



Victorian Murray Floodplain Restoration Project

Gunbower Historical Heritage Desktop Assessment

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Lower Murray Urban and Rural Water Corporation



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Abbreviations

CHL	Commonwealth Heritage List
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
the Heritage Act	<i>Heritage Act 2017</i>
HHA	Historical Heritage Assessment
HIA	Heritage Impact Assessment
HO	Heritage Overlay
HV	Heritage Victoria
LGA	Local Government Area
LMW	Lower Murray Urban and Rural Water Corporation
mAHD	metres above Australian Height Datum
NHL	National Heritage List
NT	National Trust of Australia (Victoria)
the project	Gunbower Floodplain Restoration Project
R8	R8 joint venture
RNE	Register of the National Estate
VHI	Victorian Heritage Inventory
VHR	Victorian Heritage Register
VMFRP	Victorian Murray Floodplain Restoration Project
WHL	World Heritage List

Executive Summary

Project overview

This desktop historical heritage assessment has been prepared for the Gunbower National Park Floodplain Restoration Project (the project), to support the preparation of referrals under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and Victorian *Environment Effects Act 1978*. The project is one of nine discrete environmental works projects being undertaken as part of the Victorian Murray Floodplain Restoration Project (VMFRP), which is being implemented as part of Victoria's obligations under the Murray Darling Basin Plan. Lower Murray Urban and Rural Water Corporation (LMW) has been nominated by the partnership established to deliver VMFRP, as the project proponent for the purpose of submitting referrals and approval applications.

The project is predominantly located within the Gunbower National Park, and the localities of Leitchville, Gunbower, Patho and Torrumbarry, within the Gannawarra and Campaspe Local Government Areas (LGA).

The project is located on the mid-Murray floodplain in Northern Victoria. Gunbower National Park covers approximately 9,330 ha and includes part of Gunbower Forest, an internationally important wetland listed under the Ramsar Convention. Gunbower Forest also forms part of the Gunbower-Koondrook-Perricoota Forest icon site under The Living Murray Initiative. The forest is bounded to the north by the River Murray and along its southern edge by private land and Gunbower Creek. The forest comprises a system of natural drainage paths, creeks, permanent and temporary wetlands, Black Box and Grey Box woodlands and River Red Gum forest.

The proposed works for the Gunbower National Park Floodplain Restoration Project are designed to provide a combination of pumped inflows from the Murray River and the National Channel via Camerons Creek into the Forest floodplain and permanent and semi-permanent wetlands. The works will result in inundation of approximately 457 ha in Middle Gunbower Forest and 247 ha in Upper Gunbower Forest.

The current design involves the construction of 12 small regulators, one fishway, three pipelines, two pump stations, one channel upgrade, one drop structure, one bridge, three culvert crossings, two drainage outlets, road upgrades, erosion control works and a series of containment banks to divert, retain and release water in the Gunbower National Park.

Desktop review

There are no listed historical heritage places that intersect with the area of investigation or the inundation area. However, prior historical heritage assessments indicate that the following sites comprise potential historical heritage places, which:

- Intersect with the Middle Gunbower Forest area of investigation:
 - Cohuna and Gannawarra Pumps (nominated for the VHR as Cohuna Headworks, but not yet assessed)
 - Old Weir, Mackays Bridge
- Are adjacent to the Middle Gunbower Forest area of investigation:
 - Deep Creek Inlet
 - McKays Mill
- Intersect with the Middle Gunbower Forest area of investigation and inundation area:
 - Redundant Regulator, Deep Creek
- Intersect with the Middle Gunbower Forest inundation area:
 - Wooden Bridges, Old Cohuna Channel
- Intersect with the Upper Gunbower Forest area of investigation:

- Cameron Creek Bridge
- Are adjacent to the Upper Gunbower Forest area of investigation:
 - Concrete Pits, Torrumbarry Weir
- Intersect with the Upper Gunbower Forest inundation area:
 - Cameron Creek Regulator (Weir).

There is moderate potential for previously unidentified historical heritage items to be present within the area of investigation and the inundation area, based on a review of the background history of the area. Site types most likely to be identified in the area of investigation and the inundation area would be heritage places or archaeological sites associated with early agricultural or pastoral activities, logging, river shipping, and water management practices.

Impact assessment

There are no listed historical heritage places that intersect with the area of investigation or the inundation area. However, the proposed works or the inundation may impact upon the historical heritage values of the following potential heritage places, as identified and assessed by Kaufman and Ballinger (2014):

- Cohuna and Gannawarra Pumps (nominated for the VHR, but its heritage status has not been confirmed with HV) – Proposed works at Middle Gunbower Forest
- Old Weir, Mackays Bridge – Proposed works at Middle Gunbower Forest
- Deep Creek Inlet – Proposed works at Middle Gunbower Forest
- McKays Mill – Proposed works at Middle Gunbower Forest
- Redundant Regulator, Deep Creek – Proposed works and inundation area at Middle Gunbower Forest
- Wooden Bridges, Old Cohuna Channel – Inundation area at Middle Gunbower Forest
- Cameron Creek Bridge – Proposed works at Upper Gunbower Forest
- Concrete Pits, Torrumbarry Weir – Proposed works at Upper Gunbower Forest
- Cameron Creek Regulator (Weir) – Inundation area at Upper Gunbower Forest.

Additionally, the proposed works and inundation may impact upon unidentified historical heritage items or archaeological sites due to the moderate potential for such to be present within the area of investigation and inundation area.

Approvals, mitigation measures and recommendations

Table 1, provides a summary of potential requirements and recommendations, including for mitigation measures.

If the scope of works changes to include other features of the heritage places detailed in Table 1, further heritage assessment would be required, and this assessment will need to be updated.

Table 1: Statutory requirements, mitigation measures and recommendations for heritage places within the area of investigation

Place	Statutory requirements	Recommendations	Mitigation measures
Entire area of investigation	Discovery of archaeological sites - under Section 127 of the <i>Heritage Act 2017</i> (the Heritage Act), if an archaeological site is discovered during construction or excavation on any land, the person in charge of the construction or excavation must as soon as practicable report the discovery to Heritage Victoria (HV).	<p>Due to the moderate potential for previously unidentified historical heritage items or archaeological sites to be present within the area of investigation, it is recommended that a Historical Heritage Assessment (HHA) be undertaken for the project.</p> <p>The HHA should include a targeted field survey of the area of investigation to visit and assess previously identified places and to identify further historical archaeological sites or historical heritage places, and a prepare a significance assessment of these places.</p> <p>If any historical heritage items or archaeological sites are identified as part of the HHA, a Heritage Impact Assessment (HIA) would be required:</p> <ul style="list-style-type: none"> ▪ Assessment of impacts on all historical heritage sites ▪ Detailed identification of mitigation measures and approval requirements ▪ A Heritage Impact Statement. <p>All historical archaeological places are protected under the the Heritage Act, whether they are registered or not.</p> <p>Further historical research to ascertain the likely presence of any historical archaeological places or material within the area of investigation is recommended to reduce the risk of delays to the project. Such delays would include the stoppage of works to avoid damage or destruction of historical archaeological sites and materials while the appropriate approvals are sought. This would enable VMFRP to proactively consider the nomination of historical heritage archaeological deposits ahead of the works, which would provide VMFRP with more certainty in relation to timeframes and statutory obligations.</p> <p>The completion of the HIA for the project would mitigate these issues.</p>	<p>General mitigation measures to be implemented across the area of investigation:</p> <ul style="list-style-type: none"> ▪ Historical heritage awareness training should be completed as part of the site induction for all personnel and/or contractors prior to the commencement of construction works to ensure: <ul style="list-style-type: none"> - an understanding of where all heritage places are located within the area of investigation - an understanding of the potential heritage places that may be impacted during the project - the procedures required to be undertaken in the event of discovery of historical heritage material, features or deposits, or the discovery of human remains ▪ If an archaeological site is discovered during construction or excavation on any land, the person in charge of the construction or excavation must as soon as practicable report the discovery to HV ▪ A copy of this report should be kept onsite and on file with the project records. All contractors and/or project staff should be made aware of the heritage status of the heritage places in the area of investigation prior to works taking place.

Place	Statutory requirements	Recommendations	Mitigation measures
Cohuna and Gannawarra Pumps (nominated for the VHR)	<p>While not currently registered on any heritage register, this historical heritage place was nominated for listing on the VHR by Kaufman and Ballinger (2014), but its heritage status has not been confirmed with HV.</p> <p>Based on this nomination, this heritage place has interim protection under Part 8 of the Heritage Act, which covers a substantial area including the main Cohuna and Gannawarra Headworks remnants, Deep Creek Inlet Channel, connecting channel and broad areas with visible archaeology or archaeological potential. As such, any works in the headworks area will require a Permit from HV.</p>	<p>Cohuna and Gannawarra Pumps, which were nominated for the VHR (Kaufman and Ballinger 2014), may be impacted by track works.</p> <p>Consultation with HV must be undertaken to ascertain the status of the nomination of this heritage place on the VHR.</p> <p>This heritage place has interim protection under Part 8 of the Heritage Act, and therefore it is recommended that this heritage place be inspected by a suitably qualified archaeologist. It should be included in the HIA to support the necessary Permit required for works to occur within this heritage place.</p>	<p>As there is potential for the fabric and significance of the Cohuna and Gannawarra Pumps to be directly impacted by track works, it is recommended that the following mitigation measures be implemented to avoid any adverse impacts where possible to the heritage values of the site, as assessed by Kaufman and Ballinger (2014).</p> <p>The historic complex should be avoided:</p> <ul style="list-style-type: none"> ▪ Prior to any works, including any vegetation clearance, site establishment or construction works in the area, protective barrier fencing will be erected between the nominated historical features and the works area, to fence the features and thereby avoid inadvertent impact; the fencing would be installed for the duration of works for the project and removed following completion. <p>Should impact to the historic complex be unavoidable it is likely that a Heritage Impact Statement will be required. This requirement is dependent on the outcomes of liaison with HV on the listing status of these places.</p>
Old Weir, Mackays Bridge Deep Creek Inlet McKays Mill Redundant Regulator, Deep Creek Wooden Bridges, Old Cohuna Channel Cameron Creek Bridge Concrete Pits, Torrumbarry Weir Cameron Creek Regulator (Weir)	<p>There are no statutory requirements for these places, as they are not currently included on any heritage register.</p>	<p>Although these potential heritage places are not listed on any heritage register, based on the assessments undertaken by Kaufman and Ballinger (2014) an inspection of these places (as part of an archaeological survey of the area of investigation) by a historical archaeologist is recommended to assess their heritage significance or archaeological potential.</p> <p>Based on the information from Kaufman and Ballinger (2014) it is possible that these places may threshold for inclusion on the Heritage Overlay (HO) of the relevant local council. In that case liaison with the local council prior to works commencing, would be recommended.</p> <p>Once the inspection has been undertaken further recommendations regarding future management of these places can be developed.</p>	<p>As there is potential for the fabric of these places to be directly impacted by project works, it is recommended that the following mitigation measures be implemented to avoid any adverse impacts where practicable to the heritage values of the site, as assessed by Kaufman and Ballinger (2014):</p> <ul style="list-style-type: none"> ▪ The heritage fabric of the potential heritage places should be avoided by fencing off the heritage features from the remainder of the works area, if practicable ▪ If impact to these features are unavoidable, then liaison with the relevant local council should be undertaken to ascertain planning permit requirements. <p>As there is also potential for the fabric of some of the potential heritage places to be indirectly impacted by erosion from inundation, it is recommended that the following mitigation measures be implemented to avoid any adverse impacts where practicable to the heritage values of the places:</p> <ul style="list-style-type: none"> ▪ Engage a qualified hydrologist to determine the impact erosion would have on the potential heritage places, and any measures that could be implemented to minimise erosional impacts

Place	Statutory requirements	Recommendations	Mitigation measures
			<ul style="list-style-type: none"><li data-bbox="1406 311 2112 392">▪ If impact to these features are unavoidable, then liaison with the relevant local council should be undertaken to ascertain planning permission requirements (if any).

Important note about your report

The purpose of R8's engagement under the Victorian Murray Floodplain Rehabilitation Project (VMFRP) is to design infrastructure for VMFRP including regulators, levees, roads, access tracks and culverts. The designs are required to be suitable for construction pricing to inform business case prioritisation. The purpose of this infrastructure is to allow floodplains to be watered at the hydraulic design levels nominated by Lower Murray Urban and Rural Water Corporation. R8 is also engaged to provide Regulatory Approvals and Cultural Heritage Services. The purpose of these services is to support VMFRP to lodge the necessary approvals documents for the project with the relevant approvals authorities.

The sole purpose of this report and the associated services performed by R8 is to complete a Desktop Heritage Report for VMFRP in accordance with the scope of services agreed between R8 and Lower Murray Urban and Rural Water Corporation.

R8 has prepared this report in accordance with the usual care and skill expected of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures and practices at the date of issue of this report. However, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report, to the extent permitted by law.

In preparing this report, R8 has relied on the information by VMFRP at the commencement of the project and other (government agencies). In particular R8 is reliant on VMFRP's prior flood modelling work to define inundation levels and extents. R8 is not responsible for achievement of the project's desired operational ecology outcomes.

This report should be read in full and no excerpts are to be taken as representative of the findings. No responsibility is accepted by R8 for use of any part of this report in any other context. This report has been prepared on behalf of, and for the exclusive use of Lower Murray Urban and Rural Water Corporation, and is subject to, and issued in accordance with, the provisions of the agreement between R8 and VMFRP Lower Murray Urban and Rural Water Corporation. R8 accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this report by any third party.

1. Introduction

1.1 Project background

The Gunbower National Park Floodplain Restoration Project (the project) is one of nine discrete environmental works projects being undertaken as part of the Victorian Murray Floodplain Restoration Project (VMFRP), which is being implemented as part of Victoria's obligations under the Murray Darling Basin Plan. The VMFRP aims to restore a more natural inundation regime across more than 14,000 ha of high ecological value Murray River floodplain in Victoria through the construction of new infrastructure and modification of existing infrastructure.

The VMFRP is being implemented in partnership between Lower Murray Urban and Rural Water Corporation (LMW), Goulburn Murray Rural Water Corporation (GMW), Mallee Catchment Management Authority (Mallee CMA), North Central Catchment Management Authority (North Central CMA), Parks Victoria and the Department of Environment, Land, Water and Planning (DELWP), and is funded by the Commonwealth Department of Agriculture, Water and Environment (DAWE). LMW has been nominated by the partnership as the project proponent for the purpose of submitting referrals and approval applications.

R8 is a joint venture formed between Jacobs and GHD, which has engaged by LMW to deliver design, cultural heritage and approvals services for the VMFRP. This desktop historical heritage assessment has been prepared for the project to support the preparation of referrals under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and Victorian *Environment Effects Act 1978*.

1.2 Project location

The Gunbower National Park Floodplain Restoration Project (the project) is predominantly located within the Gunbower National Park, and the localities of Leitchville, Gunbower, Patho and Torrumbarry, within the Gannawarra and Campaspe Local Government Area (LGA).

The proposed works for the Gunbower National Park floodplain and wetlands are designed to provide a combination of pumped inflows from the Murray River and the National Channel via Camerons Creek into the Forest. The works will result in inundation of approximately 457 ha in Middle Gunbower Forest and 247 ha in Upper Gunbower Forest.

The key environmental works areas that will be targeted for managed inundation as part of the project include:

- Upper Gunbower Forest (84.8 to 85.0 m AHD target water level) – inundation of approximately 247 ha of floodplain forest and wetlands containing:
 - Upper Camerons Creek
 - Camerons Creek Lagoon 1, 2, 3 and 4 (permanent wetlands)
 - Black Charlie Lagoon (permanent wetland)
 - Baggots Swamp (semi-permanent wetland)
- Middle Gunbower Forest (upstream of Deep Creek, 83.7 to 84.4m AHD target water level) – inundation of approximately 336 ha of floodplain forest and wetlands including:
 - Deep Creek
 - Middle forest floodplain area
 - Pig Swamp (semi-permanent wetland)
 - Emu Hole Lagoon (semi-permanent wetland)
- Middle Gunbower Forest (downstream of Deep Creek, up to 83.0 m AHD target water level) – inundation of approximately 121 ha of floodplain forest and wetlands containing:
 - Red Rise Swamp – upper (semi-permanent wetland)

- Red Rise Swamp – lower (semi-permanent wetland)
- Broken Axle Creek
- Spur Creek.

The following terms are used to describe the project area (refer to Figure 1.1):

- Development footprint - this is the indicative area that the project infrastructure will occupy, based on the current design, and includes laydown areas to be used during construction. This also includes the kiosk station associated with the potential power supply but does not include power poles, stays or cables, containment banks or tracks used for access during construction and operation
- Construction footprint - this includes the project infrastructure (included in the development footprint) as well as the indicative area of land required to construct the infrastructure based on the current design. This includes access tracks. The construction footprint is the area that will be directly impacted / disturbed by proposed works
- Area of investigation - this includes the development footprint, as well as a buffer around the development footprint and access tracks to allow for potential design refinements. This area has been the basis of desktop assessment and targeted field investigations. The area of investigation also includes potential levee locations which are subject to further risk assessment and therefore yet to be confirmed
- Inundation area - area of land subject to flooding during managed events, up to a specific design water level.

1.3 Purpose of assessment

The purpose of this desktop historical heritage assessment is to:

- Identify registered historic heritage places potentially impacted by construction works or managed inundation
- Identify likelihood of unregistered historic heritage being encountered in construction areas
- Describe likely approval requirements
- Describe further investigations and/or recommended management measures.

1.4 Desktop assessment

This desktop assessment involved the following activities:

- Register searches
- Review of previous heritage reports and local heritage studies, site cards and other site information
- Background historical research including historical maps and plans
- Synthesis of background information to identify known heritage places both in the area of investigation and within the inundation areas, and areas with potential for previously unidentified heritage places
- Summary of potential impacts and mitigation measures
- Identifying further heritage investigation required to meet legislative requirements and to minimise project risk
- Identifying approvals requirements under the *Heritage Act 2017* (the Heritage Act), local planning schemes, and *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

1.5 Authorship

This report was prepared by Caroline Seawright (Project Archaeologist, R8). Mapping was prepared by Nicole Kiely (Senior Consultant – Spatial and Information Services, R8). A technical review was undertaken by Rose Overberg (Principal Heritage Consultant, R8).

1.6 Assumptions and limitations

The constraints are as follows:

- The assessment was undertaken using the assessment area provided by VMFRP based on the current design.
- No field investigation was undertaken
- The register searches were undertaken on 22 May 2020 and any findings within this report are based on those search results. As such, this report is accurate as to the date of that generation.

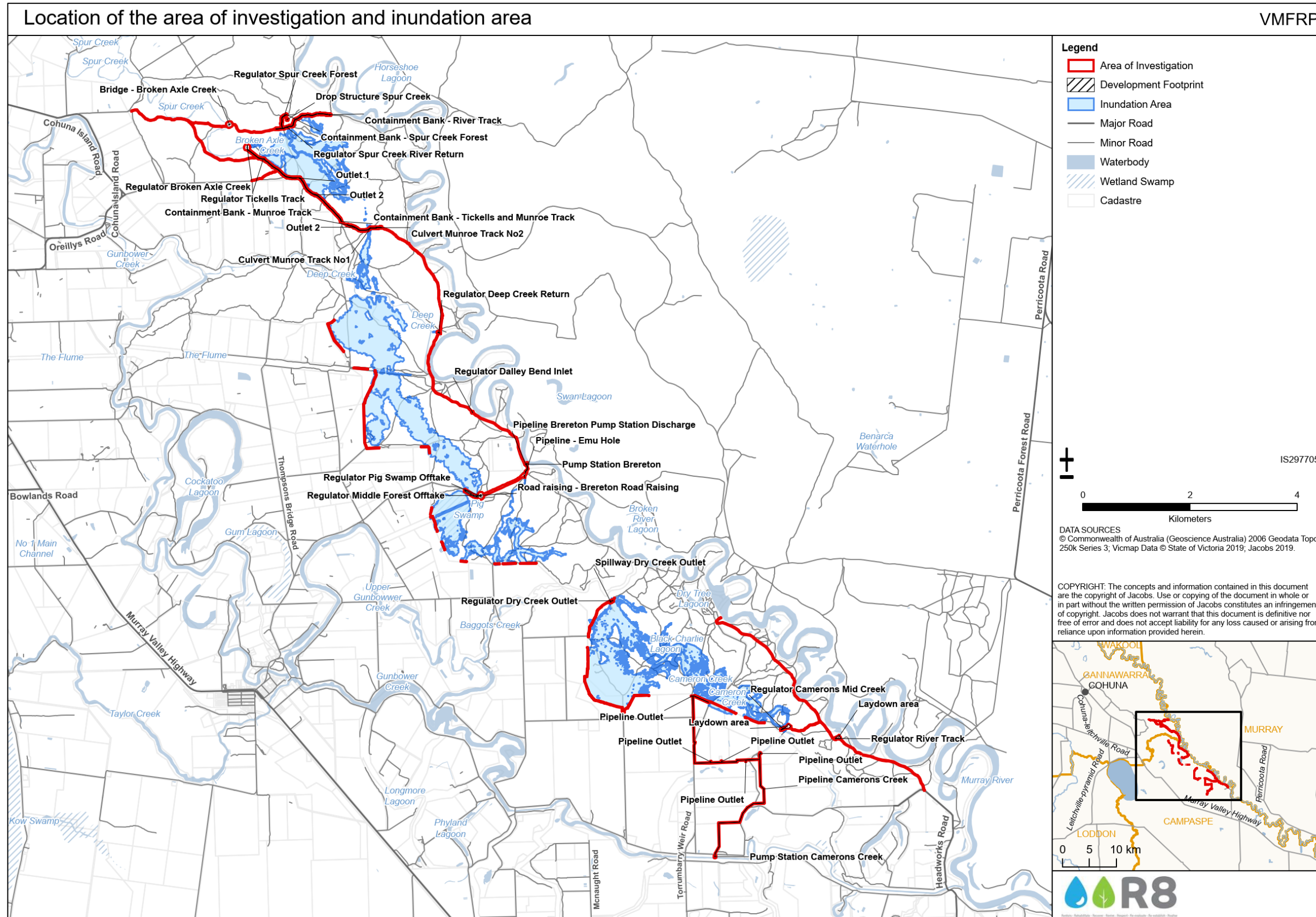


Figure 1.1: Location of the area of investigation and inundation area

2. Desktop review

2.1 Heritage context

2.1.1 Register searches

The following heritage registers were searched on 22 May 2020 by Caroline Seawright (Project Archaeologist, R8) to determine whether any known historical heritage places were present within or in proximity to the area of investigation and to the inundation area:

- Victorian Heritage Register (VHR)
- Victorian Heritage Inventory (VHI)
- Gannawarra Planning Scheme Heritage Overlay (Gannawarra HO)
- Campaspe Planning Scheme Heritage Overlay (Campaspe HO)
- Commonwealth Heritage List (CHL)
- National Heritage List (NHL)
- World Heritage List (WHL)
- Register of the National Estate (RNE)
- National Trust of Australia (Victoria) (NT).

There are no historical heritage places within proximity to the area of investigation or inundation area (Figure 2.1).

The closest historical heritage place to the area of investigation comprises Torrumbarry Weir Lock Chamber, Steam Boiler and Steam Winch Complex (H0993/Campaspe HO202/RNE 101506), which is situated on the Murray River. It is approximately 266 m to the north of the Upper Gunbower Forest area of investigation, and approximately 1 km east of the Upper Gunbower Forest inundation area.

2.1.2 Previous historical heritage assessments

There have been five historical heritage investigations undertaken in proximity to the area of investigation (Table 2.1). Only the Thematic Environmental History of the *Gannawarra Shire Heritage Study Stage One* is presently available; no additional volumes or stages of the study are currently available for review.

Table 2.1: Summary of the existing historical archaeology due diligence assessments

Author	Summary
Hyett (2005)	<p>TerraCulture undertook an archaeological survey of three bridge replacements within Gunbower Forest, on behalf of the Mid Murray Forest Management Area (FMA) as part of proposed bridge replacement works. These comprised Suicide Bridge (approximately 550 m north of the Middle Gunbower Forest area of investigation), McKay Bridge (approximately 465 m north of the Middle Gunbower Forest area of investigation), and Barham Cut Bridge (approximately 22 km northwest of the Middle Gunbower Forest area of investigation).</p> <p>The results of the desktop assessment noted that there was the potential for the following types of historical heritage places or archaeological sites to be identified across Gunbower Island:</p> <ul style="list-style-type: none"> ▪ Colonial exploration and settlement ▪ Pastoral and agricultural industry ▪ Industrial and extractive industries ▪ Transport and communications.

Author	Summary
	<p>The archaeological report also stated that Gunbower Island had yet to be subject to a systematic survey for archaeological sites and features for non-Aboriginal use of the area. However, the report noted that of particular interest were historical references to mid nineteenth century shepherds' huts situated along Gunbower Creek; these do not appear to have been investigated due to their distance from the study area.</p> <p>During the field survey, no archaeological sites or features were located within the survey area, although McKay Bridge situated near the Upper Spur-Creek Weir (D7726-0007), the weir being on the Murray River. Logging was noted as having occurred at each of the three locations.</p>
<p>Ballinger (2005); Ballinger <i>et al.</i> (2005a); Ballinger <i>et al.</i> (2005b)</p>	<p>Robyn Ballinger, Tom Henty, Lorraine Huddle, Ian Wight published the Campaspe Shire (Gaps) Heritage Study for the Shire of Campaspe in 2005, predominantly focussing on the unsurveyed rural areas – the towns of Rochester, Kyabram and Lockington, and other smaller towns and rural areas of the Shire.</p> <p>It included a review of 191 places of potential significance identified by the Campaspe Heritage Advisory Committee, as well as considering any obvious gaps in terms of themes, places types or evident omissions; the Campaspe Shire (Gaps) Heritage Study ended up identifying 884 places of potential cultural heritage significance, 76 of which were assessed in detail. Of these, one place was recommended for addition to the VHR, three places were recommended for the VHI, and 69 were recommended for addition to the Campaspe Planning Scheme. Four heritage precincts were surveyed and assessed: Tongala Precinct, Kyabram Commercial Precinct, Kyabram Union Street Precinct, and Lockington Precinct.</p> <p>Within the localities in which the area of investigation is situated, a number of heritage places were recommended for listing on the Campaspe HO – Two places were identified in Patho, only one of which was recommended for the Planning Scheme: Uniting Church and Wesleyan Chapel (HO612), and Torrumbarry Weir Siding site which did not meet the criteria for inclusion on the HO; one place was identified in Torrumbarry: Torrumbarry Hall (not currently listed on the HO); three places were identified on Gunbower Island: Gunbower Island School No. 3503 (former) (HO601), 'Tarilta' homestead (HO605), and Tobacco kilns (HO606); and eight places in Gunbower: Gunbower Coop. Butter Co. (former) (HO602), Gunbower Estate (HO603), House (HO604), Christ Church Anglican Church (HO607), St Mathews Catholic Church (HO608), Uniting Church (HO609), Gunbower Soldiers Memorial Hall (HO610), and Gunbower State School 2231 (not currently listed on the HO).</p> <p>None of these heritage places are within, or adjacent to, the area of investigation or the inundation area; the closest of these historical places to the area of investigation comprises Gunbower Island School No. 3503 (former) (HO601), at approximately 440 m to the west. However, these places highlight the historical uses of the region, which included tobacco growing and dairying, and the establishment of both rural estates and townships.</p>
<p>Ballinger (2008)</p>	<p>Robyn Ballinger prepared the Stage One Heritage Study on behalf of the Gannawarra Shire in 2008. Volume one comprises a thematic history of the Shire and does not identify either individual places of historical heritage importance or heritage conservation areas.</p> <p>The first use of the Gunbower area was as Gunbower Run, which comprised 180,000 acres of land licensed to James Hutton Rowan in 1846 for sheep and cattle raising. According to the study, sometime between then and selectors taking up land from c.1873, sawmillers came to Gunbower Island for timber getting. Between 1874 and the 1890s, barges and paddle steamers were built on Gunbower Island by Blair, Westergate and Chadwick, from wood cut on the island at sawmills operated by Blair and McGouther, Nelson, and Gray and Robson. One of three graves found on Cemetery Bend, which is on Gunbower Island within the locality of Cohuna, is thought to belong to the son of a sawmill, William Mathers. The Kerang-Koondrook tramway, which opened in 1889, was used to transport large numbers of sleepers cut on Gunbower Island from Koondrook. The study also mentions barges hauling timber, railway sleepers, and logs for the fellers and saw millers working within the 'red gum forests of Koondrook and Gunbower Island' in 1922. As such, Gunbower State Forest has been subject to historic logging, which 'had taken a significant toll on forests by the early 1870s' (Ballinger 2008, p. 61).</p> <p>'The timber industry that once operated on Gunbower Island is evidenced by timber cutter steps etched into trees, a levee bank thought to have been built by a community associated with a timber mill in operation from the 1870s, and a clearing linked to Robson's mill site. The site of a Forest Commission nursery, established on Gunbower Island in 1887, is evidenced by the growth of Gippsland pine and mountain ash' (Ballinger 2008, p. 62).</p> <p>The Gunbower State Forest is mentioned in relation to steam driven pumps being installed by the Cohuna Irrigation Trust along the Murray River with earthen channels running through the forest in the late 1880s. The pumps comprised two 34-inch Weymouth pumps which delivered water through the forest to Gunbower Creek</p>

Author	Summary
	<p>and Barr Creek to irrigate 150-acre feet of land per day. By 1897, farming allotments had been established on Gunbower Island; however, most settlements collapsed due to the inexperience of settlers and poorly chosen land. Between 1919 and 1923, the River Murray Commission oversaw the construction of the Torrumbarry Weir and Lock on the River Murray downstream from the Gunbower Creek off-take at Torrumbarry in the period 1919-1923. This boosted irrigation supplies to the districts of Koondrook, Gannawarra, Cohuna and Kerang. Additionally, tobacco was grown on the sand hills situated on Gunbower Island from 1931.</p> <p>Gunbower Island is therefore likely to contain historical heritage relating to timber getting, paddle steam making, early irrigation networks, and cattle grazing, and farming.</p>
<p>Kaufman and Ballinger (2014)</p>	<p>As part of North Central CMA's Gunbower National Park Flood Enhancement Project (now Gunbower National Park Floodplain Restoration Project – this project), which is a part of the overall Sustainable Diversion Limits (SDL) project, the construction of infrastructure to divert and control environmental water on the floodplain was proposed. To enable this project to progress, LRGM – Services undertook a non-Indigenous cultural heritage assessment and historical archaeological survey of the Gunbower National Park study area. This study encompassed six works areas across the Gunbower State Forest, five of which partially intersect with the areas of investigation.</p> <p>Desktop researched identified several sites on Gunbower Island, including Masters House (VHR H2330), Torrumbarry Weir Lock Chamber, Steam Boiler and steam winch complex (VHR H0993/Campaspe HO202/RNE 101506/National Trust B6516), Upper Spur Creek Weir (VHI D7726-0007). Several additional sites were noted on Heritage Victoria's Hermes database, including Torrumbarry Irrigation System, Masters Hut Masters Landing (associated with H0993), Old Cohuna Headworks (nominated to the VHR as Cohuna Headworks), Torrumbarry Weir (associated with H0993), and Old Straight Cut Channel. Community consultation revealed a number of new historic sites, including the Gunbower Boys Camp, Old Deep Creek Road Crossing and several old regulator sites. The remainder of the historic sites/features recorded were located in the field.</p> <p>The Old Straight Cut is a large straight channel running from the River Murray near the end of Brereton Road through to the Upper Gunbower Lagoon, with a large embankment or levee on each side. Only a section of the northern embankment has been removed beside Brereton Road, likely due to roadworks. While Old Straight Cut Channel was identified as being a potential heritage item, no archaeological sites were located during the site inspection. Additionally, no legislative compliance issues relating to historic cultural heritage were identified. This place was assessed as being of insufficient significance to merit nomination to a Statutory listing. However, it was determined to be a component of the overall historic landscape of the area. As such, a policy of minimum disturbance to components of the historic landscape, including Old Straight Cut, was recommended.</p> <p>Identified sites confirmed during the site inspection comprise:</p> <ul style="list-style-type: none"> ▪ Cohuna and Gannawarra Pumps (nominated to the VHR as Cohuna Headworks, but its heritage status has not been confirmed with HV) <ul style="list-style-type: none"> ▪ Assessed as being of State (historical, scientific [technological]) significance, meeting Heritage Council Criteria A, B, C and F ▪ The Gannawarra Pump (headworks) is situated at the eastern end of the Old Cohuna Channel and formerly pumped water from the river into the channel, or into Deep Creek by a connecting channel. The Cohuna Pump (headworks) is about 200 m ESE of the Gannawarra Pump and is connected to the Old Cohuna Channel via a large excavated channel. ▪ Noted as being in good archaeological condition, as concrete fabric is robust and at low risk ▪ Intersect with the Middle Gunbower Forest area of investigation ▪ Deep Creek Inlet <ul style="list-style-type: none"> ▪ Assessed as being of Local significance ▪ It comprises both structural and archaeological features: part of the main Deep Creek channel, a pondage on the west side of River Track, a culvert under the roadway with a gate operated by a wheel on a platform constructed at road level, a low timber-edged earth platform on the north edge of the pondage, and a small-diameter pipe protruding from the earth near a small pondage on the east side of the track, a number of timber posts and diagonal beams from the banks of the Murray River immediately north of the Deep Creek offtake, and a concrete footing measuring 1.2 m² and 0.3 m tall near two large, flanged steel pipes that protrude from the earth 4.5 m to the west

Author	Summary
	<ul style="list-style-type: none"> ▪ The gate-opening structure over the culvert under River Track was in fair-good structural condition; the timber-edged earth platform beside the western pondage was in fair-poor archaeological condition; the timber structure on the bank of the Murray was in poor condition, with poor integrity; the possible machinery site was in good archaeological condition, but it was difficult to assess its integrity ▪ Located adjacent to the Middle Gunbower Forest area of investigation ▪ Boys Camp, Gunbower <ul style="list-style-type: none"> ▪ Assessed as being of Local significance ▪ The principal features include an offtake from Deep Creek, small irrigation channels and remnants of former fences (which may outline irrigated garden beds), and rubbish (steel scrap, building materials, household refuse etc) dumped in places around the site ▪ Fair archaeological condition, but the inspection was cursory and closer inspection may reveal archaeological fabric of former buildings or camps ▪ Not within the area of investigation or inundation area ▪ Old Pump Site, Deep Creek <ul style="list-style-type: none"> ▪ Assessed as being of Local significance ▪ The pump site, which is located on the northern bank of Deep Creek several hundred metres east of the Deep Creek Road junction, includes rotting heavy timber frame footings approximately 3 m x 1 m with seven thick hold-down bolts extending vertically, two rotting posts cut off near ground level adjacent to the footings, and a channel which crosses Deep Creek Track ▪ The timber footings were in an advanced state of decay ▪ Not within the area of investigation or inundation area ▪ Wooden Bridges, Old Cohuna Channel <ul style="list-style-type: none"> ▪ Assessed as being of Local significance ▪ Bridge No 1 is a timber bridge with a deck measuring approximately 10.6 m x 3.75 m, while Bridge No 2 is a timber bridge with a deck measuring approximately 7.47 m x 3.8 m; both are situated on Hancock Track, and span channels entering Old Cohuna Channel from the south ▪ Bridge No 1 was in poor structural condition and is no longer used, but Bridge No 2 was in fair-good structural condition and was still in use ▪ Intersects the Middle Gunbower Forest inundation area ▪ Old Road Crossing, Deep Creek <ul style="list-style-type: none"> ▪ Assessed as being of Local significance ▪ A former road crossing of Deep Creek that comprises a transverse mound of earth with upright timber retaining posts on the western side, located within the Deep Creek channel; a few timber uprights and horizontal boards survive on the eastern side, along with some faint traces of the former road alignment (particularly to the south) ▪ The former road crossing was in fair-poor condition, with poor integrity ▪ Not within the area of investigation or inundation area ▪ McKays Mill <ul style="list-style-type: none"> ▪ Assessed as being of Local significance ▪ Little fabric remains of the former sawmill, which includes a large diameter wire rope is wrapped around a tree, and a large block of concrete made from brick-rubble aggregate to the west that is no longer <i>in situ</i>; the principal visible archaeological features are a long narrow trench lined with reinforced concrete, a rectangle marked with laid, flat stones (possible chimney position), three long shallow indentations faintly visible in the ground surface, and another network of faint indentations that could represent bed-log positions for machinery ▪ The site was in fair-poor archaeological condition and the integrity was poor – the concrete and stone fabric is noted as being robust, but of low relief and vulnerable to earthworks ▪ Adjacent to the Middle Gunbower Forest area of investigation ▪ Possible Pump Site, Baggot Creek Inlet <ul style="list-style-type: none"> ▪ Assessed as being of Local significance

Author	Summary
	<ul style="list-style-type: none"> ▪ This site comprises two small distribution channels that begin near the bank of the river on the heavily eroded river bank ▪ The channels were in fair condition; no trace of any former pumps or pumping engines were visible ▪ Not within the area of investigation or inundation area ▪ Old Weir, Mackays Bridge <ul style="list-style-type: none"> ▪ Assessed as being of Local significance ▪ The former weir comprises two raking concrete abutments that are visible on the south side of Mackays Bridge, and remnant timbers sandwiched between concrete blocks on each abutment ▪ Poor structural condition and integrity, with little fabric remaining ▪ Intersects the Middle Gunbower Forest area of investigation ▪ Old Regulator Positions, Old Cohuna Channel <ul style="list-style-type: none"> ▪ The operational fabric of former Gannawarra Pump was assessed as being of Local significance, but contributes to State significance of the wider Cohuna and Gannawarra Pumps site and is included in that heritage place's nomination to the VHR ▪ This comprises the western regulator, with scant remnants of timber walling at the top of both the north and south banks of the channel, and the eastern regulator, which is inferred by mounds of earth extending out into the channel from both banks ▪ Poor condition and integrity; very little fabric survives, and the little that does is noted as not durable ▪ Not within the area of investigation or inundation area ▪ Redundant Regulator, Deep Creek <ul style="list-style-type: none"> ▪ Assessed as being of low Local significance ▪ The two-gate concrete regulator is situated on the south side of the Old Cohuna Channel, with a high wire fence and gateway built across the bank between the head of this channel and the southern edge of the Old Cohuna Channel, and a small excavated bay containing a concrete wall which formerly housed a gate that is located on the east side of a secondary channel ▪ The regulator was in good structural condition, although missing the sluice gates ▪ Intersects the Middle Gunbower Forest area of investigation ▪ Masters Hut and Landing (VHR H2330) <ul style="list-style-type: none"> ▪ Confirmed as being of State significance ▪ This comprises a rambling weatherboard house/hut on the banks of the River Murray, with no visible evidence of a former wharf or jetty ▪ The house appeared to be in fair structural condition ▪ Not within the area of investigation or inundation area ▪ Concrete Pits, Torrumbarry Weir <ul style="list-style-type: none"> ▪ Assessed as being of Local significance ▪ Two old concrete-lined pits were recorded in an area between the car park for the present boat ramp and Torrumbarry Weir Road; they are approximately 1.8 m x 1.6 m with unknown depth which may contain subsurface features ▪ Fair-good condition; the concrete-lined pits have filled with earth and are of robust fabric ▪ Adjacent to the Upper Gunbower Forest area of investigation ▪ Cameron Creek Bridge <ul style="list-style-type: none"> ▪ Assessed as being of Local significance ▪ This bridge consists of a timber deck built over raking concrete abutments with a two-bay weir installed underneath; the deck of unusual construction (four panels of transverse planks), and is approximately 4.94 m x 3.03 m – all the timber components are sawn and no round poles have been used ▪ Condition varies; early fabric (timber) tends towards poorer condition due to environmental decay ▪ Intersect with the Upper Gunbower Forest area of investigation ▪ Cameron Creek Regulator (Weir) <ul style="list-style-type: none"> ▪ Assessed as being of Local significance

Author	Summary
	<ul style="list-style-type: none"> ▪ This comprises a two-gate concrete weir installed in an earthen dam across Cameron Creek, which sets water levels with wooden drop bars ▪ Condition varies; timber fenceposts are vulnerable to environmental decay and fenceposts are also combustible ▪ Located within the Upper Gunbower Forest inundation area.
Shire of Campaspe (2014a; 2014b; 2014c)	<p>In 2014, the Shire of Campaspe undertook a review of heritage precincts and individual heritage places across the municipality to ensure that the information was up to date and accurate for the Campaspe Planning Scheme Amendment C50.</p> <p>The following precincts were supported and deemed appropriate to be adopted by the Panel (subject to a number of minor changes) and included in Part 1 of the C50 Amendment: Old Echuca Township (HO1), Echuca Central (HO2), Echuca Central Residential (HO3), Echuca North Residential Precinct (HO87), Kyabram Commercial (HO127), Union Street Kyabram (HO128), Rochester (HO203), Rushworth (HO301), Whroo (HO312), and Lockington (HO401). Echuca East Residential (HO86) and Tongala (HO501) were recommended for further work and public exhibition.</p> <p>The Panel recommended the majority of proposed individual properties be advanced with some minor revisions, while the generic Statements of Significance for schools, halls, and churches were recommended to be held over for Part 2 of the C50 Amendment.</p> <p>Of the individual places, the following were located within the localities in which the area of investigation is situated: Uniting Church and Wesleyan Chapel (HO612), Gunbower Island School No.3503 (former) (HO601), 'Tarilta' homestead (HO605), Tobacco kilns (HO606), Gunbower Coop. Butter Co. (former) (HO602), Gunbower Estate (HO603), Dwelling (HO604), Christ Church Anglican Church (HO607), St Mathews Catholic Church (HO608), Uniting Church (HO609), and Gunbower Soldiers Memorial Hall (HO610).</p> <p>As with the 2005 Campaspe Shire (Gaps) Heritage Study, none of these heritage places are within, or adjacent to, the area of investigation or the inundation area. These places highlight the historical uses of the region, which included tobacco growing and dairying, and the establishment of both rural homesteads and townships.</p>

2.2 Historical context

2.2.1 Historical background

Non-Aboriginal settlement of the Gunbower region first occurred after Charles Sturt's exploratory expedition along the Murray River in 1830, and Major Thomas Mitchell's Australia Felix exploration in 1836 (Bell 2013, p. 17). Sturt named Lindesay River (now known as Lindsay River) on 27 January 1830 after his commanding officer, Colonel Patrick Lindesay (Cumpston 1951; Feeken 2019). An 1838 map of the South Eastern Portion of Australia and Mitchell's three expeditions show that Mitchell crossed to the north side of the Murray River at on 15 June 1836, near the confluence of the Murray and Murrumbidgee Rivers, and continued westwards along the Murray River before headed northwards along the Darling River after 30 May 1836 (Mitchell 1838).

The area of investigation is within the former Gunbower and Torrumbarry squatting runs. Gunbower Station covered an area which roughly included the current townships of Cohuna, Wee Wee Rup and Gunbower (at its western boundary) and east to the River Murray. The eastern boundary of Torrumbarry was at Gunbower, and the run also roughly encompassed Torrumbarry and Roslynmead. The Gunbower run was taken up by James Hutton Rowan two years before it was gazetted in 1848 (Spreadborough and Anderson 1983, p. 166). Prior to this, in 1884 the present-day Gunbower State Forest area was situated within land marked as State Forest (Department of Lands and Survey 1884). Following this, it was taken up by George Christian Rowan in 1851, followed by George Houston in 1856. Henry Miller then took over its license for a few months in 1868, before it was taken over by Richard Goldsbrough and Hugh Parker in the same year. The last recorded licensee was Salathiel Booth of Kyneton in 1873 (Spreadborough and Anderson 1983, p. 166). An 1845 plan of the station, cited by Coulson (1995), reportedly shows that the original homestead station and shepherds' huts on Gunbower Creek, situated at the western end of the run near Spence's Bridge. A later map, dating to 1864, shows the homestead on the southern bank of Gunbower Creek, rather than on Gunbower Island (Hyett *et al.* 2005, p. 13).

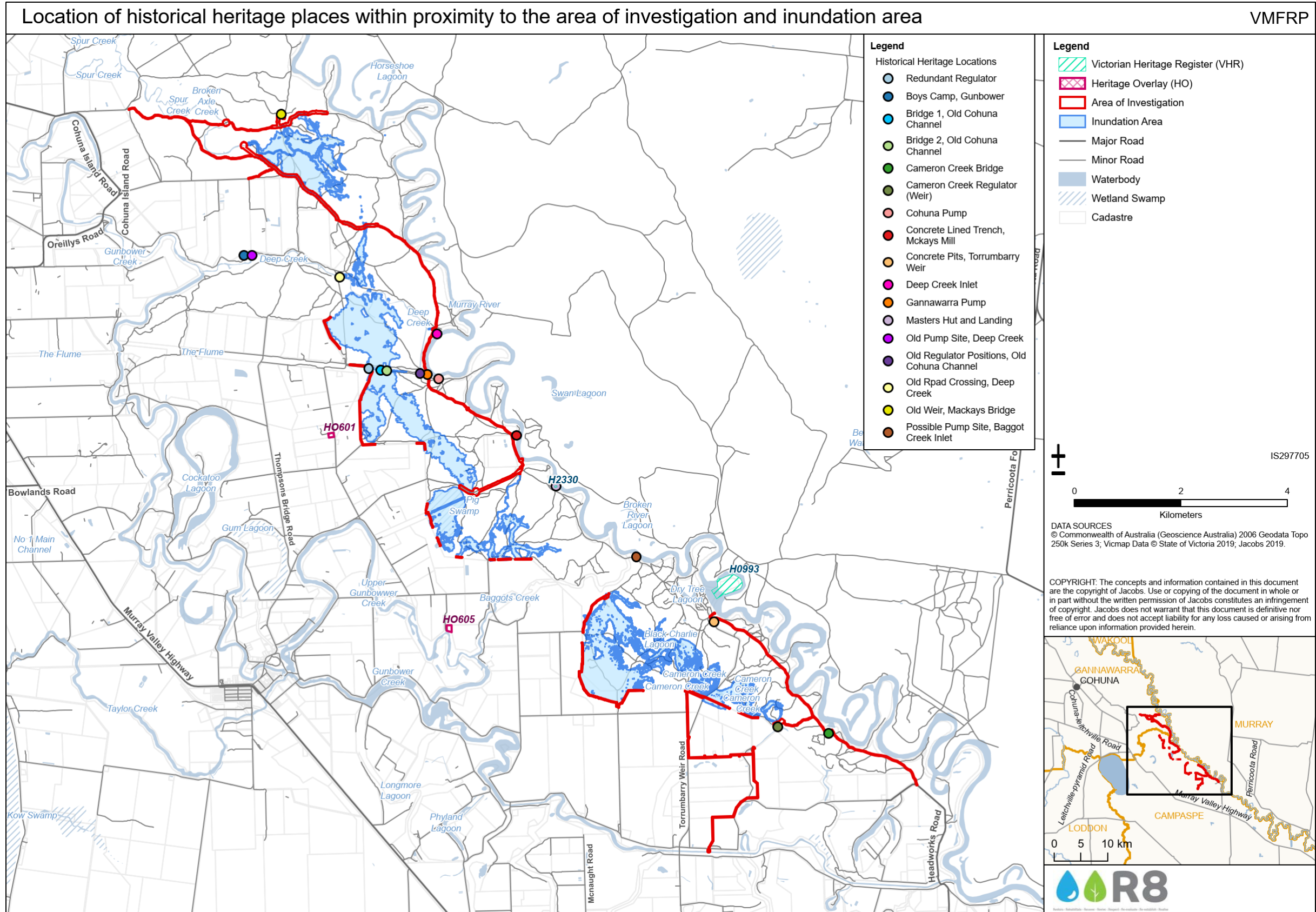


Figure 2.1: Location of historical heritage places within proximity to the area of investigation and inundation area

Torrumbarry Run was gazetted in 1847, but was originally taken up by J and W Collyer six years prior. It was then leased to W D Collyer in 1853, followed by the Colonial Bank of Australasia in 1857 for a few months, before passing on to Edward Rowe, Richard Goldsbrough and George Kirk. It was then taken up by Hugh Glass in 1859, and subdivided into Torrumbarry East, Torrumbarry Middle, and Torrumbarry West in 1862; the present activity area was situated in the former Torrumbarry West run. Torrumbarry West was passed on to Blackwood and Ibbotson in 1869, and finally forfeited in 1880 (Spreadborough and Anderson 1983, pp. 191-192).

By around 1850, several huts had been established along the smaller rivers and creeks to the west of the Murray River (Figure 2.2). These include 'Old Hut' which appears to have been near the former alignment on Gunbower Creek near the current intersection of Torrumbarry Weir Road and the Murray Valley Highway; 'Wurrumbery Collyer's 7 Mile Hut' near today's Mayers Lane; 'Nannilla Collyer's 12 Mile Hut' near the present-day confluence Upper Gunbower and Gunbower Creeks; and 'Rowan's 17 Mile Hut', now at the location of Gunbower Estate (H603), off the Murray Valley Highway. Some of these huts, or the location names by which the huts went, appear to have been well-known for at least a couple of decades. In *An Act to consolidate and amend the Laws relating to Local Government*, which dates to 1874, 'Nanilla and Rowan's seventeen-mile hut' are mentioned to help signpost the boundaries of the Echuca municipal district (Victorian Government 1874); Nanilla appears to have been the name of the creek between Kow Swamp and Gunbower Creek (now Taylor Creek) and the name of a Parish near Gunbower during the late 1800s (State of Victoria 1868a; 1868b; 1879; 1890). Mapping indicates that Wurrumbery likely relates to a former waterway that is no longer extant due to the construction of the National Channel in the 1890s (Bisset *et al.* 2015). Rowan's 17 Mile Hut appears to be related to the Rowans who occupied Gunbower Run, as the hut is in the approximate location of the Gunbower Estate (H0603) heritage boundary. None of these structures are located within the vicinity of the area of investigation or the inundation area.

The present-day township of Gunbower was gazetted in 1879, five years after the first primary school was established in the Gunbower Creek district. The present-day primary school at Gunbower was opened in 1881, along with the establishment of the Gunbower Racing Club, situated opposite the present-day Gunbower Hotel (which was built in 1941). The racecourse was subsequently moved to Fox Island, part of Gunbower Island, in the early 1900s (Victorian Places 2015a). In 1903, Gunbower was known as an agricultural area of importance, primarily growing wheat and barley, as much of the land having been selected under the Land Act of 1869. The surrounding region was known for timber getting, with wood such as swamp gum, box, dogwood, myall, tea tree, and several kinds of acacia being harvested (Gordon and Gotch 1903). The Elmore to Cohuna railway line was opened, with Gunbower railway station being extant from 1915 to 1981 (VicSig 2020; Victorian Places 2015a).

Patho, the locality between the localities of Gunbower and Torrumbarry, comprises a mixture of irrigated and dry farming on the Patho Plain. This district was split between the Gunbower and Torrumbarry squatting runs in the 1840s, but by the 1870s was partially subdivided for farming selections. A Methodist chapel was opened in Patho in 1876, which doubled as Gunbower Creek school from 1877. By 1888, the school was renamed as Patho. During the 1880s, the Cohuna Irrigation Trust brought water from the Murray River (and Kow Swamp) to small irrigated holdings within the locality. Once Torrumbarry Weir was completed (it was built between 1919 and 1924), the Patho area was opened up for substantial irrigation (Victorian Places 2015b). Patho railway station was added to the Elmore-Cohuna railway line, which allowed for the transport constructions materials to the weir. As with the station at Gunbower, Patho railway station was established in 1915, and closed in 1981 (Australian Railways Wiki n.d.; VicSig 2020; Victorian Places 2015b). The school closed in 1979 (Victorian Places 2015b).

Torrumbarry comprises a rural village on the Murray Valley Highway, which was named after the original Torrumbarry Run. The Torrumbarry region has mainly been used for dry farming, after the region was opened for farming selection during the 1870s. The township of Torrumbarry was gazetted in 1874, with four schools opening in the district between 1875 and 1876 (Victorian Places 2015c). Torrumbarry was part of the Rochester Irrigation District, and was supplied with water by the Waranga Western Channel after it was built in 1909 (Shire of Campaspe 2014b, p. 126; Victorian Places 2015c). After Torrumbarry Weir (H0993/HO202) was opened at the eastern end of Gunbower Island in 1924, after a five-year building programme, the Torrumbarry region was more extensive irrigated. The weir serves as a lock on the Murray River, and as storage for an irrigation system that extends westwards towards Swan Hill. The water from the weir is carried by gravitation by the National

Channel, across the Gunbower Island to the Kow Swamp storage and to Gunbower Creek. Most irrigation water goes to dairy farming. Today, Torrumbarry Weir is used for watersports, with camping areas nearby, and is part of Gunbower National Park. Today, Torrumbarry has a hotel/motel, a hall, a church, and a recreation reserve (Victorian Places 2015c).

Victorian river red gum forests have been harvested on Gunbower Island since early settlement, with barges and paddle steamers being built on Gunbower Island from 1874 and into the 1890s (Ballinger 2008; DSE 2003, p. 14). Along the Murray River they were heavily cut between 1860 and 1880 to service river transport along the Murray River and the expansion of the state's railway system (DSE 2003, p. 14). The first major use of River Red Gum was by Collier and Bury who were contracted to source the sleepers for the Bendigo to Echuca Railway line (Bonhomme 1990). In recent years, a single sawmill has taken logs from Gunbower forest which are used for heavy construction timbers, railway sleepers, house stumps, furniture timbers, flooring, and fence posts. Only River Red Gum has continued to be harvested, however, species of Box were harvested in the past. Timber harvesting and silvicultural practices have resulted in an altered age structure of the forest that is generally younger, modified vegetation (DSE 2003, p. 14). John McKay set up a sawmill on Gunbower Island in 1917, after acquiring rights over a section of Gunbower State Forest, and bought out Cohuna Saw Mills on Gunbower Island in 1918, and set up a large sawmill near Gunbower on the Murray River in 1927 (Kaufman and Ballinger 2014, pp. 88-89).

Irrigation has also had a major impact on the water supply within and surrounding Gunbower Island. Between 1877 and 1881 there was a severe drought which resulted in the Victorian Government passing the Water Conservation Act 1883, which provided for the establishment of Irrigation Trusts. Between 1883 and 1905 the water supply for Victoria was administered by these Irrigation Trusts. Under the local management of Irrigation Trusts, channel systems were rapidly constructed, however, there was inadequate conservation of water and Trusts had to rely on seasonal flows to meet the landowner's requirements (McCoy 1988, p. 10). Local stories about the Old Straight Cut Channel suggest that it was constructed manually in 1870 by approximately 200 people using shovels and wheel barrows. It cuts through the northern section of Pig Swamp to transfer water from the Murray River to Upper Gunbower Creek. Within a year of construction, the large extant earthen block was added at the Murray River end of the channel shortly after its construction to prevent uncontrolled flooding of the Upper Gunbower Creek system; it was subsequently used to bring irrigation water to farms from the creek (Gunbower Trails 2020, pp. 21-22; Maher and O'Brien 2015). During the 1970s, the gravity-fed channel was cut to allow for natural flooding into Pig Swamp (Maher and O'Brien 2015, pp. 18, 21-22; North Central Catchment Management Authority 2014, p. 68).

With the introduction of the Water Act 1905 most irrigation areas fell under the control of the State Rivers and Water Supply Commission. Under the administration of the State Rivers and Water Supply Commission, the Torrumbarry System was developed between 1906 and 1915 along the same lines as adopted by the Irrigation Trusts, an extension of irrigation served by pumping units. However, with the completion of the Torrumbarry Weir and Lock (near Gunbower) this approach changed due to the ability to control the water supply from the River Murray. Greater control led to substantial modifications within the area between 1923 and 1924 (McCoy 1988, p. 24).

Today, the area of investigation is situated on the edge of, and within, the Gunbower National Park. As such, it is likely to have been impacted by agriculture, timber harvesting, stock grazing and river transport, and, to a lesser degree, from tourism. Gunbower forest is listed under the Ramsar Convention as a Ramsar wetland managed by Parks Victoria (Parks Victoria 2018).

2.2.2 Historical maps and aerial imagery review

In the early 1850s, the assistant surveyor's maps of the Murray River at Gunbower Island shows the present-day area of investigation and inundation area as comprising box forests and shrubbery, gum and box forest, shrubs and grassy plains, some of the plains with several small channels that fill with water during heavy floods, lagoons, and sand ridges with pine and box forests with some grassy plains along the creeks to the south of the Murray River. Along the original path of Gunbower Creek, the land to the southwest of the creek comprised sand hills, lagoons, box forests, and open grassy plains interspersed with clumps of box forests. A track runs from

'Turrumbery Collyer's Headstation', (immediately south of the present-day Baillieu Lagoon Wildlife Reserve in Torrumbarry), in the same general alignment as today's Murray Valley Highway – westwards to Patho, then northwest to Gunbower, before the track heads in a northerly direction following Gunbower Creek northwards. Several huts are situated adjacent to the track and Gunbower Creek – 'Old Hut', 'Nannilla Collyer's 12 Mile Hut', and 'Rowan's 17 Mile Hut'; 'Wurrumbery Collyer's 7 Mile Hut' is to the north of the track, but adjacent to creek, between 'Old Hut' and 'Nannilla Collyer's 12 Mile Hut' (Figure 2.2).

The presence of Turrumbery (Torrumbarry) Collyer's Headstation and huts (referring to the Collyer family who owned Torrumbarry Run during the 1840s and 1850s) shows that the land in and around Gunbower Island was used for pastoral purposes at the time. None of these places are within the area of investigation.

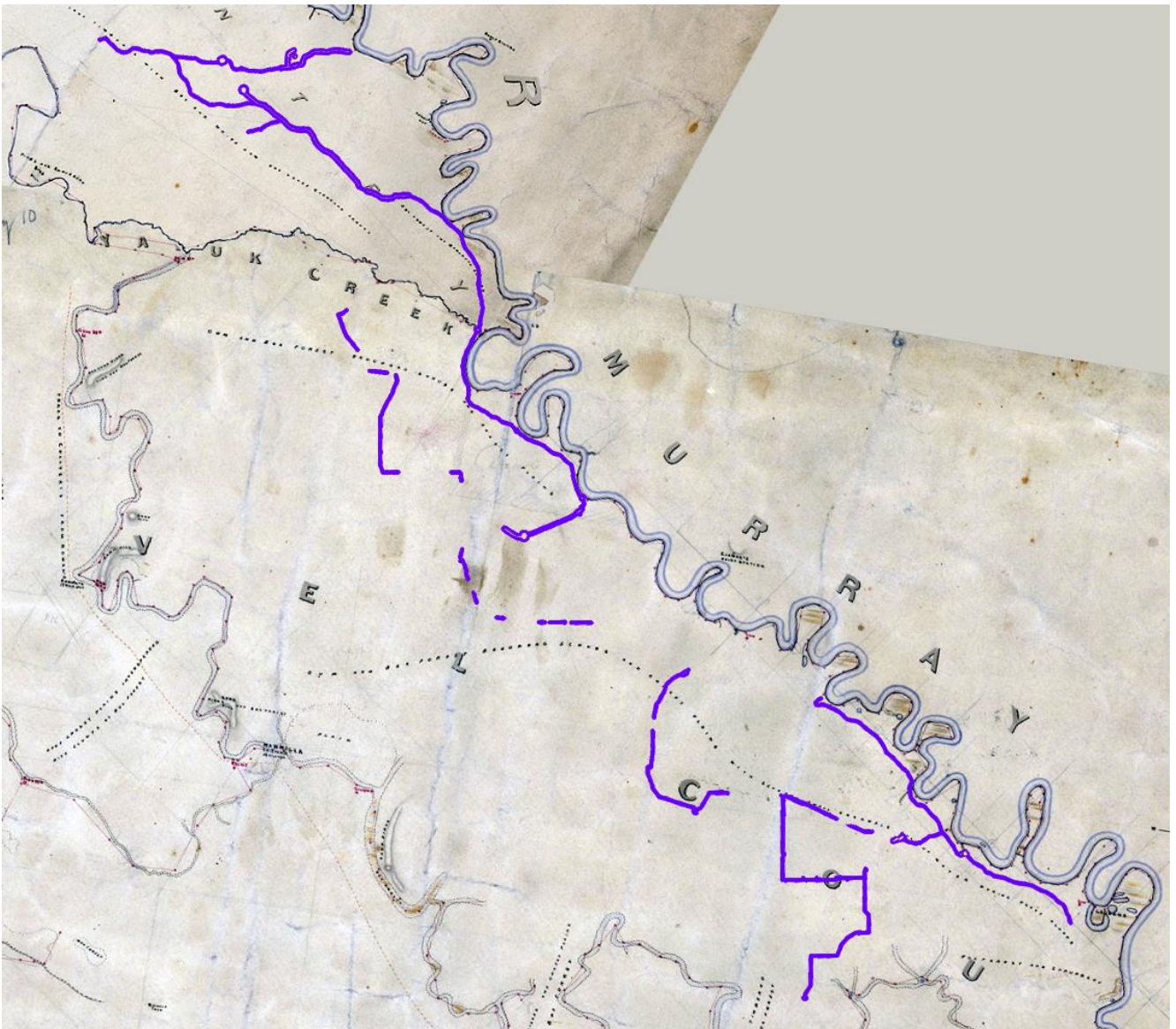


Figure 2.2: Surveyor's map of Gunbower Island, with approximate area of investigation location in purple (Urquhart 1850a; 1850b)

The County of Gunbower map from 1884 show that Gunbower Island comprised State Forest, along with much of the land to the northeast of Gunbower Creek, except for several small allotments excised from the State Forest. These comprise land between present-day Gamble, McPhail and Matthews Roads and Gunbower Creek; several allotments, including for auction, near Phyland Lagoon and today's Murray Valley Highway; and parts of two allotments, one associated with Gunbower Estate (HO603) and one for auction immediately north of

Gunbower Estate. There were no townships extant on Gunbower Island or near the area of investigation. Gunbower, Nannilla and Wurrumbery Creeks are marked on the map (Figure 2.3).

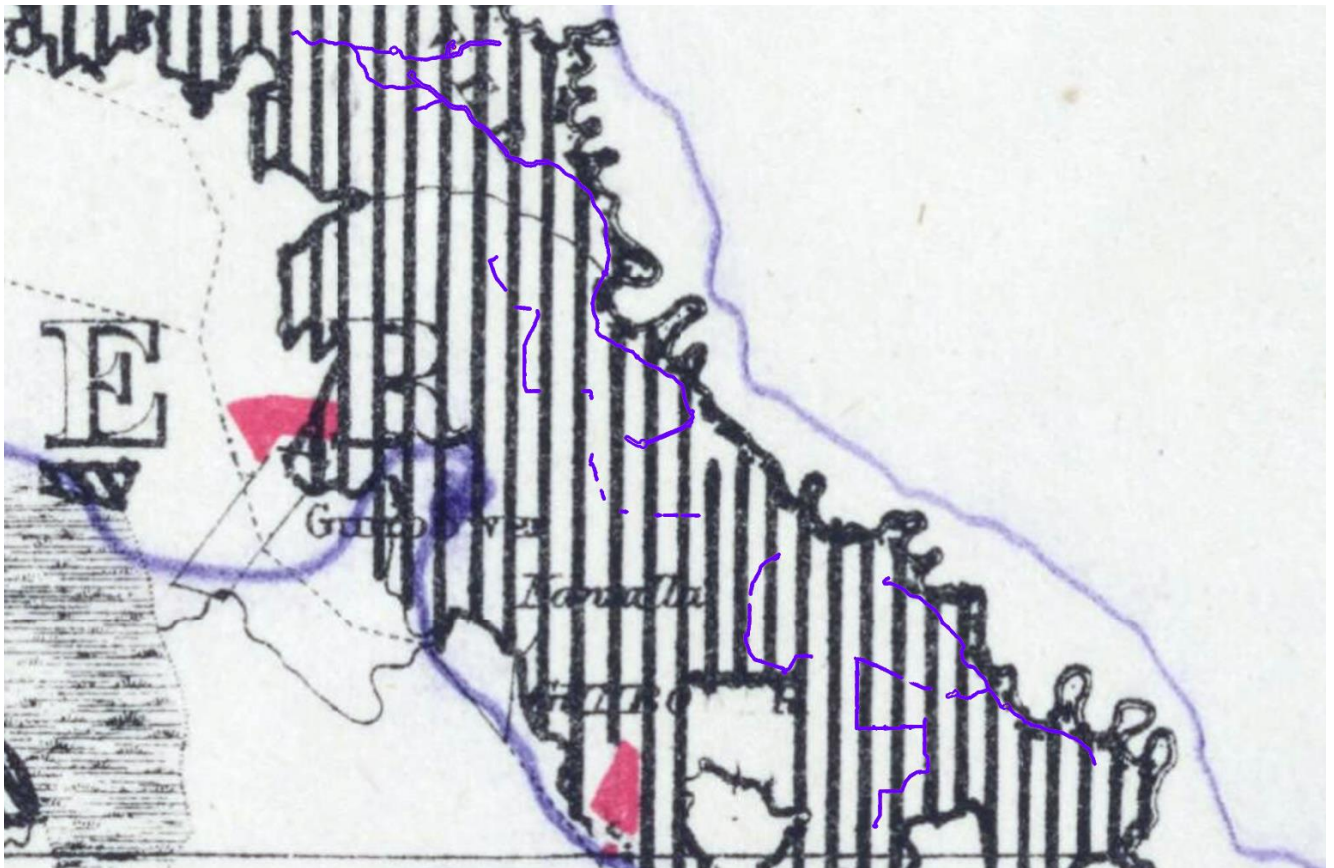


Figure 2.3: 1884 County of Gunbower map, with approximate location of the area of investigation outlined in purple (Department of Lands and Survey 1884)

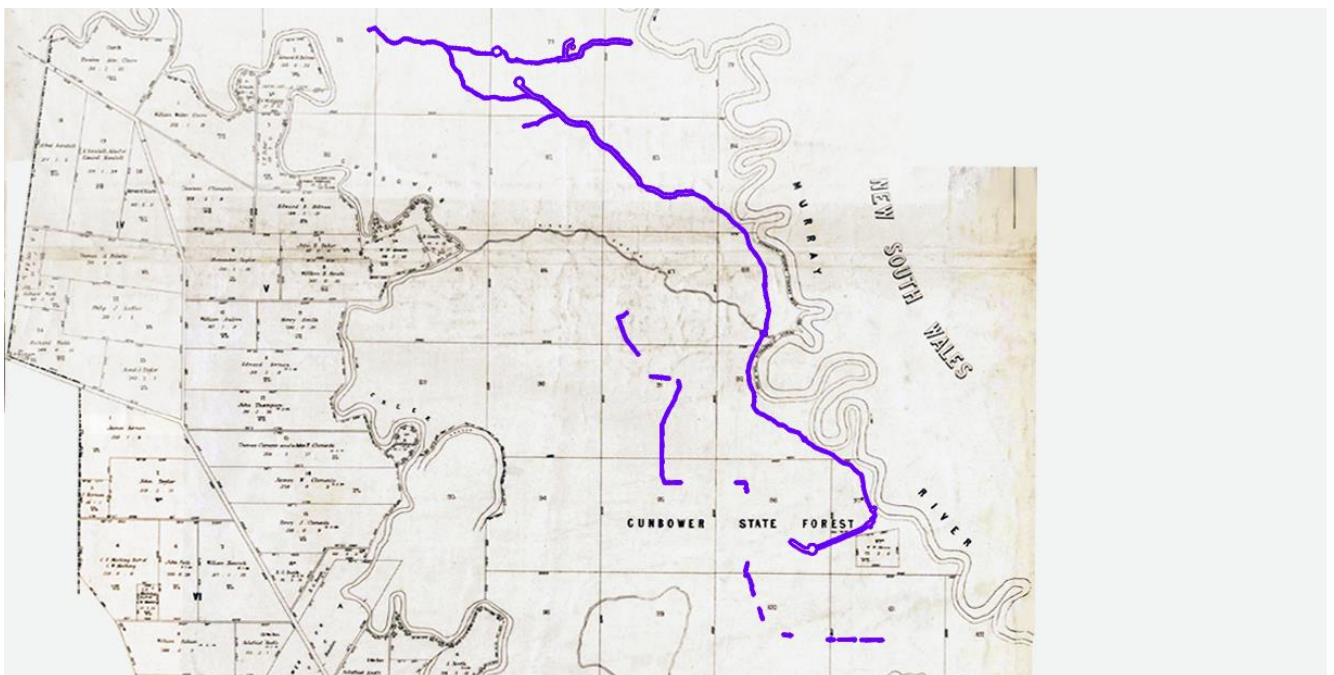


Figure 2.4: 1890 Parish of Gunbower map, with approximate location of the area of investigation outlined in purple (Victoria Department of Crown Lands and Survey 1890)

By 1890, the Parish of Gunbower map, depicting the northern portion of the Parish, shows that a single allotment, owned by WW Moore, is situated within Gunbower State Forest adjacent to the Murray River and within proximity to the area of investigation. Otherwise, the forest encompasses land between the Murray River and Gunbower Creek in the west. The township of Gunbower is depicted on the main roadway, located between Taylors and Gunbower Creeks, with the Gunbower Pre-emptive Rights allotment (to Gunbower’s northwest) being owned by George Houston. No irrigation channels are noted on this map (Figure 2.4).



Figure 2.5: 1916 Gunbower county map, with approximate location of the area of investigation outlined in purple (Department of Crown Lands and Survey 1916)

A 1916 map of the County of Gunbower map shows that the area of investigation intersected primarily sits within Gunbower State Forest adjacent to gazetted allotments; the Gunbower State Forest in this area is now approximately half its original size, as land in the western portions of the former forest have been subdivided into rural-residential allotments. Several channels are shown in the forest, cutting across the area of

investigation, between the Murray River and land to the west (including Old Straight Cut Channel), the Main Channel in the north having a pumping station (Cohuna and Gannawarra Pumps). Outside of the forest, the area of investigation intersects with some small rural allotments, particularly those that are adjacent to the Gunbower State Forest. Other features of the area comprise the township of Gunbower, the Gunbower race course, the Gunbower Pre-emptive Purchase allotment of today's Gunbower Estate, the railway line (which splits away from running adjacent to the roadway at Gunbower Estate), and Thomson's Weir to the northwest of Gunbower Island (Figure 2.5).

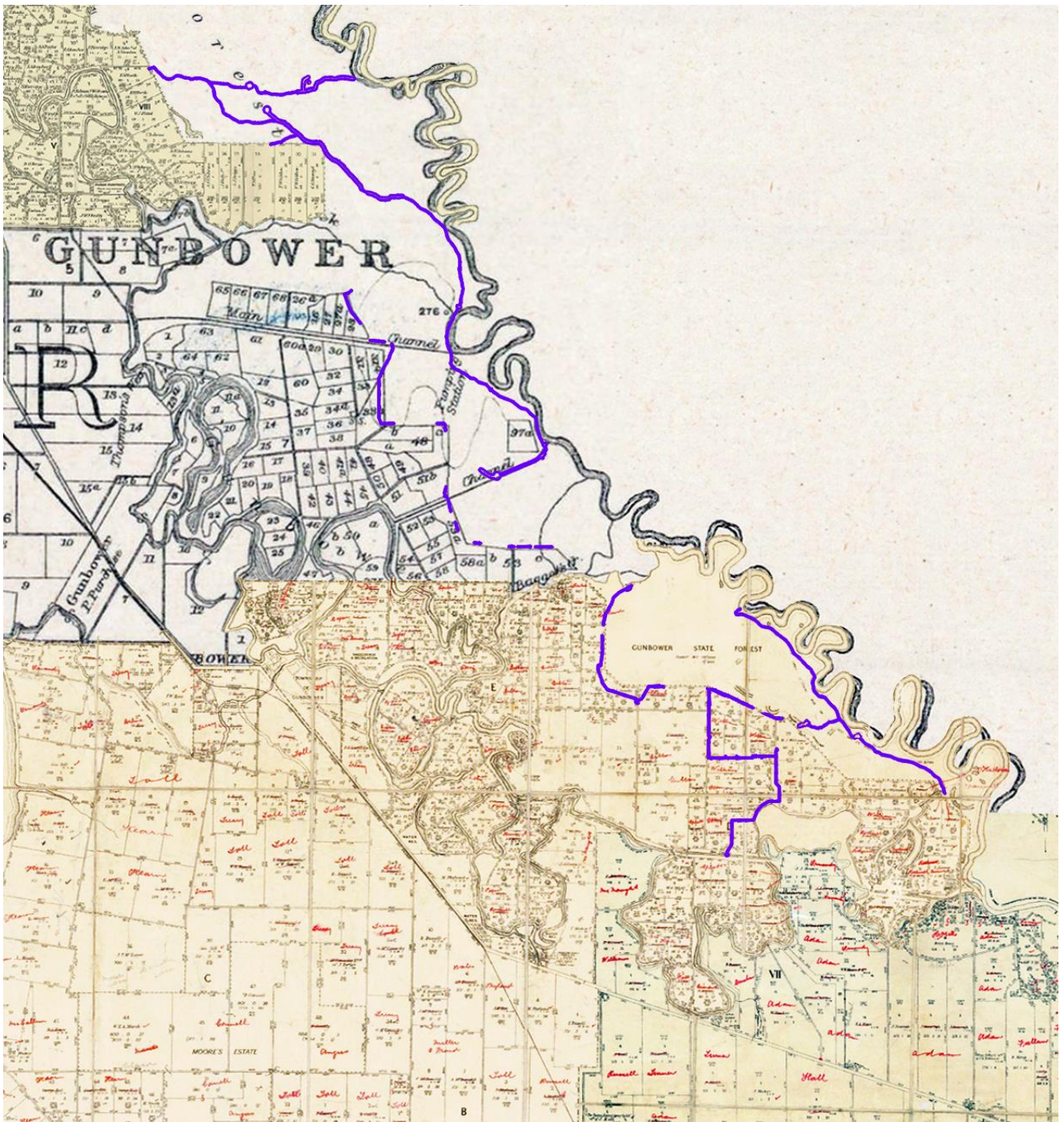


Figure 2.6: 1920s maps of part of the Parish of Gunbower (on the 1916 Gunbower county map), and the Parishes of Patho and Turrumberry North, with approximate location of the area of investigation outlined in purple (Department of Crown Lands and Survey 1916; Victoria Department of Crown Lands and Survey 1922; 1925; 1926)

The 1920s Parish maps from the available Parishes of Gunbower, Patho and Turrumberry North (Figure 2.6) confirm that much of the former Gunbower State Forest (which is still visible in the 1890 Gunbower map) has been taken up with rural-residential allotments. The area of investigation, where it is not within the Gunbower State Forest, primarily runs adjacent to the allotments next to the forest. A small section follows road reserve, and land detailed as being under the *Mines Act*, between several allotments in the Parish of Patho.

Other than the changing in ownership of allotments noted in citations on the late 1950s-1960s parish maps (Figure 2.7), little has changed other than the extent of the township of Gunbower. The Gunbower State Forest (named as 'Reserved Forest' in the Parish of Gunbower, and 'Permanent Forest' in Patho), Gunbower Pre-emptive Rights allotment and the race course are still extant, as are the small allotments in the region outside the forest. Old Straight Cut Channel is visible between the Murray River and WW Moore's allotment and Gunbower Creek within the Parish of Gunbower, and the National Channel between the Murray River and Gunbower Creek in the Parish of Patho. A roadway is also extant between Turrumberry Weir (highlighted in red on the map) on the Murray River, within the forest, and an allotment to the south within the Parish of Patho.

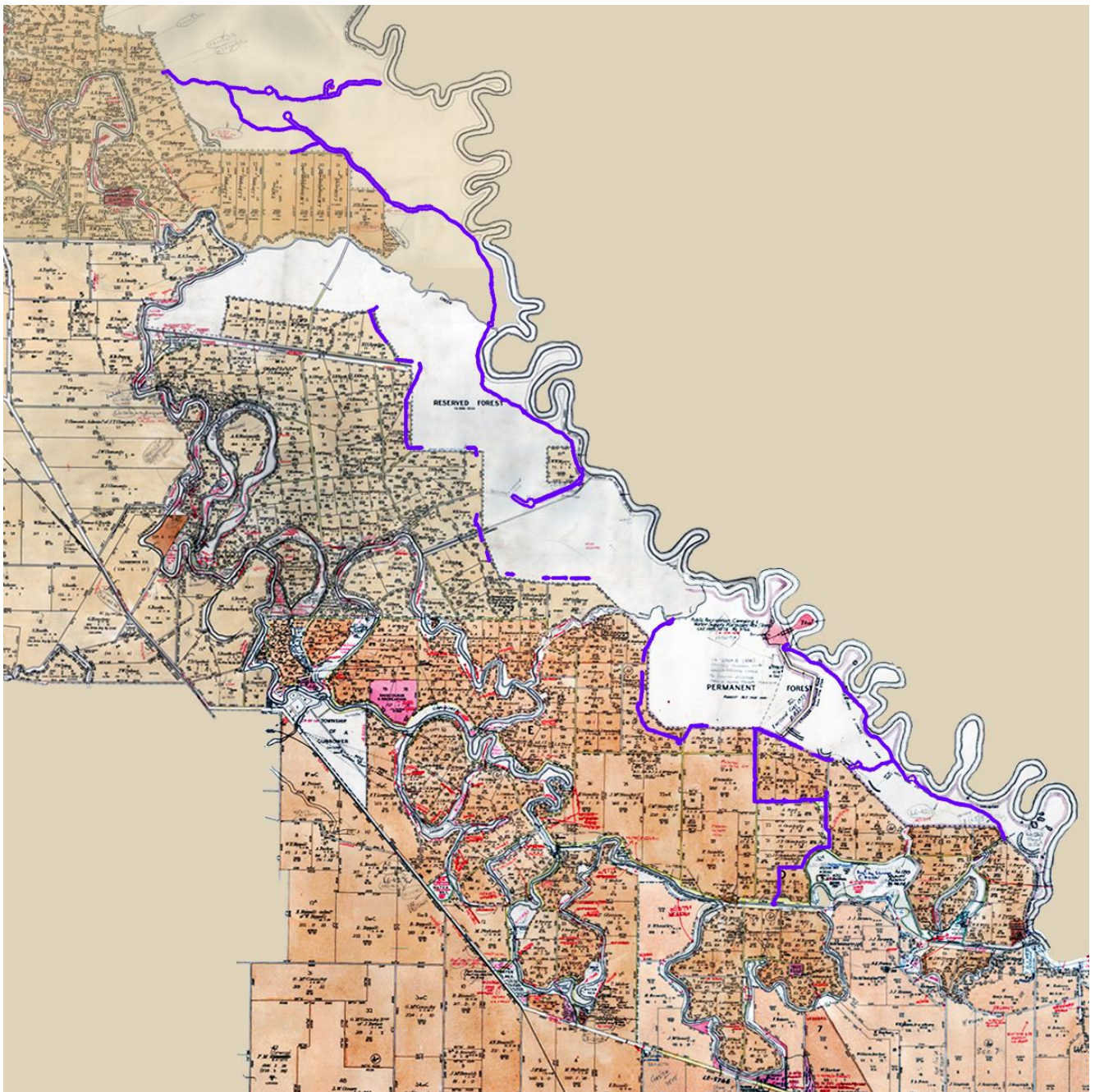


Figure 2.7: 1950s-1960s of Parishes of Gunbower, Patho and Turrumberry North, with approximate location of the area of investigation (Department of Lands and Survey 1958; 1962; 1967a; 1967b)

Aerial imagery from 1945 and 1958 shows that area of investigation typically comprises floodplain between the Murray River and the farming allotments to the southwest of the Gunbower State Forest, with some of the area of investigation extending into farmland in the southeast. Deep Creek is visible cutting through the area of investigation in the northern portion of the area of investigation, as is the Main Channel (also known as the Old Cohuna Channel) that originates from the Murray River south of Deep Creek, situated along Hancock Track. A cleared area to the southeast, at the location of the Cohuna and Gannawarra Pumps, is also visible along the Murray River. Old Straight Cut Channel intersects with the area of investigation further to the southeast, near WW Moore's allotment (which is visibly distinct from the Gunbower State Forest, in the vicinity of McKays Mill which is immediately adjacent to WW Moore's allotment). Buildings associated with Turrumberry (Torrumbarry) Weir are also visible adjacent to the Murray River. National Channel is visible, intersecting with the southernmost end of the area of investigation. Some tracks and roadways are visible on Gunbower Island within the tree-covered State Forest. There may have been bridges present where tracks cross creeks and other waterways. Some structures are apparent adjacent to the area of investigation outside of Gunbower State Forest, within rural allotments. No further structures are present within proximity to the area of investigation (Figure 2.8).

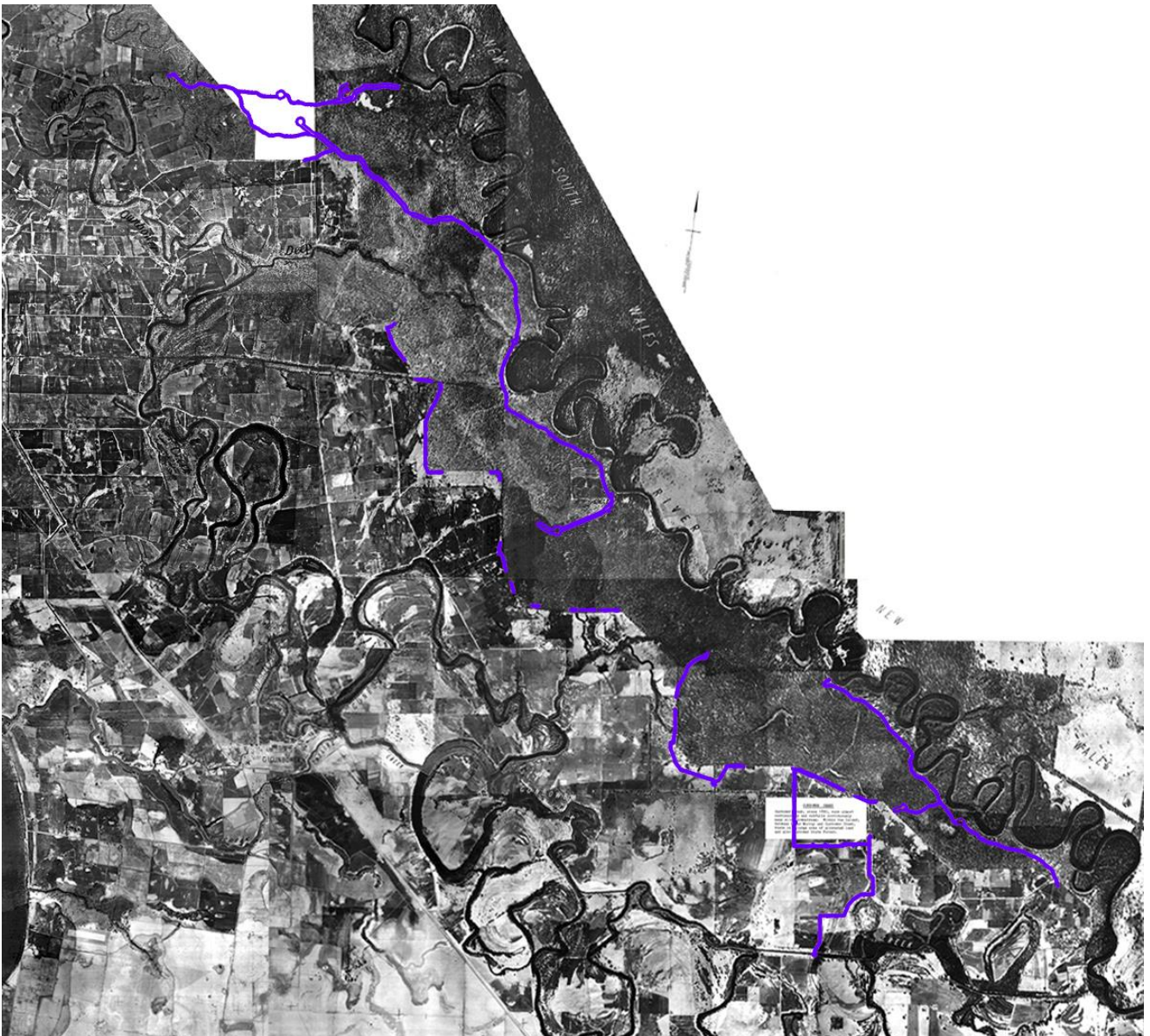


Figure 2.8: Combined 1945 and 1958 aerial imagery with approximate location of the area of investigation outlined in purple (Aerial Survey of Victoria 1945a; 1945b; 1945c; 1958a; 1958b)

Today, modern aerial imagery shows that the area of investigation generally follows existing roadways and tracks. Where it enters the State Forest, it crosses through thickly-covered treed areas except where the pathways are visible between the trees. There are channels visible that intersect with the area of investigation, including the Main Channel/Old Cohuna Channel, Old Straight Cut Channel near the former McKays Mill, and the National Channel. A channel is also visible within the vicinity of the Cameron Creek Regulator (weir), crossing through the urban allotment, southwest towards Halls Road in Torrumbarry. Various structures are visible adjacent to the area of investigation within rural allotments across Gunbower Island. No additional structures appear to be present within the dense tree cover found within the Gunbower State Forest.

2.3 Predictive statement

Following a search of the above registers, review of the previous literature and analysis of relevant reports, the following predictive statements can be made in relation to the area of investigation and the inundation area:

- The most likely site type in the area of investigation would be places associated with early agricultural or pastoral activities, logging, river shipping, and water management practices
- There is moderate potential for previously unidentified historical heritage to be present within the area of investigation, due to the historic land use of Gunbower Island, especially in relation to possible pastoral or rural heritage places associated with the former rural landscape that intersects with the area of investigation.

2.4 Summary of desktop findings

There are no listed historical heritage places that intersect with the area of investigation or the inundation area. However, prior historical heritage assessments indicate that the following sites comprise potential historical heritage places, which:

- Intersect with the Middle Gunbower Forest area of investigation:
 - Cohuna and Gannawarra Pumps (nominated for the VHR as Cohuna Headworks, but its heritage status has not been confirmed with HV)
 - Old Weir, Mackays Bridge
- Are adjacent to the Middle Gunbower Forest area of investigation:
 - Deep Creek Inlet
 - McKays Mill
- Intersect with the Middle Gunbower Forest area of investigation and inundation area:
 - Redundant Regulator, Deep Creek
- Intersect with the Middle Gunbower Forest inundation area:
 - Wooden Bridges, Old Cohuna Channel
- Intersect with the Upper Gunbower Forest area of investigation:
 - Cameron Creek Bridge
- Are adjacent to the Upper Gunbower Forest area of investigation:
 - Concrete Pits, Torrumbarry Weir
- Intersect with the Upper Gunbower Forest inundation area:
 - Cameron Creek Regulator (Weir).

There is moderate potential for previously unidentified historical heritage items to be present within the area of investigation and the inundation area, based on a review of the background history of the area. Site types most likely to be identified in the area of investigation and the inundation area would be heritage places or archaeological sites associated with early agricultural or pastoral activities, logging, river shipping, and water management practices.

3. Impact assessment

3.1 Proposed works

3.1.1 Main works

The Gunbower National Park Floodplain Restoration Project (the project) is located on the mid-Murray floodplain in Northern Victoria. Gunbower National Park covers approximately 9,330 ha and includes part of Gunbower Forest, an internationally important wetland listed under the Ramsar Convention. Gunbower Forest also forms part of the Gunbower-Koondrook-Perricoota Forest icon site under The Living Murray Initiative. The forest is bounded to the north by the River Murray and along its southern edge by private land and Gunbower Creek. The forest comprises a system of natural drainage paths, creeks, permanent and temporary wetlands, Black Box and Grey Box woodlands and River Red Gum forest.

The project is designed to facilitate managed inundation to address the hydrological deficit in the inundation regime caused by river regulation and climate change, particularly the reduced frequency and duration of flooding. Under natural conditions, flooding would have occurred seven years in ten and at present flooding is only occurring four years in ten (NCCMA, 2014). The managed inundation aims provide water across approximately 704 ha of the Gunbower National Park, replicating inundation events from flows of between 30-50,000 ML/d in the Murray River (at Torrumbarry Weir). The planned inundation events will require a much lower volume of water than that involved in a natural inundation event as the proposed infrastructure will enable pumping to deliver water to target areas in the floodplain, whilst still achieving a similar frequency and duration of inundation as a natural event. In addition, there are existing environmental water works in place for the Lower Gunbower Forest undertaken under The Living Murray Project which, while complementary, are separate to this project.

The proposed works for the Gunbower National Park floodplain and wetlands are designed to provide a combination of pumped inflows from the Murray River and the National Channel via Camerons Creek into the Forest. The works will result in inundation of approximately 457 ha in Middle Gunbower Forest and 247 ha in Upper Gunbower Forest.

The main components of the project including structures and access tracks, based on the current design for the project, are summarised in Table 3.1. The includes the proposed construction of 12 small regulators, one fishway, three pipelines, two pump stations, power supply, one channel upgrade, one drop structure, one bridge, three culvert crossings, two drainage outlets, access track upgrades, erosion control works and a series of containment banks to divert, retain and release water in the Gunbower National Park (Figure 1.1).

The design, number and location of project structures and extent of levees and access track upgrades may be refined through the project design process, including to minimise impacts in response to findings from ecology fieldwork and cultural heritage assessment (as part of the Cultural Heritage Management Plan). However generally the project works will be similar in nature to those described in the sections below. The area of investigation provides a buffer around the current design of the development footprint and access tracks recognising the potential for future changes. To the extent practicable, changes to the design and construction footprints of the main components of the project will be within the area of investigation and designed to avoid or minimise impacts on identified heritage values, with any changes occurring outside of this area to be assessed to identify their potential to impact on historic heritage values.

Key design elements that are yet to confirmed and will require further assessment include the design and location of levees/ containment banks and power supply. The containment banks are subject to further risk assessment to confirm if works are required. Potential locations for these have been included in the areas of investigation and historic heritage values considered in this report. VMFRP are currently working with Powercor to confirm the preferred alignment for the power supply. The location of the new poles, stays and cables associated with the pump station power supply are yet to be confirmed and therefore are not included in the

project footprints assessed in this report. These works will be designed to minimise impacts on heritage, with potential historic heritage implications to be assessed once the design is confirmed.

Table 3.1: Summary of proposed works at Gunbower National Park

Area	Main components
Upper Gunbower	<ul style="list-style-type: none"> ▪ Three small regulators <ul style="list-style-type: none"> - Camerons Creek River Track Regulator - Camerons Mid Creek Regulator - Dry Tree Creek Outlet Regulator ▪ Dry Tree Creek culvert ▪ Containment banks / levees – adjacent to and supporting the Camerons Mid Creek Regulator* ▪ One conefishway – Camerons Mid Creek fishway. ▪ One spillway located within Baggots Creek Track ▪ One Pump Station located on GMW's National Channel ▪ One Pipeline to deliver environmental water into Gunbower National Park. The pipeline will also include several irrigation and stock and domestic supply offtakes to replace existing customer points. ▪ Power supply to new pump station.
Middle Gunbower (upstream Deep Creek)	<ul style="list-style-type: none"> ▪ One Pump station located on the bank of the River Murray and associated discharge pipeline. ▪ Power supply to new pump station. ▪ Five regulators <ul style="list-style-type: none"> - Pig Swamp Offtake Regulator - Emu Hole Lagoon Offtake Regulator - Middle Forest Offtake Regulator - Deep Creek River Return Regulator - Dalley Bend Inlet Regulator ▪ Emu Hole Lagoon offtake pipeline ▪ Middle Forest offtake pipeline (main discharge to OSCC) ▪ Old Straight Cut Channel minor upgrade works ▪ Road and car park works <ul style="list-style-type: none"> - Brereton Road works - Riverside car parking area ▪ Containment banks / levees as required*
Middle Gunbower (downstream Deep Creek)	<ul style="list-style-type: none"> ▪ Three spillways <ul style="list-style-type: none"> - Broken Axle Creek Spillway - Munroe Track Spillways x 2 ▪ Four regulators <ul style="list-style-type: none"> - Broken Axle Creek Regulator - Tickells Track Regulator - Spur Creek River Return Regulator - Spur Creek Forest Regulator ▪ One drop structure: Spur Creek drop structure ▪ Three culverts: <ul style="list-style-type: none"> - Broken Axle Creek Culvert - Munroe Track Culvert 1 - Munroe Track Culvert 2 ▪ Drainage Outlets within the containment banks (2 No.) ▪ A series of containment banks on Munroe Track, Tickells Track and River Track as required*.

* subject to further risk assessment and therefore not confirmed.

3.2 Potential impacts

The potential impacts from proposed works and from the inundation are outlined in Table 3.2.

Table 3.2: Potential impacts on historical heritage within the area of investigation and the inundation area

Heritage place	Impact assessment
Cohuna and Gannawarra Pumps (nominated for the VHR)	<p>Proposed works - Middle Gunbower Forest</p> <p>Proposed works may impact upon the historical and scientific (technological) significance (Table 2.1) of Cohuna and Gannawarra Pumps, as identified by Kaufman and Ballinger (2014), which was assessed as being of State-level. This site comprises both the Cohuna and Gannawarra Pumps (headworks), which form scant remnants of timber walling at the top of both the north and south banks of the channel at the western regulator, and mounds of earth extending out into the channel from both banks at the eastern regulator.</p> <p>The proposed track works (Section 3.1) may impact upon the physical fabric of this potential historical heritage place.</p>
Old Weir, Mackays Bridge	<p>Proposed works - Middle Gunbower Forest</p> <p>Proposed works may impact upon the heritage significance (Table 2.1) of Old Weir, Mackays Bridge. This heritage place comprises concrete abutments with remnant timbers between them, which was identified as being of local significance by Kaufman and Ballinger (2014).</p> <p>The proposed Spur Creek regulator and track works (Section 3.1) may impact upon the physical fabric of this potential historical heritage place.</p>
Deep Creek Inlet	<p>Proposed works - Middle Gunbower Forest</p> <p>Proposed works may impact upon the heritage significance (Table 2.1) of Deep Creek Inlet. This heritage place comprises structural and archaeological features, including part of the channel, a pondage, roadway culvert with a wheel-operated gate, a platform, various pipes, timber posts and diagonal beams, and a concrete footing. These features, which were identified as being of local significance by Kaufman and Ballinger (2014), may be impacted by the adjacent works.</p> <p>The proposed Deep Creek return regulator and track (Section 3.1) may impact upon the physical fabric of this potential historical heritage place.</p>
McKays Mill	<p>Proposed works - Middle Gunbower Forest</p> <p>Proposed works may impact upon the heritage significance (Table 2.1) of McKays Mill, as identified by Kaufman and Ballinger (2014), which comprises wire rope wrapped around a tree, and a block of concrete no longer <i>in situ</i>, and archaeological features including a concrete-lined trench, the base of a possible chimney, shallow indentations. It was assessed as being of local significance.</p> <p>The proposed track works (Section 3.1) may impact upon the physical fabric of this potential historical heritage place.</p>
Redundant Regulator, Deep Creek	<p>Proposed works - Middle Gunbower Forest</p> <p>Proposed works may impact upon the heritage significance (Table 2.1) of Redundant Regulator, Deep Creek. This comprises a two-gate regulator with a high wire fence and gateway built across the bank, and a concrete wall within a small excavated bay on the east side of a secondary channel. It is of local significance, as assessed by Kaufman and Ballinger (2014).</p> <p>The proposed levee works (Section 3.1) may impact upon the physical fabric of this potential historical heritage place.</p> <p>Inundation area - Middle Gunbower Forest</p> <p>The physical location of the Redundant Regulator heritage place is situated at the intersection of Hancock Track and Fence Track, where a smaller channel joins the Old Cohuna Channel. It is within close proximity to the inundation area.</p> <p>As the features of this former regulator intersect with the inundation area, this heritage place may be impacted by the inundation, which is further detailed in Section 3.1.1.</p>
Wooden Bridges, Old Cohuna Channel	<p>Inundation area - Middle Gunbower Forest</p> <p>The physical location of the Wooden Bridges heritage place is situated along Hancock Track, within close proximity to the inundation area. This heritage place comprises two timber bridges of different sizes and</p>

Heritage place	Impact assessment
	<p>conditions that span channels entering Old Cohuna Channel. It was assessed as being of local significance by Kaufman and Ballinger (2014).</p> <p>As these wooden structures intersect with the inundation area, this heritage place may be impacted by the inundation, which is further detailed in Section 3.1.1.</p>
Cameron Creek Bridge	<p>Proposed works - Upper Gunbower Forest</p> <p>Proposed works may impact upon the heritage significance (Table 2.1) of Cameron Creek Bridge, which has been identified by Kaufman and Ballinger (2014) as being of local significance. It comprises a timber decked bridge, all of sawn timbers with no round poles, over a two-bay weir underneath.</p> <p>The proposed River Track regulator, laydown area, and track works (Section 3.1) may impact upon the physical fabric of this potential historical heritage place.</p>
Concrete Pits, Torrumbarry Weir	<p>Proposed works - Upper Gunbower Forest</p> <p>Proposed works may impact upon the heritage significance (Table 2.1) of Concrete Pits, Torrumbarry Weir. This heritage place is of local significance, as identified by Kaufman and Ballinger (2014). The site two old concrete-lined pits, approximately 1.8 m x 1.6 m with unknown depth, which are likely to contain subsurface archaeological deposits.</p> <p>The proposed track works (Section 3.1) may impact upon the physical fabric of this potential historical heritage place.</p>
Cameron Creek Regulator (Weir)	<p>Inundation area - Upper Gunbower Forest</p> <p>The physical location of the Cameron Creek Regulator (Weir) heritage place is situated across Cameron Creek near River Track. It comprises a two-gate concrete weir installed in an earthen dam across Cameron Creek, which sets water levels via the use of wooden drop bars. This heritage place is of local significance, as identified by Kaufman and Ballinger (2014). It is within close proximity to the inundation area.</p> <p>As the features of this former regulator (weir) intersects with the inundation area, this heritage place may be impacted by the inundation, which is further detailed in Section 3.1.1.</p>

4. Approval requirements

The approvals requirements for potential heritage places of archaeological sites within the area of investigation is provided in Table 4.1. If the scope of works changes, this heritage assessment will need to be updated.

Table 4.1: Statutory requirements for heritage within the area of investigation

Project element	Statutory requirements
Entire area of investigation	Discovery of archaeological sites - under Section 127 of the Heritage Act, if an archaeological site is discovered during construction or excavation on any land, the person in charge of the construction or excavation must as soon as practicable report the discovery to HV.
Cohuna and Gannawarra Pumps (nominated for the VHR)	<p>While not currently registered on any heritage register, this historical heritage place was nominated for listing on the VHR by Kaufman and Ballinger (2014). but its heritage status has not been confirmed with HV. Clarification from HV on this issue will be confirmed during subsequent studies.</p> <p>Based on this nomination, this heritage place has interim protection under Part 8 of the Heritage Act, which covers a substantial area including the main Cohuna and Gannawarra Headworks remnants, Deep Creek Inlet Channel, connecting channel and broad areas with visible archaeology or archaeological potential. As such, any works in the headworks area will require a Permit from HV.</p>
Old Weir, Mackays Bridge	There are no statutory requirements for these places, as they are not currently included on any heritage register.
Deep Creek Inlet	
McKays Mill	
Redundant Regulator, Deep Creek	
Wooden Bridges, Old Cohuna Channel	
Cameron Creek Bridge	
Concrete Pits, Torrumbarry Weir	
Cameron Creek Regulator (Weir)	

5. Historical heritage recommendations

5.1 Recommendations and project risk

Whilst there are no registered historical heritage places that intersect with either the area of investigation and inundation area, there is moderate potential for previously unidentified historical heritage items or archaeological sites to be present within these areas. Therefore, due to the possibility for unidentified historic archaeology to be impacted, it is recommended that a Historical Heritage Assessment (HHA) be undertaken for the project.

This should include a targeted field survey of the area of investigation to visit and assess previously identified places and to identify further historical archaeological sites or historical heritage places, and a prepare a significance assessment of these places.

If any historical heritage items or archaeological sites are identified as part of the HHA, a Heritage Impact Assessment (HIA) would be required:

- Assessment of impacts on all historical heritage sites
- Detailed identification of mitigation measures and approval requirements
- Heritage Impact Statement(s).

All historical archaeological places are protected under the Heritage Act, whether they are registered or not.

Undertaking a field survey to ascertain the likely presence of any historical archaeological places or material within the area of investigation is recommended to reduce the risk of delays to the project. Such delays would include the stoppage of works to avoid damage or destruction of historical archaeological sites and materials while the appropriate approvals are sought. The completion of the HIA for the project would mitigate these issues.

Any design changes requiring works outside the area of investigation assessed in this report would require assessment to identify their potential to impact on historic heritage values and any associated approval or mitigation requirements.

5.2 Site-specific recommendations

5.2.1 VHR-nominated site

Cohuna and Gannawarra Pumps, which were nominated for the VHR (Kaufman and Ballinger 2014), but its heritage status has not been confirmed with HV, may be impacted by track works. Clarification from HV on this issue will be confirmed during subsequent studies. Consultation with HV must be undertaken to ascertain the status of the nomination of this heritage place on the VHR.

This heritage place has interim protection under Part 8 of the Heritage Act, and therefore it is recommended that this heritage place be inspected by a suitably qualified archaeologist. It should be included in the HIA to support the necessary Permit required for works to occur within this heritage place.

5.2.2 Unregistered historical heritage place

Although Old Weir, Deep Creek Inlet, McKays Mill, Redundant Regulator, Wooden Bridges, Cameron Creek Bridge, Concrete Pits, and Cameron Creek Regulator (Weir) are not listed on any heritage register, based on the assessments undertaken by Kaufman and Ballinger (2014) an inspection of these places (as part of an archaeological survey of the area of investigation) by a historical archaeologist is recommended to assess their heritage significance or archaeological potential.

Based on the information from Kaufman and Ballinger (2014) it is possible that these places may threshold for inclusion on the Heritage Overlay (HO) of the relevant local council. In that case liaison with the local council prior to works commencing, would be recommended.

Once the inspection has been undertaken further recommendations regarding future management of these places can be developed.

6. Mitigation measures

High level mitigation measures have been recommended based on the current design and desktop assessment, these are outlined in Table 6.1. These should be reviewed and updated following completion of the recommended HHA and in response to any design changes.

Table 6.1: Proposed project activities and specific management measures for the heritage places within the area of investigation

Proposed activities	Project element	Mitigation measures
General activities	Entire area of investigation	<p>General mitigation measures to be implemented across the area of investigation:</p> <ul style="list-style-type: none"> ▪ Historical heritage awareness training should be completed as part of the site induction for all personnel and/or contractors prior to the commencement of construction works to ensure: <ul style="list-style-type: none"> - an understanding of where all heritage places are located within the area of investigation - an understanding of the potential heritage places that may be impacted during the project - the procedures required to be undertaken in the event of discovery of historical heritage material, features or deposits, or the discovery of human remains ▪ If an archaeological site is discovered during construction or excavation on any land, the person in charge of the construction or excavation must as soon as practicable report the discovery to HV ▪ A copy of this report should be kept onsite and on file with the project records. All contractors and/or project staff should be made aware of the heritage status of the heritage places in the area of investigation prior to works taking place.
Track works	Cohuna and Gannawarra Pumps (nominated for the VHR)	<p>As there is potential for the fabric and significance of the Cohuna and Gannawarra Pumps to be directly impacted by track works, it is recommended that the following mitigation measures be implemented to avoid any adverse impacts where possible to the heritage values of the site, as assessed by Kaufman and Ballinger (2014).</p> <p>The historic complex should be avoided:</p> <ul style="list-style-type: none"> ▪ Prior to any works, including any vegetation clearance, site establishment or construction works in the area, protective barrier fencing will be erected between the nominated historical features and the works area, to fence the features and thereby avoid inadvertent impact; the fencing would be installed for the duration of works for the project and removed following completion. <p>Should impact to the historic complex be unavoidable it is likely that a Heritage Impact Statement will be required. This requirement is dependent on the outcomes of liaison with HV on the listing status of these places.</p>
	McKays Mill Concrete Pits, Torrumbarry Weir	<p>As there is potential for the fabric of these places to be directly impacted by project works, it is recommended that the following mitigation measures be implemented to avoid any adverse impacts where practicable to the heritage values of the site, as assessed by Kaufman and Ballinger (2014):</p>
Spur Creek regulator works Track works	Old Weir, Mackays Bridge	<ul style="list-style-type: none"> ▪ The heritage fabric of the potential heritage places should be avoided by fencing off the heritage features from the remainder of the works area, if practicable ▪ If impact to these features are unavoidable, then liaison with the relevant local council should be undertaken to ascertain planning permit requirements.
Deep Creek return regulator works Track works	Deep Creek Inlet	
River Track regulator works Laydown area works Track works	Cameron Creek Bridge	<p>As there is also potential for the fabric of some of the potential heritage places to be indirectly impacted by erosion from inundation, it is recommended that the</p>

Proposed activities	Project element	Mitigation measures
Levee works Inundation area	Redundant Regulator, Deep Creek	following mitigation measures be implemented to avoid any adverse impacts where practicable to the heritage values of the places:
Inundation area	Wooden Bridges, Old Cohuna Channel	<ul style="list-style-type: none"> ▪ Engage a qualified hydrologist to determine the impact erosion would have on the potential heritage places, and any measures that could be implemented to minimise erosional impacts
	Cameron Creek Regulator (Weir)	<ul style="list-style-type: none"> ▪ If impact to these features are unavoidable, then liaison with the relevant local council should be undertaken to ascertain planning permission requirements (if any).

7. References

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