	Exocarpos strictus	Pale-fruit Ballart	Yes	Yes	Yes
	Geococcus pusillus	Earth Cress	Yes		
	Geranium spp.	Crane's Bill	Yes		
	Glinus lotoides	Hairy Carpet-weed	Yes		
P	Gnaphalium spp.	Cudweed	Yes		
	Goodenia fascicularis	Silky Goodenia			Yes
	Goodenia gracilis	Slender Goodenia			Yes
	Goodenia pinnatifida	Cut-leaf Goodenia			Yes
r	Gratiola pumilo	Dwarf Brooklime	Yes		
	Haloragis aspera	Rough Raspwort			Yes
	Haloragis heterophylla	Varied Raspwort	Yes		
	Isolepis spp.	Club Sedge	Yes		
	Juncus amabilis	Hollow Rush	Yes		
	Juncus aridicola	Tussock Rush			Yes
	Juncus flavidus	Gold Rush	Yes		Yes
	Juncus holoschoenus	Joint-leaf Rush			Yes
	Juncus ingens	Giant Rush	Yes		
	Juncus sp.	Rush		Yes	
	Juncus subsecundus	Finger Rush	Yes		
	Juncus usitatus	Billabong Rush	Yes		
	Lachnagrostis filiformis s.s.	Common Blown-grass	Yes	Yes	Yes
P	Laphangium luteoalbum	Jersey Cudweed	Yes	Yes	
	Lemna disperma	Common Duckweed	Yes	Yes	Yes
	Lepidium pseudohyssopifolium	Native Peppercress	Yes		Yes
	Lobelia concolor	Poison Pratia	Yes		Yes
	Ludwigia peploides subsp. montevidensis	Clove-strip	Yes		Yes
	Lythrum hyssopifolia	Small Loosestrife	Yes		Yes
	Lythrum hyssopifolia	Short-leaf Bluebush	Yes	Yes	Yes
	Maireana decalvans	Black Cotton-bush	Yes		Yes
	Maireana enchylaenoides	Wingless Bluebush	Yes	Yes	Yes
P	Marsilea costulifera	Narrow-leaf Nardoo	Yes		

Status	Scientific Name	Species Name	Biosis 2014	GHD 2017	R8 2019
P	Marsilea drummondii	Common Nardoo	Yes	Yes	Yes
	Myriophyllum crispatum	Upright Water-milfoil	Yes		Yes
	Myriophyllum papillosum	Robust Water-milfoil			Yes
	Ottelia ovalifolia subsp. ovalifolia	Swamp Lily			Yes
	Oxalis perennans	Grassland Wood-sorrel	Yes		Yes
	Parietaria debilis s.s.	Shade Pellitory	Yes		
	Paspalidium jubiflorum	Warrego Summer-grass	Yes	Yes	
	Persicaria decipiens	Slender Knotweed	Yes		Yes
	Persicaria prostrata	Creeping Knotweed	Yes	Yes	
	Pittosporum angustifolium	Weeping Pittosporum	Yes	Yes	Yes
	Plantago varia	Variable Plantain	Yes	Yes	
	Poa labillardierei var. labillardierei	Common Tussock-grass	Yes		
	Portulaca oleracea	Common Purslane			Yes
	Potamogeton tricarinatus s.l	Floating Pondweed			Yes
	Pratia concolor	Poison Concolor		Yes	Yes
	Ptilotus spathulatus	Pussy Tails	Yes		
	Ranunculus pumilio Ferny	Small-flower Buttercup	Yes		
	Ranunculus sessiliflorus var. sessiliflorus	Annual Buttercup	Yes		
	Rhagodia spinescens	Hedge Saltbush	Yes		Yes
P	Rhodanthe corymbiflora	Paper Sunray			Yes
	Rumex bidens	Mud Dock	Yes		
	Rumex brownii	Slender Dock	Yes		
	Rumex tenax	Narrow-leaf Dock			Yes
	Rytidosperma caespitosum	Common Wallaby-grass	Yes		Yes
	Rytidosperma duttonianum	Brown-back Wallaby-grass		Yes	Yes
	Rytidosperma fulvum	Copper-awned Wallaby-grass	Yes		
	Rytidosperma setaceum var. setaceum	Bristly Wallaby-grass	Yes	Yes	Yes
	Salsola tragus subsp. tragus	Prickly Saltwort	Yes	Yes	
	Sclerolaena diacantha	Grey Copperburr	Yes	Yes	Yes
	Sclerolaena muricata	Black Roly-poly			Yes
	Sclerolaena muricata var. semiglabra	Dark Roly-poly	Yes		
	Sclerolaena muricata var. villosa	Grey Roly-poly		Yes	
r, P	Senecio campylocarpus	Floodplain Fireweed	Yes		
P	Senecio quadridentatus	Cotton Fireweed	Yes	Yes	Yes
P	Senecio runcinifolius	Tall Fireweed	Yes		Yes
	Senecio sp.	Groundsel		Yes	
	Sida corrugata	Variable Sida	Yes	Yes	Yes
P	Solenogyne dominii	Smooth Solenogyne	Yes		
	Spergularia marina s.s.	Lesser Sea-spurrey	Yes	Yes	

Status	Scientific Name	Species Name	Biosis 2014	GHD 2017	R8 2019
	Stellaria angustifolia	Swamp Starwort	Yes		
P	Stuartina muelleri	Spoon Cudweed	Yes		
	Teucrium racemosum s.l.	Grey Germander	Yes	Yes	Yes
	Triglochin spp.	Water Ribbons	Yes		Yes
	Typha domingensis	Narrow-leaf Cumbungi	Yes		
	Typha orientalis	Broad-leaf Cumbungi	Yes	Yes	Yes
P	Vittadinia cervicularis	Annual New Holland Daisy	Yes		
P	Vittadinia cervicularis var. cervicularis	Annual New Holland Daisy	Yes		
r, P	Vittadinia condyloides	Club-hair New Holland Daisy	Yes		
P	Vittadinia cuneata subsp. cuneata	Fuzzy New Holland Daisy		Yes	Yes
P	Vittadinia gracilis	Woolly New Holland Daisy		Yes	Yes
	Wahlenbergia fluminalis	River Bluebell	Yes		Yes
P	Xerochrysum bracteatum	Golden Everlasting		Yes	Yes

Appendix J. Fauna species recorded during R8 surveys (2019)

Summary of the fauna species recorded during surveys between October 22 – November 1, 2019.

Key:

L – Listed as threatened

en – endangered

nt – near threatened

* – Introduced

^ – Species which make up the FFG-listed Victorian Temperate Woodland Bird Community

Species name (Scientific name)	EPBC	FFG	DELWP Advisory List	Other
Australian Magpie (*Cracticus tibicen*)				
Australian Pelican (*Pelecanus conspicillatus*)				
Australian Raven (*Corvus coronoides*)				
Australian Reed-warbler (*Acrocephalus australis*)				
Australian White Ibis (*Threskiornis molucca*)				
Australian Wood Duck (*Chenonetta jubata*)				
Black Kite (*Milvus migrans*)				
Black Swan (*Cygnus atratus*)				
Brown Falcon (*Falco berigora*)				
Brown Treecreeper (*Climacteris picumnus*)			nt	^
Brown-headed Honeyeater (*Melithreptus brevirostris*)				^
Common Bronzewing (*Phaps chalcoptera*)				
Common Brushtail Possum (*Trichosurus vulpecula*)				
Crested Pigeon (*Ocyphaps lophotes*)				
Crimson Rosella (*Platycercus elegans*)				
Diamond Firetail (*Stagonopleura guttata*)		L	nt	^
Eastern Grey Kangaroo (*Macropus giganteus*)				
Eastern Rosella (*Platycercus eximius*)				
Emu (*Dromaius novaehollandiae*)				
Eurasian Coot (*Fulica atra*)				
Fairy Martin (*Petrochelidon ariel*)				
Galah (*Eolophus roseicapilla*)				
Grey Fantail (*Rhipidura albiscapa*)				

Species name (Scientific name)	EPBC	FFG	DELWP Advisory List	Other
Grey Shrike-thrush (*Colluricincla harmonica*)				
Grey-crowned Babbler (*Pomatostomus temporalis*)		L	en	^
Lace Monitor (*Varanus varius*)			en	
Laughing Kookaburra (*Dacelo novaeguineae*)				
Little Black Cormorant (*Phalacrocorax sulcirostris*)				
Little Pied Cormorant (*Microcarbo melanoleucos*)				
Little Raven (*Corvus mellori*)				
Long-billed Corella (*Cacatua tenuirostris*)				
Magpie-lark (*Grallina cyanoleuca*)				
Microbat spp. (species not able to be determined)				
Noisy Friarbird (*Philemon corniculatus*)				
Noisy Miner (*Manorina melanocephala*)				
Pacific Black Duck (*Anas superciliosa*)				
Peaceful Dove (*Geopelia striata*)				
Pied Butcherbird (*Cracticus nigrogularis*)				
Purple Swamphen (*Porphyrio porphyrio*)				
Red-bellied Black Snake (*Pseudechis porphyriacus*)				
Red-capped Robin (*Petroica goodenovii*)				^
Rufous Whistler (*Pachycephala rufiventris*)				
Sacred Kingfisher (*Todiramphus sanctus*)				
Straw-necked Ibis (*Threskiornis spinicollis*)				
Sugar Glider (*Petaurus breviceps*)				
Sulphur-crested Cockatoo (*Cacatua galerita*)				
Superb Fairy-wren (*Malurus cyaneus*)				
Tree Skink (*Egernia striolata*)				
Welcome Swallow (*Hirundo neoxena*)				
Western Gerygone (*Gerygone fusca*)				^
Whistling Kite (*Haliastur sphenurus*)				
White-faced Heron (*Egretta novaehollandiae*)				
White-plumed Honeyeater (*Ptilotula penicillatus*)				
White-throated Treecreeper (*Cormobates leucophaeus*)				
White-winged Chough (*Corcorax melanorhamphos*)				
White-winged Triller (*Lalage sueurii*)				
Willie Wagtail (*Rhipidura leucophrys*)				

Species name (Scientific name)	EPBC	FFG	DELWP Advisory List	Other
Yellow Thornbill (*Acanthiza nana*)				
Yellow-footed Antichinus (*Antechinus flavipes*)				

Appendix K. Weed species recorded in the project area

	Species Name	Common Name	VBA	Biosis 2014	GHD 2017	R8 2019
CLASS MAGNOLIOPSIDA						
(Flowering Plants)						
Suborder Lilianae						
(Monocotyledons)						
ASPHODELACEAE						
	Asphodelus fistulosus	Onion Weed	X			
ASPARAGACEAE						
	Asparagus asparagoides	Bridal Creeper	X	X	X	X
	Asparagus officinalis	Asparagus	X			
CYPERACEAE						
	Cyperus eragrostis	Drain Flat-sedge	X	X	X	X
IRIDACEAE						
	Romulea rosea	Onion Grass	X	X		X
JUNCACEAE						
	Juncus acutus subsp. acutus	Spiny Rush	X			
	Juncus articulatus subsp. articulatus	Jointed Rush	X			
POACEAE						
	Agrostis capillaris	Brown-top Bent	X			
	Agrostis gigantea	Red-top Bent	X			
	Aira caryophyllea subsp. caryophyllea	Silvery Hair-grass	X			
	Anthosachne scabra s.l.	Common Wheat-grass	X			
	Alopecurus aequalis	Orange Fox-tail	X			
	Avena barbata	Bearded Oat	X			
	Avena fatua	Wild Oat	X			
	Avena sativa	Oat	X			
	Avena spp.	Oat	X		X	X
	Avena sterilis	Sterile Oat	X			
	Avena sterilis subsp. sterilis	Sterile Oat	X			
	Axonopus fissifolius	Carpet Grass	X			
	Briza maxima	Quaking Grass	X			
	Briza minor	Lesser Quaking Grass	X			
	Bromus alopecuros	Mediterranean Brome	X			
	Bromus catharticus	Prairie Grass	X			
	Bromus diandrus	Great Brome	X	X	X	X
	Bromus hordeaceus	Soft Brome	X		X	X
	Bromus madritensis	Madrid Brome	X		X	X
	Bromus rubens	Red Brome	X		X	X

	Bromus sterilis	Sterile Brome	X			
	Cenchrus clandestinus	Kikuyu	X	X	X	X
	Cynodon dactylon	Couch	X	X		X
	Cynodon dactylon	Couch	X			
	Cynosurus echinatus	Rough Dog's-tail	X			
	Dactylis glomerata	Cocksfoot	X			
	Dichelachne crinita	Long-hair Plume-grass	X			
	Distichlis distichophylla	Australian Salt-grass	X			
	Echinochloa colona	Awnless Barnyard-grass	X			
	Echinochloa crus-galli	Barnyard Grass	X			
	Echinochloa crus-pavonis	South American Barnyard-grass	X			
	Ehrharta erecta	Panic Veldtgrass	X	X	X	X
	Ehrharta longiflora	Annual Veldt-grass	X	X	X	X
	Eragrostis cilianensis	Stink Grass	X			
	Festuca arundinacea	Tall Fescue	X			
	Glyceria declinata	Manna Grass	X			
	Glyceria maxima	Reed Sweet-grass	X	X		
	Hordeum glaucum	Northern Barley-grass	X			
	Hordeum hystrix		X			
	Hordeum leporinum	Barley-grass	X			
	Hordeum marinum		X			
	Hordeum murinum s.l.	Barley-grass	X			
	Hordeum spp.	Barley Grass	X		X	X
	Hordeum marinum	Sea Barley-grass	X	X		
	Hordeum vulgare	Barley	X		X	X
	Lachnagrostis filiformis s.l.	Common Blown-grass	X			
	Lagurus ovatus	Hare's-tail Grass	X			
	Lolium rigidum	Wimmera Rye-grass	X	X	X	X
	Lophopyrum ponticum	Tall Wheat-grass	X			
	Nassella neesiana	Chilean Needle-grass	X			
	Nassella trichotoma	Serrated Tussock	X			
	Parapholis incurva	Coast Barb-grass	X			
	Paspalum dilatatum	Paspalum	X	X		X
	Paspalum distichum	Water Couch	X	X		X
	Phalaris aquatica	Canary Grass	X			
	Phalaris minor	Lesser Canary-grass	X			
	Phalaris paradoxa	Paradoxical Canary-grass	X			
	Phragmites australis	Native Reed	X			
	Poa annua	Winter Grass	X	X		
	Polypogon littoralis	Perennial Beard-grass	X			
	Polypogon monspeliensis	Annual Beard-grass	X	X		

	Sorghum halepense	Johnson Grass	X			
	Vicia hirsuta	Tiny Vetch	X			
	Vicia sativa	Common Vetch	X			
	Vicia sativa subsp. sativa	Common Vetch	X			
	Vicia spp.	Vetch	X		X	X
	Vulpia bromoides	Squirrel-tail Fescue	X			
	Vulpia muralis	Wall Fescue	X			
	Vulpia myuros	Rat's-tail Fescue	X			
	Vulpia myuros f. myuros	Rat's-tail Fescue	X			
	Vulpia spp.	Fescue	X			X
CLASS MAGNOLIOPSIDA						
(Flowering Plants)						
Subclass Magnoliidae						
(Dicotyledons)						
AIZOACEAE						
	Mesembryanthemum crystallinum s.l.	Common Ice-plant	X	X	X	X
	Mesembryanthemum nodiflorum	Small Ice-plant	X			
AMARANTHACEAE						
	Amaranthus albus	Stiff Tumbleweed	X			
	Amaranthus hybridus	Spleen Amaranth	X			
	Amaranthus muricatus	Rough-fruit Amaranth	X			
	Amaranthus viridis	Green Amaranth	X			
ANACARDIACEAE						
	Schinus molle	Pepper Tree	X	X		
APIACEAE						
	Foeniculum vulgare	Fennel	X			
	Galenia pubescens var. pubescens	Galenia	X	X		X
	Galenia secunda					
APOCYNACEAE						
	Vinca major	Blue Periwinkle	X			
ASTERACEAE						
	Arctotheca calendula	Capeweed	X	X		X
	Aster subulatus	Aster-weed	X	X	X	X
	Carduus spp.	A Slender Thistle	X			
	Carduus pycnocephalus	Slender Thistle	X			
	Carduus tenuiflorus	Winged Slender-thistle	X			

	Carthamus lanatus	Saffron Thistle	X			
	Centaurea calcitrapa	Star Thistle	X			
	Centaurea melitensis	Malta Thistle	X	X		
	Centaurium tenuiflorum	Slender Centaury	X			
	Cichorium intybus	Chicory	X	X		
	Cirsium vulgare	Spear Thistle	X	X	X	X
	Chondrilla juncea	Skeleton Weed	X			
	Chrysocephalum apiculatum	Common Everlasting	X			
	Conyza bonariensis	Flaxleaf Fleabane	X	X	X	X
	Conyza sp.	Fleabane	X			
	Cotula bipinnata	Ferny Cotula	X	X		X
	Cotula coronopifolia	Water Buttons	X			
	Craspedia paludicola		X			
	Dittrichia graveolens	Stinkwort	X			
	Erigeron spp.	Fleabane	X			
	Erigeron sumatrensis	Tall Fleabane	X			
	Gamochaeta calviceps	Silky Cudweed	X			
	Gamochaeta purpurea s.l.	Purple Cudweed	X			
	Gazania linearis	Gazania	X	X		
	Glyceria declinata	Manna Grass	X			
	Glyceria maxima	Reed Sweet-grass	X			
	Helminthotheca echioides	Ox-tongue	X	X	X	X
	Hypochaeris glabra	Smooth Cat's-ear	X			
	Hypochaeris radicata	Flatweed	X	X		X
	Iva axillaris subsp. robustior	Poverty Weed	X			
	Lactuca saligna	Willow-leaf Lettuce	X			
	Lactuca serriola	Prickly Lettuce	X	X	X	X
	Leontodon rhagadioloides	Hedypnois	X			
	Leontodon saxatilis subsp. saxatilis	Hairy Hawkbit	X			
	Onopordum acanthium subsp. acanthium	Scotch Thistle	X			
	Onopordum acaulon	Stemless Thistle	X			
	Rhaponticum repens	Creeping Knapweed	X			
	Senecio pinnatifolius var. lanceolatus	Variable Groundsel	X			
	Scorzonera laciniata	Scorzonera	X			
	Scorzonera laciniata var. laciniata	Scorzonera	X			
	Silybum marianum	Variegated Thistle	X			
	Sonchus asper subsp. asper	Rough Sow-thistle	X	X		X
	Sonchus oleraceus	Common Sowthistle	X	X	X	X
	Symphyotrichum subulatum	Aster-weed	X			
	Taraxacum officinale	European Dandelion	X			
	Xanthium orientale	Californian Burr	X			

	Xanthium spinosum	Bathurst Burr	X	X		
	Xanthium strumarium s.l.	Noogoora Burr species aggregate	X			
BORAGINACEAE			X			
	Echium plantagineum	Paterson's Curse	X			
	Heliotropium europaeum	Common Heliotrope	X		X	
	Heliotropium supinum	Creeping Heliotrope	X			
BRASSICACEAE			X			
	Brassica fruticulosa	Twiggy Turnip	X			
	Brassica spp.	Turnip	X		X	X
	Capsella bursa-pastoris	Shepherd's Purse	X	X		
	Carrichtera annua	Ward's Weed	X			
	Lepidium africanum	Common Peppercress	X	X	X	X
	Lepidium bonariense	Argentine Cress	X			
	Sisymbrium erysimoides	Smooth Mustard	X	X		X
	Sisymbrium officinale	Hedge Mustard	X			
	Sisymbrium orientale	Indian Hedge-mustard	X			
	Sisymbrium spp.	Mustard	X			
	Raphanus raphanistrum	Wild Radish	X			
	Rorippa palustris	Marsh Yellow-cress	X			
CARYOPHYLLACEAE			X			
	Cerastium glomeratum s.l.	Common Mouse-ear Chickweed	X			
	Petrorhagia dubia	Velvety Pink	X	X		
	Polycarpon tetraphyllum	Four-leaved Allseed	X			
	Spergularia rubra s.l.	Red Sand-spurrey	X			
	Stellaria media	Chickweed	X	X		
CONVOLVULACEAE						
	Convolvulus arvensis	Common Bindweed	X			
	Cuscuta campestris	Field Dodder				
CRASSULACEAE						
	Crassula helmsii	Swamp Crassula	X			
CHENOPODIACEAE						
	Chenopodium album	Fat Hen	X			
	Chenopodium murale	Sowbane	X	X		
	Suaeda australis	Austral Seablite	X			
CUCURBITACEAE						
	Citrullus lanatus	Camel Melon	X			
	Cucumis myriocarpus subsp. myriocarpus	Paddy Melon	X			
EUPHORBIACEAE						

	Enchylaena tomentosa var. tomentosa	Ruby Saltbush				
	Euphorbia peplus	Petty Spurge	X			
FABACEAE - Faboideae						
	Alhagi maurorum	Camel Thorn	X			
	Chamaecytisus palmensis	Tree Lucerne	X			
	Genista monospessulana	Montpellier Broom	X			
	Glycyrrhiza glabra	Liquorice	X			
	Medicago lupulina	Black Medic	X			
	Medicago minima	Little Medic	X			
	Medicago polymorpha	Burr Medic	X			
	Medicago sativa subsp. sativa	Lucerne	X			
	Medicago spp.	Medic	X			
	Medicago truncatula	Barrel Medic	X			
	Trifolium angustifolium var. angustifolium	Narrow-leaf Clover	X			
	Trifolium arvense var. arvense	Hare's-foot Clover	X			
	Trifolium campestre var. campestre	Hop Clover	X			
	Trifolium dubium	Suckling Clover	X	X		X
	Trifolium glomeratum	Cluster Clover	X			
	Trifolium repens var. repens	White Clover	X	X		X
	Trifolium resupinatum	Shaftal Clover	X			
	Trifolium resupinatum var. majus	Shaftal Clover	X			
	Trifolium spp.	Clover	X			
	Trifolium striatum	Knotted Clover	X			
	Trifolium subterraneum	Subterranean Clover	X	X		
	Trifolium tomentosum var. tomentosum	Woolly Clover	X			
	Ulex europaeus	Gorse	X			
	Vicia hirsuta	Tiny Vetch	X			
	Vicia sativa	Common Vetch	X			
	Vicia sativa subsp. sativa	Common Vetch	X			
FABACEAE - Mimosoideae						
	Acacia baileyana	Cootamundra Wattle	X			
	Acacia decurrens	Early Black-wattle	X			
GERANIACEAE						
	Erodium cicutarium	Common Heron's-bill	X			
HALORAGACEAE						
	Myriophyllum aquaticum	Parrot's Feather	X	X		X
HYPERICACEAE						
	Hypericum perforatum subsp. veronense	St John's Wort	X			

LAMIACEAE						
	Marrubium vulgare	Horehound	X	X	X	X
	Mentha pulegium	Pennyroyal	X			
	Salvia verbenaca	Wild Sage	X			
	Stachys arvensis	Stagger Weed	X			
MALVACEAE						
	Malva neglecta	Dwarf Mallow	X			
	Malva parviflora	Small-flower Mallow	X	X	X	
	Malvella leprosa	Alkali Sida	X			
	Modiola caroliniana	Red-flower Mallow	X			
	Sida corrugata	Variable Sida				
OLEACEAE						
	Olea europaea subsp. europaea	Common Olive	X	X		X
OXALIDACEAE						
	Oxalis pes-caprae	Soursob	X	X		X
PAPAVERACEAE						
	Fumaria bastardii	Bastard's Fumitory	X			X
	Fumaria capreolata	White Fumitory	X			
	Fumaria indica	Indian Fumitory	X			
	Fumaria muralis subsp. muralis	Wall Fumitory	X			
PLANTAGINACEAE						
	Callitriche brutia var. brutia	Thread Water-starwort	X	X		
	Kickxia elatine	Hairy Toadflax	X			
	Plantago coronopus	Buck's-horn Plantain	X			
	Plantago lanceolata	Ribwort	X	X		X
	Veronica peregrina subsp. xalapensis	Wandering Speedwell	X			
POLYGONACEAE						
	Duma florulenta	Tangled Lignum	X			
	Polygonum aviculare s.l.	Prostrate Knotweed	X	X	X	X
	Rumex conglomeratus	Clustered Dock	X	X		X
	Rumex crispus	Curled Dock	X			
	Rumex pulcher subsp. pulcher	Fiddle Dock	X			
PRIMULACEAE						
	Lysimachia arvensis	Pimpernel	X	X		
RANUNCULACEAE						
	Ranunculus muricatus	Sharp Buttercup	X			
	Ranunculus sceleratus subsp. sceleratus	Celery Buttercup	X	X		
ROSACEAE						
	Crataegus monogyna	Hawthorn	X			
	Rosa canina	Dog Rose	X			
	Rosa rubiginosa	Sweet Briar	X		X	

	Rubus fruticosus spp. agg.	Blackberry	X			
	Rubus ulmifolius var. ulmifolius	Elm-leaf Blackberry	X			
RUBIACEAE						
	Galium aparine	Cleavers	X	X		X
SALICACEAE						
	Salix babylonica s.l.	Weeping Willow	X			
	Salix fragilis	Crack Willow	X	X		
SIMAROUBACEAE						
	Ailanthus altissima	Tree of Heaven	X			
SOLANACEAE						
	Lycium barbarum	Chinese Box-thorn	X			
	Lycium ferocissimum	African Box-thorn	X	X	X	X
	Solanum elaeagnifolium	Silver-leaf Nightshade	X			
	Solanum nigrum s.l.	Black Nightshade	X	X		X
TAMARICACEAE						
	Tamarix ramosissima	Tamarisk	X			
URTICACEAE						
	Urtica urens	Small Nettle	X			
VERBENACEAE						
	Phyla canescens	Fog-fruit	X			

Appendix L. Large Old Tree (LOTs) / large trees recorded within the construction footprint (combined list from GHD 2017 and R8 2019)

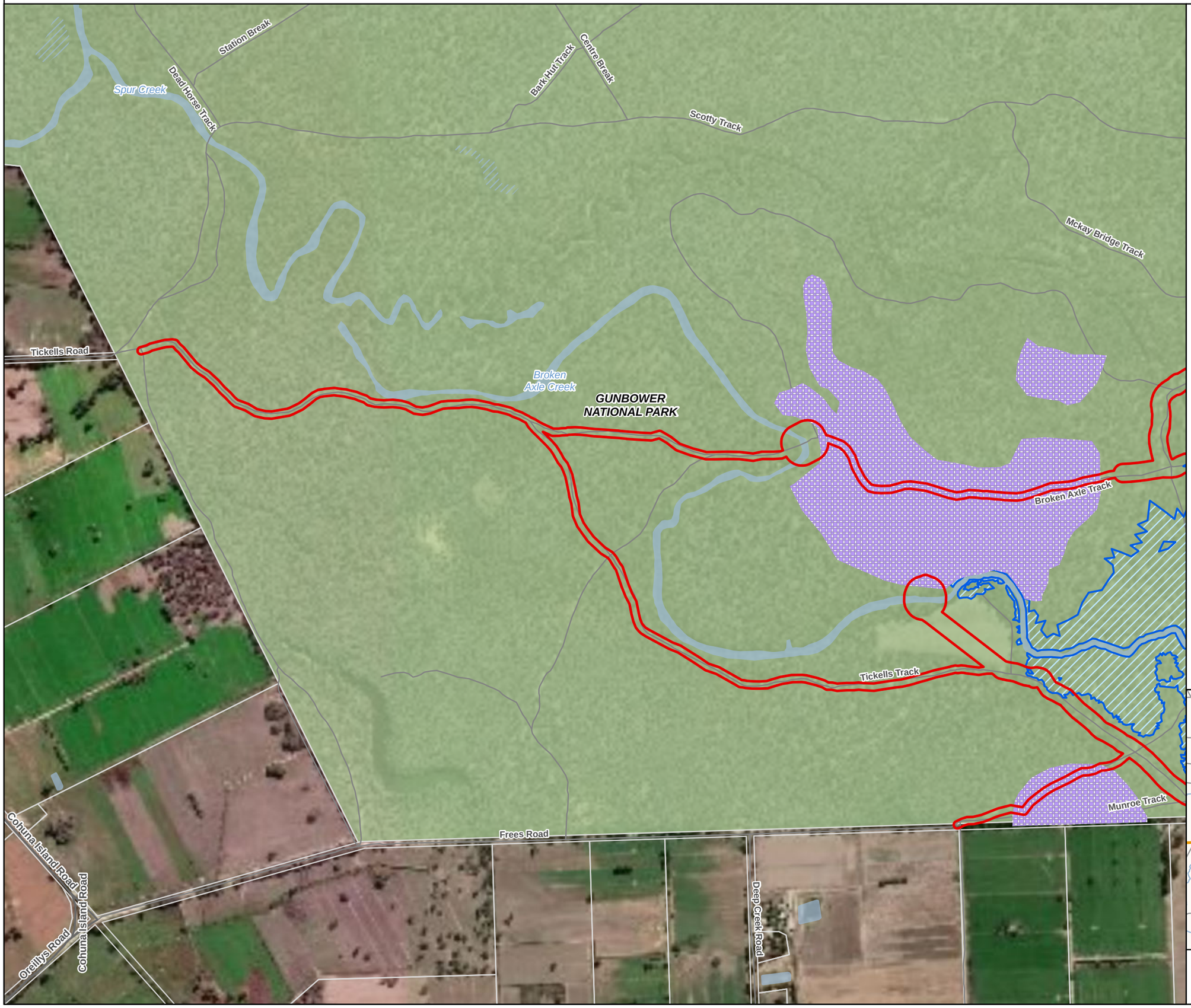
Tree ID	Source	Tree Species	DBH (cm)	Canopy Tree / Scattered Tree
1	R8 2019	Black Box (*Eucalyptus largiflorens*)	62	CT
2	R8 2019	Black Box (*Eucalyptus largiflorens*)	60	CT
3	R8 2019	Black Box (*Eucalyptus largiflorens*)	144	CT
4	R8 2019	Black Box (*Eucalyptus largiflorens*)	111	CT
5	R8 2019	River Red Gum (*Eucalyptus camaldulensis*)	90	CT
6	R8 2019	River Red Gum (*Eucalyptus camaldulensis*)	70	ST
7	R8 2019	River Red Gum (*Eucalyptus camaldulensis*)	85	CT
8	R8 2019	River Red Gum (*Eucalyptus camaldulensis*)	82	CT
9	R8 2019	Black Box (*Eucalyptus largiflorens*)	50	CT
10	R8 2019	Black Box (*Eucalyptus largiflorens*)	52	CT
11	R8 2019	Black Box (*Eucalyptus largiflorens*)	85	CT
12	R8 2019	Black Box (*Eucalyptus largiflorens*)	62	CT
13	GHD 2017		60	CT
14	GHD 2017	Black Box (*Eucalyptus largiflorens*)	43.2	CT
15	GHD 2017		156.2	CT
16	GHD 2017		106.6	CT
17	GHD 2017		113.8	CT
18	GHD 2017		132.1	CT
19	GHD 2017		88.5	CT
20	GHD 2017		69.9	CT
21	GHD 2017		150 est	CT
22	GHD 2017	Black Box (*Eucalyptus largiflorens*)	40.6	CT
23	GHD 2017	Black Box (*Eucalyptus largiflorens*)	50.3	CT
24	GHD 2017	Black Box (*Eucalyptus largiflorens*)	65	CT
25	GHD 2017	Grey Box (*Eucalyptus microcarpa*)	68.5	CT
26	GHD 2017	Grey Box (*Eucalyptus microcarpa*)	70 est	CT
27	GHD 2017	Black Box (*Eucalyptus largiflorens*)	75 est	CT
28	GHD 2017		68.5	CT

Tree ID	Source	Tree Species	DBH (cm)	Canopy Tree / Scattered Tree
29	GHD 2017	Black Box (*Eucalyptus largiflorens*)	56.8	CT
30	GHD 2017	Black Box (*Eucalyptus largiflorens*)	53.7	CT
31	GHD 2017	Black Box (*Eucalyptus largiflorens*)	40.3	CT
32	GHD 2017	Black Box (*Eucalyptus largiflorens*)	49.3	CT
33	GHD 2017	Black Box (*Eucalyptus largiflorens*)	47.5	CT
34	GHD 2017	Black Box (*Eucalyptus largiflorens*)	43.4	CT
35	GHD 2017	Black Box (*Eucalyptus largiflorens*)	42.5	CT
36	GHD 2017	Black Box (*Eucalyptus largiflorens*)	46.4	CT
37	GHD 2017	Black Box (*Eucalyptus largiflorens*)	57.5	CT
38	GHD 2017	Black Box (*Eucalyptus largiflorens*)	51.5	CT
39	GHD 2017	Black Box (*Eucalyptus largiflorens*)	78	CT
40	GHD 2017	Black Box (*Eucalyptus largiflorens*)	42.2	CT
41	GHD 2017	Black Box (*Eucalyptus largiflorens*)	40.8	CT
42	GHD 2017	Black Box (*Eucalyptus largiflorens*)	40	CT
43	GHD 2017		73.9	CT
44	GHD 2017	Black Box (*Eucalyptus largiflorens*)	65.2	CT
45	GHD 2017	Black Box (*Eucalyptus largiflorens*)	51.2	CT
46	GHD 2017	Black Box (*Eucalyptus largiflorens*)	59.4	CT
47	GHD 2017	Black Box (*Eucalyptus largiflorens*)	41.8	CT
48	GHD 2017	Black Box (*Eucalyptus largiflorens*)	60.3	CT
49	GHD 2017	Black Box (*Eucalyptus largiflorens*)	43.8	CT
50	GHD 2017	Black Box (*Eucalyptus largiflorens*)	53.3	CT
51	GHD 2017	Black Box (*Eucalyptus largiflorens*)	41.5	CT
52	GHD 2017		85.5	CT
53	GHD 2017		170 est	CT
54	GHD 2017		105.2	CT
55	GHD 2017		137	CT
56	GHD 2017		65.5	CT
57	GHD 2017		68	CT
58	GHD 2017		75.7	CT

Appendix M. EPBC Act threatened community mapping within the project area

Appendix M Location of EPBC Act listed threatened community in construction footprint at Gunbower National Park, Page 1 of 13

VMFRP



Legend

- EPBC Act listed threatened community
- Likely presence of EPBC Act listed threatened community
- Area of Investigation
- Inundation Area
- Major Road
- Minor Road
- Waterbody
- Wetland Swamp
- Cadastre

Public Land Management

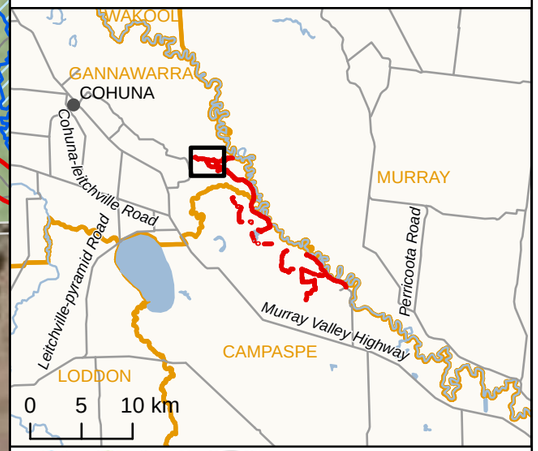
- NATIONAL PARK

IS297705

0 200 400

Metres

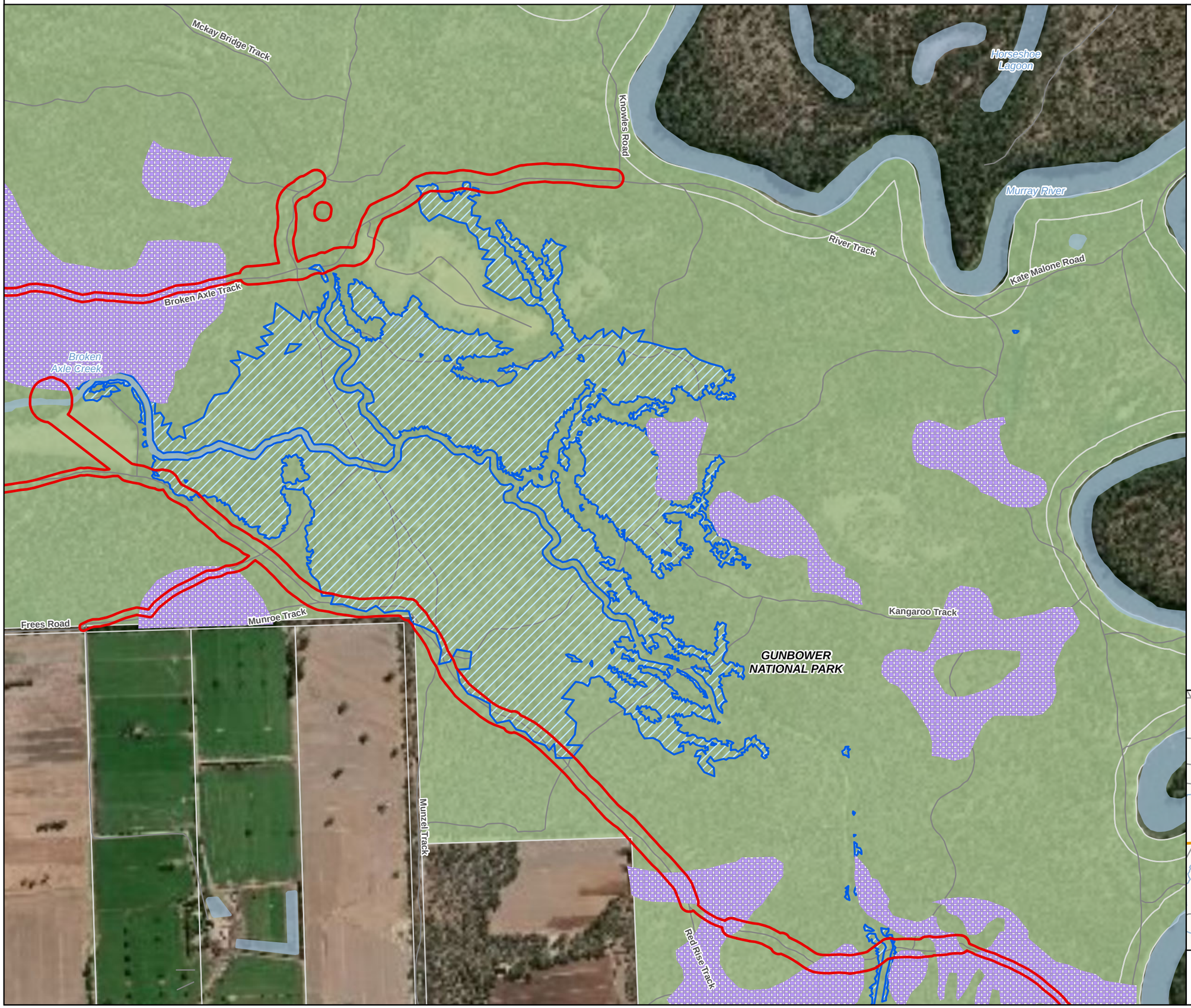
DATA SOURCES
© Commonwealth of Australia (Geoscience Australia) 2006 Geodata Topo 250k Series 3; Vicmap Data, DELWP © State of Victoria 2019; Jacobs & GHD 2019-2020.



Path: J:\IE\Projects\03_Southern\IS297700\Spatial\ArcPro\AGP\Ecology\Gunbower\Gunbower.aprx

Appendix M Location of EPBC Act listed threatened community in construction footprint at Gunbower National Park, Page 2 of 13

VMFRP



Legend

- EPBC Act listed threatened community
- Likely presence of EPBC Act listed threatened community
- Area of Investigation
- Inundation Area
- Minor Road
- Waterbody
- Wetland Swamp
- Cadastre

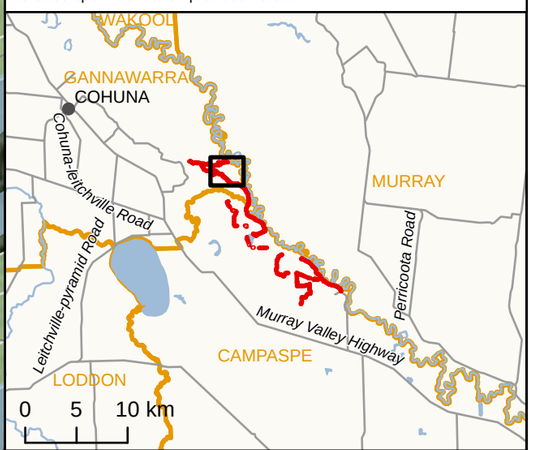
Public Land Management

- NATIONAL PARK

IS297705

0 200 400

Metres



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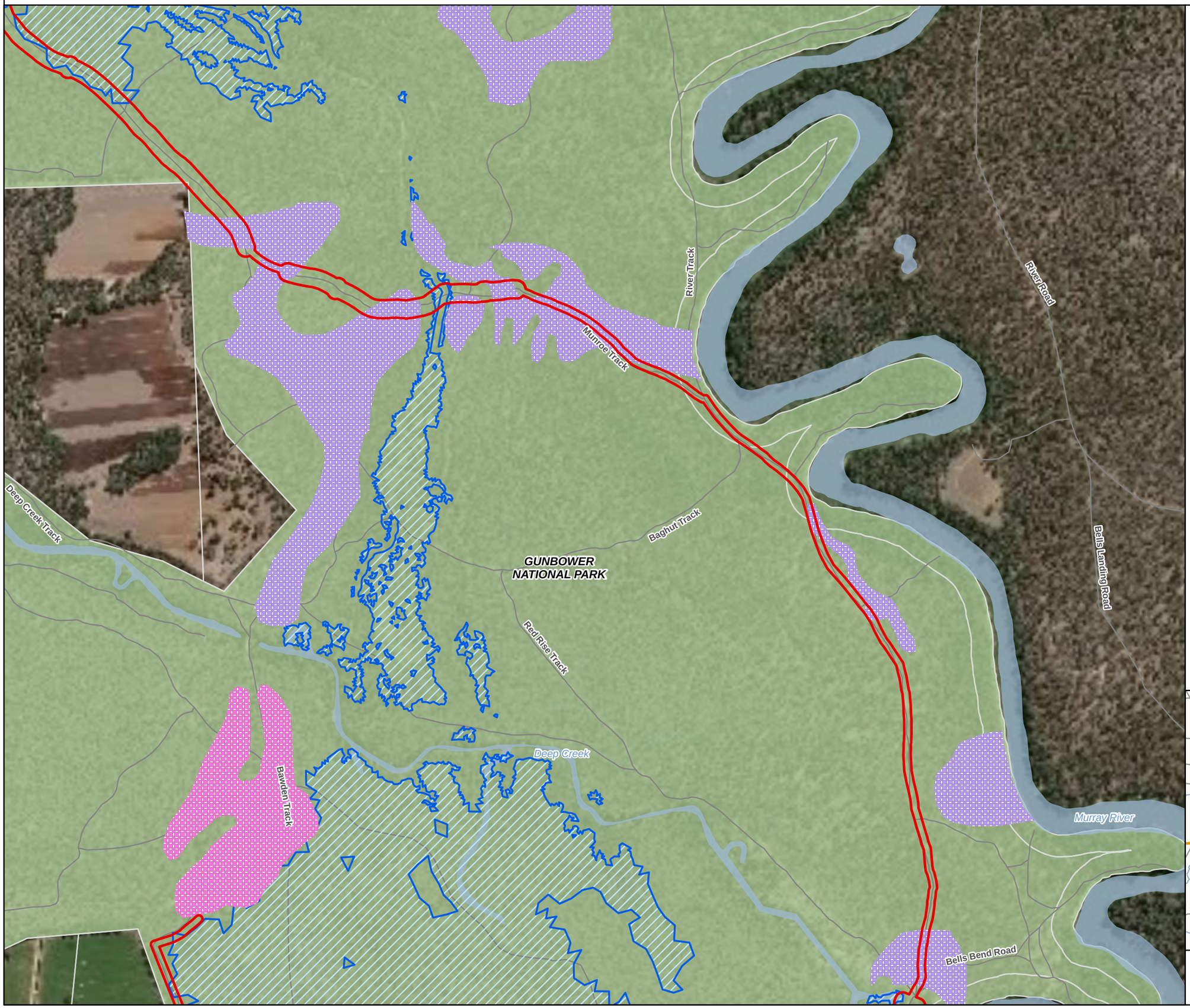
Appendix M Location of EPBC Act listed threatened community in construction footprint at Gunbower National Park, Page 3 of 13

VMFRP



Legend

- EPBC Act listed threatened community
- Likely presence of EPBC Act listed threatened community
- Area of Investigation
- Inundation Area
- Minor Road
- Waterbody
- Cadastre

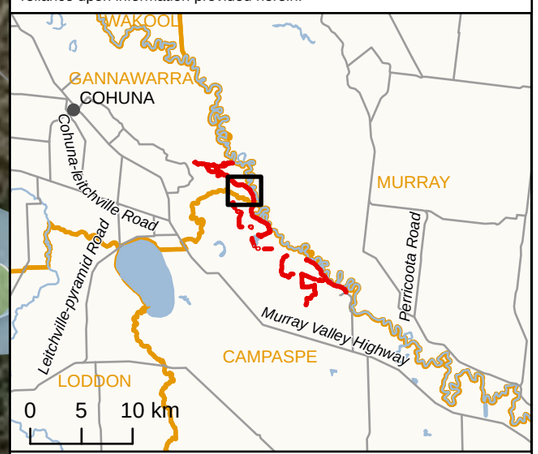
Public Land Management

- NATIONAL PARK

IS297705

0 200 400

Metres

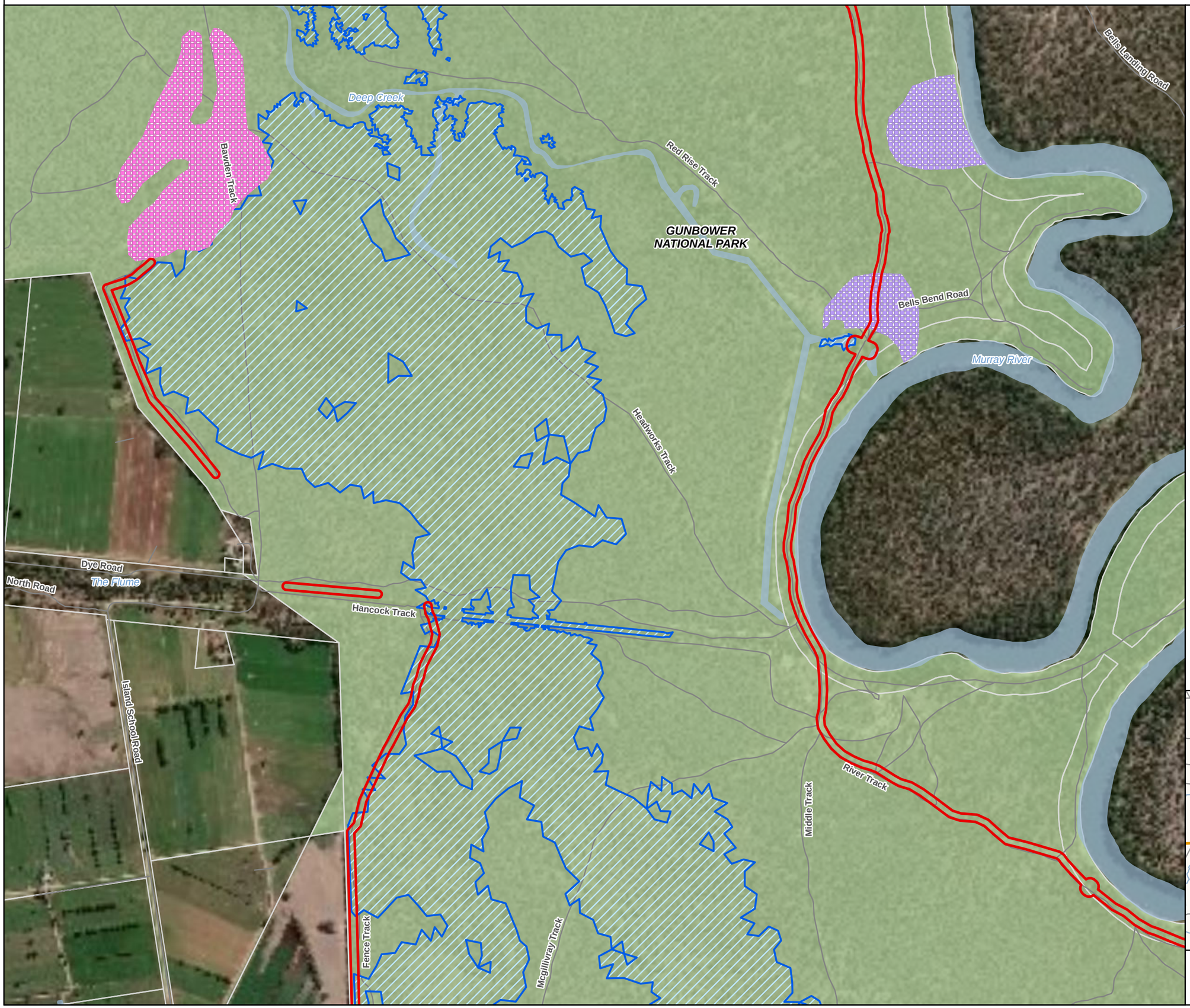


R8

Path: J:\IE\Projects\03_Southern\IS297700\Spatial\ArcPro\AGP\Ecology\Gunbower\Gunbower.aprx

Appendix M Location of EPBC Act listed threatened community in construction footprint at Gunbower National Park, Page 4 of 13

VMFRP



Legend

- EPBC Act listed threatened community
- Likely presence of EPBC Act listed threatened community
- Area of Investigation
- Inundation Area
- Minor Road
- Waterbody
- Cadastre

Public Land Management

- NATIONAL PARK

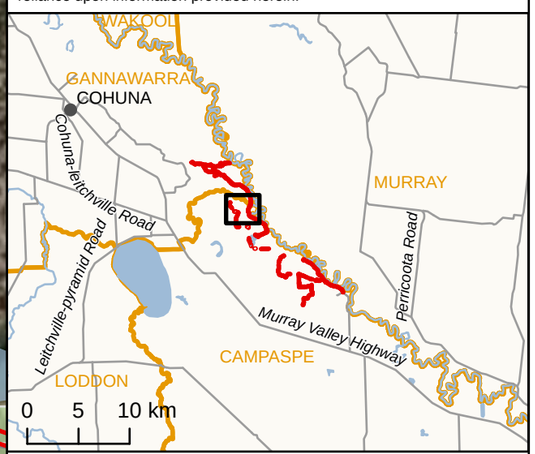
IS297705

0 200 400

Metres

DATA SOURCES

© Commonwealth of Australia (Geoscience Australia) 2006 Geodata Topo 250k Series 3; Vicmap Data, DELWP © State of Victoria 2019; Jacobs & GHD 2019-2020.



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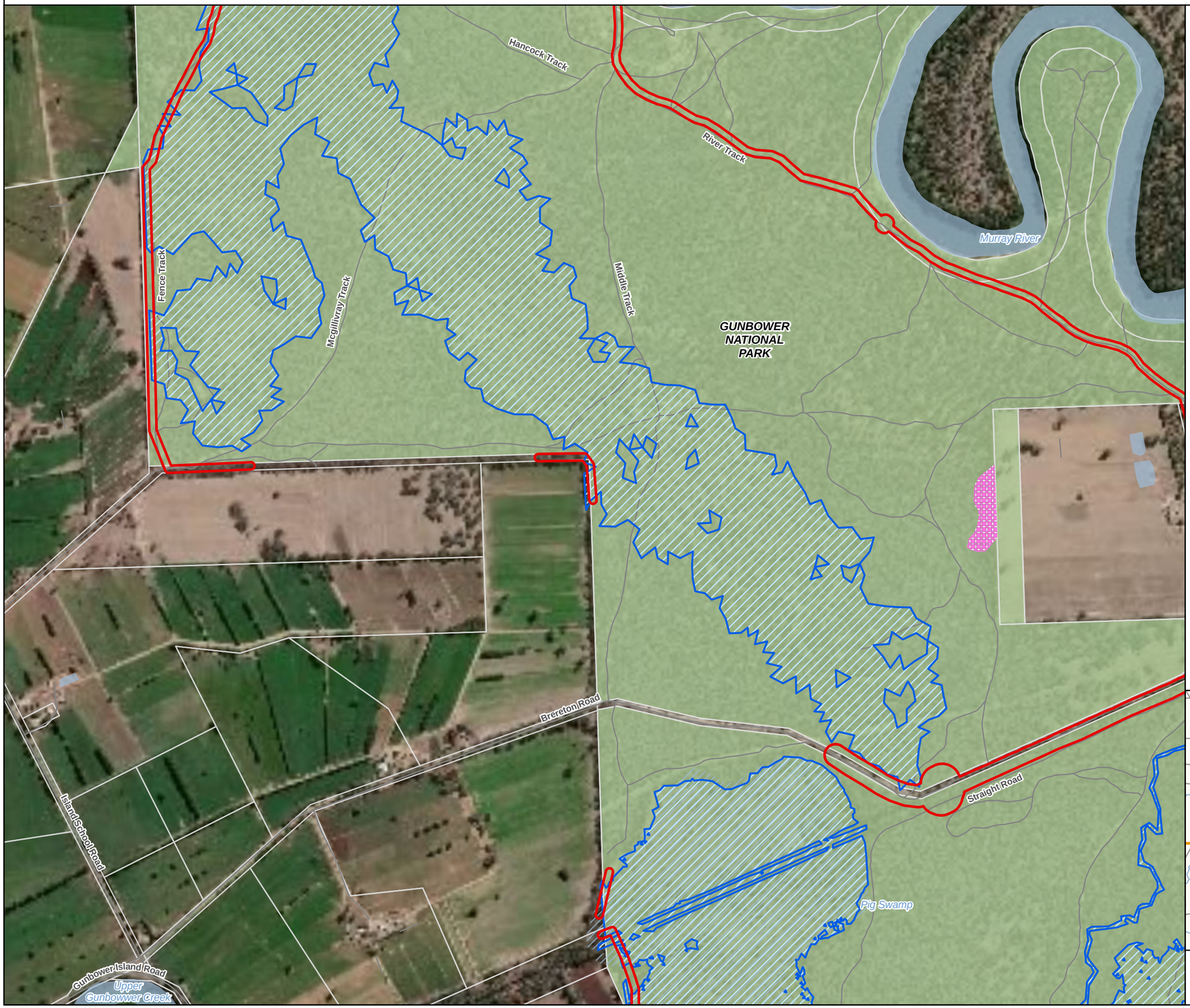
Appendix M Location of EPBC Act listed threatened community in construction footprint at Gunbower National Park, Page 5 of 13

VMFRP



Legend

- EPBC Act listed threatened community
- Likely presence of EPBC Act listed threatened community
- Area of Investigation
- Inundation Area
- Minor Road
- Waterbody
- Wetland Swamp
- Cadastre

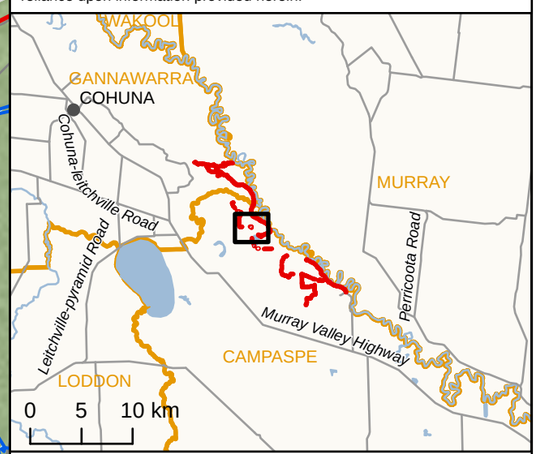
Public Land Management

- NATIONAL PARK

IS297705

0 200 400

Metres



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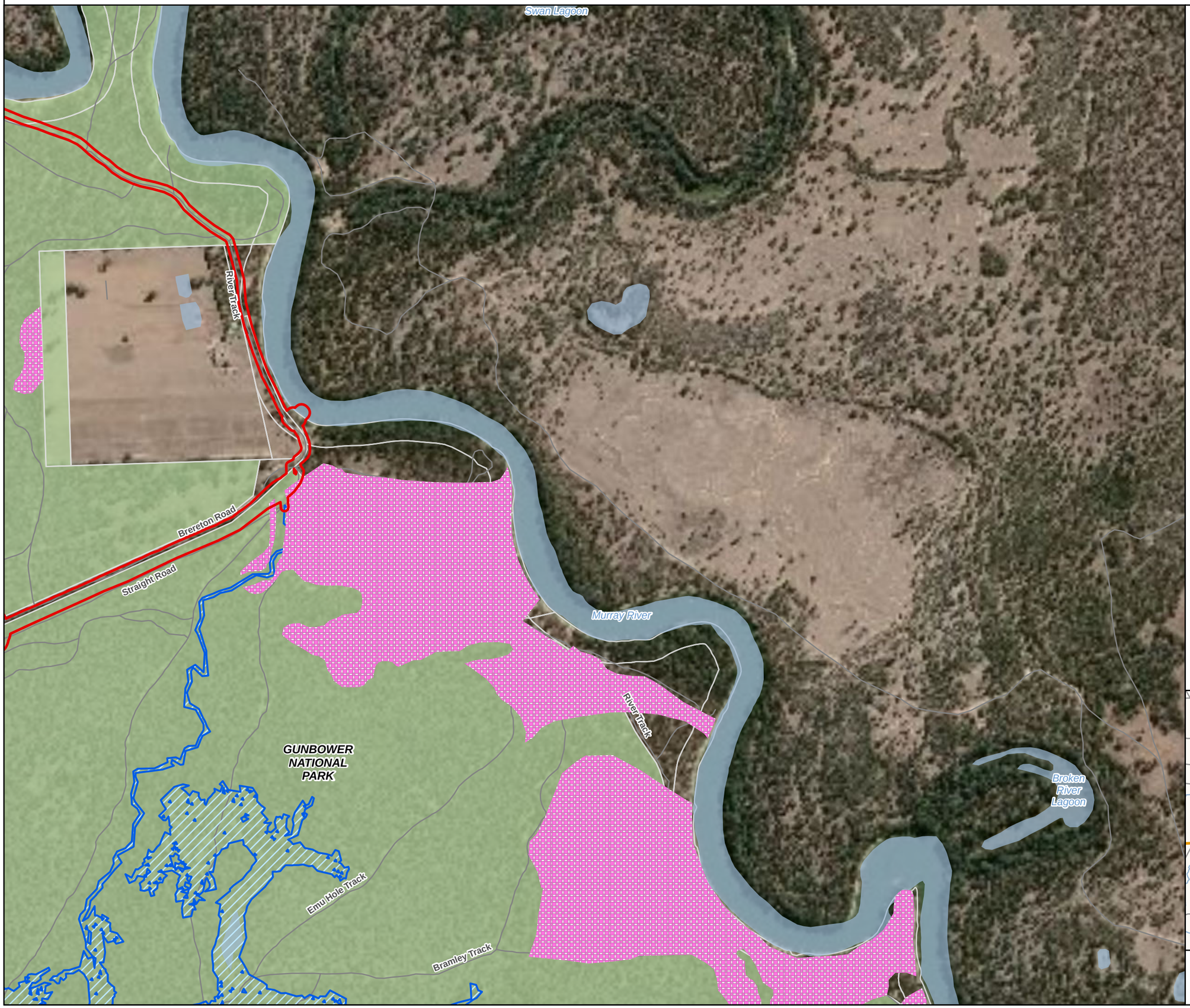
Appendix M Location of EPBC Act listed threatened community in construction footprint at Gunbower National Park, Page 6 of 13

VMFRP



Legend

- EPBC Act listed threatened community
- Likely presence of EPBC Act listed threatened community
- Area of Investigation
- Inundation Area
- Minor Road
- Waterbody
- Cadastre

Public Land Management

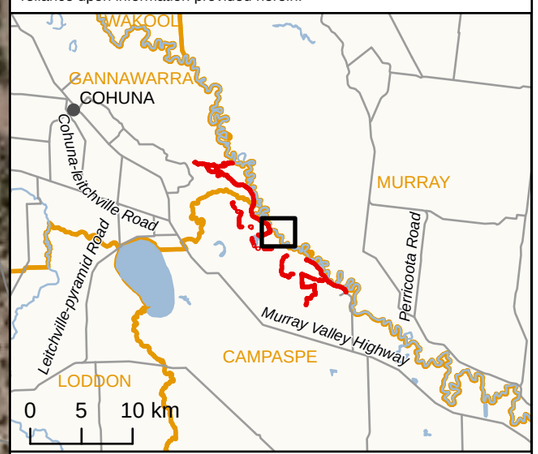
- NATIONAL PARK

IS297705

0 200 400

Metres

DATA SOURCES
© Commonwealth of Australia (Geoscience Australia) 2006 Geodata Topo 250k Series 3; Vicmap Data, DELWP © State of Victoria 2019; Jacobs & GHD 2019-2020.



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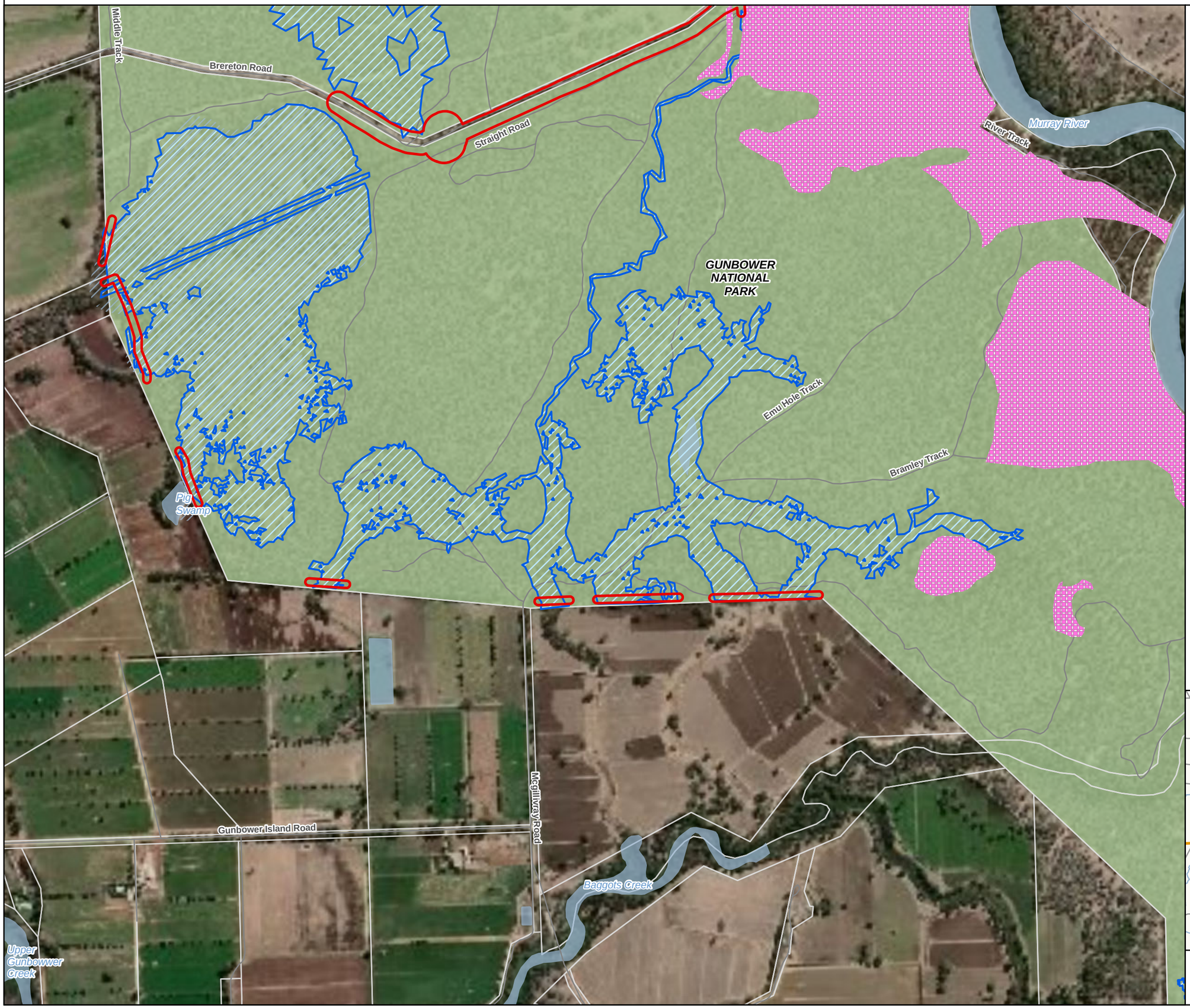
Appendix M Location of EPBC Act listed threatened community in construction footprint at Gunbower National Park, Page 7 of 13

VMFRP



Legend

- EPBC Act listed threatened community
- Likely presence of EPBC Act listed threatened community
- Area of Investigation
- Inundation Area
- Minor Road
- Waterbody
- Wetland Swamp
- Cadastre

Public Land Management

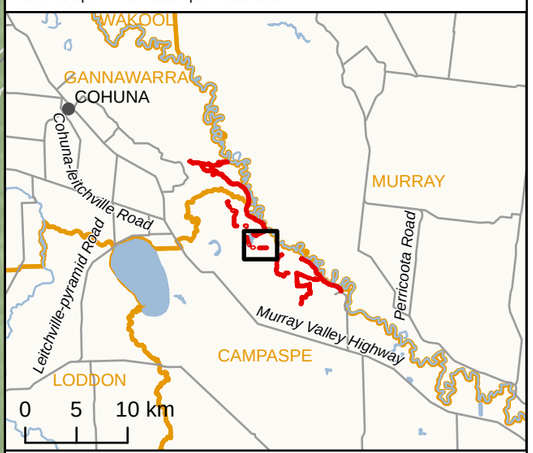
- NATIONAL PARK

IS297705

0 200 400

Metres

DATA SOURCES
© Commonwealth of Australia (Geoscience Australia) 2006 Geodata Topo 250k Series 3; Vicmap Data, DELWP © State of Victoria 2019; Jacobs & GHD 2019-2020.



R8

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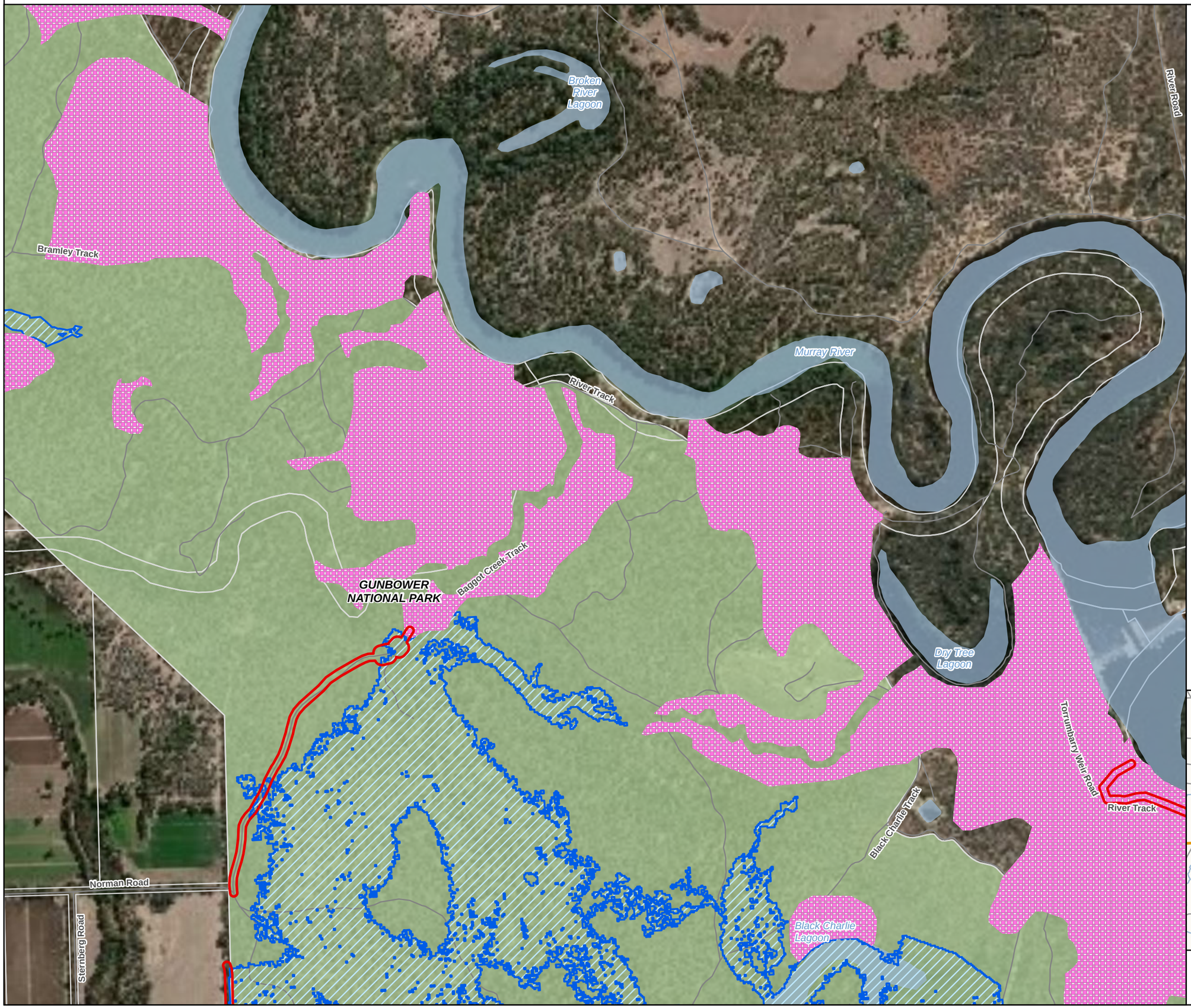
Appendix M Location of EPBC Act listed threatened community in construction footprint at Gunbower National Park, Page 8 of 13

VMFRP



Legend

- EPBC Act listed threatened community
- Likely presence of EPBC Act listed threatened community
- Area of Investigation
- Inundation Area
- Minor Road
- Waterbody
- Cadastre

Public Land Management

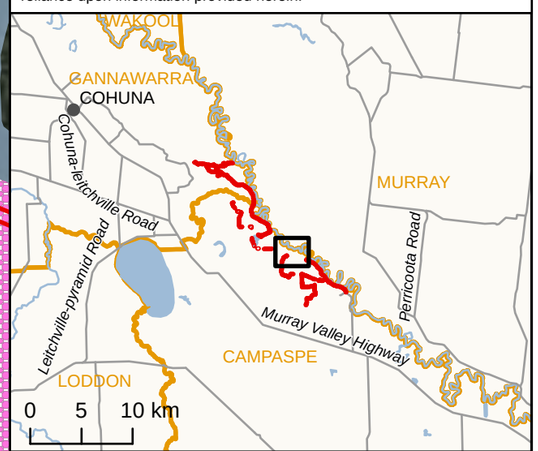
- NATIONAL PARK

IS297705

0 200 400

Metres

DATA SOURCES



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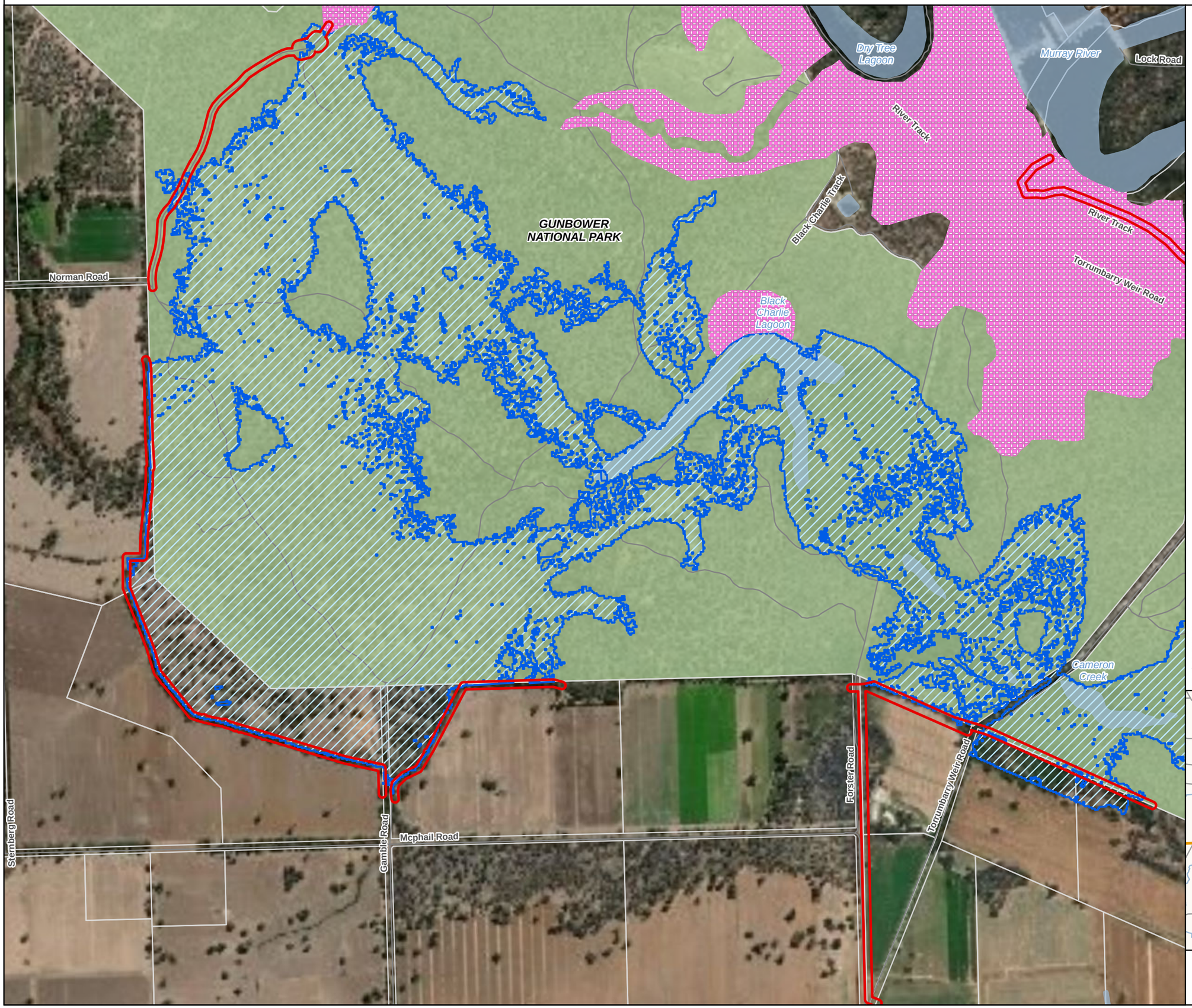
Appendix M Location of EPBC Act listed threatened community in construction footprint at Gunbower National Park, Page 9 of 13

VMFRP



Legend

- EPBC Act listed threatened community
- Likely presence of EPBC Act listed threatened community
- Area of Investigation
- Inundation Area
- Minor Road
- Waterbody
- Cadastre

Public Land Management

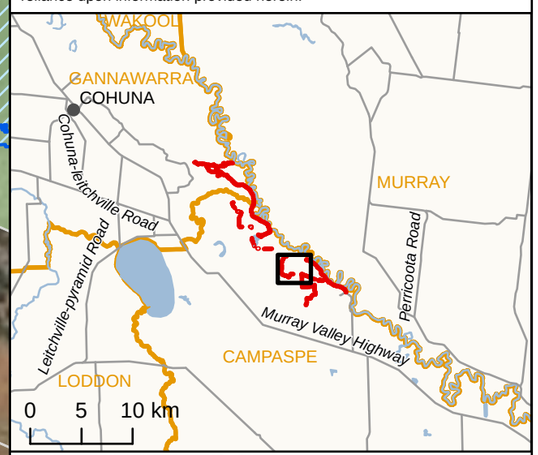
- NATIONAL PARK

IS297705

0 200 400

Metres

DATA SOURCES
© Commonwealth of Australia (Geoscience Australia) 2006 Geodata Topo 250k Series 3; Vicmap Data, DELWP © State of Victoria 2019; Jacobs & GHD 2019-2020.



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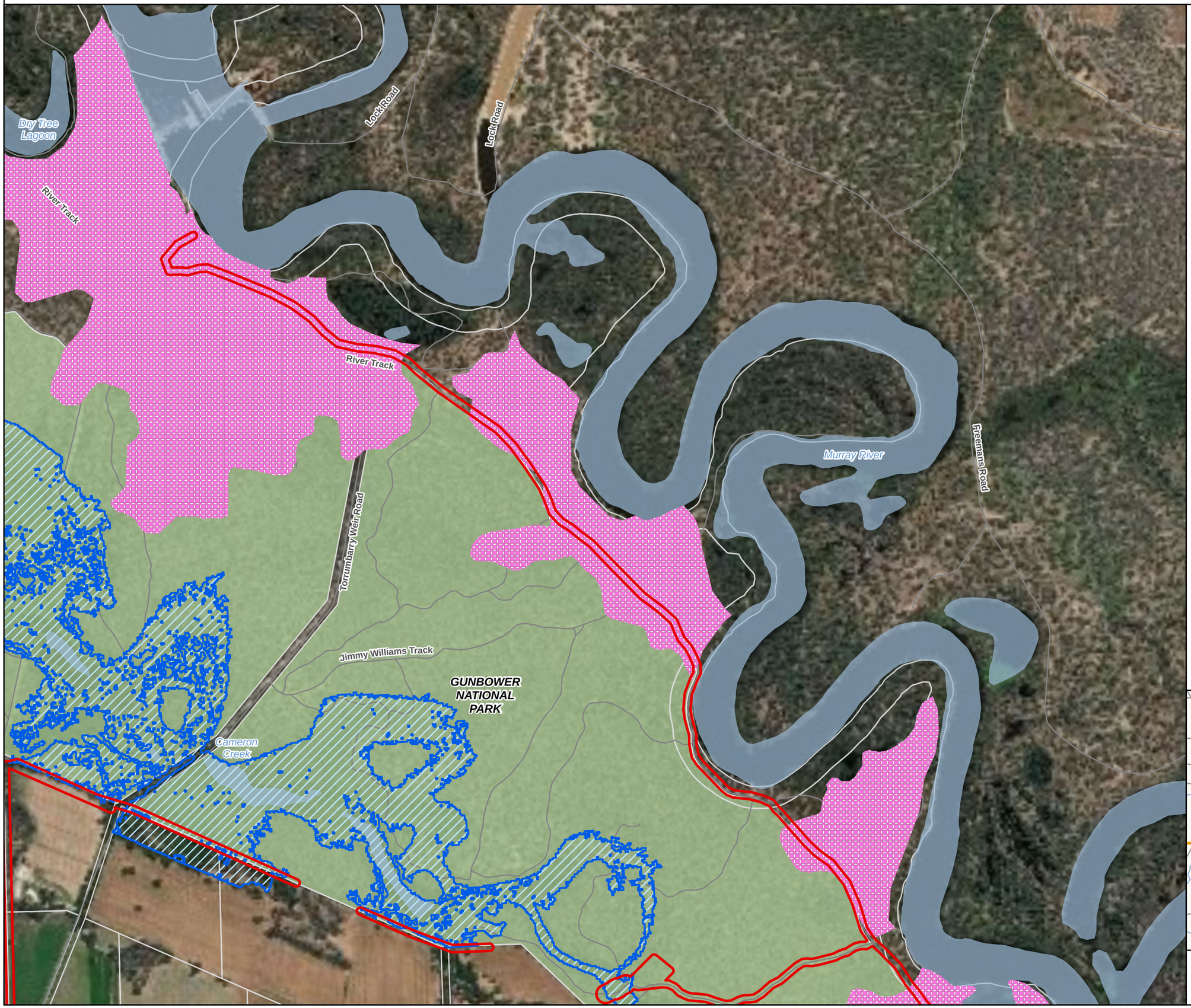
Appendix M Location of EPBC Act listed threatened community in construction footprint at Gunbower National Park, Page 10 of 13

VMFRP



Legend

- EPBC Act listed threatened community
- Likely presence of EPBC Act listed threatened community
- Area of Investigation
- Inundation Area
- Minor Road
- Waterbody
- Cadastre

Public Land Management

- NATIONAL PARK

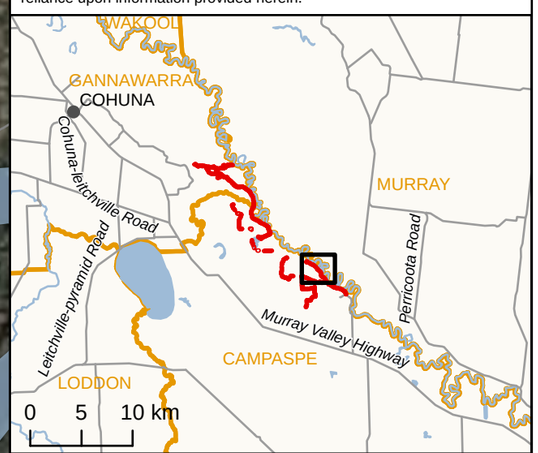
IS297705

0 200 400

Metres

DATA SOURCES

© Commonwealth of Australia (Geoscience Australia) 2006 Geodata Topo 250k Series 3; Vicmap Data, DELWP © State of Victoria 2019; Jacobs & GHD 2019-2020.



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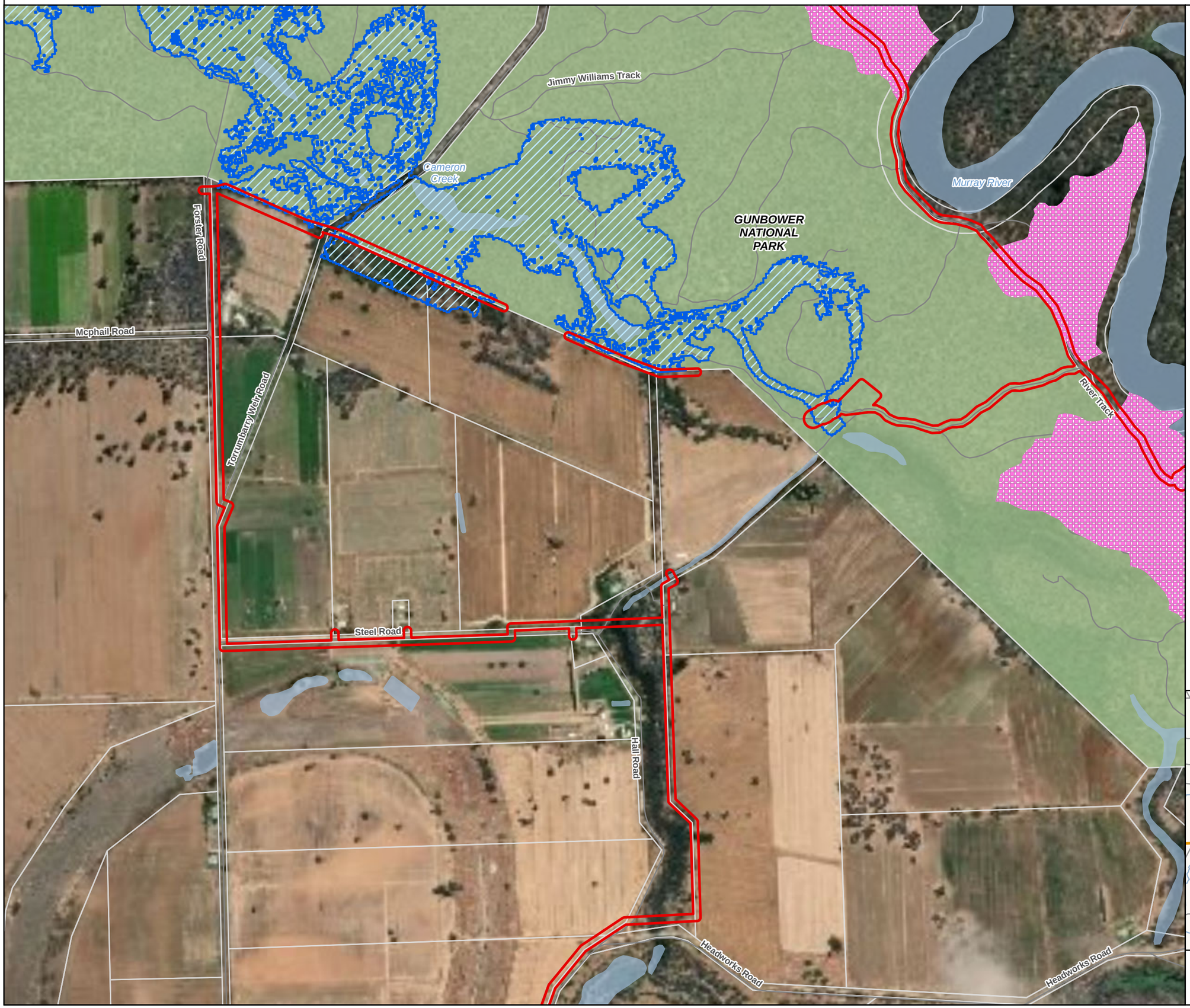
Appendix M Location of EPBC Act listed threatened community in construction footprint at Gunbower National Park, Page 11 of 13

VMFRP



Legend

- EPBC Act listed threatened community
- Likely presence of EPBC Act listed threatened community
- Area of Investigation
- Inundation Area
- Minor Road
- Waterbody
- Cadastre

Public Land Management

- NATIONAL PARK

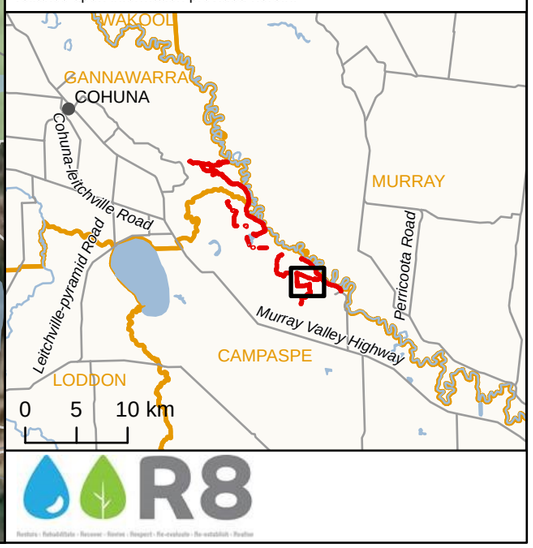
IS297705

0 200 400

Metres

DATA SOURCES

© Commonwealth of Australia (Geoscience Australia) 2006 Geodata Topo 250k Series 3; Vicmap Data, DELWP © State of Victoria 2019; Jacobs & GHD 2019-2020.



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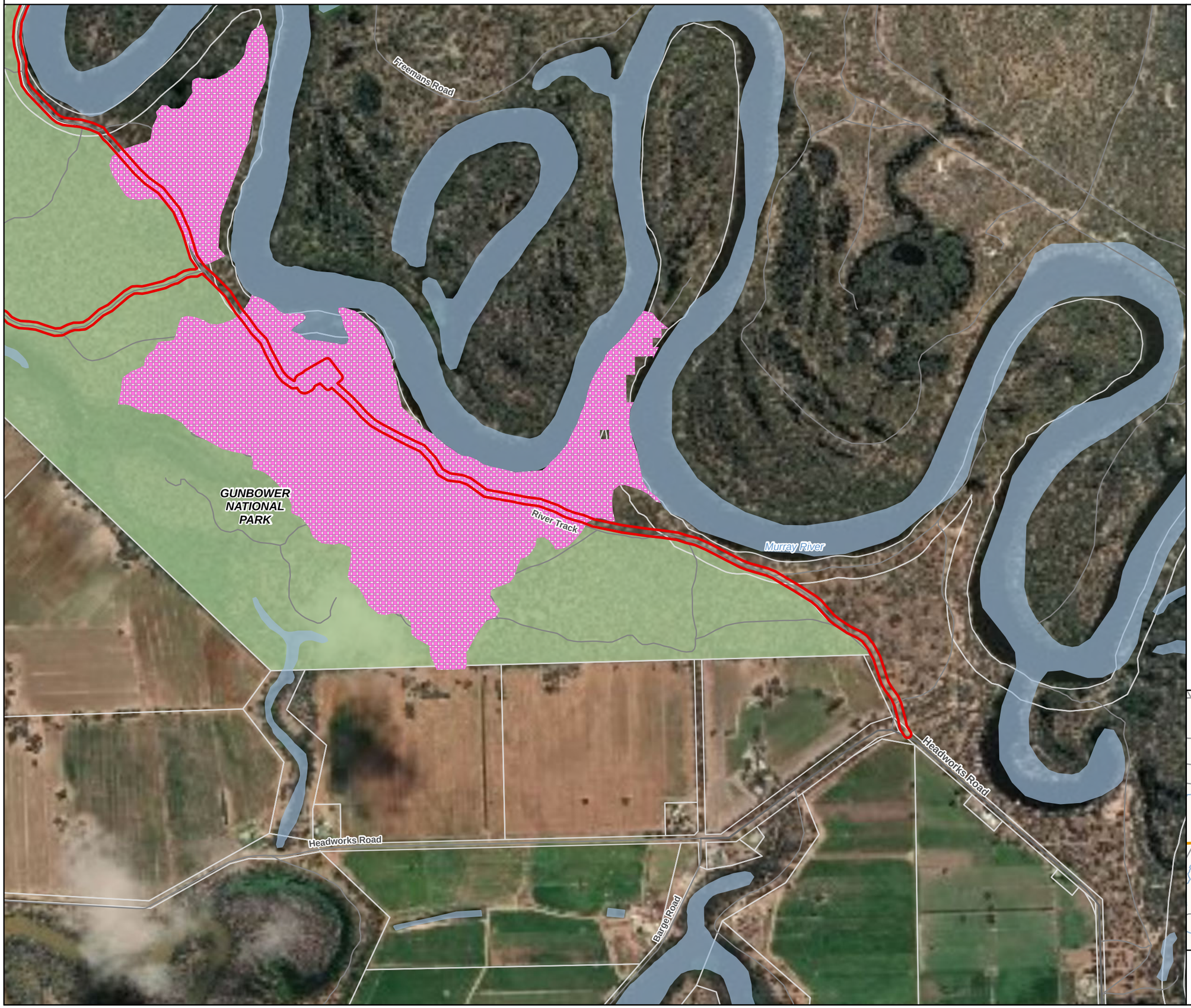
Appendix M Location of EPBC Act listed threatened community in construction footprint at Gunbower National Park, Page 12 of 13

VMFRP



Legend

- EPBC Act listed threatened community
- Likely presence of EPBC Act listed threatened community
- Area of Investigation
- Major Road
- Minor Road
- Waterbody
- Cadastre

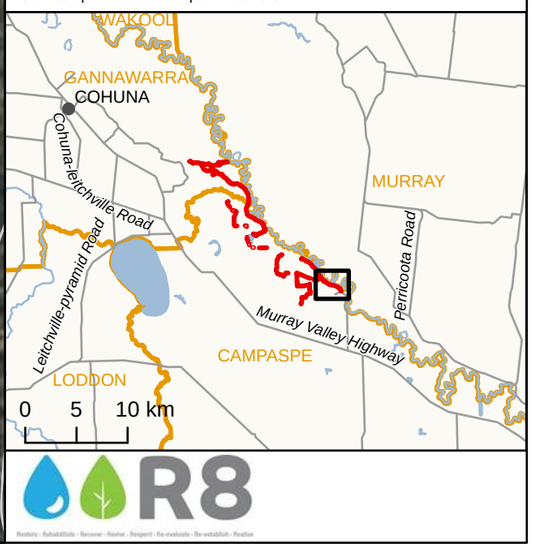
Public Land Management

- NATIONAL PARK

IS297705

0 200 400

Metres



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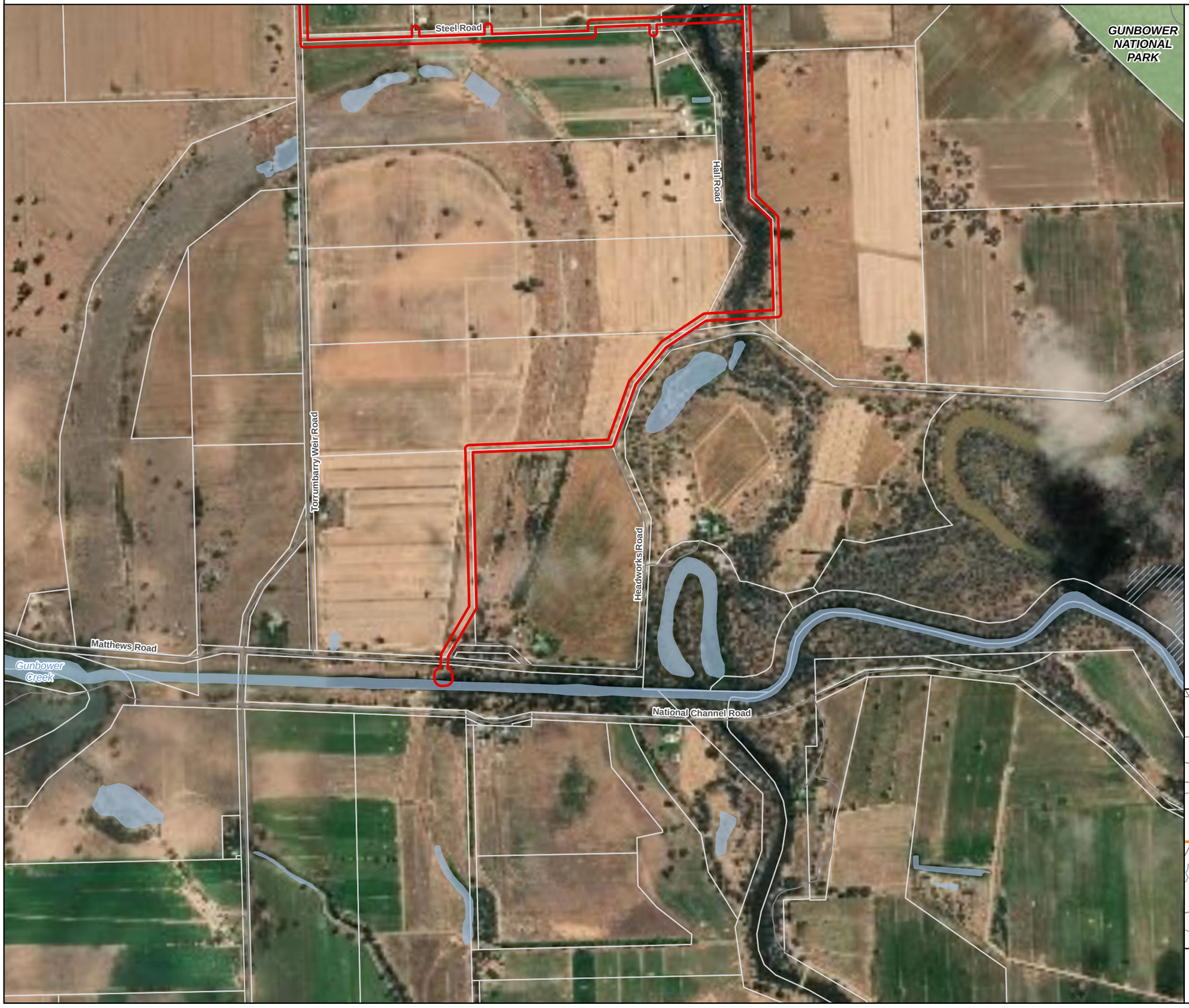
Appendix M Location of EPBC Act listed threatened community in construction footprint at Gunbower National Park, Page 13 of 13

VMFRP



Legend

- EPBC Act listed threatened community
- Likely presence of EPBC Act listed threatened community
- Area of Investigation
- Minor Road
- Waterbody
- Wetland Swamp
- Cadastre

Public Land Management

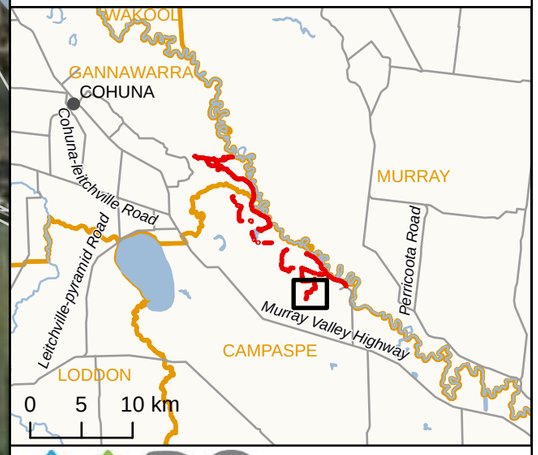
- NATIONAL PARK

IS297705

0 200 400

Metres

DATA SOURCES
© Commonwealth of Australia (Geoscience Australia) 2006 Geodata Topo 250k Series 3; Vicmap Data, DELWP © State of Victoria 2019; Jacobs & GHD 2019-2020.



R8

Path: J:\IE\Projects\03_Southern\IS297700\Spatial\ArcPro\AGP\Ecology\Gunbower\Gunbower.aprx

Appendix N. Example photos from Squirrel Glider arboreal camera surveys

Figure L-1 Lace Monitor (adult)

Figure L-2 Lace Monitor (adult)

Figure L-3 Sugar Glider, differentiated from a Squirrel Glider by distinctive characteristics, including head shape, head stripes, less prominent nose and smaller body size.

Figure L-4 Sugar Glider, differentiated from a Squirrel Glider by distinctive characteristics, including head shape, head stripes, less prominent nose and smaller body size.

Figure L-5 Lace Monitor (juvenile)

Figure L-6 Lace Monitor (juvenile)

Figure L-7 Yellow-footed Antechinus

Figure L-8 Laughing Kookaburra

Figure L-9 Emu (DELWP Advisory List, near threatened)

Figure L-10 Brown Treecreeper (DELWP Advisory List, near threatened)

Appendix O. Significance assessment for critically endangered and endangered ecological communities

An assessment of the potential impact to Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia threatened ecological community (Endangered) against the EPBC Act EPBC Act Significant Impact Guidelines 1.1 is provided below.

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

Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia, EPBC Act – Endangered
Reduce the extent of an ecological community
A total of 4.18 ha of the Threatened Ecological Community (TEC) was mapped as occurring within the construction footprint. The proposed works will likely result in the permanent loss of 1.71 ha of the threatened community in the development footprint. The anticipated removal of 1.71 ha of the community accounts for 0.13% of the community extent, of approximately 1300 ha within the Gunbower Forest (North Central CMA 2012b). 2.47 ha along access tracks will be avoided by restricting vehicle access to existing tracks with limited lopping of vegetation allowed to allow access for larger vehicles. Further mitigation measures in the CEMP will protect areas of the TEC from both direct and indirect impacts, including designating 'no go zones', applying EPA standards for erosion and sediment controls and standard vehicle hygiene measures to prevent the spread and introduction of weeds and diseases. Though the project will result in the reduction on extent of 1.71 ha of an Endangered Ecological Community, given the minimal area of physical removal of the community in the context of broader Gunbower Forest that supports significant intact areas of the TEC it is not considered that the loss 1.71 ha of Grey Box Grassy Woodland is notable in extent of the community or will have a long term impact on the survival of the community. **No significant impact**
Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines
The proposed works will likely result in the permanent loss of 1.71 ha of the TEC in the development footprint. 2.47 ha along access tracks will be avoided by restricting vehicle access to existing access tracks with limited lopping of vegetation allowed to allow access for larger vehicles. The construction footprint is centred on existing access tracks and the community where identified consisted of areas with informal 4WD access tracks. It is not considered that the proposed works will result in additional fragmentation of the community. Further mitigation measures in the CEMP will protect areas of the TEC from both direct and indirect impacts, including designating 'no go zones', applying EPA standards for erosion and sediment controls and standard vehicle hygiene measures to prevent the spread and introduction of weeds and diseases. **No significant impact**
Adversely affect habitat critical to the survival of an ecological community
It is not considered that the loss of 1.71 ha of the TEC is notable in extent of the community or will have a long term impact on the survival of the community. Given there is approximately 1300 ha of the TEC in the wider Gunbower Forest, it is considered that the loss of 1.71 ha is a negligible reduction in the extent of the TEC, that also occurs elsewhere. The 1.71 ha anticipated to be lost occurs adjacent to existing access tracks and represents marginal areas of the community not considered habitat critical to it's survival.

Further mitigation measures in the CEMP will protect areas of the TEC from both direct and indirect impacts, including designating 'no go zones', applying EPA standards for erosion and sediment controls and standard vehicle hygiene measures to prevent the spread and introduction of weeds and diseases. **No significant impact**
Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns
It is anticipated that for the 0.98 ha of the TEC within the inundation area that the level of inundation of these areas will benefit the community by restoring a more natural flooding regime. A return of a natural flooding regime will benefit the vegetation communities adjacent to the community and lead to positive biodiversity outcomes for the ecotonal areas between the community and the lower-lying, more frequently inundated woodland systems. Reinstating a flooding regime to these floodplain forests is not anticipated to modify or destroy abiotic factors necessary for the community's survival or substantially alter surface water drainage patterns. Further mitigation measures in the CEMP will protect areas of the TEC from both direct and indirect impacts, including designating 'no go zones', applying EPA standards for erosion and sediment controls and standard vehicle hygiene measures to prevent the spread and introduction of weeds and diseases. **No significant impact**
Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting
It is anticipated that for the 0.98 ha of the TEC within the inundation area that the level of inundation of these areas will benefit the community by restoring a more natural flooding regime. A return of a natural flooding regime will benefit the vegetation communities adjacent to the community and lead to positive biodiversity outcomes for the ecotonal areas between the community and the lower-lying, more frequently inundated woodland systemsReinstating a flooding regime to these floodplain forests may have the potential to introduce aquatic-dependent species into fringing areas of the community within the inundation area, however is not anticipated to cause a substantial change in species composition. Further mitigation measures in the CEMP will protect areas of the TEC from both direct and indirect impacts, including designating 'no go zones', applying EPA standards for erosion and sediment controls and standard vehicle hygiene measures to prevent the spread and introduction of weeds and diseases. **No significant impact**
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: ▪ Assisting invasive species, that are harmful to the listed ecological community, to become established, or ▪ Causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community
The proposed works are unlikely to introduce weed species to the ecological community after the implementation of strict vehicle hygiene measures. **No significant impact**
Interfere with the recovery of an ecological community
It is considered unlikely the Project will interfere with the recovery of the community. However, there is no recovery plan for the community. Mitigation measures including the reinstatement/management of known habitat in the wider vicinity of the site is expected to assist the recovery of the TEC. A return of a natural flooding regime will benefit the vegetation communities adjacent to the community and lead to positive

biodiversity outcomes for the ecotonal areas between the community and the lower-lying, more frequently inundated woodland systems

Further mitigation measures in the CEMP will protect areas of the TEC from both direct and indirect impacts, including designating 'no go zones', applying EPA standards for erosion and sediment controls and standard vehicle hygiene measures to prevent the spread and introduction of weeds and diseases.

No significant impact

Appendix P. Significance assessment for EPBC Act listed flora

Below are the significant impact criteria for species listed under the EPBC Act as Vulnerable and Endangered. The criteria are addressed below for:

EPBC Act Vulnerable (VU) listed

- River Swamp Wallaby-grass (*Amphibromus fluitans*),
- Ridged Water-milfoil (*Myriophyllum porcatum)*,
- Floodplain Rustyhood (*Pterostylis cheraphila*) and
- Slender Darling-pea (*Swainsona murrayana*)

EPBC Act Endangered (EN) listed

- Winged Peppercress (*Lepidium monoplocoides*),
- Stiff Groundsel (*Senecio behrianus*)

NB – What is an important population of a species?

An 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

- Key source populations either for breeding or dispersal
- Populations that are necessary for maintaining genetic diversity, and/or
- Populations that are near the limit of the species' range

EPBC Act listed Vulnerable Species

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

River Swamp Wallaby-grass (*Amphibromus fluitans*) EPBC Act – Vulnerable
Lead to a long-term decrease in the size of an important population of a species
River Swamp Wallaby-grass is known to occur within the broader Gunbower Forest and National Park, particularly in the Lower Forests with populations recorded and being regularly monitored as part of the TLM vegetation condition monitoring (Bennetts and Cook 2020, Bennetts and Jolly 2020). The species was recorded in the area of investigation in the far western extent of the Baggot's creek overflow in Upper Gunbower Forest, approximately 1.75 km from the nearest construction area. Further surveys are required in spring 2020 for Middle Gunbower (downstream of Deep Creek) and Camerons Creek pump station and pipeline in Upper Gunbower to confirm the presence or absence there. However it is unlikely that an important population is present given the construction footprint is centred on existing tracks and degraded areas. No important populations are listed in the assessment advice for the species (TSSC 2010), and individuals recorded in the Upper and Middle Gunbower Forests would likely not be considered a key source population, a population necessary for genetic diversity or population at the limit of the species' range. The vegetation removal required for the project is predominantly located on higher ground away from the semi-permanent wetlands and floodways considered potential habitat for this species and avoids the locations where this species was previously recorded. The proposed construction works will therefore not lead to a long-term decrease in the size of an important population. The operational phase of the project is likely to improve habitat quality in the project area and benefit the population in Gunbower National Park. **No significant impact**

Reduce the area of occupancy of an important population
The proposed construction footprint is centred on existing tracks and degraded areas wherever possible. This will not significantly reduce the area of occupancy of any population as most structures will be established on previously disturbed tracks and clearances. The area does not represent core habitat or range for this species. No important populations are listed in the assessment advice for the species (TSSC 2010), and individuals recorded in the Upper and Middle Gunbower Forests would likely not be considered a key source population, a population necessary for genetic diversity or population at the limit of the species' range. The vegetation removal required for the project is predominantly located on higher ground away from the semi-permanent wetlands and floodways considered potential habitat for this species and avoids the locations where this species was previously recorded. The proposed construction works will therefore not reduce the area of occupancy of an important population. The operational phase of the project is expected to improve habitat availability and quality in the project area and benefit the population in Gunbower National Park **No significant impact**
Fragment an existing important population into two or more populations
The proposed construction works will not fragment an existing important population into two or more populations. The construction footprint is approximately 1.75 km from the closest known population and only limited potential habitat is present within the construction footprint due to existing disturbance along access tracks. Further surveys are required in spring 2020 for Middle Gunbower (downstream of Deep Creek) and Camerons Creek pump station and pipeline in Upper Gunbower to confirm the presence or absence there. However it is unlikely that an important population is present given the construction footprint is centred on existing tracks and degraded areas. No important populations are listed in the assessment advice for the species (TSSC 2010), and individuals recorded in the Upper and Middle Gunbower Forests would likely not be considered a key source population, a population necessary for genetic diversity or population at the limit of the species' range. The operational phase of the project is expected to improve habitat availability and quality in the project area and benefit the population in Gunbower National Park **No significant impact**
Adversely affect habitat critical to the survival of a species
The proposed construction works will not adversely affect habitat critical to the survival of the species. The vegetation removal required for the project is predominantly located on higher ground away from the semi-permanent wetlands and floodways considered potential habitat for this species and avoids the locations where this species was previously recorded. The operational phase of the project is expected to improve habitat availability and quality in the project area and benefit the population in Gunbower National Park **No significant impact**
Disrupt the breeding cycle of an important population
The proposed construction works will not impact the lifecycle of the species. The vegetation removal required for the project is predominantly located on higher ground away from the semi-permanent wetlands and floodways considered potential habitat for this species and avoids the locations where this species was previously recorded. Further surveys are required in spring 2020 for Middle Gunbower (downstream of Deep Creek) and Camerons Creek pump station and pipeline in Upper Gunbower to confirm the presence or absence there. However it is unlikely that an important population is present given the construction footprint is centred on existing tracks and degraded areas. The operational phase of the project is expected to improve habitat availability and quality in the project area and benefit the population in Gunbower National Park

No significant impact
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
The proposed construction works will not modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. The vegetation removal required for the project is predominantly located on higher ground away from the semi-permanent wetlands and floodways considered potential habitat for this species and avoids the locations where this species was previously recorded. The operational phase of the project is expected to improve habitat availability and quality in the project area and benefit the population in Gunbower National Park **No significant impact**
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat
The proposed works are unlikely to introduce weed species to the species' habitat after the implementation of strict vehicle hygiene measures. **No significant impact**
Introduce disease that may cause the species to decline
The proposed works are unlikely to introduce disease that may cause the species to decline after the implementation of strict vehicle hygiene measures. **No significant impact**
Interfere substantially with the recovery of the species.
The proposed construction activities will not interfere substantially with the recovery of the species, as most structures will be established on previously disturbed tracks and clearances. However, there is no recovery plan for the species. The operational phase of the project is expected to improve habitat availability and quality in the project area and benefit the population in Gunbower National Park. This is likely to assist in the recovery of the species. **No significant impact**

Ridged Water-milfoil (*Myriophyllum porcatum*) EPBC Act – Vulnerable
Lead to a long-term decrease in the size of an important population of a species
Ridged Water-milfoil has not been recorded in Gunbower Forest or the study area, however potential suitable wetland habitat is present. No previous surveys within the Gunbower National Park project area have recorded the species (Bennetts and Cook 2020, Bennetts and Jolly 2020). Further surveys are required in spring 2020 for Middle Gunbower (downstream of Deep Creek) and Camerons Creek pump station and pipeline in Upper Gunbower to confirm the presence or absence there. However, it is unlikely that an important population is present given the construction footprint is centred on existing tracks and degraded areas. The majority of the 15 known widely separated populations occur in central north Victoria on private land, wetlands, parks, swamps, farm dams and temporary waterholes (Murphy 2006). No important populations are known to occur along the Murray River in the Gunbower Forests. The vegetation removal required for the project is predominantly located on higher ground away from the semi-permanent wetlands and floodways considered potential habitat for this species. The proposed construction works will therefore not lead to a long-term decrease in the size of an important population. The operational phase of the project is likely to improve habitat quality in the project area and benefit any potential population in Gunbower National Park.

No significant impact
Reduce the area of occupancy of an important population
The proposed construction footprint is centred on existing tracks and degraded areas wherever possible. This will not significantly reduce the area of occupancy of any potential population as most structures will be established on previously disturbed tracks and clearances. No important populations are known to occur along the Murray River in the Gunbower Forests. The vegetation removal required for the project is predominantly located on higher ground away from the semi-permanent wetlands and floodways considered potential habitat for this species. The proposed construction works will therefore not reduce the area of occupancy of an important population. The operational phase of the project is likely to improve habitat quality in the project area and benefit any potential population in Gunbower National Park. **No significant impact**
Fragment an existing important population into two or more populations
The proposed construction works will not fragment an existing important population into two or more populations. The proposed construction footprint is centred on existing tracks and degraded areas wherever possible. No important populations are known to occur along the Murray River in the Gunbower Forests. Further surveys are required in spring 2020 for Middle Gunbower (downstream of Deep Creek) and Camerons Creek pump station and pipeline in Upper Gunbower to confirm the presence or absence there. However it is unlikely that an important population is present given the construction footprint is centred on existing tracks and degraded areas. The vegetation removal required for the project is predominantly located on higher ground away from the semi-permanent wetlands and floodways considered potential habitat for this species. The operational phase of the project is likely to improve habitat quality in the project area and benefit any potential population in Gunbower National Park. **No significant impact**
Adversely affect habitat critical to the survival of a species
The proposed construction works will not adversely affect habitat critical to the survival of the species. The proposed construction footprint is centred on existing tracks and degraded areas wherever possible. This will not adversely affect habitat critical to the survival of a species as most structures will be established on previously disturbed tracks and clearances. No important populations are known to occur along the Murray River in the Gunbower Forests. The vegetation removal required for the project is predominantly located on higher ground away from the semi-permanent wetlands and floodways considered potential habitat for this. The operational phase of the project is likely to improve habitat quality in the project area and benefit any potential population in Gunbower National Park. **No significant impact**
Disrupt the breeding cycle of an important population
The proposed construction works will not impact the lifecycle of the species. The vegetation removal required for the project is predominantly located on higher ground away from the semi-permanent wetlands and floodways considered potential habitat for this species. Further surveys are required in spring 2020 for Middle Gunbower (downstream of Deep Creek) and Camerons Creek pump station and pipeline in Upper Gunbower to confirm the presence or absence there. However it is unlikely that an important population is present given the construction footprint is centred on existing tracks and degraded areas. The operational phase of the project is likely to improve habitat quality in the project area and benefit any potential population in Gunbower National Park. **No significant impact**

Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
The proposed construction works will not modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. The vegetation removal required for the project is predominantly located on higher ground away from the semi-permanent wetlands and floodways considered potential habitat for this species. The operational phase of the project is likely to improve habitat quality in the project area and benefit any potential population in Gunbower National Park. **No significant impact**
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat
The proposed works are unlikely to introduce weed species to the species' habitat after the implementation of strict vehicle hygiene measures. **No significant impact**
Introduce disease that may cause the species to decline
The proposed works are unlikely to introduce disease that may cause the species to decline after the implementation of strict vehicle hygiene measures. **No significant impact**
Interfere substantially with the recovery of the species.
The proposed construction activities will not interfere substantially with the recovery of the species, as most structures will be established on previously disturbed tracks and clearances. The operational phase of the project is likely to improve habitat quality in the project area and benefit any potential population in Gunbower National Park. This is likely to assist in the recovery of the species. **No significant impact**

Floodplain Rustyhood (*Pterostylis cheraphila*) EPBC Act – Vulnerable
Lead to a long-term decrease in the size of an important population of a species
Floodplain Rustyhood has been recently recorded in Lower Gunbower Forest, on Spur Island approximately 2 km north-west of the project area (Bennetts and Cook 2020). Only a sinle population is known, however there is the potential for other nearby populations to exist within the broader Gunbower Forest. The species has not been recorded during TLM vegetation condition monitoring or other threatened species surveys (Bennetts et al. 2012, Bennetts and Cook 2020, Bennetts and Jolly 2020). Further surveys are required in spring 2020 for Middle Gunbower (downstream of Deep Creek) and Camerons Creek pump station and pipeline in Upper Gunbower to confirm the presence or absence there. However it is unlikely that an important population is present given the construction footprint is centred on existing tracks and degraded areas. Only three populations are listed in the Recovery Plan for the species (Duncan et al. 2010), although the population recorded in Lower Gunbower Forest would be considered an important population as it is a key source population, a population necessary for genetic diversity and a population at the limit of the species' range. The proposed construction footprint is centred on existing tracks and degraded areas wherever possible. This will not significantly reduce the area of occupancy of any population as most structures will be established on previously disturbed tracks and clearances. The area does not represent core habitat or range for this species.

The proposed construction works will therefore not reduce the area of occupancy of a population, particularly as the area of vegetation removal associated with the construction footprint is considered negligible when compared to the broader Gunbower Forest and area that will benefit from a more natural flooding regime. Given the species can tolerate inundation, the restoration of a natural flooding regime may enhance the quality of suitable habitat available for this species to recolonise. **No significant impact**
Reduce the area of occupancy of an important population
The proposed construction footprint is centred on existing tracks and degraded areas wherever possible. This will not significantly reduce the area of occupancy of any population as most structures will be established on previously disturbed tracks and clearances. The area does not represent core habitat or range for this species. Only three populations are listed in the Recovery Plan for the species (Duncan et al. 2010), although the population recorded in Lower Gunbower Forest would be considered an important population as it is a key source population, a population necessary for genetic diversity and a population at the limit of the species' range. The proposed construction works will therefore not reduce the area of occupancy of a population, particularly as the area of vegetation removal associated with the construction footprint is considered negligible when compared to the broader Gunbower Forest and area that will benefit from a more natural flooding regime. Given the species can tolerate inundation, the restoration of a natural flooding regime may enhance the quality of suitable habitat available for this species to recolonise. **No significant impact**
Fragment an existing important population into two or more populations
The proposed construction works is unlikely to fragment an existing important population into two or more populations. The construction footprint is approximately 2 km from the closest known population and only limited potential habitat is present within the construction footprint due to existing disturbance along access tracks. Further surveys are required in spring 2020 for Middle Gunbower (downstream of Deep Creek) and Camerons Creek pump station and pipeline in Upper Gunbower to confirm the presence or absence there. However it is unlikely that an important population is present given the construction footprint is centred on existing tracks and degraded areas. Only three populations are listed in the Recovery Plan for the species (Duncan et al. 2010), although the population recorded in Lower Gunbower Forest would be considered an important population as it is a key source population, a population necessary for genetic diversity and a population at the limit of the species' range. Given the species can tolerate inundation, the restoration of a natural flooding regime may enhance the quality of suitable habitat available for this species to recolonise. **No significant impact**
Adversely affect habitat critical to the survival of a species
The proposed construction works will not adversely affect habitat critical to the survival of the species. This will not significantly reduce the area of occupancy of any population as most structures will be established on previously disturbed tracks and clearances. The area does not represent core habitat or range for this species. Given the species can tolerate inundation, the restoration of a natural flooding regime may enhance the quality of suitable habitat available for this species to recolonise. **No significant impact**
Disrupt the breeding cycle of an important population
The proposed construction works will not impact the lifecycle of the species. This will not significantly reduce the area of occupancy of any population as most structures will be established on previously disturbed tracks and clearances. The area does not represent core habitat or range for this species. Further surveys are required

in spring 2020 for Middle Gunbower (downstream of Deep Creek) and Camerons Creek pump station and pipeline in Upper Gunbower to confirm the presence or absence there. However it is unlikely that an important population is present given the construction footprint is centred on existing tracks and degraded areas. Given the species can tolerate inundation, the restoration of a natural flooding regime may enhance the quality of suitable habitat available for this species to recolonise. **No significant impact**
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
The proposed construction works will not modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. This will not significantly reduce the area of occupancy of any population as most structures will be established on previously disturbed tracks and clearances. The area does not represent core habitat or range for this species. Given the species can tolerate inundation, the restoration of a natural flooding regime may enhance the quality of suitable habitat available for this species to recolonise. **No significant impact**
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat
The proposed works are unlikely to introduce weed species to the species' habitat after the implementation of strict vehicle hygiene measures. **No significant impact**
Introduce disease that may cause the species to decline
The proposed works are unlikely to introduce disease that may cause the species to decline after the implementation of strict vehicle hygiene measures. **No significant impact**
Interfere substantially with the recovery of the species.
The proposed construction activities will not interfere substantially with the recovery of the species, as most structures will be established on previously disturbed tracks and clearances. Given the species can tolerate inundation, the restoration of a natural flooding regime may enhance the quality of suitable habitat available for this species to recolonise. **No significant impact**

Slender Darling-pea (*Swainsona murrayana*) EPBC Act – Vulnerable
Lead to a long-term decrease in the size of a population of a species
Slender Darling-pea has not been recorded in Gunbower National Park, however potential suitable seasonally inundated Black Box woodland and depressions are present in the project area. The species is known from populations on lake margins and grasslands in the Kerang region, across the Patho Plains and in Terrick Terrick National Park, south of the project area (DEHWA 2008). Previous surveys during vegetation condition monitoring and threatened species surveys have not recorded the species in the Upper and Middle Gunbower Forests (Bennetts et al. 2012, Bennetts and Cook 2020), however the species is still considered as 'possibly' occurring within the inundation area of the project. Further surveys are required in spring 2020 for Middle Gunbower (downstream of Deep Creek) and Camerons Creek pump station and pipeline in Upper Gunbower to confirm the presence or absence there. However it is unlikely that a population is present given the construction footprint is centred on existing tracks and degraded areas.

The proposed construction works will therefore not lead to a long-term decrease in the size of a population, particularly as the area of vegetation removal associated with the construction footprint is considered negligible when compared to the broader Gunbower Forest and area that will benefit from a more natural flooding regime. Given the species can tolerate inundation, the restoration of a natural flooding regime may enhance the quality of suitable habitat available for this species to recolonise. **No significant impact**
Reduce the area of occupancy of a population
The proposed construction footprint is centred on existing tracks and degraded areas wherever possible. This will not significantly reduce the area of occupancy of any population as most structures will be established on previously disturbed tracks and clearances. The area does not represent core habitat or range for this species. The proposed construction works will therefore not reduce the area of occupancy of a population, particularly as the area of vegetation removal associated with the construction footprint is considered negligible when compared to the broader Gunbower Forest and area that will benefit from a more natural flooding regime. Given the species can tolerate inundation, the restoration of a natural flooding regime may enhance the quality of suitable habitat available for this species to recolonise. **No significant impact**
Fragment an existing population into two or more populations
The construction footprint is approximately 10 km from the closest known population in the grasslands of Terrick Terrick National Park and only limited potential habitat is present within the construction footprint due to existing disturbance along access tracks. Further surveys are required in spring 2020 for Middle Gunbower (downstream of Deep Creek) and Camerons Creek pump station and pipeline in Upper Gunbower to confirm the presence or absence there. However it is unlikely that a population is present given the construction footprint is centred on existing tracks and degraded areas. The proposed construction works will not fragment an existing population into two or more populations, particularly as the area of vegetation removal associated with the construction footprint is considered negligible when compared to the broader Gunbower Forest and area that will benefit from a more natural flooding regime. Given the species can tolerate inundation, the restoration of a natural flooding regime may enhance the quality of suitable habitat available for this species to recolonise. **No significant impact**
Adversely affect habitat critical to the survival of a species
The proposed construction footprint is centred on existing tracks and degraded areas wherever possible. This will not significantly adversely affect habitat critical to the survival of the species as most structures will be established on previously disturbed tracks and clearances. The area does not represent core habitat or range for this species. The proposed construction works will therefore not adversely affect habitat critical to the survival of the species, particularly as the area of vegetation removal associated with the construction footprint is considered negligible when compared to the broader Gunbower Forest and area that will benefit from a more natural flooding regime. Given the species can tolerate inundation, the restoration of a natural flooding regime may enhance the quality of suitable habitat available for this species to recolonise. **No significant impact**
Disrupt the breeding cycle of a population
The proposed construction works will not impact the lifecycle of the species. Further surveys are required in spring 2020 for Middle Gunbower (downstream of Deep Creek) and Camerons Creek pump station and pipeline in Upper Gunbower to confirm the presence or absence there. However, it is unlikely that a population is present given the construction footprint is centred on existing tracks and degraded areas.

Given the species can tolerate inundation, the restoration of a natural flooding regime may enhance the quality of suitable habitat available for this species to recolonise. **No significant impact**
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
The proposed construction footprint is centred on existing tracks and degraded areas wherever possible. This will not significantly adversely affect habitat critical to the survival of the species as most structures will be established on previously disturbed tracks and clearances. The area does not represent core habitat or range for this species. The proposed construction works will not modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline, particularly as the area of vegetation removal associated with the construction footprint is considered negligible when compared to the broader Gunbower Forest and area that will benefit from a more natural flooding regime. Given the species can tolerate inundation, the restoration of a natural flooding regime may enhance the quality of suitable habitat available for this species to recolonise. **No significant impact**
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat
The proposed works are unlikely to introduce weed species to the species' habitat after the implementation of strict vehicle hygiene measures. **No significant impact**
Introduce disease that may cause the species to decline
The proposed works are unlikely to introduce disease that may cause the species to decline after the implementation of strict vehicle hygiene measures. **No significant impact**
Interfere substantially with the recovery of the species.
The proposed construction footprint is centred on existing tracks and degraded areas wherever possible. This will not significantly adversely affect habitat critical to the survival of the species as most structures will be established on previously disturbed tracks and clearances. Given the species can tolerate inundation, the restoration of a natural flooding regime may enhance the quality of suitable habitat available for this species to recolonise. This is likely to assist in the recovery of the species (Mavromihalis 2010. **No significant impact**

EPBC Act listed Endangered Species

Winged Peppercress (*Lepidium monoplocoides*) EPBC Act – Endangered
Lead to a long-term decrease in the size of a population of a species
Winged Peppercress has not been recorded in the project area within Gunbower National Park, however a new population has been recorded within 10 km north-west of the project area and known populations occur downstream in Lower Gunbower Forest. These populations are regularly monitored as part of the TLM threatened species monitoring (Bennetts and Cook 2020). Previous surveys during vegetation condition monitoring and threatened species surveys have not recorded the species in the Upper and Middle Gunbower Forests (Bennetts et al. 2012, Bennetts and Cook 2020), however the species is still considered as 'possibly' occurring within the inundation area of the project. Further surveys are required in spring 2020 for Middle

Gunbower (downstream of Deep Creek) and Camerons Creek pump station and pipeline in Upper Gunbower to confirm the presence or absence there. However it is unlikely that a population is present given the construction footprint is centred on existing tracks and degraded areas. The proposed construction works will therefore not lead to a long-term decrease in the size of a population, particularly as the area of vegetation removal associated with the construction footprint is considered negligible when compared to the broader Gunbower Forest and area that will benefit from a more natural flooding regime. Given the species can tolerate inundation, the restoration of a natural flooding regime may enhance the quality of suitable habitat available for this species to recolonise. **No significant impact**
Reduce the area of occupancy of a population
The proposed construction footprint is centred on existing tracks and degraded areas wherever possible. This will not significantly reduce the area of occupancy of any population as most structures will be established on previously disturbed tracks and clearances. The area does not represent core habitat or range for this species. The proposed construction works will therefore not reduce the area of occupancy of a population, particularly as the area of vegetation removal associated with the construction footprint is considered negligible when compared to the broader Gunbower Forest and area that will benefit from a more natural flooding regime. Given the species can tolerate inundation, the restoration of a natural flooding regime may enhance the quality of suitable habitat available for this species to recolonise. **No significant impact**
Fragment an existing population into two or more populations
The construction footprint is approximately 7 km from the closest known population in Lower Gunbower Forest and only limited potential habitat is present within the construction footprint due to existing disturbance along access tracks. Further surveys are required in spring 2020 for Middle Gunbower (downstream of Deep Creek) and Camerons Creek pump station and pipeline in Upper Gunbower to confirm the presence or absence there. However it is unlikely that a population is present given the construction footprint is centred on existing tracks and degraded areas. The proposed construction works will not fragment an existing population into two or more populations, particularly as the area of vegetation removal associated with the construction footprint is considered negligible when compared to the broader Gunbower Forest and area that will benefit from a more natural flooding regime. Given the species can tolerate inundation, the restoration of a natural flooding regime may enhance the quality of suitable habitat available for this species to recolonise. **No significant impact**
Adversely affect habitat critical to the survival of a species
The proposed construction footprint is centred on existing tracks and degraded areas wherever possible. This will not significantly adversely affect habitat critical to the survival of the species as most structures will be established on previously disturbed tracks and clearances. The area does not represent core habitat or range for this species. The proposed construction works will therefore not adversely affect habitat critical to the survival of the species, particularly as the area of vegetation removal associated with the construction footprint is considered negligible when compared to the broader Gunbower Forest and area that will benefit from a more natural flooding regime. Given the species can tolerate inundation, the restoration of a natural flooding regime may enhance the quality of suitable habitat available for this species to recolonise. **No significant impact**
Disrupt the breeding cycle of a population
The proposed construction works will not impact the lifecycle of the species. Further surveys are required in spring 2020 for Middle Gunbower (downstream of Deep Creek) and Camerons Creek pump station and

pipeline in Upper Gunbower to confirm the presence or absence there. However, it is unlikely that a population is present given the construction footprint is centred on existing tracks and degraded areas.

Given the species can tolerate inundation, the restoration of a natural flooding regime may enhance the quality of suitable habitat available for this species to recolonise.

No significant impact

Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The proposed construction footprint is centred on existing tracks and degraded areas wherever possible. This will not significantly adversely affect habitat critical to the survival of the species as most structures will be established on previously disturbed tracks and clearances. The area does not represent core habitat or range for this species.

The proposed construction works will not modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline, particularly as the area of vegetation removal associated with the construction footprint is considered negligible when compared to the broader Gunbower Forest and area that will benefit from a more natural flooding regime. Given the species can tolerate inundation, the restoration of a natural flooding regime may enhance the quality of suitable habitat available for this species to recolonise.

No significant impact

Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

The proposed works are unlikely to introduce weed species to the species' habitat after the implementation of strict vehicle hygiene measures.

No significant impact

Introduce disease that may cause the species to decline

The proposed works are unlikely to introduce disease that may cause the species to decline after the implementation of strict vehicle hygiene measures.

No significant impact

Interfere substantially with the recovery of the species.

The proposed construction footprint is centred on existing tracks and degraded areas wherever possible. This will not significantly adversely affect habitat critical to the survival of the species as most structures will be established on previously disturbed tracks and clearances.

Given the species can tolerate inundation, the restoration of a natural flooding regime may enhance the quality of suitable habitat available for this species to recolonise. This is likely to assist in the recovery of the species (Mavromihalis 2010.

No significant impact

Stiff Groundsel (*Senecio behrianus*) EPBC Act – Endangered

Lead to a long-term decrease in the size of a population of a species

Stiff Groundsel is only known from six locations within Victoria, one of those being just outside the Gunbower National Park within a road reserve on McGillivray Road, Gunbower (50 m from the area of investigation) (Rakali Ecological Consulting 2015). The species was not recorded in the area of investigation or outside the project area during field survey in 2019. Previous surveys during vegetation condition monitoring and threatened species surveys have not recorded the species in the Upper and Middle Gunbower Forests

(Bennetts et al. 2012, Bennetts and Cook 2020), however the species is still considered as 'possibly' occurring within the inundation area of the project.

Further surveys are required in spring 2020 for Middle Gunbower (downstream of Deep Creek) and Camerons Creek pump station and pipeline in Upper Gunbower to confirm the presence or absence there. However it is unlikely that an important population is present given the construction footprint is centred on existing tracks and degraded areas.

The proposed construction works will therefore not lead to a long-term decrease in the size of a population, particularly as the area of vegetation removal associated with the construction footprint is considered negligible when compared to the broader Gunbower Forest and area that will benefit from a more natural flooding regime. Given the species can tolerate inundation, the restoration of a natural flooding regime may enhance the quality of suitable habitat available for this species to recolonise.

No significant impact

Reduce the area of occupancy of an important population

The proposed construction footprint is centred on existing tracks and degraded areas wherever possible. This will not significantly reduce the area of occupancy of any population as most structures will be established on previously disturbed tracks and clearances. The area does not represent core habitat or range for this species.

The proposed construction works will therefore not reduce the area of occupancy of a population, particularly as the area of vegetation removal associated with the construction footprint is considered negligible when compared to the broader Gunbower Forest and area that will benefit from a more natural flooding regime. Given the species can tolerate inundation, the restoration of a natural flooding regime may enhance the quality of suitable habitat available for this species to recolonise.

No significant impact

Fragment an existing population into two or more populations

The construction footprint is approximately 1.5 km from the closest population on McGillivray Road, outside the project area and only limited potential habitat is present within the construction footprint due to existing disturbance along access tracks. Further surveys are required in spring 2020 for Middle Gunbower (downstream of Deep Creek) and Camerons Creek pump station and pipeline in Upper Gunbower to confirm the presence or absence there. However it is unlikely that a population is present given the construction footprint is centred on existing tracks and degraded areas.

The proposed construction works will not fragment an existing population into two or more populations, particularly as the area of vegetation removal associated with the construction footprint is considered negligible when compared to the broader Gunbower Forest and area that will benefit from a more natural flooding regime. Given the species can tolerate inundation, the restoration of a natural flooding regime may enhance the quality of suitable habitat available for this species to recolonise.

No significant impact

Adversely affect habitat critical to the survival of a species

The proposed construction footprint is centred on existing tracks and degraded areas wherever possible. This will not significantly adversely affect habitat critical to the survival of the species as most structures will be established on previously disturbed tracks and clearances. The area does not represent core habitat or range for this species.

The proposed construction works will therefore not adversely affect habitat critical to the survival of the species, particularly as the area of vegetation removal associated with the construction footprint is considered negligible when compared to the broader Gunbower Forest and area that will benefit from a more natural flooding regime. Given the species can tolerate inundation, the restoration of a natural flooding regime may enhance the quality of suitable habitat available for this species to recolonise.

No significant impact

Disrupt the breeding cycle of a population
The proposed construction works will not impact the lifecycle of the species. Further surveys are required in spring 2020 for Middle Gunbower (downstream of Deep Creek) and Camerons Creek pump station and pipeline in Upper Gunbower to confirm the presence or absence there. However, it is unlikely that a population is present given the construction footprint is centred on existing tracks and degraded areas. Given the species can tolerate inundation, the restoration of a natural flooding regime may enhance the quality of suitable habitat available for this species to recolonise. **No significant impact**
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
The proposed construction footprint is centred on existing tracks and degraded areas wherever possible. This will not significantly adversely affect habitat critical to the survival of the species as most structures will be established on previously disturbed tracks and clearances. The area does not represent core habitat or range for this species. The proposed construction works will not modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline, particularly as the area of vegetation removal associated with the construction footprint is considered negligible when compared to the broader Gunbower Forest and area that will benefit from a more natural flooding regime. Given the species can tolerate inundation, the restoration of a natural flooding regime may enhance the quality of suitable habitat available for this species to recolonise. **No significant impact**
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat
The proposed works are unlikely to introduce weed species to the species' habitat after the implementation of strict vehicle hygiene measures. **No significant impact**
Introduce disease that may cause the species to decline
The proposed works are unlikely to introduce disease that may cause the species to decline after the implementation of strict vehicle hygiene measures. **No significant impact**
Interfere substantially with the recovery of the species.
The proposed construction footprint is centred on existing tracks and degraded areas wherever possible. This will not significantly adversely affect habitat critical to the survival of the species as most structures will be established on previously disturbed tracks and clearances. Given the species can tolerate inundation, the restoration of a natural flooding regime may enhance the quality of suitable habitat available for this species to recolonise. This is likely to assist in the recovery of the species Interestingly, sites within Gunbower National Park (Batemans Track, McGillivray Track, Centre Break and Pig Swamp Track) have been identified as potential future reintroduction sites for this species (Rakali Ecological Consulting 2015). **No significant impact**

Appendix Q. Significance assessment for EPBC Act listed fauna

Below are the significant impact criteria for species listed under the EPBC Act as Vulnerable, Endangered and Critically Endangered. The criteria are addressed below for:

EPBC Act Vulnerable (VU) listed

- Painted Honeyeater (*Grantiella picta*),
- Superb Parrot (*Polytelis swainsonii*),
- White-throated Needletail (*Hirundapus caudacutus*)
- South-eastern Long-eared Bat (*Nyctophilus corbeni*),
- Growling Grass Frog (*Litoria raniformis*) and
- Murray Cod (*Maccullochella peelii*).

EPBC Act Endangered (EN) listed

- Sloane's Froglet (*Crinia sloanei*)
- Australasian Bittern (*Botaurus poiciloptilus*)
- Australian Painted Snipe (*Rostratula australis*) and
- Trout Cod (*Maccullochella macquariensis*)

Critically Endangered (CR) listed

- Silver Perch (*Bidyanus bidyanus*).

NB – What is an important population of a species?

An 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

- Key source populations either for breeding or dispersal
- Populations that are necessary for maintaining genetic diversity, and/or

Populations that are near the limit of the species' range

EPBC Act listed Vulnerable Species

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

Painted Honeyeater (*Grantiella picta*) EPBC Act – Vulnerable, FFG Act – Listed, Victorian Advisory List - Vulnerable
Lead to a long-term decrease in the size of an important population of a species
Painted Honeyeater is considered to have potential to utilise habitats within the proposed construction footprint and broader inundation area. This species has not been previously recorded within the study area, and very few records exist across the local landscape. They are known to be highly mobile and have the potential to rarely forage in the Gunbower National Park. The proposed construction footprints are however not likely to significantly impact any areas of important habitat to this extremely mobile nomadic species, which forages widely over large areas in pursuit of mistletoe and flowering eucalypts. **No significant impact**
Reduce the area of occupancy of an important population
This species has not been previously recorded within the study area, and very few records exist across the local landscape. They are known to be highly mobile and have the potential to rarely forage in the Gunbower National Park. The proposed construction footprints are however not likely to reduce the area of occupancy of an important population. The proposed construction footprint is centred on existing tracks and degraded

areas wherever possible. This will not significantly reduce the area of occupancy of any population as most structures will be established on previously disturbed tracks and clearances. The area does not represent core habitat or range for this species.

No significant impact

Fragment an existing important population into two or more populations

The project is highly unlikely to result in the fragmentation of important Painted Honeyeater habitat (large trees supporting abundant mistletoe) as Gunbower National Park consists of 9,330 ha of contiguous habitat, with the proposed construction footprint located on existing tracks and disturbed areas within an unbroken canopy of open woodland vegetation. The area does not represent core habitat or range for this species.

No significant impact

Adversely affect habitat critical to the survival of a species

This species has not been previously recorded within the study area, and very few records exist across the local landscape. They are known to be highly mobile and have the potential to rarely forage in the Gunbower National Park. The proposed construction footprints are however not likely to reduce the area of occupancy of an important population. The proposed construction footprint is centred on existing tracks and degraded areas wherever possible. This will not significantly reduce the area of occupancy of any population as most structures will be established on previously disturbed tracks and clearances. The area does not represent core habitat or range for this species.

No significant impact

Disrupt the breeding cycle of an important population

The proposed construction footprint represents small, isolated and discreet areas of habitat within an extensive area of potentially suitable, but largely marginal habitat for this highly mobile species, and it is extremely unlikely to disrupt the breeding cycle of any population of this species. The area does not represent core habitat or range for this species.

No significant impact

Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The proposed construction footprint represents small, isolated and discreet areas of habitat within an extensive area of potentially suitable, but largely marginal habitat for this highly mobile species, and it is extremely unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. The area does not represent core habitat or range for this species.

The proposed construction works will not impact known or potential nesting trees or suitable foraging habitat, and therefore will not significantly modify, destroy, remove, isolate or decrease the availability or quality of Painted Honeyeater habitat within the area.

No significant impact

Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

Weed infiltration is possible from the proposed works, within the limited areas of construction. Appropriate systems must be set in place and followed to minimise the possibility of weed dispersal and exotic predator control, and will be included in a Construction Environmental Management Plan (CEMP). Impacts to this species from invasive species have not been identified as a threatening process previously and are highly unlikely in this case.

No significant impact

Introduce disease that may cause the species to decline

The proposed construction works are not expected to introduce any avifauna diseases to any potential Painted Honeyeater populations within the study area (the greatest chance for this to occur will be transmittal of disease from captive birds to wild birds, with a very low chance of this occurring), particularly with hygiene protocols for vehicles/machinery/staff that will be further described in a CEMP that will be prepared for the project. **No significant impact**
Interfere substantially with the recovery of the species.
The proposed construction activities will not interfere substantially with the recovery of the species, as this species and its breeding and foraging habitats will not be impacted by the proposed works, directly or indirectly. The project is likely to enhance habitat for this species, by promoting healthy woodlands suitable for foraging (Seran BL&A 2018) **No significant impact**

Superb Parrot (*Polytelis swainsonii*) EPBC Act – Vulnerable, FFG Act – Listed, Victorian Advisory List - Endangered
Lead to a long-term decrease in the size of an important population of a species
Superb Parrot is considered to have potential to infrequently utilise habitats within the proposed construction footprint and broader inundation area. Although extensive suitable Red Gum forest habitat exists, this species has only been previously recorded once within the study area (1996, VBA), with the closest and main population known from Barmah State Forest 50 km further east upstream of the Murray River. The proposed construction footprint represents a very small, low quality area of foraging habitat for this highly mobile species, and is considered highly unlikely to lead to a long-term decrease in the size of an important population of this species. The area does not represent core habitat or range for this species. **No significant impact**
Reduce the area of occupancy of an important population
The proposed construction footprint is centred on existing tracks and degraded areas wherever possible. This will not significantly reduce the area of occupancy of any population as most structures will be established on previously disturbed tracks and clearances. The area does not represent core habitat or range for this species. **No significant impact**
Fragment an existing important population into two or more populations
The project is highly unlikely to result in the fragmentation of important Superb Parrot habitat (nesting trees) as the species has only been recorded once in the study area. Gunbower National Park consists of 9,330 ha of contiguous potential habitat, with the proposed construction footprint located on existing tracks and disturbed areas. **No significant impact**
Adversely affect habitat critical to the survival of a species
The proposed construction footprint will not adversely affect habitat critical to the survival of this species, as it represents small, isolated and discrete areas of potential habitat within an extensive area of rarely used habitats for this mobile and infrequently recorded species. Critical habitat (nesting trees) for the species is known to occur within Barmah State Forest further upstream of the Murray River. **No significant impact**

Disrupt the breeding cycle of an important population
The species is not known to breed in Gunbower National Park. The proposed construction footprint represents small, isolated and discreet areas of habitat within an extensive area of potentially suitable, but largely marginal habitat for this highly mobile species, and it is extremely unlikely to disrupt the breeding cycle of any population of this species. **No significant impact**
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
The proposed construction footprint represents small, isolated and discreet areas of habitat within an extensive area of potentially suitable, but largely marginal habitat for this highly mobile species, and it is extremely unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. The area does not represent core habitat or range for this species. The proposed construction works will not impact known or potential nesting trees or suitable foraging habitat, and therefore will not significantly modify, destroy, remove, isolate or decrease the availability or quality of Superb Parrot habitat within the area. **No significant impact**
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat
Weed infiltration is possible from the proposed works, within the limited areas of construction. Appropriate systems must be set in place and followed to minimise the possibility of weed dispersal and exotic predator control, and will be included in a Construction Environmental Management Plan (CEMP). Impacts to this species from invasive species have not been identified as a threatening process previously and are highly unlikely in this case. **No significant impact**
Introduce disease that may cause the species to decline
The proposed construction works are not expected to introduce any avifauna diseases to any potential Superb Parrot populations within the study area (the greatest chance for this to occur will be transmittal of disease from captive birds to wild birds, with a very low chance of this occurring), particularly with hygiene protocols for vehicles/machinery/staff that will be further described in a CEMP that will be prepared for the project. **No significant impact**
Interfere substantially with the recovery of the species.
The proposed construction activities will not interfere substantially with the recovery of the species, as this species and its breeding and foraging habitats will not be impacted by the proposed works, directly or indirectly. The project is likely to enhance habitat for this species, by promoting healthy woodlands suitable for foraging (Seran BL&A 2018) **No significant impact**

White-throated Needletail (*Hirundapus caudacutus*) EPBC Act – Vulnerable, FFG Act – Listed, Victorian Advisory List - Vulnerable
Lead to a long-term decrease in the size of an important population of a species
White-throated Needletail is considered to have potential to utilise habitats within the proposed construction footprint and broader inundation area. This species has only been recorded once within the study area (VBA,

1980), and very few records exist across the local landscape. They are known to be primarily aerial, migratory birds that have the potential to rarely forage in the Gunbower National Park. The proposed construction footprints are however not likely to significantly impact any areas of important habitat to this primarily aerial species, which forages widely over large areas high in the airspace. **No significant impact**
Reduce the area of occupancy of an important population
This species has only been recorded once within the study area (VBA, 1980), and very few records exist across the local landscape. They are known to be primarily aerial, migratory birds that have the potential to rarely forage in the Gunbower National Park. The proposed construction footprints are however not likely to reduce the area of occupancy of an important population. The proposed construction footprint is centred on existing tracks and degraded areas wherever possible. This will not significantly reduce the area of occupancy of any population as most structures will be established on previously disturbed tracks and clearances. The area does not represent core habitat or range for this species. **No significant impact**
Fragment an existing important population into two or more populations
The project is highly unlikely to result in the fragmentation of important White-throated Needletail habitat as Gunbower National Park consists of 9,330 ha of contiguous habitat, with the proposed construction footprint located on existing tracks and disturbed areas within an unbroken canopy of open woodland vegetation. The area does not represent core habitat or range for this primarily aerial species, which forages widely over large areas high in the airspace. **No significant impact**
Adversely affect habitat critical to the survival of a species
This species has only been recorded once within the study area (VBA, 1980), and very few records exist across the local landscape. They are known to be primarily aerial, migratory birds that have the potential to rarely forage in the Gunbower National ParkThe proposed construction footprints are however not likely to reduce the area of occupancy of an important population. The proposed construction footprint is centred on existing tracks and degraded areas wherever possible. This will not significantly reduce the area of occupancy of any population as most structures will be established on previously disturbed tracks and clearances. The area does not represent core habitat or range for this primarily aerial species, which forages widely over large areas high in the airspace. **No significant impact**
Disrupt the breeding cycle of an important population
The proposed construction footprint represents small, isolated and discreet areas of habitat within an extensive area of potentially suitable, but largely marginal habitat for this highly mobile species, and it is extremely unlikely to disrupt the breeding cycle of any population of this species. The area does not represent core habitat or range for this species. **No significant impact**
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
The proposed construction footprint represents small, isolated and discreet areas of habitat within an extensive area of potentially suitable, but largely marginal habitat for this highly mobile species, and it is extremely unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. The area does not represent core habitat or range for this species. The proposed construction works will not impact known or potential nesting trees or suitable foraging habitat, and therefore will not significantly modify, destroy, remove, isolate or decrease the availability or quality of White-throated Needltail habitat within the area.

No significant impact
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat
Weed infiltration is possible from the proposed works, within the limited areas of construction. Appropriate systems must be set in place and followed to minimise the possibility of weed dispersal and exotic predator control, and will be included in a Construction Environmental Management Plan (CEMP). Impacts to this species from invasive species have not been identified as a threatening process previously and are highly unlikely in this case. **No significant impact**
Introduce disease that may cause the species to decline
The proposed construction works are not expected to introduce any avifauna diseases to any potential White-throated Needletail populations within the study area (the greatest chance for this to occur will be transmittal of disease from captive birds to wild birds, with a very low chance of this occurring), particularly with hygiene protocols for vehicles/machinery/staff that will be further described in a CEMP that will be prepared for the project. **No significant impact**
Interfere substantially with the recovery of the species.
The proposed construction activities will not interfere substantially with the recovery of the species, as this species and its breeding and foraging habitats will not be impacted by the proposed works, directly or indirectly. The project is likely to enhance habitat for this species, by promoting healthy woodlands suitable for foraging (Seran BL&A 2018) **No significant impact**

South-eastern Long-eared Bat (*Nyctophilus corbeni*) EPBC Act – Vulnerable, FFG Act – Listed, Victorian Advisory List - Endangered
Lead to a long-term decrease in the size of an important population of a species
The South-eastern or Corben's Long-eared Bat is considered unlikely to occur within the construction footprint or inundation area of the Gunbower National Park, and has not been recorded previously within the study area. It has however been considered further due to its relatively poorly understood status in Victoria in regards to habitat preferences and use. The species has not been recorded in the project area and was not recorded during bat surveys in the construction footprint in 2017 (GHD 2017). The closest records in Victoria to the project area are in old growth mallee vegetation around the Hattah township and Hattah-Kulkyne National Park, over 200 km to the north/west. It is considered unlikely that this species utilises Red Gum forests and woodland habitats within the project area. In the unlikely occurrence of this species occurring in the construction footprint, impacts as a result of vegetation removal and potential habitat loss will be localised, and therefore resultant impacts to the species are expected to be very low. However, broader mitigation measures for hollow-dependent species as outlined in Section 9 will also apply to threatened bats including South-eastern Long-eared Bat, including pre-clearance surveys and hollow-bearing tree management. **No significant impact**
Reduce the area of occupancy of an important population

It is considered unlikely that this species utilises Red Gum forests and woodland habitats within the Gunbower National Park project area, and that if it does occur, it is likely to be in extremely low numbers that would not be impacted by the proposed works or could be mitigated by preclearance surveys and hollow-bearing tree management protocols in the highly unlikely event that an *N. corbeni* is encountered during site development. In the unlikely occurrence of this species occurring in the construction footprint, impacts as a result of vegetation removal and potential habitat loss will be localised, and therefore resultant impacts to the species are expected to be very low. However, broader mitigation measures for hollow-dependent species as outlined in Section 9 will also apply to threatened bats including South-eastern Long-eared Bat, including pre-clearance surveys and hollow-bearing tree management. **No significant impact**
Fragment an existing important population into two or more populations
It is considered unlikely that this species utilises Red Gum forests and woodland habitats within the Gunbower National Park project area, and that if it does occur, it is likely to be in extremely low numbers that would not be impacted by the proposed works or could be mitigated by preclearance surveys and hollow-bearing tree management protocols in the highly unlikely event that an *N. corbeni* is encountered during site development. In the unlikely occurrence of this species occurring in the construction footprint, impacts as a result of vegetation removal and potential habitat loss will be localised, and therefore resultant impacts to the species are expected to be very low. However, broader mitigation measures for hollow-dependent species as outlined in Section 9 will also apply to threatened bats including South-eastern Long-eared Bat, including pre-clearance surveys and hollow-bearing tree management. **No significant impact**
Adversely affect habitat critical to the survival of a species
It is considered unlikely that this species utilises Red Gum forests and woodland habitats within the Gunbower National Park project area, and that if it does occur, it is likely to be in extremely low numbers that would not be impacted by the proposed works or could be mitigated by preclearance surveys and hollow-bearing tree management protocols in the highly unlikely event that an *N. corbeni* is encountered during site development. In the unlikely occurrence of this species occurring in the construction footprint, impacts as a result of vegetation removal and potential habitat loss will be localised, and therefore resultant impacts to the species are expected to be very low. However, broader mitigation measures for hollow-dependent species as outlined in Section 9 will also apply to threatened bats including South-eastern Long-eared Bat, including pre-clearance surveys and hollow-bearing tree management. **No significant impact**
Disrupt the breeding cycle of an important population
It is considered unlikely that this species utilises Red Gum forests and woodland habitats within the Gunbower National Park project area, and that if it does occur, it is likely to be in extremely low numbers that would not be impacted by the proposed works or could be mitigated by preclearance surveys and hollow-bearing tree management protocols in the highly unlikely event that an *N. corbeni* is encountered during site development. The proposed construction footprint represents small, isolated and discreet areas of habitat within an extensive area of potentially suitable, but largely marginal habitat for this highly mobile species, and it is extremely unlikely to disrupt the breeding cycle of any population of this species. The area does not represent core habitat or range for this species. **No significant impact**
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
The proposed construction footprint represents small, isolated and discreet areas of habitat within an extensive area of potentially suitable, but largely marginal habitat for this highly mobile species, and it is

extremely unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. The area does not represent core habitat or range for this species. In the unlikely occurrence of this species occurring in the construction footprint, impacts as a result of vegetation removal and potential habitat loss will be localised, and therefore resultant impacts to the species are expected to be very low. However, broader mitigation measures for hollow-dependent species as outlined in Section 9 will also apply to threatened bats including South-eastern Long-eared Bat, including pre-clearance surveys and hollow-bearing tree management. **No significant impact**
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat
Weed infiltration is possible from the proposed works, within the limited areas of construction. Appropriate systems must be set in place and followed to minimise the possibility of weed dispersal and exotic predator control, and will be included in a Construction Environmental Management Plan (CEMP). Impacts to this species from invasive species have not been identified as a threatening process previously and are highly unlikely in this case. **No significant impact**
Introduce disease that may cause the species to decline
The proposed construction works are not expected to introduce any diseases to any potential South-eastern Long-eared Bat populations within the study area, particularly with hygiene protocols for vehicles/machinery/staff that will be further described in a CEMP that will be prepared for the project. **No significant impact**
Interfere substantially with the recovery of the species.
The proposed construction activities will not interfere substantially with the recovery of the species, as this species and its breeding and foraging habitats will not be impacted by the proposed works, directly or indirectly. The project is likely to enhance habitat for this species, by promoting healthy woodlands suitable for foraging (Seran BL&A 2018) **No significant impact**

The following assessment against the Significant Impact Guidelines for the Growling Grass Frog (*Litoria raniformis*) listed as Vulnerable under the EPBC Act was made (DEWHA 2009):

Growling Grass Frog (*Litoria raniformis*) EPBC Act – Vulnerable, FFG Act – Listed, Victorian Advisory List - Endangered
Habitat degradation in area supporting an important population
Due to the fragmentation of habitat for the Growling Grass Frog, any viable population is considered an important population for the persistence and recovery of the species. A viable population is considered one that is not isolated from other populations or waterbodies, such that the opportunity to interact with other nearby populations and has the ability to establish new populations when waterbodies fill and become available (DEWHA, 2009). Previous surveys have failed to identify the species within the Gunbower Forest, The Gunbower Forest Ramsar Site Ecological Character Description determines the following as to the likely presence of the Growling Grass Frog, 'Single record only and despite a number of fish surveys in recent years (Ward 2009) the species has not been found again. There is a low degree of certainty that the site is important for this species (DSEWPAC, 2011). It is therefore considered unlikely that the project area supports an important population of the Growling Grass Frog. The Growling Grass Frog is considered to have potential to utilise habitats within the broader inundation area. Previous surveys have failed to identify the species within the Gunbower National Park. However suitable

habitat exists near permanent waterways and previous records (1961) of the species indicate the species was once and may still be present in low densities. Despite the long absence of records of this species, the presence of suitable habitat, and the ability of this species to recolonise areas suggest that it has potential to occur in the area, and a reintroduction of more suitable ecological watering regimes may help facilitate this.

Small areas of potential habitat for the species exist in the construction footprint at Camerons Creek, Baggotts Creek and Deep Creek. Targeted surveys are recommended to confirm the absence of this species which will ensure the project doesn't reduce the area of occupancy of the species. Should the species be identified mitigation measures will be implemented to ensure the species is not impacted during construction. The species will benefit from the operational phase of the project.

No significant impact

Isolation and fragmentation of important populations.
Due to the fragmentation of habitat for the Growling Grass Frog, any viable population is considered an important population for the persistence and recovery of the species. A viable population is considered one that is not isolated from other populations or waterbodies, such that the opportunity to interact with other nearby populations and has the ability to establish new populations when waterbodies fill and become available (DEWHA, 2009). Previous surveys have failed to identify the species within the Gunbower Forest, The Gunbower Forest Ramsar Site Ecological Character Description determines the following as to the likely presence of the Growling Grass Frog, 'Single record only and despite a number of fish surveys in recent years (Ward 2009) the species has not been found again. There is a low degree of certainty that the site is important for this species (DSEWPAC, 2011). It is therefore considered unlikely that the project area supports an important population of the Growling Grass Frog. Small areas of potential habitat for the species exist in the construction footprint at Camerons Creek, Baggotts Creek and Deep Creek. Targeted surveys are recommended to confirm the absence of this species which will ensure the project doesn't isolate and fragment a potential population of the species. Should the species be identified mitigation measures will be implemented to ensure the species is not impacted during construction. The species will benefit from the operational phase of the project. The project will not significantly reduce the area of occupancy of any population should it exist, as the structures will be established on already disturbed tracks and levees. The project will not result in the fragmentation of important Growling Grass Frog habitat as the park is unlikely to presently support a population of this species and contains very limited potential habitat. The area does not represent core habitat or range for this species. If external populations of this species recolonise the area, there is the potential to provide an increased and improved area of habitat that may help link otherwise disjointed populations upstream and downstream of the Gunbower National Park project area, thereby the works may increase connectivity for this species across the landscape. **No significant impact**

Murray Cod (*Maccullochella peelii*) - EPBC Act – Vulnerable, FFG Act – Listed, Victorian Advisory List - Vulnerable
Lead to a long-term decrease in the size of an important population of a species
The Murray Cod is known to occur in the Murray River and Gunbower Creek alongside the project area and is considered a main channel specialist. Murray Cod occurs naturally in the waterways of the Murray-Darling Basin (ACT, SA, NSW and Vic) and is known to live in a wide range of warm water habitats from clear, rocky streams to slow flowing turbid rivers and billabongs (TSSC, 2003). The species has been frequently recorded in the Murray River and Gunbower Creek, including in the Torrumbarry Weir Pool (Stuart, 2020). Species recorded in low abundances during annual monitoring between 2008-2017 of the Murray River in Gunbower Forest (Bloink et al. 2018). The species may enter the forest

areas during inundation events, but seasonally inundated semi-permanent forest wetlands do not provide suitable long term habitat. Presence within the main channels of the Murray River and Gunbower Creek adjacent the site should be assumed and the species is considered as possible occurrence within the inundation area.

The proposed construction footprint is in predominantly dry areas, and it is considered unlikely that the proposed actions will lead to a long-term decrease in the size of an important population of this species. Consideration of any in-stream works such as coffer dam construction, dewatering works, and any potential for sediment/ contaminant run-off into wet areas from construction footprints must consider Murray Cod to avoid potential localised impacts. A construction specific aquatic fauna management plan should be developed for all works around waterways.

During operations, the project area will receive water via pumping meaning there is a very low likelihood of large numbers of Murray Cod entering the floodplain. Fine fish screens will be fitted to pipe inlets used to water the floodplain, preventing the introduction of species to the floodplain. A staged and managed drawdown regime will be implemented to monitor water quality of return flows and provide cues for native fish to exit the wetlands to prevent stranding. Outlet regulators will provide for unrestricted fish passage during manged drawdown and natural floodplain inundation events. Low return flows during the maintenance and drawdown periods of environmental watering are planned (1,540 ML total) and will occur at a time of year when flows in the Murray River are high to reduce any potential blackwater impacts to the main Murray River channel

It is unlikely that the construction and operation phase of the project will lead to a long-term decrease in size of a population due to the minimal construction impacts and mitigation measures for operation.

No significant impact

Reduce the area of occupancy of the species
The proposed construction footprints are in predominantly dry areas, and it is considered unlikely that the proposed actions will lead to a reduction in the area of occupancy of a population of this species. Consideration of any in-stream works such as coffer dam construction, dewatering works, and any potential for sediment/ contaminant run-off into wet areas from construction footprints must consider Murray Cod. A construction specific aquatic fauna management plan should be developed for all works around waterways. During operations, the project area will receive water via pumping meaning there is a very low likelihood of large numbers of Murray Cod entering the floodplain. Fine fish screens will be fitted to pipe inlets used to water the floodplain, preventing the introduction of species to the floodplain. A staged and managed drawdown regime will be implemented to monitor water quality of return flows and provide cues for native fish to exit the wetlands to prevent stranding. Outlet regulators will provide for unrestricted fish passage during manged drawdown and natural floodplain inundation events. Low return flows during the maintenance and drawdown periods of environmental watering are planned (1,540 ML total) and will occur at a time of year when flows in the Murray River are high to reduce any potential blackwater impacts to the main Murray River channel It is unlikely that the construction and operation phase of the project will reduce the area of occupancy of the species due to the minimal construction impacts and mitigation measures for operation. **No significant impact**
Fragment an existing important population into two or more populations
The proposed construction footprints are in predominantly dry areas, and it is considered unlikely that the proposed actions will fragment an existing population into two or more populations Consideration of any in-stream works such as coffer dam construction, dewatering works, and any potential for sediment/ contaminant run-off into wet areas from construction footprints must consider Murray Cod. A construction specific aquatic fauna management plan should be developed for all works around waterways. During operations, the project area will receive water via pumping meaning there is a very low likelihood of large numbers of Murray Cod entering the floodplain. Fine fish screens will be fitted to pipe inlets used to water the floodplain, preventing the introduction of species to the floodplain. A staged and managed

drawdown regime will be implemented to monitor water quality of return flows and provide cues for native fish to exit the wetlands to prevent stranding. Outlet regulators will provide for unrestricted fish passage during manged drawdown and natural floodplain inundation events. Low return flows during the maintenance and drawdown periods of environmental watering are planned (1,540 ML total) and will occur at a time of year when flows in the Murray River are high to reduce any potential blackwater impacts to the main Murray River channel

It is unlikely that the construction and operation phase of the project will fragment an existing important population into two or more populations due to the minimal construction impacts and mitigation measures for operation.

No significant impact

Adversely affect habitat critical to the survival of a species
The proposed construction footprints are in predominantly dry areas, and it is considered unlikely that the proposed actions will affect habitat critical to the survival of the species. Consideration of any in-stream works such as coffer dam construction, dewatering works, and any potential for sediment/ contaminant run-off into wet areas from construction footprints must consider Murray Cod. A construction specific aquatic fauna management plan should be developed for all works around waterways. During operations, the project area will receive water via pumping meaning there is a very low likelihood of large numbers of Murray Cod entering the floodplain. Fine fish screens will be fitted to pipe inlets used to water the floodplain, preventing the introduction of species to the floodplain. A staged and managed drawdown regime will be implemented to monitor water quality of return flows and provide cues for native fish to exit the wetlands to prevent stranding. Outlet regulators will provide for unrestricted fish passage during manged drawdown and natural floodplain inundation events. Low return flows during the maintenance and drawdown periods of environmental watering are planned (1,540 ML total) and will occur at a time of year when flows in the Murray River are high to reduce any potential blackwater impacts to the main Murray River channel It is unlikely that the construction and operation phase of the project will adversely affect habitat critical to the survival of the species due to the minimal construction impacts and mitigation measures for operation. **No significant impact**
Disrupt the breeding cycle of a population
The proposed construction footprints are in predominantly dry areas, and it is considered unlikely that the proposed actions disrupt the breeding cycle of a population. Consideration of any in-stream works such as coffer dam construction, dewatering works, and any potential for sediment/ contaminant run-off into wet areas from construction footprints must consider Murray Cod. A construction specific aquatic fauna management plan should be developed for all works around waterways. During operations, the project area will receive water via pumping meaning there is a very low likelihood of large numbers of Murray Cod entering the floodplain. Fine fish screens will be fitted to pipe inlets used to water the floodplain, preventing the introduction of species to the floodplain. A staged and managed drawdown regime will be implemented to monitor water quality of return flows and provide cues for native fish to exit the wetlands to prevent stranding. Outlet regulators will provide for unrestricted fish passage during manged drawdown and natural floodplain inundation events. Low return flows during the maintenance and drawdown periods of environmental watering are planned (1,540 ML total) and will occur at a time of year when flows in the Murray River are high to reduce any potential blackwater impacts to the main Murray River channel Furthermore, spawning of most native fish occurs from mid spring onwards (SKM 2003), so avoiding pumping from mid spring onwards will also minimise the likelihood of eggs and larvae present in the water column of the Murray River from being entrained It is unlikely that the construction and operation phase of the project will disrupt the breeding cycle of a population due to the minimal construction impacts and mitigation measures for operation. **No significant impact**

Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
The proposed construction footprints are in predominantly dry areas, and it is considered unlikely that the proposed actions will decrease the availability or quality of habitat to the extent that the species is likely to decline. Consideration of any in-stream works such as coffer dam construction, dewatering works, and any potential for sediment/ contaminant run-off into wet areas from construction footprints must consider Murray Cod. A construction specific aquatic fauna management plan should be developed for all works around waterways. During operations, the project area will receive water via pumping meaning there is a very low likelihood of large numbers of Murray Cod entering the floodplain. Fine fish screens will be fitted to pipe inlets used to water the floodplain, preventing the introduction of species to the floodplain. A staged and managed drawdown regime will be implemented to monitor water quality of return flows and provide cues for native fish to exit the wetlands to prevent stranding. Outlet regulators will provide for unrestricted fish passage during manged drawdown and natural floodplain inundation events. Low return flows during the maintenance and drawdown periods of environmental watering are planned (1,540 ML total) and will occur at a time of year when flows in the Murray River are high to reduce any potential blackwater impacts to the main Murray River channel It is unlikely that the construction and operation phase of the project will decrease the availability or quality of habitat to the extent that the species is likely to decline due to the minimal construction impacts and mitigation measures for operation. **No significant impact**
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered of critically endangered species' habitat
Eleven alien fish species are now established in the Murray-Darling River system, with Carp *Cyprinus carpio*, Redfin Perch *Perca fluviatilis*, Goldfish *Carassius auratus* and Eastern Gambusia *Gambusia holbrooki* the most widespread (NMCRT, 2010). These species are already established in the vicinity of the project site. The construction phase of the project is not likely to lead to an increase in these species. Inundation of floodplain habitat during the operational phase has a high likelihood of increasing carp populations within wetland habitat and also in aquatic habitat that remains following flood events. Wetlands are not the preferred habitat for the species and the inundation events will mimic natural over-bank flows. That said, the impact of operation will create conditions that are likely to benefit carp, which may negatively impact Murray Cod. Following recommended mitigation measures (see DELWP, 2018) to control carp may minimise their colonisation. This could include measures such as implementing a winter fill regime, developing a native fish exit strategy to strand carp and drying of weltands with high carp density. **No significant impact**
Introduce disease that may cause the species to decline
Silver perch are highly susceptible to several diseases including Epizootic Haematopoietic Necrosis Virus (EHNV) (Langdon 1989). The likelihood of the introduction of disease during the construction phase is minimal if standard hygiene protocols are implemented. **No significant impact**
Interfere with the recovery of the species.
The proposed construction activities will not interfere substantially with the recovery of the species, as potential impacts to this species and its breeding and foraging habitats will be mitigated through a construction specific aquatic fauna management plan, design of infrastructure and adapative management of risks associated with blackwater, water quality and carp as is currently implemented on other watering projects (e.g. Hattah Lakes TLM works). **No significant impact**

EPBC Act listed Endangered Species

Sloane's Froglet (*Crinia sloanei*) EPBC Act – Endangered
Lead to a long-term decrease in the size of a population
Sloane's Froglet is considered to have potential to utilise habitats within the proposed construction footprint and broader inundation area. Suitable habitat exists near permanent waterways and previous records (1993) of the species indicate the species was once and may still be present in low densities. Recent extensive surveys have only located the species at a few general locations in the Albury-Wodonga region (Knight 2013). Small areas of potential habitat for the species exist in the construction footprint at Camerons Creek, Baggotts Creek and Deep Creek. Targeted surveys for Sloane's Froglet will be completed late winter/early spring 2020 to determine the presence or absence of this species within the proposed construction footprint. Where the species is not identified within the construction footprint during targeted surveys there will be no requirement for further assessment or specific mitigation measures. Where the species is identified during targeted assessment further consideration will be given to the design to seek to further minimise the impact to the species. In addition, specific mitigation measures will be detailed to ensure that the proposed construction works do not result in a long-term decrease in the size of a population. The vegetation removal required for the project is predominantly located on higher ground away from the semi-permanent wetlands and floodways considered potential habitat for this species. The project is unlikely to lead to a long-term decrease in the size of a population should it exist, as the structures will be primarily established on already disturbed tracks and levees. Despite an absence of records of this species, the presence of suitable habitat, and the ability of this species to recolonise areas suggest that it has potential to occur in the area, and a reintroduction of more suitable ecological watering regimes may help facilitate this. Sloane's Froglet is almost set to benefit from the operational phase of the project. **No significant impact**
Reduce the area of occupancy of a population
Small areas of potential habitat for the species exist in the construction footprint at Camerons Creek, Baggotts Creek and Deep Creek. Targeted surveys for Sloane's Froglet will be completed late winter/early spring 2020 to determine the presence or absence of this species within the proposed construction footprint. Where the species is not identified within the construction footprint during targeted surveys there will be no requirement for further assessment or specific mitigation measures. Where the species is identified during targeted assessment further consideration will be given to the design to seek to further minimise the impact to the species. In addition, specific mitigation measures will be detailed to ensure that the proposed construction works do not reduce the area of occupancy of a population. The vegetation removal required for the project is predominantly located on higher ground away from the semi-permanent wetlands and floodways considered potential habitat for this species. The project is unlikely to reduce the area of occupancy of a population should it exist, as the structures will be primarily established on already disturbed tracks and levees. Despite an absence of records of this species, the presence of suitable habitat, and the ability of this species to recolonise areas suggest that it has potential to occur in the area, and a reintroduction of more suitable ecological watering regimes may help facilitate this. Sloane's Froglet is almost set to benefit from the operational phase of the project. **No significant impact**
Fragment an existing population into two or more populations
Small areas of potential habitat for the species exist in the construction footprint at Camerons Creek, Baggotts Creek and Deep Creek. Targeted surveys for Sloane's Froglet will be completed late winter/early spring 2020 to determine the presence or absence of this species within the proposed construction footprint.

Where the species is not identified within the construction footprint during targeted surveys there will be no requirement for further assessment or specific mitigation measures. Where the species is identified during targeted assessment further consideration will be given to the design to seek to further minimise the impact to the species. In addition, specific mitigation measures will be detailed to ensure that the proposed construction works do not fragment an existing population should it exist. The vegetation removal required for the project is predominantly located on higher ground away from the semi-permanent wetlands and floodways considered potential habitat for this species. The project is unlikely to fragment an existing population into two or more populations should it exist, as the structures will be primarily established on already disturbed tracks and levees. Despite an absence of records of this species, the presence of suitable habitat, and the ability of this species to recolonise areas suggest that it has potential to occur in the area, and a reintroduction of more suitable ecological watering regimes may help facilitate this. Sloane's Froglet is almost set to benefit from the operational phase of the project. **No significant impact**
Adversely affect habitat critical to the survival of a species
Small areas of potential habitat for the species exist in the construction footprint at Camerons Creek, Baggotts Creek and Deep Creek. Targeted surveys for Sloane's Froglet will be completed late winter/early spring 2020 to determine the presence or absence of this species within the proposed construction footprint. Where the species is not identified within the construction footprint during targeted surveys there will be no requirement for further assessment or specific mitigation measures. Where the species is identified during targeted assessment further consideration will be given to the design to seek to further minimise the impact to the species. In addition, specific mitigation measures will be detailed to ensure that the proposed construction works do not advsersely affect habitat critical to the survival of the species The vegetation removal required for the project is predominantly located on higher ground away from the semi-permanent wetlands and floodways considered potential habitat for this species. The project is unlikely to adversely affect habitat critical to the survival of the species, as the structures will be primarily established on already disturbed tracks and levees. Despite an absence of records of this species, the presence of suitable habitat, and the ability of this species to recolonise areas suggest that it has potential to occur in the area, and a reintroduction of more suitable ecological watering regimes may help facilitate this. Sloane's Froglet is almost set to benefit from the operational phase of the project. **No significant impact**
Disrupt the breeding cycle of a population
Small areas of potential habitat for the species exist in the construction footprint at Camerons Creek, Baggotts Creek and Deep Creek. Targeted surveys for Sloane's Froglet will be completed late winter/early spring 2020 to determine the presence or absence of this species within the proposed construction footprint. Where the species is not identified within the construction footprint during targeted surveys there will be no requirement for further assessment or specific mitigation measures. Where the species is identified during targeted assessment further consideration will be given to the design to seek to further minimise the impact to the species. In addition, specific mitigation measures will be detailed to ensure that the proposed construction works do not disrupt the breeding cycle of a population. The vegetation removal required for the project is predominantly located on higher ground away from the semi-permanent wetlands and floodways considered potential habitat for this species. The project is unlikely to disrupt the breeding cycle of a population should it exist, as the structures will be primarily established on already disturbed tracks and levees. Despite an absence of records of this species, the presence of suitable habitat, and the ability of this species to recolonise areas suggest that it has potential to occur in the area, and a reintroduction of more suitable

ecological watering regimes may help facilitate this. Sloane's Froglet is almost set to benefit from the operational phase of the project. **No significant impact**
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
Small areas of potential habitat for the species exist in the construction footprint at Camerons Creek, Baggotts Creek and Deep Creek. Targeted surveys for Sloane's Froglet will be completed late winter/early spring 2020 to determine the presence or absence of this species within the proposed construction footprint. Where the species is not identified within the construction footprint during targeted surveys there will be no requirement for further assessment or specific mitigation measures. Where the species is identified during targeted assessment further consideration will be given to the design to seek to further minimise the impact to the species. In addition, specific mitigation measures will be detailed to ensure that the proposed construction works do not modify, destroy, remove or isolate or decrease the availability or quality of habitat. The vegetation removal required for the project is predominantly located on higher ground away from the semi-permanent wetlands and floodways considered potential habitat for this species. The project is unlikely to decrease the availability or quality of habitat for a population should it exist, as the structures will be primarily established on already disturbed tracks and levees. Despite an absence of records of this species, the presence of suitable habitat, and the ability of this species to recolonise areas suggest that it has potential to occur in the area, and a reintroduction of more suitable ecological watering regimes may help facilitate this. Sloane's Froglet is almost set to benefit from the operational phase of the project. **No significant impact**
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat
Eleven alien fish species are now established in the Murray-Darling River system, with Carp *Cyprinus carpio*, Redfin Perch *Perca fluviatilis*, Goldfish *Carassius auratus* and Eastern Gambusia *Gambusia holbrooki* the most widespread (NMCRT, 2010). These species are already established in the vicinity of the project site. The construction phase of the project is not likely to lead to an increase in these species. Inundation of floodplain habitat during the operational phase has a high likelihood of increasing carp and Gambusia populations within wetland habitat and also in aquatic habitat that remains following flood events. Wetlands are not the preferred habitat for the species and the inundation events will mimic natural over-bank flows. That said, the impact of operation will create conditions that are likely to benefit carp, which may negatively impact Sloane's Froglet. Following recommended mitigation measures (see DELWP, 2018) to control carp may minimise their colonisation. This could include measures such as implementing a winter fill regime, developing a native fish exit strategy to strand carp and drying of weltands with high carp density. **No significant impact**
Introduce disease that may cause the species to decline
Mitigation measures such as vehicle hygiene measures to prevent the spread or transmission of Chytrid Fungus as per Murray et al (2011) during and after the construction phase will reduce the likelihood of spreading disease. **No significant impact**
Interfere substantially with the recovery of the species.
The vegetation removal required for the project is predominantly located on higher ground away from the semi-permanent wetlands and floodways considered potential habitat for this species. The project is unlikely to interfere substantially with the recovery of the species, as the structures will be primarily established on already disturbed tracks and levees.

Despite an absence of records of this species, the presence of suitable habitat, and the ability of this species to recolonise areas suggest that it has potential to occur in the area, and a reintroduction of more suitable ecological watering regimes may help facilitate this. Sloane's Froglet is almost set to benefit from the operational phase of the project.

No significant impact

Australasian Bittern (*Botaurus poiciloptilus*) EPBC Act – Endangered, FFG Act – Listed, Victorian Advisory List - Endangered
Lead to a long-term decrease in the size of a population
Australasian Bittern is considered to have potential to infrequently utilise habitats within the broader inundation area. The species requires densely vegetated permanent freshwater or brackish swamps and wetlands and is found in southern coastal areas and along the Murray River region of northern Victoria. The species has only been recorded once in the project area, in Pig Swamp (VBA, 1993) although suitable habitat exists along Cameron's Creek and Black Charlie Lagoon. This suggests the species is likely to visit the project infrequently and in response to flooding years when improved habitat availability and condition is recorded. The proposed construction footprint is centred on existing tracks and degraded areas wherever possible. Given vegetation removal for the project will primarily occur in dry, terrestrial vegetation types and only a small area of wetland habitat is within the construction footprint it is unlikely to lead to a decrease in the size of a population. The operational phase of the project is likely to greatly enhance the extent and quality of habitat available. **No significant impact**
Reduce the area of occupancy of the species
The proposed construction footprint is centred on existing tracks and degraded areas wherever possible. Given vegetation removal for the project will primarily occur in dry, terrestrial vegetation types and only a small area of wetland habitat is within the construction footprint it is unlikely to reduce the area of occupancy of the species. The operational phase of the project is likely to greatly enhance the extent and quality of habitat available. **No significant impact**
Fragment an existing population into two or more populations
The project is highly unlikely to result in the fragmentation of Australasian Bittern habitat. The proposed construction footprint is centred on existing tracks and degraded areas wherever possible. Given vegetation removal for the project will primarily occur in dry, terrestrial vegetation types and only a small area of wetland habitat is within the construction footprint it is unlikely to reduce the area of occupancy of the species. The operational phase of the project is likely to greatly enhance the extent and quality of habitat available. **No significant impact**
Adversely affect habitat critical to the survival of a species
The proposed construction footprint will not adversely affect habitat critical to the survival of this species, as it represents small, isolated and discrete areas of potential habitat within an extensive area of rarely used habitats for this mobile and infrequently recorded species. The operational phase of the project is likely to greatly enhance the extent and quality of habitat available. **No significant impact**
Disrupt the breeding cycle of a population

The species is not known to breed in Gunbower National Park. The proposed construction footprint represents small, isolated and discreet areas of habitat within an extensive area of potentially suitable, but largely marginal habitat for this highly mobile species, and it is extremely unlikely to disrupt the breeding cycle of any population of this species. **No significant impact**
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
The proposed construction footprint represents small, isolated and discreet areas of habitat within an extensive area of potentially suitable, but largely marginal habitat for this highly mobile species, and it is extremely unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. The area does not represent core habitat or range for this species. The proposed construction works will not impact known or potential nesting trees or suitable foraging habitat, and therefore will not significantly modify, destroy, remove, isolate or decrease the availability or quality of Superb Parrot habitat within the area. **No significant impact**
Result in invasive species that are harmful to an endangered species becoming established in the endangered species' habitat
Weed infiltration is possible from the proposed works, within the limited areas of construction. Appropriate systems must be set in place and followed to minimise the possibility of weed dispersal and exotic predator control, and will be included in a Construction Environmental Management Plan (CEMP). Impacts to this species from invasive species have not been identified as a threatening process previously and are highly unlikely in this case. There is potential for the introduction of environmental water to lead to an increase in abundance of feral predators (cats, foxes), herbivores (e.g. goats) and omnivores (e.g. pigs) due to the associated increase in productivity. Some of the species such as cats and foxes could potentially prey on migratory waterbirds. **No significant impact**
Introduce disease that may cause the species to decline
The proposed construction works are not expected to introduce any avifauna diseases to any potential Australasian Bittern populations within the study area (the greatest chance for this to occur will be transmittal of disease from captive birds to wild birds, with a very low chance of this occurring), particularly with hygiene protocols for vehicles/machinery/staff that will be further described in a CEMP that will be prepared for the project. **No significant impact**
Interfere substantially with the recovery of the species.
The proposed construction activities will not interfere substantially with the recovery of the species, as this species and its breeding and foraging habitats will not be impacted by the proposed works, directly or indirectly. The operational phase of the project is likely to greatly enhance the extent and quality of habitat available and assist in the recovery of the species. **No significant impact**

Australian Painted Snipe (*Botaurus poiciloptilus*) EPBC Act – Endangered, FFG Act – Listed, Victorian Advisory List - Endangered
Lead to a long-term decrease in the size of a population
Australian Painted Snipe is considered to have potential to infrequently utilise habitats within the broader inundation area. The species requires vegetated permanent or seasonally inundated freshwater or brackish swamps and wetlands and is found infrequently across eastern Australia. The species has not been recorded in the project area, although suitable habitat exists along Cameron's Creek and Black Charlie Lagoon. This suggests the species may have the potential to visit the project infrequently and in response to flooding years when improved habitat availability and condition is recorded. The proposed construction footprint is centred on existing tracks and degraded areas wherever possible. Given vegetation removal for the project will primarily occur in dry, terrestrial vegetation types and only a small area of wetland habitat is within the construction footprint it is unlikely to lead to a decrease in the size of a population. The operational phase of the project is likely to greatly enhance the extent and quality of habitat available. **No significant impact**
Reduce the area of occupancy of the species
The proposed construction footprint is centred on existing tracks and degraded areas wherever possible. Given vegetation removal for the project will primarily occur in dry, terrestrial vegetation types and only a small area of wetland habitat is within the construction footprint it is unlikely to reduce the area of occupancy of the species. The operational phase of the project is likely to greatly enhance the extent and quality of habitat available. **No significant impact**
Fragment an existing population into two or more populations
The project is highly unlikely to result in the fragmentation of Australian Painted Snipe habitat. The proposed construction footprint is centred on existing tracks and degraded areas wherever possible. Given vegetation removal for the project will primarily occur in dry, terrestrial vegetation types and only a small area of wetland habitat is within the construction footprint it is unlikely to reduce the area of occupancy of the species. The operational phase of the project is likely to greatly enhance the extent and quality of habitat available. **No significant impact**
Adversely affect habitat critical to the survival of a species
The proposed construction footprint will not adversely affect habitat critical to the survival of this species, as it represents small, isolated and discrete areas of potential habitat within an extensive area of rarely used habitats for this mobile and infrequently recorded species. The operational phase of the project is likely to greatly enhance the extent and quality of habitat available. **No significant impact**
Disrupt the breeding cycle of a population
The species is not known to breed in Gunbower National Park. The proposed construction footprint represents small, isolated and discreet areas of habitat within an extensive area of potentially suitable, but largely marginal habitat for this highly mobile species, and it is extremely unlikely to disrupt the breeding cycle of any population of this species. **No significant impact**
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The proposed construction footprint represents small, isolated and discreet areas of habitat within an extensive area of potentially suitable, but largely marginal habitat for this highly mobile species, and it is extremely unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. The area does not represent core habitat or range for this species. The proposed construction works will not impact known or potential nesting trees or suitable foraging habitat, and therefore will not significantly modify, destroy, remove, isolate or decrease the availability or quality of Superb Parrot habitat within the area. **No significant impact**
Result in invasive species that are harmful to an endangered species becoming established in the endangered species' habitat
Weed infiltration is possible from the proposed works, within the limited areas of construction. Appropriate systems must be set in place and followed to minimise the possibility of weed dispersal and exotic predator control, and will be included in a Construction Environmental Management Plan (CEMP). Impacts to this species from invasive species have not been identified as a threatening process previously and are highly unlikely in this case. There is potential for the introduction of environmental water to lead to an increase in abundance of feral predators (cats, foxes), herbivores (e.g. goats) and omnivores (e.g. pigs) due to the associated increase in productivity. Some of the species such as cats and foxes could potentially prey on migratory waterbirds. **No significant impact**
Introduce disease that may cause the species to decline
The proposed construction works are not expected to introduce any avifauna diseases to any potential Australian Painted Snipe populations within the study area (the greatest chance for this to occur will be transmittal of disease from captive birds to wild birds, with a very low chance of this occurring), particularly with hygiene protocols for vehicles/machinery/staff that will be further described in a CEMP that will be prepared for the project. **No significant impact**
Interfere substantially with the recovery of the species.
The proposed construction activities will not interfere substantially with the recovery of the species, as this species and its breeding and foraging habitats will not be impacted by the proposed works, directly or indirectly. The operational phase of the project is likely to greatly enhance the extent and quality of habitat available and assist in the recovery of the species. **No significant impact**

Trout Cod (*Maccullochella macquariensis*) - EPBC Act – Endangered, FFG Act – Listed, Victorian Advisory List – Critically Endangered
Lead to a long-term decrease in the size of an important population of a species
The Trout Cod is known to occur in the Murray River alongside the project area and is considered a main channel specialist. Trout Cod occurs naturally in the waterways of the Murray-Darling Basin (ACT, SA, NSW and Vic) and has been recorded downstream of Yarrawonga Weir in the vicinity of large woody debris, branch piles and steep clay banks, usually in areas of fast flowing current (DSE, 2008) and in Gunbower Creek (Mallen-Cooper et. al. 2014) and Torrumbarry Weir Pool (Stuart, 2020). The species may enter the forest areas during inundation events, but seasonally inundated semi-permanent forest wetlands do not provide suitable long

term habitat. Presence within the main channels of the Murray River and Gunbower Creek adjacent the site should be assumed and the species is considered as possible occurrence within the inundation area.

The proposed construction footprint is in predominantly dry areas, and it is considered unlikely that the proposed actions will lead to a long-term decrease in the size of an important population of this species. Consideration of any in-stream works such as coffer dam construction, dewatering works, and any potential for sediment/ contaminant run-off into wet areas from construction footprints must consider Murray Cod to avoid potential localised impacts. A construction specific aquatic fauna management plan should be developed for all works around waterways.

During operations, the project area will receive water via pumping meaning there is a very low likelihood of large numbers of Trout Cod entering the floodplain. Fine fish screens will be fitted to pipe inlets used to water the floodplain, preventing the introduction of species to the floodplain. A staged and managed drawdown regime will be implemented to monitor water quality of return flows and provide cues for native fish to exit the wetlands to prevent stranding. Outlet regulators will provide for unrestricted fish passage during manged drawdown and natural floodplain inundation events. Low return flows during the maintenance and drawdown periods of environmental watering are planned (1,540 ML total) and will occur at a time of year when flows in the Murray River are high to reduce any potential blackwater impacts to the main Murray River channel

It is unlikely that the construction and operation phase of the project will lead to a long-term decrease in size of a population due to the minimal construction impacts and mitigation measures for operation.

No significant impact

Reduce the area of occupancy of the species

The proposed construction footprints are in predominantly dry areas, and it is considered unlikely that the proposed actions will lead to a reduction in the area of occupancy of a population of this species. Consideration of any in-stream works such as coffer dam construction, dewatering works, and any potential for sediment/ contaminant run-off into wet areas from construction footprints must consider Trout Cod. A construction specific aquatic fauna management plan should be developed for all works around waterways.

During operations, the project area will receive water via pumping meaning there is a very low likelihood of large numbers of Trout Cod entering the floodplain. Fine fish screens will be fitted to pipe inlets used to water the floodplain, preventing the introduction of species to the floodplain. A staged and managed drawdown regime will be implemented to monitor water quality of return flows and provide cues for native fish to exit the wetlands to prevent stranding. Outlet regulators will provide for unrestricted fish passage during manged drawdown and natural floodplain inundation events. Low return flows during the maintenance and drawdown periods of environmental watering are planned (1,540 ML total) and will occur at a time of year when flows in the Murray River are high to reduce any potential blackwater impacts to the main Murray River channel

It is unlikely that the construction and operation phase of the project will reduce the area of occupancy of the species due to the minimal construction impacts and mitigation measures for operation.

No significant impact

Fragment an existing important population into two or more populations

The proposed construction footprints are in predominantly dry areas, and it is considered unlikely that the proposed actions will fragment an existing population into two or more populations Consideration of any in-stream works such as coffer dam construction, dewatering works, and any potential for sediment/ contaminant run-off into wet areas from construction footprints must consider Trout Cod. A construction specific aquatic fauna management plan should be developed for all works around waterways.

During operations, the project area will receive water via pumping meaning there is a very low likelihood of large numbers of Trout Cod entering the floodplain. Fine fish screens will be fitted to pipe inlets used to water the floodplain, preventing the introduction of species to the floodplain. A staged and managed drawdown regime will be implemented to monitor water quality of return flows and provide cues for native fish to exit the wetlands to prevent stranding. Outlet regulators will provide for unrestricted fish passage during manged drawdown and natural floodplain inundation events. Low return flows during the maintenance and drawdown

periods of environmental watering are planned (1,540 ML total) and will occur at a time of year when flows in the Murray River are high to reduce any potential blackwater impacts to the main Murray River channel

It is unlikely that the construction and operation phase of the project will fragment an existing important population into two or more populations due to the minimal construction impacts and mitigation measures for operation.

No significant impact

Adversely affect habitat critical to the survival of a species
The proposed construction footprints are in predominantly dry areas, and it is considered unlikely that the proposed actions will affect habitat critical to the survival of the species. Consideration of any in-stream works such as coffer dam construction, dewatering works, and any potential for sediment/ contaminant run-off into wet areas from construction footprints must consider Trout Cod. A construction specific aquatic fauna management plan should be developed for all works around waterways. During operations, the project area will receive water via pumping meaning there is a very low likelihood of large numbers of Trout Cod entering the floodplain. Fine fish screens will be fitted to pipe inlets used to water the floodplain, preventing the introduction of species to the floodplain. A staged and managed drawdown regime will be implemented to monitor water quality of return flows and provide cues for native fish to exit the wetlands to prevent stranding. Outlet regulators will provide for unrestricted fish passage during manged drawdown and natural floodplain inundation events. Low return flows during the maintenance and drawdown periods of environmental watering are planned (1,540 ML total) and will occur at a time of year when flows in the Murray River are high to reduce any potential blackwater impacts to the main Murray River channel It is unlikely that the construction and operation phase of the project will adversely affect habitat critical to the survival of the species due to the minimal construction impacts and mitigation measures for operation. **No significant impact**
Disrupt the breeding cycle of a population
The proposed construction footprints are in predominantly dry areas, and it is considered unlikely that the proposed actions disrupt the breeding cycle of a population. Consideration of any in-stream works such as coffer dam construction, dewatering works, and any potential for sediment/ contaminant run-off into wet areas from construction footprints must consider Trout Cod. A construction specific aquatic fauna management plan should be developed for all works around waterways. During operations, the project area will receive water via pumping meaning there is a very low likelihood of large numbers of Trout Cod entering the floodplain. Fine fish screens will be fitted to pipe inlets used to water the floodplain, preventing the introduction of species to the floodplain. A staged and managed drawdown regime will be implemented to monitor water quality of return flows and provide cues for native fish to exit the wetlands to prevent stranding. Outlet regulators will provide for unrestricted fish passage during manged drawdown and natural floodplain inundation events. Low return flows during the maintenance and drawdown periods of environmental watering are planned (1,540 ML total) and will occur at a time of year when flows in the Murray River are high to reduce any potential blackwater impacts to the main Murray River channel Furthermore, spawning of most native fish occurs from mid spring onwards (SKM 2003), so avoiding pumping from mid spring onwards will also minimise the likelihood of eggs and larvae present in the water column of the Murray River from being entrained It is unlikely that the construction and operation phase of the project will disrupt the breeding cycle of a population due to the minimal construction impacts and mitigation measures for operation. **No significant impact**
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
The proposed construction footprints are in predominantly dry areas, and it is considered unlikely that the proposed actions will decrease the availability or quality of habitat to the extent that the species is likely to decline. Consideration of any in-stream works such as coffer dam construction, dewatering works, and any

potential for sediment/ contaminant run-off into wet areas from construction footprints must consider Trout Cod. A construction specific aquatic fauna management plan should be developed for all works around waterways.

During operations, the project area will receive water via pumping meaning there is a very low likelihood of large numbers of Trout Cod entering the floodplain. Fine fish screens will be fitted to pipe inlets used to water the floodplain, preventing the introduction of species to the floodplain. A staged and managed drawdown regime will be implemented to monitor water quality of return flows and provide cues for native fish to exit the wetlands to prevent stranding. Outlet regulators will provide for unrestricted fish passage during manged drawdown and natural floodplain inundation events. Low return flows during the maintenance and drawdown periods of environmental watering are planned (1,540 ML total) and will occur at a time of year when flows in the Murray River are high to reduce any potential blackwater impacts to the main Murray River channel

It is unlikely that the construction and operation phase of the project will decrease the availability or quality of habitat to the extent that the species is likely to decline due to the minimal construction impacts and mitigation measures for operation.

No significant impact

Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered of critically endangered species' habitat

Eleven alien fish species are now established in the Murray-Darling River system, with Carp *Cyprinus carpio*, Redfin Perch *Perca fluviatilis*, Goldfish *Carassius auratus* and Eastern Gambusia *Gambusia holbrooki* the most widespread (NMCRT, 2010). These species are already established in the vicinity of the project site. The construction phase of the project is not likely to lead to an increase in these species.

Inundation of floodplain habitat during the operational phase has a high likelihood of increasing carp populations within wetland habitat and also in aquatic habitat that remains following flood events. Wetlands are not the preferred habitat for the species and the inundation events will mimic natural over-bank flows. That said, the impact of operation will create conditions that are likely to benefit carp, which may negatively impact Trout Cod. Following recommended mitigation measures (see DELWP, 2018) to control carp may minimise their colonisation. This could include measures such as implementing a winter fill regime, developing a native fish exit strategy to strand carp and drying of weltands with high carp density.

No significant impact

Introduce disease that may cause the species to decline

Silver perch are highly susceptible to several diseases including Epizootic Haematopoietic Necrosis Virus (EHNV) (Langdon 1989). The likelihood of the introduction of disease during the construction phase is minimal if standard hygiene protocols are implemented.

No significant impact

Interfere with the recovery of the species.

The proposed construction activities will not interfere substantially with the recovery of the species, as potential impacts to this species and its breeding and foraging habitats will be mitigated through a construction specific aquatic fauna management plan, design of infrastructure and adapative management of risks associated with blackwater, water quality and carp as is currently implemented on other watering projects (e.g. Hattah Lakes TLM works).

No significant impact

EPBC Act listed Critically Endangered Species:

Silver Perch (*Bidyanus bidyanus*) - EPBC Act – Critically Endangered, FFG Act – Listed, Victorian Advisory List - Vulnerable
Lead to a long-term decrease in the size of a population
Silver Perch is a main channel specialist that is endemic to the Murray-Darling system, utilising a diversity of habitats but with a preference for faster-flowing water including rapids and races, and more open sections of a river (DoE, 2013a, Stuart, 2020). Recent surveys have detected Silver Perch in low abundances during annual monitoring of the Murray River adjacent to Gunbower Forest (2008-2017) (Bloink et. al. 2018). Silver Perch have also been detected in low numbers in surveys on the Gunbower Creek (Rehwinkel & Sharpe, 2009). The Murray River upstream and downstream of the project area and the Murray River in vicinity of project area has been mapped as possible habitat by NSW Fisheries. Although the species has not been recorded within the semi-permanent wetlands of the project area, they may enter the forest areas during natural inundation events, but the seasonally inundated semi-permanent forest wetlands do not provide suitable long term habitat. Presence within the main channels of the Murray River and Gunbower Creek adjacent the site should be assumed and the species is considered as possible occurrence within the inundation area. The proposed construction footprint is in predominantly dry areas, and it is considered unlikely that the proposed actions will lead to a long-term decrease in the size of an important population of this species. Consideration of any in-stream works such as coffer dam construction, dewatering works, and any potential for sediment/ contaminant run-off into wet areas from construction footprints must consider Silver Perch to avoid potential localised impacts. A construction specific aquatic fauna management plan should be developed for all works around waterways. During operations, the project area will receive water via pumping meaning there is a very low likelihood of large numbers of Silver Perch entering the floodplain. Fine fish screens will be fitted to pipe inlets used to water the floodplain, preventing the introduction of species to the floodplain. A staged and managed drawdown regime will be implemented to monitor water quality of return flows and provide cues for native fish to exit the wetlands to prevent stranding. Outlet regulators will provide for unrestricted fish passage during manged drawdown and natural floodplain inundation events. Low return flows during the maintenance and drawdown periods of environmental watering are planned (1,540 ML total) and will occur at a time of year when flows in the Murray River are high to reduce any potential blackwater impacts to the main Murray River channel It is unlikely that the construction and operation phase of the project will lead to a long-term decrease in size of a population due to the minimal construction impacts and mitigation measures for operation. **No significant impact**
Reduce the area of occupancy of the species
The proposed construction footprints are in predominantly dry areas, and it is considered unlikely that the proposed actions will lead to a reduction in the area of occupancy of a population of this species. Consideration of any in-stream works such as coffer dam construction, dewatering works, and any potential for sediment/ contaminant run-off into wet areas from construction footprints must consider Silver Perch. A construction specific aquatic fauna management plan should be developed for all works around waterways. During operations, the project area will receive water via pumping meaning there is a very low likelihood of large numbers of Silver Perch entering the floodplain. Fine fish screens will be fitted to pipe inlets used to water the floodplain, preventing the introduction of species to the floodplain. A staged and managed drawdown regime will be implemented to monitor water quality of return flows and provide cues for native fish to exit the wetlands to prevent stranding. Outlet regulators will provide for unrestricted fish passage during manged drawdown and natural floodplain inundation events. Low return flows during the maintenance and drawdown periods of environmental watering are planned (1,540 ML total) and will occur at a time of year when flows in the Murray River are high to reduce any potential blackwater impacts to the main Murray River channel

It is unlikely that the construction and operation phase of the project will reduce the area of occupancy of the species due to the minimal construction impacts and mitigation measures for operation.

No significant impact

Fragment an existing important population into two or more populations

The proposed construction footprints are in predominantly dry areas, and it is considered unlikely that the proposed actions will fragment an existing population into two or more populations Consideration of any in-stream works such as coffer dam construction, dewatering works, and any potential for sediment/ contaminant run-off into wet areas from construction footprints must consider Silver Perch. A construction specific aquatic fauna management plan should be developed for all works around waterways.

During operations, the project area will receive water via pumping meaning there is a very low likelihood of large numbers of Silver Perch entering the floodplain. Fine fish screens will be fitted to pipe inlets used to water the floodplain, preventing the introduction of species to the floodplain. A staged and managed drawdown regime will be implemented to monitor water quality of return flows and provide cues for native fish to exit the wetlands to prevent stranding. Outlet regulators will provide for unrestricted fish passage during manged drawdown and natural floodplain inundation events. Low return flows during the maintenance and drawdown periods of environmental watering are planned (1,540 ML total) and will occur at a time of year when flows in the Murray River are high to reduce any potential blackwater impacts to the main Murray River channel

It is unlikely that the construction and operation phase of the project will fragment an existing important population into two or more populations due to the minimal construction impacts and mitigation measures for operation.

No significant impact

Adversely affect habitat critical to the survival of a species

The proposed construction footprints are in predominantly dry areas, and it is considered unlikely that the proposed actions will affect habitat critical to the survival of the species. Consideration of any in-stream works such as coffer dam construction, dewatering works, and any potential for sediment/ contaminant run-off into wet areas from construction footprints must consider Silver Perch. A construction specific aquatic fauna management plan should be developed for all works around waterways.

During operations, the project area will receive water via pumping meaning there is a very low likelihood of large numbers of Silver Perch entering the floodplain. Fine fish screens will be fitted to pipe inlets used to water the floodplain, preventing the introduction of species to the floodplain. A staged and managed drawdown regime will be implemented to monitor water quality of return flows and provide cues for native fish to exit the wetlands to prevent stranding. Outlet regulators will provide for unrestricted fish passage during manged drawdown and natural floodplain inundation events. Low return flows during the maintenance and drawdown periods of environmental watering are planned (1,540 ML total) and will occur at a time of year when flows in the Murray River are high to reduce any potential blackwater impacts to the main Murray River channel

It is unlikely that the construction and operation phase of the project will adversely affect habitat critical to the survival of the species due to the minimal construction impacts and mitigation measures for operation.

No significant impact

Disrupt the breeding cycle of a population

The proposed construction footprints are in predominantly dry areas, and it is considered unlikely that the proposed actions disrupt the breeding cycle of a population. Consideration of any in-stream works such as coffer dam construction, dewatering works, and any potential for sediment/ contaminant run-off into wet areas from construction footprints must consider Silver Perch. A construction specific aquatic fauna management plan should be developed for all works around waterways.

During operations, the project area will receive water via pumping meaning there is a very low likelihood of large numbers of Silver Perch entering the floodplain. Fine fish screens will be fitted to pipe inlets used to

water the floodplain, preventing the introduction of species to the floodplain. A staged and managed drawdown regime will be implemented to monitor water quality of return flows and provide cues for native fish to exit the wetlands to prevent stranding. Outlet regulators will provide for unrestricted fish passage during manged drawdown and natural floodplain inundation events. Low return flows during the maintenance and drawdown periods of environmental watering are planned (1,540 ML total) and will occur at a time of year when flows in the Murray River are high to reduce any potential blackwater impacts to the main Murray River channel. Furthermore, spawning of most native fish occurs from mid spring onwards (SKM 2003), so avoiding pumping from mid spring onwards will also minimise the likelihood of eggs and larvae present in the water column of the Murray River from being entrained

It is unlikely that the construction and operation phase of the project will disrupt the breeding cycle of a population due to the minimal construction impacts and mitigation measures for operation.

No significant impact

Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The proposed construction footprints are in predominantly dry areas, and it is considered unlikely that the proposed actions will decrease the availability or quality of habitat to the extent that the species is likely to decline. Consideration of any in-stream works such as coffer dam construction, dewatering works, and any potential for sediment/ contaminant run-off into wet areas from construction footprints must consider Silver Perch. A construction specific aquatic fauna management plan should be developed for all works around waterways.

During operations, the project area will receive water via pumping meaning there is a very low likelihood of large numbers of Silver Perch entering the floodplain. Fine fish screens will be fitted to pipe inlets used to water the floodplain, preventing the introduction of species to the floodplain. A staged and managed drawdown regime will be implemented to monitor water quality of return flows and provide cues for native fish to exit the wetlands to prevent stranding. Outlet regulators will provide for unrestricted fish passage during manged drawdown and natural floodplain inundation events. Low return flows during the maintenance and drawdown periods of environmental watering are planned (1,540 ML total) and will occur at a time of year when flows in the Murray River are high to reduce any potential blackwater impacts to the main Murray River channel

It is unlikely that the construction and operation phase of the project will decrease the availability or quality of habitat to the extent that the species is likely to decline due to the minimal construction impacts and mitigation measures for operation.

No significant impact

Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered of critically endangered species' habitat

Eleven alien fish species are now established in the Murray-Darling River system, with Carp *Cyprinus carpio*, Redfin Perch *Perca fluviatilis*, Goldfish *Carassius auratus* and Eastern Gambusia *Gambusia holbrooki* the most widespread (NMCRT, 2010). These species are already established in the vicinity of the project site. The construction phase of the project is not likely to lead to an increase in these species.

Inundation of floodplain habitat during the operational phase has a high likelihood of increasing carp populations within wetland habitat and also in aquatic habitat that remains following flood events. Wetlands are not the preferred habitat for the species and the inundation events will mimic natural over-bank flows. That said, the impact of operation will create conditions that are likely to benefit carp, which may negatively impact Silver Perch. Following recommended mitigation measures (see DELWP, 2018) to control carp may minimise their colonisation. This could include measures such as implementing a winter fill regime, developing a native fish exit strategy to strand carp and drying of weltands with high carp density.

No significant impact

Introduce disease that may cause the species to decline

Silver perch are highly susceptible to several diseases including Epizootic Haematopoietic Necrosis Virus (EHNV) (Langdon 1989). The likelihood of the introduction of disease during the construction phase is minimal if standard hygiene protocols are implemented. **No significant impact**
Interfere with the recovery of the species.
The proposed construction activities will not interfere substantially with the recovery of the species, as potential impacts to this species and its breeding and foraging habitats will be mitigated through a construction specific aquatic fauna management plan, design of infrastructure and adapative management of risks associated with blackwater, water quality and carp as is currently implemented on other watering projects (e.g. Hattah Lakes TLM works). **No significant impact**

Appendix R. Significance assessment for migratory species

An assessment of the potential impact to Migratory species against the EPBC Act EPBC Act Significant Impact Guidelines 1.1 is provided below. It was determined that the project is **unlikely** to have a Significant Impact on migratory species.

The significant impact criteria for EPBC Act listed migratory species were applied to all species identified by the VBA and PMST database searches. The likelihood of occurrence, and likelihood of impact for these species has also been considered for the fonstruction footprint and inundation area (Table 5-6).These species are Fork-tailed Swift (*Apus pacificus*), Common Sandpiper (*Actitis hypoleucus*), Sharp-tailed Sandpiper (*Calidris acuminata*), Curlew Sandpiper (*Calidris ferruginea*), Pectoral Sandpiper (*Calidris melanotos*), Latham's Snipe (*Gallinago hardwickii*), White-throated Needtail *(Hirundapus caudacutus),* Yellow Wagtail (*Motacilla flava*), Satin Flycatcher (*Myiagra* cyanoleuca), Eastern Curlew (*Numenius madagascariensis*), Osprey *(Pandion haliaetus),* Glossy Ibis (*Plegadis falcinellus*), Common Greenshank (*Tringa nebularia*) and Rufous Fantail (*Rhipidura rufifrons*).

Important information regarding migratory species includes the following (taken from DAWE Significant Impact guidelines 2013):

What is important habitat for a migratory species?

An area of 'important habitat' for a migratory species is:

a. habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or

b. habitat that is of critical importance to the species at particular life-cycle stages, and/or

c. habitat utilised by a migratory species which is at the limit of the species range, and/or

d. habitat within an area where the species is declining.

What is an ecologically significant proportion?

Listed migratory species cover a broad range of species with different life cycles and population sizes. Therefore, what is an 'ecologically significant proportion' of the population varies with the species (each circumstance will need to be evaluated). Some factors that should be considered include the species' population status, genetic distinctiveness and species specific behavioural patterns (for example, site fidelity and dispersal rates).

What is the population of a migratory species?

'Population', in relation to migratory species, means the entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries including Australia.

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
Fourteen migratory species were identified as having the potential to occur within the construction footprint (PMST and VBA). Most of these species are either highly unlikely to occur (e.g. Curlew Sandpiper, Eastern Curlew) or would very rarely use airspace over these footprints (e.g. Fork-tailed Swift, Yellow Wagtail). There was one record for the Glosy Ibis within study area, and suitable wetland habitat present in the inundation area. It is highly unlikely that the construction footprint supports habitat that would be considered important for migratory species foraging or breeding activity or support an ecologically significant proportion of a population of migratory species. Given that the proposed construction footprint does not provide important habitat for listed migratory species, it is considered unlikely that the planned works would disrupt the lifecycle of an ecologically significant proportion of a population of a migratory species. Reinstating historical environmental flows within the Gunbower National Park project area will improve the quality of fauna habitats present. Such enhancements correspond to increased productivity of the swamp forest communities, increased vegetation diversity and structure from more drought-tolerant species and increase the overall health and integrity of the area, which will likely improve potential breeding, foraging and refuge resources for listed migratory species. **No significant impact**
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species
Within the proposed construction footprint it is unlikely that the proposed Guttrum and Benwell Forests Project will result in the introduction of invasive species that might be harmful to migratory species. A CEMP will be developed for the project that will include measures such as vehicle hygiene protocols to mitigate the potential spread of weeds. There is potential for the introduction of environmental water to lead to an increase in abundance of feral predators (cats, foxes), herbivores (e.g. goats) and omnivores (e.g. pigs) due to the associated increase in productivity. Some of the species such as cats and foxes could potentially prey on migratory waterbirds. An accompanying feral animal management and control program would need to be implemented within the inundation extent. **No significant impact**
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.
Given that the proposed construction footprint does not provide important habitat for listed migratory species, it is unlikely that the planned works would disrupt the lifecycle of an ecologically significant proportion of a population of a migratory species. Reinstating historical environmental flows within the Gunbower National Park project area will improve the quality of fauna habitats present. Such enhancements correspond to increased productivity of the swamp forest communities, increased vegetation diversity and structure from more drought-tolerant species and increase the overall health and integrity of the area, which will likely improve potential breeding, foraging and refuge resources for listed migratory species. **No significant impact**

Appendix S. Significance assessment for Wetland of International Importance (Ramsar Wetlands)

An assessment of the potential impact to the Gunbower Forest Ramsar site against the EPBC Act EPBC Act Significant Impact Guidelines 1.1 is provided below. This assessment incorporates findings from the Wetland Assessment Gunbower National Park report prepared for the project (R8 2020).

It is anticipated that 19.57 ha of vegetation, primarily consisting of terrestrial vegetation will be removed for the construction of the environmental watering infrastructure. This represents <0.0001% of the total area of the Gunbower Forest Ramsar site and through the operatation of the project is expected to deliver substantial improvements to vegetation condition and improve fauna habitats. Considering the substantial benefits to wetland health by restoring a natural flooding regime, it was determined that the project is **unlikely** to have a Significant Impact on the Gunbower Forest Ramsar site.

An action is likely to have a significant impact on the ecological character of a declared Ramsar wetland if there is a real chance or possibility that it will result in:

Gunbower Forest – Ramsar Site
Areas of the wetland being destroyed or substantially modified
The project will involve some clearing operations along existing access tracks to facilitate the construction activities. This will largely occur in the terrestrial elements of the Ramsar site and will impact 19.57 ha of terrestrial vegetation of the approximately 20,218 ha Ramsar site (DEPI 2013). Additionally, managed flooding to reinstate a more natural hydrology to 704 ha of wetland within the Ramsar site is the overall aim of the project. 'Modification' is not considered to be the result of the overall project with the return of a hydrological system more closely approximating natural conditions. Flooding events will be managed to restore and improve the overall health of the wetland billabongs and lagoon systems within the Ramsar site. A loss of 19.57 ha of terrestrial vegetation will be required to facilitate the restoration works. The <0.0001 % of the total area of the Ramsar site expected to be impacted through vegetataion removal is not considered to be notable in extent and will will result in significant improvements to wetland and floodplain habitats within the Ramsar site. The overall context of the restoration works to the wetland system will provide a net benefit to the ecology of the wetland system, providing a greater resilience and functionality of the Ramsar site with the changing water allocation issues and impending climate change impacts to general water availability. **No significant impact**
A substantial and measurable change in the hydrological regime of the wetland, for example, a substantial change to the volume, timing, duration and frequency of ground and surface water flows to and within the wetland
The objectives of the project are to alter the current hydrological regime through artificial flooding of key biodiversity assets within the Ramsar site to restore natural ecological conditions for a total inundation area of 704 ha. The ecological objectives which form the basis of the operating scenarios have been developed with the aim of improving the environmental values within the Project Area. As a result, the modification is expected to have positive benefits rather than causing an impact due to altered hydrology (NCCMA, 2014). A change to the volume, timing and duration of surface water inflows is the overall objective of the works to reinstate a more natural flood character and reduce the stress and health impacts from the lack of availability of flooding due to water allocations and climate change. Increased groundwater recharge following managed inundation of the upper and middle Gunbower Forest is expected to benefit River Red Gum woodland and forest, improving canopy condition in drier times (NCCMA, 2014) and resulting in improved recruitment within this community.

Detailed investigations into the specific hydrology of the various ecological community that define the wetland elements of the Gunbower Ramsar site have been undertaken by various specialists over the past decade. The final agreed flood allocations are designed to mimic natural flows into the system to support the natural ecological functionality.

No significant impact

The habitat or lifecycle of native species, including invertebrate fauna and fish species, dependant upon the wetland being seriously affected

The habitat and lifecycle of a range of native species is expected to benefit from the delivery of environmental water to Gunbower National Park including River Red Gums and understory, wetland plants, aquatic fauna including fish, macroinvertebrates, frogs and turtles, waterbirds and terrestrial fauna including woodland birds (NCCMA, 2014).

There are some expected localised and mainly temporary (although some small permanent reductions) impacts to habitat, from construction of the works. The expected project impacts are detailed in Section 6 and include:

- Physical disturbance within wetlands where upgrades of existing roads are required and construction of banks and structures will take place including disturbance or removal of vegetation and possible water quality impacts to wetlands
- Entrapment, restriction of passage or temporary loss of habitat due to cofferdam construction, dewatering works and sediment/contaminant runoff into wet areas from the Construction Footprint.
- Transport or proliferation of invasive weeds impacting upon the health of wetland and floodplain vegetation communities

These impacts are localised and will be mitigated through the implementation of a construction environmental management plant and a construction specific aquatic fauna management plan to be developed for all works around waterways including wetlands, see Section 9.

With the implementation of planned mitigations it is not expected that the project will seriously affect the habitat or lifecycle of native species dependent on the Gunbower Forest Ramsar site.

No significant impact

A substantial and measurable change in the water quality of the wetland – for example:

a substantial change in the level of salinity, pollutants, or nutrients in the wetland, or water temperature which may adversely impact on biodiversity, ecological integrity, social amenity or human health.

Blackwater events have the potential to occur during watering of Gunbower National Park, particularly for the River Red Gum and Forest Watering scenario. Blackwater can have low levels of dissolved oxygen and can cause stress to or death of aquatic biota. The risk of blackwater events occurring in Gunbower National Park during managed floodplain inundation is relatively high due to high organic loads, minimal circulation and warm water temperatures (NCCMA, 2014). The business case found that the risk of blackwater events causing ecological impacts was considered to be low. This is likely because the permanent waterbodies containing the resident native fish population, Camerons Creek and Black Charlie Lagoon, are upstream of the broader forest area that will be targeted for River Red Gum and Forest watering events meaning that the blackwater impacts are unlikely to affect resident native fish. It is expected that over time the risk of blackwater events will reduce as more frequent floodplain watering will reduce the build-up of organic material that can cause blackwater events (NCCMA, 2014).

There is a risk that during managed floodplain inundation events, the infiltration of water causes the watertable to rise exposing vegetation to saline groundwater which could cause poor health or death of floodplain vegetation (NCCMA, 2014). The business case found that this would be unlikely to occur and that groundwater and salinity monitoring and adaptive management could be effective mitigations with the residual risk characterised as negligible (NCCMA, 2014).

Some localised water quality impacts are possible during construction due to the runoff of sediment or contaminants from works sites into wet areas (NCCMA, 2014). Mitigations such as soil erosion control measures and sediment management approaches will be implemented to reduce this risk.

The project could cause a short-term substantial and measurable change in the water quality of the Ramsar site due to a blackwater event in some localised areas depending on organic carbon loads, flow through volumes and dilution potential. However due to the low risk of ecological impacts to the resident native fish community, it is not considered that this change will adversely impact on biodiversity, ecological integrity, social amenity or human health.

No significant impact

A substantial and measurable change in the water quality of the wetland – for example:

An invasive species that is harmful to the ecological character of the wetland being established (or an existing invasive species being spread) in the wetland.

Transport or proliferation of invasive weeds impacting upon the health of wetland and floodplain vegetation communities has been identified as a potential risk from construction and mitigations are proposed within the Environmental Management Framework to reduce this risk. It is expected that with more frequent inundation under the project's operating scenarios the incidence of some terrestrial weeds will be reduced, but the effectiveness will be determined by the frequency of inundation and whether weeds can re-establish between watering events. An Environmental Watering Plan (EWP) will be developed to adaptively manage weed invasions under the operation of the project (NCCMA, 2014).

The business case identified the risk of introduction and increased abundance of pest fish, particularly carp, within Camerons Creek and Black Charlie Lagoon (NCCMA, 2014). Carp can damage the ecological value of habitat and impact upon the native small-bodied fish community. Impacts to the native fish community within Black Charlie Lagoon could affect ecological character of the Gunbower Forest Ramsar site, see 7.3.1.2 for more details. Although Carp are currently able to access these environments during high flow events on the Murray River, the project may increase the number of Carp as larvae and eggs pass through screens on pumps and enter the permanently inundated wetlands. A fish assessment undertaken for threatened fish species within the project area concludes that significant impacts under the EPBC Act or FFG Act were unlikely to occur as a result of construction or operation of the project provided that appropriate mitigations were implemented such as a construction specific aquatic fauna management plan, use and maintenance of screens on pumps and manual removal of carp from permanent wetlands as needed.

With the implementation of an EWP which includes monitoring and adaptive management to track any occurrence of potential weeds and appropriate action taken, either through refinement of the watering regime or other control measures, and the implementation of mitigations to reduce the risk of pest fish it is considered unlikely that an invasive species harmful to the ecological character of the Ramsar site would be established or spread by the project

Potential for significant impact

Appendix T. Native Vegetation Removal Report (NVR)

Scenario test – native vegetation removal

This report provides offset requirements for internal testing of different proposals to remove native vegetation. **This report DOES NOT support an application to remove, destroy or lop native vegetation under Clause 52.16 or 52.17 of planning schemes in Victoria.** A report must be obtained from the Department of Environment, Land, Water and Planning (DELWP).

Date of issue: **09/06/2020**
Time of issue: **4:07 pm**

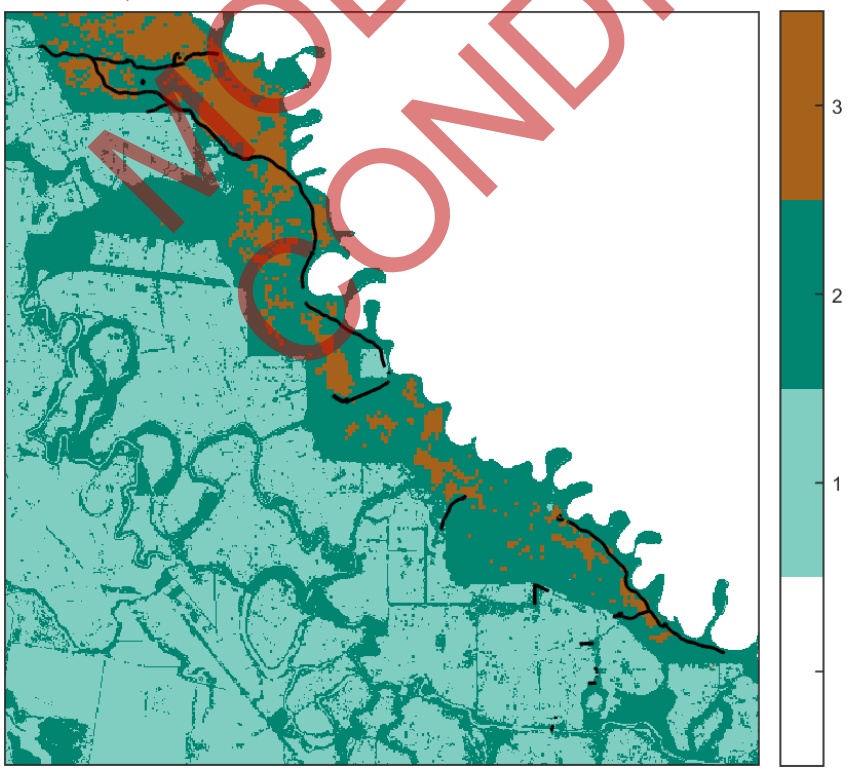
Report ID: Scenario Testing

Project ID	v2Gunbower_Impacted_Veg090620_100

Assessment pathway

Assessment pathway	**Detailed Assessment Pathway**
Extent including past and proposed	19.888 ha
Extent of past removal	0.000 ha
Extent of proposed removal	19.888 ha
No. Large trees proposed to be removed	66
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 designated under the Convention on Wetlands of International Importance (the Ramsar Convention); and a wetland listed in the Directory of Important Wetlands of Australia.

1. Location map



Scenario test – native vegetation removal

Offset requirements if a permit is granted

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

Scenario test – native vegetation removal

Species offset amount[1]	30.560 species units of habitat for Black Falcon, *Falco subniger* 28.738 species units of habitat for Twin-leaf Bedstraw, *Asperula gemella* 28.330 species units of habitat for Blue Burr-daisy, *Calotis cuneifolia* 28.590 species units of habitat for Umbrella Grass, *Digitaria divaricatissima var. divaricatissima* 28.717 species units of habitat for Flat Spike-sedge, *Eleocharis plana* 28.521 species units of habitat for Cane Grass, *Eragrostis australasica* 11.515 species units of habitat for Spreading Emu-bush, *Eremophila divaricata subsp. divaricata* 28.293 species units of habitat for Spotted Emu-bush, *Eremophila maculata subsp. maculata* 28.717 species units of habitat for Long Eryngium, *Eryngium paludosum* 28.640 species units of habitat for Winged Peppercress, *Lepidium monoplocoides* 28.717 species units of habitat for Smooth Minuria, *Minuria integerrima* 28.717 species units of habitat for Spiny Lignum, *Duma horrida subsp. horrida* 12.118 species units of habitat for Wavy Marshwort, *Nymphoides crenata* 28.717 species units of habitat for Swamp Buttercup, *Ranunculus undosus* 28.717 species units of habitat for Dwarf Bitter-cress, *Rorippa eustylis* 28.624 species units of habitat for Northern Sandalwood, *Santalum lanceolatum* 28.509 species units of habitat for Stiff Groundsel, *Senecio behrianus* 28.717 species units of habitat for Branching Groundsel, *Senecio cunninghamii var. cunninghamii* 25.752 species units of habitat for Slender Darling-pea, *Swainsona murrayana* 28.728 species units of habitat for Red Swainson-pea, *Swainsona plagiotropis* 28.573 species units of habitat for Deane's Wattle, *Acacia deanei subsp. paucijuga* 28.697 species units of habitat for Squat Picris, *Picris squarrosa* 28.717 species units of habitat for Riverina Bitter-cress, *Cardamine moirensis* 27.583 species units of habitat for Fuzzy New Holland Daisy, *Vittadinia cuneata var. hirsuta* 26.590 species units of habitat for Cotton Sneezeweed, *Centipeda nidiformis* 28.723 species units of habitat for Scaly Mantle, *Eriochlamys squamata* 24.839 species units of habitat for Floodplain Fireweed, *Senecio campylocarpus* 28.618 species units of habitat for Pale Flax-lily, *Dianella sp. aff. longifolia (Riverina)* 23.479 species units of habitat for Red-chested Button-quail, *Turnix pyrrhothorax* 22.647 species units of habitat for Superb Parrot, *Polytelis swainsonii* 11.595 species units of habitat for Murray-Darling Rainbowfish, *Melanotaenia fluviatilis* 17.027 species units of habitat for Silver Perch, *Bidyanus bidyanus* 28.371 species units of habitat for Carpet Python, *Morelia spilota metcalfei*
Large trees	66 trees

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

Scenario test – native vegetation removal

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

Scenario test – native vegetation removal

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.

This report DOES NOT support an application to remove, destroy or lop native vegetation under Clause 52.16 or 52.17 of planning schemes in Victoria.

If you wish to remove the mapped native vegetation you must submit the related shapefiles to the Department of Environment, Land, Water and Planning (DELWP) for processing, by email to ensymnvrtool.support@delwp.vic.gov.au. DELWP will provide a *Native vegetation removal report* that is required to meet the permit application requirements in accordance with *Guidelines for the removal, destruction or lopping of native vegetation* (Guidelines).