2.3 Historical Context

The first European to enter the Wimmera region was Thomas Mitchell in 1836 (Bird, 1990, p. 15). Mitchell reported favourably on pastoral conditions and European settlers soon moved into the region via Portland. Incoming settlers often occupied permanent water sources, displacing Aboriginal people and leading to widespread conflict throughout the region during the 1840s. Initial European settlement focus on large squatters run, with the study area falling within the Mount Talbot Run (refer to Plate 1). The Mount Talbot homestead is located approximately 7 km south of the study area. While the Mount Talbot run has since been broken up, land use of the study has largely focused on agricultural and pastoral uses since the 1840s until the current day.

Plate 1 1869 Map of Pastoral Runs (Owen, 1869)

A comparison between 1947 (Figure 6), 1963 (Figure 7) and current aerials (refer to Figure 1), indicate significant changes have occurred to the landscape as a result of historic agricultural activity. Tree coverage has significantly declined across the study area, although it appears to have increased in the northwest of the study area since 1963. Drainage of Jallumba Marsh sometime between 1963 and 2003 has converted the mosaic of marshy ponds visible in 1947 and 1963 aerials to largely cleared land, now used for cropping (Plate 2). Although ploughing and cropping have occurred, the mosaic of former marshy ponds is still visible in 2014 and 2016 aerials during dry and wet months (refer to Plate 3 and Plate 4) and in Light Detection and Ranging (LIDAR) imaging, suggesting that land has been drained but not been levelled.

The current extent of Jallumba Marsh is largely limited to the Jallumba Reserve on the western extent and low-lying areas on the extreme eastern extent of the former marsh boundary (refer to Figure 1). The former marsh now drains directly into Red Gum Swamp to south and this increased waterflow appears to have raised water levels. Mature *Eucalyptus camaldulensis* (River Red-Gum) located along the former shoreline of the swamp have died as a result.

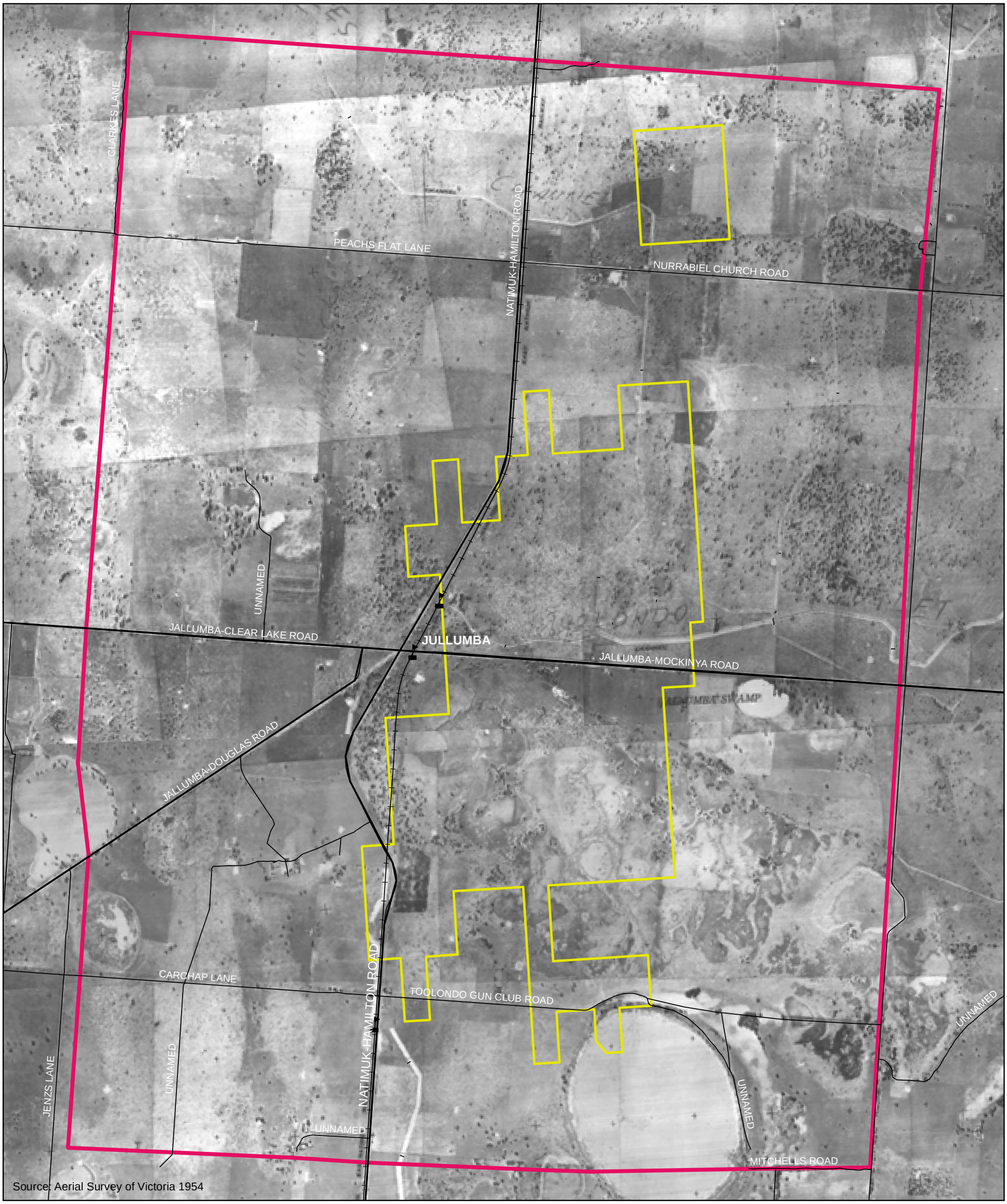
Plate 2 North of Red Gum Swamp looking across Jallumba Marsh (Iluka)

Plate 3 Jallumba Marsh January 2014 (Google Earth)

Plate 4 Jallumba Marsh October 2016 (Google Earth)

Being rural in nature, there are relatively few built features in the study area (refer to Figure 8). The vast majority of these structures relate to homesteads and agricultural infrastructure. Many homesteads were established prior to 1947, with some expansion over time as new outbuildings and infrastructure are constructed. The Balmoral rail line was constructed in 1912 with the Jallumba Station opened in the same year. There appears to have been built infrastructure at the Jallumba railway station, which included a goods shed (Plate 5), but the station was closed in 1979 and built infrastructure appears to have been removed sometime after 1986 (Bibliophile, 2018). Further, there is a small sand quarry operation present south of Jallumba-Mockinya Road, located in source bordering dunes associated with the former Jallumba Marsh.

Plate 5 Former Jallumba Goods Shed (When there were stations 1989)



LEGEND

- Study area
- WIM100 East optimised body

Paper Size A3

0 250 500 1,000

Metres

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

N

Iluka Resources Limited
Murray Basin Operations

WIM100
1947 Aerial Map

Job Number	31-36122
Revision	B
Date	23 Jun 2018

Figure 6

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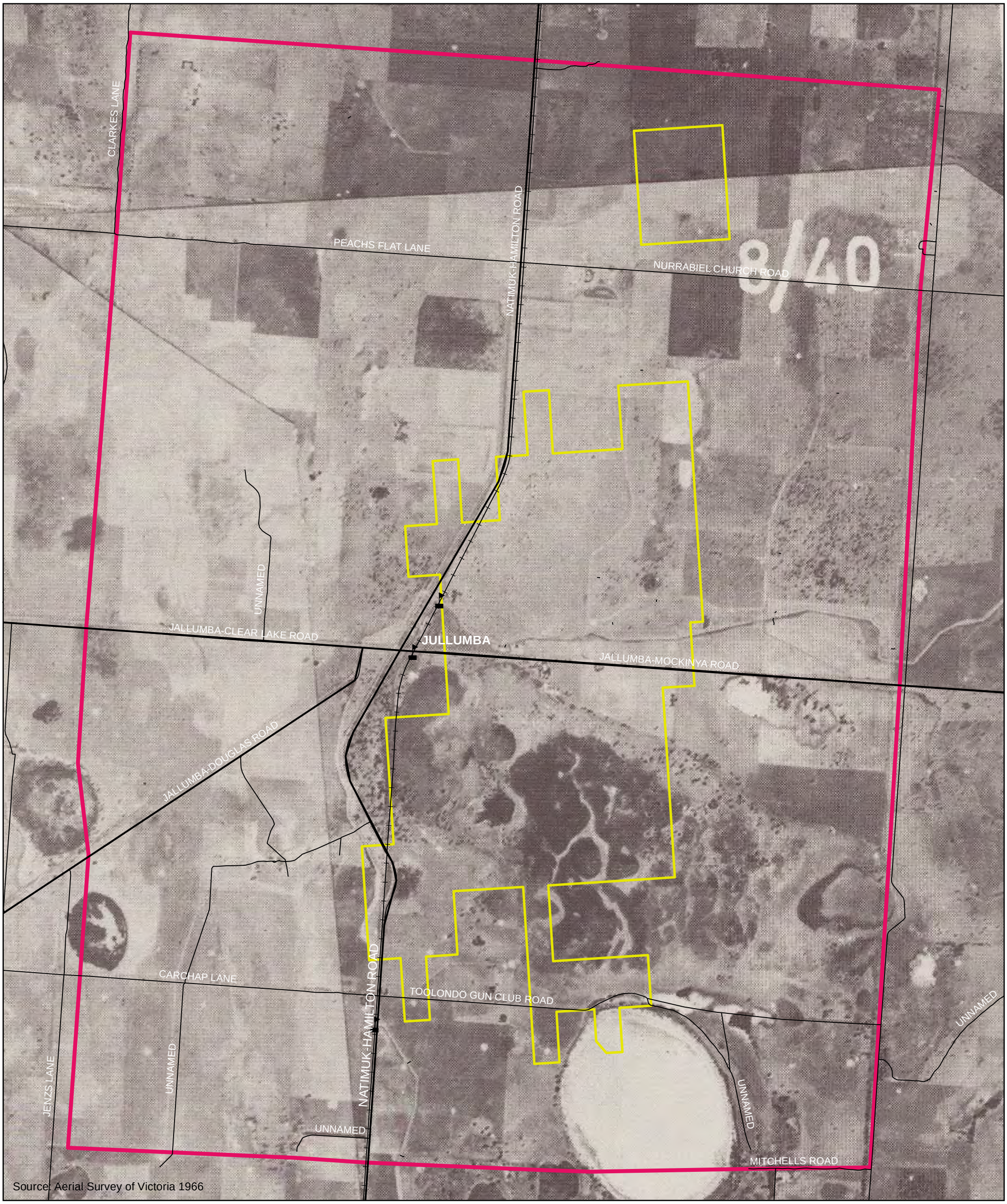

LEGEND

- Study area
- WIM100 East optimised body

Paper Size A3

0 250 500 1,000

Metres

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

N

Iluka Resources Limited
Murray Basin Operations

WIM100
1963 Aerial Map

Job Number	31-36122
Revision	B
Date	23 Jun 2018

Figure 7

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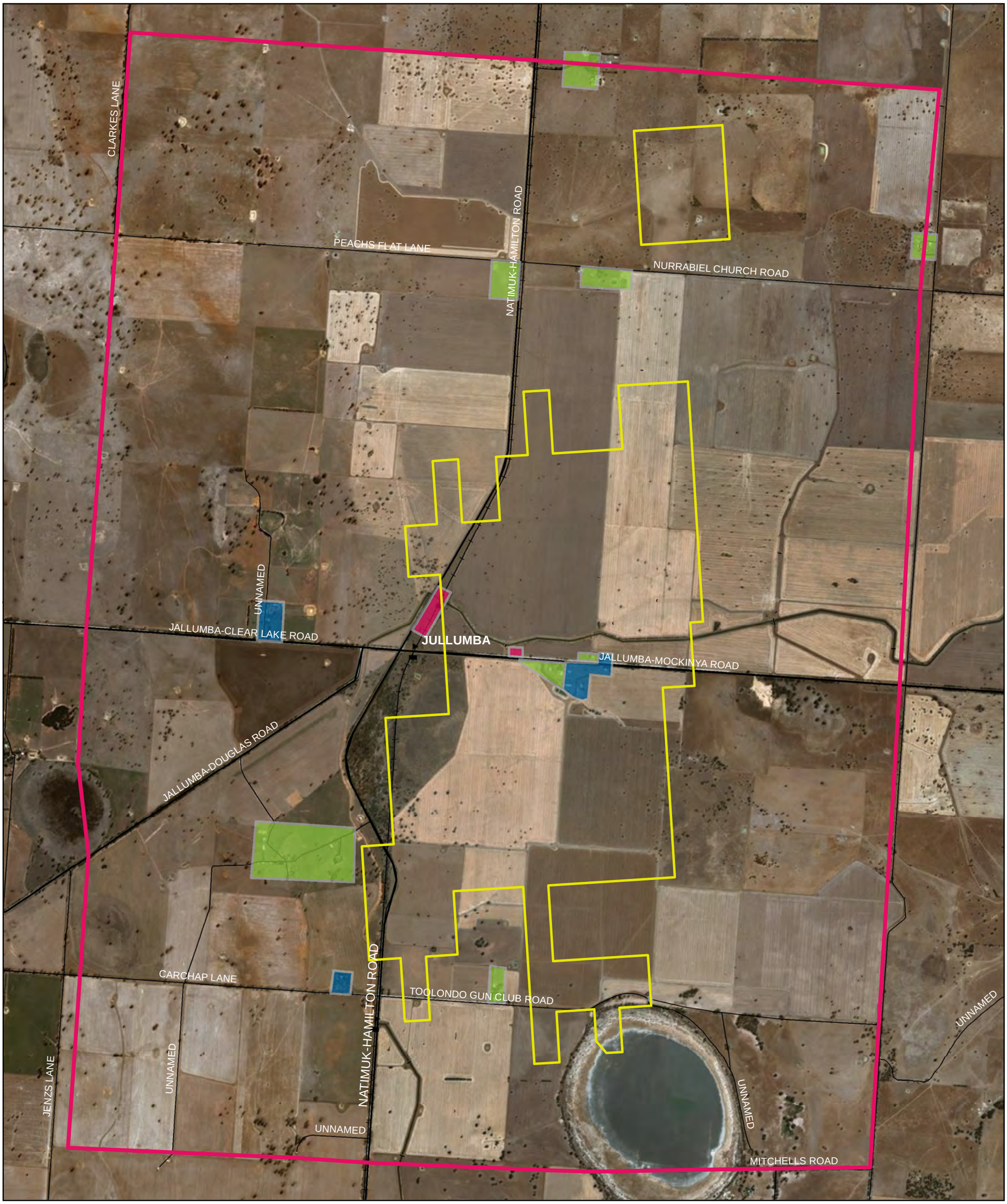

LEGEND

- Study area
- WIM100 East optimised body

Built features

- 1947 - 1980s
- 1947 - 2018
- 1963 - 2018

Paper Size A3

0 250 500 1,000

Metres

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

N

Iluka Resources Limited
Murray Basin Operations

WIM100
Built features

Job Number	31-36122
Revision	A
Date	18 Jul 2018

Figure 8

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2.4 Archaeological Context

2.4.1 Previous studies

Limited archaeological study has been undertaken within the Wimmera region in comparison to other regions of Victoria. Initial archaeological investigation was prompted by academic research (Massola, 1962; Lourandos, 1976) and surveys undertaken for the Victorian Archaeological Survey (VAS) (Gunn, 1985; Bird, Aboriginal Sites in the Horsham Region, 1990; Rhodes, 2000). Further studies have been commissioned in association with development of rural infrastructure and mining, as well as further academic interest in the area.

A brief summary of these archaeological investigations is provided below.

Lourandos 1976

Following Massola's descriptions of Aboriginal fish traps at Toolondo (Massola, 1962), Lourandos undertook further investigations of the channels and subsequently published preliminary results in *The Artefact* (1976). The investigations included survey and archaeological excavation, with results provided within the context of archaeological trends in the wider Wimmera area. Reviewing ethnographic resources, Lourandos argued that past subsistence patterns of Aboriginal people was largely seasonal and took advantage of mosaic of habitats, with a particular focus on fishing, eeling and birding (Lourandos, 1976, p. 178).

Lourandos had a particular focus on large-scale artificial drainage system used by Aboriginal people to harvest eels during the early autumn. He inspected known Aboriginal channels at Mt Williams and Toolondo, however only Toolondo retained any evidence of channels. Lourandos recorded a main channel 2.5 m wide by 1 m deep connecting Clear Swamp and Budeongutte Swamp (Plate 6 and Plate 7). The main channel was intersected by small cross-cutting channels that formed a grid (Lourandos, 1976).

Lourandas documents that the Toolondo channels are at the extreme northern end of the range of *Anquilla australis occidentalis,* the freshwater species of eel being exploited by Aboriginal people. Unlike Budeongutte Swamp, eels are not found today in Clear Swamp as it is not connected to river systems with coastal access. Lourandas suggests that the channel system may have been an attempt to regulate the availability of eels by extending their habitat within this area (Lourandos, 1976, p. 187). Lourandos argues that such techniques are a further example of environmental modification practiced by Aboriginal people in past, along with other practices such as cultural burns.

Plate 6 Aboriginal channel at Clear Swamp ca. 1974 (Lourandos, 1976)

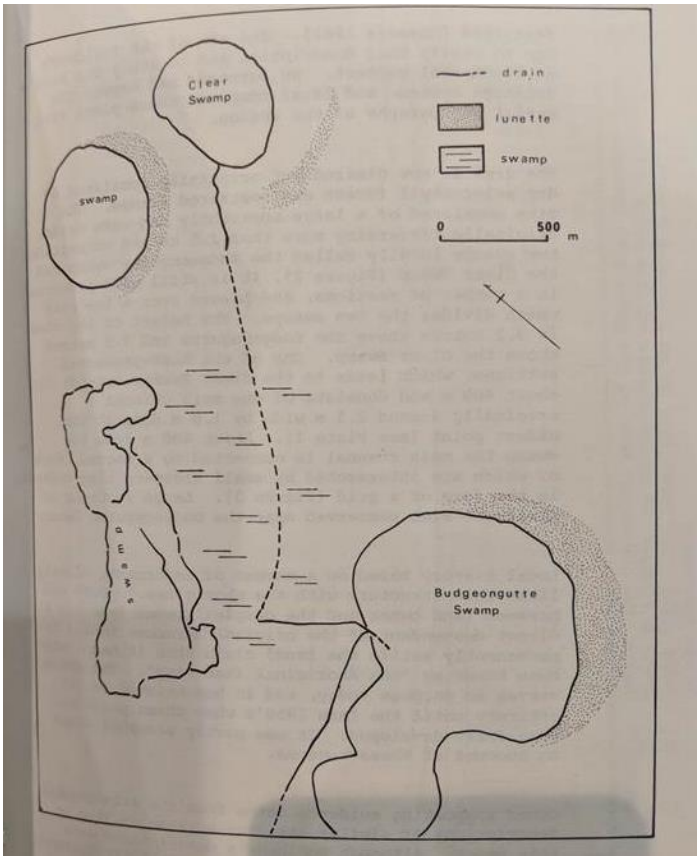


Plate 7 Ground plan of the Aboriginal drainage system at Toolondo (Lourandos, 1976)

Gunn 1985

Gunn (1985) undertook an archaeological survey of Aboriginal rock art sites in the Mount Talbot Scenic Reserve, approximately 10 km southeast of WIM100. Mount Talbot is a prominent ridge of Wartook Sandstone located on the northern end of Black Range and surrounded by flat plains. Gunn identified four rock shelters with evidence of habitation (i.e art and/or stone artefacts were present within the shelter) and two further rock shelters with archaeological potential.

Bird 1986

Bird (1986) undertook excavations of a small rock shelter, MT1, at Mount Talbot, approximately 10 km southeast of WIM100. Bird encountered relatively shallow archaeological deposits with the majority of artefactual material confined to layers between 5 cm and 25 cm below the surface, and no material deeper than 50 cm. A total of 1,009 stone artefacts were recovered from the excavation, with quartz being the most common raw material (80%) followed by silcrete/quartzite (15%), chert (5%) and volcanic glass (<1%). Based on the presence of back tools and thumbnail scrapers within all layers of the deposits, Bird argued that the assemblage was representative of the Australian Small Tool Tradition and occupation of MT1 potential dates to the last 3,000 to 4,000 years BP (Bird, 1986).

Bird 1990

Bird (1990) undertook a regional study of Aboriginal cultural heritage places around Horsham as part of series of Victorian Archaeological Survey regional studies. For the purposes of establishing regional trends, the study grouped the areas around Horsham into land system units. The current study area was grouped within what Bird referred to as the Southern Wimmera Plains, a unit defined by flat or gently undulating dunes and sand sheets with chains of lakes and swamps. Bird noted that the mosaic of wetlands within the plains would have been rich in flora and fauna resources, but that raw stone material would have been imported as the region lacked suitable stone materials for making artefacts (Bird, 1990). Lunettes are noted as being elevated well-drained landforms that would have attracted open camp sites.

In documenting Aboriginal cultural heritage place types, Bird notes that scarred trees are the most common type recorded in the region (45%), with most species being either Box (28%) or River Red-Gum (59%) (Bird, 1990). Mounds, artefact scatters and isolated artefacts can appear in isolation or in greater concentrations, typically associated with major water sources. Burials are commonly found in easily dug sandy soils such as lunettes or source bordering dunes (Bird, 1990).

Searle 1994

Searle (1994) prepared a report for the Goolum Goolum Burial Project, which sought to relocate the providence of Aboriginal ancestral remains held in the Museum of Victoria's Goolum Goolum collection. The majority of the Goolum Goolum material is associated with the Wimmera and was collected between 1905 and 1968 from a variety of sources including landowners, collectors and the police. Searle concluded that very little information was available to pin point the provenance of remains, but the notes she assembled indicate that many of the ancestral remains were collected from sand dunes or river banks (Searle, 1994).

Rhodes and Bird 2000

Rhodes and Bird (2000) undertook a regional survey of the south-west Wimmera, recording 428 Aboriginal cultural heritage places. Based on their findings, Rhodes and Bird have developed a regional archaeological predictive model for Aboriginal heritage that remains the basis for the majority of later studies within the region. This predictive model is based on land systems defined by relief, landforms and water sources. Targeted surveys were undertaken of each land system category, which were defined as:

Stratum 1	Flat, relatively waterless plain
Stratum 2	Mostly flat plain with seasonal swamps and ephemeral waterways
Stratum 3	Rolling terrain with numerous seasonal waterways
Stratum 4	Rolling landscape and lakes
Stratum 5	Outliers – sample areas containing rugged terrain and/or rivers

Rhodes and Bird characterised the study area as belonging in land system Stratum 4 - Rolling landscape and lakes. One of the sample areas for Stratum 4 included Clear Lake, which is located northwest of the study area. Rhodes and Bird, noted that Stratum 4 was relatively rich in sites, with cultural material mainly clustered around lakes and swamps. Over 59% of Aboriginal cultural heritage places were located on lakeshores within this stratum, predominately consisting of isolated artefacts (54%) (Rhodes, 2000).

Of the 85 Aboriginal cultural heritage places identified in Stratum 4, 21% were scarred trees, 24% were artefact scatters and 55% were isolated artefacts. With Stratum 4, scarred trees were predominately located on lakeshores (56%), Stringybark woodlands (11%) and gum/box/buloke savannah woodland (33%). Denser artefact scatters that included hearths, bones, ochre and other cultural materials were also predominately located on lakeshores (65%) and source bordering dunes (20%), with minor occurrences on sandy plains, clay plains and alluvial plains. Isolated artefacts occurred across all landforms but were primarily located on lakeshores (54%) (Rhodes, 2000).

Wood 1997

Wood (1997) undertook archaeological surveys of road verges for optic cable installation to the study of the areas around Nhll and Horsham, including Clear Lake. Woods recorded two scarred trees (VAHR 7225-0181 and 7225-0182) in remnant vegetation located on dunes, as well as a low density artefact scatter on the banks of the Glenelg River. Two historical sites were also recorded, a former hay shed and former state school site.

Gunn 2001

Gunn (2001) undertook an archaeological survey for a proposed heavy mineral sand mining development near Douglas (Iluka's Douglas Mine), 18 km southwest of the study area. Gunn undertook both vehicle and pedestrian survey, with the pedestrian survey limited to areas of predicted high potential or good visibility, due to the large size of the investigation area. Four scarred trees were recorded along road verges, one isolated artefact was recorded on the eastern margin of Telangatuk Swamp (VAHR 7223-0022), and two scarred trees and one artefact scatter were recorded on the eastern side of Lake Kanagulk (VAHR 7223-0007, 7223-0008 and 7223-0021 respectively).

Based on the survey results, Gunn considered the margins of both Lake Kanagulk and Telangatuk Swamp to have the most potential for Aboriginal cultural material. As the western embankment of Telangatuk Swamp was to be impacted by the proposed development, archaeological excavations, consisting of two mechanical scrapes, were undertaken. The scrapes were undertaken to 10 cm in depth and no Aboriginal cultural material was encountered. While not discounting the potential use of the area by Aboriginal people in the past, Gunn argued that the results indicated that this margin of the swamp was "not one of concentrated occupation" (Gunn, 2001, p. 25).

Gunn found overall that Aboriginal site patterning reflected trends previously identified across the Wimmera by Rhodes and Bird 2000. Cultural material tended to be concentrated around larger water sources with lower densities around smaller water sources. While Gunn also indicated that little or no signs of occupation appeared in areas away from water, he contended that site patterning in regards to proximity to water was not yet well understood in the Wimmera.

Gunn 2003

Followings Gunn's 2001 report, Aboriginal Affairs Victoria requested additional survey to be undertaken to substantiate the reliability of the original results. Gunn undertook additional survey for the follow-up report (2003), which timed surveys for the summer period to maximise ground surface visibility. Survey was predominately pedestrian, targeting areas that had previously been subject to vehicle survey in 2001, and the survey team walked just over 46 km in transects 6 to 9 m wide. An additional 12 Aboriginal cultural heritage places were recorded, including four artefact scatters, six low density scatters and two scarred trees (Gunn, 2003, p. 14).

Artefact scatters were all located on the crests of gully walls associated with ephemeral waterways. Similar, low density scatters were also located on crests overlooking creeks, with one place being located along the top of a dune. Scarred trees were restricted to areas of surviving remnant vegetation where it occurred (Gunn, 2003, p. 14). While new Aboriginal cultural heritage places were located, Gunn considered that the findings reinforced the model developed by Rhodes and Bird (2000), although there was notable lack of cultural material around Long Gum Swamp, Telangatuk Swamp and Marina Swamp.

Gunn suggested that this could reflect more permanent water sources nearby at Lake Kanagulk and Glenelg River being used as more permanent camp locations while smaller nearby swamps were accessed on a daily basis. Gunn further suggested that this could be an indication that Aboriginal utilisation of the region was systematic rather than ad hoc, via "a seasonal round" travelling between major water sources (Gunn, 2003, p. 22)

Cupper and Stone 2008

Cupper and Stone (2008) prepared a Cultural Heritage Management Plan (CHMP) for the Wimmera Mallee Pipeline Project Supply System 6. The CHMP assessed proposed pipeline routes predominately located in road reserves, including several sections located in the WIM100 study area. These sections included road reserve on the Toolondo Gun Club Road, Jallumba-Mockinya Road, Jallumba-Douglas Road and Quick Sinclair Russells Road. Archaeological survey was undertaken of road reserve sections on the Toolondo Gun Club Road, however despite good visibility no cultural material was identified. No archaeological excavation was undertaken as part of this project.

Light, Schell and Turnbull 2009

Light, Schell and Turnbull (2009) prepared a CHMP for Iluka's Echo Mine Project located 2.5 km east of WIM100. The CHMP assessed areas located directly north of Connangorach Swamp, and included other ephemeral swamps such as Grassy Swamp. The CHMP included archaeological survey and excavation, with excavation focusing on the northern margins of Connangorach Swamp. Two previously recorded Aboriginal cultural heritage places and nine new places were assessed as part of the CHMP.

The largest Aboriginal cultural heritage place assessed was VAHR 7324-0014, an extensive artefact scatter (950 m by 40 m) located on a lunette along the northern margin of Connangorach Swamp. Excavations on the northern section of the lunette show a relatively shallow silty sandy profile overlaying mottled sand and clay. Artefactual material included stone artefacts and remains of hearths, with artefact densities varying between 0.45 m^2 and 5.9 m^2 across the place. One further low density artefact scatter, VAHR 7324-0678, was located on the margin of Connangorach Swamp, but west of the lunette (Light, 2009).

A further five low density artefact scatters were located on the margins of Grassy Swamp, VAHR 7324-0640, 7324-0668, 7324-0669, 7324-0670 and 7324-0671. These places consisted of one or two flaked quartz artefacts.

Three scarred trees, VAHRs 7342-0662, 7342-0663 and 7324-0665, were recorded between 500 m and 1 km northwest of Grassy Swamp. All scars were relatively large and located on Box trees, with VAHR 7342-0663 also showing evidence of steel axe marks (Light, 2009).

Turnbull and Schell 2009

Turnbull and Schell (Turnbull, 2009) undertook salvage excavations to comply with the CHMP prepared for Iluka's Echo Mine Project (Light, 2009). The salvage excavations were undertaken for VAHR 7324-0678 and surface collections undertaken VAHRs 7324-0670, 7324-0671, 7324-0669 and 7324-0640.

Seven 1 m x 1 m pits were excavated at VAHR 7324-0678, with three quartz artefacts recovered from a pit directly adjacent to the original CHMP excavations. The surface collection located and collected one artefact each from VAHRs 7324-0640, 7324-0669, 7324-0670 and 7324-0671 (Turnbull, 2009, p. 7). The results confirm the results of the 2009 CHMP, which characterised these Aboriginal cultural heritage places as low density artefact scatters.

Campanelli 2015

Campanelli (2015) undertook archaeological survey and excavation of Aboriginal cultural heritage places at Bates Lake (VAHR 7224-0160), Connangorach Swamp (VAHR and Djurite (Mount Arapiles) as part of a PhD research project. Bates Lake is approximately 30 km west of the study area and investigations focused on the south eastern foreshore where there was a small artefact scatter and potential burnt clay. Limited cultural material was recovered from a 1 m x 1 m test pit and contemporary disturbance was noted (Campanelli, 2015, pp. 8-19).

Survey and excavation focussed on the northeastern edge of Connangorach Swamp, on the lunette where VAHR 7324-0014 had previous been recorded by Light. Light's previous investigations had focused on the edge of the lunette (2009), however Campanelli excavated a 1 m x 1 m test pit in deep sandy deposit located on the southern end of the lunette. A total of 114 stone artefacts were recovered from a stratified context, in addition to baked clay lumps and ochre (Campanelli, 2015, p. 26).

A shallow 1 m x 1 m test pit was excavated at Djurite within the living space of a rock shelter with art, VAHR 7224-0171. The excavation recovered degraded bone fragments, Acacia seeds and 191 stone artefacts (Campanelli, 2015, p. 40).

2.4.2 Aboriginal cultural heritage place patterning

There have been three Aboriginal cultural heritage places registered on the VAHR within the study area. These places were recorded by the Victorian Archaeological Survey in 1976 and are summarised below.

- **Jallumba Swamp 1** (VAHR 7224-0001) - Recorded by Hutchison and Cochrane in 1976 on a source bordering dune to the north of Red Gum Swamp. Notes on the site card record the place as a lithic artefact scatter 170 m by 70 m, located across a blowout on top of the dune. Raw material types include quartz, 'flint', greenstone, granite, ferriarette, rhyolite, quartzite and laterite, suggesting both flaked and ground stone tools are present. Although no location is given, the recording documents that a skeleton was reported to have been exposed at the place 'several years ago', with no details of potential location. Photos of the place were noted as being taken in 1977 by D Byne, but subsequently missing from the file.
- **McKendrick 1 Toolondo** (VAHR 7224-0002) - Recorded by Frank in 1976 as 'an outstanding mound at the site of excavation MK-1'. The place is located approximately 200 m west of Red Gum Swamp and two 1 m by 1 m test trenches were excavated in the mound by the Victorian Archaeological Survey. Excavation revealed baked clay balls within blackened soil above clays (refer to Plate 8). Radiocarbon dates for VAHR 7224-0002 were published in 1977 as SUA 583 (Radiocarbon Laboratory, University of Sydney, Sydney, Australia) 820 ± 95 BP (before present), but were documented as unreliable (Coutts, 1977).
- **McKendrick 1 Toolondo** (VAHR 7224-0003) - Recorded by Frank in 1976 and was recorded as a mound site approximately 9 m by 7 m, 28 cm high. Located approximately 200 m west of Red Gum Swamp and 200 m south of VAHR 7224-0002, it was noted that mound consisted of black sandy soil.

Plate 8 East wall profile of excavations at VAHR 7224-0002 (Source: VAHR)

No other Aboriginal cultural heritage places have been recorded within the study area, however it is suggested this is due to a lack of archaeological investigation rather than a lack of potential.

Regional trends suggest that lunettes and source bordering dunes adjacent to permanent water sources are likely to have high concentrations of cultural material, including burials, hearths, mounds and other occupation material. Cultural material is also likely to be present around the margins of swamps, marshes and other areas subject to periodic inundation. Scarred trees have the potential to be present where mature native trees survive.

Research (Bird, 1990; Rhodes, 2000; Gunn, 2001) indicates that density of cultural material is influenced by proximity to waterways. Permanent freshwater sources may have also been used as a base to exploit other nearby wetlands (Lourandos, 1976; Gunn, 2001), meaning that cultural material tends to be concentrated around the former rather than the latter. However, Gunn (2001) documents that there is not yet a clear understanding of the relationship between distance from permanent water sources and cultural material density. It is noted that VAHR 7224-0002 and 7224-0003 are located 200 m to west of Red Gum Swamp and within the wider region scarred trees can be located at considerable distances from water (Gunn, 2001).

It is also noted that the study area is unlikely to contain earthen fish traps as seen at Clear Swamp. Red Gum Swamp and Jallumba Marsh are not connected to larger watercourses with coastal access and are outside of the range of *Anquilla australis occidentalis* (Lourandos, 1976).

Regional research and identified trends allow for predictive modelling for Aboriginal cultural material for the study area shown in Figure 9 and is described below:

- **High archaeological potential** – Lunettes and source bordering dunes located next to Red Gum Swamp and the former Jallumba Marsh, both being permanent or large water bodies. Cultural material is likely to consist of stone artefacts, hearths, mounds and potentially ancestral human remains, potentially in high densities. Archaeological testing in similar landforms (Campanelli, 2015) indicate that archaeological deposits may be both deep and stratified. Ancestral human remains have been previously identified on the Red Gum Swamp lunette at VAHR 7224-0001.
- **Moderate archaeological potential** – Sandy ridges and the margins of waterbodies, which has been determined using a 400 m buffer of current and former water bodies. The 400 m margin buffer around waterbodies has been based on current spatial patterning of Aboriginal cultural material in the region. Cultural material is likely to consist of stone artefacts, hearths and mounds. Previous investigations (Gunn, 2001; Gunn, 2003; Light, 2009; Turnbull, 2009) indicate that cultural material is most likely to occur in low densities and isolated occurrences, but may occur in localised high densities.
- **Low archaeological potential** – Flat or gently undulating plains. Previous investigations (Gunn, 2001; Gunn, 2003; Light, 2009; Turnbull, 2009) indicate that cultural material is likely to consist of isolated or low density stone artefacts.
- Remnant vegetation – Scarred trees have the potential to occur where mature remnant trees have survived.

2.4.3 Historical heritage place patterning

There are no historical archaeological sites or features registered on the VHI, VHR or HO within the study area.

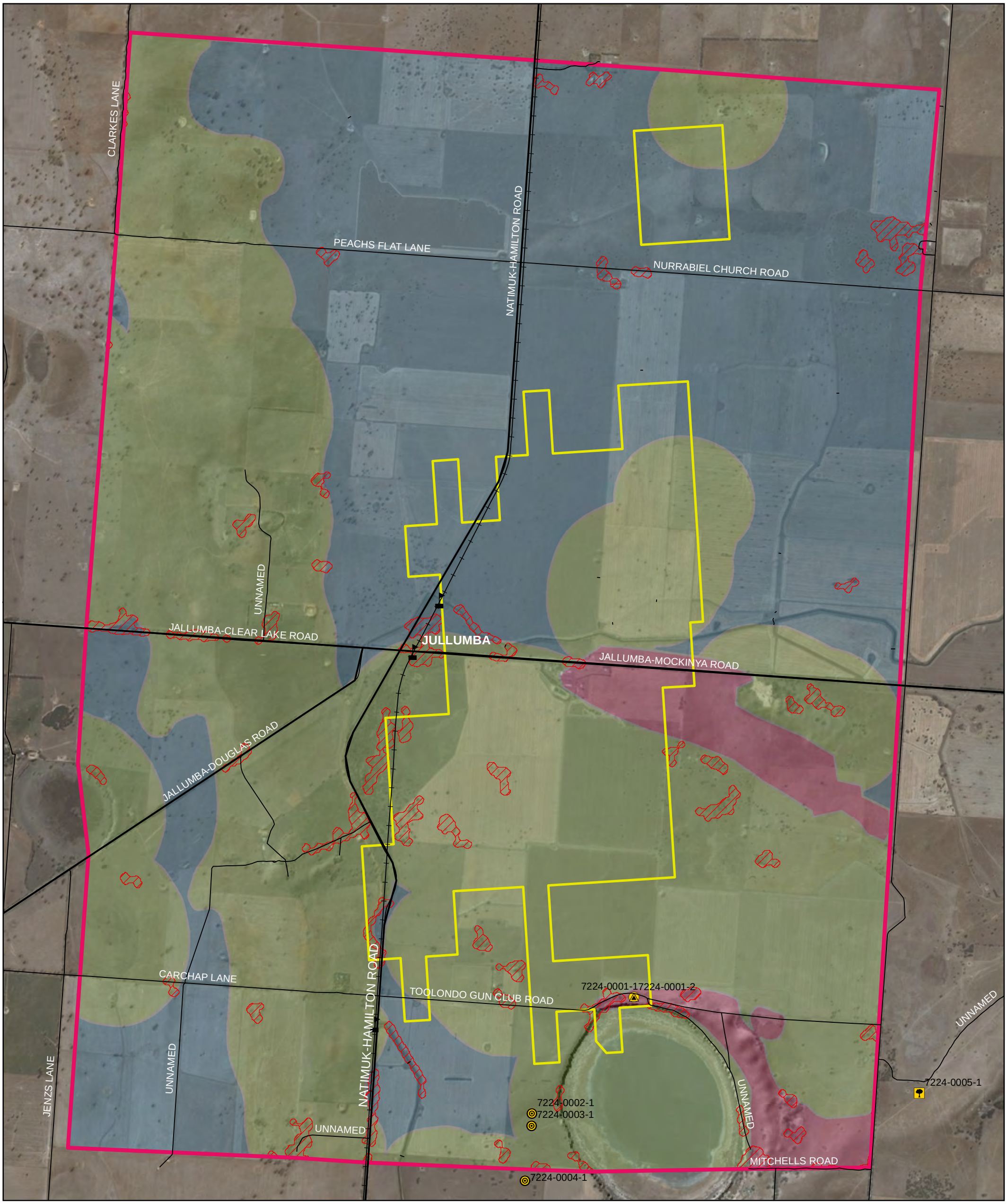
Little historical heritage research has been undertaken of the study area. Early European settlement in the area was associated with The Mount Talbot squatting run, the homestead site for which is located approximately 7 km south of the study area. Since this time the study area has remained largely rural in nature and there are relatively few built features present (refer to Figure 8). The majority of these features relate to homesteads and agricultural infrastructure. Many homesteads appear to have been established prior to 1947, with some expansion over time as new outbuildings and infrastructure are constructed. There appears to have been built infrastructure at the Jallumba railway station that has since been removed. There is potential for some historical heritage values to be present in these locations, consisting of either built features or archaeological deposits.

2.5 Desktop assessment summary

The landscape of 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 (see Figure 1), with the latter being significantly larger prior to being drained (refer to Figure 6 and Figure 7). Although archaeological research is limited, the mosaic of current and former water bodies with permanent freshwater available at Red Gum Swamp, would have resulted in the study area being attractive for Aboriginal people in the past.

Previous archaeological investigations indicate that cultural material is likely to be present around the margin of water bodies (Gunn, 2001; Gunn, 2003; Light, 2009; Turnbull, 2009) with potential for ancestral human remains and dense stratified archaeological deposits on lunettes and source bordering dunes (Bird, 1990; Rhodes, 2000; Campanelli, 2015). Ancestral human remains and a large artefact scatter, VAHR 7224-0001, have previously been recorded in the Red Gum Swamp lunette. Individual mounds, VAHR 7224-0002 and 7224-0003 have also been identified on the southwest margins of Red Gum Swamp.

Little historical heritage research has been undertaken of the study area. However, there may be potential for historical archaeological remains associated with the former Jallumba Railway Station/Siding. There is also potential for historical built/archaeological features to be present at former and current homestead sites, predominately those established prior to 1947 (refer to Figure 8).



LEGEND

- Study area
- WIM100 East optimised body
- Aboriginal Ancestral Remains (Burial)
- Artefact Scatter
- Earth Feature
- Scarred Tree

Archaeological potential

- High
- Moderate
- Low

- Remnant trees

Paper Size A3

0 250 500 1,000

Metres

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

N

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Murray Basin Operations

Job Number	31-36122
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Date	18 Jul 2018

WIM100

Aboriginal archaeological predictive modelling

Figure 9

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3. Aboriginal Cultural Heritage

This section assesses legislative obligations and risk management options for Aboriginal heritage.

3.1 Regulatory triggers

Under the *Aboriginal Heritage Regulations 2018* a mandatory CHMP is required if the activity is located in an area of CHS and is classified as a high impact activity.

3.1.1 High impact activity

The proposed works would be classified as a high impact activity under Regulation 51 as follows:

Regulation 51 Activities requiring earth resource authorisations

An activity is a high impact activity if it is an activity-

(a) for which an earth resource authorisation is required before the activity may be carried out; and

(b) that would result in significant ground disturbance

3.1.2 Cultural heritage sensitivity

The study area intersects with, or contains a number of areas of CHS under Regulations 25, 26, 34 and 39 as follows:

Regulation 25 Registered cultural heritage places

(1) A registered cultural heritage place is an area of cultural heritage sensitivity.

(2) Subject to subregulation (3), land within 50 metres of a registered cultural heritage place is an area of cultural heritage sensitivity.

(3) If part of the land within 50 metres of a registered cultural heritage place has been subject to significant ground disturbance, that part is not an area of cultural heritage sensitivity.

Regulation 26 Waterways

(1) Subject to subregulation (2), a waterway or land within 200 metres of a waterway is an area of cultural heritage sensitivity.

(2) If part of a waterway or part of the land within 200 metres of a waterway has been subject to significant ground disturbance, that part is not an area of cultural heritage sensitivity.

Regulation 34 Koo Wee Rup Plain

(1) Subject to subregulation (2), the Koo Wee Rup Plain is an area of cultural heritage sensitivity.

(2) If part of the Koo Wee Rup Plain has been subject to significant ground disturbance, that part is not an area of cultural heritage sensitivity.

(3) In this regulation, Koo Wee Rup Plain means an area identified as "Qg" and "Qm1" in the Surface Geology of Victoria 1:250 000 map book.

Regulation 39 Lunettes

(1) Subject to subregulation (2), a lunette is an area of cultural heritage sensitivity.

(2) If part of a lunette has been subject to significant ground disturbance, that part is not an area of cultural heritage sensitivity.

(3) In this regulation, lunette means an area identified as "Q1" and "Q11" in the Surface Geology of Victoria 1:250 000 map book.

3.1.3 Significant ground disturbance

Under either subregulation (2) or (3) of Regulations 25, 26, 34 and 39, an area of CHS that has been subject to significant ground disturbance is no longer an area of CHS and therefore no longer acts as a trigger for a mandatory CHMP. The Regulations define significant ground disturbance as:

Regulation 5 Definitions

significant ground disturbance means disturbance of—

(a) the topsoil or surface rock layer of the ground; or

(b) a waterway—

by machinery in the course of grading, excavating, digging, dredging or deep ripping, but does not include ploughing other than deep ripping;

The *Aboriginal Heritage Act 2006 Practice Note: Significant Ground Disturbance* (Aboriginal Victoria) provides further clarification for significant ground disturbance:

The Victorian Civil and Administrative Tribunal (VCAT) has determined that the words "topsoil or surface rock layer" include the former topsoil or former surface rock layer if that topsoil or surface rock layer is a naturally occurring surface level that is readily ascertainable and does not include the current topsoil or current surface rock layer if established by the mere filling of the land.

Ploughing (other than deep ripping) to any depth is not significant ground disturbance. Deep ripping is defined in the regulations to mean 'ploughing of soil using a ripper or subsoil cultivation tool to a depth of 60 centimetres or more'. None of the words used in this definition are defined, and therefore have their ordinary meanings. VCAT has determined that a ripper or subsoil cultivation tool must be distinguished from conventional ploughs or topsoil cultivation tools such as disc ploughs or rotary hoes which are not sufficient to show significant ground disturbance.

Deep ripping will result in significant ground disturbance regardless of the degree of disturbance caused to the topsoil or surface rock layer of the ground.

It is important to note that above definitions of significant ground disturbance are based on the mechanical means in which it has occurred. Significant ground disturbance may or may not limit the potential for cultural material to present in the study area.

The *Aboriginal Heritage Act 2006 Practice Note: Significant Ground Disturbance* (Aboriginal Victoria) documents that:

The burden of proving that an area has been subject to significant ground disturbance rests with the applicant for a statutory authorisation for the activity (or the sponsor of the activity).

The practice note lists a hierarchy of evidence to determine significant ground disturbance as follows:

Level 1 – Common knowledge

The fact that land has been subject to significant ground disturbance may be common knowledge. Very little or no additional information should be required from the responsible authority.

For example, common knowledge about the redevelopment of a petrol station with extensive underground storage tanks.

Level 2 – Publicly available records

If the existence of significant ground disturbance is not common knowledge, a responsible authority may be able to provide assistance from its own records about prior development and use of land, or advise the applicant about other publicly available records, including aerial photographs.

These documents may allow a reasonable inference to be made that the land has been subject to significant ground disturbance.

In such event, no further inquiries or information would be needed by the responsible authority. The particular records and facts relied upon should be noted by the responsible authority as a matter of record.

For example, a former quarry site subsequently filled, but where the public records show the area of past excavation.

Level 3 – Further information

If 'common knowledge' or 'publicly available records' do not provide sufficient information about the occurrence of significant ground disturbance, the applicant may need to present further evidence either voluntarily or following a formal request from the responsible authority. Further evidence could consist of land use history documents, old maps or photographs of the land or statements by former landowners or occupiers. Statements should be provided by statutory declaration or similar means.

For example, the construction of a former dam on a farm.

Level 4 – Expert advice or opinion

If these levels of inquiry do not provide sufficient evidence of significant ground disturbance (or as an alternative to level 3), the applicant may submit or be asked to submit a professional report with expert advice or opinion from a person with appropriate skills and experience.

Depending on the circumstances, this may involve a site inspection and/or a review of primary documents. If there is sufficient uncertainty some preliminary sub-surface excavation or geotechnical investigation may be warranted.

3.1.4 *Evidence*

This assessment has reviewed background information, and publically available records that satisfy evidence Levels 1 and 2 outlined in the *Aboriginal Heritage Act 2006 Practice Note: Significant Ground Disturbance* (Aboriginal Victoria). The evidence for significant ground disturbance in the study area is summarised below.

Based on evidence from the desktop assessment, it is possible to determine that significant ground disturbance has **not** occurred across all areas of CHS within the study area. Significant ground disturbance associated with the sandmining and the construction of rail, road and canal infrastructure has occurred in discrete areas. However, the vast majority of the areas of CHS located within the study area have not been subject to mechanical disturbance other than ploughing, which is not classified as significant ground disturbance.

3.1.5 Mandatory CHMP requirements

The proposed works are classified as a high impact activity under Regulation 44 and occur in areas of CHS under Regulations 25, 26, 34 and 39 of the *Aboriginal Heritage Regulations 2018*. Subregulation (2) or (3) of Regulations 25, 26, 34 and 39 indicate that an area of CHS that has been subject to significant ground disturbance is no longer an area of CHS and therefore no longer acts as a trigger for a mandatory CHMP. Significant ground disturbance cannot be demonstrated to have occurred across the entirety of the area of CHS and therefore a mandatory CHMP will likely be triggered if Iluka proceeds with works within the optimised ore body for WIM100.

3.2 Risk assessment

Should the current WIM100 optimised body be selected for development, then a mandatory CHMP would be triggered by the *Aboriginal Heritage Regulations 2018* under Section 46 of the *Aboriginal Heritage Act 2006.* A CHMP would be the most appropriate method to manage Aboriginal heritage risk for the project. Once approved, a CHMP allows harm to occur and will provide a clear set of contingencies, agreed to by the RAP, in case of unexpected finds.

Based on the desktop assessment, the following is summarised of the CHMP process:

- As the study area is in a RAP area, the Barengi Gadjin would likely choose to evaluate the CHMP.
- 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 RAP.
- 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.
  - It is difficult to predict the exact extent and potential of this landform, as it is not mapped in surface geological interpretations and LIDAR data is relatively coarse.
  - Previous archaeological assessments have suggested that lakes/swamps with permanent water appear to have denser concentrations of cultural material, while surrounding seasonal swamps/wetlands/marsh tend to have lower concentrations or absence of cultural material (Gunn, 2001; Gunn, 2003; Light, 2009; Turnbull, 2009). This interpretation is largely based on surface survey results and has yet to be tested with rigours of archaeological excavation.
  - The CHMP is likely to require survey and manual hand excavation to quantify the extent, nature and significance of any Aboriginal cultural material present within this landform. If the entire landform requires clearance for ancestral human remains, then targeted ground penetrating radar is likely to be the most cost effective option.
  - Should ancestral human remains be identified during the CHMP assessment they are likely to become ‘no-go’ areas.

- Other areas of moderate archaeological potential are likely to contain Aboriginal cultural material, but previous assessments in the region (Gunn, 2001; Gunn, 2003; Light, 2009; Turnbull, 2009) indicate that material is likely to be low density in nature. CHMP assessment of these areas of potential is likely to require a combination of archaeological survey and excavation.
- The CHMP assessment process will identify the extent, nature and significance of Aboriginal cultural heritage places within the development footprint. The CHMP will contain conditions to manage harm to Aboriginal heritage values, which must be complied with by the proponent, once the CHMP is approved. The CHMP will allow harm to Aboriginal heritage values, but may contain measures to mitigate or avoid harm (i.e. archaeological salvage, surface collection, temporary fencing etc.).
- An approved CHMP will include contingency plans agreed to with the RAP in the case unanticipated finds or ancestral human remains. Note that these contingency plans relate to new finds in areas previously not identified as containing Aboriginal cultural material, or finds that alter the known nature or significance of an Aboriginal cultural heritage place (i.e human remains are found within a mound that was previously only recorded as containing burnt clay and charcoal). Contingency plans typically required works to stop and then negotiations to be undertaken with the RAP to establish an agreed management approach to the new material encountered.

Outside of lunette and source bordering dune areas, the majority of the WIM100 optimised body presents Aboriginal risk that is typically 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.

If a CHMP is initiated, then preliminary archaeological excavation (i.e 1 m x 1 m test pits) in this landform should allow the nature of Aboriginal cultural material to be quantified. Once the nature of cultural material is understood, consultation can be undertaken with the RAP to determine a method of "clearing" the dune. Targeted survey with ground penetrating radar is likely to be the most cost effective method for achieving this, but will need to be discussed with the RAP.

4. Historic Cultural Heritage

This section assesses legislative obligations and risk management options for historic heritage.

4.1 Regulatory triggers

Regulatory triggers for heritage approvals under the EPBC Act, *Heritage Act 2017* and *Planning and Environment Act 1987* are detailed below.

4.1.1 Environment Protection and Biodiversity Conservation Act 1999

Approvals are required under the EPBC Act if:

- a proposed action is likely to have a significant impact on a matter of national environmental significance; or
- if the proposed action likely to have a significant impact on the environment in general (for actions by Commonwealth agencies or actions on Commonwealth land) or the environment on Commonwealth land (for actions outside Commonwealth land).

A search of the EPBC Protected Matters Search Tool has indicated that there is no heritage matters of national environmental significance within the study area. A search of the land tenure via GeoVic indicates that the study area is not located on Commonwealth Land.

No approvals for the proposed works are required under the EPBC Act for heritage matters.

4.1.2 Heritage Act 2017

Under the *Heritage Act 2017*, a permit or permit exemption is required to change any place or object listed on the VHR. The Act also requires a Consent for any actions that will uncover, excavate or damage an archaeological site listed on the VHI. There are no VHR or VHI sites within the study area.

No approvals for the proposed works are required under the *Heritage Act 2017*.

4.1.3 Planning and Environment Act 1987

The Horsham Planning Scheme HO lists heritage items, that may require a planning permit approval for certain actions. There are no items listed on the Horsham Planning Scheme HO within the study area.

No approvals for the proposed works are required under the *Planning and Environment Act 1987* for heritage matters.

4.2 Risk assessment

Although no historical heritage sites have been registered with the study area, there are areas of current and former built infrastructure that may contain historic heritage values (refer to Figure 8).

Potentially, these areas can be avoided by the proposed development, however, if they cannot it is recommended that a Historical Heritage Assessment (HHA) be undertaken to address historical heritage risk. It is unlikely that significant historical heritage values are present and a HHA may determine that values are low significance, approvals are not required and close out historical heritage risk.

5. Summary

This section of the report summarises findings and provides recommendations on potential approval requirements and management of heritage risk. The recommendations are based on the results of the legislative risk assessments undertaken in section 3 and 4 and are summarised in Table 2 below.

Table 2 Legislative heritage requirements

Act	Requirements
EPBC Act 1999	It is unlikely approvals for the proposed works would be required under the EPBC Act for heritage matters.
Aboriginal Heritage Act 2006	A mandatory Cultural Heritage Management Plan (CHMP) would likely be triggered under Section 46 of the *Aboriginal Heritage Act 2006* for a future mining proposal and is considered the most appropriate method to manage Aboriginal heritage risk for the project. The study area is in a Registered Aboriginal Party (RAP) area, the Barengi Gadjin, who would likely choose to evaluate the CHMP. Based on the desktop assessment, the following Aboriginal heritage risks have been identified: • 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. • 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.

Act	Requirements
Heritage Act 2017	There are currently no registered heritage items in the study area that would trigger approvals for the proposed works under the *Heritage Act 2017*. 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.
Planning and Environment Act 1987	There are currently no registered heritage items in the study area that would trigger approvals for the proposed works under the *Planning and Environment Act 1987* for heritage matters.

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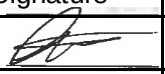
0	A.Ford	C.Arthur		C.Arthur		20/07/2018

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