



Wongborel/Mt Brown & Gogulgar Bilya/Avon River Reserve Conservation Management Plan

Shire of York

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Ecological Australia Pty Ltd also acknowledges the Traditional Owners and ongoing custodians of the Country throughout Western Australia and their connections to land, waters, and communities. We pay respect to Western Australian Aboriginal cultures and Elders past, present and emerging.

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Template 2.8.1

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Abbreviations

Abbreviation	Description
ACHIS	Aboriginal Cultural Heritage Information Systems
AIATSIS	Australian Institute of Aboriginal and Torres Strait Islander Studies
BAM Act	<i>Biosecurity Agriculture Management Act 2007</i>
BC Act	<i>Biodiversity Conservation Act 2016</i>
BOM	Bureau of Meteorology
DFCA	Department of Biodiversity, Conservation and Attractions
DEC	Department of Environment and Conservation
DEW (SA)	Department of Environment and Water (South Australia)
DFES	Department of Fire and Emergency Services
DoE	Department of the Environment
DPIRD	Department of Primary Industries and Regional Development
DPLH	Department of Planning, Land and Heritage
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
IBRA	Interim Biogeographic Regionalisation for Australia
OBRM	Office of Bushfire Risk Management
NIASA	Nursery Industry Accreditation Scheme
PEC	Priority Ecological Community
TEC	Threatened Ecological Community
WoNS	Weeds of National Significance

Executive Summary

Eco Logical Australia was engaged by the Shire of York to prepare a Conservation Management Plan of the 147 ha Wongborel/Mt Brown Reserve, located approximately 1 km east of the Shire's Council Chambers, and the Gogulgar Bilya/Avon River Reserve, which occurs for approximately 7 km on either side of Avon River as it flows through the centre of the town.

The purpose of the Management Plan is to outline environmental management and monitoring recommendations for the two reserves. The ultimate decision and responsibility for the implementation of recommendations detailed in this Management Plan is with the Shire and/or suitably qualified delegate.

The Management Plan has been guided and informed by baseline studies and information provided by the Shire as well as the legislative requirements and best practises in environmental management.

The implementation of a cultural burning and a revegetation program within the two reserves are the key components of the Management Plan. Other management measures also addressed in this document include the following:

- Weed Management.
- Native Flora and Vegetation Management.
- Native Fauna and Habitat Management.
- Disease Management.
- Feral and Grazing Animal Management.
- Bushfire Management.
- Disturbance and Erosion Management.
- Ballardong Noongar Cultural Heritage Management.
- European and Other Cultural Heritage Management.
- Visitor Access and Activities Management.

1. Introduction

1.1. Overview and Scope

Eco Logical Australia (ELA) was engaged by the Shire of York (the Shire) to prepare a Conservation Management Plan (the Plan) for two reserves currently invested with the Shire. The first reserve is the Wongborel/Mt Brown Reserve, which is located approximately 1 km east of the Shire's Council Chambers and is approximately 147 ha in size. The second is a section of the Gogulgar Bilya/Avon River Reserve, which occurs for approximately 7 km on either side of Avon River as it flows through the centre of the town. Further details on these two reserves are presented in Section 1.3.

The scope of this Plan is restricted to three broad management groups, each of which consist of several key components. These broad management groups and their components are outlined below:

- Caring for Country (Environmental and Natural Values).
 - Weed Management.
 - Native Flora and Vegetation Management.
 - Native Fauna and Habitat Management.
 - Disease Management.
 - Feral and Grazing Animal Management.
 - Bushfire Management.
 - Disturbance and Erosion Management.
- Connecting with Country (Cultural and Heritage Values).
 - Ballardong Noongar Cultural Heritage Management.
 - European and Other Cultural Heritage Management.
- People on Country (Recreation, Tourism and Community Values).
 - Visitor Access Management.
 - Activities Management.

At the request of the Shire a particular focus has been given to the implementation of appropriate Noongar cultural burning and revegetation programs within the reserves, which form a part of the Bushfire Management and Native Flora and Vegetation Management components respectively.

For each management group and its components, the Plan provides multiple management objectives as well as implementation and monitoring recommendations which should be implemented to ensure that these are achieved in a timely and effective manner. While each management group will be discussed separately many of the recommendations are mutually beneficial.

1.2. Vision and Objectives

The overarching vision for this Management Plan is to ensure that:

The unique natural, cultural, heritage and community values of the Wongborel/Mt Brown and Gogulgar Bilya/Avon River Reserves are conserved and enhanced for current and future generations.

To achieve this vision several strategic management objectives have been developed based on the Wheatbelt Regional Parks and Reserves Management Plan as a guide (DBCA 2021), to ensure

consistency between local and regional objectives for reserve management. The strategic management objectives provide a broad direction for the management and mitigation measures outlined within this document. The strategic management objectives are outlined below:

- The cultural and heritage values present within the Wongborel/Mt Brown and Gogulgar Bilya/Avon River Reserves, especially those of the Ballardong Noongar people, are conserved for current and future generations.
- The biodiversity and ecological integrity of the Wongborel/Mt Brown and Gogulgar Bilya/Avon River Reserves are conserved for current and future generations.
- Recreation, tourism, and community experiences are allowed to continue to occur within the Wongborel/Mt Brown and the Gogulgar Bilya/Avon River Reserves.
- The current understanding of the values within and management issues facing the Wongborel/Mt Brown and the Gogulgar Bilya/Avon River Reserves is continually developed to guide, adapt, and improve management actions within the reserves in the future.
- The needs and values of other stakeholders, particularly those which adjoin the Wongborel/Mt Brown and Gogulgar Bilya/Avon River Reserves are considered during management.

1.3. Reserves

1.3.1. Wongborel/Mt Brown Reserve

The Wongborel / Mt Brown Reserve is a prominent landscape feature and is a significant area for the Ballardong Noongar people and their creation stories of the landscape within the York area. The reserve occurs approximately 1 km east of the Shire's Council Chambers and was vested as a Class A reserve for the purposes of 'Parkland' in the early 20th century (Common Ground Trails 2022). It covers a total area of 147 ha, and its highest point is 342.5 m above sea level (**Figure 1-1**).

Anecdotally, much of the site has been historically accessed and used for agricultural activities (e.g. grazing, market gardens) as well as isolated areas of stone quarrying along southern slopes. In recent times the reserve has predominantly been used for recreational activities such as bushwalking and mountain biking. These activities occur along more than 12 km of unsanctioned singled track trails and a network of fire management tracks that occur throughout the reserve (Common Ground Trails 2022). The reserve also incorporates a picnic area and outlook, both of which provide views of the Walwalying/Mt Bakewell Reserve, the Gogulgar Bilya/Avon River, and the York town site.

In 2021, the Shire commissioned a trail network plan to be developed to reinvigorate the site and control the expanding network of unofficial tracks within the reserve (Common Ground Trails 2022). The plan proposes that 12 official walking and mountain biking trails of varying difficulties are developed within the reserve and that both the picnic and lookout areas are redesigned to accommodate the needs of visitors more effectively.

1.3.2. Gogulgar Bilya/Avon River Reserve

The Gogulgar Bilya/Avon River flows through the centre of the York township from its origins at Lake Yealering to its terminus within Walyunga National Park. The Gogulgar Bilya/ Avon River is recognised as a registered Aboriginal site (Site ID: 3536) as it has a close mythological association with Waugyl/River Serpent (Snappy Gum 2021).

ELA was advised that in the 1950s several channel-clearing projects were undertaken along the river to clear areas of sediment build-up, which occurs as a result of the natural river movement and braiding, to allow easier navigation of vessels along the river. This has led to sedimentation of many of the natural pools and the build-up of clay-dominated soils along the riverbanks. The presence of intensive agriculture along the banks of the Gogulgar Bilya/Avon River since European settlement of the area has resulted in an increase in salinity within the system. This has led to the system becoming more brackish, resulting in the deaths of Flooded Gum (*Eucalyptus Rudis*).

The Management Plan focus on the 7 km section of the Gogulgar Bilya/Avon River which occurs from the Ballardong St bridge to Aubrey Rd (**Figure 1-2**). This area has been selected for the development of three walking/bike trails as part of the York trail network plan (Common Ground Trails 2022). This section of the river does already have several discontinuous bushfire management trails which are also currently used as walk trails by local residents and visitors.



Figure 1-1: Wongborel/Mt Brown Reserve

- Wongborel/Mt Brown Reserve
- Distributor Road
- Access Road



Datum/Projection:
GDA 1994 MGA Zone 50
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Figure 1-1: Wongborel/Mt Brown Reserve



Figure 1-2: Gogulgar Bilya/Avon River Reserve

- ▬ Gogulgar Bilya/Avon River Reserve
- ▬ Distributor Road
- ▬ Access Road



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Figure 1-2:Gogulgar Bilya/Avon River Reserve

2. Caring for Country (Environmental and Natural Values)

2.1. Existing Environment

2.1.1. Bioregion and Climate

The two reserves are located within the Avon Wheatbelt Interim Biogeographical Regionalisation for Australia (IBRA) bioregion and the Katanning IBRA subregion. The Katanning subregion is characterised by a gently undulating landscape with generally low relief residual lateritic uplands and derived sandplains (Beecham 2001).

The subregion has a semi-arid (Dry) warm Mediterranean climate, which generally experiences hot dry summers and cold winters (BOM 2023). The mean annual rainfall for the York township is 403 mm, with the majority of rain falling in the winter months of June to August. However, due to climate change the York area's climate is predicted to become warmer and dryer in the coming decades (DBCA, 2021). The occurrence of episodic events, including floods and droughts, is also predicted to become more frequent within this period. These changes are likely to exacerbate the existing pressures on the two reserves, such as the impacts of fire. The vulnerability of species within the reserves to these changes will be dependent on a number of factors including history traits, degree of exposure to pressures and capacity to adapt to change (Steffen et al 2009).

2.1.2. Geology, Landform and Soils

2.1.2.1. Geology

At a broadscale, the Shire of York overlies the Yilgarn Craton which mainly consists of a crystalline basement of granitic and gneissic rock intruded by dolerite dykes. Within the Yilgarn Craton, there are a number of surface geological units that were mapped by Geoscience Australia at a 1:250,000 scale. The Gogulgar Bilya/Avon River Reserve overlies two units, the Holocene Alluvium unit and the Archean Gneiss, Granulite and Migmatite unit. These units also underlie the Wongborel/Mount Brown Reserve, with the former being isolated to the south-eastern corner of the reserve, while the latter dominates the north-eastern half. Between these two units occurs the Archean Felsic Intrusive unit. The descriptions of surface geological units are presented in Table 2-1 and are spatially presented in **Figure 2-1**

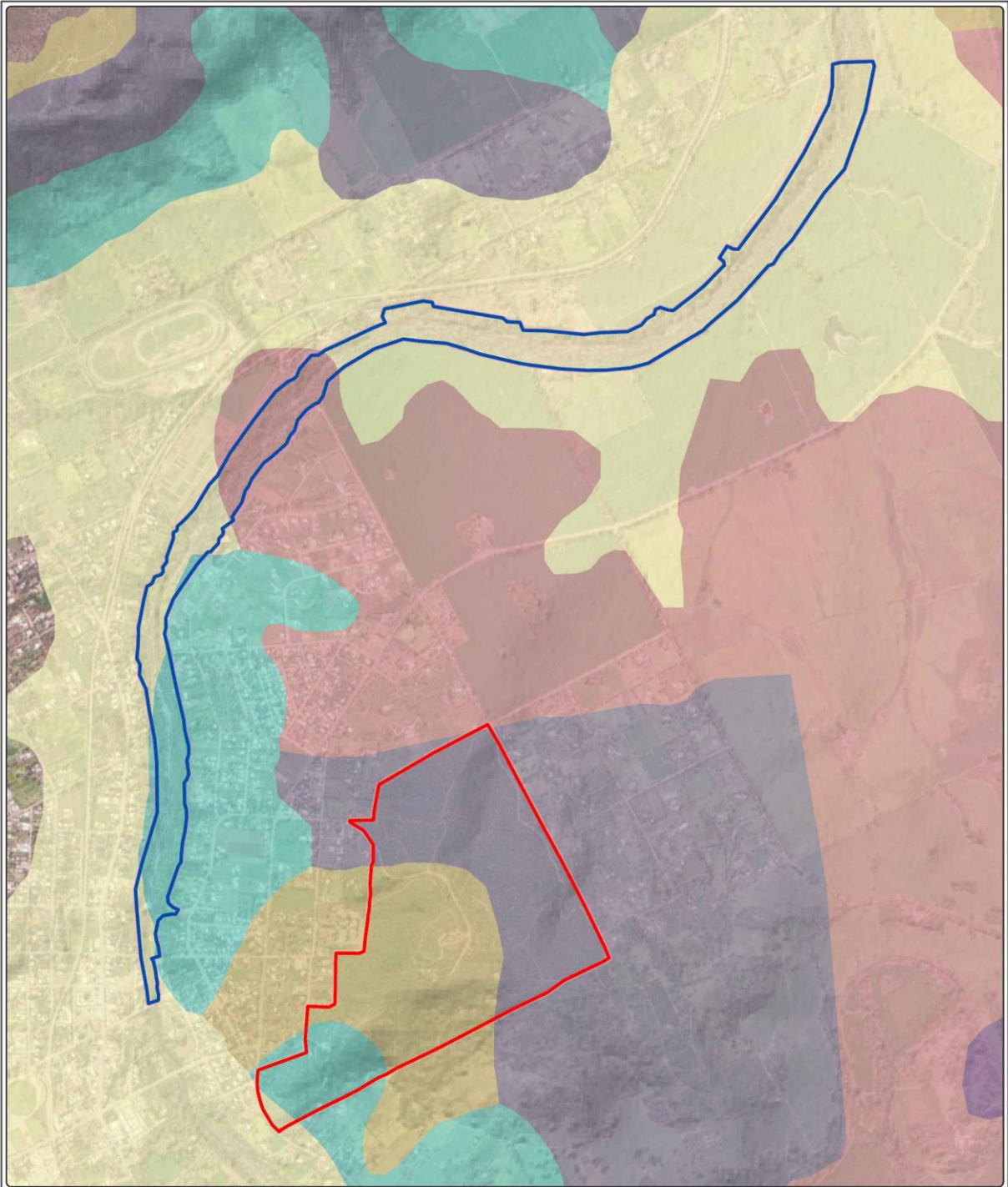


Figure 2-1: Surface Geological Units

<ul style="list-style-type: none"> Gogulgar Bilya/Avon River Reserve Wongborel/Mt Brown Reserve 	<p>Geoscience Australia 250K surface geology</p> <ul style="list-style-type: none"> Qra Qrc Agp Anb Anl Aqo 	<p>0 220 440 880 Metres</p> <p>Datum/Projection: GDA 1994 MGA Zone 50</p> <p>23PER5424-RD Date: 25/07/2023</p> <div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> <p>N</p> </div> <div> <p>A TETRA TECH COMPANY</p> </div> </div>
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Table 2-1: Surface Geological Units

Surface Geological Units	Descriptions
Holocene Alluvium	Channel and flood plain alluvium; gravel, sand, silt, clay, locally calcreted.
Archean Gneiss, Granulite and Migmatite	Banded granitic gneiss (monzogranitic to granodioritic), quartzofeldspathic gneiss with mafic bands, migmatite, granofels, mafic and felsic granulites, hypersthene-plagioclase-quartz granulite; schist, pelitic or mafic granofels.
Archean Felsic Intrusive	Undifferentiated felsic intrusive rocks, including monzogranite, granodiorite, granite, tonalite, quartz monzonite, syenogranite, diorite, monzodiorite, pegmatite. Locally metamorphosed, foliated, gneissic. Local abundant mafic and ultramafic inclusions.

2.1.2.2. Soils

The soils of the Yilgarn Craton are divided into several zones based on the geomorphological criteria from a regional perspective (Percy 2003). The Shire occurs within the Northern Zone of ancient drainage, which has an erosional surface of gently undulating rises to low hills. Continuous stream channels that flow in most years. The soils are formed via colluvial or in-situ rock weathering mechanisms. These zones can be further divided into several systems which are based on recurring patterns in landforms, soils, and vegetation at a 1:250,000 mapping scale (Percy 2003). The Wongborel/Mount Brown Reserve occurs within the Jelcobine System, while the Gogulgar Bilya/Avon River Reserve occurs within the Avon Flats System. Surface geological unit descriptions are presented in Table 2-2 and are spatially presented in Figure 2-2

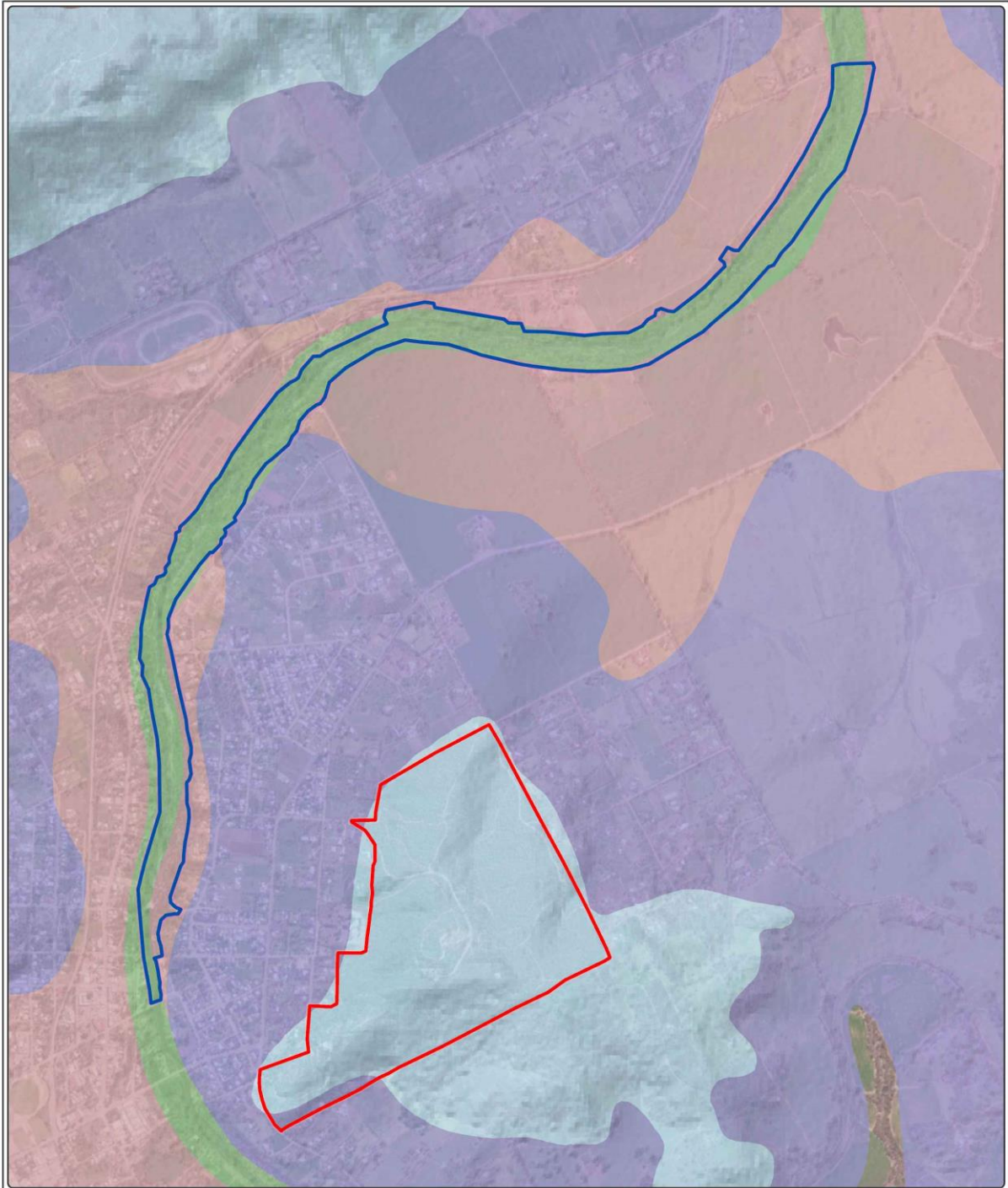
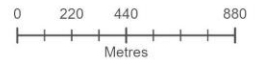


Figure 2-2: Soil Systems

- Gogulgar Bilya/Avon River Reserve
- Wongborel/Mt Brown Reserve

- Soil Landscape Systems**
- Avon Flats Subsystem
 - Avon flat wet, river Phase
 - Jelcobine York Subsystem
 - Steep Rocky Hills 2 Subsystem (Jc)



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Table 2-2: Soil Systems

Reserves	Soil System Name	Soil System Description
Wongborel/ Mount Brown Reserve	Jelcobine System	Isolated steep low hills with undulating low granite hills and isolated lateritic remnants in the Zone of Rejuvenated Drainage. Gravels, and grey shallow to deep sandy duplexes. Wandoo, York gum, Jam and Casuarina woodland predominate.
Gogulgar Bilya/ Avon River Reserve	Avon Flats System	Alluvial flats, in the northern Zone of Rejuvenated Drainage, with brown loamy earth, grey non-cracking clay and brown deep sand. York gum-salmon gum-flooded gum-sheoak woodland.

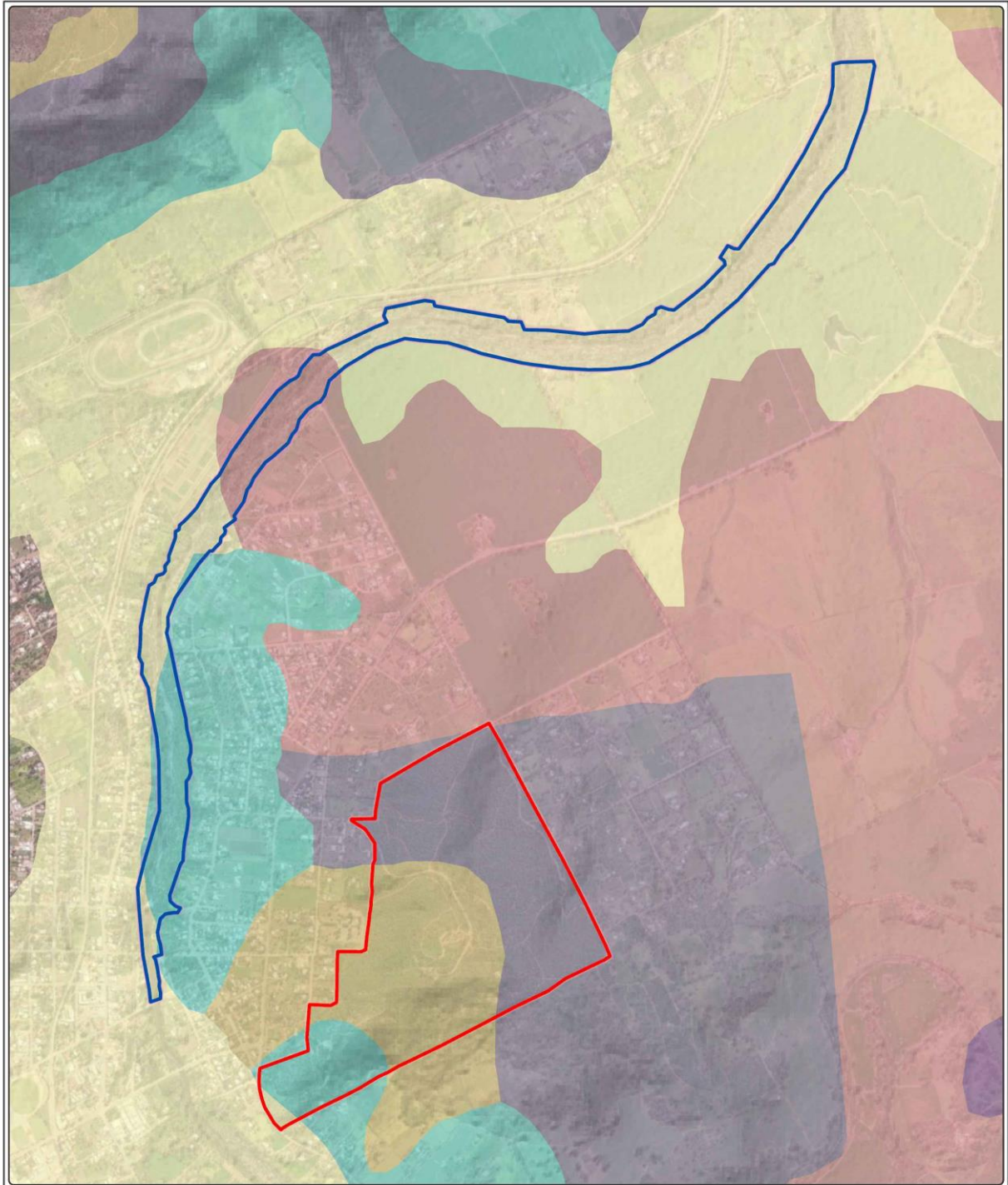


Figure 2-1: Surface Geological Units

<ul style="list-style-type: none"> Gogulgar Bilya/Avon River Reserve Wongborel/Mt Brown Reserve 	<p>Geoscience Australia 250K surface geology</p> <ul style="list-style-type: none"> Qra Qrc Agp Anb Anl Aqo 	<p>0 220 440 880 Metres</p> <p>Datum/Projection: GDA 1994 MGA Zone 50</p> <p>23PER5424-RD Date: 25/07/2023</p> <div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> <p>N</p> </div> <div> <p>A TETRA TECH COMPANY</p> </div> </div>
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Figure 2-1: Surface Geological Units

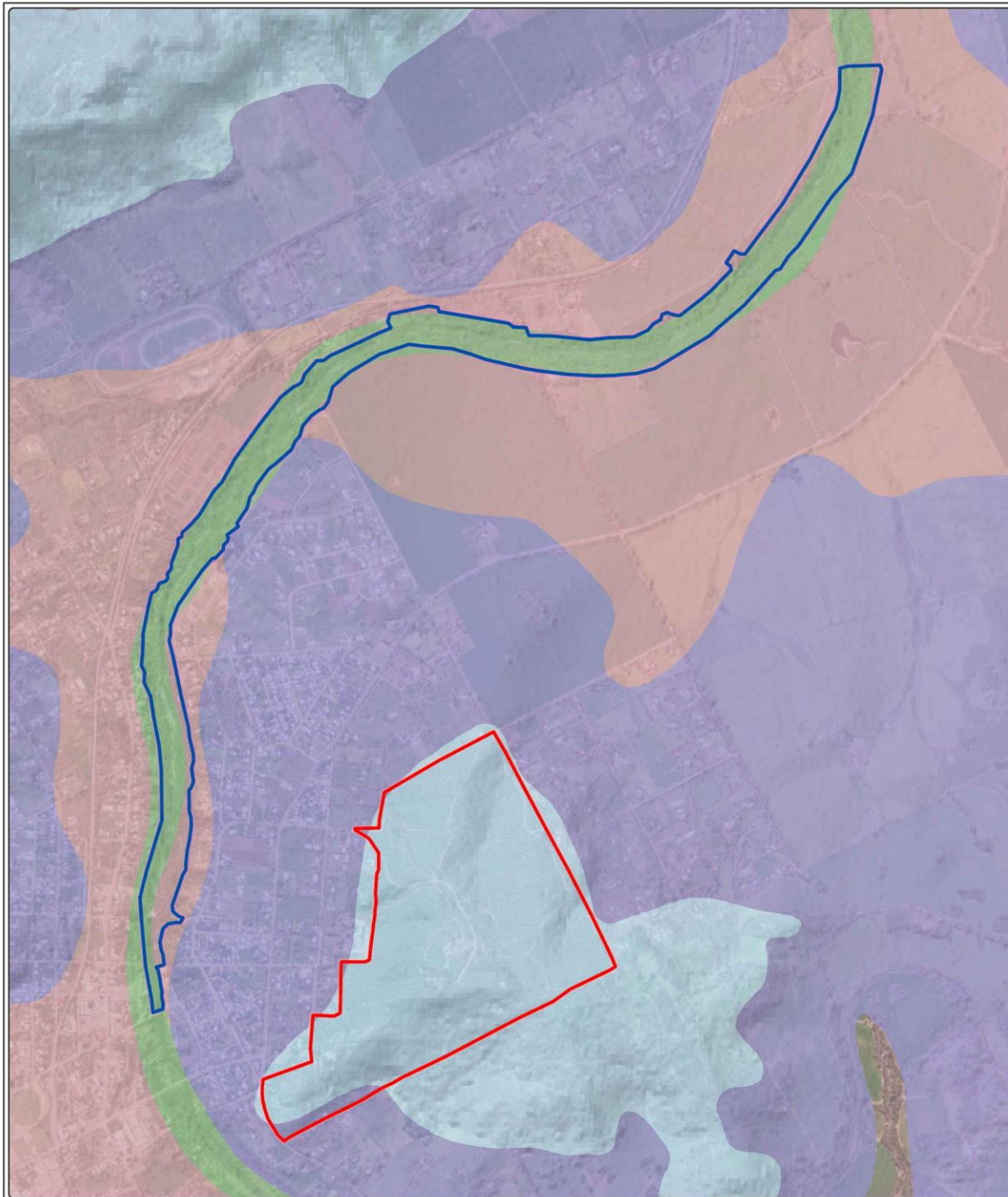


Figure 2-2: Soil Systems

<ul style="list-style-type: none"> Gogulgar Bilya/Avon River Reserve Wongborel/Mt Brown Reserve 	<p>Soil Landscape Systems</p> <ul style="list-style-type: none"> Avon Flats Subsystem Avon flat wet, river Phase Jelcobine York Subsystem Steep Rocky Hills 2 Subsystem (Jc) 	<p>0 220 440 880 Metres</p> <p>Datum/Projection: GDA 1994 MGA Zone 50 23PER5424-RD Date: 25/07/2023</p> <div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> <p>N</p> </div> <div> <p>ATETRA TECH COMPANY</p> </div> </div>
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Figure 2-2: Soil Systems

2.1.3. Hydrology and Hydrogeology

2.1.3.1. Hydrology

The York township occurs within the Avon-mainstream sub-catchment of the larger Swan-Avon catchment (Figure 2-3). The Avon River is the dominant water body within the catchment and flows through the township as it flows from its origin at Lake Yealering to Walyunga National Park where it becomes the Swan River.

The Gogulgar Bilya/Avon River Reserve is situated on the floodplain either side of the Avon River and as such, much of the surface water drains directly into the Avon River (Figure 2-3). The surface water flows from the western half of the Wongborel/Mt Brown Reserve would have historically also flowed directly into the Avon River via natural drainage lines, however, these natural drainage lines have become altered through the towns development. To date, the surface water from the reserve has been directed into under-street culverts, where it is directed towards the Avon River (Crossley 2004).

Unlike the Gogulgar Bilya/Avon River Reserve and the western half of the Wongborel/Mt Brown Reserve the surface water from the eastern side of the Wongborel/Mt Brown Reserve does not flow directly into

the Avon River (Figure 2-3

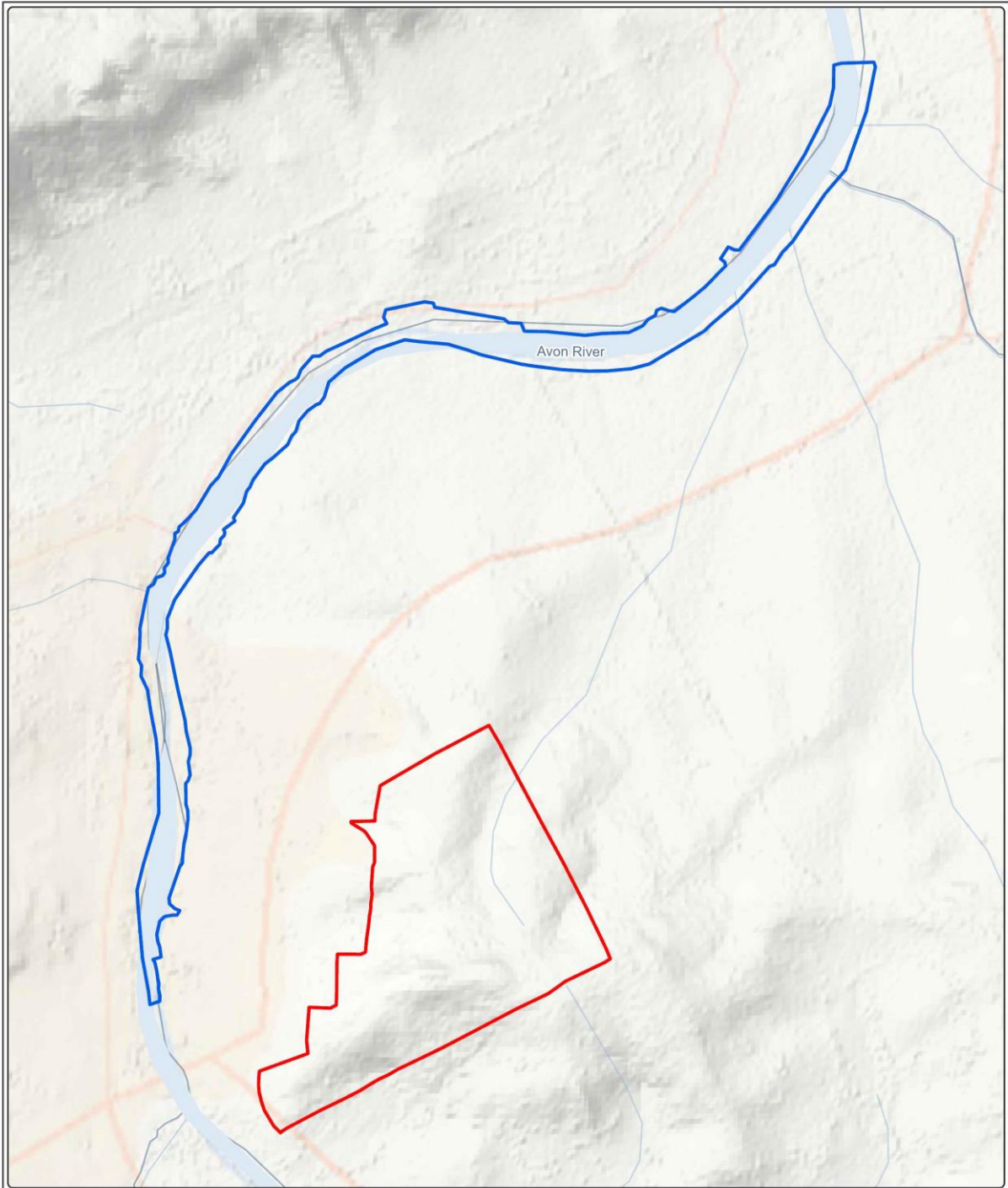


Figure 2-3: Hydrology of the Gogulgar Biya/Avon River and Wongborel/Mt Brown Reserves

-  Gogulgar Biya/Avon River Reserve
-  Wongborel/Mt Brown Reserve
-  Major watercourse
-  Minor watercourse

0 220 440 880
Metres

Datum/Projection:
GDA 1994 MGA Zone 50
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Figure 2-3). Instead, it flows into two unnamed non-perennial tributaries, which join with the Avon River north and south of the township. However, due to extensive changes in the local landscape, these tributaries are no longer visible from aerial photography.

2.1.3.2. Hydrogeology

The township of York has two hydrological systems, one system on the hillslopes and another operating in the valley of the Avon River (Crossley 2004). The former consists of small and compartmentalised aquifers which extend from the slopes into the valley. These aquifers are likely to form within the active weathering contact zone between bedrock and saprolite, fracture margins and contact zone of dykes as well as permeable surface and subsurface soils during the winter months (Crossley 2004). While the latter consists of a complex and relatively transmissive and interconnected aquifer and aquitards within tertiary sediments. This aquifer is likely to be fed by the basal discharge of the hillslope aquifers.

The groundwater around the York township is generally considered to be marginally fresh to brackish (Crossley 2004). The salinity of the groundwater increases as the proximity to the Avon River increases and the distance to the land surface decreases. As such, the groundwater within the Gogulgar Bilya/Avon River Reserve is approximately three metres below the land surface and is considered to be brackish and as a result, there is a higher occurrence of salt-tolerant species relative to areas outside the reserve.

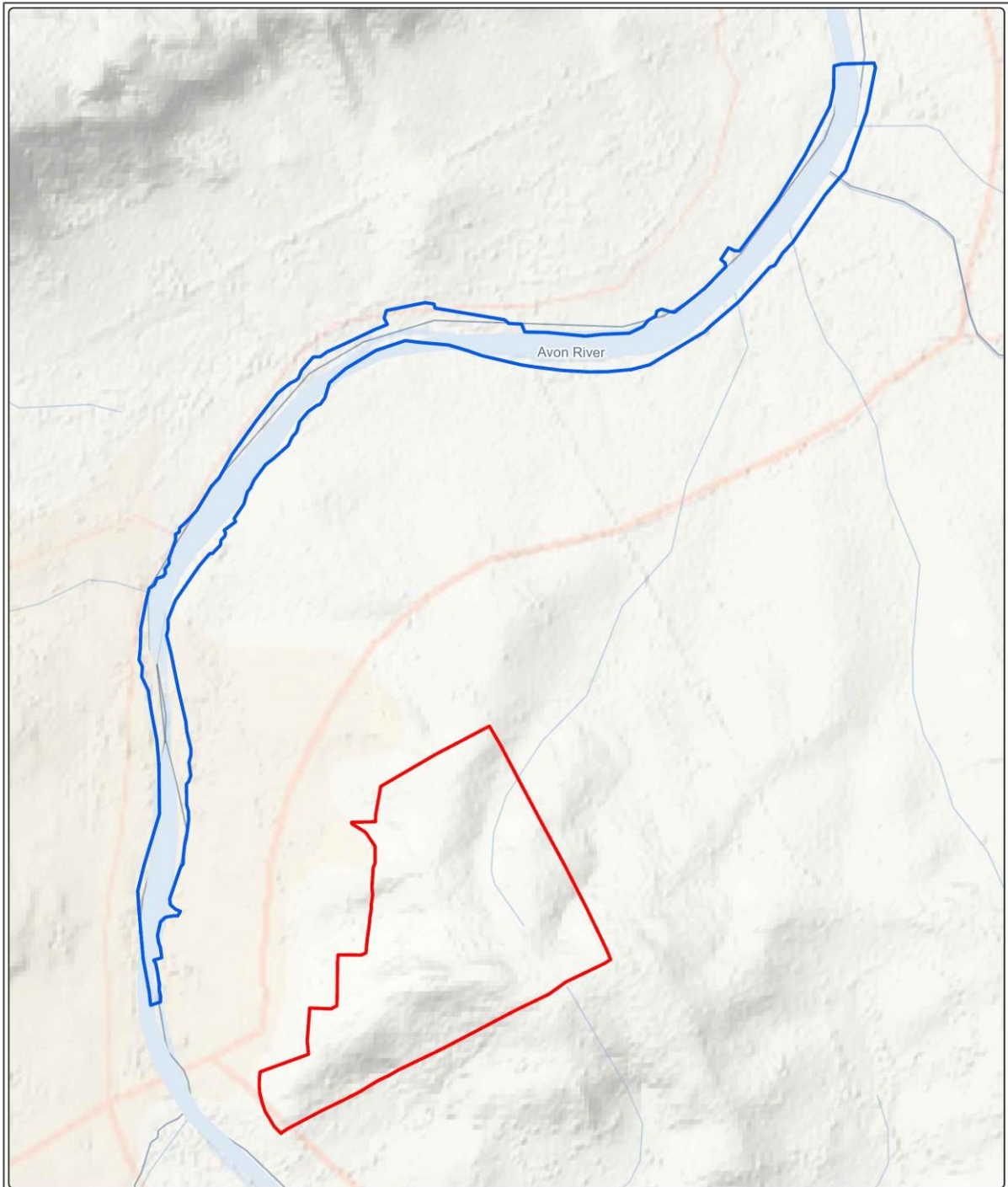
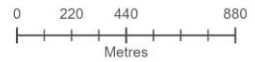


Figure 2-3: Hydrology of the Gogulgar Biya/Avon River and Wongborel/Mt Brown Reserves

-  Gogulgar Bilya/Avon River Reserve
-  Wongborel/Mt Brown Reserve
-  Major watercourse
-  Minor watercourse



Datum/Projection:
GDA 1994 MGA Zone 50
23PER5424-RD Date: 24/07/2023



Figure 2-3:Hydrology of the Gogulgar Bilya/Avon River and Wongborel/Mt Brown Reserves

2.1.4. Vegetation

2.1.4.1. Regional Vegetation

The various vegetation types of Western Australia were described and mapped at a regional scale by Beard (1979) into regional (1:250,000) vegetation associations. These vegetation associations were refined by the Department of Primary Industries and Regional Development (DPIRD) in 2002 (Shepard et al. 2002).

The Gogulgar Bilya/Avon River Reserve and the southern portion of the Wongborel/Mt Brown Reserve occur within the York 352 vegetation association (**Figure 2-4**

association. Less than 11% of the pre-European extent of the former and less than 19% of the latter remains within the Katanning IBRA subregion.

2.1.4.2. Local Vegetation

Three native vegetation communities were recorded as occurring within the Wongborel/Mt Brown Reserve and are described in Table 2-3 (Del Botanics 2019). The York Gum with Jam open Woodland community was the most common covering most of the reserve while the distribution of the Sheoak Woodland and Granite Outcrop communities are more restricted. The former is present on the southern slopes of Wongborel/Mt Brown and the latter is present around granite extrusions, common in areas of higher relief.

Table 2-3: Vegetation communities identified within the Wongborel/Mt Brown Reserve

Vegetation community	Description
Vegetation Community 1: York Gum and Jam open Woodland	Open Woodland of <i>Eucalyptus loxophleba</i> and <i>Acacia acuminata</i> , over grassland of <i>Neurachne alopecuroidea</i> and <i>*Avena barbata</i> and herbland of <i>*Lupinus cosentinii</i> , <i>Arctotheca calendula</i> and <i>Rhodanthe manglesii</i>
Vegetation Community 2: Sheoak Woodland	Low woodland of <i>Allocasuarina huegeliana</i> , over grassland of <i>Neurachne alopecuroidea</i> and <i>*Avena barbata</i> and <i>*Aira caryophyllea</i>
Vegetation Community 3: Granite outcrops	Exposed granite outcrops with lichens and mosses

No formal vegetation mapping has occurred along the Gogulgar Bilya/Avon River Reserve. However, the vegetation along the river has been preliminary described by ELA as being a tall open shrubland or a closed woodland of *Casuarina obesa* and *Melaleuca spp.* (Paperbark), depending on the age of regrowth, over an understory of a mixture of weedy annual species and low shrub species. Woodlands of *Eucalyptus rudis* or *E. loxophleba* have also been observed within the reserve along the upper margins of the riverbanks (D. Brassington personal communication 2023).

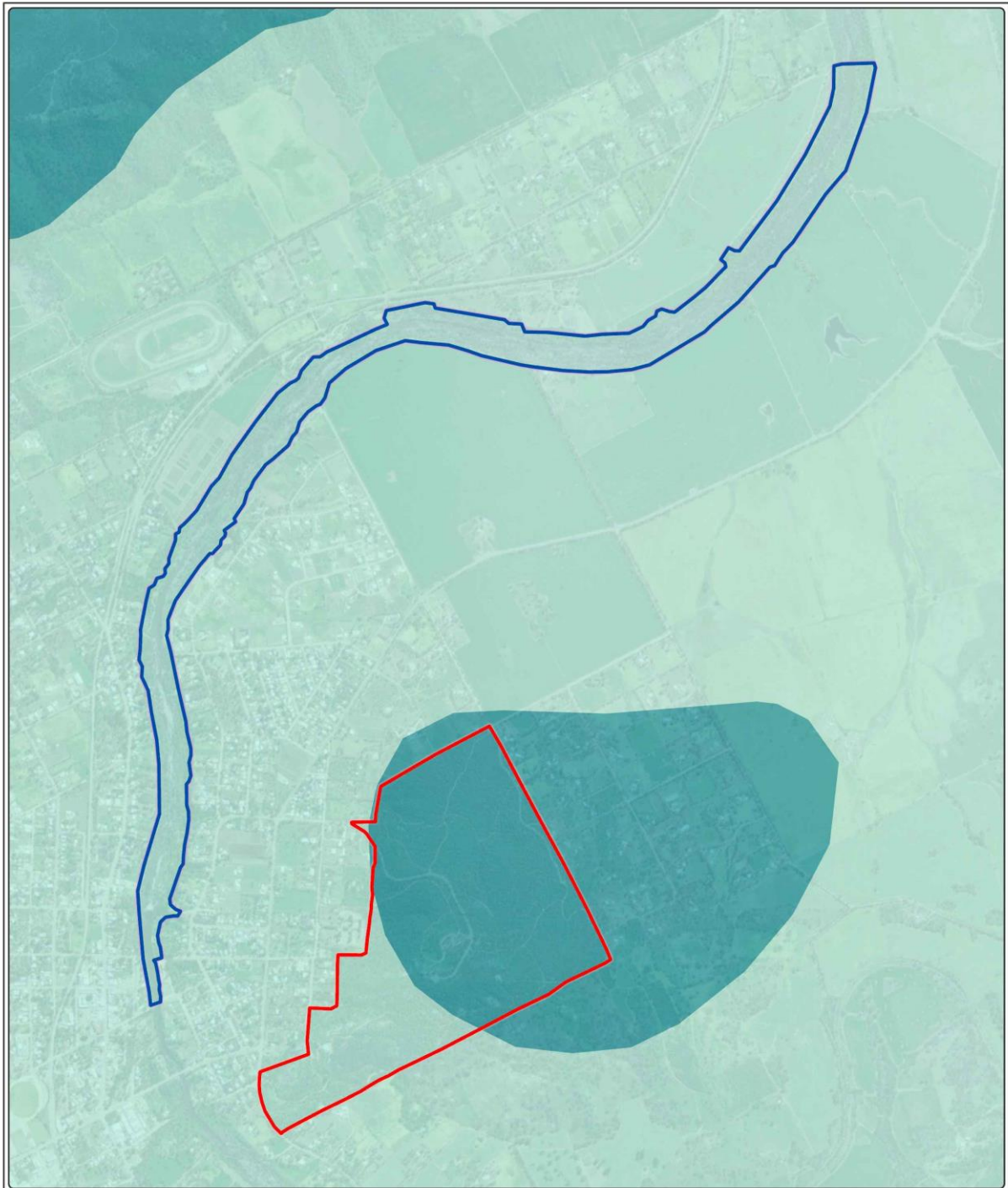


Figure 2-4: Vegetation Associations of the Gogulgar Bilya/Avon River and Wongborel/Mt Brown Reserves


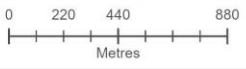



 Gogulgar Bilya/Avon River Reserve	Pre-European Vegetation	
 Wongborel/Mt Brown Reserve	 YORK_352	
	 YORK_946	Datum/Projection: GDA 1994 MGA Zone 50 23PER5424-RD Date: 2/08/2023



Figure 2-4: Vegetation Associations of the Gogulgar Bilya/Avon River and Wongborel/Mt Brown Reserves

2.1.4.3. Threatened Ecological Communities

Ecological communities are described as vegetation communities that are assemblages of species that occur together in a particular habitat (DBCA 2023). An ecological community's structure, composition and distribution are determined by a range of environmental factors. 'Threatened Ecological Communities' (TECs) are ecological communities that are recognised as rare or under threat and therefore warrant special protection (DBCA 2023). Priority Ecological Communities (PECs) are those biological communities that are recognised by the Minister for the Environment (Western Australia) to be of significance, but which do not meet the criteria of a TEC (DBCA 2023).

Some of the patches within the 'York Gum and Jam open Woodland' vegetation community within the Wongborel/Mt Brown Reserve possess similar characteristics to those which define the '*Eucalyptus Woodlands of the Western Australian Wheatbelt*' TEC (EPBC Act; Critically Endangered) (DoE 2016). However, a targeted vegetation assessment would be required to confirm the presence of this TEC within the reserve.

2.1.4.4. Local Vegetation Condition

The vegetation condition within the Wongborel/Mt Brown Reserve was mapped using the vegetation condition scale used for Bush Forever sites within the Perth Metropolitan region (Government of Western Australia 2000). The majority of the reserve was mapped as Degraded, with the existing bushfire management tracks, water corporation tanks, outlook and picnic areas being mapped as Completely Degraded (Del Botanics 2019).

No formal vegetation condition mapping has been conducted within the Gogulgar Bilya/Avon River Reserve. However, observations by ELA along the river suggest that the majority of the reserve would be classified as Degraded. Some of the patches within the reserve, including areas where revegetation efforts have been most successful, have potential to be classified as being in a Good to Very Good Condition.

2.1.5. Flora

A total of 65 vascular plant species were recorded as occurring within the two reserves (Del Botanics 2019, D. Brassington personal communication 2023). However, due to the broad nature of the assessments conducted within the reserves to date, it is unlikely to represent all species present and a detailed flora assessment would be required to confirm this. Twenty-four of these species are native to the York region, with an additional 13 being native to other regions within Western Australia which have been planted within the reserves as part of current and historical revegetation programs. The remaining 29 species are invasive weed species and will be discussed further in Section 2.1.5.2.

2.1.5.1. Threatened and Priority Flora

No Threatened flora species as listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or *Biodiversity Conservation Act 2016* (BC Act), or DBCA-listed Priority flora species were recorded within the Wongborel/Mt Brown Reserve during the 2019 reconnaissance survey (Del Botanics 2019) and no formal flora surveys have been conducted within the Gogulgar Bilya/Avon River Reserve to confirm the presence of conservation significant species. However, a desktop assessment (Del Botanics 2019) identified that six EPBC/BC Act-listed species and 14 DBCA-listed Priority species have the potential to occur within the Wongborel/Mt Brown Reserve and the Gogulgar Bilya/Avon River

Reserve (Table 2-4). The desktop assessment was conducted using information obtained from the DBCA database and the EPBC Act Protected Matters Search Tool.

Table 2-4: Threatened and Priority Flora Species Potentially Present within the Wongborel/Mt Brown and the Gogulgar Bilya/Avon River Reserves

Genus/Species	Common Name	EPBC Act Listing	BC Act Listing	DBCA Listing
<i>Acacia cuneifolia</i>	NA	NA	NA	Priority 4
<i>Asterolasia grandiflora</i>	NA	NA	NA	Priority 4
<i>Caladenia integra</i>	Mantis Orchid, Smooth-lipped Spider Orchid	NA	NA	Priority 4
<i>Dasymalla axillaris</i>	Native Foxglove	Critically Endangered	Critically Endangered	NA
<i>Drosera albonotata</i>	NA	NA	NA	Priority 2
<i>Eucalyptus x carnabyi</i>	NA	NA	NA	Priority 4
<i>Gastrolobium hamulosum</i>	Hook-point Poison	Endangered	Critically Endangered	NA
<i>Hemigenia platyphylla</i>	NA	NA	NA	Priority 4
<i>Hibbertia montana</i>	NA	NA	NA	Priority 4
<i>Placynthium nigrum</i>	NA	NA	NA	Priority 3
<i>Pterostylis echinulata</i>	NA	NA	NA	Priority 3
<i>Senecio gilbertii</i>	NA	NA	NA	Priority 1
<i>Stackhousia</i> sp. Red- blotched corolla	NA	NA	NA	Priority 3
<i>Symonanthus bancroftii</i>	Bancrofts Symonanthus	Endangered	Critically Endangered	NA
<i>Thelymitra dedmaniarum</i>	Cinnamon Sun Orchid	Endangered	Critically Endangered	NA
<i>Thelymitra stellata</i>	Star Sun-orchid	Endangered	Endangered	NA
<i>Verticordia staminosa</i> subsp. <i>staminosa</i>	Wongan Featherflower	Endangered	Critically Endangered	NA
<i>Xanthoparmelia hypoleiella</i>	NA	NA	NA	Priority 3
<i>Xanthoparmelia subimitatrix</i>	NA	NA	NA	Priority 3

2.1.5.2. Weeds

A total of 28 weed species were recorded across the two reserves, the majority of which are grassy, herbaceous, and shrubby understory species (Del Botanicus 2019). The weed species recorded within the reserve and their status as a Weed of National Significance (WoNS) and under the *Biosecurity and Agricultural management Act 2007* (BAM Act) is presented in Table 2-5. It is noted that due to the broad nature of the flora and vegetation assessments that have occurred to date in the reserves the weed list presented below may not be exhaustive.

Table 2-5: Weeds Recorded within the Wongborel/Mt Brown and the Gogulgar Bilya/Avon River Reserves

Species Name	Common Name	WoNS Status	BAM Act Status
<i>Aira caryophylla</i>	Silvery Hairgrass	No	Permitted – s11
<i>Arctotheca calendula</i>	Cape Weed	No	Permitted – s11
<i>Asparagus asparagoides</i>	Bridal Creeper	Yes	Declared Pest - s22(2)
<i>Avena barbata</i>	Wild Oats	No	Permitted – s11
<i>Brachychiton populneus</i>	Kurrajong	No	Permitted – s11
<i>Brassica tournefortii</i>	Mediterranean Turnip	No	NA
<i>Briza maxima</i>	Greater Quaking Grass/ Blowfly Grass	No	Permitted – s11
<i>Bromus diandrus</i>	Great Brome	No	Permitted – s11
<i>Cheilanthes austrotenuifolia</i>	NA	No	Permitted – s11
<i>Echium plantagineum</i>	Patterson Curse	No	Declared Pest - s22(2)
<i>Ehrharta calycina</i>	Perennial Veldt Grass	No	NA
<i>Erodium sp.</i>	Storks Bill	No	Permitted – s11
<i>Moraea miniata</i>	Two-leaf Cape Tulip	No	NA
<i>Lolium sp.</i>	Ryegrass	No	NA
<i>Lupinus cosentinii</i>	Western Australian Blue Lupin	No	NA
<i>Lupinus angustifolius</i>	Narrow Leaf Lupin	No	Permitted – s11
<i>Lycium ferocissimum</i>	African Boxthorn	Yes	Permitted – s11
<i>Olea europaea</i>	Olive Tree	No	Permitted – s11
<i>Oxalis pes-caprae</i>	Sour Grass	No	Permitted – s11
<i>Raphanus raphanistrum</i>	Wild radish	No	Permitted – s11
<i>Romulea rosea</i>	Onion Grass	No	Permitted – s11
<i>Rumex sp.</i>	Curley Dock	No	NA
<i>Schinus molle</i>	Pepper Tree	No	Permitted – s11
<i>Sonchus sp.</i>	Sow Thistle	No	NA
<i>Trifolium sp.</i>	Clover	No	NA
<i>Ursinia anthemoides</i>	NA	No	Permitted – s11

2.1.6. Dieback/Plant Pathogens

Phytophthora Dieback is a disease caused by the introduction of a soil-borne root-rot fungus, most commonly *Phytophthora cinnamomi*, into the root system of susceptible species. These susceptible species predominately occur within the Ericaceae, Fabaceae, Myrtaceae, Proteaceae, and Xanthorrhoeaceae plant families.

A broadscale *Phytophthora* Dieback assessment was conducted for the Wongborel/Mt Brown Reserve in November 2019 (Terratree 2019). This assessment found that no areas within the reserve were infected with the disease, however, the absence of significant indicator species meant that most of the reserve was mapped as Uninterpretable. Three soil samples were taken from the reserve, two of the samples returned positive results for *Pythium mercurial* and the other sample returned a positive result for *Phytophthora rosacearum* (Terratree 2019). Neither of these species are considered to be as virulent as *P. cinnamomi* and are likely to have a limited impact on the vegetation within the reserve. Considering that this initial survey was conducted four years ago, a follow up survey will be required to be undertaken especially considering the level of access available to the site.

No *Phytophthora* Dieback assessments have been conducted within the Gogulgar Bilya/Avon River Reserve and thus the diseases current occurrence in this reserve is unknown.

2.1.7. Fauna

Due to the fragmented nature of native vegetation within the Wheatbelt both the reserves are considered to be important refuges for native animals (Del Botanics 2019). Ten vertebrate fauna species were recorded within the Wongborel/Mt Brown Reserve during a reconnaissance survey conducted in 2019 (Table 2-6). The species recorded represent a snapshot of the total fauna likely to occur within the site, given the broad scale of the survey.

Table 2-6: Fauna species recorded in Wongborel/Mt Brown Reserve during 2019 reconnaissance survey.

Genus/Species	Common Name
<i>Aquila audax</i>	Wedge-tailed Eagle
<i>Barnardius zonarius</i>	Australian Ringneck / Twenty Eight Parrot
<i>Coracina novaehollandiae</i>	Black-faced Cuckooshrike
<i>Macropus fuliginosus</i>	Western Grey Kangaroo
<i>Ninox boobook</i>	Australian Boobook
<i>Oryctolagus cuniculus</i>	European Rabbit
<i>Podargus strigoides</i>	Tawny Frogmouth
<i>Tachyglossus aculeatus</i>	Shorted-beaked Echidna
<i>Varanus gouldii</i>	Sand Goanna
<i>Vulpes vulpes</i>	European Red Fox

2.1.7.1. Threatened and Priority Fauna

No EPBC Act or BC Act-listed species or DBCA-listed Priority species were recorded within the Wongborel/Mt Brown Reserve during the 2019 reconnaissance survey (Del Botanics 2019) and no formal fauna surveys have been conducted within the Gogulgar Bilya/Avon River Reserve.

However, a desktop assessment conducted by Del Botanics (2019) identified that 10 EPBC/BC Act-listed species and two DBCA-listed Priority species that have the potential to occur within the Wongborel/Mt Brown and the Gogulgar Bilya/Avon River Reserves (Table 2-7). The desktop assessment was conducted using information obtained from the DBCA database and the EPBC Act Protected Matters Search Tool. It is noted Rakali (*Hydromys chrysogaster*) have recently been observed within the Gogulgar Bilya/Avon River Reserve (John Crook personal communication 2023).

Table 2-7:Threatened and Priority Fauna Species Potentially Present within the Wongborel/Mt Brown and the Gogulgar Bilya/Avon River Reserves

Genus/Species	Common Name	EPBC Act Listing	BC Act Listing	DBCA Listing
<i>Calidris ferruginea</i>	Curlew Sandpiper	Critically Endangered	Critically Endangered	NA
<i>Calyptorhynchus banksii naso</i>	Forest Red-tailed Black Cockatoo	Vulnerable	Vulnerable	NA
<i>Dasyurus geoffroii</i>	Chuditch	Vulnerable	Vulnerable	NA
<i>Hydromys chrysogaster</i>	Rakali	NA	NA	Priority 4
<i>Idiosoma nigrum</i>	Shield-backed Trapdoor Spider	Vulnerable	Endangered	NA
<i>Lagostrophus fasciatus fasciatus</i>	Banded hare-wallaby	Vulnerable	Vulnerable	NA
<i>Leipoa ocellata</i>	Malleefowl	Vulnerable	Vulnerable	NA
<i>Neelaps calonotos</i>	Black-striped Snake	NA	NA	Priority 3
<i>Phascogale calura</i>	Red-tailed Phascogale	Vulnerable	Conservation Dependent	NA
<i>Rostratula australis</i>	Australian Painted Snipe	Endangered	Endangered	NA
<i>Zanda baudinii</i>	Baudin's Black-Cockatoo	Endangered	Endangered	NA
<i>Zanda latirostris</i>	Carnaby's Black Cockatoo	Endangered	Endangered	NA

2.1.7.2. Introduced Fauna Species

Two introduced species, the European Red Fox (**Vulpes vulpes*) and the European Rabbit (**Oryctolagus cuniculus*), have been recorded within the Wongborel/Mt Brown Reserve. The European Red Fox, along with feral cats (*Felis catus*), are considered to have been a major cause of the decline in native vertebrate fauna species, especially ground-dwelling mammals, in numerous parts of the State (DSEWPac 2010). The European Rabbit is also a significant pest causing the direct loss of plant species, especially saplings, and the indirect loss of flora and fauna through environmental changes (Del Botanics 2019).

While no formal fauna surveys have been conducted within the Gogulgar Bilya/Avon River Reserve European Rabbits have been observed within the reserve.

To ELA's knowledge, no aquatic fauna surveys have been undertaken within the relevant river section.

2.1.8. Fire

Fire is an important element of the environment within Western Australia, with numerous flora and fauna species evolving to incorporate its occurrence into their life histories. Pre- and early-colonial use of fire by Indigenous Australians to manipulate vegetation is well documented (Rodrigues et al 2022) Implementation of these fire practices have been completely disrupted since the introduction of

European agriculture in the region and with the resultant reduction in extent, and fragmentation, of native vegetation (Section 2.1.4.1) As such the patterns and impacts of fires are understood to have also been significantly altered.

Both reserves have been identified as bushfire-prone areas under the state-wide *Map of Bush Fire Prone Areas* prepared by the Office of Bushfire Risk Management (OBRM 2019). As such, both sites have undergone regular prescribed burning to minimise fuel loads and the potential threats to surrounding properties. It has been noted that the fire regime previously implemented within the Wongborel/Mt Brown Reserve has resulted in burns occurring at a high frequency and intensely, resulting in the proliferation of weeds within the site. The exact timings of the prescribed burns within the two reserves have historically been not well recorded or are not currently available from the Shire.

2.2. Management

Based on the review of existing environmental values within the reserves (Section 2.1), environmental management considerations were identified. These are:

- Weed Management.
- Native Flora and Vegetation Management.
- Native Fauna and Habitat Management.
- Invasive Species Management.
- Bushfire Management.

The following sections outline the management objectives and outcomes for each of the management considerations. Each objective has been allocated a letter and number code, with the letter identifying its corresponding management consideration, i.e. W = Weed Management.

Recommendations are also provided for implementation and monitoring actions to achieve related objectives as well as the most suitable timing within which these actions should be undertaken.

Priority rankings have also been assigned to each of the recommended management actions to assist in the Shire's decision-making process for the execution of the plan. The priority ranking system is based on the definitions provided in Table 2-8.

Table 2-8: Priority Rankings for Recommended Management Actions

Priority ranking	Definition and justification	Recommended implementation timing
High	High-priority recommendations are an essential requirement and should be implemented immediately or as soon as practical.	Within one year of Management Plan implementation.
Medium	Medium-priority recommendations are important and could also be implemented when additional funding and opportunities exist.	Within five years of Management Plan implementation.
Low	If suitable funding and opportunities exist, these recommendations should be investigated and implemented as additional value-adding components and/or to gain additional knowledge and understanding of biodiversity values.	Within ten years of Management Plan implementation.

2.2.1. Weed Management

Both Wongborel/ Mount Brown and Gogulgar Bilya/ Avon River Reserves have been identified as being infested with a variety of weed species, including two weeds listed as Declared Pests under the BAM Act (Del Botanics 2019) (Plate 2-1). The occurrence of this large population of weed species within the reserve has contributed to the overall decline of vegetation condition within the reserves and has increased associated bushfire risk.

The management of weeds forms the key component of environmental management within these two reserves. Without appropriate weed management the effectiveness of other management measures, as identified in the following sections - including, most significantly, successful seedling establishment and growth - will be greatly reduced.



Plate 2-1: Weed Infestations within the Wongborel/ Mount Brown (Left) and Gogulgar Bilya/ Avon River Reserves (Right)

The following principles guide the weed management strategy (Bradley 1971):

- Identification and control of existing weeds in accordance with priorities.
- Prevention of the introduction of new weed species.
- Prevention of further encroachment of weeds into the bushland areas,
- Minimisation of detrimental effects of weed control on native flora and fauna.
- Integration of weed control actions into bushland restoration programs.

To implement this strategy there are several techniques that can be utilised, and these have been classified into three main groups: mechanical, chemical, and biological. Examples of these techniques are presented in Table 2-9.

Table 2-9: Weed Control Techniques

Mechanical*	Chemical	Biological
Hand removal	Broadscale herbicides	Bushfire
Mulching	Selective herbicides	Weed suppression through Native Plants
Slashing	Contact/Painting herbicides	Bio-controls
Scalping	Residual/pre-emergent herbicides	

*It is important to note that some mechanical weed control techniques, may involve clearing of native vegetation with a Native Vegetation Clearing Permit from the Department of Water and Environmental Regulation (DWER) required prior to implementation.

Several of these techniques can be used in conjunction to provide an effective outcome, noting that each technique has its own strengths and limitations. The effectiveness of these techniques will vary from area to area, depending on numerous factors including which weed species are present and landscape location. As such, all weed control works should be undertaken by, or under the direction of, a suitably qualified contractor (i.e. specialising or experienced in native vegetation revegetation and rehabilitation weed control).

Weed management objectives and associated desired outcomes are presented in Table 2-10.

Table 2-10: Weed Management Objectives and Outcomes

Objective No.	Objectives	Outcomes
W1	Reduce the extent of priority weeds (WoNS; hard to eradicate species), within the reserves.	<ul style="list-style-type: none"> Extent and density of priority weed species is reduced, as shown in review against baseline weed mapping. Percentage weed cover is reduced to 30% after 10 years.
W2	Minimise the introduction and/or spread of weeds.	<ul style="list-style-type: none"> Extent and density of weed species is reduced as shown in annual weed mapping. No new weed species are identified in annual weed mapping.

A list of recommended management actions to achieve weed management objectives and outcomes are presented in Table 2-11. The definitions for each of the priority tiers are presented in Table 2-8.

Table 2-11: Recommended Weed Management Actions

Objective No	Action No	Management Recommendations	Timing	Priority
W1 & W2	1	<p>Undertake baseline weed mapping to obtain a full inventory of weed species, including:</p> <ul style="list-style-type: none"> Weed species, status (i.e. Declared Pests or WoNS) location and approximate numbers. Species presence, extent, and percentage cover. 	Spring	High
W1 & W2	2	<p>Develop a detailed weed management program, in consultation with a suitably qualified consultant. The management program should include but not be limited to the following:</p> <ul style="list-style-type: none"> Establish priority weed management areas, consistent with revegetation zone mapping (identified in Section 2.2.2) and in consideration of baseline weed mapping (as described above). Establish priority weed species for management based on weed mapping, the recommended priority being: <ol style="list-style-type: none"> Declared Pests or WoNs species. Hard to eradicate species. All other species (general weed control). Establishment of appropriate weed control techniques (as identified in Table 2-9) for both broadscale control and species-specific control. Establish control sites within the revegetation zones to determine the effectiveness of weed control within that zone. Establishment of weed control timings, i.e. late winter to late spring. Develop and continually update weed management prioritisation ratings. 	Ongoing	High
W1 & W2	3	All weed control works will be undertaken, or as directed, by a suitably qualified contractor.	Ongoing	High
W1 & W2	4	Herbicides should be used with caution on the banks (i.e. riparian zones) of the Avon River, with non-herbicide solutions preferentially used in those areas, particularly closer to inundated areas. Riparian	Ongoing	High

Objective No	Action No	Management Recommendations	Timing	Priority
		zone weed control should only be undertaken using herbicides (and wetting agents) that are approved for use in aquatic environments by the Australian Pesticides and Veterinary Medicines Authority (APVMA).		
W1 & W2	5	Clean all equipment when arriving to site and from different work areas to remove seeds, soil and weed materials.	Ongoing	Moderate
W1 & W2	6	Ensure that all soil accompanying seedlings and revegetation material are certified weed free.	Ongoing	Moderate
W1 & W2	7	Training of staff and volunteers in weed identification and management.	Ongoing	Moderate
W1 & W2	8	Induct employees or contractors on weed hygiene and pest species prior to the commencement of works on site, including: <ul style="list-style-type: none"> Risks and awareness of weeds and pest species. Overview of hygiene procedures. Documentation and reporting requirements. 	Ongoing	Moderate
W1 & W2	9	Disturbance to native vegetation and soil will be minimised to limit the potential for invasion by introduced flora and fauna.	Ongoing	Moderate
W1 & W2	10	Driving will be restricted to existing tracks.	Ongoing	Moderate

Table 2-12 outlines the monitoring actions which are proposed to be implemented to assess the effectiveness of the management actions outlined in Table 2-31.

Table 2-12: Recommended Monitoring for Weed Management

Objective No.	Monitoring Methodology/Parameter	Reporting	Frequency
W1 & W2	Undertake annual weed mapping to compare against baseline weed mapping, including: <ul style="list-style-type: none"> Weed species, status (i.e. Declared Pests or WoNS) location and approximate numbers/densities. Species presence, extent, and percentage cover. 	Weed mapping report	Annually
W1 & W2	Undertake weed assessment to determine the occurrence of weeds within the treated areas compared to the control sites	Weed percentage cover	Annually
W1 & W2	Undertake visual inspections to determine appropriate implementation of weed management program. The inspection should focus on: <ul style="list-style-type: none"> Evidence of over spraying, including death of native species. Prevalence of weed species in treated areas. Disturbances which are resulted in the introduction of weed species. The occurrence of any species which are resistant to the control techniques which are being implemented. 	Field Notes & Photographs	Annually

2.2.2. Native Flora and Vegetation Management

Native flora and vegetation management can be divided into two key management considerations, including:

- Native flora and vegetation management.
- Revegetation and enhancement.

2.2.2.1. Native Flora and Vegetation

Only a reconnaissance survey has been conducted with the Wongborel/Mt Brown Reserve to date and no formal surveys have been conducted within the Gogulgar Bilya/Avon River Reserve to ELA's knowledge. The results of Wongborel/Mt Brown Reserve reconnaissance survey and on-site observations indicate that, overall, the vegetation within the reserves can be considered to be in a degraded condition, with patches of better condition throughout.

The degraded nature of the reserves is primarily due to the impacts of disturbance from historical activities, management, and fire regimes. However, some areas of vegetation within the Wongborel/Mt Brown Reserve are anticipated to represent elements of the *Eucalyptus woodlands of the Western Australian Wheatbelt* TEC.

2.2.2.2. Revegetation and Regeneration

Revegetation is recommended to enhance native vegetation recovery within the reserves and augment natural processes to improve ecosystem biodiversity and function.

Revegetation activities within the Wongborel/Mt Brown Reserve have been minimal to date. However, substantial effort by the local River Conservation Society with the help of volunteers has occurred to revegetate the Gogulgar Bilya/Avon River Reserve. Revegetation activities which have occurred to date along the river include:

- Mechanical weed control.
- Physically breaking up areas of compacted soil with hand tools.
- Contact/painting herbicide application on woody weeds, particularly African Boxthorn.
- Hand planting of native species.



Plate 2-2 and Plate 2-3 present examples of revegetation efforts undertaken along the river within approximately the last five years and more recently.



Plate 2-2: Historical Revegetation Activities within the Gogulgar Bilya/Avon River Reserve



Plate 2-3: Recent Revegetation Activities within Gogulgar Bilya/Avon River Reserve

To identify suitable revegetation zones within the reserves for the short, medium, and long-term, a revegetation site selection matrix was developed. These zones provide a starting point from which specific revegetation sites can be identified by a suitable qualified contractor. The criteria used to construct the revegetation site selection matrix were:

- Patch size.
- Level of disturbance.
- Ease of access.
- Environmental values.
- Known social, cultural and heritage values.

For each of these criteria a revegetation zone was allocated a score out of two. The definitions for these scores are presented in Table 2-13. From this, each zone received a total score out of 10, known as a 'revegetation priority score'. Those zones which received a high 'revegetation priority score' were identified as suitable for revegetation in the short term, while those zones with a lower 'revegetation priority score' were identified as suitable for revegetation in the long term. The output generated by the matrix for the Wongborel/Mt Brown Reserve and the Gogulgar Bilya/Avon River Reserve is presented in Figure 2-5 and Figure 2-6 respectively.

It should be noted that there is considerable overlap between areas revegetation priority zones and areas that scored highly with respect to their potential for cultural burning (Section 2.2.6).

Table 2-13: Revegetation Scoring Criteria Matrix

Value	Patch Size	Level of Disturbance	Ease of Access	Environmental Values	Social, Cultural and Heritage values
2	Small = <5 ha	Low = weeds and small bike trails	High = < 50 m from track	High = Significant fauna and flora habitat and restricted habitat types (granite outcrops)	High = Adjacent to high-traffic areas such as entrances and recreational areas and culturally significant sites (granite outcrops and healing sites)
1	Medium = 6-9 ha	Medium = weeds, firebreaks, recreational areas, and intense erosion.	Medium = 51 m to 99 m from track	Medium = Native vegetation and fauna habitat	Medium = Adjacent to high-traffic areas such as entrances and recreational areas
0	Large = >10 ha	High = Dumping, quarrying, adjacent to farmland and infrastructure	High = >100 m from track	Low = Cleared or highly disturbed areas with minimal value for flora and fauna	Low = Bike trails and native vegetation.

It is noted that the matrix is based on available information, which at the time of preparation is broad and such that not all significant environmental values within the reserves are expected to have been identified. As such, it is recommended that consideration be given to additional surveys/studies to better identify key environmental values, i.e. through detailed flora and vegetation assessment, including an assessment of conservation significant species, occurrence of TEC and PECs and weed species; and detailed terrestrial fauna studies. These results could then be incorporated into the matrix to provide more accurate and site specific revegetation priority scores for each zone. It is recommended that the matrix should be continually updated as more information becomes available through the completion of additional surveys or updated information.

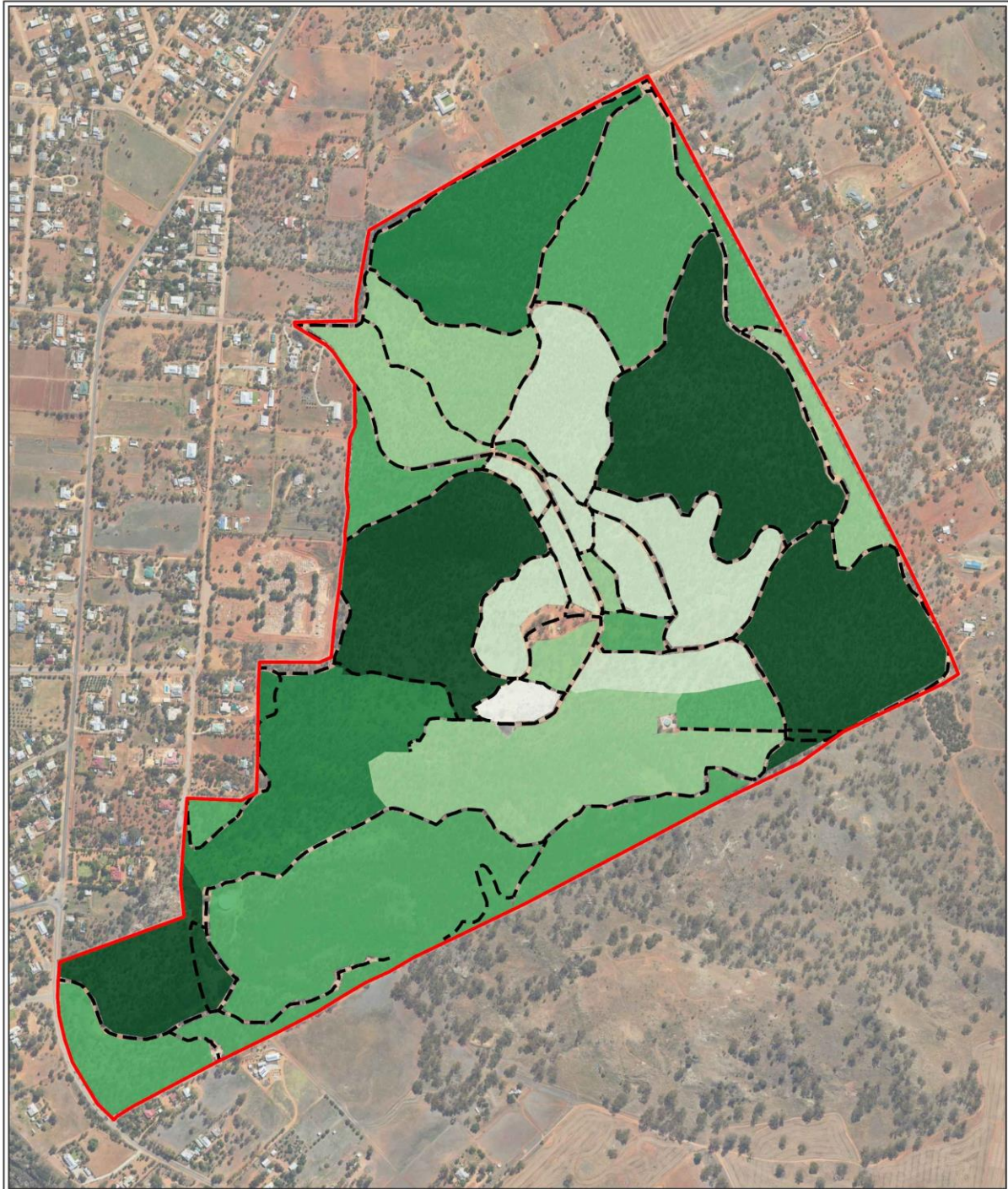


Figure 2-4: Wongborel/Mt Brown Reserve Revegetation Priority Zones



Figure 2-5: Wongborel/Mt Brown Reserve Revegetation Priority Zones



Figure 2-5: Gogulgar Bilya/Avon River Reserve Revegetation Priority Zones

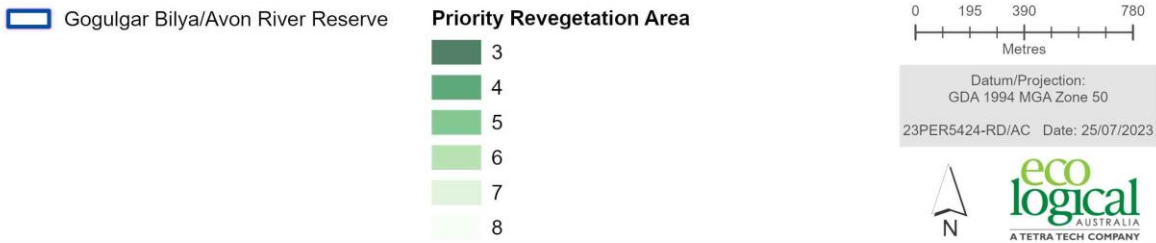


Figure 2-6: Gogulgar Bilya/Avon River Reserve Revegetation Priority Zones

The native flora and vegetation objective and the associated desired outcomes developed for this plan are presented in Table 2-14.

Table 2-14: Native Flora and Vegetation Management Objectives and Outcomes

Objective No.	Objectives	Outcomes
NFV1	Protect and enhance native vegetation and flora habitat within the reserves	<ul style="list-style-type: none"> • Reinstatement of native flora and vegetation communities through assisting natural regenerative ecosystem processes and active revegetation. • Minimise degradation of flora and vegetation within the reserves. • Successful revegetation sites will meet the following conditions: <ul style="list-style-type: none"> ○ Greater than 70% seedling survival rate. ○ Greater than 70% of planted species diversity is maintained. ○ Less than 30% weed cover.

A list of recommended management actions to achieve weed management objectives and outcomes are presented in Table 2-15. The definitions for each of the priority tiers are presented in Table 2-8.

Table 2-15: Recommended Native Flora and Vegetation Management Actions

Objective No.	Action No.	Management Recommendations	Timing	Priority
NFV1	1	<p>Contract a suitability qualified contractor to undertake a baseline detailed and targeted flora and vegetation survey within both reserves to determine:</p> <ul style="list-style-type: none"> • Vegetation condition. • Occurrence of flora species, including conservation significant species. • Vegetation communities, including TEC and PEC occurrence. 	Spring	High
NFV1	2	Select suitable revegetation and reference sites within the reserves based on revegetation priority zone scoring.	Pre-revegetation	High
NFV1	3	Undertake weed control before, during and after revegetation activities, as outlined in Appendix A and as per the weed control program, to be developed, as outlined in Section 2.2.1.	Pre, during and post revegetation	High
NFV1	4	Avoid clearing within areas comprising significant flora and/or vegetation, as per mapping to be completed during baseline studies.	Ongoing	High
NFV1	5	Undertake natural revegetation activities as advised by the revegetation contractor, based on the guiding principles as outlined in Appendix A.	See Appendix A	Moderate
NFV1	6	Establishment of populations of rushes and sedges within the drainage outlets along the Avon River to provide natural water filtration	As required	Moderate
NFV1	7	Undertake revegetation activities using species identified in Appendix A or as advised by a suitably qualified revegetation contractor.	See Appendix A	Moderate
NFV1	8	Ensure that all soil, mulch, and plant stock is sourced from Nursery Industry Accreditation Scheme (NIASA) accredited stockists.	Ongoing	Moderate
NFV1	9	Ensure that all soil accompanying seedlings and revegetation material are certified weed free.	Ongoing	Moderate

Table 2-16 outlines the monitoring actions which are proposed to be implemented to assess the effectiveness of the management actions outlined in Table 2-15.

Table 2-16: Recommended Monitoring for Native Flora and Vegetation Management

Objective No.	Monitoring Methodology/Parameter	Reporting	Frequency
NVF1	<p>Undertake photo and visual monitoring using permanent (i.e. recorded by GPS so they can be replicated) transects through revegetation and reference sites. Photos will be taken from the same photo monitoring locations in all subsequent years. During the transect walks the following will be identified:</p> <ul style="list-style-type: none"> • Weed percentage cover, supplementing monitoring undertaken for objectives W1 & W2. • Species diversity. • Seedling survival rate. 	Revegetation report.	Annually
NVF1	<p>Undertake photo and visual monitoring using permanent (i.e. recorded by GPS so they can be replicated) transects through areas left to regenerate naturally. Along the transects the overall vegetation condition and species diversity should be recorded and used to determine regeneration success.</p> <p>A site achieving regeneration success will be based on the site meeting the following conditions:</p> <ul style="list-style-type: none"> • Greater than 70% of the species diversity is maintained. • Increase in overall vegetation condition by one classification as per the Keighery Vegetation Condition Scale (Keighery 1994). 	Revegetation report.	Annually

2.2.3. Native Fauna and Habitat Management

Despite the lack of surveys within the Wongborel/Mt Brown and Gogulgar Bilya/Avon River Reserves anecdotal observations provided by participants in field visit indicate a variety of fauna species are supported. The reserves have potential to support further species, particularly as vegetation condition improves. Several species with the potential to occur within the reserves are protected under State and Commonwealth legislation, including Carnaby’s Black Cockatoo (EPBC Act; Endangered, BC Act; Endangered), Chuditch (EPBC Act; Vulnerable, BC Act; Vulnerable) and Red-tailed phascogale (EPBC Act; Conservation Dependent, BC Act; Vulnerable). Along with the above listed species, other fauna that may also be considered significant include those the Ballardong People advise should be included in management considerations as they are culturally important.

The most effective way of protecting native fauna populations is commonly recognised to be through the maintenance and where possible enhancement of the native fauna habitat. This is primarily achieved through the implementation of weed management and revegetation programs. In addition to these generalised management strategies, species-specific management can also be undertaken as required. Increasing community education and awareness of the local fauna species within the reserves can also be expected to help with the protection of fauna species and their habitats.

One management objective has been identified for the management of native fauna and fauna habitat within the two reserves. This objective and its associated desired outcomes have been presented in Table 2-17.

Table 2-17: Fauna and habitat Management Objectives and Outcomes

Objective No.	Objectives	Outcomes
FH1	To conserve and enhance fauna habitats within the reserves to protect the diversity and population of the native fauna present.	<ul style="list-style-type: none"> Promote increased occurrence and diversity of fauna species within the reserves. Protection and enhancement of significant fauna habitat.

A list of recommended management actions to achieve native fauna and fauna habitat management objectives and outcomes are presented in Table 2-18. The definitions for each of the priority tiers are presented in Table 2-8.

Table 2-18: Recommended Native Fauna and Habitat Management Actions

Objective No.	Action No.	Management Recommendations	Timing	Priority
FH1	1	Undertake a detailed fauna survey to determine the occurrence of fauna species.	As required	High
FH1	2	Avoid clearing* (e.g. for bicycle tracks) within significant habitat areas, to be mapped as part of the baseline studies.	Ongoing	High
FH1	3	Should any injured or sick native fauna be encountered, a fauna handling specialist from the DBCA is to be contacted via the Wildcare helpline. Install signage providing relevant details for reserve users.	Ongoing	High

Objective No.	Action No.	Management Recommendations	Timing	Priority
FH1	4	Following completion of the baseline fauna assessment, incorporate significant habitat areas to the revegetation site selection matrix (see Section 2.2.2), to inform the revegetation program.	Ongoing	Moderate
FH1	5	Retain dead wood and hollow logs throughout the reserves as these provide significant habitat for fauna.	Ongoing	Moderate
FH1	6	Consider the inclusion of tree species that provide nesting and foraging values for significant fauna species, to be confirmed in consultation with the revegetation contractor.	As required	Moderate
FH1	7	Identify further priority management actions for significant fauna species, if recorded during the baseline study.	As required	Moderate
FH1	8	Develop a fauna sighting submission form on the Shire’s website so public can submit opportunistic sightings of fauna species within the reserves. Results should be used to inform future management decisions and in raising public awareness of the reserves’ values.	As required	Low
FH1	9	Install of appropriate signage within the reserves advertising the fauna sighting submission form and some key species, such as those currently listed under the EPBC Act, BC Act or by DBCA, or in relation to Ballardong cultural heritage (based on advice from Ballardong Elders)	As required	Low
FH1	10	Consider the installation of nesting boxes [^] , if baseline surveys indicate, regular nesting or breeding of Black Cockatoos within the reserves.	As required	Low

*Note that any clearing is subject to relevant environmental regulation, such as the *Environmental Protection Act 1986* (e.g. Native Vegetation Clearing Permit) and *Environment Protection and Biodiversity Conservation Act 1999*.

[^]Nesting boxes and other forms of artificial habitat can require dedicated ongoing management to ensure long term success. Advice should be sought from suitably qualified experts prior to installation.

Table 2-19 outlines the monitoring actions which are proposed to be implemented to assess the effectiveness of the management actions outlined in Table 2-18.

Table 2-19: Recommended Monitoring for Native Fauna and Habitat Management

Objective No.	Monitoring Methodology/Parameter	Reporting	Frequency
FH1	Recording of opportunistic fauna sightings by shire staff, including rangers, as well as members of the public. A particular emphasis should be placed on those species currently listed under the EPBC Act, BC Act or by DBCA.	Paper or online submissions to the Shire to be included in a fauna sighting register	Ongoing
FH1	Contract a suitability qualified contractor to undertake fauna monitoring, including nesting box checks if appropriate, within the reserves.	Fauna monitoring report	Biennially

2.2.4. Disease Management

The primary plant disease of concern for the Wongborel/Mt Brown and Gogulgar Bilya/Avon River Reserves is Phytophthora Dieback caused by the water mould *Phytophthora cinnamomi*. The key mechanism for the transmission of this disease is the movement of infested water and soil by humans, equipment, and machinery.

Wongborel/Mt Brown Reserve has undergone a Phytophthora Dieback Assessment (Terratree 2019). The results of the assessment at Wongborel/Mt Brown Reserve indicate that there is no evidence of the disease being present within the reserve. This is likely due to the low rainfall of the region, its location away from water-gaining sites and the low number of susceptible species present within the reserve. Due to this assessment occurring more than three years ago and the uncontrolled nature of access to the site an additional survey is warranted to confirm that the disease does not occur within the reserve.

While an official Phytophthora Dieback Assessment has not been conducted within the Gogulgar Bilya/Avon River Reserve, the presence of water-gaining sites, such as pools and the river itself, makes it a highly suitable environment within which the mould can persist. The implementation of the York Trails Concept Plan, as described in Section 1.3.1, and revegetation programs also significantly increase the risk of the disease being introduced or spreading further through the reserves.

Two management objectives have been identified for the management of disease within the two reserves. These objectives and their associated desired outcomes have been presented in Table 2-20.

Table 2-20: Disease Management Objectives and Outcomes

Objective No.	Objectives	Outcomes
D1	Prevent the spread of dieback into uninfected or uninterpretable areas beyond the natural rate of expression.	<ul style="list-style-type: none"> Dieback is not detected within the Wongborel/Mt Brown Reserve. No additional infestations of Dieback are detected within the Gogulgar Bilya/Avon River Reserve. There is no significant decline in the current vegetation condition as a result of the spread of dieback. No revegetation sites fail as a result of the introduction of dieback.
D2	Educate bushland managers and the community about dieback.	<ul style="list-style-type: none"> All bush managers have undertaken green card training prior to operating within the reserve. Increased community awareness of Phytophthora Dieback.

A list of recommended management actions to achieve weed management objectives and outcomes are presented in Table 2-21. The definitions for each of the priority tiers are presented in Table 2-8

Table 2-21: Recommended Disease Management Actions

Objective No.	Action No.	Management Recommendations	Timing	Priority
D1	1	Contract a suitably qualified individual to undertake a baseline Phytophthora Dieback Assessment along the Gogulgar Bilya/Avon River Reserve and a follow up survey assessment within the Wongborel/Mt Brown Reserve.	As required	High
D1	2	Ensure that all vehicles, tools, equipment, and machinery brought onto the site for the purposes of site maintenance, revegetation, or	Ongoing	High

Objective No.	Action No.	Management Recommendations	Timing	Priority
		construction of the trail network are free of mud and soil (potential vector of the pathogen) prior to entering, through the establishment of checkpoints.		
D1	3	All contractor and shire vehicles will arrive on site in a clean condition, with no mud etc. on the exterior of the vehicle. Especially during winter and other wet periods.	Ongoing	High
D1	4	Limit vehicle access in the reserves to Pioneer Rd and the existing Bushfire management tracks, where practicable.	Ongoing	High
D1	5	Ensure that any revegetation material, including mulch and soil is obtained from disease-free sources and all plants, are supplied by a nursery with the appropriate industry accreditations.	Ongoing	Moderate
D1	6	Installation of signage and shoe and bike tire clean-down station within the reserves, preferably at the start and end of each trail path.	As required	Moderate
D1	7	Construct compacted crushed limestone 'green bridges' along the trails and bushfire management trails where they pass through 'low-lying' or 'water-gaining sites'.	As required	Moderate
D1	8	Contract a suitably qualified individual to undertake Dieback treatment within the Gogulgar Bilya/Avon River Reserve if it is detected during assessments.	As required	Low
D2	9	Ensure all bush managers within the reserves have undertaken Green Card training.	Ongoing	Moderate
D2	11	All employees or contractors will be inducted on hygiene and pest species prior to the commencement of works on site, including: <ul style="list-style-type: none"> Risks and awareness of weeds and pest species. Overview of hygiene procedures. Documentation and reporting requirements. 	Ongoing	Moderate
D2	10	The implementation of a community awareness program to promote Dieback awareness.	Ongoing	Low

Table 2-22 outlines the monitoring actions which are proposed to be implemented to assess the effectiveness of the management actions outlined in Table 2-31.

Table 2-22: Recommended Monitoring for Disease Management

Objective No.	Monitoring Methodology/Parameter	Reporting	Frequency
D1	Undertaking visual inspections within the reserves for: <ul style="list-style-type: none"> Significant increase in vegetation death along the disease front and within areas mapped as Uninfested within baseline mapping. Rapid plant deaths around disturbance areas, especially along Pioneer Road, Picnic Area, Lookout, or any water gaining sites. 	Field Notes & Photographs	Annually
D1	A suitably qualified contractor to undertake a disease boundary survey in the event that plant deaths are believed to be caused by a disease occurrence within the reserves.	Dieback spread	Triennially
D2	Annual checks of the council training register to ensure all bush managers have undertaken Green Card training.	Training register	Annually

2.2.5. Feral and Grazing Fauna Management

The European Red Fox and the European Rabbit are the most prominent terrestrial feral species within the reserves. The Shire has previously undertaken rabbit and fox baiting programs within the Wongborel/Mt Brown Reserve (Shire of York 2008). These programs have resulted in a short-term reduction in the size of their population, however, due to the restricted scope and irregularity of the baiting programs, the long-term impact of these programs is thought to be limited.

The occurrence of both native (i.e. kangaroos) and introduced (i.e. livestock) grazing animals can significantly impact on the environment within the reserves. Through their grazing behaviour they can denude the understory of its native species. The removal of these species can lead to increased weed infestation, reduced soil structure and increased erosion. Additionally, if grazing animals are not properly managed within revegetation areas there is a high potential for them to fail.

Two management objectives have been identified for the management of feral and grazing fauna management within the two reserves. These objectives and their associated desired outcomes are presented in Table 2-23.

Table 2-23:Feral and Grazing Fauna Management Objectives and Outcomes

Objective No.	Objectives	Outcomes
FGF1	Control introduced fauna to reduce predation /competition with native fauna	<ul style="list-style-type: none"> No increase in the populations of feral fauna within the reserves. No new feral fauna species are introduced into the reserve. No obvious decline in native fauna population as a result of predation or competition with feral animals.
FGF2	Control presence of grazing fauna (feral and native) to reduce the impact of grazing on native flora species	<ul style="list-style-type: none"> No increased population of feral or native grazing species within the reserves. No evidence of significant grazing occurring within revegetation areas. No areas within the reserve become denuded of vegetation as a result of overgrazing. No livestock from surrounding farmland have access to the reserve.

A list of recommended management actions to achieve weed management objectives and outcomes are presented in Table 2-24. The definitions for each of the priority tiers are presented in Table 2-8.

Table 2-24: Recommended Feral and Grazing Fauna Management Actions

Objective No.	Action No.	Management Recommendations	Timing	Priority
FG1	1	Undertake a targeted fauna survey to determine the occurrence of feral and grazing fauna species. Can be undertaken as part of the detailed fauna survey recommended for Action 1 for Objective FH1.	As required	High
FGF1	2	Reduce the prevalence of vermin within the reserves which may attract additional feral predators such as cats and foxes. This can be achieved through: <ul style="list-style-type: none"> The provision of adequate rubbish and litter disposal facilities. Undertake frequent servicing and emptying of these facilities. 	Ongoing	High

Objective No.	Action No.	Management Recommendations	Timing	Priority
FGF1	3	A suitably qualified contractor is employed to undertake targeted rabbit and red fox pest management.	Annually	Medium
FGF1	4	The implementation of a community awareness program to promote responsible pet ownership – to reduce the impacts of domesticated animals such as cats on native wildlife.	Ongoing	Medium
FGF2	5	Installation of temporary fencing around revegetation areas to restrict access of grazing fauna (feral and native) until the plants become fully established and/or use of tree guards to protect seedlings.	Autumn prior to revegetation; during revegetation.	Medium
FGF2	6	Implementation of a kangaroo management program by a suitably qualified contractor.	As required	Low
FGF2	7	Installation of boundary fencing along correct boundary alignments of the reserves. These fences should be effective in prohibiting unauthorised access of vehicles, whilst maintaining the visual amenity of the site.	As required	Low

Table 2-25 outlines the monitoring actions which are proposed to be implemented to assess the effectiveness of the management actions outlined in Table 2-24.

Table 2-25: Recommended Monitoring for Feral and Grazing Fauna Management

Objective No.	Monitoring Methodology/Parameter	Reporting	Frequency
FGF1	<ul style="list-style-type: none"> • Undertake visual inspections of the reserves for the following: <ul style="list-style-type: none"> ○ Increased amounts of litter and rubbish. ○ Increased abundance of feral animals. ○ Increased abundance of vermin. • These should primarily focus on the boundary firebreaks, Picnic Area, Lookout and Pioneer Road. 	Field Notes & Photographs	Monthly
FGF2	Undertake visual inspections of the reserve for the following and compare against baseline surveys: <ul style="list-style-type: none"> • Increased abundance of feral and native grazing species. • Evidence of grazing within revegetation areas. • Breaks within the boundary fences. 	Field Notes & Photographs	Monthly

2.2.6. Fire Management including Cultural Burning

The historical fire regimes which have been implemented in both reserves are not well documented. However, anecdotal evidence suggests that the previous regimes have allowed for burns to occur at an intensity and regularity which is unlikely to result in environmental enhancement. This has resulted in the degradation of the reserves, particularly the Wongborel/Mt Brown Reserve.

The Shire proposes to undertake cultural burning throughout both reserves. Cultural burning is described as practises developed by Aboriginal Traditional Owners to enhance the health of the land and its people. Cultural burning can also achieve positive outcome for hazard reduction and the safety of the surrounding community.

To identify potentially suitable cultural burning zones within the reserve for the short, medium, and long term a cultural burning site selection matrix was developed. These zones will provide a starting point from which specific cultural burning sites can be selected through on-ground identification by Ballardong Elders and knowledge holders in consultation with suitably qualified support such as DFES. It is important to note that Ballardong Elders and knowledge holders have not provided any advice in this regard at the time of preparation, so the areas identified in this study are very much preliminary, to provide a starting point, and subject to change once this plan has been reviewed and any such advice is provided. The criteria used to create the matrix were:

- Patch size.
- Hazard to residents.
- Ease of access.
- Height in the landscape.
- Topography.

These criteria were selected for their relevance to bushfire behaviour and safety to residents. For each criterion, a zone was allotted a score out of two. The definitions used to allocate the scores are outlined in Table 2-26. These scores were then combined so that each zone received a total score out of 10, which was known as a ‘Cultural Burning Priority Score’. Those zones which received a high ‘Cultural Burning Priority Score’ were identified as suitable for burning in the short term, while those with a lower ‘Cultural Burning Priority Score’ were identified as suitable for burning in the long term. The outputs generated by the matrix for the Wongborel/Mt Brown Reserve and the Gogulgar Bilya/Avon River Reserve is presented in Figure 2-7 and Figure 2-8 respectively.

Table 2-26: Bushfire Matrix Criteria

Value	Patch Size	Hazard to residents	Ease of Access	Height in Landscape	Topography
2	Small = <5 ha	Low = isolated from properties	High = <50 m from track	High = 271 m to >310 m	Gentle Slope - <10°
1	Medium = 6-9 ha	Medium = close proximity to properties	Medium = 51 m to 99 m from track	Medium = 231 m to 270 m	Medium Slope = 11° to 19°
0	Large = >10 ha	High = Adjacent to properties	Low = <100 m from track	Low = <190 m to 230 m	Steep Slope = >20°

It is noted that the matrix is based on the latest available information, which at the time of creation is very broad and does not sufficiently identify all significant environmental and relevant cultural heritage values within the reserves. As such, it is:

- Essential that Ballardong Elders and knowledge holders are engaged to review, advise on, endorse, and participate on ground cultural burning activities and areas.
- Recommended that additional surveys/studies are undertaken to confirm environmental values, i.e. detailed flora, and vegetation assessment, including an assessment of conservation significant species, occurrence of TEC and PECs and weed species; and detailed terrestrial fauna studies, that would then be incorporated into the matrix to provide more accurate and site specific cultural burning priority scores for each zone.

It is also recommended that the matrix should be continually updated as more information becomes available through the completion of additional surveys.

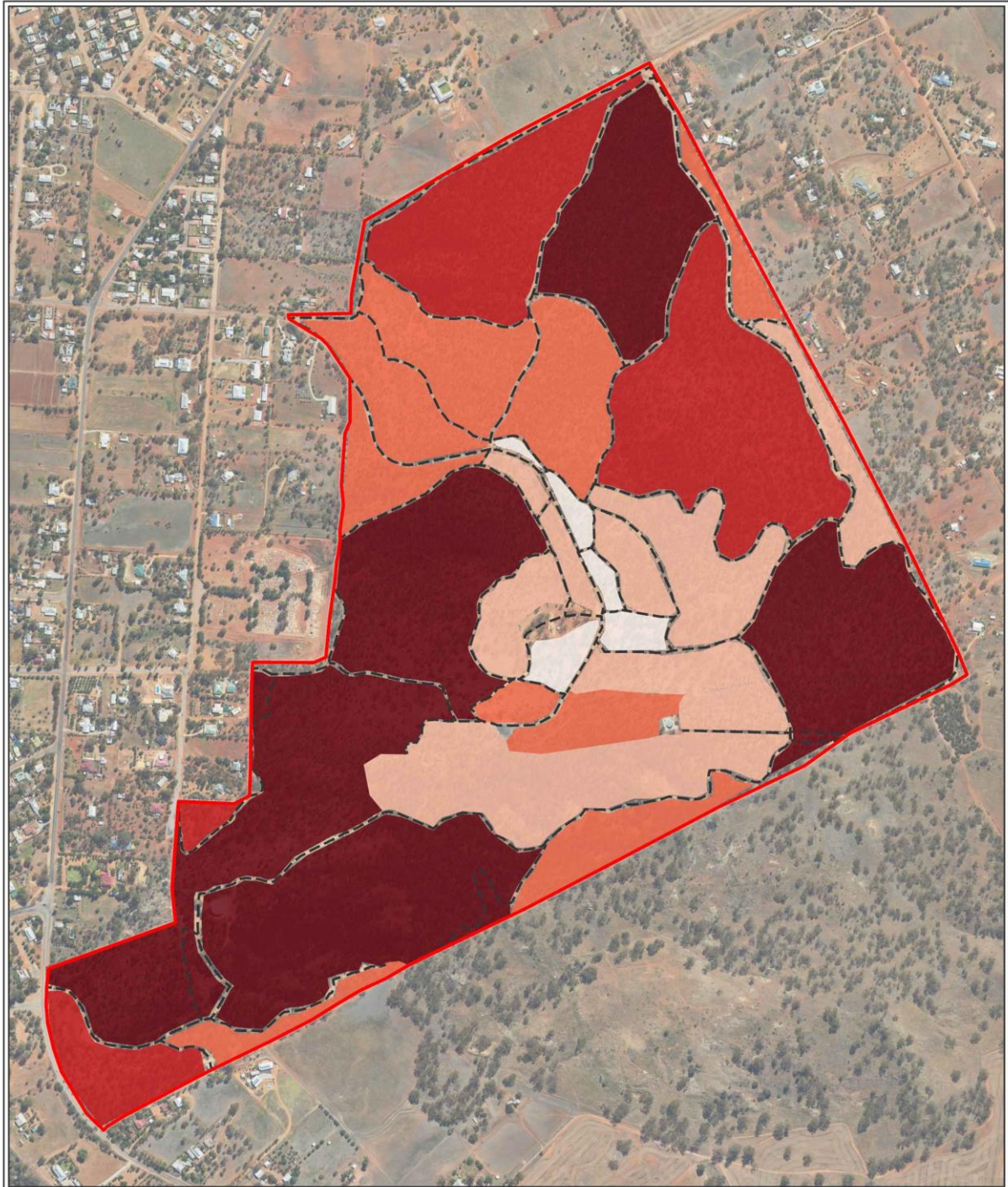


Figure 2-6: Wongborel/Mt Brown Reserve Cultural Burning Priority Zones



Figure 2-7 Wongborel/Mt Brown Reserve Cultural Burning Priority Zones



Figure 2-7: Gogulgar Bilya/Avon River Reserve Cultural Burning Priority Zones

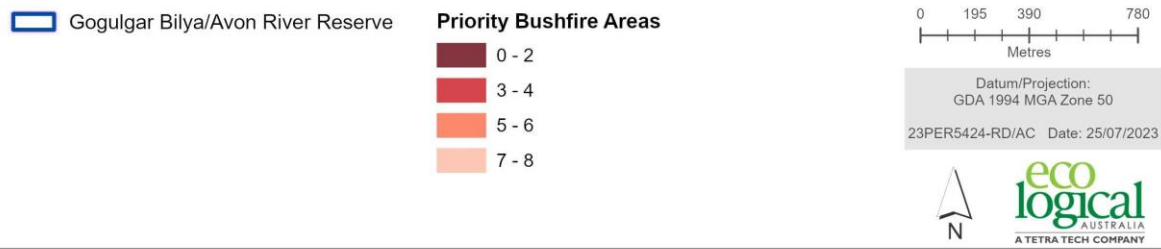


Figure 2-8: Gogulgar Bilya/Avon River Reserve Cultural Burning Priority Zones

One management objective has been identified for the management of bushfires within the two reserves. This objective and its associated desired outcome are presented in Table 2-27.

Table 2-27: Bushfire Management Objectives and Outcomes

Objective No	Objectives	Outcomes
B1	Establishment of appropriate cultural burning methods within the reserves.	<ul style="list-style-type: none"> Optimal burning intervals for local vegetation are implemented. Environmental values are maintained or enhanced. Culturally appropriate burning guidelines are established. No increase in risk to community assets.

A list of recommended management actions to achieve weed management objectives and outcomes are presented in Table 2-28. The definitions for each of the priority tiers are presented in Table 2-8.

Table 2-28: Recommended Bushfire Management Actions

Objective No.	Action No.	Management Recommendations	Timing	Priority
B1	1	Undertake a detailed flora and vegetation survey to determine vegetation conditions and the occurrence of flora species and vegetation communities, including TECs, within the reserves.	Spring	High
B1	2	Undertake a detailed fauna survey to determine the occurrence of fauna species, especially Threatened and Priority species.	Spring	High
B1	3	Seek the advice and endorsement Ballardong Elders and knowledge holders with the support of the Department of Fires and Emergency Services (DFES) staff to determine appropriate timing and techniques for cultural burning.	Ongoing	High
B1	4	Engage Ballardong Elders and knowledge holders (or their endorsed representative) to undertake (or inform) pre- and post-burning cultural value assessments facilitated by community liaison persons	Pre and post cultural burning	Moderate
B1	5	<p>Select suitable cultural burning sites within the reserves based on the advice and endorsement of Ballardong Elders and knowledge holders, derived from cultural burning priority zone scoring (if accepted).</p> <p>This action is accompanied by the following recommendations:</p> <ul style="list-style-type: none"> Do not conduct any burns in the vicinity of any populations of conservation significant flora or fauna species habitat that are identified during baseline surveys, subject to relevant environmental approvals. No cultural burning is undertaken within the Gogulgar Bilya/Avon River Reserve in the short to moderate term (as defined in Table 2-8). 	Pre-cultural burning	Moderate

Objective No.	Action No.	Management Recommendations	Timing	Priority
B1	6	<p>Cultural burning guidelines and safety requirements are developed and continually updated on the advice of Ballardong Elders and knowledge holders in consultation with DFES. These guidelines should include but not be limited to the following:</p> <ul style="list-style-type: none"> • Community and participant safety. • The ultimate on-ground decision making authorities (i.e. Community Emergency Services Manager, with overall responsibility for community safety). • Protection of significant fauna habitats (such as hollow logs, dead wood, and foraging trees). • Working in conjunction with all vegetation and flora management, native fauna management and disease management objectives. 	Ongoing	Moderate

Table 2-29 outlines the monitoring actions which are proposed to be implemented to assess the effectiveness of the management actions outlined in Table 2-28.

Table 2-29: Recommended Monitoring for Bushfire Management

Objective No.	Monitoring Methodology	Parameters	Frequency
B1	Cultural value assessments to be conducted by or facilitated by community liaison person as guided by, and with participation of Ballardong Elders and knowledge holders (or their endorsed representative).	Cultural value report	Pre and Post burning
B1	<p>Undertake a visual inspection of the area post-burning, taking note of the following:</p> <ul style="list-style-type: none"> • The species that are naturally germinating from fire and those that do not. • The effectiveness of the pre and post burning weed management strategies, as outlined in Section 2.2.1. • The rate at which species recover from fire (i.e. rapidity of germination or regrowth). 	Post-burning evaluation report.	Immediate post-burning and then annually.

2.2.7. Disturbance and Erosion Management

Several recreational activities are known to occur within the reserves, namely horseback riding, four-wheel driving, motorbiking and mountain biking along unofficial tracks, resulting in adverse impacts on the environment. These impacts include accelerated erosion, soil compaction and the spreading of weeds.

Due to the general steepness of the Wongborel/Mt Brown reserve and the alluvial forces of the Gogulgar Bilya/Avon River, there are several places within the reserves where substantial erosional processes can be observed (Plate 2-4). This is mainly restricted to areas denuded of vegetation, such as firebreaks, access tracks and some riverbanks. Due to its current restricted nature, the impact on the surrounding environment is minimal. However, the removal of the weedy understory through the proposed weed control and revegetation programs has the potential to substantially increase the occurrence and level of erosion in the reserves, which in turn increases the potential impact on the surrounding environment, therefore management controls are required to mitigate the impacts of erosion.



Plate 2-4: Evidence of erosion within Mt Brown Reserve

Two management objectives have been identified for the management of disturbance and erosion within the two reserves. These objectives and its associated desired outcomes have been presented in Table 2-30.

Table 2-30: Disturbance and Erosion Management Objectives and Outcomes

Objective No.	Objectives	Outcomes
D&E1	Minimise the extent and occurrence of disturbance to natural bushland within the reserves.	<ul style="list-style-type: none"> Minimise the potential for new unofficial tracks are to be created within the reserves. All existing unofficial tracks within the reserve are blocked and suitably remediated. Reduce the potential for unauthorised access to areas of the reserve. Access to the reserve is restricted to authorised entrances only.
D&E2	Maintain soil structure and health when carrying out revegetation and	<ul style="list-style-type: none"> All significant erosion within the reserve has been remediated. Reduction in signs of erosion being observed within the reserves. Long-term soil stability is achieved through presence of native vegetation and revegetation activities,

Objective No.	Objectives	Outcomes
	weed control programs	<ul style="list-style-type: none"> Culverts and drains are utilised to direct surface water flows and reduce erosion.

A list of recommended management actions to achieve weed management objectives and outcomes are presented in Table 2-31. The definitions for each of the priority tiers are presented in Table 2-8.

Table 2-31: Recommended Disturbance and Erosion Management Actions

Objective No.	Action No.	Management Recommendations	Timing	Priority
D&E1	1	Installation of signage throughout the reserves indicating prohibited activities, penalties and associated environmental impacts.	As required	High
D&E1	2	Removal of any dumped rubbish as soon as possible.	Ongoing	High
D&E1	3	Blocking of nonessential access points, including unofficial trails and firebreaks, within the reserves with minor earthworks/boulders/logs to prevent unauthorised access.	As required	Medium
D&E1	4	Installation of locked gates (similar to those along controlling access into the Gogulgar Bilya/Avon River Reserve) at the essential access points to allow access of maintenance and emergency service vehicles into the reserves.	As required	Medium
D&E1	5	Installation of temporary fencing around revegetation areas and/or tree guards, and signage, to reduce disturbance and any potential detrimental impacts until the plants become fully established.	Autumn prior to revegetation	Medium
D&E1	6	Installation of boundary fencing along the correct boundary alignments of the reserves. These fences should be effective in prohibiting unauthorised access of vehicles, whilst maintaining the visual amenity of the site.	As required	Low
D&E2	7	Repair erosion damage to tracks and firebreaks.	Ongoing	High
D&E2	8	Installation of culverts and diversion drains along roads on steep slopes and preferential surface flow lines to reduce surface water runoff and subsequent erosion.	As required	Medium
D&E2	9	<p>Installation of erosion controls along banks of the Avon River where appropriate. This should primarily be through the installation of native vegetation. However, it can be used in conjunction with other methods whilst the native vegetation becomes established, this can include:</p> <ul style="list-style-type: none"> Installation of retaining walls along riverbanks. Installation of matting or geogrid fabrics around the planted native vegetation. Ripraps (protective layer of large stones at the base of the bank slope). <p>Significant erosion control measures should be implemented in consultation with the Shire and environmental</p>	As required	Medium

Objective No.	Action No.	Management Recommendations	Timing	Priority
		engineering experts, and subject to required environmental and/or planning approvals.		
D&E2	10	<p>When conducting revegetation and weed control management, ensure that the soil is stabilised and protected against erosion until native vegetation becomes established, potential methods include:</p> <ul style="list-style-type: none"> Planting of individuals within furrows/depressions. Stepped cutting or battering along steep slopes. Application of mulch and matting around plantings. Installation of netting (e.g. geocell) where erosion is significant. Disruption of surface level flows through the construction of minor earthworks or logs. 	As required	Medium

These monitoring actions will also allow for any issues which may arise during the implementation of the management actions to be identified at an early stage.

Table 2-32: Recommended Monitoring for Disturbance and Erosion Management

No.	Monitoring Methodology/Parameters	Reporting	Frequency
7.1	<p>Undertake visual inspection of the reserves and record any evidence of significant disturbance, including but not limited to:</p> <ul style="list-style-type: none"> Unauthorised vehicle access. Construction of unauthorised tracks. Rubbish dumping. <p>If disturbance is considered to be significant then remediation action should be undertaken or raised with the appropriate authorities.</p>	Field Notes & Photographs	Monthly
7.2	<p>Undertake visual inspections of the reserves, including revegetation sites, and record evidence of erosion using photos and GPS coordinates.</p> <p>Revisit these sites during subsequent inspections to identify the extent of the impact over time and if necessary, undertake remediations actions that may include:</p> <ul style="list-style-type: none"> Refilling with material with a high resistance to erosion (i.e. rocks). Riverbank armouring. Reducing surface gradients. <p>If remediation has already occurred on this site, then suitable alternative management actions will be identified and implemented.</p>	Field Notes & Photographs	Bi-annually (Early Autumn and Late Spring)

3. Connecting with Country (Cultural and Heritage Values)

3.1. Receiving Environment

3.1.1. Ballardong Noongar Cultural Heritage

Aboriginal and Torres Strait Islander People have inhabited Australia and its offshore islands for more than 60,000 years and comprise hundreds of unique groups with their own languages, histories, and cultural traditions (AIATSIS 2023).

Aboriginal and Torres Strait Islander people have a deep connection with 'Country', a term which extends beyond the physical elements, encompassing an interdependent relationship between an individual and their ancestral lands and waters (Behrendt 2015). This independence relationship is based on respect, with the land sustaining and providing for the people and in return people managing and sustain the land through their cultural practices.

The Noongar people are the traditional custodians of the south-west of Western Australia and comprising of various sub-groups which share a common language and cultural traditions (Snappy Gum Heritage, 2021). The Ballardong people is the sub-group of the Noongar people which live and care for Country in York. York is located near the western boundary of Ballardong Country, which extends as far as approximately Pithara in the north, Newdegate in the south and Merredin and Hyden in the east.

The landscape around the York township contains culturally significant sites for the Ballardong People including the Gogulgar Bilya/Avon River and Wongborel/Mt Brown (Snappy Gum Heritage 2021). The Aboriginal Cultural Heritage Information System (ACHIS) identified several Registered Aboriginal Sites around the York township (DPLH 2023). Four of these intersect with the Gogulgar Bilya/Avon River and Wongborel/Mt Brown Reserves, including:

- Gogulgar Bilya/Avon River (Site ID: 15979).
- Marley Pool (Site ID:29397).
- Wongborel/Mt Brown (Site ID: 39018).
- Wongborel Rock Formation (Site ID: 39019).

An additional culturally significant site has been preliminary indicated in discussions with Ballardong people. A summary of both registered and non-registered culturally significant sites is discussed in the following sections.

Some knowledge with respect to some sites and places is culturally restricted (cannot be shared or described in a public document such as this without appropriate permissions) and emphasises the essential importance of ensuring Ballardong Elders and knowledge holders are fully and properly informed of, involved in and consent to activities that may be implemented under this plan.

3.1.1.1. Gogulgar Bilya/Avon River

In Ballardong culture the Gogulgar Bilya/Avon River has a mythological association with the Waugyl or river snake/serpent (Snappy Gum Heritage 2021). The Waugyl is a key figure within Ballardong creation stories, as it is believed to have created the Gogulgar Bilya/Avon River and its surrounding tributaries

during the dreaming. The Waugyl is still believed to travel up and down the river, as evident from the flow of the water (Lafrentz and Villiers 2009). It is also believed to reside within the permanent summer pools which occur along the Gogulgar Bilya/Avon River, such as Marley Pool.

3.1.1.2. Marley Pool/Mile Pool

Marley Pool, referred to locally as 'Mile Pool' is a culturally significant pool which is located along the Gogulgar Bilya/Avon River. It has previously been clarified by local Elders that the name Marley Pool is a misnomer and actually refers to a separate site upstream of the York township on the Mackie River, a tributary of the Gogulgar Bilya/Avon River (Snappy Gum Heritage 2021). The exact location of the 'Mile Pool' site is unclear; however, the ACHIS database has covered the site with a 200 m radius buffer area which is sufficient to incorporate all the culturally significant aspects of the site. The site is known by Ballardong Elders to be a corroboree site, ceremonial place, and birthing place (Chown and Matternner 2011). The site was not identified as having any gender restrictions and is historical associated with camping, hunting, water sources and food resources.

3.1.1.3. Wongborel/Mt Brown

Wongborel/Mt Brown was added to the ACHIS directory after 1 July as Place no. 39018, however due to the repeal of the *Aboriginal Cultural Heritage Act 2021* its exact status is not known at the time of writing this report. It should be noted however, that as the site has been lodged for registration, the same level of protection applies to the site, as if already registered under the *Aboriginal Heritage Act 1972*. This also applies to Place no. 39019 Wongborel Rock formation. Wongborel/Mt Brown is identified as being of high cultural significance due to its association with Walwalying/Mt Bakewell and their combined significance in the creation story of the York landscape (Snappy Gum Heritage 2021). Ballardong People identify Wongborel/Mt Brown as a women's place due to its connection to Wilura, a young woman from the York landscape creation stories. The mountain has also occasionally been referred to as 'the sleeping woman'. While the site has traditionally been identified as a women's place, the mountain nor any of the sites on it are gender exclusive places.

Within the Wongborel / Mt Brown Reserve one site has been identified as being of cultural and spiritual importance to the Ballardong Noongar people (Snappy Gum Heritage 2021). Local Elders have indicated that this site is associated with specific rocks that are spiritual and healing places. The exact location is restricted. Local Elders also identified a special cultural site on the mountain, however, the knowledge around the exact location of this site is also restricted.

3.1.1.4. Big Sandy and Little Sandy Beaches/Swimming Holes

Neither the Big Sandy Beach nor the Little Sandy Beach are classified as Registered Aboriginal Sites in the ACHIS database, however, discussions with local Elders have identified these sites as being culturally significant and should be submitted for registration (Snappy Gum Heritage 2021). These sites are associated with the Waugyl and the creation of the Gogulgar Bilya/Avon River, with the Waugyl leaving the earth at Big Sandy and re-entering at Little Sandy Beach. Historically, both sites have been identified as being popular recreational locations for Ballardong People.

3.1.2. European and Other Cultural Heritage

The European heritage of the York township commenced when it was established in 1831. Initially the town consisted of just two houses, a barn, an Army Barracks and 50 acres of cleared land (Hasluck 1931). In the 1850's convicts were transported to the York Area from the Swan River Colony to assist with the

labour shortage that the community was experiencing at the time (Deacon 1948). These convicts constructed a road to York, enabling the town to expand and some of the historical buildings which are still present within the town today. Since then, the community has continued to expand and has become one of the Wheatbelts iconic townships.

The York Township contains 29 heritage sites which have been identified as State Registered Places **(Figure 3-1**

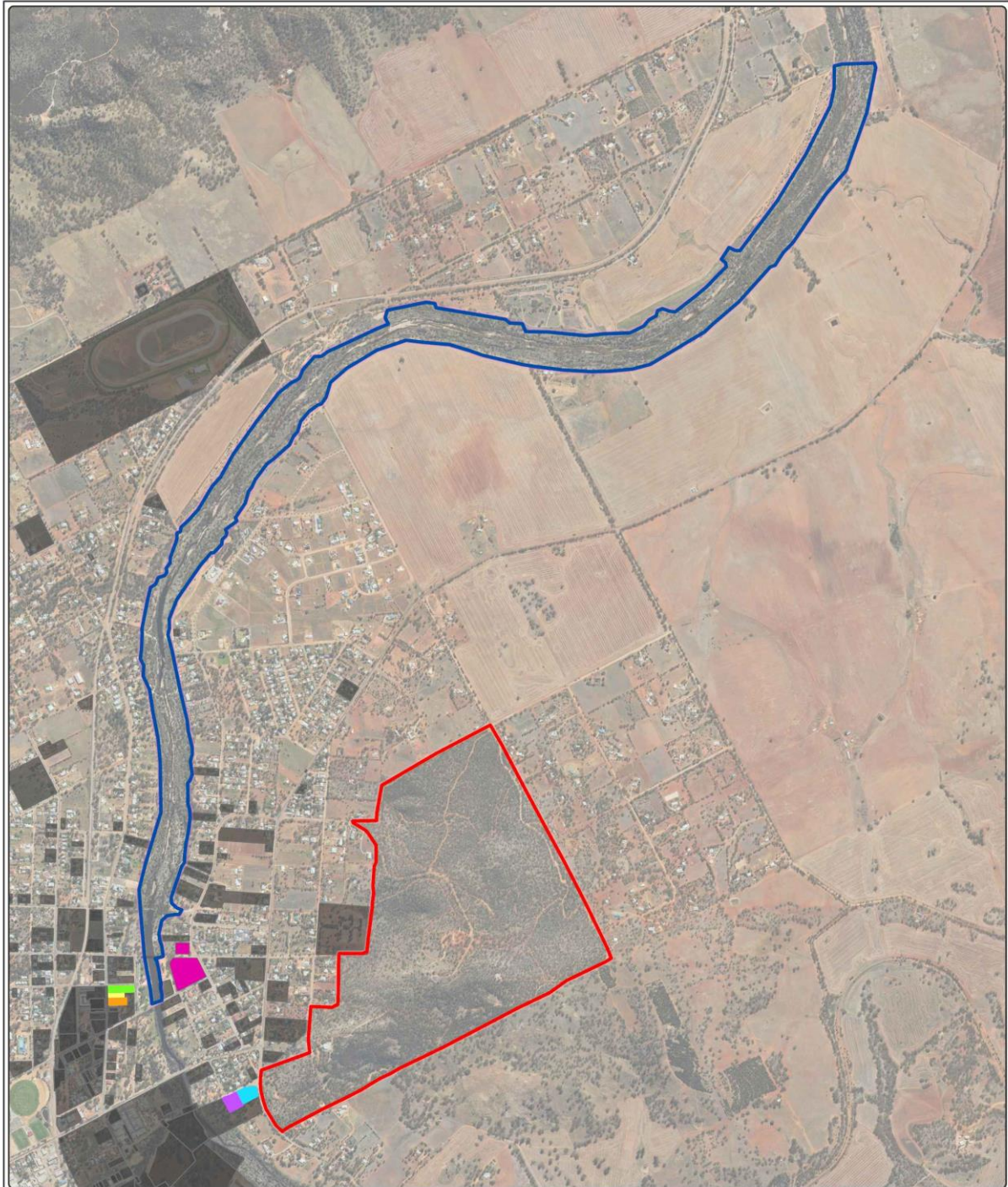
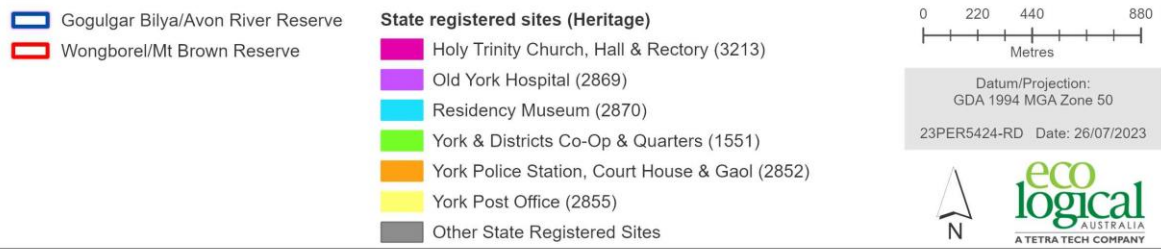


Figure 3-1: State Registered Heritage Sites in Shire of York



). While none of these sites occur within the Wongborel/Mt Brown Reserve and the Gogulgar Bilya/Avon River Reserve, several occur adjacent to the two reserves. These sites are:

- Holy Trinity Church, Hall, and Rectory (Site: 3213).
- York and District Co-Op & Quarters (Site: 11551).
- York Post Office (Site: 2855).
- York Police Station, Court House & Goal (Site: 2852).
- Old York Hospital (Site: 2869).
- Residency Museum (Site: 2870).

Due to the historical nature of the township, there are an additional 258 sites that have not been listed as State Registered Places but have been Heritage Listed by the Shire (

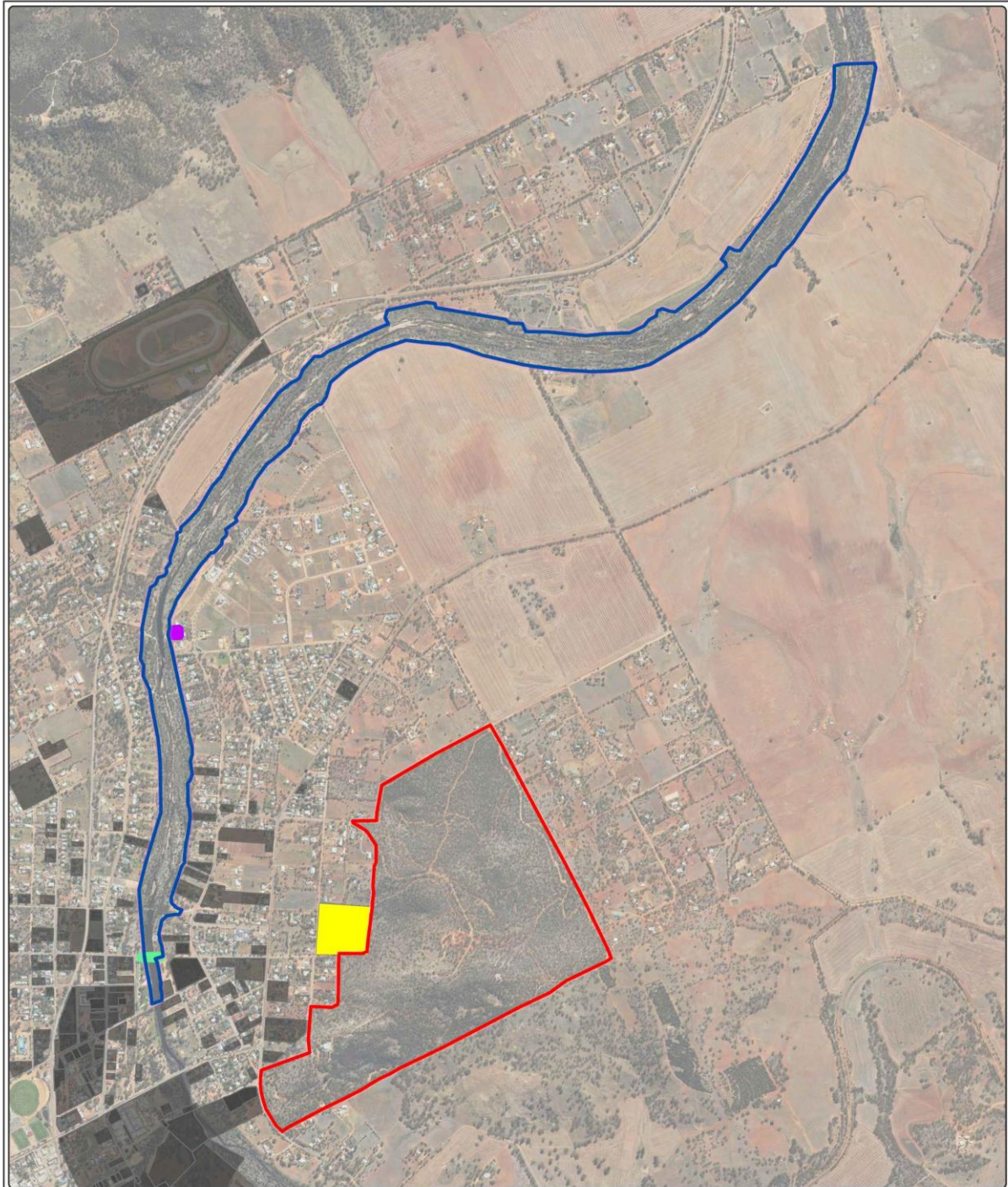


Figure 3-2: Local Registered Places in Shire of York



). Similarly, to the State Registered Places most of these sites do not occur within either of the reserves, the only exception being the Suspension Bridge (Site: 2889) which crosses the Gogulgar Bilya/Avon River

Reserves. Many of the locally listed sites that are located adjacent to the reserves and are residences or houses. The notable exceptions for this are the York Cemetery (Site: 2885), located on the western border of the Wongborel/Mt Brown Reserve and the Miles Pool Homestead on the western banks of the Gogulgar Bilya/Avon River Reserve.

It is noted that a 'well' has recently been uncovered whilst revegetation activities were being undertaken in 2023 near the Miles Pool Homestead (Plate 3-1). This structure is suspected to be associated with the homestead; however, this has yet to be confirmed.



Plate 3-1: Recently discovered 'well' down slope of the Miles Pool Homestead

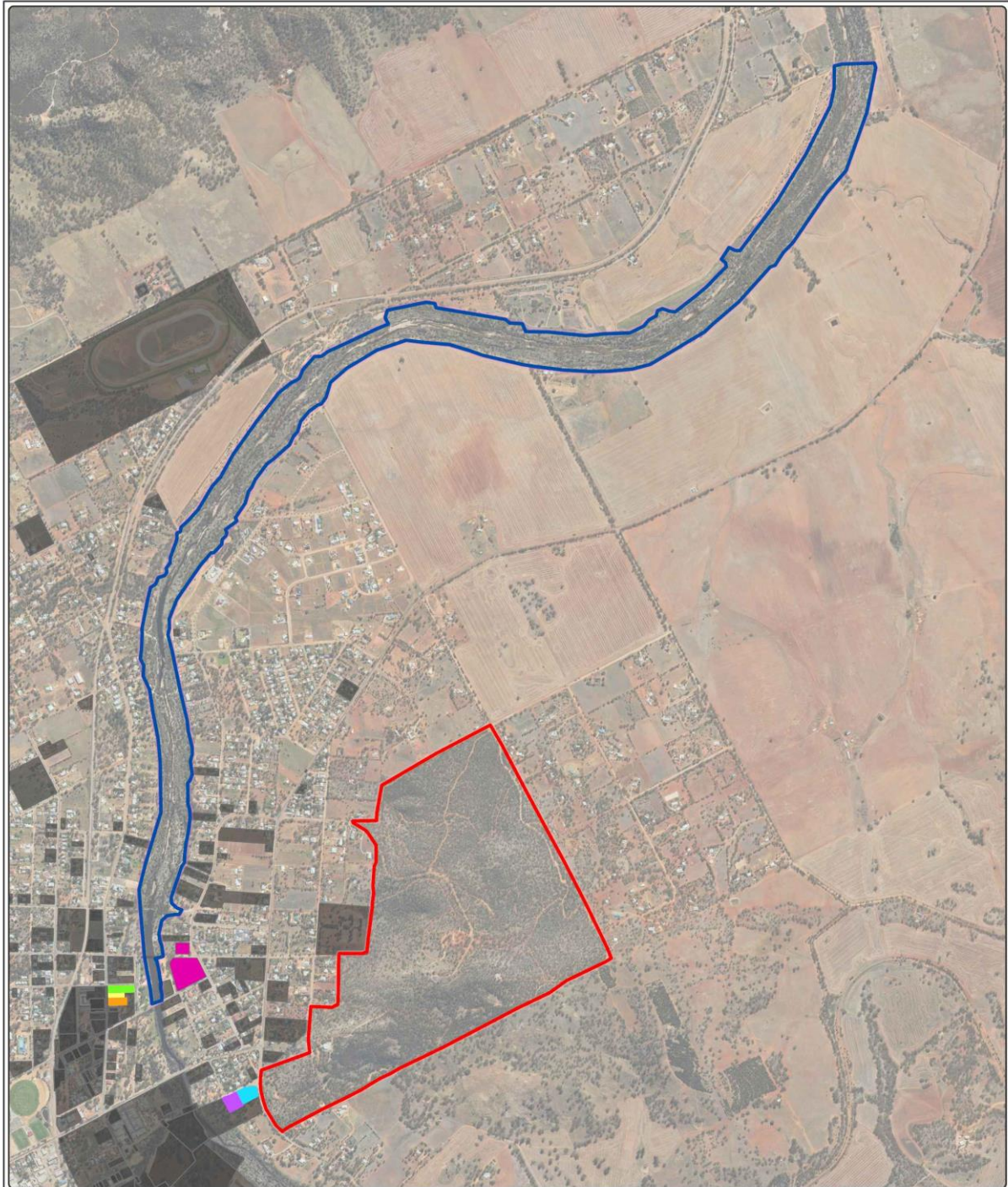


Figure 3-1: State Registered Heritage Sites in Shire of York



Figure 3-1: State Registered Places in Shire of York

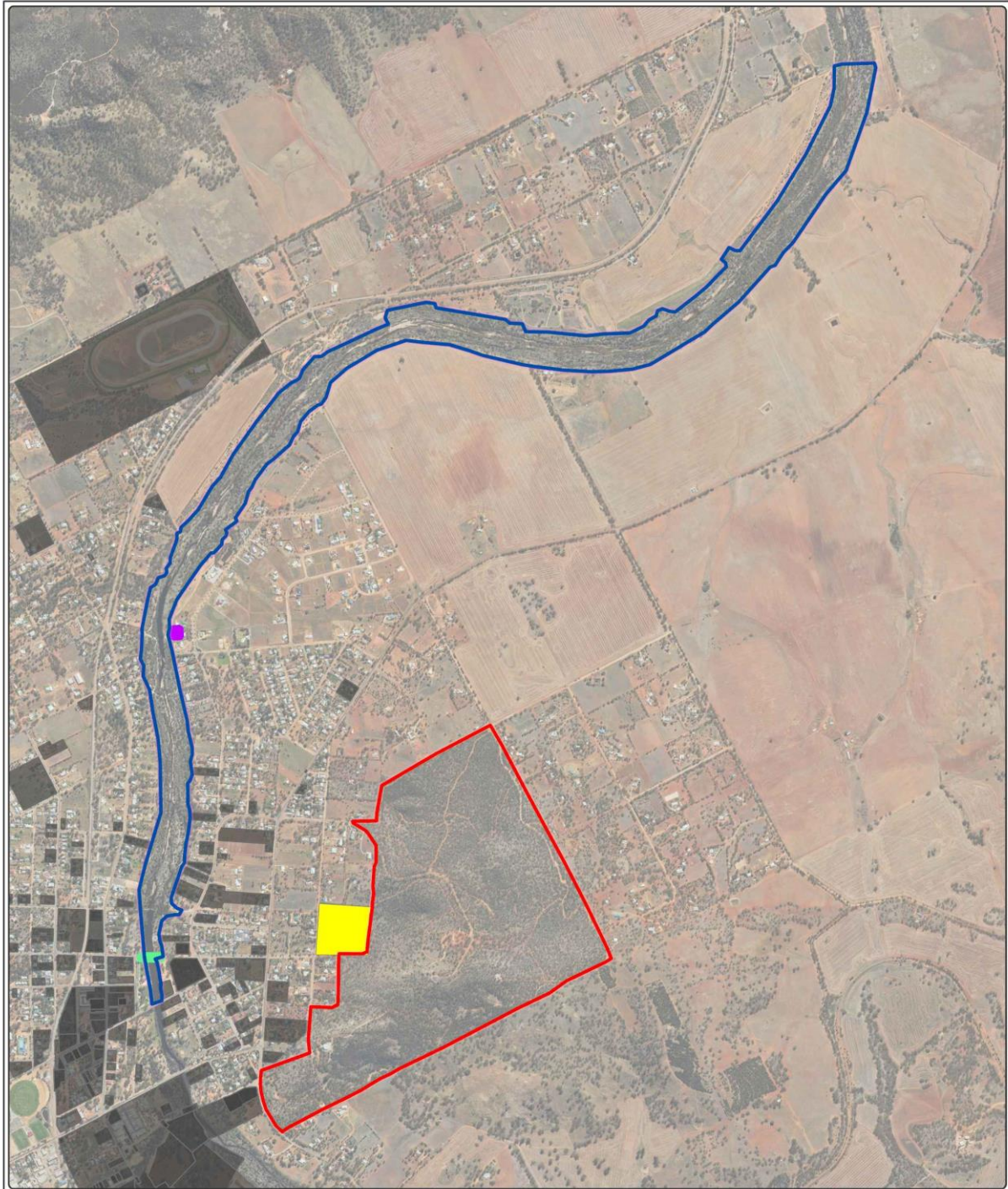


Figure 3-2: Local Registered Places in Shire of York

<ul style="list-style-type: none"> Gogulgar Bilya/Avon River Reserve Wongborel/Mt Brown Reserve 	<p>Local Registered Places (Heritage)</p> <ul style="list-style-type: none"> Mile Pool Homestead Suspension Bridge (2889) York Cemetery (2885) Other Local Heritage Places 	<p>0 220 440 880</p> <p style="text-align: center;">Metres</p> <p>Datum/Projection: GDA 1994 MGA Zone 50</p> <p>23PER5424-RD Date: 26/07/2023</p>
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Figure 3-2: Locally Registered Heritage Sites in Shire of York

3.2. Management

The following sections outline the management objectives and outcomes for the management of Ballardong Noongar and European Cultural Heritage within the Gogulgar Bilya/Avon River and Wongborel/Mt Brown reserves. Each objective has been allocated a letter and number, with the letter identifying its corresponding management consideration, i.e. W= Weed Management, and the number identifying the objective number for that management considerations.

The sections also provide recommendations for implementation and monitoring actions to achieve their related objectives as well as the most suitable timing within which these actions should be undertaken. Some actions must be undertaken at certain times of the year or before/after other management actions have been undertaken. It is noted that some of the recommendations are mutually beneficial for some of the environmental considerations.

Priority rankings have also been assigned to each of the recommended management actions to assist in the Shire decision-making process for the execution of the plan. The priority ranking system is based on the definitions provided in Table 2-8.

3.2.1. Ballardong Noongar Cultural Heritage

As shown in Section 3.1.1 the reserves contain several sites that are of cultural significance to Ballardong People. The Shire recognises the importance of these sites and has attempted to raise awareness in the local community and for visitors through the production of education material and the installation of signage at some of the sites, such as Wongborel/Mt Brown Lookout and Mile Pool (Plate 3-2).

The Management Plan aims to build on these initiatives of local and visitor education as well as recognition of Ballardong culture to ensure that not just the culturally significant sites but Country as a whole that is protected and respected by all people. The Management Plan aims to ensure that through the management of these reserve Ballardong connection to Country is enhanced and that customary use and management of the reserves, such as cultural burning, is encouraged and appropriately facilitated. The Management Plan also strives to ensure that the current working relationship between Ballardong People and the rest of the community is continually fostered to achieve a cross-cultural management approach for both reserves.



Plate 3-2: Shire of York Sign Describing Significance of Wongborel/Mt Brown to Ballardong Noongar People

The objectives and the associated desired outcomes for Ballardong Noongar Cultural Heritage have been presented in Table 3-1.

Table 3-1: Ballardong Noongar Cultural Heritage Management Objectives and Outcomes

No.	Objectives	Outcomes
BNCH1	To conserve and protect the value of the land to the Ballardong People by protecting cultural and natural heritage within the two reserves.	<ul style="list-style-type: none"> No culturally significant sites within the reserves are adversely impacted by the implementation of any of the recommendations made in this document. Increased wider community awareness and respect for the culturally significant sites within the reserves. All management actions and developments within the reserve are beneficial for Country.
BNCH2	To support Ballardong connection to Country and customary use of the reserves.	<ul style="list-style-type: none"> Customary cultural practises are permitted to be implemented within the reserves. Increased wider community awareness and respect for Ballardong Noongar culture.
BNCH3	Improve working relationship and partnerships with Ballardong People.	<ul style="list-style-type: none"> The inclusion of Ballardong People in the planning and implementation of this Management Plan. The recognition and development of Ballardong expertise in the management of the reserves. Increased wider community awareness and respect for the Ballardong Noongar culture.

A list of recommended management actions to achieve weed management objectives and outcomes are presented in Table 3-2. These recommendations include recommendations adapted from those presented in the 2021 Noongar Cultural Heritage Survey (Snappy Gum Heritage 2021). The definitions for each of the priority tiers are presented in Table 2-8. **Error! Reference source not found..**

Table 3-2: Recommended Ballardong Cultural Heritage Management Actions

Objective No.	Action No.	Management Recommendations	Timing	Priority
BNCH1	1	Undertake a site identification survey with selected Ballardong representatives who were identified as being knowledgeable about the location and values of the birthplace at Marley Pool (Site ID: 29397).	As required	High
BNCH1	2	Ensure that all culturally significant sites are not disturbed or impacted during the management of the reserves or the development of the trail network.	As required	High
BNCH3	3	The Ballardong Noongar Community is included as a key stakeholder in the management and development of both reserves	As required	High
BNCH2	4	Undertake consultation with local Elders and DFES staff to determine appropriate timing and techniques for cultural burning.	Ongoing	High
BNCH3	5	The culturally significant sites within the reserves are referred to in dual language terms (English and Noongar) in all Shire signage and cultural heritage materials.	As required	High
BNCH2	6	Engage Ballardong Elders and knowledge holders (or their endorsed representative) to undertake (or inform) pre- and post-burning cultural value assessments facilitated by community liaison persons	Pre and post cultural burning	Moderate
BNCH2	7	Select suitable cultural burning sites within the reserves based on the advice and endorsement of Ballardong Elders and knowledge holders, derived from cultural burning priority zone scoring (if accepted) (See Section 2.2.6).	Pre-cultural burning	Moderate
BNCH2/3	8	The Ballardong Noongar Community are active participants in decision-making and development of cultural interpretation material within the reserves	As required	Moderate

3.2.2. European and Other Cultural Heritage Management

The historical nature of the York township and the absence of substantial written records means that some additional historical site may remain unrecorded, despite the large number recorded in the town. These sites, such as the recently discovered ‘well’ near Mile Pool Homestead have the potential to be impacted by some of the management actions recommended in the other sections of this Management Plan. This does not just include direct damage from management actions such as ripping but also degradation from being exposed to weathering and fires.

The objective and the associated desired outcomes for the European and Other Cultural Heritage Sites have been presented in Table 3-3

Table 3-3: European and Other Cultural Heritage Management Objectives and Outcomes

No.	Objectives	Outcomes
EOCH	To conserve and protect European and other cultural heritage in consultation with relevant stakeholders	<ul style="list-style-type: none"> None of the known European and other cultural heritage sites are disturbed or impacted as a result of the management actions outlined in this document. Efforts are made to identify any unknown heritage sites present within the two reserves where areas will become disturbed during management actions.

A list of recommended management actions to achieve weed management objectives and outcomes are presented in Table 3-4. The definitions for each of the priority tiers are presented in Table 2-8.

Table 3-4: Recommended European and Other Cultural Heritage Management Actions

No.	Management Recommendations	Timing	Priority
EOCH	Ensure that all European and other cultural heritage sites are not indirectly impacted by the management actions within the reserves. Through active avoidance and implementation of protection mechanisms such as avoidance buffers.	As required	High
EOCH	Ensure that if any heritage sites are uncovered during management actions, these are investigated, and appropriate protection actions are undertaken.	As required	High
EOCH	Undertake heritage surveys at the ‘well’ near Mile Pool Homestead to determine exact location and avoidance measures to be detailed into management planning.	As required	Moderate

4. People on Country (Recreation, Tourism and Community)

4.1. Receiving Environment

4.1.1. Visitor Access

Currently the public has access to all areas of the Gogulgar Bilya/Avon River Reserve and the Wongborel/Mt Brown Reserve. This is mainly by walking and cycling along the firebreaks and access roads, such as Pioneer Road. There are also some areas along the Gogulgar Bilya/Avon River Reserve which are accessible by boat, while Pioneer Road also provides public vehicle access to the Wongborel/Mt Brown Reserve Lookout and Picnic Area.

However, it is known that the site also contains approximately 12 km of unofficial biking trails and anecdotal evidence suggest the use of horses, motorbikes, and vehicles within the reserves. These unauthorised (or at least impactful) activities use the fire breaks to gain access to areas of both the reserves to undertake recreational activities or gain access to the motocross track, to the north of the Gogulgar Bilya/Avon River Reserve. The firebreaks and access roads within the reserves are actively managed by the Shire. However, the unofficial bike trials are only maintained by members of the local community or other users, and this is not condoned by the Shire.

The presence of these unofficial bike trials and the open vehicle access has contributed to the declining health of the vegetation within the reserve. This has mainly been through the soil compaction, damage to vegetation and fauna habitat and dumping. These activities also have the potential to introduce or spread *Phytophthora Dieback* through the reserves. There has also been anecdotal evidence of these activities resulting in damage to environmentally and culturally sensitive areas such as trafficable granite outcrops on Wongborel/Mt Brown Reserve.

The Shire is proposing the development of a biking/walking trail network through both reserves and the York township to facilitate controlled access of the site. The network will consist of 12 mountain biking/walking trails of varying difficulties in the Wongborel/Mt Brown Reserve as well as three multi-use trails through the Gogulgar Bilya/Avon River Reserve.

4.1.2. Visitors Activities

The primary activities conducted within the reserves are associated with recreation, however, some commercial/utility activities also occur within the Wongborel/Mt Brown Reserve. These come in the form of water tanks and pipeline infrastructure located in the south-western corner of the reserve.

Mountain biking and bushwalking/running are the primary recreational activities that are undertaken within the Gogulgar Bilya/Avon River and the Wongborel/Mt Brown Reserves. Officially, these activities are to occur along the bushfire management trails, firebreaks and access roads. However, as mentioned in the previous section, there are approximately 12 km of unofficial bikes tracks through the Wongborel/Mt Brown Reserve which locals and tourists use for mountain biking. The presence of these tracks and the undertaking of activities along them is not condoned by the Shire. As discussed above the Shire is proposing the development of a biking/walking trail network through both reserves and the York township.

The reserves also include several ‘day-use sites’ which provide opportunities for visitors to rest from the more active recreational activities. These ‘day-use sites’ includes facilities for visitors to picnic and/or and barbeque. The ‘day-use site’ within the Gogulgar Bilya/Avon River Reserve possess a nature playground and skatepark which were redeveloped in mid-2022 to entice families with young children to visit the area (Plate 4-1). The Wongborel/Mt Brown Reserve possesses picnic and lookout areas which provide visitors with locations to enjoy a picnic in a natural setting and enjoy spectacular views (Plate 4-2). The Picnic area within the reserve also includes a memorial tree grove, which was organised between the Shire and the Men of the Trees organisation (**Error! Reference source not found.**). The grove is a place where people could plant a tree, of varying species, in memory of lost family members. Until recently there has been an absence of guidelines around the management of this area, which has resulted in personal plaques and memorabilia being erected throughout the grove, which is opposed by the Shire.



Plate 4-1: The Skatepark (Left) and native Playground (Right) 'Day-Use Site' within the Gogulgar Bilya/Avon River Reserve



Plate 4-2: Picnic Area (Left) and Lookout (Right) 'Day-Use Site' within the Wongborel/Mt Brown Reserve



Plate 4-3: Memorial Tree Grove in the Wongborel/Mt Brown Reserve

In conjunction with the development of a biking/walking trail network, the Shire is proposing to reinvigorate the Wongborel/Mt Brown Reserve Picnic Area and Lookout (Common Ground 2022). The York trial network concept plan proposes that additional barbeque and picnic shelters are constructed within the Picnic Area as well as a purpose-built mountain biking skills park. The Lookout Area is also proposed to undergo a significant upgrade with the construction of new shelters and connecting trails as well as the installation of educational and trail location signage. The plan also proposes that new car parks are constructed for each of these areas. These redevelopments facilitate the continual use of the site, but they also aim to help restrict the extent of the impacts within the reserves to known areas, which can be targeted for ongoing management.

4.2. Management

The following sections outline the management objectives and outcomes for the management of visitor access and activities within the Gogulgar Bilya/Avon river and Wongborel/Mt Brown reserves. These two considerations are intricately linked and as such, they will be discussed in conjunction throughout this section.

The following sections outline the management objectives and outcomes for each of the management considerations. Each objective has been allocated a letter and number code, with the letter identifying its corresponding management consideration, i.e. V = Visitor Management.

The sections also provide recommendations for implementation and monitoring actions to achieve their related objectives as well as the most suitable timing within which these actions should be undertaken. Some actions must be undertaken at certain times of the year or before/after other management actions have been undertaken. It is noted that some of the recommendations are mutually beneficial for some of the environmental considerations.

Priority rankings have also been assigned to each of the recommended management actions to assist in the Shire’s decision-making process for the execution of the plan. The priority ranking system is based on the definitions provided in Table 2-8.

4.2.1. Visitor Access & Activities

The primary focus for visitor management within the reserves should be finding a balance between allowing people to undertake their preferred recreational activities as well as protecting the existing environment from the significant impacts associated with them. The implementation of the trail network plan will provide visitors with a systematic way of identifying areas suitable for their preferred recreational activities which are permitted in the given reserve. However, the trail plan must be continually amended to ensure that it avoids impacting any areas which have been identified as being environmentally and/or culturally significant as a result of subsequent environmental assessments, surveys and/or advice of Ballardong Elders. These areas include the granite outcrops within the Wongborel/Mt Brown Reserve as well as the pools and secondary channels present within the Gogulgar Bilya/Avon River Reserve.

The objective and the associated desired outcomes for the management of visitors within the reserves have been presented in Table 4-1.

Table 4-1: Visitor Management Objectives and Outcomes

Objective No.	Objectives	Outcomes
V1	To provide a range of sustainable recreational opportunities that minimise environmental impact while maximising social and economic benefits for the Shire.	<ul style="list-style-type: none"> • Visitors are informed and educated on the environmental and cultural values present within the reserves. • Permitted activities occur in such a manner and location that minimises the impact on the surrounding environment.

To achieve these objectives and outcomes Table 4-2 presents recommended management actions. The table also presents the recommended timing for these actions as well as their overall priority in relation

to all the other management actions presented in this Management Plan. The definitions for each of the priority tiers are presented in Table 2-8Error! Reference source not found..

Table 4-2: Recommended Visitor Management Actions

Objective No.	Action No.	Management Recommendations	Timing	Priority
V1	1	Review and revise the trail concept plan, prior to implementation, based on any subsequent environmental assessments or surveys and consultation with Ballardong Elders and the local community.	Prior to implementation of trail concept plan	High
V1	2	Removal or realignment of tracks within the trail network plan to avoid environmentally and culturally significant areas as far as practicable. This should be advised by suitability qualified experts or local knowledge holders.	Prior to implementation of trail concept plan	High
V1	3	Utilisation of the existing fire breaks and access tracks as far as practicable within the reserves in preference to the construction of new tracks or redevelopment of existing unofficial tracks	Prior to implementation of trail concept plan	High
V1	4	Reduce the number of official and unofficial tracks within the reserve as far as practicable without diminishing the usability of the reserves for recreational activities.	Prior to implementation of trail concept plan	High
V1	5	Ensure waste management within the reserves is maintained at the current high level.	As required	High
V1	6	Installation of natural or artificial barriers where the unofficial tracks intersect with the firebreaks / access tracks and new tracks developed to prevent the access to bike tracks.	Post trial plan implementation complete	Medium
V1	7	Revegetate decommissioned tracks or the unofficial tracks which will not be incorporated into the trail concept plan.	Post trial plan implementation complete	Medium
V1	8	Installation of natural or artificial barriers at unofficial vehicle access points and the installation of gates at official vehicle access points to limited unauthorised access to access tracks.	As required	Medium
V1	9	Develop and implement an asset management system to ensure maintenance of all existing facilities (ablutions, tracks, barbeques, shelters etc.)	As required	Medium
V1	10	Installation and maintenance of labelled maps of trails to ensure safety of walkers and emergency vehicles	As required	Medium
V1	11	Install warning signs along very steep sections of trails in accordance with AS2156.1-2001.	As required	Medium
V1	12	Installation of speed and animal hazard signage along Pioneer Road	As required	Medium
V1	13	Update maps and brochures with changes to access and infrastructure throughout the reserves once facility and trail redevelopment have been completed.	As required	Low

Objective No.	Action No.	Management Recommendations	Timing	Priority
V1	14	<p>Installation of educational signage at appropriate areas within the reserves, including but not limited to entrances, picnic areas and significant areas. These may include information on the following:</p> <ul style="list-style-type: none"> • Environmental values. • Cultural values. • History. • Prohibited activities. • Pests, diseases, and weeds. • Revegetation programs. 	As required	Low
V1	15	<p>Installation of boundary fencing along the correct boundary alignments of the reserves. These fences should be effective in prohibiting unauthorised access of vehicles, whilst maintaining the visual amenity of the site.</p>	As required	Low

5. Understanding Country

5.1. Current Knowledge Gaps and Future Survey/Study Opportunities

Throughout this document, gaps in the current level of knowledge about the Wongborel/Mt Brown and Gogulgar Bilya/Avon River Reserves have been identified and potential opportunities to address them proposed. This section consolidates these findings and presents them in Table 5-1.

Table 5-1: Current Knowledge Gaps and Future Survey/Study Opportunities

Management Topics	Current Knowledge Gaps	Future Survey/Study Opportunities	Approximate Costings
Weeds	Lacks adequate weed species inventory and mapping within the reserves.	Undertake a baseline weed mapping study	~\$25,000
	Lacks adequate information on the most appropriate weed management techniques.	Undertake consultation with suitability qualified contractors and undertake trial program.	
Native Flora and vegetation	Lacks adequate baseline flora and vegetation information for both reserves, including occurrence/likelihood of threatened/priority flora and ecological communities within the reserves.	Undertake detailed and targeted terrestrial flora and vegetation surveys within the Wongborel/Mt Brown and Gogulgar Bilya/Avon River Reserves.	~\$60,000
	Lacks adequate information on the most appropriate revegetation techniques for the reserves.	Undertake consultation with suitability qualified contractors and undertake trial program.	
	Lack of site specific revegetation species	Undertake a general inventory of the local species and note propagation success of species during revegetation trials.	NA
Native Fauna and Habitat	Lack of adequate baseline aquatic and terrestrial fauna and fauna habitat data within both reserves, including occurrence/likelihood of threatened/priority fauna species as well as significant habitat areas.	Conduct detailed and targeted terrestrial fauna surveys within the Wongborel/Mt Brown and Gogulgar Bilya/Avon River Reserves.	~\$70,000
		Conduct a detailed aquatic fauna survey within the Gogulgar Bilya/Avon River Reserve.	~\$40,000
Disease	Lack baseline Phytophthora Dieback mapping within the Gogulgar Bilya/Avon River Reserve.	Conduct a detailed Phytophthora Dieback survey within the Gogulgar Bilya/Avon River Reserve.	~\$15,000
Bushfire	Lack of adequate information on appropriate burning intervals, seasons, and species response to fire.	Undertake detailed and targeted terrestrial flora and vegetation surveys within the Wongborel/Mt Brown and Gogulgar Bilya/Avon River Reserves.	As above

Management Topics	Current Knowledge Gaps	Future Survey/Study Opportunities	Approximate Costings
		Consultation with traditional owners and DFES representatives and undertake trials.	NA
Disturbance	Lack of adequate information on the current location of erosion prone areas within the reserves.	Conduct mapping or field investigation to identify erosion prone areas within the reserves.	NA
Visitors	Lack of adequate mapping on all the unofficial bike trails within the reserves.	Conduct field investigations and mapping of unofficial bike trails locations within the reserves.	NA
	Lack of information on the required access points within the reserves.	Conduct field investigations and mapping of key access locations within the reserves.	NA
European and Other Cultural Heritage	Lack of information for recently discovered 'Well' structure within the Gogulgar Bilya/Avon River Reserve.	Conduct archaeological/heritage surveys	~\$20,000

6. Management Plan Evaluation

The implementation of this Management Plan is one part of an adaptive planning process. An adaptive planning process considers new technologies new information and knowledge and changing circumstances. Progress of the Management Plan implementation should be monitored and evaluated to ensure that works are on track to achieving the objectives. If the results of monitoring and evaluation found that the objectives are not being met, then changes to the recommendations (and/or objectives) may be required.

6.1. Management Plan Status Check

It is recommended that the implementation status of the recommendations in the Management Plan are checked every 12 months from the commencement of the Management Plan. This check will determine the status of the recommendations against the following categories:

- Implemented.
- Partially implemented or on track.
- Not yet implemented.
- No longer relevant.

The latter category may require review and changes to the recommendations (and/or objectives). Monitoring of the implementation of the plan is to be undertaken by the Shire.

6.2. Management Plan Review

An overall review of the Management Plan should be carried out every ten years. The review will consider the cause of any recommendation not being implemented or objectives not being met. The review of findings that will inform the preparation of the next management plan. The review should also include, but not be limited to the following terms of reference:

- Determine the status of the knowledge gaps within the existing Management Plan.
- Determine the cause of the knowledge gaps not being filled.
- Consider each recommendation and its implementation status.
- Determine the cause of recommendations not yet implemented.
- Evaluate the performance of each recommendation in relation to objectives it was intended to achieve.
- Determine the cause of objectives not being achieved.

The review will also make recommendations regarding any changes to be considered during the preparation of the next management plan.

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8. Appendices

Appendix A : General Revegetation Principles

OVERVIEW

Revegetation in Wongborel/Mt Brown and Gogulgar Bilya/Avon River Reserves will enhance biodiversity values within the bushland. The following sections outlines general revegetation principles which provide a guide when undertaking related activities. These general revegetation principles should be confirmed with a qualified revegetation contractor, following the completion of site-specific survey requirements discussed in Section 2.

Revegetation should be carried out over a ten-year period, including all activities associated with:

- Seed or seedlings collection/sourcing.
- Implementation of planting.
- Monitoring and maintenance.

SITE PREPARATION

Weed Management

Weeds compete with young seedlings for moisture and nutrients and as such it is critical for early (i.e. up to 2 years prior to planting) and targeted weed control to be conducted to achieve successful revegetation. Three stages influence seedling survival and growth (White and Mullan 2006):

1. A weed-free area prior to planting allows more soil moisture to be stored for the seedling and can assist with site preparation.
2. All weeds present at the time of planting will use moisture and may even smother seedlings.
3. Control of late-germinating weeds is necessary to prevent competition with seedlings in a crucial stage of development.

Once planting has been completed weed management within the revegetation areas should continue as part of annual weed control activities and maintained for the duration of this Management Plan. Weed control should be undertaken in line with the general methodology outlined below or as directed by a suitably qualified contractor.

1. Applying a broad-spectrum herbicide to kill existing competitive plants and prevent seed set (avoid areas of native grass) – ideally up to two years prior to planting.
2. A follow-up application in the autumn prior to planting.
3. A third spray applied 6-10 weeks (or as advised by weed control specialist) after the second spray to control opportunistic weeds – subject to seasonal conditions this spray round may coincide with the next (4th) stage.
4. A final spray just before planting. If using residual chemicals, follow the 25:25 rule – wait 25 days after application or wait for 25 mm of rain before planting (or seeding). The final spray

may also include other chemical applications, such as insecticide for the control of red-legged earth mite or lucerne flea.

5. A fifth spray with a grass-specific herbicide will likely be necessary 6-12 months after planting to control developing grass competition with establishing shrubs and trees.

A combination of knockdown (e.g. glyphosate) and residual (e.g. simazine) herbicides will be used as advised by the weed control contractor. Selective herbicides may also be required for problem/persistent weeds.

Access Management

Access to the revegetation sites should be controlled as much as practicable to minimise the disturbance to the site. The most effective method is the construction of temporary fencing around the revegetation sites, with appropriate gates to allow for site works, maintenance, and monitoring to be conducted. The fencing should be of a suitable quality to restrict access to the public as well as grazing fauna species, such as stock exclusion fencing and locked gates. Sufficient signage should also be erected around the revegetation site to explain its purpose and the need for restrictions.

Soil Preparation and Erosion Control

The aim of undertaking soil preparation for a revegetation site is to produce loose, well-drained and aerated soils which are suitable for the establishment of seeds and seedlings. The most common techniques are deep ripping, mounding and furrow lining; however, there is likely to be limited areas available to apply these techniques given they generally require large machinery and the high potential for disturbance of existing native plants, as well as potential to cause or exacerbate erosion (any ripping or similar on slopes should follow hill contours). Each technique has its own benefits and limitations, and their suitability will vary from area to area. It is recommended that a qualified contractor is consulted about the most appropriate technique for a given site prior to any soil preparation being undertaken.

If the revegetation area is likely to be highly impacted by erosion, as a result of its occurrence on steep slopes, preferential flow lines or in areas with minimal over-story species, the implementation of erosion control is recommended. Erosion controls may include the placement of appropriate geotextiles over larger areas, hessian sacks around planted vegetation, the placement of logs throughout the revegetation site, the use of rock chutes, the installation of silt fencing or the application of mulch. All of these options help to protect the soil or give it structure to resist its erosion by wind or water.

Cultural Burning

Fire is a natural process in Western Australia that many of the native flora species have adapted. Aboriginal peoples including those of the Noongar nations such as the Ballardong have used fire to regulate and manage the health of land and water for countless generations. The incorporation of cool burning of proposed revegetation sites can help with the reduction of weeds and stimulate the germination of dormant seeds within the soil bank or plants to reshoot depending on their ecology (DEW [SA] 2021). Burns can also help with the formation of hollows and increase the number of hollow logs.

Pre-revegetation burning must be used with caution as it can also have detrimental effects if not managed correctly. Disturbance caused by fire can result in a positive response from weed species which can suppress the germination of natives. Additionally, exposed soil post burning can lead to increased erosion, and increased grazing from feral and native herbivores due to the presence of new growth, that may also impact native seedlings (planted or from natural recruitment from the soil seed bank).

To maximise the benefits of fire on revegetation sites and minimising its potential threats the following recommendations are made:

1. Erosion control is implemented in areas susceptible to erosion such as preferential flow lines and steeply sloped areas. These controls can include mulch, silt fencing, geotextiles, hessian mats, rocks, or logs.
2. Post-fire weed control (if fire is conducted post the commencement of revegetation, then a targeted method of weed control should be utilised as a broadscale method is likely to have detrimental effects on the native vegetation).
3. Installation of fencing to prevent herbivores (feral and native) from entering into the revegetation area.

PLANTING AND ESTABLISHMENT TECHNIQUES

Tubestock

The utilisation of tubestock is recommended over other planting options as it generally has a higher survival rate than other methods. Where possible, tubestock should be propagated from provenance seed collected using a Nursery Industry Accreditation Scheme (NISA) accredited nursery. Tubestock should be appropriately prepared, hardened and be free from pests and diseases, such as Phytophthora Dieback. In areas that cannot be appropriately fenced to prevent the access of grazing fauna, it is recommended that plastic or shade cloth tree guards should be installed around the seedlings.

Direct Seeding

Direct seeding is also an option and is usually more economical, however, this method can have low success rates. Direct seeding does however create a more natural mix of species from the various structured layers compare to planting (Shire of Mundaring 2016).

Natural Regeneration

Alternatively, in areas that retain basic structure, generally along the Avon River, but are currently impacted by disturbances, the potential for natural regeneration may be possible. In particular, areas which are in good condition may be able to return to a better state by removing the removal of disturbances, such as weeds.

Natural vegetation regeneration should be encouraged through weed management as outlined in Section 2.2.1 (i.e. focusing on areas of higher quality and working outwards; Bradley 1971), to allow vegetation to re-establish itself and maintain species diversity. This method is preferable as the benefits of protecting existing vegetation far outweigh those of establishing new vegetation in previously cleared areas (Australian Association of Bush Regeneration 2017).

Instances, where this approach may not be successful, are areas affected by long-term disturbances or where most species (including soil-stored seed) have been removed, such as many sites on Wongborel/Mt Brown. Revegetation using locally native species within these areas is likely to be necessary to reinstate the native vegetation and habitat (Office of Environment and Heritage 2017; DEC 2012).

It is therefore recommended to firstly assist natural regeneration (i.e. through weed control and/or revegetation) in better condition areas based on vegetation condition mapping and to secondly undertake revegetation in areas that are Degraded or Completely Degraded.

Habitat Creation and Enhancement

The revegetation of an area should also consider including species and features which will support native fauna species. Examples of approaches to achieve this include, using shrub and understorey species that provide a dense understorey and cover for ground-dwelling fauna, such as Echidnas. Placement of hollow logs throughout revegetation areas should be included to provide habitat for ground-dwelling fauna species. Additionally, the species mix should include species that provide foraging habitat for an array of species, including species to support the conservation of black cockatoos.

TIMING

The relative timing of the various elements of revegetation is provided in Table 8-1:

Table 8-1: Relative timings for revegetation

Revegetation Activity	Timings
Initial weed management	Late Autumn (2 years prior to planting/seeding) For optimal results, this should commence a maximum of two years prior to revegetation activities being undertaken. Should be undertaken on an annual or bi-annual basis as recommended by a suitably qualified contractor.
Soil Preparation	Late Summer (year of planting/seeding) Only to be undertaken if a suitably qualified contractor believes this is required for the given revegetation site.
Cultural burning	Early Autumn (year of planting/seeding) Or as guided by Ballardong Elders with the support of DFES.
Second weed spraying	Early Autumn (year of planting/seeding) This round of weed management should focus on preemergent herbicide application.
Installation of fences and signage	Early Autumn (year of planting/seeding) The signage and fencing should be installed once the pre-revegetation weed management has been undertaken but before planting/seeding has commenced.
Third weed spraying	Late Autumn (year of planting/seeding)
Direct seeding	Late Autumn Seedling planting should commence after the first rains of the year have passed through and the soil moisture level has increased from the summer months.

Revegetation Activity	Timings
Seedling planting	(Late Autumn to) Early Winter to Mid-Winter Planting commences after the first rains of the year have passed through and the soil moisture level is adequate to ensure seedling establishment.
Maintenance – site	Continuously The fences, erosion control mechanisms and signage should be maintained regularly throughout the year.
Maintenance – infill planting	Late Autumn to Early Winter (subsequent years after revegetation) Infill planting should occur every year after the commencement of revegetation until the vegetation establishes, and the community becomes self-sustaining.
Monitoring	Late Spring (subsequent years after revegetation) Monitoring should occur once every year at the same time of year to get an accurate representation of the sites progress.

SUGGESTED SPECIES COMPOSITION

The species composition in each of the areas recommended for revegetation should be derived from the original vegetation complexes which would have occurred naturally within the revegetation site. Although it may not be practicable to re-introduce all species once present in these vegetation complexes, the selection of species should allow for the re-establishment of each structural layer of the vegetation complex. Where possible integrate species with a range of flowering times and types to support a wide range of fauna species, such as black cockatoos, Chuditch, Rakali and Red-tailed Phascogale. Other species may be considered essential to include in the species mix as they have cultural importance, as advised by Ballardong Elders, for example bush tucker species. Suggested species for the Wongborel/Mt Brown Reserve and Gogulgar Bilya/Avon River Reserve are provided in Table 8-2 and Table 8-3 respectively, however these should be confirmed following the completion of detailed flora and fauna studies, in consultation with the revegetation contractor.

MONITORING

It is recommended that permanent markers are installed at each revegetation site and use photo monitoring to assess the success of each revegetation site. This should be done initially at the time of planting, and then on an ongoing annual basis. The GPS location of each photo monitoring point should be recorded to be used as the location for all subsequent years of photo monitoring. On-going photo monitoring will inform future management of the revegetation sites and any evidence to support revisions required for the overall revegetation strategy.

If any areas are identified as being suitable for a natural regeneration approach, then these should be surveyed annually to monitor the recovery success of species richness and diversity.

Table 8-2: Suggested Species for Inclusion in Revegetation for areas in Wongborel/Mt Brown Reserve.

Plant Type	Scientific Name	Common Name	Source
Tree	<i>Acacia acuminata</i>	Jam Wattle	DPIRD, 1994
Tree	<i>Allocasuarina huegeliana</i>	Rock Sheoak	DPIRD, 1994
Tree	<i>Eucalyptus loxophleba</i>	York Gum	DPIRD, 1994
Tree	<i>Santalum acuminatum</i>	Quandong	DPIRD, 1994
Tall Shrub (>2m)	<i>Acacia lasiocalyx</i>	Silver Wattle	DPIRD, 1994
Tall Shrub (>2m)	<i>Acacia microbotrya</i>	Manna Wattle	DPIRD, 1994
Tall Shrub (>2m)	<i>Hakea preissii</i>	Needle Tree	DPIRD, 1994
Tall Shrub (>2m)	<i>Melaleuca hamata</i>	NA	Brassington, D. Pers Comms
Shrub (1-2m)	<i>Acacia pulchella</i>	Prickly Moses	DPIRD, 1994
Shrub (1-2m)	<i>Allocasuarina campestris</i>	NA	DPIRD, 1994
Shrub (1-2m)	<i>Allocasuarina humilis</i>	Dwarf Sheoak	DPIRD, 1994
Shrub (1-2m)	<i>Calothamnus quadrifidus</i>	One-sided Bottlebrush	DPIRD, 1994
Shrub (1-2m)	<i>Gastrolobium spinosum</i>	Prickly Poison	DPIRD, 1994
Shrub (1-2m)	<i>Grevillea paniculata</i>	NA	DPIRD, 1994
Shrub (1-2m)	<i>Grevillea pilulifera</i>	Woolly-flowered Grevillea	DPIRD, 1994
Shrub (1-2m)	<i>Hakea prostrata</i>	Harsh Hakea	DPIRD, 1994
Shrub (1-2m)	<i>Hypocalymma angustifolium</i>	White Myrtle	Brassington, D. Pers Comms

Plant Type	Scientific Name	Common Name	Source
Shrub (1-2m)	<i>Mirbelia ramulosa</i>	NA	DPIRD, 1994
Shrub (1-2m)	<i>Leptospermum erubescens</i>	Roadside Teatree	DPIRD, 1994
Shrub (1-2m)	<i>Templetonia sulcata</i>	Centipede Bush	Brassington, D. Pers Comms
Shrub (1-2m)	<i>Trymalium ledifolium</i>	NA	Brassington, D. Pers Comms
Small Shrub (<1m)	<i>Acacia erinacea</i>	NA	Brassington, D. Pers Comms
Small Shrub (<1m)	<i>Acacia horridula</i>	NA	Brassington, D. Pers Comms
Small Shrub (<1m)	<i>Allocasuarina microstachya</i>	Na	Brassington, D. Pers Comms
Small Shrub (<1m)	<i>Atriplex semibaccata</i>	Berry Saltbush	Brassington, D. Pers Comms
Small Shrub (<1m)	<i>Bossiaea eriocarpa</i>	Commo Brown Pea	Brassington, D. Pers Comms
Small Shrub (<1m)	<i>Dampiera lavandulacea</i>	NA	Brassington, D. Pers Comms
Small Shrub (<1m)	<i>Dodonaea viscosa subsp. angustissima</i>	NA	DPIRD, 1994
Small Shrub (<1m)	<i>Enchylaena tomentosa</i>	Barrier Saltbush	Brassington, D. Pers Comms
Small Shrub (<1m)	<i>Gastrolobium parvifolium</i>	Berry Poison	Brassington, D. Pers Comms
Small Shrub (<1m)	<i>Hakea lissocarpha</i>	Honey Bush	Brassington, D. Pers Comms
Small Shrub (<1m)	<i>Hibbertia exasperata</i>	NA	Brassington, D. Pers Comms
Small Shrub (<1m)	<i>Kennedia prostrata</i>	Running Postman	DPIRD, 1994
Rush	<i>Lomandra effusa</i>	Scented Matrush	Brassington, D. Pers Comms

Table 8-3: Suggested Species for Inclusion in Revegetation for areas in Gogulgar Bilya/Avon River Reserve

Plant Type	Scientific Name	Common Name	Source
Tree	<i>Casuarina obesa</i>	Swamp Sheoak	DPIRD, 1994
Tree	<i>Eucalyptus loxophleba</i>	York Gum	DPIRD, 1994
Tree	<i>Eucalyptus rudis</i>	Flooded Gum	DWER, 2001
Tree	<i>Eucalyptus sargentii</i>	Salt River Gum	DWER, 2001
Tree	<i>Melaleuca preissiana</i>	Stout Paperbark	DPIRD, 1994
Tree	<i>Melaleuca raphiophylla</i>	Swamp Paperbark	DPIRD, 1994
Tall Shrub (>2m)	<i>Acacia merrallii</i>	Merrall's Wattle	DWER, 2001
Tall Shrub (>2m)	<i>Acacia microbotrya</i>	Manna Wattle	DWER, 2001
Tall Shrub (>2m)	<i>Callistemon phoeniceus</i>	Lesser Bottlebrush	DWER, 2001
Tall Shrub (>2m)	<i>Hakea preissii</i>	Needle Bush	DWER, 2001
Tall Shrub (>2m)	<i>Melaleuca acuminata</i>	NA	DWER, 2001
Tall Shrub (>2m)	<i>Melaleuca hamulosa</i>	NA	DWER, 2001
Tall Shrub (>2m)	<i>Melaleuca lateriflora var. lateriflora</i>	NA	DWER, 2001
Tall Shrub (>2m)	<i>Melaleuca thyoides</i>	Salt Lake Honey Myrtle	DWER, 2001
Tall Shrub (>2m)	<i>Melaleuca uncinata</i>	NA	DWER, 2001
Tall Shrub (>2m)	<i>Melaleuca viminea</i>	Mohan	DWER, 2001
Shrub (1-2m)	<i>Atriplex amnicola</i>	River Saltbush	DWER, 2001

Plant Type	Scientific Name	Common Name	Source
Shrub (1-2m)	<i>Atriplex bunburyana</i>	Silver saltbush	DWER, 2001
Shrub (1-2m)	<i>Atriplex nummularia</i>	Old Man Saltbush	DWER, 2001
Shrub (1-2m)	<i>Atriplex paludosa</i>	Marsh Saltbush	DWER, 2001
Shrub (1-2m)	<i>Atriplex stipitata</i>	Kidney Saltbush	DWER, 2001
Shrub (1-2m)	<i>Atriplex vesicaria</i>	Bladder Saltbush	DWER, 2001
Small Shrub (<1m)	<i>Atriplex semibaccata</i>	Creeping Saltbush	DWER, 2001
Small Shrub (<1m)	<i>Enchylaena tomentosa</i>	Ruby Saltbush	DWER, 2001
Small Shrub (<1m)	<i>Maireana brevifolia</i>	Bluebush	DWER, 2001
Small Shrub (<1m)	<i>Frankenia paucifolia</i>	Sea heath	DWER, 2001
Small Shrub (<1m)	<i>Rhagodia spinescens</i>	Spring Saltbush	DWER, 2001
Small Shrub (<1m)	<i>Salicornia blackiana</i>	NA	DWER, 2003
Small Shrub (<1m)	<i>Tecticornia halocnemoides</i>	Shrubby Samphire	DWER, 2003
Small Shrub (<1m)	<i>Tecticornia lylei</i>	NA	DWER, 2003
Small Shrub (<1m)	<i>Tecticornia indica</i> subsp. <i>bidens</i>	NA	DWER, 2003
Small Shrub (<1m)	<i>Tecticornia lepidosperma</i>	NA	DWER, 2003
Sedge	<i>Baumea juncea</i>	Bare Twig-rush	DWER, 2000
Sedge	<i>Chorizandra enodis</i>	Black Bristlerush	DWER, 2000
Sedge	<i>Cyprus gymnocaulos</i>	Spiny flat sedge	DPIRD, 1994

Plant Type	Scientific Name	Common Name	Source
Rush	<i>Bolboschoenus caldwellii</i>	Marsh club rush	DPIRD, 1994
Rush	<i>Hopkinsia anoetocolea</i>	NA	DWER, 2000
Rush	<i>Juncus pallidus</i>	Pale Rush	DWER, 2000
Rush	<i>Lepyrodia glauca</i>	NA	DWER, 2000
Grasses	<i>Agrostis avenacea</i>	Blown Grass	DWER, 2003
Grasses	<i>Rytidosperma caespitosum</i> (Wallaby Grass	DWER, 2003
Grasses	<i>Enteropogon acicularis</i>	Curley Windmill Grass	DWER, 2003
Grasses	<i>Eragrostis australasica</i>	Canegrass	DWER, 2003
Grasses	<i>Eragrostis dielsii</i>	Mallee Lovegrass	DWER, 2003
Grasses	<i>Leptochloa fusca</i>	Brown Beetle Grass	DWER, 2003
Grasses	<i>Polypogon tenellus</i>	NA	DWER, 2003
Grasses	<i>Puccinellia stricta</i>	Marsh Grass	DWER, 2003
Grasses	<i>Sporobolus virginicus</i>	Marine Couch	DWER, 2003
Aquatic herb	<i>Ruppia polycarpa</i>	Water weed	DPIRD, 1994

