



Iluka Resources Limited

WIM100

Cultural Heritage Assessment

July 2018

Executive summary

Iluka Resources Limited (Iluka) Murray Basin Operations include mining, processing, transport, storage and shipping of minerals sand products. Iluka currently holds two exploration licences (EL) over the WIM100, WIM50 and Goschen South areas (VIC) that host fine-grained mineral sand deposits. These fine-grained mineral sand deposits have not previously been developed. Optimised resource and reserve boundaries have been or are being developed based on drilling results, however further work is required to determine whether a mining proposal will be developed for the deposits.

Iluka has commissioned GHD to prepare stand-alone desktop Cultural Heritage Assessments (CHA) for the three study areas to inform future field survey and the selection of the preferred deposit. Future impact assessments will be undertaken should selection of the deposits progress into the approvals stage. This CHA has been prepared to provide information and advice on heritage considerations for potential Murray Basin Operations within the WIM 100 study area.

Legislative and non-legislative considerations for the project have been assessed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), *Planning and Environment Act 1987*, *Aboriginal Heritage Act 2006* and *Heritage Act 2017*. This CHA has been undertaken to a desktop level only and does not constitute an approval under the Acts identified above.

This report is subject to, and must be read in conjunction with, the limitations set out in section 1.5 and the assumptions and qualifications contained throughout the CHA. A summary of findings, recommendations on potential approval requirements and management of heritage risk are presented below in Table 1. This summary is based on the results of the legislative risk assessments undertaken in sections 3 and 4. This section of the report summarises

Table 1 Legislative heritage requirements

Act	Requirements
<i>EPBC Act 1999</i>	It is unlikely approvals for the proposed works would be required under the EPBC Act for heritage matters.
<i>Aboriginal Heritage Act 2006</i>	<p>A mandatory Cultural Heritage Management Plan (CHMP) would likely be triggered under Section 46 of the <i>Aboriginal Heritage Act 2006</i> for a future mining proposal and is considered the most appropriate method to manage Aboriginal heritage risk for the project.</p> <p>The study area is in a Registered Aboriginal Party (RAP) area, the Barengi Gadjin, who would likely choose to evaluate the CHMP.</p> <p>Based on the desktop assessment, the following Aboriginal heritage risks have been identified:</p> <ul style="list-style-type: none"> Red Gum Swamp and its associated lunette are likely to be considered 'no go' areas by Barengi Gadjin due to the known presence of ancestral human remains. However, this will require confirmation with the Barengi Gadjin.

Act	Requirements
	<ul style="list-style-type: none"> • The source bordering dune to the north of the former Jallumba Marsh is likely to be a high risk area, due to the potential for ancestral human remains. • Other areas of moderate archaeological potential are located across large portions of the optimised resource area north and south of Jallumba-Mockinya Road, however previous assessments in the region indicate that Aboriginal cultural material is likely to be low density in nature. • Outside of lunette and source bordering dune areas, the majority of the WIM100 optimised body presents Aboriginal risk that is considered manageable through the CHMP process. As documented above, the Red Gum Swamp lunette landform is likely to be a 'no-go' area. The source bordering dune north of the former Jallumba Marsh will require further investigation to fully understand the constraints of this landform.
<i>Heritage Act 2017</i>	<p>There are currently no registered heritage items in the study area that would trigger approvals for the proposed works under the <i>Heritage Act 2017</i>.</p> <p>However, there are some areas of potential historical heritage that may be impacted by a future mining proposal. It is recommended that if these areas cannot be avoided, a Historical Heritage Assessment (HHA) be undertaken to resolve this risk.</p>
<i>Planning and Environment Act 1987</i>	<p>There are currently no registered heritage items in the study area that would trigger approvals for the proposed works under the <i>Planning and Environment Act 1987</i> for heritage matters.</p>

Table of contents

1.	Introduction.....	1
1.1	Purpose of this report	1
1.2	Study area	1
1.3	Aboriginal stakeholders.....	1
1.4	Proposed works.....	1
1.5	Limitations and assumptions.....	1
2.	Desktop Assessment	4
2.1	Environmental Context.....	4
2.2	Statutory Context.....	8
2.3	Historical Context.....	10
2.4	Archaeological Context.....	16
2.5	Desktop assessment summary.....	23
3.	Aboriginal Cultural Heritage.....	26
3.1	Regulatory triggers.....	26
3.2	Risk assessment.....	29
4.	Historic Cultural Heritage.....	31
4.1	Regulatory triggers.....	31
4.2	Risk assessment.....	31
5.	Summary	32
6.	Bibliography	34

Table index

Table 1	Legislative heritage requirements	i
Table 2	Legislative heritage requirements	32

Figure index

Figure 1	WIM100 Study Area	3
Figure 2	Extent of Upper Miocene to Pliocene marine invasion of the western Murray Basin (Bowler, 2006).	4
Figure 3	WIM100 Geology	6
Figure 4	WIM100 EVC 1750 Mapping.....	7
Figure 5	WIM100 Aboriginal Heritage Constraints.....	9
Figure 6	WIM100 1947 Aerial Map.....	13
Figure 7	WIM100 1963 Aerial Map.....	14
Figure 8	WIM100 Built Features.....	15
Figure 9	WIM100 Aboriginal archaeological predictive modelling	25

1. Introduction

Iluka Resources Limited (Iluka) Murray Basin Operations include mining, processing, transport, storage and shipping of minerals sand products. Iluka currently holds two exploration licences (EL) over the WIM100, WIM50 and Goschen South areas (VIC) that host fine-grained mineral sand deposits. These deposits have not previously been developed. Optimised resource and reserve boundaries have been, or are being, developed based on drilling results, however further work is required to determine whether a mining proposal will be developed for the deposits.

1.1 Purpose of this report

This CHA provides information and advice on heritage considerations for potential Murray Basin Operations within the WIM100 study area. Legislative and non-legislative considerations for the project have been assessed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), *Planning and Environment Act 1987*, *Aboriginal Heritage Act 2006* and *Heritage Act 2017*. This CHA has been undertaken to a desktop level only and does not constitute an approval under the Acts identified above.

1.2 Study area

The study area is approximately 5562 ha in size and straddles the Natimuk-Hamilton Road (Figure 1) north of Toolondo. The east of the study area is largely bounded by Quick Sinclair Russells Road and the west is partially bounded by Clarkes Lane. Outside of road boundaries, the north and south of the study area follows rural property boundaries. The study area is located within the Horsham Rural City Council and predominately consists of rural properties and reserves containing flat plains, sandy ridges, swamps and inundation depressions.

1.3 Aboriginal stakeholders

The Barengi Gadjin Land Council Aboriginal Corporation (Barengi Gadjin) are the Registered Aboriginal Party (RAP) that has been appointed over the study area at the time of issuing this CHA. It is outside of the scope of this CHA to consult with the RAP or other Traditional Owner groups.

1.4 Proposed works

A detailed works plan has yet to be developed but, should they proceed, Murray Basin Operations inside the study area will include mining, processing, transport, storage and shipping of minerals sand products. Any mining operations will predominately focus on an optimised ore body identified by exploratory drilling (refer to Figure 1), this may change over time in response to project economics.

1.5 Limitations and assumptions

This report has been prepared by GHD for Iluka and may only be used and relied on by Iluka for the purpose agreed between GHD and Iluka as set out in section 1.1 of this report.

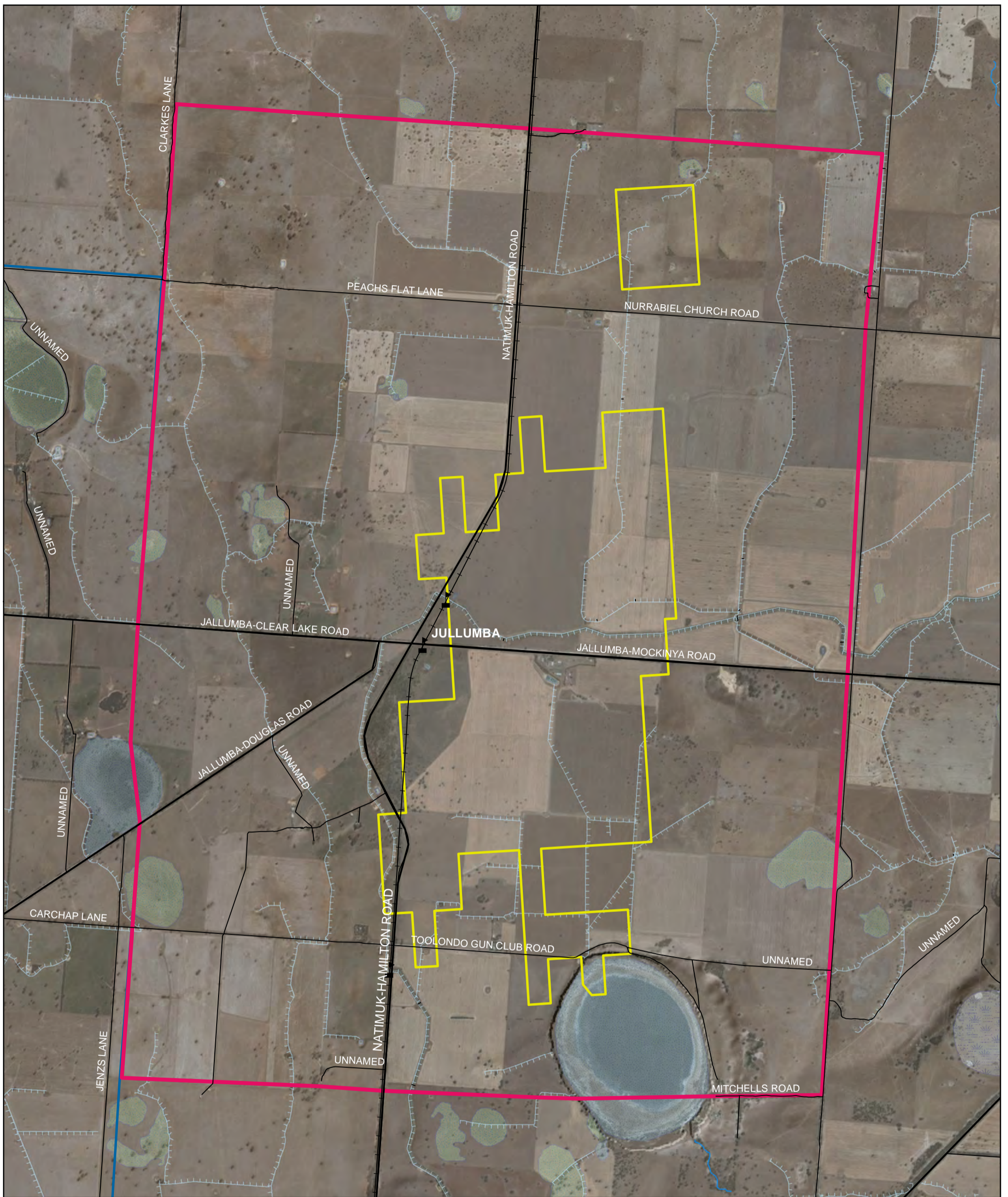
GHD otherwise disclaims responsibility to any person other than Iluka arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

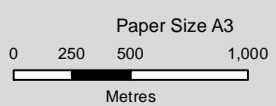
The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Iluka and others (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.



LEGEND



Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 55



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 Murray Basin Operations

WIM100
 Study Area

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Figure 1

2. Desktop Assessment

This desktop assessment examines technical data to establish a high-level cultural, environmental, statutory, archaeological and historic context for the study area. This context is used to understand the potential for built, archaeological and intangible heritage values to be present in the study area and associated legislative obligations and heritage risks for the project.

2.1 Environmental Context

2.1.1 Topography

The study area consists of low-level plains above flood level within a network of lakes, swamps and areas subject to inundation (Agriculture Victoria, 2018). Prominent water features inside the study area include Red Gum Swamp and Jallumba Marsh (Figure 1). Lakes, swamps and inundation areas are typically located in depressions with elevated lunettes or source bordering dunes on their northern and eastern fringes. Drainage channels have significantly altered the size of Jallumba Marsh, which was significantly larger than current mapping indicates. Other major topographical features include a sandy ridge running north to south through the western half of the study area.

2.1.2 Geology and geomorphology

The study is located on the southern end of the Murray Basin, a shallow intracratonic sedimentary basin covering an area of 300,000 km² in southeastern South Australia, southwestern New South Wales and northwestern Victoria (refer to Figure 2). The sedimentary sequence of the basin is the result of repeated marine incursions from the southwest and represents major sequences deposited in the Paleocene - Eocene to Early Oligocene, Oligocene - Middle Miocene, and Late Miocene – Pliocene (Brown, 1990).

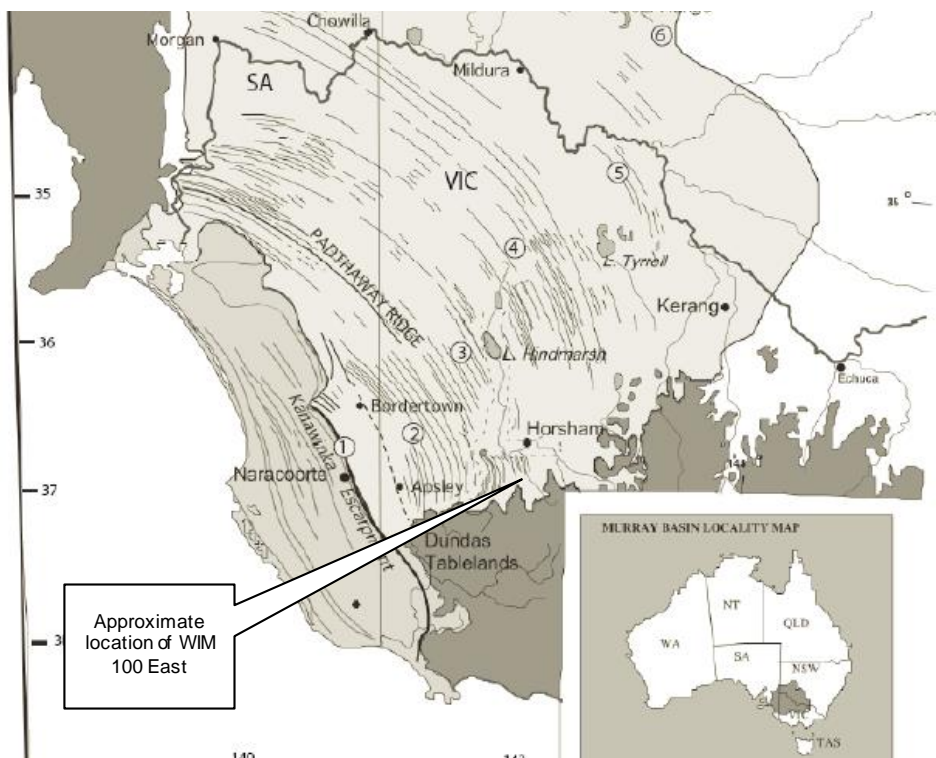


Figure 2 Extent of Upper Miocene to Pliocene marine invasion of the western Murray Basin (Bowler, 2006).

The surface geology of the study area largely consists of the unconsolidated poorly sorted clays, silts, gravels and silty clays of the Shepparton Formation overlying older marine sands, silts, gravels and clays of the Loxton Sand (Brown, 1990) (refer to Figure 3). The Shepparton Formation varies between 5 and 10 m in thickness in the study area, with the interface with Loxton sands being marked by heavy iron induration (Iluka pers comms 2018).

The plains created by these formations include a network of lakes and swamps located in shallow depressions that have built up deposits of grey to black mud, silt, clay and peat (Department of Economic Development, Jobs, Transport and Resources, 2018a). Lunettes or source bordering dunes typically border these depressions to the north and east and vary in size. A larger linear sandy ridge runs north to south through the western portion of the study area. This ridge is part of a larger parallel series of ridges ranging from 10 to 60 m in height, which overlie sandy clays and former lagoonal deposits (Department of Economic Development, Jobs, Transport and Resources, 2018b).

2.1.3 Flora and Fauna

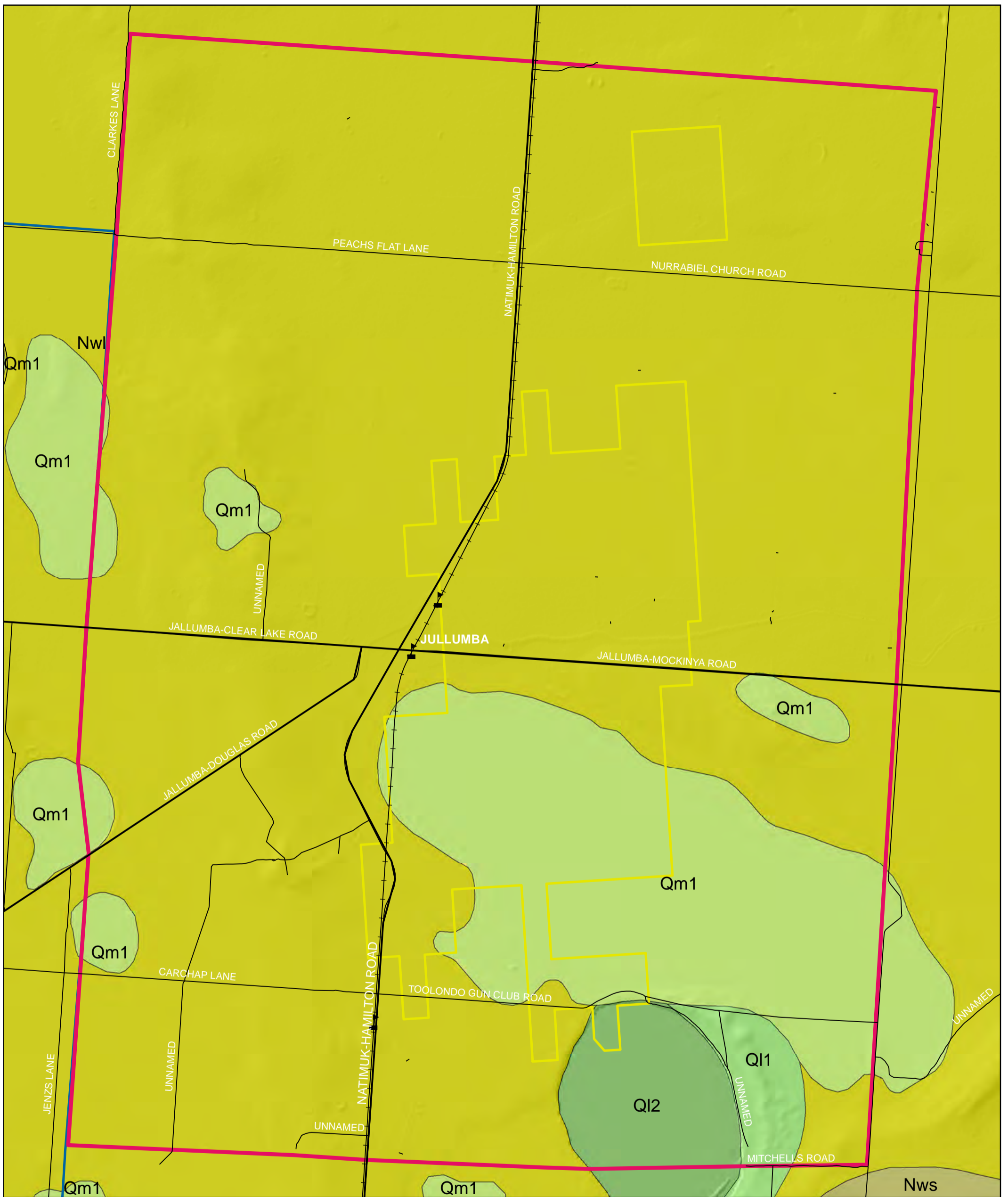
Prior to European settlement and land clearing activities, estimations of 1750 Ecological Vegetation Classes (EVC) indicate that the vegetation of the study area largely consisted of Plains Woodland (EVC 803) and Red Gum Swamp (EVC 292) (Department of Economic Development, Jobs, Transport and Resources, 2018a) (refer to Figure 4). EVC 803 Plains Woodland is described as:

Grassy or sedgy woodland to 15 m tall with large inter-tussock spaces potentially supporting a range of annual or geophytic herbs adapted to low summer rainfall, with low overall biomass. Mostly occurs on terrain of low relief in areas receiving <600 mm rainfall per annum. Fertile, sometimes seasonally waterlogged, mostly silty, loamy or clay topsoils, with heavy subsoils, derived largely from former Quaternary swamp deposits (Department of Sustainability and Environment, 2004).

The major tree species of EVC 803 Plains Woodland include *Eucalyptus leucoxylon* (Yellow Gum), *Allocasuarina luehmannii* (Buloke), *Eucalyptus microcarpa* (Grey Box) and *Eucalyptus melliodora* (Yellow Box), with tree canopy cover being relatively sparse at 15%. EVC 292 Red Gum Swamp is described as:

Occurs on alluvial plains in the seasonally wet depressions of shallow drainage lines or prior stream meanders, typically associated with heavy paludal soils, sometimes with gilgai development. The annual rainfall across its distribution is generally below 700 mm, and the period of inundation may range from 2 to 6 months. River Red Gum woodland to 15 m tall with sedgy or grassy-herbaceous ground-layer, comprising various balances of true aquatics and species tolerant of intermittent to seasonal inundation (Department of Sustainability and Environment, 2004).

The major tree species of EVC 292 Red Gum Swamp Woodland are *Eucalyptus camaldulensis* (River Red-Gum) with tree canopy cover being relatively sparse at 10%. It is observed that unlike other current and former swamps in the study area, EVC 292 does not cover the entirety of Red Gum Swamp, which is mapped as EVC 682 Permanent Open Freshwater.

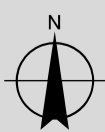


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- | | | | |
|-----------------------------------|--|---|--------------------------------|
| Study area | QI - Undefined lunette and lake deposits | Qm1 - Undefined swamp and lake deposits | Qxm - Molineaux Sand Formation |
| WIM100 East optimised body | QI2 - Undefined lake deposits | QI1 - Undefined lunette deposits | Nwl - Loxton Sand Formation |
| Geological interpretations | Qa1 - Undefined alluvium | Nws - Shepperton Formation | |



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

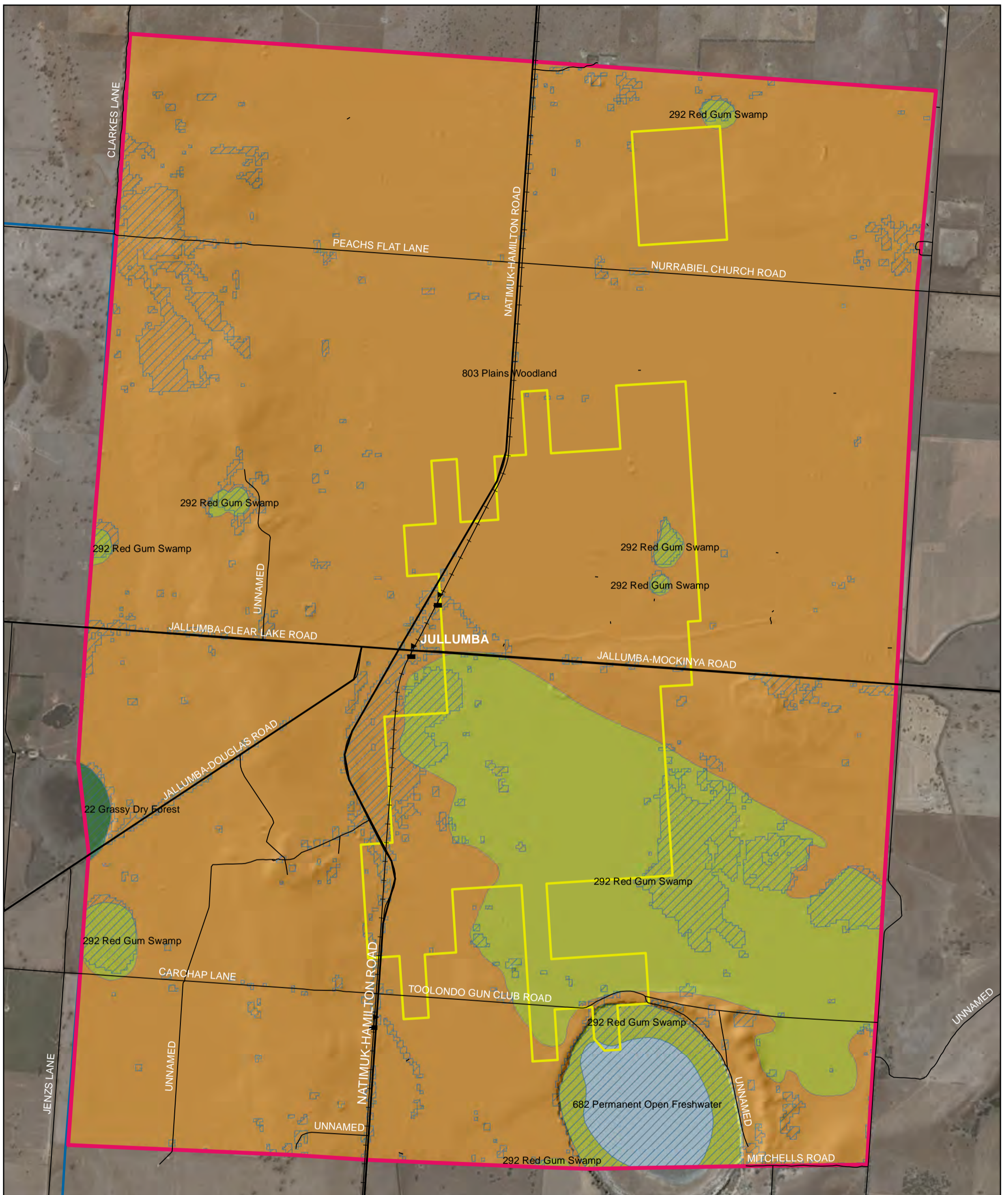


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Murray Basin Operations

**WIM100
Geology**

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Figure 3



LEGEND

- Study area
- WIM100 East optimised body
- 292 Red Gum Swamp
- 682 Permanent Open Freshwater
- 803 Plains Woodland
- 22 Grassy Dry Forest
- Remnant vegetation

Paper Size A3
 0 250 500 1,000
 Metres



Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 55

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**WIM100
 EVC 1750 Mapping**

Figure 4

2.2 Statutory Context

2.2.1 Environment Protection and Biodiversity Conservation Act 1999

Commonwealth requirements in relation to environmental assessment (includes heritage) and management are principally specified in the EPBC Act, which is administered by the Commonwealth Department of the Environment and Energy (DoEE).

The EPBC Act provides for listing of natural, historic or Indigenous heritage values on Commonwealth lands, under Australian Government control or that are of outstanding heritage value. Listings include the World Heritage List (WHL), National Heritage List (NHL) and Commonwealth Heritage List (CHL).

The EPBC Protected Matters Search Tool was accessed on 16 April 2018. There are **no** heritage values registered on the WHL, NHL or CHL within the study area.

2.2.2 Aboriginal Heritage Act 2006

The *Aboriginal Heritage Act 2006* and *Aboriginal Heritage Regulations 2018* stipulate the requirements for the assessment, management and protection of Aboriginal heritage in Victoria. Requirements for assessment and approvals, which are linked with the Victorian planning system and are regulated by Aboriginal Victoria (AV). AV maintains the Victorian Aboriginal Heritage Register (VAHR), which lists sites containing both tangible and intangible Aboriginal cultural heritage values.

The Aboriginal Cultural Heritage Register and Information System (ACHRIS) was accessed on 16 April 2018. There are **three** Aboriginal cultural heritage places registered on the VAHR within the study area. Details of Aboriginal cultural heritage places are detailed in section 2.4.2.

Aboriginal Victoria maintains a dataset that is a spatial representation of "Areas of Cultural Heritage Sensitivity" (CHS) as specified in Division 3, Part 2 of the *Aboriginal Heritage Regulations 2018*. Mapping of CHS is continually revised, however a major update of CHS occurred in May 2018 when the current Regulations came into effect. The study area also includes areas of CHS associated with the waterways, registered Aboriginal cultural heritage places and former waterways (refer to Figure 5).

2.2.3 Heritage Act 2017

The *Heritage Act 2017* is the principle legislation covering the assessment, management and protection of non-Aboriginal heritage in Victoria. Heritage Victoria (HV) regulates heritage assessment and approvals and administers the Act. HV maintains the Victorian Heritage Register (VHR), which lists items of State significance, and the Victorian Heritage Inventory (VHI), which lists items with significant historic archaeological heritage values.

The Victorian Heritage Database was accessed on 16 April 2018. There are **no** heritage values registered on the VHR or VHI within the study area.

2.2.4 Planning and Environment Act 1987

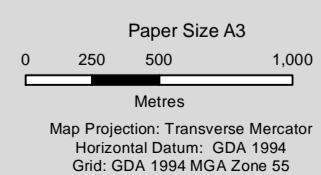
The *Planning and Environment Act 1987* is the primary legislation for management of planning systems in Victoria. The Act includes provisions for the Planning Schemes, which regulate the use and development of land. Planning Schemes, list and manage items of local heritage significance through Heritage Overlays (HO) and are administered by their relevant Councils.

There are **no** items listed on the Horsham Planning Scheme HO within the study area.



LEGEND

- Study area
- WIM100 East optimised body
- Cultural heritage sensitivity
- ▲ Aboriginal Ancestral Remains (Burial)
- Artefact Scatter
- ◎ Earth Feature
- ✦ Scarred Tree



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WIM100
Aboriginal Heritage Constraints

Figure 5