

Little Murray Urban Frontage Swan Hill – Landscape Master Plan: Draft Ecological Input

29th September 2025

Practical Ecology has been engaged to provide ecological consultancy services for the Little Murray Urban Frontage Landscape Master Plan ('the Plan') in Swan Hill. As stated in the RFQ, specific objectives of the Plan are to define measurable targets including:

- Priority areas for replanting and revegetation;
- Strategies for weed and pest management, including control measures for invasive species;
- Recommendations for public infrastructure, such as pathways, seating, and accessibility improvements; and
- Bank stabilisation recommendations to mitigate erosion and enhance resilience.

The findings of our desktop review and site assessment and resulting recommendations are detailed in the sections below.

1. Existing Conditions

1.1 Vegetation

1.1.1 Modelled Vegetation

The Study Area is within the Murray Fans Bioregion and Historical modelling of ecological vegetation classes (EVCs), indicates that the majority of the Study Area on the west side of the Little Murray River was covered with EVC 103: Riverine Chenopod Woodland prior to colonisation (DSE 2005a). The Bioregional conservation Status (BCS) for this EVC is listed as Endangered.

EVC 103: Riverine Chenopod Woodland (*syn.* Black Box Chenopod Woodland) is described by (DSE 2004) as *'Eucalypt woodland to 15 m tall with a diverse shrubby and grassy understorey occurring on most elevated riverine terraces. Confined to heavy clay soils on higher level terraces within or on the margins of riverine floodplains (or former floodplains), naturally subject to only extremely infrequent incidental shallow flooding from major events if at all flooded.'*

EVC 98: Semi-arid Chenopod Woodland is modelled as occurring in a small section of the Study Area (DSE 2005a) near the intersection of Marraboor Street and Bryan Street. The BCS for this EVC is also listed as Endangered.

EVC 98: Semi-arid Chenopod Woodland is described by (DSE 2004) as *'Sparse, low non-eucalypt woodland to 12 m tall of the arid zone with a tall open chenopod shrub-dominated understorey to a treeless, tall chenopod*

shrubland to 3 m tall. This EVC may occur as either a woodland (typically with a very open structure but tree cover >10%) or a shrubland (tree cover) with trees as an occasional emergent).

EVC 295: Riverine Grassy Woodland is historically modelled to occur within the Study Area (DSE 2005b), along the eastern bank of the Little Murray River.

EVC 295: Riverine Grassy Woodland is described by (DSE 2004) as occurring on 'the floodplain of major rivers, in a slightly elevated position where floods are rare, on deposited silts and sands, forming fertile alluvial soils. River Red Gum woodland to 20 m tall with a groundlayer dominated by graminoids and sometimes lightly shrubby or with chenopod shrubs.'

1.1.2 Existing Vegetation

- The Study Area is comprised of nearly contiguous remnant native vegetation resembling EVC 103 (despite the lack of Black Box *Eucalyptus largiflorens*) along the Upper Bank of the Little Murray River. In some areas this is owing completely to the presence of mature River Red Gum *Eucalyptus camaldulensis*. In areas of higher quality vegetation, canopy cover consists of both River Red Gum and River Coobah *Acacia stenophylla* and a well-developed shrub layer comprised of Tangled Lignum *Duma florulenta* Hedge Saltbush *Rhagodia spinescens* and Nitre Goosefoot *Chenopodium nitrariaceum* is present. A moderate diversity (though often low abundance) of ground layer species is present in some sections of higher quality vegetation. This consists of largely seasonal life forms (as per the reference EVC: 103) such as Jersey Cudweed *Laphangium luteoalbum*, Woolly New Holland Daisy *Vittadinia gracilis* and Tufted Burr-Daisy *Calotis scapigera*. Barrier Saltbush *Enchylaena tomentosa* var. *tomentosa*, Nodding Saltbush *Einadia nutans* subsp. *nutans*, Saloop *Einadia hastata* and Short-leaf Bluebush *Maireana brevifolia* were regularly observed within the Study Area.
- Small fragments of remnant and planted EVC 98: Semi-arid Chenopod Woodland (shrubland component only, no woodland species typical of this EVC were present) of low and moderate quality were recorded in the Higher Ground zone (in the David Ellemore trail section only), in elevated positions less likely to be subject to flooding or inundation. This vegetation type was typically dominated by Cattlebush *Alectryon oleifolius* subsp. *canescens*, Nitre Goosefoot *Chenopodium nitrariaceum*, Hedge Saltbush and Nitre-bush *Nitraria billardierei*. Several native grass species such as Black-Head Grass *Enneapogon nigricans* Spider Grass *Enteropogon acicularis* Windmill Grass *Chloris truncata* Rough Spear-Grass *Austrostipa scabra* and Wallaby Grass *Rytidosperma* spp. This includes a sand hill area along the Upper Bank of the Little Murray River that appears to have been planted and accompanied by interpretive signage describing the significance of some of the flora species to the Wemba Wemba people. Species found here included Cattlebush *Alectryon oleifolius* subsp. *canescens*, Nitre-bush *Nitraria billardierei*, Weeping Pittosporum *Pittosporum angustifolium* and Desert Jasmine *Jasminum didymum* subsp. *lineare*.
- Vegetation resembling EVC 813: Intermittent Swampy Woodland was present at the Toe zone in a small patch. Due to the steep nature of much of the river bank, there are likely additional areas of Intermittent Swampy Woodland that were not recorded. Key native species in Intermittent Swampy Woodland included River Red Gum *Eucalyptus camaldulensis*, River Coobah *Acacia stenophylla*, Tangled Lignum *Duma florulenta* and Common Sneezeweed *Centipeda cunninghamii*. Creeping Knotweed *Persicaria prostrata* was also present. A high percentage of bare ground was observed in some sections of Toe zones within the Study Area; in others there were large infestations of noxious and environmental (and mostly woody) weed species such as Weeping Willow *Salix babylonica*, African Boxthorn *Lycium ferocissimum*, Olive *Olea europaea*, Spear Thistle *Cirsium vulgare*, Desert Ash *Fraxinus angustifolia* and Canary Island Palm *Phoenix canariensis*. Weeping Willow is of particular concern due to its ability to establish low down in the Toe zone, or even in the water.

- Riparian plantings of species typical of Riverine Chenopod Woodland have been installed in patches along the river bank. Typical species include Barrier Saltbush, Hedge Saltbush and Climbing Saltbush. Riparian plantings in areas where infrastructure such as the observation decking have been installed consist of native species that are commonly used in landscaping such as Common Tussock-Grass *Poa labillardierei* and Spiny-Headed Mat-Rush *Lomandra longifolia*.
- Due to access limitations, the portion of the Study Area on the eastern side of the Little Murray River was unable to be surveyed. The existing vegetation along the eastern bank of the Little Murray River appeared to be consistent with the Riverine Grassy Woodland EVC 295 that is modelled along most sections of the eastern bank that occur within the Study Area. Upon the limited observation (from the western bank) the vegetation appeared to be largely a River Red Gum woodland, with a more open understorey dominated by graminoids (grasses) with light shrub cover.

1.1.3 Listed Ecological Communities

Table 1. Listed ecological communities potentially occurring within 5 km of the Study Area.

Listing Status*	Community: Description	Present within Study Area?
FFG Act		
n/a	Semi-arid North-West Plains Buloke Grassy Woodland	No
EPBC Act		
EN	Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	No
EN	Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions	No
EN	Weeping Myall Woodlands	No
EN	Mallee Bird Community of the Murray Darling Depression Bioregion	No
CR	Natural Grasslands of the Murray Valley Plains	No
CR	Plains mallee box woodlands of the Murray Darling Depression, Riverina, and Naracoorte Coastal Plain Bioregions	No

1.1.4 Trees

Several estimated Large Trees as per the *Guidelines for the Removal, Destruction and Lopping of Native Vegetation* (DELWP 2017) were observed in the Study Area. These were primarily River Red Gum *Eucalyptus camaldulensis* occurring along the elevated riverine terraces of the Upper Bank of the Little Murray River.

1.2 Flora

A total of 111 plant taxa were recorded in the Study Area, including a combination of indigenous and non-indigenous species, which are listed in Appendix 1.

1.2.1 Listed Flora

The listed flora species recorded within 5 kilometres of the Study Area in the past 50 years are presented in Appendix 2 along with a determination of their likelihood of occurrence (as informed by the results of both the

Desktop and Site Assessments). Species considered as having a moderate or higher likelihood of occurring in the Study Area are listed in Table 2 below.

Table 2. Listed flora species with a moderate or higher likelihood of occurrence.

Listing Status *		Scientific Name	Common Name	Likelihood of Occurrence
EPBC	FFG			
–	En	<i>Myoporum montanum</i>	Waterbush	Present
–	Vu	<i>Eremophila divaricata subsp. divaricata</i>	Spreading Emu-bush	Present
–	En	<i>Jasminum didymum subsp. lineare</i>	Desert Jasmine	Present
–	En	<i>Asperula gemella</i>	Twin-leaf Bedstraw	Moderate
–	Vu	<i>Dactyloctenium radulans</i>	Finger Grass	Moderate
–	Cr	<i>Eragrostis australasica</i>	Cane Grass	Moderate
–	En	<i>Ranunculus undosus</i>	Swamp Buttercup	Moderate
–	En	<i>Senecio cunninghamii var. cunninghamii</i>	Branching Groundsel	Moderate

*** Listing Status Key:**

EPBC Act: **EX** = Extinct; **CR** = Critically endangered; **EN** = Endangered; **VU** = Vulnerable; and **CD** = Conservation dependant.

FFG Act: **ex** = Extinct; **rx** = Regionally Extinct; **wx** = Extinct in the Wild; **cr** = Critically Endangered; **en** = Endangered; **vu** = Vulnerable; **th** = Threatened **nt** = Near Threatened; and **dd** = Data Deficient.

1.2.2 Listed Weeds

Catchment and Land Protection (CaLP) Act (1994) listed noxious weeds recorded within the Study Area are outlined in Table 2 below. It is recommended that several weeds (although they are not CaLP listed) which were observed within the Study Area also be given priority for control particularly: Onion Weed *Asphodelus fistulosus*, Gazania *Gazania linearis*, African Daisy *Dimorphotheca spp.*, Canary Island Palm *Phoenix canariensis*, *Olea europaea subsp. europaea*, Smooth Mustard *Sisymbrium erysimoides*, Pepper Tree *Schinus molle* and Desert Ash *Fraxinus angustifolia*. These species are recommended either because they are considered high impact weed species within the EVC (despite the lack of CaLP listing) or they are environmental weed species of concern in the case of Desert Ash, Gazania, African Daisy, Pepper Tree, and Canary Island Palm. Area polygons and point locations of significant weed are outlined in Map 2.

Table 2. CaLP Act listed weed species observed.

Scientific Name	Common Name	CaLP Act Listing Status [^]
<i>*Cirsium vulgare</i>	Spear Thistle	R
<i>*Foeniculum vulgare</i>	Fennel	R
<i>*Lycium ferocissimum</i>	African Boxthorn	C
<i>*Marrubium vulgare</i>	Horehound	C
<i>*Oxalis Pes-caprae</i>	Soursob	R
<i>*Salix babylonica</i>	Weeping Willow	R
<i>*Xanthium strumarium</i>	Noogoora Burr	C

[^]S = State Prohibited Weeds; P = Regionally Prohibited Weeds; C = Regionally Controlled Weeds; and R = Restricted Weeds.

1.3 Fauna

The fauna identified incidentally during the Site Assessment are presented in Table 3 below. Overall, a relatively high diversity of fauna species was observed, indicating the high value of habitat within the Study Area.

Table 3. Fauna recorded.

Scientific Name	Common Name	Record Type
<i>Anas superciliosa</i>	Pacific Black Duck	Seen
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	Seen
<i>Cacatua sanguinea</i>	Little Corella	Seen
<i>Chenonetta jubata</i>	Australian Wood Duck	Seen
<i>Corvus mellori</i>	Little Raven	Seen
<i>Dacelo novaeguineae</i>	Laughing Kookaburra	Seen
<i>Entomyzon cyanotis</i>	Blue-faced Honeyeater	Seen
<i>Eolophus roseicapilla</i>	Galah	Seen
<i>Fulica atra</i>	Eurasian Coot	Seen
<i>Grallina cyanoleuca</i>	Magpie-lark	Seen
<i>Gymnorhina tibicen</i>	Australian Magpie	Seen
<i>Hirundo neoxena</i>	Welcome Swallow	Seen
<i>Malurus cyaneus</i>	Superb Fairy-wren	Seen
<i>Manorina melanocephala</i>	Noisy Miner	Seen
<i>Milvus migrans</i>	Black Kite	Seen
<i>Ocyphaps lophotes</i>	Little Pied Cormorant	Seen
<i>Ocyphaps lophotes</i>	Crested Pigeon	Seen
<i>*Oryctolagus cuniculus</i>	European Rabbit	Seen
<i>Pelecanus conspicillatus</i>	Australian Pelican	Seen
<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant	Seen
<i>Platycercus eximius</i>	Eastern Rosella	Seen
<i>Psephotus haematonotus</i>	Red-rumped Parrot	Seen
<i>Rhipidura leucophrys</i>	Willie Wagtail	Seen
<i>Threskiornis molucca</i>	Australian White Ibis	Seen
<i>Trichoglossus moluccanus</i>	Rainbow Lorikeet	Seen

1.3.1 Listed Fauna

The listed fauna species recorded within 5 kilometres of the Study Area in the past 50 years are presented in Appendix 3 along with a determination of their likelihood of occurrence (as informed by the results of both the Desktop and Site Assessments). Of these species, 37 were considered as having a moderate or higher likelihood of occurrence, as listed below in Table 2.

For the remaining listed fauna species identified during the Desktop Assessment, the likelihood that they would occur within the Study Area is considered low or low-moderate as per Appendix 2.

Table 2. Listed fauna species with a moderate or higher likelihood of occurrence.

Listing Status ^			Scientific Name	Common Name	Likelihood Of Occurrence
Treaty	EPBC	FFG			
	VU	-	<i>Aphelocephala leucopsis</i>	Southern Whiteface	Moderate
	-	Vu	<i>Ardea alba modesta</i>	Eastern Great Egret	Moderate-High
	-	Cr	<i>Ardea intermedia plumifera</i>	Plumed Egret	Moderate
	EN	En	<i>Bidyanus bidyanus</i>	Silver Perch	Moderate
B,R,J,C	-	Vu	<i>Biziura lobata</i>	Musk Duck	Moderate-High
	EN	Cr	<i>Botaurus poiciloptilus</i>	Australasian Bittern	Moderate
B,R,J,C	VU	-	<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	High
B,R,J,C	VU	En	<i>Calidris canutus</i>	Red Knot	Moderate
B,R,J,C	CR	Cr	<i>Calidris ferruginea</i>	Curlew Sandpiper	High
B,R,J,C	-	-	<i>Calidris pugnax</i>	Ruff	Moderate
B,R,J,C	-	-	<i>Calidris ruficollis</i>	Red-necked Stint	Moderate
B,R,J,C	VU	Cr	<i>Calidris tenuirostris</i>	Great Knot	Moderate
	VU	-	<i>Climacteris picumnus</i>	Brown Treecreeper	Moderate
	-	En	<i>Egretta garzetta</i>	Little Egret	Moderate
	VU	Th	<i>Euastacus armatus</i>	Murray Spiny Crayfish	Moderate
	VU	Vu	<i>Falco hypoleucos</i>	Grey Falcon	Moderate
	-	Cr	<i>Falco subniger</i>	Black Falcon	Moderate
	CR	Vu	<i>Galaxias rostratus</i>	Flat-headed Galaxias	Moderate
B,R,J	VU	-	<i>Gallinago hardwickii</i>	Latham's Snipe	Moderate
	-	En	<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	Moderate
	-	Vu	<i>Hieraaetus morphnoides</i>	Little Eagle	Moderate-High
J	-	Vu	<i>Hydroprogne caspia</i>	Caspian Tern	Moderate
	EN	Cr	<i>Lophochroa leadbeateri</i>	Major Mitchell's Cockatoo	Moderate
	VU	En	<i>Maccullochella peelii</i>	Murray Cod	Moderate-High
	EN	Vu	<i>Melanodryas cucullata</i>	Hooded Robin	Moderate
	-	En	<i>Melanotaenia fluviatilis</i>	Murray-Darling Rainbowfish	High
	VU	-	<i>Neophema chrysostoma</i>	Blue-winged Parrot	Moderate
	-	-	<i>Numenius minutus</i>	Little Curlew	Moderate
	VU	En	<i>Nyctophilus corbeni</i>	South-eastern Long-eared Bat	Moderate
	-	Vu	<i>Oxyura australis</i>	Blue-billed Duck	High
	-	Vu	<i>Pomatostomus temporalis</i>	Grey-crowned Babbler	Moderate
	EN	Cr	<i>Rostratula australis</i>	Australian Painted-snipe	Moderate
	-	Vu	<i>Spatula rhynchotis</i>	Australasian Shoveler	High
	VU	Vu	<i>Stagonopleura guttata</i>	Diamond Firetail	Moderate
	-	En	<i>Stictonetta naevosa</i>	Freckled Duck	High
B,R,J,C	EN	En	<i>Tringa nebularia</i>	Common Greenshank	High
B,R,J,C	-	En	<i>Tringa stagnatilis</i>	Marsh Sandpiper	High

*** Listing Status Key:**

Treaty: B = Bonn Convention; and C, J and R = China-, Japan- and Republic of Korea-Australia Migratory Bird Agreements.

EPBC Act: EX = Extinct; CR = Critically endangered; EN = Endangered; VU = Vulnerable; and CD = Conservation dependant.

FFG Act: ex = Extinct; rx = Regionally Extinct; wx = Extinct in the Wild; cr = Critically Endangered; en = Endangered; vu = Vulnerable; th = Threatened nt = Near Threatened; and dd = Data Deficient.

1.3.2 Habitat Assessment

The focus with regards to fauna during the assessment was the consideration of fauna habitat values. Overall, the Study Area supports high quality habitat for a wide range of species, owing to the presence of major rivers within the Study Area (Little Murray) and nearby (Murray), large remnant trees, and a well-developed shrub layer in some sections. Habitat quality could be improved, particularly through the restoration of ground layer vegetation. Whilst a moderate diversity of native ground layer species was recorded, their abundance was low, with the ground layer in many sections being dominated by weed species. Areas of revegetation (David Ellemore trail) demonstrate that it is possible to enhance the quality of habitat for many species (particularly fauna), which can encourage them to return to the area.

An assessment of habitat features in the Study Area is provided in the table below.

Table 3. Habitat Attribute Assessment

Habitat Attribute	Abundance	Description	Use by Flora/Fauna
Canopy trees	High	Canopy tree cover is largely intact across the Study Area, with River Red Gum consistently present. In some areas River Coobah (and most other life forms) is largely absent. Some other areas are dominated by woody weeds (but still retain River Red Gum cover).	General Use Foraging and roosting habitat for birds, (e.g. Spotted Pardalote, New Holland Honeyeater), and microbats. Listed Species Foraging habitat for Grey-Crowned Babbler.
Tree Hollows and Tree fissures/cracks	Present	Some of the mature trees present on site are of a sufficient size or age to produce hollows, fissures, or cracks.	General Use Shelter for arboreal mammals (e.g. Brushtail Possum <i>Trichosurus cunninghamii</i>), birds, and microbats. Listed Species Shelter for Major Mitchell's Cockatoo.
Well-developed shrub layer	Moderate – High	In areas of higher quality vegetation within the Study Area, there is a well-developed shrub layer consisting of locally indigenous species such as Tangled Lignum <i>Duma florulenta</i> , Hedge Saltbush <i>Rhagodia spinescens</i> and Nitre Goosefoot <i>Chenopodium nitrariaceum</i> .	General Use Shelter, nesting and foraging habitat for small birds (e.g. White-browed Scrubwren, Red-browed Finch). Listed Species Shelter, nesting and foraging habitat for Brown Treecreeper.

Habitat Attribute	Abundance	Description	Use by Flora/Fauna
Diverse ground layer vegetation	Low – Moderate	Whilst a moderate diversity of ground layer vegetation was recorded throughout the Study Area, the ground layer in many sections was dominated by multiple noxious and environmental weed species such as Soursob <i>Oxalis pes-caprae</i> , Spear Thistle <i>Cirsium vulgare</i> , Gazania <i>Gazania linearis</i> and Onion Weed <i>Asphodelus fistulosus</i> . Furthermore, many of the native ground cover species recorded, were found in low numbers or as isolated specimens. Of the native ground layer species recorded, Barrier Saltbush <i>Enchylaena tomentosa var. tomentosa</i> was regularly observed across the Study Area. Some sections along the David Ellemore trail currently have reasonably good cover of native grasses such as Rough Spear-Grass <i>Austrostipa scabra</i> , Black-Head Grass <i>Enneapogon nigricans</i> , Spider Grass <i>Enteropogon acicularis</i> and Wallaby Grasses <i>Rytidosperma spp.</i> Though this is threatened by severe Soursob, Gazania and Onion Weed infestations.	General Use Generally, increases foraging opportunities for a greater diversity of fauna, and is more likely to support threatened flora.
Logs	Low	–	General Use Logs (particularly large logs) provide shelter for ground-dwelling fauna (e.g. reptiles, amphibians, mammals) and foraging resources for invertebrates.
Surface rock	Low	–	General Use Shelter and sunning opportunities for reptiles and small mammals.
Leaf litter	Moderate	In areas where there is higher coverage of native vegetation, there is suitable leaf litter cover. There are some areas with a high percentage cover of bare ground due to various disturbances such as: • Flooding; • Recreational activities; and • Installation of infrastructure.	General Use Leaf litter is an important foraging resource particularly for invertebrates.

Habitat Attribute	Abundance	Description	Use by Flora/Fauna
Waterways	Present	The Little Murray River, is found within the Study Area. The watercourse provides important habitat but is subject to several threats including: - Lack of instream habitat features (rocks, snags); - Pollution from agricultural and urban runoff; - Disturbance from recreational activities; and - Invasion of woody weeds (Willows, African Boxthorn, Canary Island Palm Poplars, Desert Ash etc).	General Use Important habitat for fish (e.g. Yarra Pygmy Perch), mammals (Rakali, Platypus), waterbirds (e.g. Eastern Great Egret) and invertebrates. Listed Species Shelter/foraging breeding habitat for Murray-Darling Rainbowfish, Southern Pygmy Perch, Murray Cod, Murray River Turtle, and listed waterbirds.
Riparian/fringing/instream vegetation	High	Much of the riparian and fringing vegetation in the Study Area has either been cleared or is dominated by weeds. However, the areas that are present with a well-developed shrub layer demonstrate its important habitat value.	General Use Foraging and breeding habitat for fish, birds, and mammals. Listed Species - Foraging and breeding habitat for listed waterbirds. - Foraging habitat for White-bellied Sea Eagle and Black Falcon.

2. Landscaping/Restoration Zones

The Study Area is surrounded by Urban development. As such, revegetation in certain areas must be compatible with any adjoining uses such as residential development, roads, tourist attractions (the Pioneer Settlement Heritage Overlay), holiday parks, and recreation spaces.

Table 4. Description of Landscaping and Restoration Zones

Zone	Description	Existing Conditions	Future Use	Reference EVCs
Toe	Between the natural water level and the lower part of the bank. Susceptible to erosion due to fluctuations and sometimes lack of vegetation.	Subject to inundation with a high percentage of bare ground and/or dominated by woody weeds such as Willow, with scattered tangled lignum, River Coobah, and very sparse cover of indigenous ground layer species such as creeping knotweed that are inundation tolerant in some areas.	Conservation	Intermittent Swampy Woodland, Riverine Chenopod Woodland, Riverine Grassy Woodland

Zone	Description	Existing Conditions	Future Use	Reference EVCs
Upper Bank	From the Toe to floodway on river bank.	Bank erosion is an issue, particularly in areas where there is increased recreational activity or infrastructure has been installed and bare ground percentage is high due to the disturbances. Some areas have well-developed canopy and shrub layers, though the ground layer is dominated by weed species such as Soursob, Horehound, Gazania and Onion Weed. In some areas, woody weed species such as African Boxthorn, Olive and Desert Ash are dominant, along with weeds in the ground layer.	Conservation	Riverine Chenopod Woodland
Higher Ground	Open space extending from the river Upper Bank to roadside and/or railway line. Higher elevation and less likely to be subject to flooding on the Western side of the Little Murray River due to the relatively steep riverine terraces that form the Upper Bank within the Study Area.	Predominantly cleared for residential land uses. In some areas such as along the David Ellemore Trail, well-developed canopy, shrub and even ground layers are present. The ground layer is threatened by weed species, particularly Soursob, Gazania and Onion Weed. The section of the Study Area most densely infested with woody weed species is near the property at 17 Pental Island Rd.	Conservation/open space	Riverine Chenopod Woodland, Semi-arid Chenopod Woodland

3. Management Considerations and Recommendations

3.1 Weed Control

Weed control works should be staged and prioritised to minimise weed spread and to maximise the cost-effective use of resources. Given that infestations of multiple weeds are widespread across the site, we recommend prioritising weed control works by location, rather than by species. **In-situ stem injection herbicide treatment is recommended for Weeping Willows, as this will minimise erosion and impact on native vegetation values within the Study Area. Following successful treatment, the dead Willow trees can be cut and removed (12**

months after they have died). It is recommended to leave the Willow stumps in-situ to minimise the risk of erosion (WeedsAustralia 2019a).

Smaller woody weed species (African Boxthorn, Olive, Desert Ash etc) can be treated with herbicide using the cut and paint method and disposed of suitably.

Soursob is a difficult weed species to eradicate, and may require persistent control efforts over multiple years to be successful. Spot spraying with herbicide at the time of bulb exhaustion (at the beginning of or just prior to the flowering stage in its life cycle) is recommended, as new bulbs will not yet be adequately developed and will be less likely to survive. Hand removal can be detrimental as it can cause developed bulbils to dislodge and thereby spread (WeedsAustralia 2019b).

Gazania has established throughout Victoria and is a highly invasive weed. Furthermore, Gazania roots produce allelopathic chemicals that inhibit the growth of other plants nearby (Shahzad, Adnan and Bajwa 2025). Spot spraying with herbicide when the plants are actively growing (Spring to Summer) is recommended (PIRSA 2024).

Higher priority areas for weed control are generally (LLS 2016):

- Small, new, and outlying infestations to prevent a seedbank from forming and to reduce the likelihood of a large infestation developing;
- Areas that have a high risk of spread to other locations, such as boundary fence lines and roadsides; and
- Locations with high value assets (e.g. native vegetation) with established infestations.

General weed management principles include (LLS 2016):

- Prevention: Prioritise weed hygiene practices to prevent the introduction of weeds into weed-free areas;
- Eradication: Prioritise eradication of small, isolated infestations and early-stage invasions of weeds; and
- Reduction or containment: where weeds are widespread or established, eradication may be impractical. Weed impact can be managed by progressively reducing infestation size, containing spread, reducing the seed bank, and reducing or preventing seed set.

Priority weed control areas include:

- Sections with higher quality native vegetation that have well-developed canopy and shrub layers (**Upper Bank and Higher Ground areas along the David Ellemore Trail, sections of the Upper Bank between the Pioneer Settlement and Bryan Street**) and some potential capacity for natural regeneration;
- Areas where the understorey contains dense infestations of woody weed species (such as **near 17 Pental Island Road**);
- Where infrastructure has been installed and there is a high percentage of bare ground and weed cover is increasing in the ground layer (**surrounding the observation deck**);
- Areas where the ground layer has a high cover of weed species (**some sections along the David Ellemore Trail**); and

- Any areas where Weeping Willow is present.

3.2 Revegetation

Prior to undertaking any ecological restoration works, areas proposed for revegetation should first be thoroughly surveyed to assess the site's capacity for natural regeneration and recovery (SERA 2021). This survey should include an assessment of existing conditions, including determining the presence of any remnant or planted indigenous flora species, and the distribution and types of weed species present.

Sourcing of plants for revegetation requires careful planning.

Due to the frequency of disturbance and difficulty of access, revegetation should be focused in the Upper Bank and Higher Ground zones of the Study Area.

As an urban water frontage, the Study Area has an important role in water quality. The presence of high quality riparian vegetation can provide many beneficial environmental effects such as strengthening habitat corridors, improved river ecology, reduction in bank erosion, improved soil structure, and enhanced stream health (VEAC 2008).

Areas that are dominated by woody weed species, with high percentage cover of weeds in the ground layer, and/or have a high percentage of bare ground due to infrastructure installation are considered as high priority for revegetation.

3.2.1 Site Preparation – Weed and Pest Animal Control

To prepare sites for revegetation, weed cover must first be reduced to negligible levels, typically through primary control and at least one follow-up treatment of weed regrowth. Weed control should occur in two seasonal rounds (i.e. once during November and once during July) beginning at least six months prior to revegetation to ensure the control of both warm season and cool season weeds.

Herbicide application (i.e. rig spraying, spot spraying) is likely to take multiple applications over time to reduce the soil-stored seed bank. The weed control methods required prior to revegetation will vary based on the existing condition of each site.

Weed control methods must be applied sensitively to avoid off-target damage to native flora.

Pest herbivores such as rabbits and hares should also be controlled at the site to prevent damage to plantings.

3.2.2 Site Preparation – Soil Preparation

Due to the presence of sensitive Aboriginal cultural values and highly erodible areas, soil disturbance (e.g. scraping, ripping, cultivating) cannot be undertaken at the site.

To prepare the site for planting, in areas where there is water flow (including flood-prone areas), erosion control matting (i.e. jute matting) should be installed to suppress weeds. **This is particularly relevant for areas with a high percentage of bare ground (surrounding the observation deck).**

In areas not prone to inundation, mulch should be spread across the site to smother weeds and improve water infiltration (Greening Australia 2003a). Mulch must be carefully sourced to ensure it does not contain contaminants or weed propagules. **Use of mulch should be minimal and restricted to Higher Ground areas (above**

the Toe and Upper Bank) without well-developed shrub and ground layer vegetation that are dominated by weed species, and have little potential for natural regeneration.

3.2.3 Planting

Planting be into moist soil if possible. Planting should be completed when the soil is moist but not waterlogged, during spring (Greening Australia 2003a). Planting at this time allows the plants to establish during the warmer months, when they are less susceptible to fungal attack and soil waterlogging. **Planting in Spring should also help avoid potential frost damage that may occur if plantings are done during the cooler months. Planting seedlings is recommended due to the difficulty of access and erosion sensitivity of much of the Study Area.**

Watering upon planting is beneficial as it removes air pockets at the roots and helps to establish good soil-root contact. Installing guards is also beneficial to protect the plant from herbivores and wind.

Monitor the site to determine if ongoing watering will be necessary. Maintenance watering may be required during the first summer following the planting.

Plant selection and planting density should be dependent on the species present and the percentage cover of life forms within the reference EVC. 55% of understorey cover is typically dominated by medium shrub (30%) and small shrub (25%) life forms within EVC 103 (DSE 2005b).

Planting densities are lifeform and EVC dependent, though generally recommended spacings are 1 per 5m² (canopy trees), 1 per 2–3 m² (shrubs), and 4–5 per 1m² (ground covers) (Greening Australia 2003b).

3.2.4 Maintenance

Any plantings are to be regularly monitored and maintained. Dead plants must be replaced, and tree guards and stakes replaced if they deteriorate before plants become established. Tree guards must be removed once plants become established.

Weeds and pasture grasses around plantings and under guards should be continually controlled to prevent competition for water, light, and nutrients. Control methods include hand weeding and careful spot spraying.

Depending on seasonal weather conditions following planting, some supplementary watering may be required during dry periods, until plants become established.

Whilst the most critical time for monitoring and maintenance will be during the first Summer following plantings, it is highly recommended to continue regular maintenance over the subsequent years to manage weed incursion, replace any plants that have died, to inform if the restoration is successful, and whether there are any adaptive management requirements (SERA 2021).

3.2.5 Monitoring

Implementing other monitoring methodologies such as photo-points and flora surveys is also highly recommended. This will allow both adaptive management as well as allowing the successes of vegetation management works to be recorded and shared.

Monitoring following any episodic events (floods, fire, severe frost, drought) is also recommended (SERA 2021).

3.3 Restoration of Habitat Features

We recommend reinstating habitat features that have been lost from the Study Area within revegetated areas managed for conservation. Rocks and logs should be installed in the ground layer to provide shelter and foraging resources for reptiles and invertebrates.

Where possible, restoring a shrub layer through denser plantings (while maintaining important view lines in the master) will improve habitat suitability for fauna, particularly birds.

DRAFT

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Appendix 1. Flora Recorded in Study Area

^ Key					
Origin					
*: Exotic species; #: Victorian native species extended beyond natural range; and Empty: Indigenous species.					
EPBC Act Listing Status			FFG Act Listing Status		
EX: Extinct; CR: Critically endangered; EN: Endangered; VU: Vulnerable; and CD: Conservation dependant.			ex: Extinct; rx: Regionally Extinct; wx: Extinct in the Wild; cr: Critically Endangered; en: Endangered; vu: Vulnerable; nt: Near Threatened; and dd: Data Deficient.		
			FFG Act Protection Category		
			R: Restricted Use; and G: General Protection.		
^ Origin	Scientific Name	Common Name	Listing Status ^		FFG Protection Category <
			EPBC Act	FFG Act	
	Ferns and Fern Allies				
*	Pinus radiata	Radiata Pine	-	-	-
	Monocotyledons				
*	Asphodelus fistulosus	Onion Weed	-	-	-
	Austrostipa scabra	Rough Spear-grass	-	-	-
*	Bromus diandrus	Great Brome	-	-	-
*	Cenchrus clandestinus	Kikuyu	-	-	-
	Chloris truncata	Windmill Grass	-	-	-
	Cynogeton procerum s.s.	Common Water-ribbons	-	-	-
*	Cynodon dactylon var. dactylon	Couch	-	-	-
*	Cyperus eragrostis	Drain Flat-sedge	-	-	-
*	Dactylis glomerata	Cocksfoot	-	-	-
*	Ehrharta erecta	Panic Veldt-grass	-	-	-
*	Ehrharta longiflora	Annual Veldt-grass	-	-	-
	Enneapogon nigricans	Dark Bottle-washers	-	-	-
	Enteropogon acicularis	Spider Grass	-	-	-
*	Eragrostis cilianensis	Stink Grass	-	-	-
*	Gladiolus spp.	Gladiolus	-	-	-
*	Lolium spp.	Rye Grass	-	-	-
	Lomandra longifolia	Spiny-headed Mat-rush	-	-	-
*	Paspalum dilatatum	Paspalum	-	-	-
*	Phoenix canariensis	Canary Island Palm	-	-	-
	Phragmites australis	Common Reed	-	-	-
*	Poa annua s.l.	Annual Meadow-grass	-	-	-
	Poa labillardierei	Common Tussock-grass	-	-	-
*	Romulea rosea	Onion Grass	-	-	-
	Rytidosperma caespitosum	Common Wallaby-grass	-	-	-
	Rytidosperma spp.	Wallaby Grass	-	-	-
*	Yucca spp.	Yucca	-	-	-
	Dicotyledons				
	Acacia hakeoides	Hakea Wattle	-	-	P
*	Acacia iteaphylla	Flinders Range Wattle	-	-	P
	Acacia ligulata	Small Cooba	-	-	P
#	Acacia pravissima	Ovens Wattle	-	-	-
	Acacia stenophylla	Eumong	-	-	P
*	Aqonis flexuosa	Willow Myrtle	-	-	-

Origin >	Scientific Name	Common Name	Listing Status ^		FFC Protection Category <
			EPBC Act	FFC Act	
*	<i>Aizoon pubescens</i>	Galenia	-	-	-
	<i>Alectryon oleifolius subsp. canescens</i>	Cattle Bush	-	-	-
*	<i>Arctotheca calendula</i>	Cape Weed	-	-	-
	<i>Atriplex semibaccata</i>	Berry Saltbush	-	-	-
	<i>Atriplex semibaccata</i>	Berry Saltbush	-	-	-
#	<i>Brachychiton populneus subsp. populneus</i>	Kurrajong	-	-	-
*	<i>Brassica spp.</i>	Turnip	-	-	-
#	<i>Callistemon citrinus</i>	Crimson Bottlebrush	-	-	-
	<i>Calotis scapigera</i>	Tufted Burr-daisy	-	-	R
	<i>Centipeda cunninghamii</i>	Common Sneezeweed	-	-	-
*	<i>Cerastium glomeratum s.l.</i>	Common Mouse-ear Chickweed	-	-	-
*	<i>Chamaecytisus palmensis</i>	Tree Lucerne	-	-	-
	<i>Chenopodium curvispicatum</i>	Cottony Saltbush	-	-	-
	<i>Chenopodium nitrariaceum</i>	Nitre Goosefoot	-	-	-
*	<i>Cirsium vulgare</i>	Spear Thistle	-	-	-
	<i>Convolvulus remotus s.l.</i>	Grassy Bindweed	-	-	-
*	<i>Dimorphotheca spp.</i>	Cape Marigold	-	-	-
	<i>Duma florulenta</i>	Tangled Lignum	-	-	-
	<i>Einadia hastata</i>	Saloop	-	-	-
	<i>Enchylaena tomentosa var. tomentosa</i>	Ruby Saltbush	-	-	-
	<i>Eremophila divaricata subsp. divaricata</i>	Spreading Emu-bush	-	Vu	-
*	<i>Erigeron bonariensis</i>	Flaxleaf Fleabane	-	-	-
*	<i>Erodium botrys</i>	Big Heron's-bill	-	-	-
	<i>Eucalyptus camaldulensis</i>	River Red-gum	-	-	-
*	<i>Eucalyptus cladocalyx</i>	Sugar Gum	-	-	-
	<i>Eucalyptus largiflorens</i>	Black Box	-	-	-
	<i>Eucalyptus sideroxylon subsp. sideroxylon</i>	Mugga	-	-	-
*	<i>Eucalyptus spathulata subsp. spathulata</i>	Swamp Mallet	-	-	-
	<i>Euphorbia spp.</i>	Spurge	-	-	-
*	<i>Foeniculum vulgare</i>	Fennel	-	-	-
*	<i>Fraxinus angustifolia</i>	Desert Ash	-	-	-
*	<i>Fumaria muralis subsp. muralis</i>	Wall Fumitory	-	-	-
	<i>Galium gaudichaudii</i>	Rough Bedstraw	-	-	-
*	<i>Gazania linearis</i>	Gazania	-	-	-
	<i>Goodenia pinnatifida</i>	Cut-leaf Goodenia	-	-	-
*	<i>Grevillea robusta</i>	Silky Oak	-	-	-
*	<i>Hedera spp.</i>	Ivy	-	-	-
	<i>Jasminum didymum subsp. lineare</i>	Desert Jasmine	-	En	-
	<i>Laphangium luteoalbum</i>	Jersey Cudweed	-	-	-
*	<i>Lepidium africanum</i>	Common Peppergrass	-	-	-
*	<i>Lycium ferocissimum</i>	African Box-thorn	-	-	-
	<i>Maireana brevifolia</i>	Short-leaf Bluebush	-	-	-
*	<i>Malva parviflora</i>	Small-flower Mallow	-	-	-
*	<i>Marrubium vulgare</i>	Horehound	-	-	-
#	<i>Melaleuca armillaris subsp. armillaris</i>	Giant Honey-myrtle	-	-	-
	<i>Melaleuca lanceolata</i>	Moonah	-	-	-
*	<i>Melaleuca styphelioides</i>	Prickly Paperbark	-	-	-
*	<i>Modiola caroliniana</i>	Red-flower Mallow	-	-	-
—	<i>Myoporum montanum</i>	Waterbush	-	En	-

Origin ^	Scientific Name	Common Name	Listing Status ^		FFC Protection Category <
			EPBC Act	FFC Act	
*	<i>Nerium oleander</i>	Oleander	-	-	-
	<i>Nitraria billardierei</i>	Nitre-bush	-	-	-
*	<i>Olea europaea</i>	Olive	-	-	-
*	<i>Oxalis pes-caprae</i>	Soursob	-	-	-
	<i>Persicaria prostrata</i>	Creeping Knotweed	-	-	-
	<i>Pittosporum angustifolium</i>	Weeping Pittosporum	-	-	-
*	<i>Plantago coronopus</i>	Buck's-horn Plantain	-	-	-
*	<i>Plantago lanceolata</i>	Ribwort	-	-	-
*	<i>Populus spp.</i>	Poplar	-	-	-
#	<i>Prostanthera nivea var. nivea</i>	Snowy Mint-bush	-	-	-
*	<i>Prunus cerasifera</i>	Cherry Plum	-	-	-
	<i>Rhagodia spinescens</i>	Hedge Saltbush	-	-	-
*	<i>Rumex crispus</i>	Curled Dock	-	-	-
*	<i>Salix babylonica s.l.</i>	Weeping Willow	-	-	-
*	<i>Salvia verbenaca</i>	Wild Sage	-	-	-
*	<i>Schinus molle</i>	Pepper Tree	-	-	-
	<i>Sclerochlamys brachyptera</i>	Short-wing Saltbush	-	-	-
	<i>Sclerolaena muricata</i>	Black Roly-poly	-	-	-
*	<i>Sisymbrium erysimoides</i>	Smooth Mustard	-	-	-
#	<i>Solanum aviculare</i>	Kangaroo Apple	-	-	-
*	<i>Solanum nigrum s.l.</i>	Black Nightshade	-	-	-
*	<i>Sonchus oleraceus</i>	Common Sow-thistle	-	-	-
*	<i>Stachys byzantina</i>	Lamb's Ears	-	-	-
*	<i>Ulmus parvifolia</i>	Chinese Elm	-	-	-
*	<i>Urtica dioica</i>	Giant Nettle	-	-	-
*	<i>Veronica speciosa</i>	Napuka	-	-	-
*	<i>Viburnum spp.</i>	Viburnum	-	-	-
	<i>Vittadinia gracilis</i>	Woolly New Holland Daisy	-	-	R

Appendix 2. Likelihood of Occurrence: Listed Flora

^Listing Status Key							
EPBC Act Listing Status				FFG Act Listing Status			
EX: Extinct; CR: Critically endangered; EN: Endangered; VU: Vulnerable; and CD: Conservation dependant.				ex: Extinct; rx: Regionally Extinct; wx: Extinct in the Wild; cr: Critically Endangered; en: Endangered; vu: Vulnerable; th: Threatened nt: Near Threatened; and dd: Data Deficient.			
Source	Listing Status ^		Scientific Name	Common Name	Individuals Recorded	Last Record	Likelihood of Occurrence
	EPBC	FFG					
VBA	-	Cr	<i>Acacia oswaldii</i>	Umbrella Wattle	6	2024	Low
VBA	-	Cr	<i>Allocasuarina luehmannii</i>	Buloke	1	2003	Low-moderate
PMST	VU	-	<i>Austrostipa metatoris</i>		N/A	N/A	Low
PMST	EN	-	<i>Caladenia tensa</i>	Rigid Spider-orchid	N/A	N/A	Low
PMST	VU	En	<i>Maireana cheelii</i>	Chariot Wheels	N/A	N/A	Low
PMST	VU	Cr	<i>Myriophyllum porcatum</i>	Ridged Water-milfoil	N/A	N/A	Low
PMST	VU	-	<i>Swainsona pyrophila</i>	Yellow Swainson-pea	N/A	N/A	Low

*** Listing Status Key:**

EPBC Act: EX = Extinct; CR = Critically endangered; EN = Endangered; VU = Vulnerable; and CD = Conservation dependant.

FFG Act: ex = Extinct; rx = Regionally Extinct; wx = Extinct in the Wild; cr = Critically Endangered; en = Endangered; vu = Vulnerable; nt = Near Threatened; and dd = Data Deficient.

Appendix 3. Likelihood of Occurrence: Listed Fauna

^ Listing Status Key

EPBC Act Listing Status

EX: Extinct; **CR:** Critically endangered; **EN:** Endangered; **VU:** Vulnerable; and **CD:** Conservation dependant.

FFG Act Listing Status

ex: Extinct; **rx:** Regionally Extinct; **wx:** Extinct in the Wild; **cr:** Critically Endangered; **en:** Endangered; **vu:** Vulnerable; **th:** Threatened; **nt:** Near Threatened; and **dd:** Data Deficient.

International Treaty Listing

B: Bonn Convention; **C:** CAMBA; **J:** JAMBA; **R:** ROKAMBA (China–; Japan; and Republic of Korea– Australia Migratory Bird Agreement).

Source	Listing Status ^			Scientific Name	Common Name	Individuals Recorded	Last Record	Likelihood Of Occurrence
	Treaty	EPBC	FFG					
VBA	B,R,J,C		En	<i>Actitis hypoleucos</i>	Common Sandpiper	N/A	N/A	Low
VBA			Vu	<i>Amytornis striatus</i>	Striated Grasswren	N/A	N/A	Low
PMST		VU	Vu	<i>Apus pacificus</i>	Fork-tailed Swift	N/A	N/A	Low-Moderate
PMST		VU	En	<i>Dasyurus maculatus maculatus</i>	Spot-tailed Quoll	N/A	N/A	Low
VBA				<i>Coracina maxima</i>	Ground Cuckoo-shrike	1	1979	Low
PMST		VU	Vu	<i>Craterocephalus fluviatilis</i>	Murray Hardyhead	N/A	N/A	Low
PMST		EN	En	<i>Crinia sloanei</i>	Sloane's Froglet	N/A	N/A	Low
VBA	C,R,J	–	Vu	<i>Gallinago megala</i>	Swinhoe's Snipe	N/A	N/A	Low
PMST	C,R,J	–	Cr	<i>Gallinago stenura</i>	Pin-tailed Snipe	N/A	N/A	Low
VBA or PMST		EN	En	<i>Gelochelidon macrotarsa</i>	Australian Gull-billed Tern	3	1980	Low-Moderate
PMST		–	Vu	<i>Geopelia cuneata</i>	Diamond Dove	1	1979	Low-Moderate
VBA		EN	Cr	<i>Grantiella picta</i>	Painted Honeyeater	N/A	N/A	Low
PMST		VU	En	<i>Hemiaspis damelii</i>	Grey Snake	N/A	N/A	Low-Moderate
PMST	C,R,J	EN	En	<i>Hirundapus caudacutus</i>	White-throated Needletail	1	1977	Low-Moderate
PMST		–	–	<i>Ixobrychus dubius</i>	Australian Little Bittern	1	1979	Low
VBA		VU	Cr	<i>Lathamus discolor</i>	Swift Parrot	N/A	N/A	Low
VBA or PMST		VU	–	<i>Leipoa ocellata</i>	Malleefowl	N/A	N/A	Low
VBA	B,R,J,C	–	En	<i>Limosa lapponica</i>	Bar-tailed Godwit	1	1982	Low
VBA or PMST	B,R,J,C	EN	Cr	<i>Limosa limosa</i>	Black-tailed Godwit	1	2018	Low
PMST		EN	En	<i>Litoria raniformis</i>	Crowling Grass Frog	N/A	N/A	Low-Moderate
VBA		VU	Th	<i>Maccullochella macquariensis</i>	Trout Cod	N/A	N/A	Low

Source	Listing Status [^]			Scientific Name	Common Name	Individuals Recorded	Last Record	Likelihood Of Occurrence
	Treaty	EPBC	FFG					
VBA		–	Cr	<i>Macquaria australasica</i>	Macquarie Perch	N/A	N/A	Low
PMST		VU	Vu	<i>Pedionomus torquatus</i>	Plains-wanderer	N/A	N/A	Low
VBA		–	En	<i>Peltohyas australis</i>	Inland Dotterel	1	1980	Low-Moderate
PMST		EN	–	<i>Pogona barbata</i>	Bearded Dragon	N/A	N/A	Low-Moderate
VBA		–	Vu	<i>Polytelis anthopeplus monarchoides</i>	Regent Parrot	N/A	N/A	Low-Moderate
VBA		EN	Vu	<i>Tandanus tandanus</i>	Freshwater Catfish	1	1997	Low
VBA	B,R,J,C	EN	Cr	<i>Tringa glareola</i>	Wood Sandpiper	1	1979	Low
VBA		EN	En	<i>Vermicella annulata</i>	Bandy Bandy	N/A	N/A	Low-Moderate

*** Listing Status Key:**

Treaty: B = Bonn Convention; and C, J, and R = China-, Japan-, and Republic of Korea-Australia Migratory Bird Agreements.

EPBC Act: EX = Extinct; CR = Critically endangered; EN = Endangered; VU = Vulnerable; and CD = Conservation dependant.

FFG Act: ex = Extinct; rx = Regionally Extinct; wx = Extinct in the Wild; cr = Critically Endangered; en = Endangered; vu = Vulnerable; th = Threatened nt = Near Threatened; and dd = Data Deficient.

Appendix 4. Maps

Maps start on the next page.

DRAFT

Map 1. Study Area

Map 2. Existing Ecological Conditions

Map 3. Landscaping and Restoration Zones

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Disclaimer
Practical Ecology bears no responsibility for the accuracy and completeness of this information and any decisions or actions taken on the basis of the map. While information appears accurate at publication, nature and circumstances are constantly changing.

Legend

-  Study area
-  Railway line

Topography

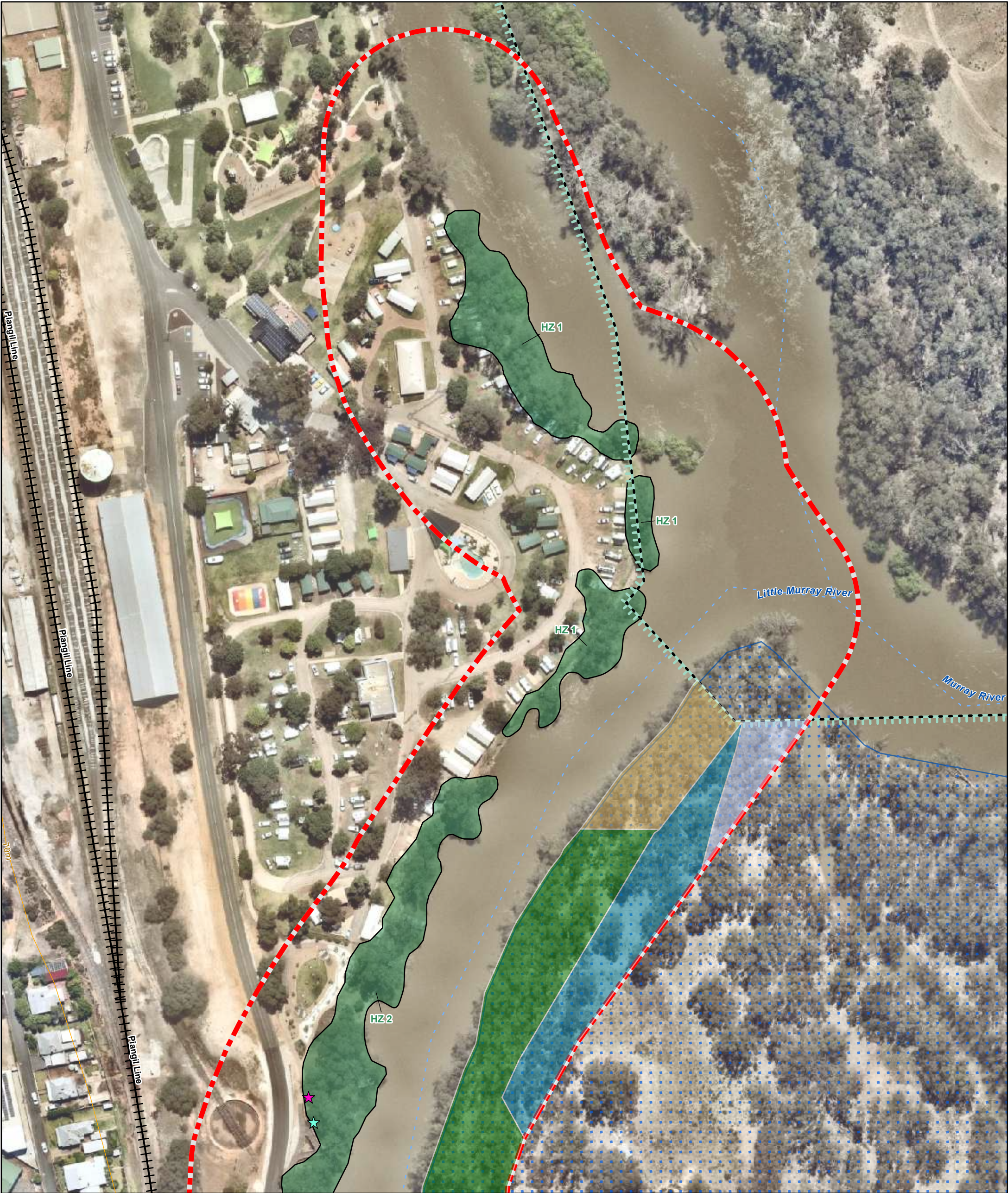
-  Contour (10m interval)
-  Major channel/aquaduct
-  Connector
-  Watercourse drain/channel
-  Area subject to inundation
-  Lake/dam

Map 1. Study Area
Swan Hill, VIC

Details
Project code: 03946 MIC
Mapping by: Nina Matheis
Date: 15/09/2025
Aerial imagery: Nearmap (11/09/2025)
Basemap data: Vicmap Basemap © State Government of Victoria



GDA2020 MGA Zone 54



Legend

-  Study area
-  Bioregion
-  Railway line

Habitat zones (HZ)

- Comments**
-  Riverine Chenopod Woodland (MuF_0103)

Invasive flora

-  African Boxthorn
-  Soursob

Pre-1750's modelled Ecological Vegetation Classe (shown only on eastern extent of study area)

-  Riverine Grassy Woodland

-  Sedgy Riverine Forest
-  Semi-arid Chenopod Woodland
-  Riverine Chenopod Woodland

Topography

-  Contour (10m interval)

Hydrology

-  Connector
-  Area subject to inundation

Map 2. Existing Conditions
Swan Hill, VIC

Page 2 of 6

Details

Project code: 03946 MIC
Mapping by: Nina Matheis
Date: 25/09/2025
Aerial imagery: Nearmap (11/09/2025)
Basemap data: Vicmap Basemap © State Government of Victoria



0 10 20 30
Meters
Scale: 1:1,500
(Page size A3)

GDA2020 MGA Zone 54





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Legend

-  Study area
-  Bioregion
-  Railway line
- Native flora**
-  Spreading Emu Bush
- Habitat zones (HZ)**
- Comments**
-  Riverine Chenopod Woodland (MuF_0103)
-  Intermittent Swampy Woodland (MuF_0813)
- Invasive flora**
-  African Boxthorn
-  Soursob

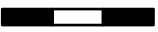
Pre-1750's modelled Ecological Vegetation Classe (shown only on eastern extent of study area)

-  Riverine Grassy Woodland
-  Sedgy Riverine Forest
-  Riverine Chenopod Woodland
- Topography**
-  Contour (10m interval)
- Hydrology**
-  Connector
-  Area subject to inundation
-  Lake/dam

Map 2. Existing Conditions
Swan Hill, VIC

Page 3 of 6

Details
Project code: 03946 MIC
Mapping by: Nina Matheis
Date: 25/09/2025
Aerial imagery: Nearmap (11/09/2025)
Basemap data: Vicmap Basemap © State Government of Victoria



0 10 20 30
Meters
Scale: 1:1,500
(Page size A3)

GDA2020 MGA Zone 54



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Legend

- Study area
- Bioregion
- Native flora**
 - Spreading Emu Bush
 - Waterbush
- Habitat zones (HZ)**
- Comments**
 - Riverine Chenopod Woodland (MuF_0103)
 - Intermittent Swampy Woodland (MuF_0813)

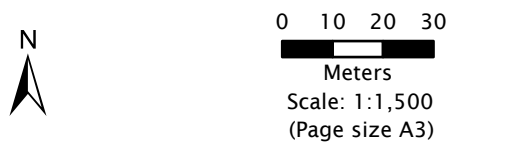
- Invasive flora**
- African Boxthorn
 - European olive
 - Gazania
 - Olive
 - Olive, Ash, Fennel
 - Soursob
 - Willow

- Pre-1750's modelled Ecological Vegetation Classe (shown only on eastern extent of study area)**
- Riverine Grassy Woodland
 - Sedgy Riverine Forest
 - Riverine Chenopod Woodland
- Hydrology**
- Connector
 - Watercourse drain/channel
 - Area subject to inundation
 - Lake/dam

Map 2. Existing Conditions
Swan Hill, VIC

Page 4 of 6

Details
Project code: 03946 MIC
Mapping by: Nina Matheis
Date: 25/09/2025
Aerial imagery: Nearmap (11/09/2025)
Basemap data: Vicmap Basemap © State Government of Victoria



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Legend

- Study area
- Bioregion
- Railway line

Native flora

- Waterbush

Habitat zones (HZ)

- Riverine Chenopod Woodland (MuF_0103)

Invasive flora

- African Boxthorn

- African Boxthorn, Olive, Soursob
- Ash, Willow, Soursob
- Gazania
- Olive
- Olive and Pepper-Tree
- Olive, Canary Island Palm
- Willow
- Weed area

Pre-1750's modelled Ecological Vegetation Classe (shown only on eastern extent of study area)

- Riverine Grassy Woodland

Topography

- Contour (10m interval)

Hydrology

- Connector
- Watercourse drain/channel
- Area subject to inundation

Map 2. Existing Conditions
Swan Hill, VIC

Page 5 of 6

Details

Project code: 03946 MIC
Mapping by: Nina Matheis
Date: 25/09/2025
Aerial imagery: Nearmap (11/09/2025)
Basemap data: Vicmap Basemap © State Government of Victoria



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Meters
Scale: 1:1,500
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Legend

- Study area
- Bioregion
- Railway line

Native flora

- Desert Jasmine

Habitat zones (HZ)

Comments

- Riverine Chenopod Woodland (MuF_0103)
- Semi-arid Chenopod Woodland (MuF_0098)

Invasive flora

- African Boxthorn
- African Boxthorn, Olive

- Horehound
- Olive
- Olive and Pepper-Tree
- Weed area

Pre-1750's modelled Ecological Vegetation Classe (shown only on eastern extent of study area)

- Riverine Grassy Woodland

Topography

- Contour (10m interval)

Hydrology

- Connector
- Watercourse drain/channel

Map 2. Existing Conditions
Swan Hill, VIC

Page 6 of 6

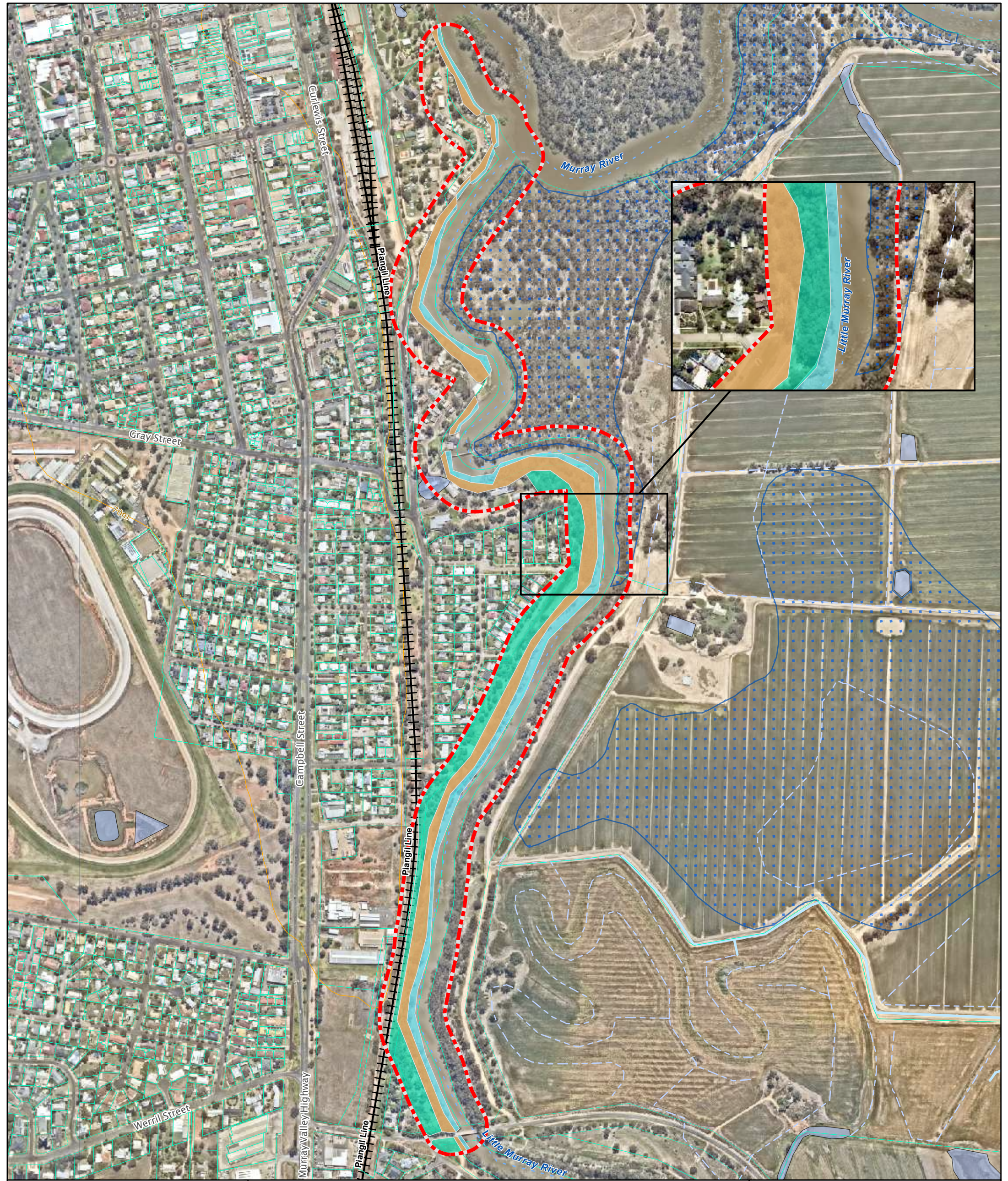
Details

Project code: 03946 MIC
Mapping by: Nina Matheis
Date: 25/09/2025
Aerial imagery: Nearmap (11/09/2025)
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Meters
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Legend



Study area



Parcel boundary



Railway line

Landscaping areas (indicative only)



Higher ground



Toe of bank



Upper bank

Topography



Contour (10m interval)



Major channel/aquaduct



Connector



Watercourse drain/channel



Area subject to inundation



Lake/dam

Map 3. Landscaping Areas

Swan Hill, VIC

Details
Project code: 03946 MIC
Mapping by: Nina Matheis
Date: 22/09/2025
Aerial imagery: Nearmap (11/09/2025)
Basemap data: Vicmap Basemap © State Government of Victoria



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