Appendix N
Non-Aboriginal heritage assessment report

Billabong Creek Regulators

Project no: IW238424
Version: S2

NSW Department of Climate Change, Energy, the Environment and Water

Non-Aboriginal Heritage Assessment
26 August 2024

Billabong Creek Regulators

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Jacobs Group (Australia) Pty Ltd

Floor 13, 452 Flinders Street
Melbourne, VIC 3000
PO Box 312, Flinders Lane
Melbourne, VIC 8009
Australia

T +61 3 8668 3000
F +61 3 8668 3001
www.jacobs.com

Executive summary

Introduction

NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW) is proposing to replace two existing weirs along Billabong Creek with new regulators (the proposal). These structures are situated on Billabong Creek within the Yanco Creek system in south-west NSW (refer Figure 1-1). The regulators will be owned and operated by Water NSW.

The two existing weir structures within the creek would be substantially demolished at Hartwood Weir and Wanganella Weir, with some parts being retained. Demolition has been deemed necessary due to health and safety concerns of the degraded structures and they may hinder the water levels and the flows required by the new regulators. The base slabs and small steps (approximately 300 mm) at the edge of the base slab on the waterway face of the former wingwalls of the existing structures, will be retained at both locations. The southern wingwall and nearby timber formwork at Wanganella Weir will also be retained.

These weirs were built in the early 20th century and have been used to regulate flows through Billabong Creek, create weirs pools for irrigation and, in the case of Wanganella Weir, provide town water supply. Both weirs are currently in a state of declining condition and functionality, and are barriers to the movement of fish along the creek. Their condition limits their ability to regulate flows through the Yanco Creek system and leads to inefficiencies in how water is delivered to the environment and to irrigators.

The study area for the proposal includes the footprint of the proposal and surrounding area, with the potential to be directly or indirectly affected by the proposal. The area of investigation covered by this non-Aboriginal heritage comprised a 5 m buffer encompassing all of the proposal works which may directly or indirectly impact upon non-Aboriginal heritage items (see Figure 2-1 and Figure 2-2).

In accordance with the principles and guidelines of Section 170A (1) of the Heritage Act, alternatives to demolition of the weirs were considered by NSW DCCEEW. The two primary reasons for the demolition of the weirs are:

- The new regulators would not be able to control flows as intended if the weirs were retained.
- The weirs would remain as barriers to upstream fish movement, and Department of Primary Industries (DPI)-Fisheries have requested their removal to allow upstream fish passage.

Partial demolition or breaching of the weirs were also considered, but was it was determined that these options were not viable as:

- The partially demolished weirs would be navigation hazards.
- The partial demolition of the weirs would accelerate the further deterioration of the already poor condition weir structures, potentially resulting in damage to the new downstream regulators in the event of a catastrophic failure of the existing partially demolished weirs.
- Maintenance of the partially demolished structures would result in poor constructability outcomes as well as posing safety issues.

Heritage Context

The study area is situated entirely in rural countryside, along Billabong Creek. The land the surrounding region has been used for grazing sheep and cattle since the late-1830s and early-1840s. The pastoral stations with which the weirs are related have passed through numerous hands, including that of Benjamin Boyd, James Scott Hindmarsh, Henry Ricketson, William Adams Brodribb, Robert Dun and James Butchart, and others. Much of the land was also taken up by pastoral companies, including Peppin & Sons and FS Falkiner & Sons Ltd, Cleckheaton, News Limited, and Australian Food & Agriculture. The land use surrounding

the weirs remains generally unchanged to the present day, as the surrounding stations are still being primarily used for grazing and cropping purposes.

There is a history of weir building along Billabong Creek, dating back to at least 1858, where newspaper reports noted that station holders along the creek had been constructing dams and reservoirs for years. This was in an effort to have enough water for their sheep and cattle, as well as for domestic purposes. However, this practice was not approved of by all station owners along the creek, as it deprived other station owners of water. Station owners lower down the creek were reported to have cut away dams higher up. For example, Frank and George DeSailly's large dam at Coree Station is noted as having stopped the flow of water entirely. In 1866 and 1895, the owners of this dam at Coree were sued for depriving other stations of water. However, the introduction of the 1912 Water Act and the licensing of dams (and weirs) quieted the issue. Subsequently, the two dams within the study area were built: Hartwood Weir was likely licensed to John Hunter Patterson III in 1914, and built in 1915-1916; and Wanganella Weir was licensed to Windouran Shire Council in 1916, and built in 1927 after they gained the necessary special lease land.

A register search of the study area shows that there is only one listed heritage item within proximity to the study area. This is Hartwood Weir (WaterNSW S170 4550110), which is listed on the WaterNSW Section 170 State Agency Heritage and Conservation register. While no official heritage curtilage is specified for this heritage item, the works are proposed on the weir itself. Background research suggests that Wanganella Weir may be of local significance, even though it is currently not listed on a register. Additionally, there is a low potential for previously unidentified historical heritage items or archaeological sites to be present within the study area.

Physical site analysis

The field survey, which was undertaken in May 2022 and on 17, 18 and 19 April 2023, recorded four heritage features within the study area. These comprised Hartwood Weir (WaterNSW S170 4550110), and the potential heritage features Old Bridge and Timber Structure, near the study area at Hartwood Weir, and the potential Wanganella Weir heritage feature within the study area at Wanganella Weir. Old Bridge, and Timber Structure, were recorded as part of an Aboriginal cultural heritage pedestrian survey in May 2022, and were unable to be re-surveyed in April 2023 as these potential heritage items were underwater.

No areas of archaeological potential were identified within the study area during the field survey, and no additional historical heritage items were identified during the April 2023 field survey.

Heritage significance

Of the four items, two were assessed as being of local significance: Hartwood Weir (WaterNSW S170 4550110) and Wanganella Weir. Hartwood Weir (1916) comprises a concrete adjustable crest weir on Billabong Creek, which is still in operation, and despite its poor condition, the weir was assessed as being of historical, historical associative, social and representative significance. Wanganella Weir (1916) comprises a concrete adjustable crest weir on Billabong Creek, which is also still in operation, and despite its extremely poor condition, it was assessed as being of historical and social significance. The impacts upon the heritage values of these items will therefore be examined as part of this assessment.

The other two items, the Old Bridge, and the Timber Structure, have been assessed as not being of heritage significance either at a state or local level. As such, Old Bridge, and Timber Structure will not be assessed further.

Statements of Heritage Impact

Statements of Heritage Impact (SOHI) have been prepared for two heritage items, Hartwood Weir (WaterNSW S170 4550110) and Wanganella Weir, which would be directly impacted by the construction of the proposal.

Impacts to both heritage items have been assessed as being **major**, due to the proposed demolition of the weir structures within the creek at both sites.

In terms of cumulative impacts, the four s170-listed weirs and one of local heritage significance being demolished as part of the SDLAM program comprises 20.83 per cent of state or local significant heritage weirs or regulators in the southern region. As such, the proposal is likely to result in a **moderate** cumulative impact to heritage water infrastructure assets, as long as the appropriate mitigation and management measures are undertaken.

Mitigation and management measures

Management measures will be implemented during pre-construction and construction (HH1, HH2 and HH3) to manage potential impacts to items of heritage significance and previously unidentified heritage items or archaeological from proposal works in the vicinity of heritage items (Table ES-1).

Table ES-1. Non-Aboriginal heritage mitigation and management measures

ID	Impact	Environmental safeguard	Responsibility	Timing
HH1	Impacts to registered and previously unidentified historical heritage items or archaeological sites	**Management of historical heritage during pre-construction and construction** ▪ Prior to construction commencing, all personnel working on site will be provided a site-specific cultural heritage induction (e.g. Project induction toolbox talks and staff inductions). This will include the heritage sensitivities of work sites and the procedures for the management of non-Aboriginal cultural heritage during construction, such as the discovery of historical artefacts, features or deposits, or the discovery of human remains. ▪ An unexpected finds protocol that specifies measures to avoid and minimise impacts on any previously unidentified historical archaeological sites and values discovered during pre-construction and construction will be prepared. If unexpected items are discovered during construction, all work will cease in the area. The Contractor will inform the site supervisor and Project Manager, and an Historical Archaeologist will be engaged to assess the item's significance. The Project Manager must advise a WaterNSW heritage officer of any unexpected finds on WaterNSW land or in relation to a WaterNSW asset, as per Section 146 of the *Heritage Act 1977* (the Heritage Act).	NSW DCCEEW, Contractor	Pre-construction, Construction
HH2	Impacts to Hartwood Weir (WaterNSW S170 4550110)	**Management of Hartwood Weir (WaterNSW S170 4550110) during pre-construction** ▪ NSW DCCEEW will record the asset prior to demolition in accordance with Heritage NSW's *How to Prepare Archives Records of Heritage Items, Guidelines for Photographic Recording of Heritage Sites, Buildings and Structures*, and the updates to technology and practice which have occurred since the 2006 guidelines were issued. The archival recording should result in three sets of a digital	WaterNSW, NSW DCCEEW, Contractor	Pre-construction

ID	Impact	Environmental safeguard	Responsibility	Timing
		photographic report, along with digital materials. NSW DCCEEW will provide WaterNSW with a draft copy for review, prior to lodging this recording with the Heritage NSW library, State Library of NSW and the local council library (***Guideline 3.57***). NSW DCCEEW and WaterNSW will also retain a copy of the final report for their own records. ▪ Explore options in conjunction with WaterNSW for the installation of interpretation at Hartwood Weir to provide information about the heritage significance of the site, fabric, value and history of the site, supported by digital content, including consideration of expenditure and ongoing maintenance. The interpretation display should include the engraving (from the right bank abutment), which is proposed to be removed as part of demolition. For example, interpretation options may include (but are not limited to): - signage - embedded interpretation - artworks - interpretive display. Places for interpretive display/s may include location/s determined by WaterNSW and/or NSW DCCEEW. Recommendations from the Edward River Council and/or other local stakeholders may be taken into consideration in the determination of the preferred location/s. ▪ Provision of 14 days prior written notification of the proposed demolition of the heritage item will be made to the Heritage Council of NSW by NSW DCCEEW and WaterNSW.		
HH3	Impacts to Wanganella Weir	**Management of Wanganella Weir during pre-construction** ▪ The asset will be recorded prior to demolition in accordance with Heritage NSW's preferred method of archival recording, as described in HH2. NSW DCCEEW will provide WaterNSW with a draft copy for review, prior to lodging this recording with the Heritage NSW library, State Library of NSW and the local council library. NSW DCCEEW and WaterNSW will also retain a copy of the final report for their own records. ▪ Explore options in conjunction with WaterNSW for the installation of interpretation (for example but not limited to signage, embedded interpretation, artworks, interpretive display) at the Wanganella Weir (near the southern wingwall and timber formwork) to provide information about the heritage significance of the site,	NSW DCCEEW, Contractor	Pre-construction

ID	Impact	Environmental safeguard	Responsibility	Timing
		fabric, value and history of the site, supported by digital content, including consideration of expenditure and ongoing maintenance. ▪ Prior to its demolition, measures to manage indirect historical heritage impacts to the remaining elements of the weir (the southern wingwall and timber formwork) will be implemented, including physical barrier protection and/or exclusion zones, until the works in the vicinity of the remaining weir features have been completed.		

Despite these measures, the residual impacts to the two heritage weirs would remain as **major**, due to the demolition of the weir structures of both the Hartwood and Wanganella Weirs.

Important note about your report

The 3Rivers Joint Venture (3Rivers), a joint venture between Jacobs Group (Australia) Pty Limited and GHD Pty Ltd has been engaged to provide certain Engineering and Approvals Services for the NSW Sustainable Diversion Limit Adjustment Mechanism (SDLAM) program in accordance with the Agreement between 3Rivers and the NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW) (the client).

The sole purpose of this report and the associated services performed by Jacobs is to provide heritage services in accordance with the scope of services set out in the contract between Jacobs and the client. That scope of services, as described in this report, was developed with the DPIE.

In preparing this report, Jacobs has relied upon, and presumed accurate, any information (or confirmation of the absence thereof) provided by the DPIE and/or from other sources. Except as otherwise stated in the report, Jacobs has not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

Jacobs derived the data in this report from information sourced from the DPIE (if any) and/or available in the public domain at the time or times outlined in this report. The passage of time, manifestation of latent conditions or impacts of future events may require further examination of the project and subsequent data analysis, and re-evaluation of the data, findings, observations and conclusions expressed in this report. Jacobs has prepared this report in accordance with the usual care and thoroughness 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. For the reasons outlined above, 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.

This report should be read in full and no excerpts are to be taken as representative of the findings. No responsibility is accepted by Jacobs 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, Jacobs's Client, and is subject to, and issued in accordance with, the provisions of the contract between Jacobs and the Client. Jacobs accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this report by any third party.

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Glossary

Term	Description
Anabranch	A section of a river or stream that diverts from the main channel of the watercourse and rejoins downstream.
Clearing area	This is the area required to construct the proposed infrastructure. Within this area it is assumed that all vegetation would be removed, including trees and ground cover vegetation. Borrow pits also include a clearing area. However, this is a conservative assumption and contractors would be encouraged to avoid removal where they can (through proposed mitigation measures).
Commonwealth Environmental Water Holder	The Commonwealth Environmental Water Holder is a statutory position established under the *Water Act 2007* (Cwth) responsible for managing the Commonwealth's environmental water holdings. These water holdings are used to protect or restore environmental assets of the Murray-Darling Basin.
Construction activity zone	The area surrounding and including the 'clearing area' that would be used for construction purposes e.g., laydown, site sheds, parking. It is assumed topsoil will need to be removed / cleared, with some re-grading to create level areas with grubbing and clearing of small shrubs/grasses. Trimming of trees may be required. Tree removal would not occur in portions of the CAZ outside of a clearing area.
Cumulative impacts	The combined impacts of the proposal on a matter with other relevant future projects.
Disturbance area	The disturbance area includes all locations where the proposal directly impacts the land surface or water body. This includes clearing areas, construction activity zones, access tracks and power supply routes.
Efficiency measure	Provide more water for the environment by making water delivery systems for irrigation more efficient. This can include replacing or upgrading on-farm irrigation, or lining channels to reduce water losses within an irrigation network
Entitlement	The volume of water authorised to be taken and used by an irrigator or water authority; includes bulk entitlements, environmental entitlements, water rights, sales water and surface-water and groundwater licenses.
Environmental flow	Any river flow pattern provided with the intention of maintaining or improving river health.
Fish passage	The ability of fish or other aquatic species to move through an aquatic system.
Fishway	Structures placed on or around constructed barriers (such as dams or weirs) to give fish the opportunity to move past the barrier.
The proposal	The construction and operation of the two regulators and supporting infrastructure.
The proposal site	The footprint that would be directly affected by construction and the location of operational infrastructure.
Regulator	A gated structure used to actively manage or control the amount of water that flows from one location to another.
Regulated	A water system in which water is stored or flow levels are controlled through the use of structures such as dams and weirs.
Sustainable diversion limit adjustment mechanism	A mechanism under the Murray-Darling Basin Plan that allows the sustainable diversion limit to be adjusted under certain circumstances.

Term	Description
Study area	The area investigated for this assessment which includes the proposal site and surrounding area, with the potential to be directly or indirectly affected by the proposal.
Weir	A low barrier or dam that is built across a watercourse and is designed to store water, control or alter the flow of water in a creek.

Acronyms and abbreviations

Term	Description
AHD	Australian height datum
CEWO	Commonwealth Environment Water Office
CHL	Commonwealth Heritage List
Cwth DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
DECC	Department of Environment and Climate Change NSW
DPE	NSW Department of Planning and Environment (now renamed as NSW Department of Planning, Housing and Infrastructure)
DPIE	NSW Department of Planning, Industry and Environment (formerly known as NSW Department of Planning and Environment)
EIS	Environmental impact statement
EP&A Act	Environmental Planning and Assessment Act 1979 (NSW)
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Cwth)
FM Act	Fisheries Management Act 1994 (NSW)
GL	Gigalitre
HAMS	Heritage Asset Management Strategy
ICOMOS	International Council on Monuments and Sites
km^2	Square kilometres
LEP	Local Environmental Plan
LGA	Local government area
MNES	Matter of National Environmental Significance
NHL	National Heritage List
NSW	New South Wales
NSW DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water (formerly Water Infrastructure NSW)
NTR	National Trust of Australia (NSW) Register
RNE	Register of the National Estate
S170 Register	Section 170 Heritage and Conservation Register
SAHG	State Agency Heritage Guide
SCADA	Supervisory Control and Data Acquisition
SDLAM	Sustainable Diversion Limit Adjustment Mechanism
SEARs	Secretary's environmental assessment requirements
SEPP	State environmental planning policy
SHR	State Heritage Register
SSI	State Significant Infrastructure
WHL	World Heritage List

1. Introduction

1.1 Overview

NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW) is proposing to replace two existing weirs along Billabong Creek with new regulators (the proposal). These structures are situated on Billabong Creek within the Yanco Creek system in south-west NSW (refer Figure 1-1). The two existing weir structures within the creek would be demolished at Hartwood Weir and Wanganella Weir. Demolition has been deemed necessary due to health and safety concerns of the degraded structures which may hinder the water levels and the flows required by the new regulators. The base slabs and the wingwalls of the existing structures will be retained at both locations.

In accordance with the principles and guidelines of Section 170A (1) of the Heritage Act, alternatives to demolition of the weirs were considered by NSW DCCEEW. The two primary reasons for the demolition of the weirs are:

- The new regulators would not be able to control flows as intended if the weirs were retained.
- The weirs would remain as barriers to upstream fish movement, and Department of Primary Industries (DPI)-Fisheries have requested their removal to allow upstream fish passage.

Partial demolition or breaching of the weirs were also considered, but was it was determined that these options were not viable as:

- The partially demolished weirs would be navigation hazards.
- The partial demolition of the weirs would accelerate the further deterioration of the already poor condition weir structures, potentially resulting in damage to the new downstream regulators in the event of a catastrophic failure of the existing partially demolished weirs.
- Maintenance of the partially demolished structures would result in poor constructability outcomes as well as posing safety issues.

These weirs were built in the early 20th century and have been used to regulate flows through Billabong Creek, create weirs pools for irrigation and, in the case of Wanganella Weir, provide town water supply. Both weirs are currently in a state of declining condition and functionality, and are barriers to the movement of fish along the creek. Their condition limits their ability to regulate flows through the Yanco Creek system and leads to inefficiencies in how water is delivered to the environment and to irrigators.

The new regulators would be fully automated and remotely operated meaning that operators could control the delivery of water more efficiently. The proposal is needed to improve the operator's ability to deliver the right amount of water to the right place at the right time. The new regulators would also feature fishways to support fish movement past the new structures. The regulators will be owned and operated by Water NSW.

The proposal is subject to environmental and planning approvals in accordance with the *NSW Environmental Planning and Assessment Act 1979* (EP&A Act) and the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The proposal is State significant infrastructure (SSI), and the Minister for Planning is the approval authority. An environmental impact statement (EIS) is required to accompany the application for approval of the proposal.

1.2 Purpose and scope of this report

This report has been prepared by Jacobs Group (Australia) (Jacobs) as part of the EIS for the proposal. The EIS has been prepared to accompany the application for approval of the proposal and addresses the Secretary's Environmental Assessment Requirements (the SEARs), issued on 17 October 2024.

The purpose of this report is to assess potential non-Aboriginal heritage issues from the construction and operation of the proposal, and where required, identify feasible and reasonable mitigation and management measures. This report:

- Addresses non-Aboriginal archaeology, built heritage items and historical conservation areas, in accordance with Heritage NSW guidelines, the Australia International Council on Monuments and Sites (ICOMOS) *Charter for Places of Cultural Significance (Burra Charter)*, and relevant Commonwealth heritage guidelines.
- Identifies non-Aboriginal heritage items within the study area.
- Assesses the potential impacts on the heritage items from the proposed proposal activities.
- Identifies mitigation and management measures to minimise impacts to heritage.

1.3 Structure of this report

The report is structured as follows:

- Section 1 – provides an introduction to the proposal and the assessment
- Section 2 – describes the methodology for the assessment
- Section 3 – describes the existing environment
- Section 4 – descriptions of the heritage items
- Section 5 – significance assessments of the heritage items
- Section 6 – description of the proposal at the heritage items
- Section 7 – assesses the impacts of the construction and operation of the proposal on heritage items
- Section 8 – provides mitigation measures for the impacts identified
- Section 9 – conclusions
- Section 10 – references.

1.4 Summary of the proposal

1.4.1 Location

The proposal is located on Billabong Creek, which is part of the Yanco Creek system in south-west New South Wales (NSW). The Yanco Creek system forms part of the Murray-Darling Basin. An overview of the location of the proposal is shown in Figure 1-1.

The proposal is located within the local government area (LGA) of Edward River.

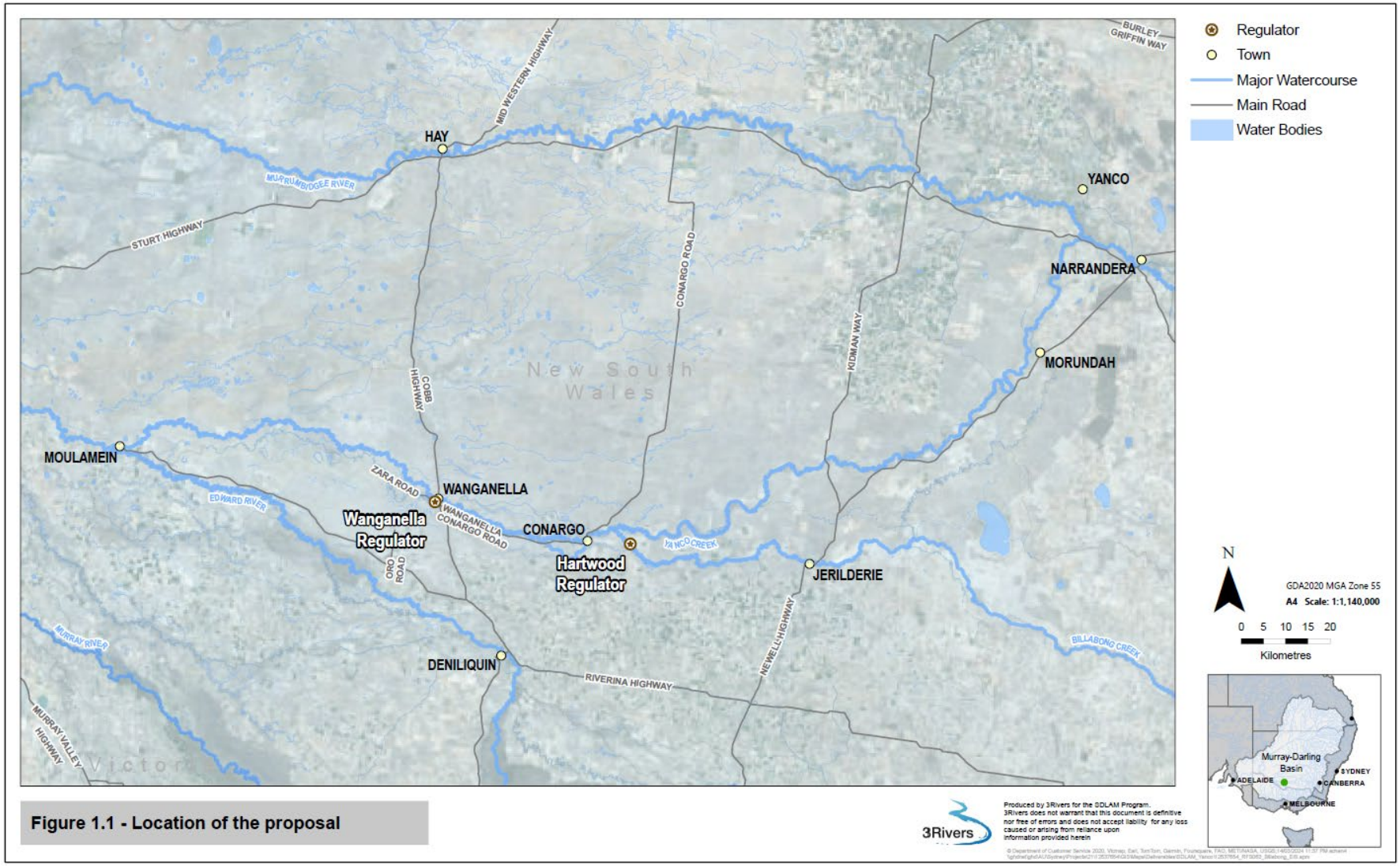

Figure 1.1 - Location of the proposal

Figure 1-1. Location of the proposal

1.4.2 Key features of the proposal

As discussed in section 1.1, the proposal involves replacing two existing weirs along Billabong Creek with new regulators including fishways. The core structure of the two regulators is similar and would include:

- concrete piers with maintenance bulkhead slots
- automated layflat gates across the crest of the structure to assist with flow management and downstream fish passage
- a low turbulence 'keyhole' type vertical slot fishway with allowances for variable headwater to provide upstream fish passage
- automated sidewinder gates within the vertical slot fishway to allow for variable headwater conditions
- fixed concrete crests on the opposite side of the gates to the vertical slot fishway
- concrete apron downstream of the structure
- concrete wingwalls upstream and downstream of the structure
- access from a trafficable deck for maintenance (Hartwood Regulator only)
- pedestrian walkway access part way across Wanganella Regulator structure to facilitate housing of gate actuators and for maintenance
- walkway grating over gates to facilitate operations and maintenance
- crushed rock maintenance pads, access and turnaround areas adjacent to the structure
- rip rap and rock beaching upstream and downstream of structure for erosion protection
- control house
- sheet pile cut-off walls beneath the structure
- fencing of the structures to prevent public access
- Supervisory Control and Data Acquisition (SCADA) control system.

An indicative layout of a regulator is shown in Figure 1-2. This example is of a five gate regulator with a fish passage and trafficable deck for maintenance vehicles.

Figure 1-2. Indicative layout of a regulator

The proposal would also involve the following elements:

- Power supply to the regulators would be provided by a mix of underground and overhead electricity cables connecting the structures to the grid.
- Access to the regulators would require permanent tracks for maintenance and some additional tracks to support construction only. Track upgrades include a new drainage culvert at Hartwood.
- The existing Forest Creek block bank, associated with the Hartwood Regulator, will be replaced with a similar earthen structure to the existing, including two concrete sills to define the upstream and downstream top of bank and armoured with rock beaching and crushed rock for erosion protection.
- The Wanganella flood bypass channel would be constructed to reduce potential upstream flooding impacts from the Wanganella Regulator. The channel would enable flood waters to drain between the billabongs in the Wanganella Reserve during flood events. It would be 85 metres long, around 40.0 metre wide and 1.7 metre deep and located north of the Wanganella landfill. Once completed, the channel sides and base would be natural and vegetated with appropriate local native species.
- An existing privately owned borrow pit on lot 56 / DP756322 near Hartwood Weir would be extended to provide material for the construction of Hartwood Regulator and Forest Creek block bank.

The location of the existing weirs, proposed infrastructure, and the indicative proposal footprints are shown on Figure 1-3 and Figure 1-4.

1.4.2.1 Heritage items

There is one registered heritage item, and three potential heritage items, within the proposal area (see section 3). These are as follows:

- Hartwood Weir (WaterNSW S170 4550110) is an operational weir owned and operated by WaterNSW, which is located on Billabong Creek within allotments 1/-/DP1144789, 2/-/DP1144789 and 3/-/DP181995.
- Old Bridge is a private bridge, which is located on Billabong Creek between allotments 28/-/DP756330 and 1/-/DP707463, approximately 145 m north of Hartwood Weir.
- Timber Structure is a set of timber posts, which is located on Billabong Creek between allotments 28/-/DP756330 and 1/-/DP707463, approximately 90 m north of Hartwood Weir.
- Wanganella Weir is an operational weir owned and operated by Edward River Council, which is located on Billabong Creek within part of allotment 7005/-/DP1024202. However, allotments 7015/-/DP1053753 and 7006/-/DP1055647 appear to have once been associated with the weir.

1.4.3 Timing

Construction of the proposal is anticipated to start in 2025 and be completed by 2026. The construction period is anticipated to be around 18 months. Construction would pause during periods of high flow.

1.4.4 Operation

The proposal would be operated in accordance with the operating requirements developed by the proponent in consultation with the asset owner and other agency stakeholders. These operating requirements are known as the Yanco Creek System Operations Plan. The plan would take into account the regulation requirements at each regulator, as well as constraints such as limits to rates of rise and fall to accommodate fish breeding requirements. The regulators will be owned and operated by Water NSW.

The proposed regulators would provide greater control of water levels which would be operated to meet environmental and water supply objectives.

1.5 Secretary's environmental assessment requirements

This non-Aboriginal heritage assessment has been prepared to address the SEARs. Table 1-1 outlines the requirements relevant to this assessment.

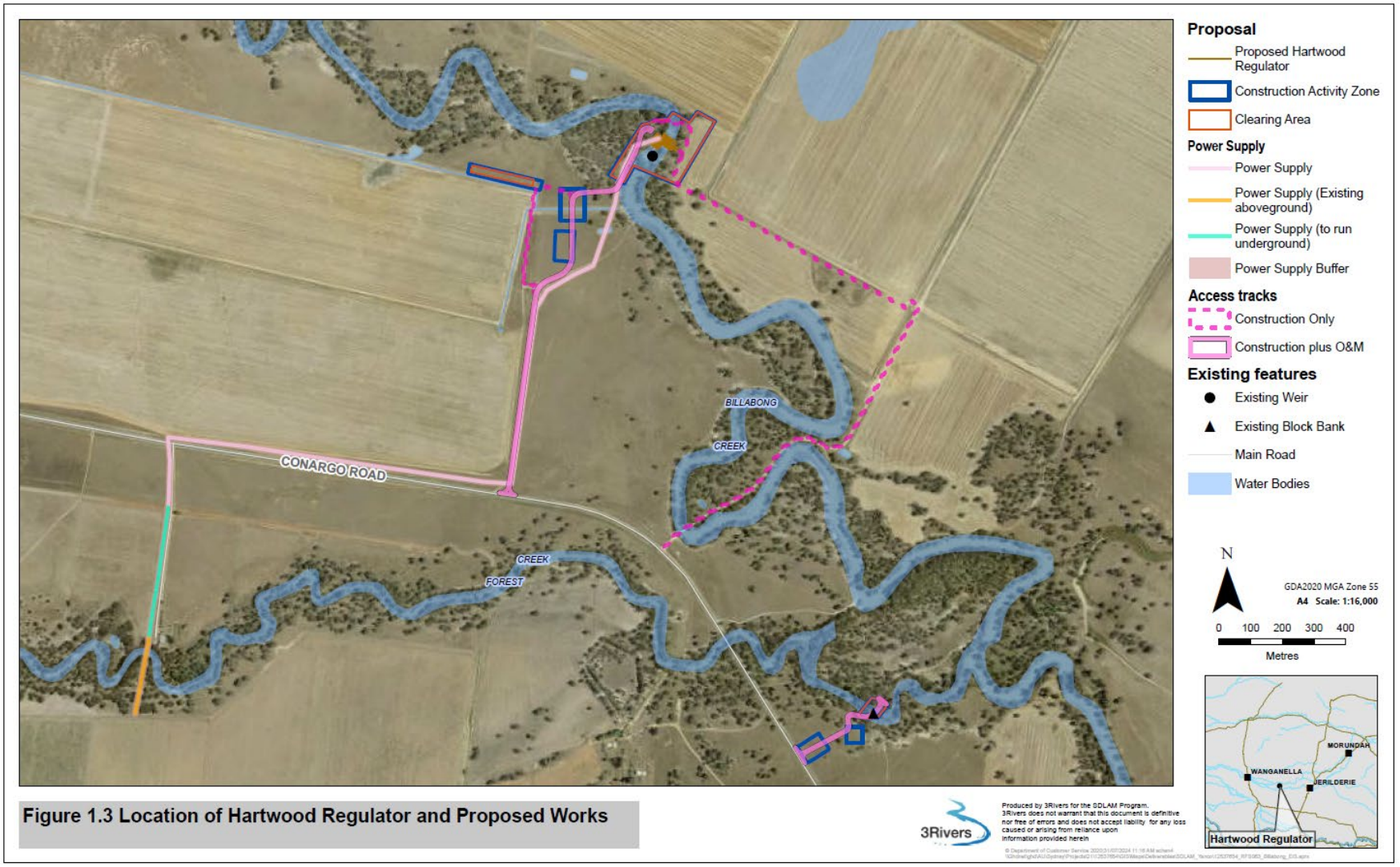

Figure 1.3 Location of Hartwood Regulator and Proposed Works

Figure 1-3. Location of Hartwood Regulator and proposed works

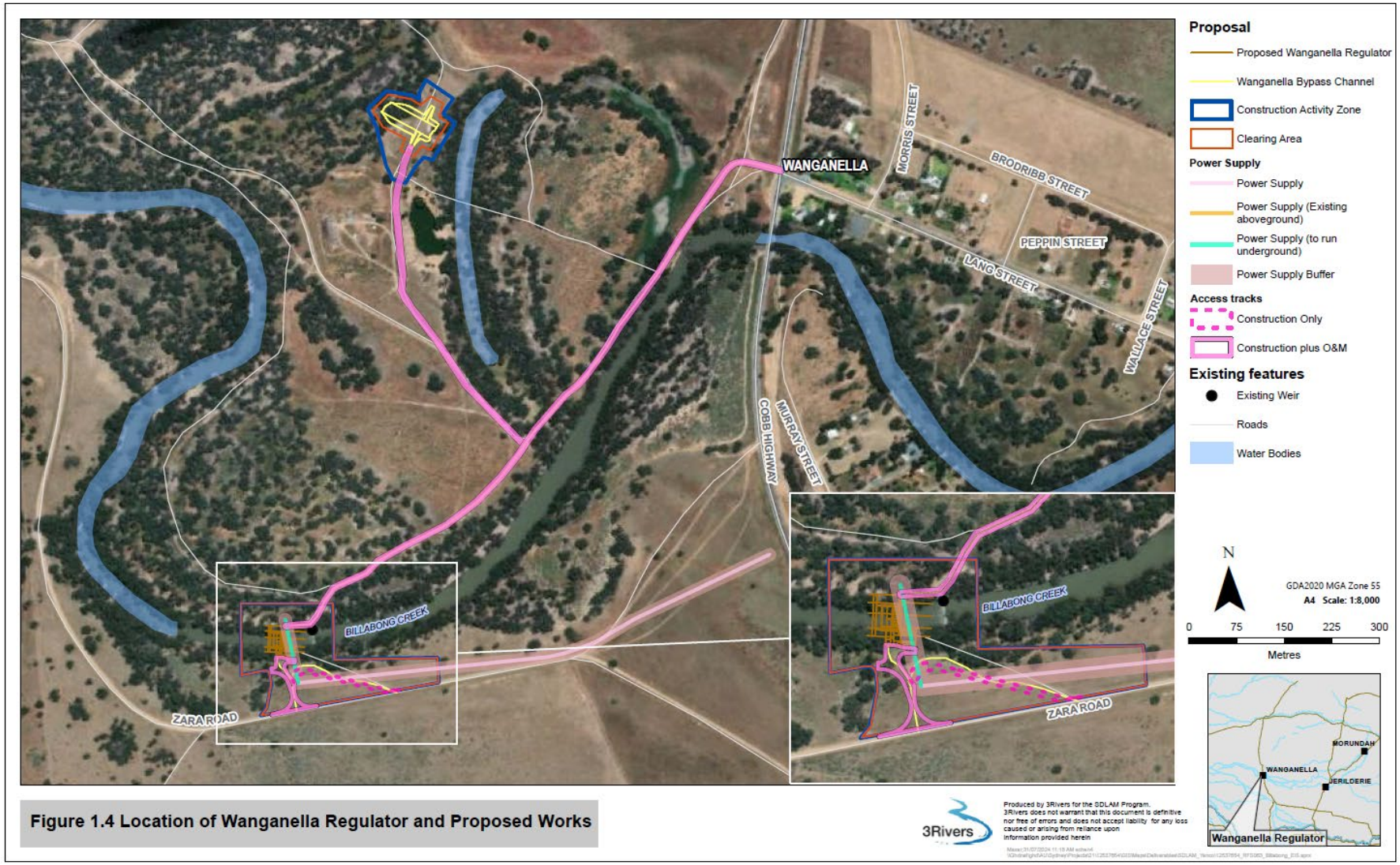

Figure 1.4 Location of Wanganella Regulator and Proposed Works

Figure 1-4. Location of Wanganella Regulator and proposed works

Table 1-1. Relevant SEARs

Requirements	Where addressed in this report
Non-Aboriginal Heritage	
Provide a heritage assessment including but not limited to an assessment of impacts to State and local heritage. Where impacts to State or locally significant heritage items are identified, the assessment shall:	Overall report.
a) Outline the proposed mitigation and management measures (including measures to avoid significant impacts and an evaluation of the effectiveness of the mitigation measures) generally consistent with the *NSW Heritage Manual* (NSW Heritage Office 1996).	Section 8.
b) Be undertaken by a suitably qualified heritage consultant(s) (note: where archaeological excavations are proposed the relevant consultant must meet the NSW Heritage Council's Excavation Director criteria).	Table 1-2.
c) Include a statement of heritage impact for all heritage items (including significance assessment).	Significance assessments – section 5. Heritage impact assessments – section 7.
d) Where potential archaeological impacts have been identified develop an appropriate archaeological assessment methodology, including research design.	No archaeological impacts identified.

1.6 Assumptions

The opinions, conclusions and any recommendations in this report are based on the assumptions made by Jacobs described in this report. The assumptions have been made using the usual standard of care and skill to be expected of the consulting profession. Jacobs disclaims liability arising from any of the assumptions being incorrect.

The following assumptions apply to this report:

- The results of non-Aboriginal heritage register searches are valid as of 19 June 2024 and are subject to change.
- Several potential heritage items were unable to be re-surveyed in April 2023 as these potential heritage items were then (and continue to be) predominantly underwater. As such, the heritage assessments are based on photographs taken during the Aboriginal cultural heritage pedestrian survey when the potential items were first identified in May 2022.

1.7 Authors

The assessment was carried out by a team of suitably qualified heritage consultants under the direction of Rose Overberg (Principal Heritage Consultant, Jacobs), as outlined in Table 1-2.

Table 1-2. Heritage consultants carrying out this assessment

Name	Qualifications	Role
Rose Overberg	Bachelor of Arts (Archaeology/Anthropology) Bachelor of Science (Honours) (Geology)	Management and direction of overall assessment Technical advice
Dr Karen Murphy	Doctor of Philosophy (Historical Archaeology) Bachelor of Arts (Honours) (Archaeology)	Technical review
Caroline Seawright	Bachelor of Archaeology (Honours)	Desktop assessment Statements of Heritage Impact Report preparation
Neil Fenley	Bachelor of Archaeology (Honours)	Field survey
Brendan Wong	Bachelor of Arts (Archaeology) (Honours)	Field survey

2. Assessment approach and methodology

2.1 Legislative and policy context to the assessment

This section summarises the legislation, guidelines and/or policies driving the approach to the assessment. The SEARs requirements relevant to non-Aboriginal heritage, and where these have been addressed in this report, are discussed in section 1.5.

2.1.1 *Environmental Planning and Assessment Act 1979* (NSW)

The *Environmental Planning and Assessment Act 1979* (EP&A Act) requires that environmental impacts are considered in land-use planning, including impacts on Aboriginal and non-Aboriginal heritage. Various planning instruments prepared under the Act identify permissible land use and development constraints. The development of Local Environmental Plans (LEPs) is governed under the provisions of Part 3, Division 3.4 of the EP&A Act. Heritage items, heritage conservation areas and archaeological sites for the area in which the proposal is situated are protected under the provisions of the Conargo LEP 2013.The two weirs are not listed as heritage items in the Conargo LEP 2013.

The proposal for the Billabong Creek Regulators will be assessed under Part 5, Division 5.2 (State significant infrastructure) of the EP&A Act. An EIS will be prepared and include a heritage assessment of the proposal. The proposal will require the approval of the Minister for Planning. Part 5.4 of the EP&A Act applies for projects designated as State Significant Infrastructure. This influences the way in which other legislation, including the *Heritage Act 1977* is applied.

2.1.2 *Heritage Act 1977* (NSW)

The *Heritage Act 1977* (the Heritage Act) provides a number of mechanisms by which items and places of heritage significance may be protected. The Heritage Act is designed to protect both listed heritage items, such as standing structures and potential archaeological remains or relics. Different parts of the Act deal with these different situations.

Approvals under Part 4 or an excavation permit under s139 of the Heritage Act are not required for an approved proposal under Part 5.4 of the EP&A Act, however, this assessment follows the intent of the Heritage Act and the conditions of the approval which are based upon the Heritage Act requirements.

2.1.2.1 State Heritage Register

The Heritage Council of NSW maintains the State Heritage Register (SHR). Only those items which are of state-level heritage significance in NSW are listed on the SHR. Listing on the SHR controls activities such as alteration, damage, demolition and development.

Approved proposals to which Part 5.4 applies do not require approval under Part 4 of the Heritage Act (eg a Section 60 approval) for items on the SHR. However, Part 5.4 proposals must outline proposed heritage management and mitigation measures.

2.1.2.2 Archaeological relics

Part 6 Division 9 of the Heritage Act protects archaeological 'relics' from being 'exposed, moved, damaged or destroyed' by the disturbance or excavation of land. This protection extends to the situation where a person has 'reasonable cause to suspect' that archaeological remains may be affected by the disturbance or excavation of the land. It applies to all land in NSW that is not included in the SHR. A 'relic' is defined by the Heritage Act as:

> '*Any deposit, object of material evidence which relates to the settlement of the area that comprises NSW, not being Aboriginal settlement, and has local or state significance.*'

Section 139 of the Heritage Act requires any person who knows or has reasonable cause to suspect that their proposed works will expose or disturb a 'relic' to first obtain an Excavation Permit from the Heritage Council of NSW (pursuant to Section 140), unless there is an applicable exception (pursuant to Section 139(4)). In cases where a Section 139 permit is not required for proposals assessed under Part 5.4 of the EP&A Act, works would need to be conducted in accordance with the intent of the Heritage Act.

Section 146 of the Heritage Act requires any person who is aware or believes that they have discovered or located a relic must notify the Heritage Council of NSW providing details of the location and other information required.

2.1.2.3 Section 170 – State Agencies

Under Section 170 of the Heritage Act, NSW government state agencies, such as NSW DCCEEW, are required to establish and maintain a register of heritage assets under their control and/or ownership. This does not apply to privately owned or Council heritage assets. This state agency heritage register is known as the Section 170 Heritage and Conservation Register, or the 'S170 Register'.

Agencies must submit their S170 Registers to the Heritage Council of NSW and also make available the register to the public. Items on S170 Registers are also listed on the State Heritage Inventory (SHI), and can also be listed on an LEP and/or the SHR.

All S170 Registers are dynamic, reflecting the current ownership of heritage assets and the thematic history and development of state agencies over time. Items are added and removed from the S170 Register as they are acquired or divested etc. Establishing S170 Registers often begins with a heritage study of a particular asset typology or a regional heritage review of an agency's assets.

Hartwood Weir was identified as a heritage item during the preparation of *Heritage Assessment of 304 River Structures of Southern Region* in 2003 by Austral Archaeology (2003) for State Water (predecessor agency to WaterNSW), and subsequently included in their S170 Register. These portfolio heritage assessment studies are often periodically reviewed by agencies to ensure their S170 Register is current.

2.1.2.3.1 S170 Notification

Section 170A (1) of the Heritage Act outlines obligations of state agencies to provide 14 days prior written notification to the Heritage Council of NSW if any of the following actions are anticipated for an S170 Register item:

- remove an item from the register,
- transfer ownership,
- cease to occupy and/or
- demolish.

Agencies may wish to take a conservative approach to S170 Notification and also provide 14 days prior notice when planning major alteration, decommissioning, part-demolition and/or part-sale of an S170 Register item.

The proposal, which includes the proposed demolition of Hartwood Weir (S170 4550110), is bound by this clause of the Heritage Act.

2.1.2.3.2 S170 Principles and Guidelines

Section 170A (2) outlines that each state agency is responsible for ensuring that the items entered on its S170 Register are maintained with due diligence in accordance with State Owned Heritage Management Principles. Section 170A (3) outlines that the Heritage Council of NSW can issue guidelines to state agencies relating to the maintenance, repair, alteration, transfer of ownership and demolition of items listed on the S170 Register. A state agency must comply with these guidelines.

The 'State Owned Heritage Management Principles' and the 'Heritage Asset Management Guidelines' have been issued and endorsed by the Heritage Council of NSW and are detailed in the 'State Agency Heritage Guide' (SAHG), which was published in 2005. In implementing these principles and guidelines, each state agency is required to develop a Heritage Asset Management Strategy (HAMS) which assists the agency in the conservation and careful management of its heritage asset portfolio. In practice, however, Heritage Council has apparently not required this of Agencies in recent times.

A key message of the SAHG and is that the NSW Government should set the standard for the community in the management of heritage assets; and that state agencies should lead by example by adopting appropriate heritage management strategies, processes and practices.

The following are relevant aspects of the SAHG referencing the demolition of S170 Register items.

2.1.2.3.3 Guideline 2.9 - Redundant Assets Plan

The HAMS should include a strategy for the management and conservation of heritage assets with no apparent economic re-use options. Where heritage assets do not meet the service delivery needs of an agency, alternate management options including transfer or lease to other parties should be thoroughly investigated, prior to any proposal to demolish.

WaterNSW do not currently have a Redundant Asset Plan in place as part of their Heritage Asset Management Strategy. As an alternative, a consideration of options has been provided in section 8 of this report.

2.1.2.3.4 Guideline 3.4 - Using Heritage Significance to Guide Changes

Detailed planning decisions for heritage assets should be made after due consideration of the heritage significance of the asset. The following should inform all decisions:

- the higher the level of significance, the lower the level of change that can be made to an asset
- an asset of 'state' heritage significance is not to be demolished or unsympathetically altered without Heritage Council notification or approval if the item is listed on the SHR
- an asset of 'local' heritage significance can only be demolished or unsympathetically changed following a detailed evaluation involving specialist heritage advice that has shown there is no prudent or feasible alternative.

2.1.2.3.5 Guideline 3.55 - Establishing Significance Prior to Demolition

A state agency needs to confirm the heritage significance of an item prior to deciding whether it should be demolished.

2.1.2.3.6 Guideline 3.56 - Demolition and Irreversible Changes to Heritage Assets

Demolition of any heritage asset, or a substantial portion of that asset, should only be considered in exceptional circumstances, and only after establishing there is no prudent or feasible alternative to demolition. This option should be considered as the last resort. The following management options for heritage assets should be considered and demonstrated not to be viable prior to a decision to demolish a heritage asset:

- continue use of the asset in its present role,
- adaptive re-use by the instrumentality or another public or private sector user,
- transfer of the asset to a new owner use or custodianship by a community group,
- stabilisation and mothballing for future use or conservation,
- stabilisation of a building, structure, work or landscape in a safe condition.

This 'assessment of alternatives' should be included in proposal feasibility, assessment and approval documentation.

2.1.2.3.7 Guideline 3.57 - Recording Prior to Demolition

A state agency should record the asset prior to commencing demolition, in accordance with Heritage NSW guidelines (*How to Prepare Archives Records of Heritage Items, Guidelines for Photographic Recording of Heritage Sites, Buildings and Structures*) and should lodge the record with the Heritage NSW library, State Library and the local council library.

2.1.2.3.8 Guideline 4.14 - Referral to the Heritage Council – State Significant Heritage Assets

Proposals involving the alteration, disposal or demolition of heritage assets of 'State' heritage significance (not listed on the SHR) should be referred to the Heritage Council of NSW for comment. Note that the Heritage Council will provide comment to the state agency within 40 days of receipt of the proposal.

2.1.3 *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) includes 'national heritage' as a Matter of National Environmental Significance (MNES) and protects listed places to the fullest extent under the Constitution. It also establishes the National Heritage List (NHL) and the Commonwealth Heritage List (CHL).

The following is a description of each of the heritage lists and the protection afforded places listed on them.

2.1.3.1 Commonwealth Heritage List

The CHL is established under the EPBC Act. The CHL is a list of properties owned by the Commonwealth that have been assessed as having significant heritage value. Any proposed actions on CHL places must be assessed for their impact on the heritage values of the place in accordance with *Actions on, or impacting upon, Commonwealth land, and actions by Commonwealth agencies (Significant Impact Guidelines 1.2)*. The guidelines require the proponent to undertake a self-assessment process to decide whether or not the action is likely to have a significant impact on the environment, including the heritage value of places. If an action is likely to have a significant impact an EPBC Act referral must be prepared and submitted to the Minister for approval.

2.1.3.2 National Heritage List

The NHL is a list of places with outstanding heritage value to Australia, including places overseas. Any proposed actions on NHL places must be assessed for their impact on the heritage values of the place in accordance with *Matters of National Environmental Significance (Significant Impact Guidelines 1.1)*. The guidelines require the proponent to undertake a self-assessment process to decide whether or not the action is likely to have a significant impact on a MNES, including the national heritage value of places. If an action is likely to have a significant impact an EPBC Act referral must be prepared and submitted to the Minister for approval.

2.1.4 Non-statutory considerations

2.1.4.1 Register of the National Estate

The Register of the National Estate (RNE) was formerly compiled as a record of Australia's natural, cultural and Aboriginal heritage places worth keeping for the future. The RNE was frozen on 19 February 2007, which means that no new places have been added or removed since that time. From February 2012 all references to the RNE were removed from the EPBC Act. The RNE is maintained on a non-statutory basis as a publicly available archive and may identify heritage items not listed elsewhere.

2.1.4.2 National Trust of Australia (NSW)

The National Trust of Australia (NSW) is a non-statutory non-profit organisation aimed at conserving built, cultural and natural heritage. In addition to owning and managing historic properties the National Trust are an active and influential advocacy organisation against development that may potentially harm heritage places and landscapes.

The National Trust of Australia (NSW) maintains the National Trust Register (NTR) of landscapes, townscapes, buildings, industrial sites, cemeteries and other items or places which the Trust determines have cultural significance and are worthy of conservation, along with a significant trees register. There are no statutory requirements associated with the NTR, however it may identify heritage items not listed elsewhere.

2.1.5 Other guidelines and policies

This assessment was carried out and report prepared according to the principles and guidelines provided in:

- *Australia ICOMOS Charter for Places of Cultural Significance* (Burra Charter) (Australia ICOMOS 2013).
- *NSW Heritage Manual* (NSW Heritage Office 1996) including the following sections:
  - Investigating History. This section was used in carrying out research into historical context and history of individual heritage items.
  - Investigating Fabric. This section was used in surveying and recording individual heritage items.
- *Assessing Heritage Significance* (Heritage Council of NSW 2023). The updated guidelines, which draw on the earlier *Assessing Heritage Significance* (NSW Heritage Office 2001) as part of the 1996 NSW Heritage Manual, was used to review existing significance assessments and carry out significance assessments for new heritage items.
- *Investigating Heritage Significance* (draft guideline) (NSW Heritage Office 2004). The updated section of NSW Heritage Manual was used to carry out significance assessment for new heritage items.
- *Guidelines for Preparing a Statement of Heritage Impact* (Department of Planning and Environment 2023).

The SEARs requirements relevant to non-Aboriginal heritage and where these have been addressed in this report, are presented in section 1.5.

2.2 Methodology

2.2.1 Study area

For the purposes of the assessment, the proposal footprint, and study area have been defined as follows:

- proposal footprint – the area that would be directly disturbed by construction and the location of operational infrastructure. The disturbance area would include clearing areas, construction activity zones, access tracks and power supply corridors.
- study area – the area investigated which includes the footprint of the proposal and surrounding area with the potential to be directly or indirectly affected by the proposal. The study area covered by this non-Aboriginal heritage comprised a 5 m buffer encompassing all of the proposal works which may directly or indirectly impact upon non-Aboriginal heritage items, as shown in Figure 2-1 and Figure 2-2.

2.2.2 Overall approach

The following methodology has been used in preparing this assessment:

- Refine the preliminary significance assessment and heritage advice previously undertaken by Jacobs (Seawright 2022)
- Review of both statutory and non-statutory heritage registers and lists to identify known heritage items within the study area. This includes the World Heritage List (WHL), NHL, CHL, the SHR, S170 Register, NTR, RNE, and environmental planning instruments (ie LEPs)
- Review of relevant heritage reports and other source material. This includes any relevant major heritage assessments, local heritage studies carried out by local councils, and conservation management plans
- Field survey of the study area to inspect listed items within the study area and to identify potential heritage items or areas of archaeological potential that may be affected by the proposal
- Completion of the statements of heritage impact for identified items located within the study area in accordance with the *Guidelines for Preparing a Statement of Heritage Impact* (Department of Planning and Environment 2023), with consideration of direct and indirect impacts
- The level of impact on the heritage significance of each heritage item in the study area has been assessed based on the definitions and framework for assessing severity of impacts from the *EPBC Act Significant impact guidelines 1.2* (DSEWPC 2013).
- Cumulative impacts have been assessed based on the *Cumulative Impact Assessment Guidelines for State Significant Projects* (DPIE 2022) guidelines.

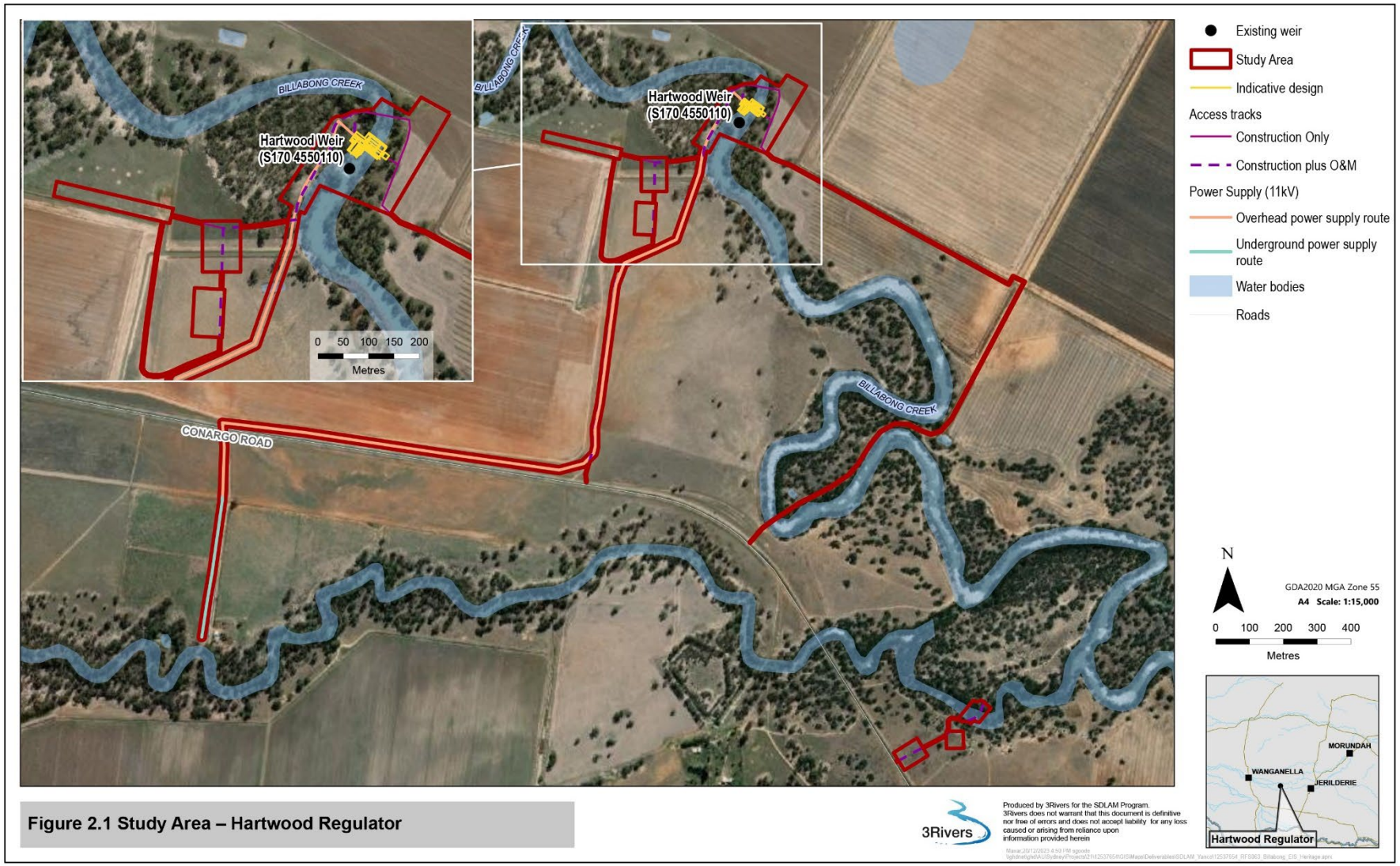

Figure 2-1. Study area used for this assessment at the Hartwood Regulator

Figure 2.2 Study Area– Wanganella Weir

Figure 2-2. Study area used for this assessment at the Wanganella Regulator

2.2.3 Desktop assessment

The desktop assessment focusses on the history of the two portions of the study area, where each section of the study area encompasses one of the two weirs, and the history associated with the surrounding regions. The aim of this assessment is to determine what historical heritage values may exist in and around the weirs. This includes non-Aboriginal heritage register searches, a review of previous historical heritage assessments, historical background research and a review of historical mapping and aerial imagery in the region along Billabong Creek.

2.2.3.1 Heritage register searches

The following heritage registers and databases were searched on 18 December 2023 and 19 June 2024 by Caroline Seawright (Project Archaeologist, Jacobs) to identify known heritage items within, or in proximity to, the study area, using a combination of spatial data tools and online databases:

- World Heritage List (WHL)
- National Heritage List (NHL)
- Commonwealth Heritage List (CHL)
- State Heritage Register (SHR)
- State Heritage Inventory (SHI)
- Section 170 Heritage and Conservation Registers (S170)
- Conargo Local Environmental Plan (LEP) 2013[1]
- Register of the National Estate (RNE)
- National Trust of Australia (NSW) Register (NTR).

The location and known curtilage of each site was then mapped in relation to the study area. The results of the register searches are presented in section 3.1.1.

2.2.3.2 Literature review

A review was carried out on the limited range of previous historical heritage investigations which had been undertaken within the region associated with the study area.

This review was undertaken in an attempt to identify heritage items which are not registered, to understand the nature and extent of any heritage assessment already carried out, to understand and assess any known cumulative impacts, and to prepare a succinct historical summary of the study area.

The literature review is provided in section 3.1.2.

2.2.3.3 Historical background

The desktop historical research of the study area was undertaken using a variety of resources such as NSW State Records & Archives, the State Library of NSW, the National Library of Australia, NSW DCCEEW Archives and Records, and local history libraries. Additionally, a review of historical mapping was undertaken to understand changes made within proximity to the study area over time.

[1] Note that the Edward River Council does not have its own LEP. The Council utilises three different LEPs to regulate land use and development within the Edward River local government area. Of these three LEPs, the proposal is subject to the Conargo LEP, which applies to all land use in the former Conargo Shire Council local government area.

The historical background section is divided into several categories, covering the early exploration of the region (1829-1841), the establishment of the Murrumbidgee Pastoral District (1841-1844), Benjamin Boyd and Deniliquin Station (1842-1864), the history of smaller stations which were products of the subdivision of early squattages (1852-), and a short history of the Yanco Creek System.

The historical background is provided in section 3.1.3.

2.2.3.4 Aerial imagery review

A review of early historical aerial imagery from the NSW Government's Historical Imagery Viewer, focussing on the study area and immediately surrounding area during the 1960s and 1970s, was examined. This was to identify whether there is any potential for unlisted heritage items to be present within proximity to the study area. Recent aerial imagery, using Google Earth Pro, was then examined to identify any subsequent changes that may have taken place over time at and around the study area.

The aerial imagery review is provided in section 3.1.4.

2.2.3.5 Timeline

The background history was used to create a timeline, which summarises major events associated with the study area. This is provided in section 3.1.5.

2.2.3.6 Predictive statement

The background history was also used to produce a predictive statement, identifying the types of previously unidentified historical heritage items and archaeological sites which may be present within the study area. This is provided in section 3.1.7.

2.2.4 Field survey

The field survey approach reflected the degree of potential disturbance or impact of the proposal.

For heritage items within or immediately adjacent to the above ground elements of the proposal, the following tasks were carried out:

- A visual inspection of the heritage items within the study area
- Key features and the nature and condition of the heritage item, including photographs and notes, were recorded.

The results of the field survey are provided in section 3.2.

2.2.4.1 Aims

The aims of the field survey were to:

- Define the key features, nature and condition of the two weirs
- Assess the potential for the two sites to contain unidentified heritage places
- Relocate and assess potential heritage items identified during an Aboriginal cultural heritage pedestrian survey associated with the proposal in May 2022
- Identify any areas of archaeological potential.

2.2.4.1.1 Limitations / constraints

No access was granted to the Hartwood weir walkway, and no walkway is extant on Wanganella Weir. As such, the field survey was undertaken from the banks of Billabong Creek.

2.2.4.2 Dates and personnel

Brendan Wong (Graduate Archaeologist, Jacobs) and Neil Fenley (Associate Archaeologist, Jacobs) undertook the field survey of both Hartwood Weir on 17 and 18 April 2023, and Wanganella Weir on 17 and 19 April 2023. An Aboriginal cultural heritage pedestrian survey identified several potential heritage items in May 2022, with photographs provided by Meaghan Aitchison (Project Archaeologist, Jacobs). The known heritage items were inspected, and their condition and details noted.

2.2.5 Heritage significance

The heritage significance of each of the heritage items identified by the desktop assessment within the study area was assessed. It covers the history of each heritage item, the description of the heritage item along with the related field survey results, a comparative analysis with similar heritage items, a significance assessment of the heritage item against the NSW Criteria (see section 2.2.5.1), and a statement of significance for each heritage item.

The heritage significance section is presented in section 5.

2.2.5.1 Basis for significance assessment

The following approach has been used to assess the heritage significance of the two weirs. The concept of cultural heritage significance helps in estimating the value of places. Places which are likely to be significant are those which 'help an understanding of the past or enrich the present, and which will be value to future generations' (Australia ICOMOS 2013, p. 12). In Australia, the significance of a place is generally assessed according to a place or objects' ability to demonstrate aesthetic, historic value, scientific value and social value.

An item will be considered to be of State (or local) heritage significance if, in the opinion of the Heritage Council of NSW, it meets one or more of the following criteria (Heritage Council of NSW 2023):

- Criterion A (Historical significance): An item is important in the course, or pattern, of NSW's cultural or natural history (or the cultural or natural history of the local area)
- Criterion B (Historical association): An item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history (or the cultural or natural history of the local area)
- Criterion C (Aesthetic/creative/technical achievement): An item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or the local area)
- Criterion D (Social, cultural, and spiritual): An item has strong or special association with a particular community or cultural group in NSW (or the local area) for social, cultural, or spiritual reasons
- Criterion E (Research potential): An item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of the local area)
- Criterion F (Rare): An item possesses uncommon, rare, or endangered aspects of NSW's cultural or natural history (or the cultural or natural history of the local area)
- Criterion G (Representative): An item is important in demonstrating the principal characteristics of a class of NSW's cultural or natural places; or cultural or natural environments (or a class of the local area's cultural or natural places; or cultural or natural environments).

2.2.5.2 Archaeological assessment

There were no heritage items with known archaeological potential, so no detailed archaeological assessments were prepared for this proposal. An investigation of potential areas of archaeological potential was undertaken as part of the field survey. Field survey results are outlined in section 3.2.

2.2.6 Statements of heritage impact

A Statement of Heritage Impact (SOHI) is an assessment report that assists owners, custodians and managers of heritage items to understand how proposed works to a heritage item or in its vicinity may impact the item's heritage significance. A SOHI can recognise and acknowledge measures proposed to conserve the significance of heritage items. It assists the consent authority to consider if an application should be approved based on its potential impacts on the significance of the heritage item.

In accordance with the Department of Planning and Environment (2023) *Guidelines for Preparing a Statement of Heritage Impact,* this report includes for each heritage item:

- A site description (including a site map)
- A site history
- A physical assessment of the site
- A heritage significance of the item, its elements, and its setting
- A description of proposed works and/or activities
- A detailed heritage impact analysis and assessment against the heritage item's identified levels of heritage significance
- An assessment of how the proposed works contribute to or detract from the significance of the heritage item
- A conclusion, including recommended conditions and/or mitigation measures.

A SOHI has been prepared for each heritage item of local or higher significance which would be impacted by the proposal, in accordance with the Department of Planning and Environment (2023) *Guidelines for Preparing a Statement of Heritage Impact*.

The SOHIs are provided in section 7.

2.2.6.1 Levels of impact

The level of impact on the heritage significance of each heritage item in the study area has been assessed using a modified version of the framework for assessing severity of impacts from the *EPBC Act Significant impact guidelines 1.2* (DSEWPC 2013). The following criteria were used to assess the level of impact:

- The scale of the proposed work and its impact
- The intensity of the proposed work and its impact
- The duration and frequency of the proposed work and its impact.

The levels of impact used in this assessment are defined in Table 2-1; for impacts to meet a certain level it must generally have two or more of the characteristics noted. The level of impact assigned to each heritage item is based on the level assessed following implementation of management or mitigation measures.

Table 2-1. Definitions of level of impacts

Level of Impact	Scale	Intensity	Duration/frequency
Major	Medium – large	Moderate – high	Permanent / irreversible
Moderate	Small – medium	Moderate	Medium – long term
Minor	Small / localised	Low	Short term / reversible

Negligible	Little or no physical impact; or little or no impact on heritage significance from physical impacts; or potential physical impacts can be prevented through implementation of management measures.

2.2.6.2 Cumulative impacts

Cumulative impacts are assessed for non-Aboriginal heritage based on the *Cumulative Impact Assessment Guidelines for State Significant Projects* (DPIE 2022) guidelines. In accordance with the guidelines, this cumulative impact assessment has considered relevant future projects that could result in a material impact on non-Aboriginal heritage.

2.2.7 Mitigation and management measures

The mitigation and management measures comprise methods of avoiding, minimising, mitigating, and/or managing the impacts from the proposal to each heritage item identified. This includes an assessment of residual impacts after the implementation of the proposed management measures. These residual impact levels are also based on the impact levels described in Table 2-1, and take into account how these mitigation and management recommendations change the total impacts to the heritage item and its significance.

3. Existing environment

3.1 Desktop assessment

3.1.1 Register search results

There is one registered non-Aboriginal heritage item within the study area, comprising Hartwood Weir (S170 4550110). This heritage item, being the weir itself, intersects with the Hartwood Weir study area, but the WaterNSW S170 spatial data is unavailable so no mapping of its registered heritage curtilage has been produced. (Refer to section 3.2 for locations identified during field survey.)

While Hartwood Station is listed on the NTR, it is approximately 10 km to the east of the study area at Hartwood Weir. However, the information sheet provided by National Trust of Australia (NSW) (1985) mentions the Hartwood weir, stating that 'Relics on Billabong Ck (e.g. weir, suspension bridge) may be significant but were not assessed for this listing'.

There are no historical heritage places within proximity to the Wanganella Weir study area.

These heritage items are summarised in Table 3-1.

Table 3-1. Historical heritage places within, or associated with, the study area

Heritage Database	Register number	Name	Address	Description	Distance from study area
WaterNSW S170	4550110	Hartwood Weir	Billabong Creek, Conargo	Weir	Within the Hartwood Weir study area
NTR	-	Hartwood Station and Outbuildings	Conargo Road, Hartwood	Homestead complex	10 km east of the Hartwood Weir study area

3.1.2 Previous historical heritage investigations

Few historical heritage investigations have been undertaken in this region. No copy of the *Deniliquin Council Heritage Study*, completed by Inventory in 2008, is available from the Edward River Council for review, and the Edward River Heritage Study, which was noted as needing completion in 2020 (Edward River Council 2020), has not been published as of 14 August 2024. Those reports which are available have been summarised in Table 3-2.

Table 3-2. Summaries of previous heritage studies and relevant historical heritage investigations

Author	Summary
Austral Archaeology (2003)	Austral Archaeology Pty Ltd (Austral) was commissioned by State Water to undertake heritage assessments of 304 river structures located across Southern New South Wales (NSW), and 36 river structures located across Northern NSW. These assets include a range of public infrastructure such as dams, weirs, regulators, levees, culverts, crossings, channels and related buildings. This resulted in a range of recommendations for the assets, based on the results of background research, site inspections and assessments of cultural significance. The management recommendations were developed to address the level of significance, rather than individual recommendations for each heritage item.

Author	Summary
	Four weirs and a regulator were identified along Billabong and Yanco Creeks: ▪ Algudgerie Weir on Billabong Creek, near Jerilderie ▪ Jerilderie Rock Weir on Billabong Creek, near Jerilderie ▪ Hartwood Weir on Billabong Creek, near Conargo ▪ Spillers Regulator on Yanco Creek, near Narrandera ▪ Tarabah Weir on Yanco Creek, near Narrandera. Algudgerie Weir, Jerilderie Rock Weir, and Hartwood Weir were assessed as being of high local significance, Spillers Regulator was assessed as being of moderate local significance, and Tarabah Weir was assessed as having no local or State significance. Of these, only Hartwood Weir intersects with the current study area. No statement of significance was provided for Hartwood Weir. However, the significance assessment of this weir was used as a basis for the significance assessment in section 4, and will not be replicated here.
Bartlett (c.2006)	The History of Conargo Shire Settlement covers the history of Conargo Shire from the early-1840s, with Benjamin Boyd's landing at Twofold Bay and Augustus Morris's exploration of the north side of the Murray River, to the mid-2000s. No individual places were identified as part of this assessment. However, the history can be applied to the study area, particularly that relating to the individual stations associated with the study area. Relevant information from this thematic history has been included in section 3.1.3.
Pennay and Pennay (2001)	The Deniliquin thematic environmental history was undertaken as part of a heritage study for the municipality of Deniliquin, an area to the southeast of the township of Wanganella. The other volumes of the heritage study were not publicly available for review. While it is outside the study area, the thematic history references the rural region surrounding the township which is applicable to the current study. No individual places were recommended for heritage protection as part of the thematic environmental history, and there are no mentions of any weirs or dams being built on any of the properties. However, the thematic history can be applied to the study area, particularly to those discrete areas located closer to Deniliquin. Relevant information from this thematic history has been included in section 3.1.3.

3.1.3 Historical background

3.1.3.1 Early exploration

The region in which the proposal is situated was first explored by non-Aboriginal people from 1829 to 1838. Charles Sturt explored the Murrumbidgee River in 1829, in an attempt to determine whether it terminated in a marsh, united with the Darling River, or emptied itself into the sea on the southern coast of the Colony. He arrived at the junction of the Lachlan and Murrumbidgee Rivers on 25 December 1829. Subsequently, he and his party followed the Murrumbidgee River by boat from 7 January 1830 and found its confluence with the Murray River on 14 January 1830. They then followed the Murray River (which he called the Hume River) to its confluence with the Darling River (Cumpston 1951).

In late 1837, reports of a shortage of stock in the new settlement of South Australia were received in Sydney, prompting the first overland cattle drives to supply the settlement with cattle (Charles Sturt Museum n.d.; Cumpston 1951). As part of the effort to bring cattle to Adelaide, Sturt left Sydney at the end of April 1838. Sturt's party travelled down the north bank of the Murray River (then known as the Hume River) from the vicinity of today's Albury, passing Ovens River on 29 May 1839 (Cumpston 1951). He crossed to the south bank of the Murray River when they arrived at the junction of the Murray and Edward Rivers (which he named

'Delangen Creek') on 8 June 1839 (Charles Sturt Museum n.d.). Sturt did not explore Delangen Creek, nor the land between the Murray and Murrumbidgee Rivers (Figure 3-1). James McLaurin, Scottish-born grazier, and his partner, John Webster, were the first to explore Delangen Creek in January 1841. They renamed it as 'Edward River' after their employer, Edward Howe (Deniliquin Pastoral Times 2017a, p. 8; Teale 1974; University of Wellington 2016).

During the late 1830s, pastoralists in central NSW and Queensland drove surplus stock to the expanding markets in Port Phillip and Adelaide, following west-flowing rivers such as the Darling, Lachlan, Murrumbidgee and Murray (Pennay and Pennay 2001). It is believed that the first settlers in the region arrived during this period, with Thomas Broughton Carne, tailor, grazier and politician, of Coonargo (Conargo) and James Scott Hindmarsh of Wanganella arriving during this period. They both set up runs along Billabong Creek (Bowd 1969; Craig 1963).

3.1.3.2 Murrumbidgee Pastoral District

In 1844, *The Journal of the Royal Geographical Society of London* published an article by Sturt noting the rich soil of the flats along the Murray River. He stated that, 'Many fine stations might indeed be formed even to the junction of the Delangen; and, as in the cases of the Morumbidgee and the Macquarrie, I have no doubt the settlers, as they want pasturage, will push down to them' (Sturt 1844, p. 144). The first Crown lessees to the Deniliquin region were Benjamin Boyd, Henry Sayer Lewes, Messrs. Phillips and Graves, Peter Stuckey and the Gwynne brothers, Henry, Richard and Francis (Pennay and Pennay 2001).

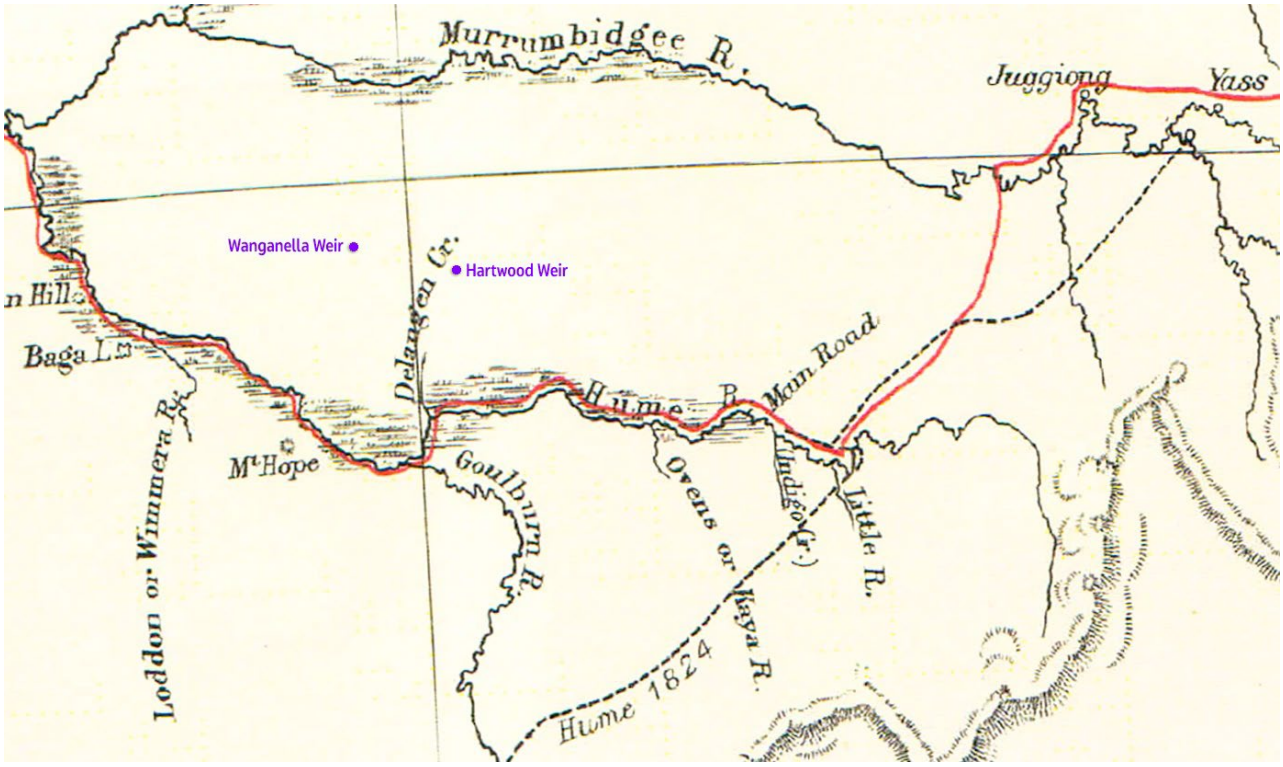

Figure 3-1. Sketch map of Charles Sturt's 1838 exploration of the Murray River, showing Delangen Creek (now known as Edward River), with the approximate location of the two study area locations in purple (Sturt 1899)

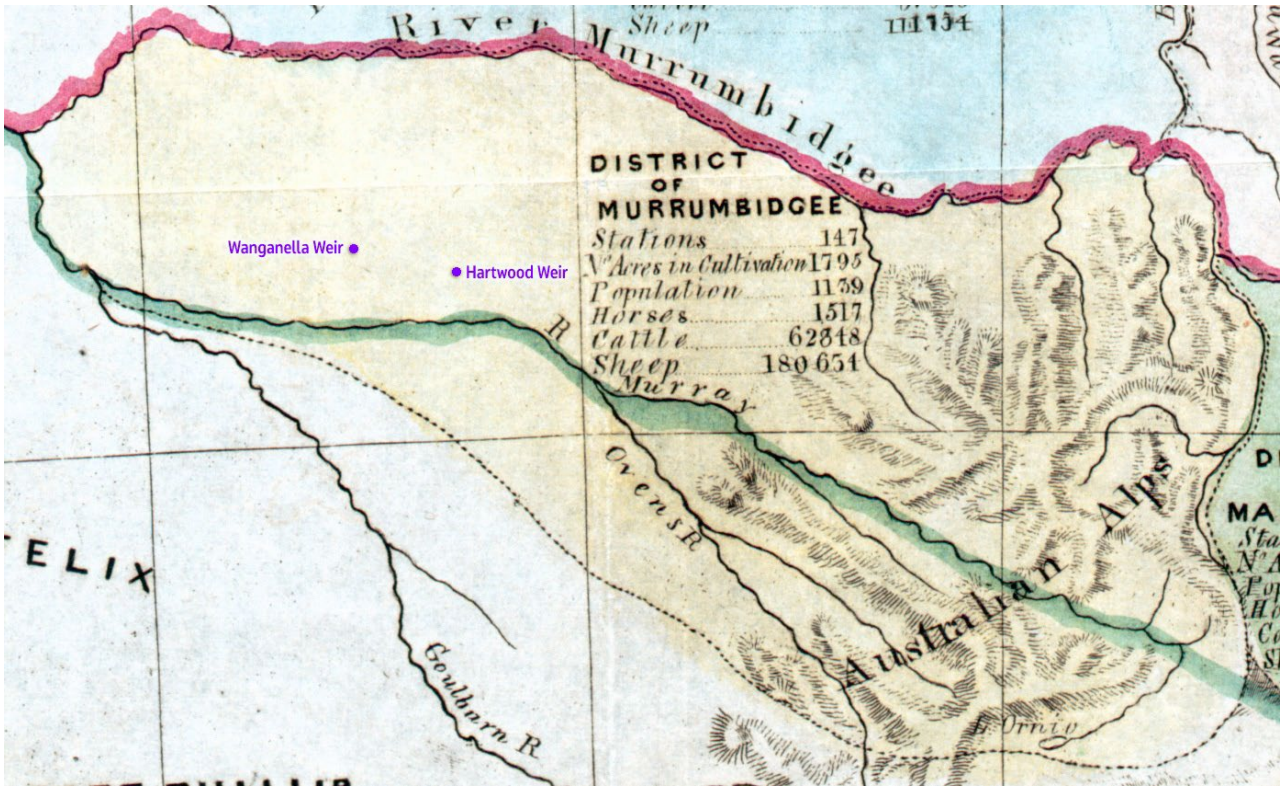

Figure 3-2. Sketch of the Murrumbidgee District showing the number of stations, cultivated land, people, and animals, with the approximate location of the two study area locations in purple (Baker 1841)

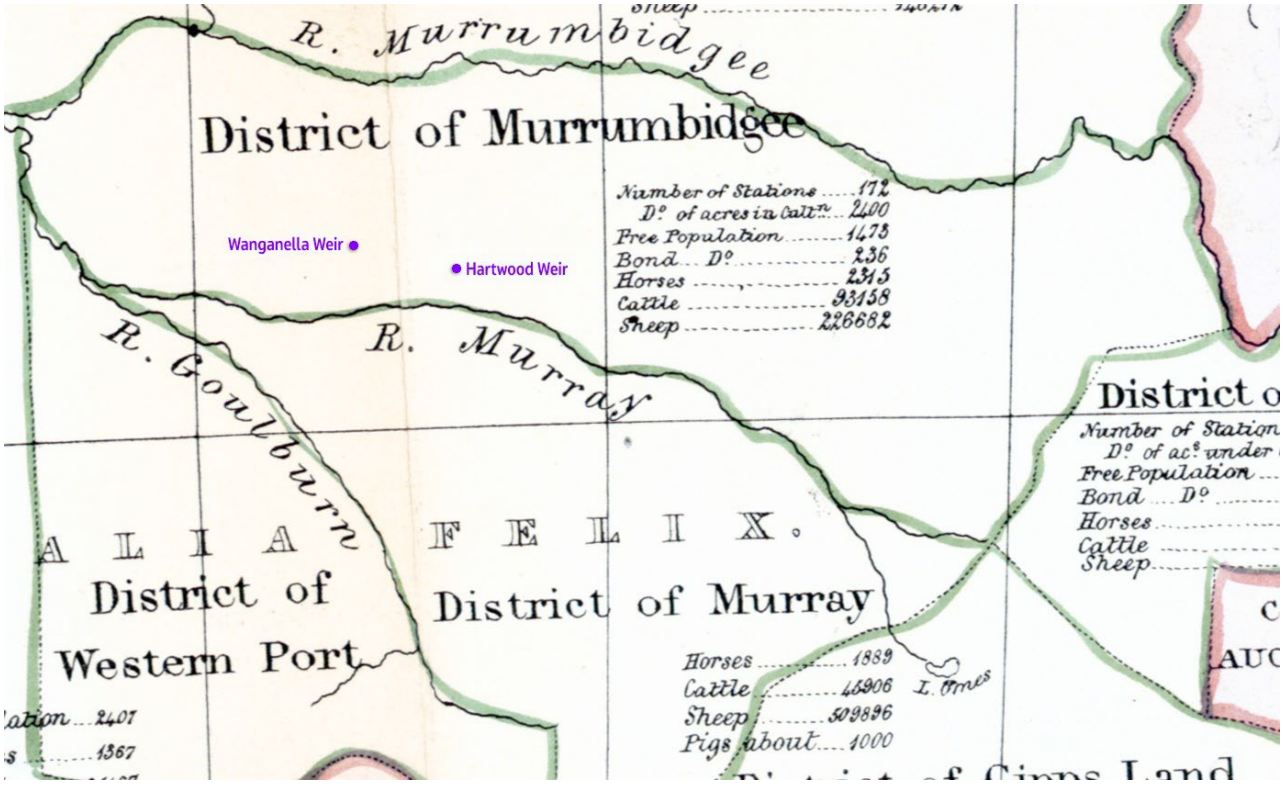

Figure 3-3. Sketch of the Murrumbidgee District showing the number of stations, cultivated land, people, and animals, with the approximate location of the two study area locations in purple (Arrowsmith 1844)

However, the Murrumbidgee District (now known as the Riverina region) was first formed several years earlier than this article (Figure 3-2), as the need for pastoral land had already drawn squatters to the region between the Murrumbidgee and Murray Rivers. By 1841, the Murrumbidgee District held 147 stations, with a population of 1,139 persons, 1,517 horses, 62,848 head of cattle, 180,654 sheep, and 1,795 acres of land under cultivation. Within three years, these had all increased, and there were 172 stations, with a population of 1,473 free persons and 236 bonded persons, 2,315 horses, 93,158 head of cattle, 226,682 sheep, and 2,400 acres of land under cultivation (Figure 3-3).

However, there were few amenities, and both communication and transport were difficult across the region. Tracks through the district were poor, with droughts being common. There were no bridges, making the crossing of the Edward River difficult. Head stations, such as Boyd's Deniliquin Station, typically comprised 6-7 men, occasionally with women and children, a wool shed, slab huts and a dwelling, along with outstations run by a hut-keeper with several shepherds (Pennay and Pennay 2001).

3.1.3.3 Deniliquin Station

It was during this period of growth in the Murrumbidgee District that much of the land around today's Deniliquin was taken up by one individual. Boyd arrived in Port Jackson on his yacht, the *Wanderer*, as a wealthy Scottish immigrant on 18 July 1842 (Dunn 2021, pp. 1, 7; Walsh 1966). He was the second son of a Scottish shipowner, Edward Boyd, who had been involved in the American and Caribbean slave trade in the 1790s and early 1800s (Dunn 2021, p. 1). Boyd came to Sydney with the purpose of founding a pastoral empire. He made his first purchase prior to his arrival in Sydney buying Colac Station and its associated flocks from its owner, Augustus Morris, when he called into Port Phillip in June 1842. Boyd appointed Morris to manage his stations (Dunn 2021, p. 7).

As part of this undertaking, Boyd is known to have practiced 'blackbirding' (a term which is used to describe the coercion and kidnapping of South Sea and Pacific Islanders to work in Australia as labour). Based on his previous use of Aboriginal and Māori labourers in his broader whaling ventures, when there was a risk of insufficient labour for his pastoral properties Boyd decided to import a workforce from Melanesia. In April 1847 (more than ten years after British Parliament passed the *Slavery Abolition Act 1833*), the *Wanderer*'s sister ship, the *Velocity*, shipped 65 South Sea Islander men and boys (aged between 14 and 25) from Lifu in the Loyalty Islands (now part of New Caledonia) and from Tanna and Aneityum in the New Hebrides (now Vanuatu). To avoid running afoul of the law, which punished slavery (including execution), the islanders were transported under a shallow guise of voluntary indentured labour, paid approximately one quarter of what Europeans could expect. Illiterate and/or non-English speaking, upon arrival in Eden their 'contracts' were marked with a thumbprint for the promised payment of one pound six shillings a year (£1/6/–), a meagre clothing allowance and rations of meat and flour, in return for five years' labour (McKinnon 2019).

Later in 1842, on Boyd's behalf, Morris also explored the salt bush country of the Riverina, from Urana in the east and Deniliquin in the south, along both the Edward River and Billabong Creek to the Murrumbidgee River junction (Barnard 1974). By 1845, Boyd had acquired over 1,750,000 acres of land in the Riverina area. Boyd also operated steamships as coastal passenger and cargo traders between Sydney and the southern ports, along with a large whaling fleet. He ran his affairs from Boydtown, his own private township, in Twofold Bay on the south coast of NSW, where he exploited South Sea Islanders by putting them to work for a pittance in an effort to save money; Boyd was so unpopular that he rarely visited his stations without being accompanied by the police or a local magistrate (Dunn 2021, p. 1). Thus, by 1846, Boyd held a vast pastoral estate through the Riverina, Monaro, central and southwest Victoria, making him one of the largest landholders outside of the Crown at the time. However, it was Morris who established the stations for Boyd along the Murray River and around the Deniliquin area. This huge tract of country, which encompassed the whole of Conargo Shire, ran from Murray River frontages west of Tocumwal to beyond the Edward River. Deniliquin Station soon became the head station for the region (Dunn 2021, p. 7). This station comprised 700,000 acres of land on the Lower Edward River down to Moulamein and back north to the Billabong Creek and south to the Niemur River (Wellings 1936, pp. 117-118). The two sections of the study area would therefore have been within Boyd's Deniliquin Station.

The earliest building in the region was an inn, which Boyd named the 'Wanderer' after his yacht, established in today's Deniliquin in 1845. Within three years, a blacksmith's forge and a store were established, and Deniliquin's first doctor, Dr Coward, arrived intending to set up a hospital. While the township was constituted in 1848, originally being called 'The Sandhills', it was officially gazetted as Deniliquin in 1850 (Deniliquin Pastoral Times 2017a, p. 8; 2017c, p. 3; Tout-Smith 2004). Government surveyors surveyed the town with allotments for sale in mid- to late-1848. Surveyor Townsend described the location as a 'central and desirable' site for the capital of the Murrumbidgee District, and that the town already had a public post office, a lockup, and several mechanics, along with the Wanderer Inn and blacksmith's shop. While Boyd objected to the layout of the township, the surveyors were to 'guard no other interests than those of the public'. On 9 September 1849, the Surveyor-General provided a design for 'Deniliquin on the Kyallite River' (Edward River), which was intended to be a large township (Deniliquin Pastoral Times 2017c, pp. 3-4).

Boyd's 'blackbirding' activities in 1847 resulted in multiple deaths in the islands which, alongside his treatment of Aboriginal workers on his properties, had raised the suspicions of the Colonial Office in London. While attempting to track down and forcibly kidnap two Uveans escapees at Rotuma Island in 1847, Captain Edward Kirsopp of Boyd's ship, *Velocity*, seized and held a local chief hostage. In the fight which ensued, the crew of the *Velocity* (and another of Boyd's ships, the *Portenia*) shot and killed a number of islanders, including the chief. In response, George Grey (Governor of New Zealand) dispatched Captain Maxwell of the British warship, *HMS Dido*, to Rotuma Island to investigate the violence in December 1847, suspecting Boyd of slaving (Dunn 2021, pp. 24-25; Howe 1978). Boyd left Sydney on the *Wanderer* in October 1849, as his pastoral empire started crumbling. His labour schemes had been unsuccessful, and his estates were struggling due to their isolation and from poor management. Boyd vanished during a hunting trip on the island of Guadalcanal, an island in the Solomons, on 15 October 1851; it was believed that he was killed by islanders, and his crew members killed local villagers across the island in retaliation (Dunn 2021, p. 25). In May 1864, after an 1854 search for him proved fruitless, letters of administration of his estate and effects (which were valued at less than £3,000) were granted to the London manager of his creditor, the Royal Bank of Australia (Walsh 1966).

Over the few years following Boyd leaving Sydney, his run was subdivided for sale: 100,000 acres were sold to James Tyson (Deniliquin Station), along with a separate 60,000 acres (Warbreccan Station); 40,000 acres to James McLaurin (Cornall Station); 180,000 acres to Mooney (Tuppal Station), along with a separate 80,000 acres (Barooga); 48,000 acres to Francis Gwynne (Murgha Station); 90,000 acres to William Degraves (Woorooma Station); 60,000 acres to Henry Gwynne (Balpool-Werai Station); and 40,000 acres to Tennant (Nyang Station) (Bartlett c.2006). By the 1850s, traffic through the area increased and the district surrounding Deniliquin was populated. The boundaries of runs were defined and travelling stock routes a mile wide (approximately 1.5 km) reserved, as was the boundary of the town. The district was beginning to be recognised as a good stock fattening area and the value of saltbush was starting to achieve recognition. The increased prosperity of the district that followed allowed the stations to become more self-sufficient, and increase the number of workers working at the homesteads. Bread, butter and candles were made on site, hams and bacon were cured, and Chinese market gardeners were employed to work the properties (Pennay and Pennay 2001).

3.1.3.4 Squattage subdivisions

Mapping dating to 1858 (Figure 3-4) shows that there were several features, including homesteads or huts and government-proclaimed reserves, along the waterways within the Murrumbidgee District, after the breakup of Boyd's Deniliquin Station.

These included:

- Along Billabong Creek:
  - Cooroonboon (Caroonboon)
  - Waugonilly (Wanganella, Wangonella, Wanganilly, Wangonilly or Wangonilli) Reserve

- Bilubola (Belubla)
- Ten Mile Waterhole
- Tantogandy
- Conargo
- Babramine
- Mullandudgil
- Mundiwah (Mundiwa)
- Curabunguning (Currabunganung, Currabungunang)
- Coree

- Along Yanko (Yanco) Creek:
  - Quallagu (along)
- Along the Kyalite (Edward) River:
- Baratta (Barratta)
- Deniliquin township
- The Wool Shed.

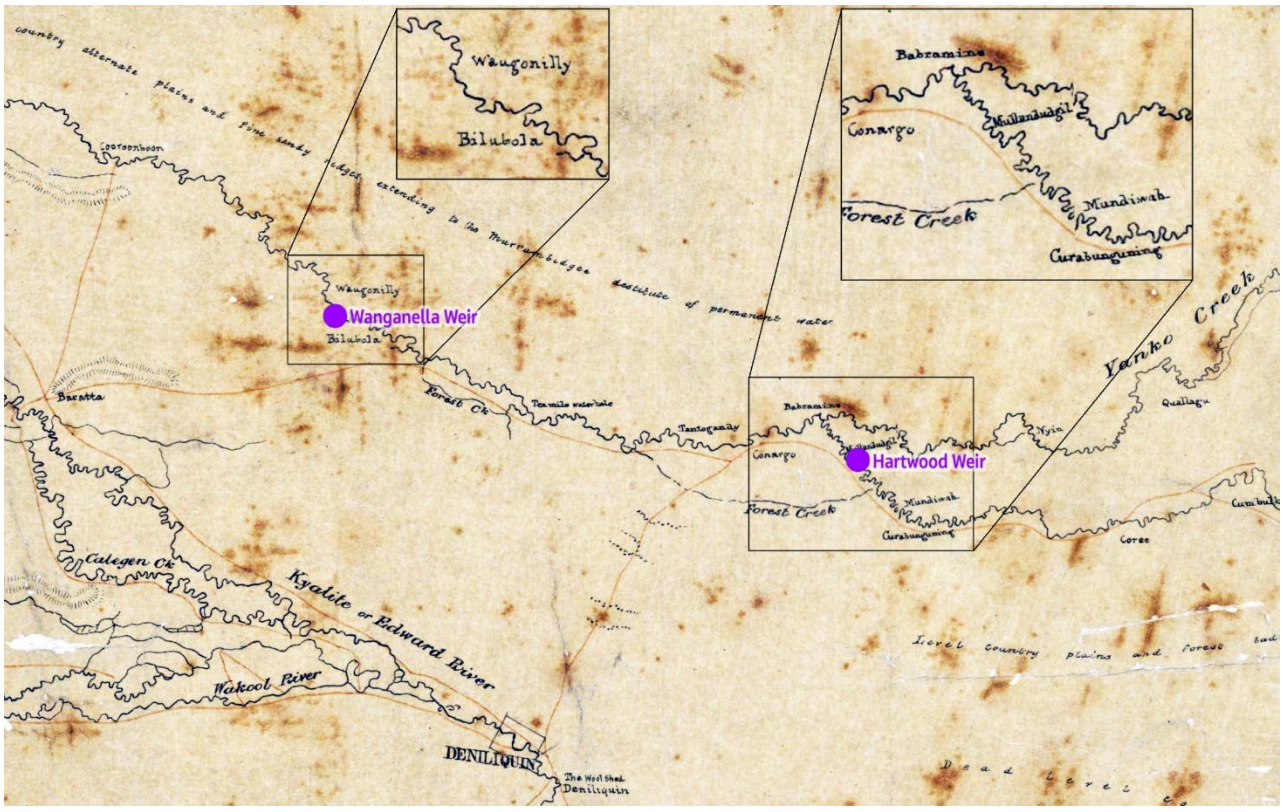

Figure 3-4. Map of the Murrumbidgee District along Billabong and Yanko (Yanco) Creeks, with the approximate location of the two study area locations in purple (Department of Crown Lands and Survey 1858)

The *NSW Government Gazette* (Tue 16 Mar 1852, p. 473) noted that Coree was associated with Burchett's head station; Conargo with parts of Alexander Innes' and Benjamin Boyd's runs; Wanganilly and Cooroonboon with part of Hindmarsh's run; Barratta with Gwynn's run; and Deniliquin with Boyd's run. Tracks were shown

running between many of the stations, with tracks running from Deniliquin northwards to Conargo, and westwards along both the Edward and Wakool Rivers. The land to the north was described as 'level country alternate plains and pine sandy ridges extending to the Murrumbidgee destitute of water'.

Those features that appear to have been in close proximity to the study area (Figure 3-4) would have been:

- Wanganella to the north, and Belubla to the south, of Billabong Creek
- Ten Mile Waterhole and Tantogandy, both north of Billabong Creek
- Babramine, Conargo, Mullandudgil, Mundiwah (Mundiwa) and Curabunguning in the east.

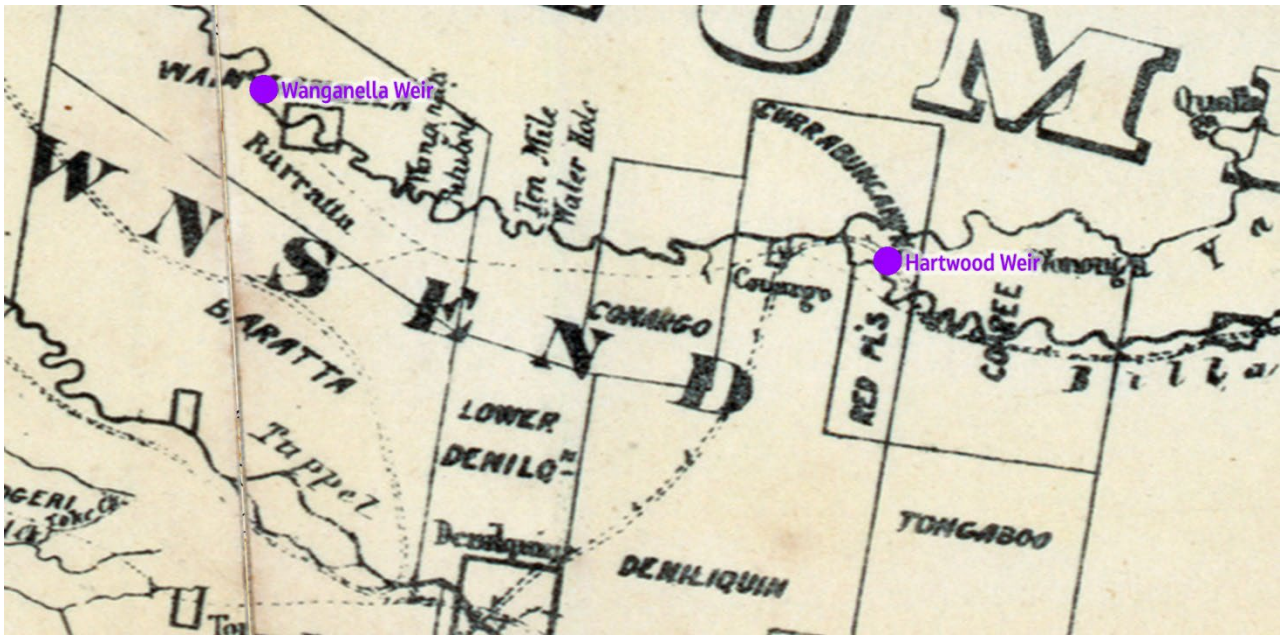

Figure 3-5. Sketch map of pastoral runs and squattages in the Murrumbidgee District, with the approximate location of the two study area locations in purple (Reuss & Browne 1860)

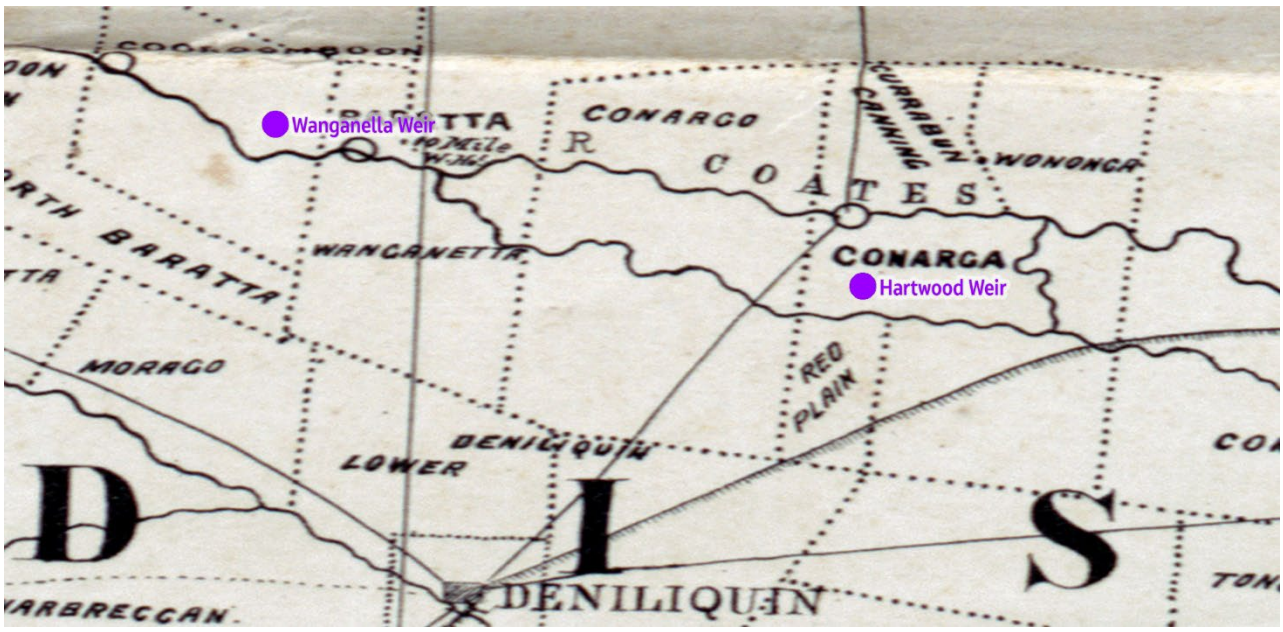

Figure 3-6. Sketch map of squatting runs in the Murrumbidgee District, with the approximate location of the two study area locations in purple (Owen 1868)

A feature called Ten Miles Waterhole, depicted on the map as being to the west of Tantogandy, actually formed the west boundary between Wanganella and Conargo (Coonargo) (*NSW Government Gazette*, 30 September 1848, p. 1355; 16 February 1850, p. 261). The place names of Tantogandy, Baramine and Mullandudgil shown on the 1858 map (Figure 3-4) do not appear to be the names of early squatting runs, as these (or similar) names do not appear in later mapping, nor in the *Squatters and Graziers Index 1837-1849* (NSW Government 2022) or in any available issues of the NSW Government Gazette. They may therefore represent features found along the waterway.

Sketch mapping of squatting runs from 1860 (Figure 3-5) show the general placement of squattages during that period. From west to east, the map shows 'Cooroomboon' at the west end of the study area, with Wanganella immediately to the east, then what appears to be Crown land in which Ten Mile Water Hole is noted, then Conargo, Deniliquin, and Currabunganung and Red Plains in the east. Belubla appears to be a station near Wanganella. However, this place is not associated with the study area, and will therefore not be examined further.

A less accurate sketch map from 1868 (Figure 3-6), judging by the alignment of the waterways in the region, confirms the general location of the pastoral runs within the vicinity of the study area. However, Wanganella is shown as being to the south of Barratta, rather than to the north, and appears to be opposite Ten Mile Water Hole.

Additionally, the confluence of the Yanko and Billabong Creeks is shown to be situated near Ten Mile Water Hole, rather than further to the east. Therefore, the locations of the stations on this map are unlikely to be accurate. It does confirm that Cooroomboon was to the west of Wanganella (which it lists as 'Wanganetta') and Barratta ('Baratta'), with Conargo to their east. Currabunganung ('Currabunganning') and Red Plains are shown to the north and south of a property between Yanko and Billabong Creeks, 'Conarga', respectively. While this map is likely to be inaccurate, which includes inconsistencies in the names of the stations, it is probable that property boundaries have also shifted somewhat since 1860. Despite this, it confirms that the following stations are likely to have once been associated with the study area: Wanganella, Conargo, and Currabunganung.

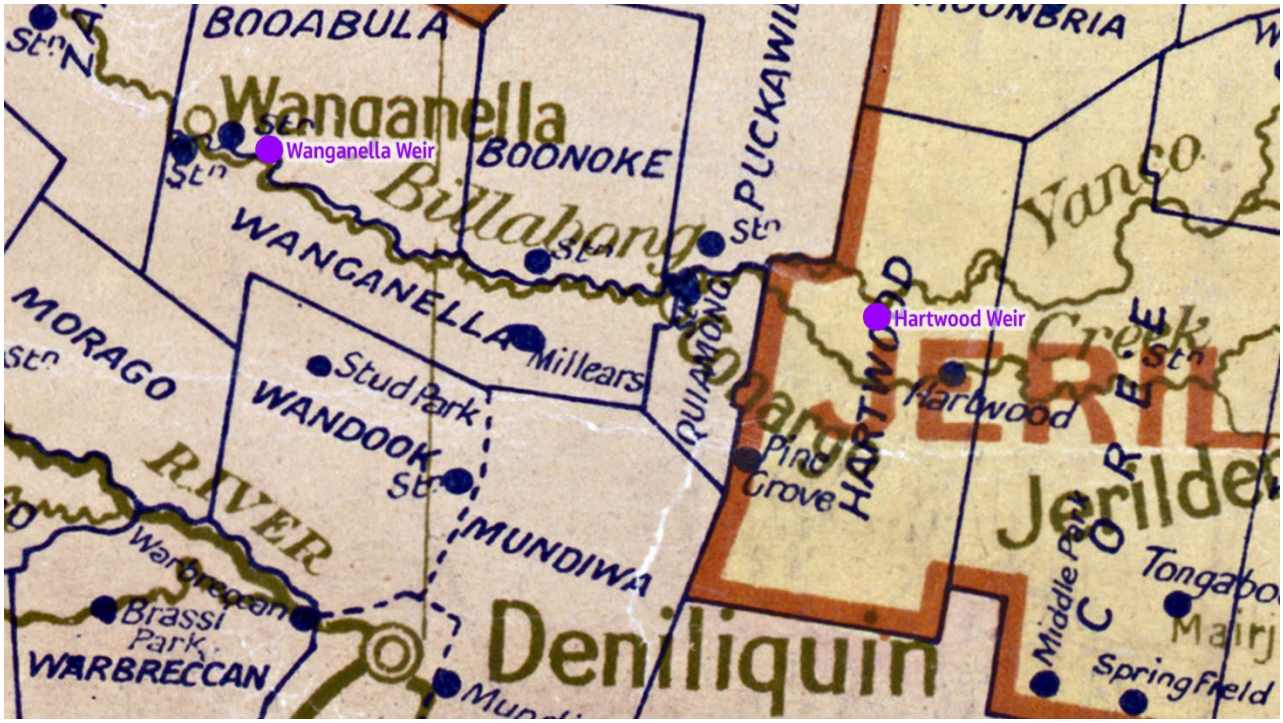

Figure 3-7. Sketch map of pastoral stations in the Deniliquin and Jerilderie areas, with the approximate location of the two study area locations in purple (HEC Robinson Pty Ltd c.1919)

Mapping dating to around 1919 shows how the stations changed in the early 20th century (Figure 3-7). The stations associated with the study area are confirmed as being at Wanganella and Hartwood Stations. While there are other stations within close proximity, the individual histories of the stations (sections 3.1.3.4.2 and 3.1.3.4.3) confirms that they are associated with the former stations, and not that of Baratta ('Baratta'), Zara, or Belubla ('Booabula').

3.1.3.4.1 Hindmarsh's Run (Wanganella Station)

Originally, Wanganella was part of James Scott Hindmarsh's much larger run. It is believed Hindmarsh occupied the area from the late 1830s (Craig 1963). He became insolvent in 1844, according to newspapers of the time such as *The Australian* (22 February 1844, p. 3), with debts of £1,143. His properties were placed under sequestration on 20 February 1844 (*NSW Government Gazette*, 23 February 1844, p. 340), and put up for auction, along with his sheep and cattle, by March 1844 (*The Sydney Morning Herald*, 7 March 1844, p. 4).

3.1.3.4.2 Wanganella Station

3.1.3.4.2.1 Station ownership and development

After Hindmarsh's run was broken up due to his insolvency, the *NSW Government Gazette* (17 October 1848, p. 1475) shows that Wanganella Station had been taken up by Alexander Innes by October 1848. It was then described as comprising 100,000 acres of land with 12,000 sheep. Innes subsequently sold the Wanganella run to William Adams Brodribb in around 1854-55 (Pennay and Pennay 2001, p. 9); however, Brodribb only arrived at Wanganella in 1 March 1857, after crossing the Australian Alps with a herd of sheep and cattle (Brodribb 1883). The district surveyor laid out a reserve on Wanganella Station on Billabong Creek in 1859, which was described as being on Brodribb's station (*The Goulburn Herald and County of Argyle Advertiser*, 5 February 1859, p. 2).

Brodribb soon split the run into two in an attempt to sell off part of the station. South Wanganella was sold to Messrs Peppin & Sons in March 1858, along with 8,000 sheep (Brodribb 1883; Pennay and Pennay 2001). North Wanganella was sold to Messrs Thomas and Gideon Lang with 20,000 sheep, 600 head of cattle and 50 horses, along with the homestead, furniture and other materials associated with the station in December 1861 (*Empire*, 28 December 1861, p. 2). Of the two stations, only the Peppins had made vast improvements to their land, with the entire Wanganella South property having been fenced with wire by 1865 (*Sydney Morning Herald*, 13 July 1865, p. 2). In 1878, Messrs Austin and Millear purchased Wanganella and Boonoke Stations from Peppin & Sons, continuing the development of the Wanganella Stud. Austin and Millear divided Wanganella Station equally between them, with Austin retaining the old homestead. Millear built a new homestead on his half of the station, naming his property Wanganella Estate (*The Argus*, 19 August 1910, p.6).

Subsequently, FS Falkiner & Sons Ltd purchased Wanganella Estate and its stud flock from the Millear family in 1910, and then the remainder of the Wanganella property from the Austin family in 1958 (*The Argus*, 19 August 1910, p. 6; *Western Herald*, 30 May 1958, p. 2). FS Falkiner & Sons Ltd specialised in livestock production, including a stud farm and a genetic sourcing service for wool sheep (Bloomberg 2022b). In 1971, Cleckheaton, an Australian yarn company, purchased all the issued capital of FS Falkiner & Sons Pty Ltd; News Limited bought FS Falkiner & Sons Pty Ltd, including Wanganella, in 1978; and FS Falkiner & Sons Pty Ltd was lastly purchased in its entirety by Australian Food & Agriculture Company Limited, who operate cattle farms, in 2000. In 2008, the Wanganella and Boonoke stud sheep were reunited as one flock under Australian Food & Agriculture Company Limited (Australian Food & Agriculture Company Limited 2022; Bloomberg 2022a; Patenall 1972).

3.1.3.4.2.2 Wangonilla township and water management

In 1862, the Department of Lands issued notice that a site has been selected for the township of Wanganella, then known as 'Wangonilla'. It was described as being situated on Billabong Creek, on the road from Hay to Deniliquin (*NSW Government Gazette*, 24 January 1862, p. 185). It was on Wanganella Station property,

approximately 50 miles (80 km) south of Hay, and 25 miles (40 km) northwest of Deniliquin. By 1865, the village had a shoemaker's shop, with 'a neat bridge' over Billabong Creek (*Sydney Morning Herald*, 13 July 1865, p. 2). By 1872, the settlement was still quite small. It held a store, a school, and two public houses. It also had an inn, 'The Wonganilla Inn', which had been built for Brodribb, who owned the Wanganella Station at the time (Town and Country Journal 2002). The inn comprised Brodribb's homestead, which he sold to Robert Neilson in 1860, but was run by someone named Dillon who also ran a mail service, and the post office, as well as a store and a smithy. The first hotel was built by James Taylor in 1864. A Union Church was opened there in 1876 (Jervis 1952, p. 243).

By the late-1890s, the people of Wangonilla had long wanted a dam or weir on Billabong Creek, prior to the construction of the current weir. The *NSW Government Gazette* (2 December 1898, p. 9372; 13 June 1899, p. 4547) recorded the request and approval by the Hay Land Board District for an application by the Trustees of Wangonilla Commons to build a timber overshot dam or weir. By the early-1900s, a more permanent dam was required by the township. In 1916, the *Independent* (17 May 1916, p. 2) reported that the Hay Land Board District ruled that the Windouran Shire Council's application for the overshot dam, which was to be 94 feet (28.65 m) in length, be postponed, to enable the Council to obtain title to the land on which they wished to construct the dam.

A second application for an overshot dam was given a five-year license to the Windouran Shire Council in 1916 under the Water Act of 1912 (*NSW Government Gazette*, 1 December 1916, p. 7069). It appears the Council may not have built the extant weir during this period, because they are listed as an applicant for licenses in 1920 to gain approval for a weir on Billabong Creek (*NSW Government Gazette,* 27 August 1920, p. 4979). The weir was to be built on land applied for under special lease 20-7. Inquiries into the applications were to be held by the Local Land Board on 29 September 1920. The *Government Gazette of the State of NSW* (24 December 1920, p. 7583) subsequently announced that the Council's application was granted, and that a special lease of 2 acres of land be granted for the purposes of building the weir on Billabong Creek. The crest of the weir was to be no less than 73 feet (22 m), with a level fixed at 8.85 feet (2.69 m) below an established benchmark. Drop boards of no more than one foot (0.3 m) in height were to be used over the crest level of the central portion of the weir, and were not to be fixed in place. The operation of the weir was to be overseen by the Water Conservation and Irrigation Commission.

In January 1927, the Water Conservation and Irrigation Commission received an application for a license for the aforementioned special lease allotment for the weir from the Windouran Shire Council, with public inquiries into the applications occurring in February (*Government Gazette of the State of NSW*, 14 January 1927, p. 136). The Windouran Shire Council's application was approved in April by the Hay Land Board District under the 1912 Water Act, with the weir specifications having changed to have a shorter length but with higher drop boards (no less than 66 feet (20.11 m) with a level fixed at 8.88 feet (2.7 m) below the benchmark and drop boards to a height of no more than 2 feet 6 inches (0.76 m) over the crest level) (*Government Gazette of the State of NSW*, 1 April 1927, p. 1667). Wanganella Weir was subsequently built in 1927 for the conservation of water for the township of Wangonilla (NSW Department of Primary Industries 2006, p. 60). The name of the village was changed to Wanganella in 1970 under the *Geographical Names Act 1966* (*Government Gazette of the State of NSW*, 4 December 1970, p. 4928).

The 1923 County of Townsend map (Figure 3-8) shows that the location of the Wanganella Weir is immediately west of the village of Wangonilla (now known as Wanganella). The weir itself is not shown on this map, but the allotment north of the creek, the location of the Wanganella flood bypass channel, comprised a travelling stock and cattle reserve (R.50332), while the area to the south was leased land for sale (R.10923 and R.10924).

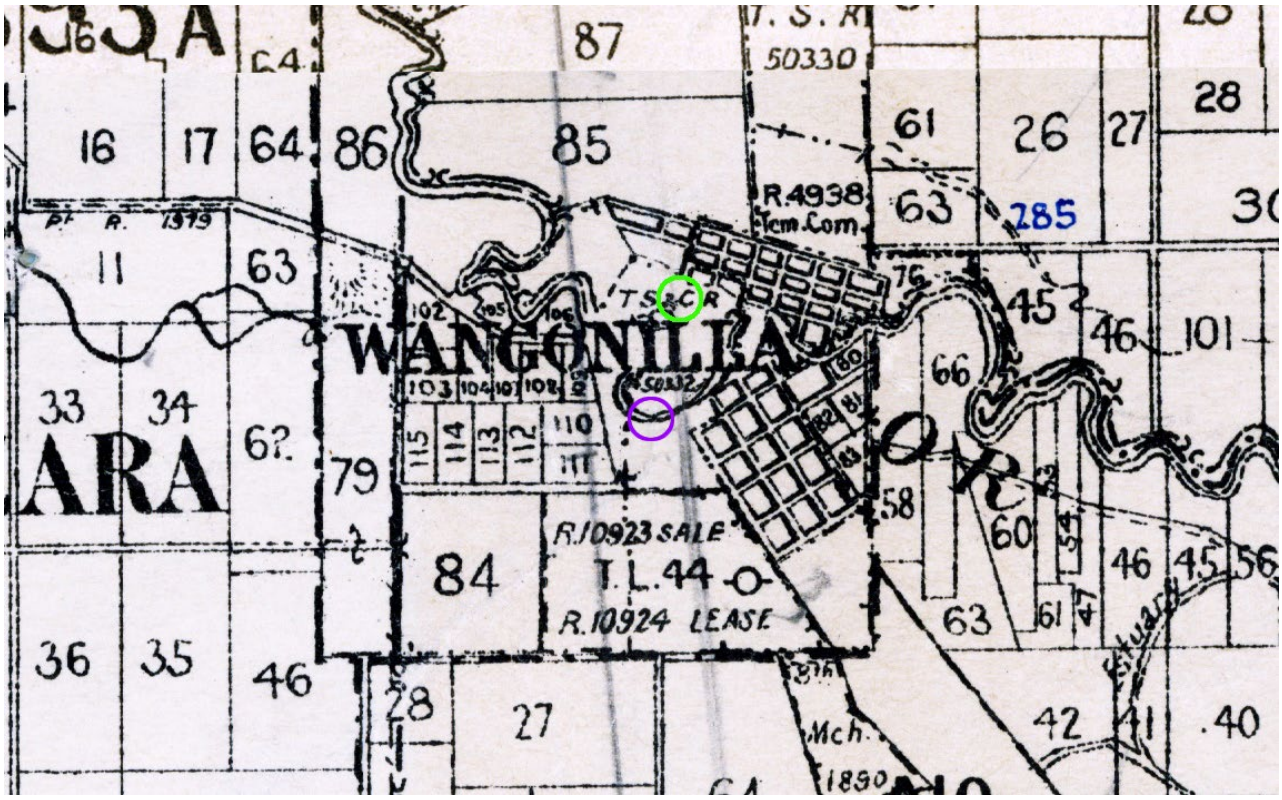

Figure 3-8. 1923 County of Townsend map with the location of weir in purple and Wanganella flood bypass channel area in green (Department of Lands 1923)

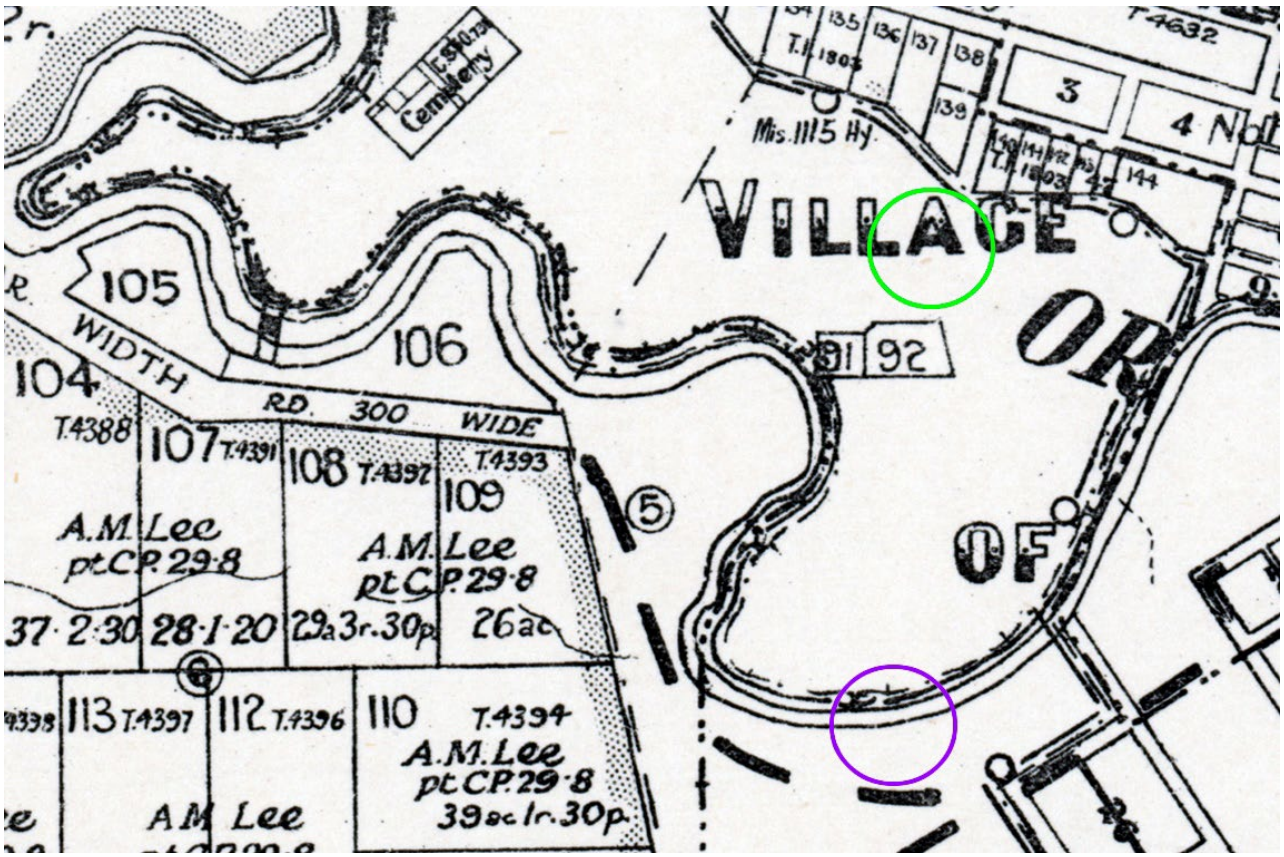

Figure 3-9. 1937 Parish of Wangonilla map with the location of weir in purple and Wanganella flood bypass channel area in green (Department of Lands 1937)

The 1937 Parish of Wangonilla map (Figure 3-9) also does not indicate the weir itself. The land to both the north and south of the weir location is delineated as 'occupation license' and suburban land, and does not comprise any allotment. A track is present to the south of Billabong Creek. Note 5 on the map states 'pt. R.58036 fr. Sle 58037 fr. Lse. genly. for Commonage Notd 22.5.25 (SW)', noting that this land had been a common area for the village of Wangonilla since 1925, with a cemetery to the northwest of the weir. This notation suggests that this is the special lease allotment used for the weir. The Wanganella flood bypass channel is within the village common area.

By 1962, county mapping (Figure 3-10) shows the land on both sides of Billabong Creek in the vicinity of the weir as being reserves. The weir does not appear to be detailed on the map. However, it is difficult to determine as the title of the parish is written over the location of the weir. The presence of the reserves however indicates that this is the location of a public space for the management of water for the township. The Wanganella flood bypass channel is within these reserves.

While the 1970 Town of Wanganella map (Figure 3-11) does not show the weir itself, it shows the location of the weir as being within its own allotment. This allotment, Special License 49.2, is owned by the Windouran Shire Council and comprises approximately 2 acres of land crossing Billabong Creek. The land surrounding this is still shown to be suburban and 'occupation license' (or 'preferential occupation') land; land across that area on both sides of the creek was noted as 'Water Trust'. The Wanganella flood bypass channel is within Trust land. Few other changes are visible on the mapping in the vicinity of the weir. Again, this supports the weir being in this location.

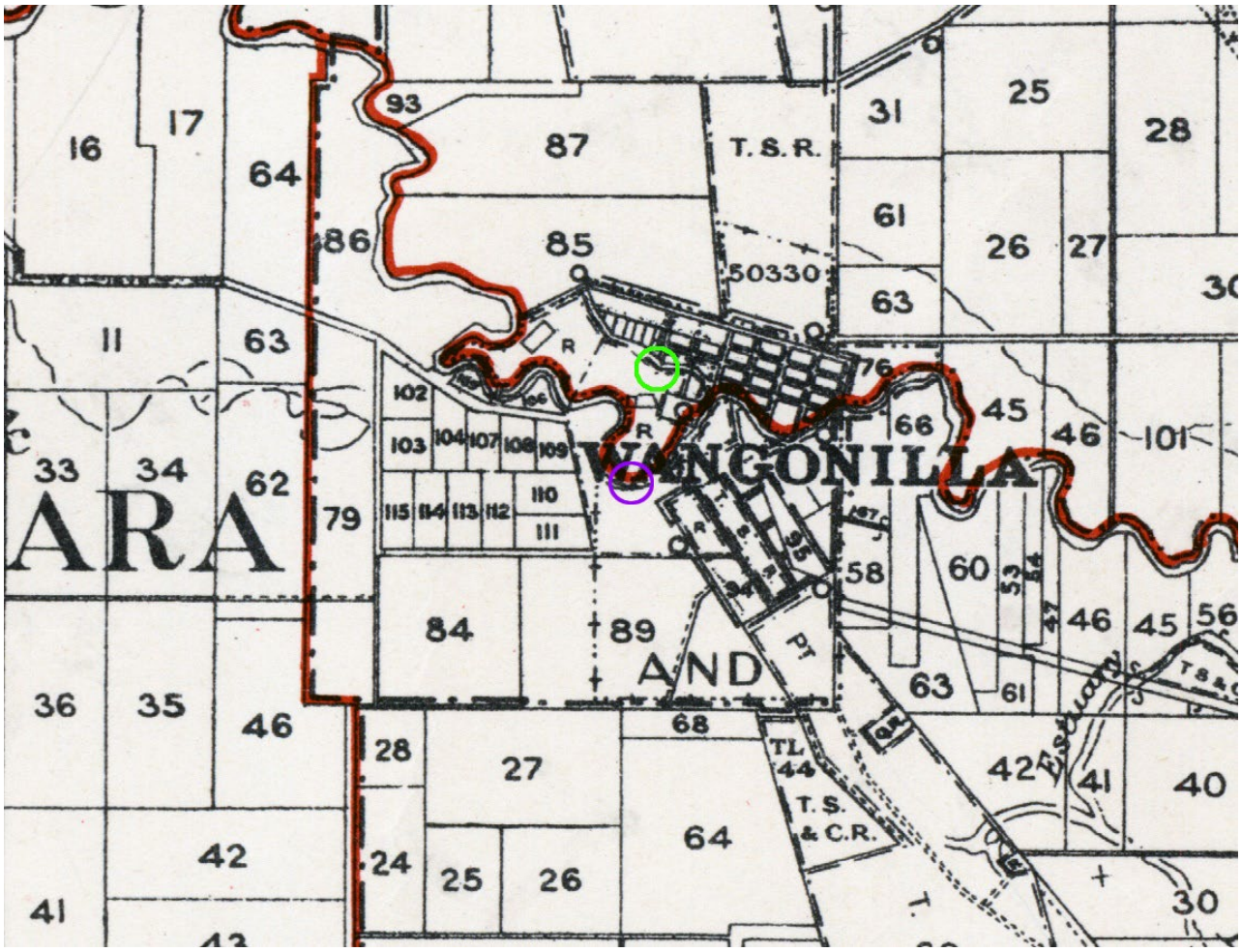

Figure 3-10. 1962 County of Townsend map with the location of weir in purple and Wanganella Swamp Wanganella flood bypass channel area in green (Department of Lands 1962)

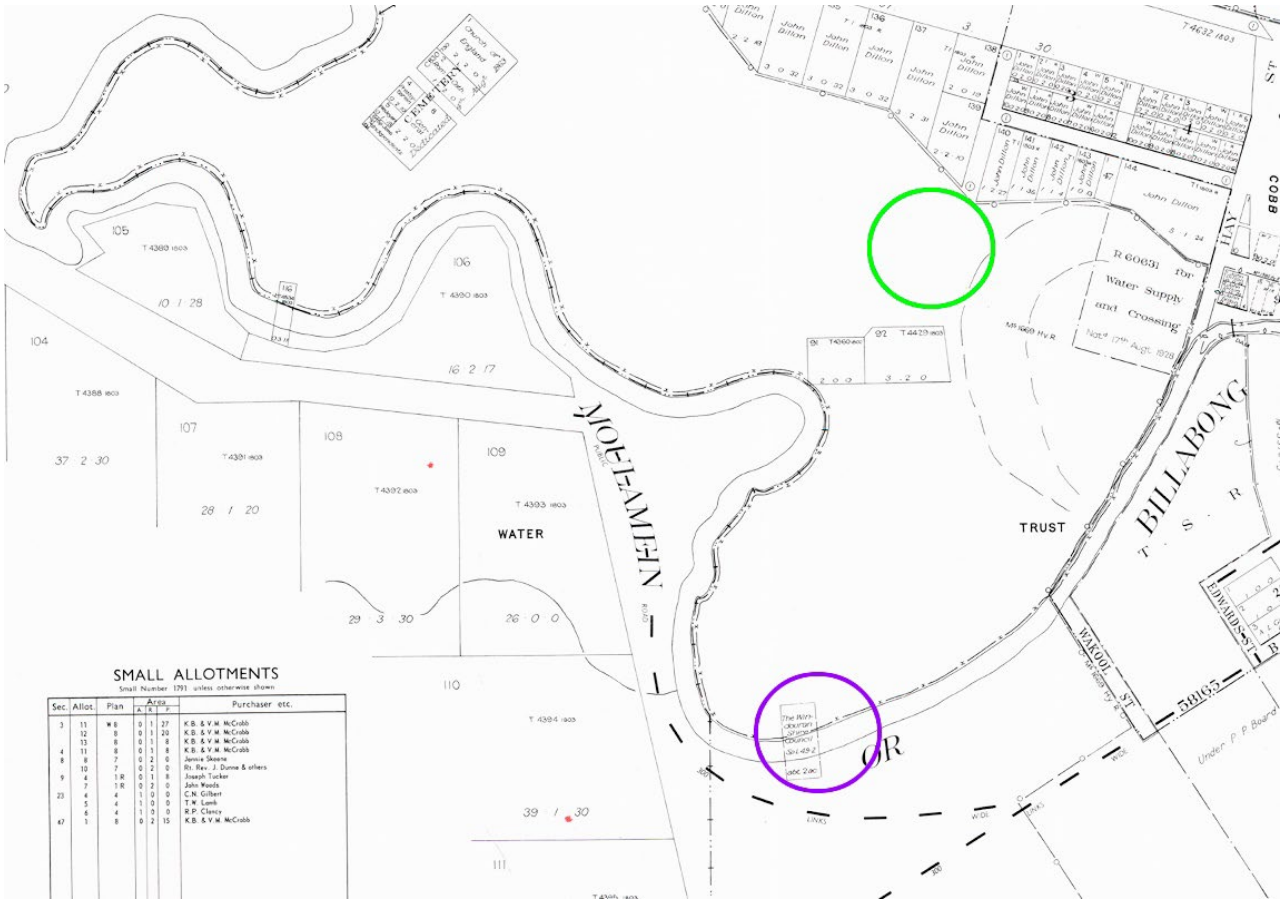

Figure 3-11. 1970 Town of Wanganella map with the location of weir in purple and Wanganella flood bypass channel area in green (Department of Lands 1970)

3.1.3.4.3 Hartwood Station (Conargo, Mundiwa and Currabunganung Stations)

3.1.3.4.3.1 Station development and change

George Shaw took up Currabunganung Station in 1841. It comprised 44,800 acres of land to the west of Coree Station. However, it appears to have been transferred over to John Brougham in that same year. The run encompassed the junction of the Yanko and Billabong Creeks, and was bounded on the north and south by 'unclaimed lands of the Crown' (Freeman 1982). The property could graze 8,000 sheep (*NSW Government Gazette*, 30 September 1848, p. 1373). Shaw also took up Red Plains, a 35,200-acre property adjacent to Currabunganung, which he is noted to have owned in 1851 (*NSW Government Gazette*, 26 July 1851, p. 1204). By July 1852, the Currabunganung was transferred to Patrick Brougham and William Brodribb (*NSW Government Gazette*, 20 July 1852, p. 1117). Subsequently, two new runs were created for sale in 1865: North Currabunganung, which was purchased by Henry Millar; and South Currabunganung, which was bought by Brougham (*NSW Government Gazette*, 30 October 1865, p. 2435). In 1867, South Currabunganung comprised 48,144 acres of land, (*NSW Government Gazette*, 9 August 1867, p. 1865). When John Brougham subsequently purchased North Currabunganung in 1866, it comprised 55,536 acres (*NSW Government Gazette*, 8 February 1866, p. 407).

In around 1845 the grazier James McLaurin, along with his father (the farmer James McLaurin) and three brothers, were occupying an abandoned run near Deniliquin, which they renamed Cornalla. In the early-1850s, the McLaurin family bought Derulamein for £3,000, after the breakup of the Deniliquin run. In November 1855, they paid a record £24,000 for the nearby 50,000-acre run of Moroco. Later, they acquired the 64,000-acre cattle run of Billabong in the Murrumbidgee District. By 1866, the family held over 203,000

acres of land in the Riverina. When their father died in 1864, the McLaurin brothers dissolved their partnership, and James took the Billabong Run (Teale 1974).

However, it was Tyson who purchased much of Boyd's Deniliquin Station in 1856, where he built stables, the main homestead, and barracks. Tyson was acknowledged as the wealthiest man in Australia in the 1850s, which he did through selling meat to miners during the Victorian goldrush through his slaughter-yard and butcher's shop. This business was sold in 1855 after which he, along with his brother John, bought and improved three sheep stations with fencing and earth tanks: South Deniliquin, Conargo and Deniliquin. They ended up owning the Upper Deniliquin, Lower Deniliquin, South Deniliquin, Derulaman, Murray, Tuppal, and Conargo runs at different times. After his brother's death in 1860, Tyson sold most of his Deniliquin holdings by 1862. The three Deniliquin runs were purchased by brothers, Robert and Alexander Landale, in 1861. Robert renamed Upper Deniliquin as Mundiwa, and used it as his main station, while Alexander took the property to the north, Wandook (Bartlett c.2006; Denholm 1976; Deniliquin Pastoral Times 2017b, p. 5).

By the mid-1860s, Patrick Brougham also owned Red Plains station in the Murrumbidgee District. Red Plains, North Currabunganung (north of the Billabong Creek), and South Currabunganung (south of the creek) came to be known collectively as Hartwood (Dowd 1961; Freeman 1982). The study area appears to be situated between what was once Currabunganung and Red Plains. In 1865, Brougham sold the run to Richard Blackwood and departed for the cheaper runs on the Darling River. Blackwood began making improvements to the Hartwood property, and it was one of the first properties in the Riverina area to be fenced in for sheep, along with several tanks and dams on the property's waterways. John Monash, civil engineer and an expert witness in early legal disputes in the area, visited the Hartwood area in July 1897 relating to disputes over water rights (involving Hartwood Station) in the Riverina area (Holgate and Taplin 2001). In 1883, Hartwood Station engaged Chinese working parties of up to 60 individuals from the Deniliquin Chinese Camp to undertake woolscouring, ringbarking, scrubbing and clearing work (Pennay and Pennay 2001). In 1885, Hartwood was divided into two parts pursuant to the 1884 Crown Land Act, with Blackwood retaining the homestead and woolshed in his leasehold area. After Blackwood's death, the property was put up for sale in 1899 but his son, Robert Blackwood, was not able to sell the station immediately (Freeman 1982).

The 41,000-acre (16,600 hectare) Hartwood Station was eventually purchased by John Hunter Patterson III in 1913, who built Hartwood Weir on Billabong Creek shortly after his arrival (Freeman 1982). Patterson hosted Queen Elizabeth II and Prince Phillip at Hartwood Station homestead in 1953 (*Jerilderie Herald and Urana Advertiser*, 19 November 1953, p. 5). Hartwood Estate was put up for sale in 1964, after the death of the Patterson III. It was bought by Harold Raymond and Mary Elizabeth Doolin (Pastoral Review Pty Ltd 1964). In 1975, the *Government Gazette of the State of NSW* (8 August 1975, p. 3181) recorded that Harold, May Elizabeth, John Andrew, Wendy Anne and Louise Elizabeth Doolin, operating as Hartwood Station, had applied for a pump to be installed on Billabong Creek. The *Commonwealth of Australia Gazette Periodic* (28 June 1994, p. 61) listed Harold Raymond and May Elizabeth Doolin of Hartwood Station, under the Resplendid Pty Ltd takeover of Australian Consolidated Minerals Limited, as dissenting shareholders with money or property owed. The *Western Australia Government Gazette* (11 May 1998, p. 2477) also listed them as having unclaimed monies. As such, they appear to have still owned Hartwood Station throughout the 1990s. After Harold Doolin's death, it was sold to the Clive Brothers in 1979, and subsequently sold again to Simon Doble in 1982 (Australian Exporters n.d.; National Trust of Australia (NSW) 1985).

Hartwood Station, which was a 6,770-hectare station which no longer encompassed the location of Hartwood Weir, was purchased by the Nature Conservation Trust of NSW in November 2008 (NSW Environmental Trust 2009); the station was purchased from Doble under the Farmer Exit Assistance program (Sartor 2010). Hartwood Station was then purchased by John Angove and Matt Truccolo, who run Anglopac Construction Group, in 2011. It comprised a 6,770-hectare property, and they planned to conserve and enhance the Hartwood homestead. More than 3,600 hectares of the property were set aside for irrigated cropping and pasture. The Nature Conservation Trust of NSW marketed sale of the property for more than $4.2 million (*Financial Review*, 11 April 2011). However, Hartwood Station was subsequently sold to district farmers, Ross and Claire Martin of Martin L A Pastoral Co, on 30 March 2020 for more than $12 million (*Southern Riverina News*, 27 May 2020). It then comprised a 6,773 hectare (16,736.45 acre) irrigated cropping and grazing

enterprise with extensive river frontage. This included significant water storage, including a 2,500 ml drainage and storage dam, and the original homestead (REA Group Ltd 2020).

3.1.3.4.3.2 Weir development and water management

Hartwood Weir (Figure 3-12) is one of the oldest weirs in the Yanco Creek System, and is situated on Billabong Creek between the localities of Hartwood and Conargo. The Hartwood Weir was built from 1915-1916 and is a privately built weir owned by the Patterson family situated on Hartwood Station (Heritage NSW 2019).

Figure 3-12. Photograph of one of three private weirs at Hartwood Station on Billabong Creek taken by W H Johnston c.1920s, which shows that Patterson was building weirs in this style at the time (Johnston n.d.)

The Pattersons arrived in Hobart in 1832, and moved to Port Phillip where they began to acquire extensive landholdings. By the 1880s, John Hunter Patterson Junior and his brother, Daniel Whittle Harvey Patterson, and cousin, Thomas Frederick Patterson, controlled four million acres of land in Victoria and NSW (University of Melbourne 2015).

Patterson was also an influential irrigator in the district, being elected as a trustee for the Yanko, Colombo and Billabong Creeks Water Trust from 1928 to 1963 (Heritage NSW 2019). Patterson primarily focussed on pastoral interests, and purchased Hartwood Station in 1913 from Robert Officer Blackwood (Boadle 1988; Carnegie 1979; University of Melbourne 2015). According to the *Jerilderie Herald and Urana Advertiser* (6 November 1914, p. 2), the Hartwood property was receiving diminishing supplies of water at this time. Patterson greatly augmented the station's water supply, turning Hartwood into a showpiece station; this would have included the construction of the weir from 1915-1916 (Boadle 1988).

Patterson gained approval from the Hay Land Board District under the 1912 Water Act for installation of a pump on Billabong Creek in 1914, and a pump and a dam on Yanko Creek in 1915 (*Government Gazette of the State of NSW*, 13 May 1914, p. 2834; 17 February 1915, p. 1006; 25 August 1915, p. 4972).

He also applied for a license for numerous dams on Billabong Creek, including those within portion 1 of the Parish of Hartwood; portion 3 of the Parishes of North Currabunganung and Thulabin; portion 38 of the Parishes of North Currabunganung and Currabunganung; and portions 39 and 40 of the parish of Currabunganung (*Government Gazette of the State of NSW*, 13 May 1914, p. 2834; 10 February 1915, p. 732; 17 February 1915, p. 1005; 16 June 1915, p. 3501; 25 August 1915, p. 4972). He subsequently laid out fine

formal gardens on Hartwood Station with his wife, Matilda, after their marriage on 8 March 1916. Patterson served on the Graziers' Association of Southern Riverina in a variety of capacities (1919-1962), was on the Australian Meat Board (1936-1946), president of the Graziers' Federal Council of Australia in 1944, a Conargo Shire councillor (1914-1948), and president of the Australian Club, Melbourne (1954-1957) (Boadle 1988).

The 1923 County of Townsend Central Division map (Figure 3-13) does not note the Hartwood Weir. However, it would have been situated between North Currabunganung allotments 150 in the north, and 27 in the south. The two surrounding allotments comprise large rural properties on both sides of Billabong Creek. The Hartwood Weir was acquired by the Yanko, Colombo and Billabong Creeks Water Trust in 1937, for whom Patterson was a trustee at the time (*Narrandera Argus and Riverina Advertiser*, 29 June 1937, p. 2). This occurred under the Water Conservation and Irrigation Commission during its 1930s program of structure acquisitions (Heritage NSW 2019). Hartwood Weir was transferred to the Water Trust on 9 December 1930 (*Government Gazette of the State of NSW*, 12 December 1930, p. 4875).

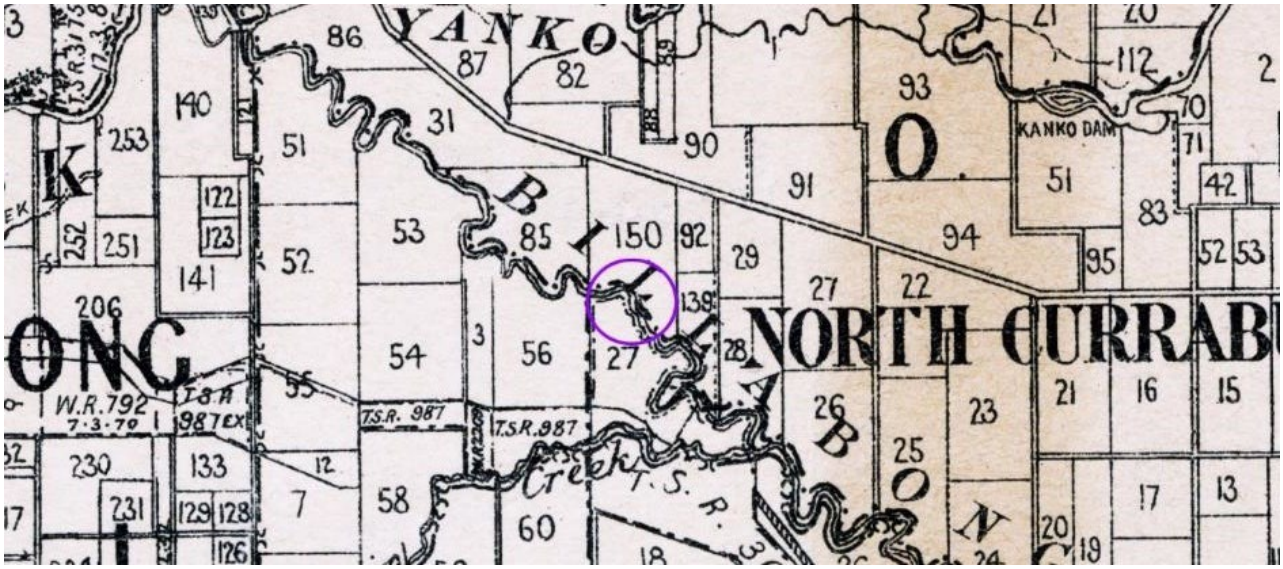

Figure 3-13. 1923 County of Townsend map with the location of weir in purple (Department of Lands 1923)

The Hartwood Weir has an engraving on the right bank abutment (Figure 3-14) which states, 'Feb 1916 A.C. Fitznead Engineer' (Heritage NSW 2019). According to the *Argus* (7 August 1941, p. 3), Arthur Churchill Fitznead arrived in Australia from England in the early 1890s. He was originally an engineer for the NSW Public Works Department (c.1891-1907), and for the Murray, Windouran and Conargo Shire Councils from the inception of the local governments in 1907.

It is unknown when Fitznead finished with the Murray Shire Council, but he remained engineer for both the Windouran and Conargo Shire Councils until July 1941. He was the mayor of the Municipality of Deniliquin in 1910 and 1912, and a chair of the Deniliquin District Hospital Board of Directors (*The Independent*, 31 July 1941, p. 2). As such, Fitznead would have been involved in overseeing the construction of Patterson's weir in his role as Conargo Shire engineer.

The 1962 County of Townsend Central Division map (Figure 3-15) actually marks the location of Hartwood Weir on Billabong Creek, situated between allotments 150 and 28 of North Currabunganung. Allotment 27 appears to have been subdivided, with the much smaller allotment 26 being created in the north of the rural property. By the time this map was published, the weir had become a public asset and was shown on the map.

John Hunter Patterson sold part of Hartwood Station to Donald Norman Armytage in 1951; part of the property included the land in which Hartwood Weir is situated (Jane Armytage, pers. comm., 21 March 2024). This sale was recorded in the *Jerilderie Herald and Urana Advertiser* (17 July 1952, p. 8) as 6,467 acres of

land. Armytage was Hunter Patterson's great nephew by marriage (Jane Armytage, pers. comm., 21 March 2024). Named 'Bali Hai', this station was owned by Donald and Joan Armytage (*FarmOnline National,* 21 June 2015). The Bali Hai property was subdivided into three licenses under the names of Donald, Neville and Robert Armytage in c.1975, when NSW State Water allowed water licences to increase from the watering of 30 acres to allocations of approximately 1200mg of water. Robert and Jane Armytage built their homestead at Bali Hai around this time (*FarmOnline National,* 21 June 2015). Billyanco station was separated from Bali Hai station in 1983, after the death of Donald Armytage(Jane Armytage, pers. comm., 21 March 2024). Billyanco is owned by Neville and Jane Paton Armytage, and is managed by their son, Sam Armytage (Jane Armytage, pers. comm., 21 March 2024). Billyanco, which is directly adjacent to the existing Hartwood Weir in the north, comprises 1,850 hectares of irrigation country sown to winter cereal and oilseed crops (*The Land*, 14 November 2015). Bali Hai is situated to the east of Hartwood Weir, while the land to the south Hartwood Weir is Crown land. The water saving strategies introduced by the Armytage family on their properties has allowed their farms to become massively productive (Jane Armytage, pers. comm., 21 March 2024).

The 1969 Parish of North Currabunganung map (Figure 3-16) clearly depicts the location of the Hartwood Weir. The weir is shown to be in its own allotment or reserve, separate to lot 150 in the north and 28 in the west. Otherwise, little change in the landscape is evident. The parish map states that the weir has been "Resumed for Weir purposes", and that it was gazetted on 26 April 1929, hence its inclusion in the 1962 county map.

Figure 3-14. Engraving on right bank abutment of Hartwood Weir (Austral Archaeology 2003)

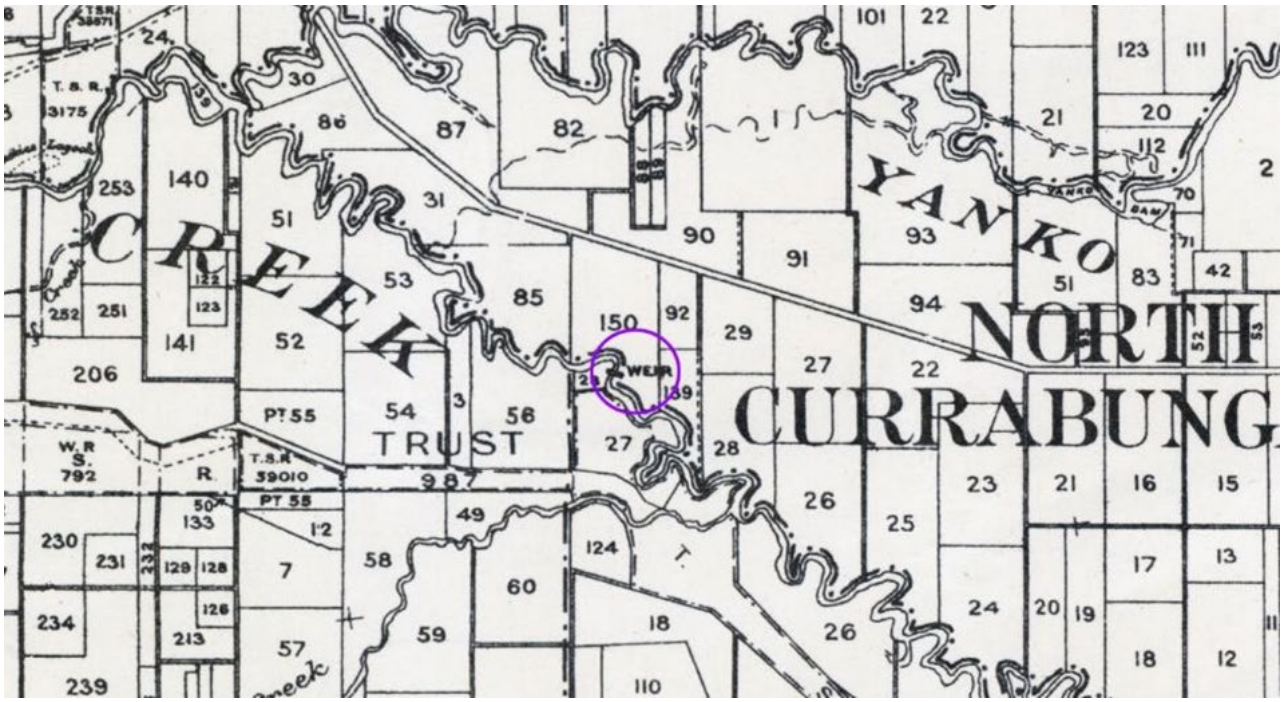

Figure 3-15. 1962 County of Townsend map with the location of weir in purple (Department of Lands 1962)

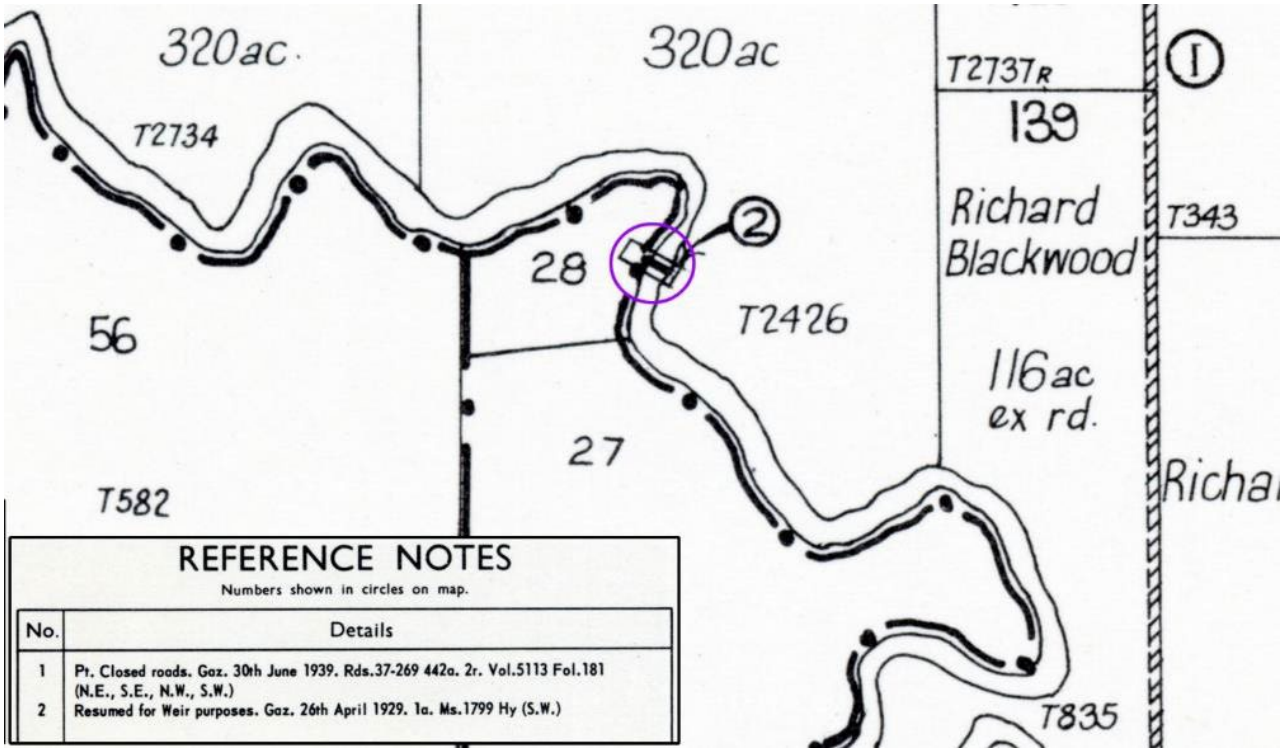

Figure 3-16. 1969 North Currabunganung map with the location of weir in purple (Department of Lands 1969)

3.1.3.5 Yanco Creek System

Billabong Creek is part of the overall Yanco Creek System. According to the Australian Food and Agricultural Company Limited, who have run properties along Billabong Creek for over 150 years (Bell 2018, p. 1):

> '*The Yanco Creek System consists of a series of creeks (Yanco, Colombo, Billabong and Forest Creek) and some ancillary creeks and anabranches, located on the southern side of the Murrumbidgee. It is the longest network of creeks in Australia and the Billabong Creek from above Holbrook to Moulamein is the single longest creek in the Southern Hemisphere. Commencing in 1855 and throughout the late 1800s a series of cuttings were constructed at the Murrumbidgee River to divert water to the Yanco Creek System under lower flow conditions than previously. The environment has adapted greatly over the ensuing 163 years since that first cutting supplied semi-permanent water into the system and even more so after the main Yanco weir was constructed in 1926, with various upgrades throughout the journey to enable a permanent water supply*' (Bell 2018, p. 2).

Some of the first pieces of infrastructure along Billabong Creek comprised dams. Reports from 1858, published in the *Border Post* (24 November 1858), note that station holders along Billybong (Billabong) Creek had been constructing dams and reservoirs for years in an effort to have enough water for their sheep and cattle, as well as for domestic purposes. However, this practice was not approved of by all station owners along the creek, as it deprived other station owners of water.

One such example of the controversy occurred with the Coree dam. This dam, which had been constructed in 1856 or 1857, stopped the flow of water along Billabong Creek and prevented water from reaching numerous stations along that waterway. Henry Ricketson (of Caroonboon) and Robert Dun (of Boonoke) were accused of cutting away a dam erected by Frank and George DeSailly at Coree. While they were charged with maliciously injuring the Coree dams on 23 October 1858, they were subsequently convicted without penalty by being discharged. Ricketson wrote to the press about the dams, noting that a squatter called Gleeson had first suggested destroying the Coree dam (Jervis 1952).

This lack of consequence to the accusations at Coree appears to have seen station owners continuing to destroy dams built by others. By 1858, all of the dams along Billabong Creek had been cut away. Further examples of these events include Ashcroft and McGregor, superintendents of Woorooma station, being charged with destruction of Brodribb's dam at Wanganella (Sydney Morning Herald, 4 December 1858, p. 5). In 1866, Samuel Wilson, who then owned Coree and maintained the dam built (and repaired) by DeSailly, was sued by John Dickson (of Caroonboon) due to water scarcity along the creek (Queensland Times, Ipswich Herald and General Advertiser, 8 February 1868, p. 3). In 1895, Sir Samuel McCaughey, nephew of Wilson, was also sued for blocking water on Billabong Creek at Coree by Blackwood of Hartwood Station (Jerilderie Herald and Urana Advertiser, 24 August 1950, p. 1; 21 September 1950, p. 4). Blackwood won the case, with heavy damages being paid to him (The Miners' Daily News, 2 June 1898, p. 3; Jerilderie Herald and Urana Advertiser, 21 September 1950, p. 4).

Works along the Murrumbidgee River were managed through the designation of Water Trust Districts and Irrigation Districts. The Water Trusts, which were formed by landholders to administer these districts through elected Trustees, did not require any change in land ownership as they provided water only for stock and domestic purposes. This control of water, through both Water Trust Districts and Irrigation Districts, allowed for the efficient land use and increased productivity throughout the Murrumbidgee system (Williamson 1968, p. 66). The Bendigo Advertiser (9 July 1914, p. 5) reported that the Murrumbidgee Scheme would entitle landowners along Billabong Creek to an annual supply of water, according to the Shire's engineer, A.C. Fitznead. The Yanko (or Yanco), Colombo and Billabong Creeks Water Trust was the earliest Water Trust in the region, being constituted in 1921 (Government Gazette of the State of NSW, 29 July 1921, p. 4518). The Yanko, Colombo and Billabong Creeks Water Trust was overseen by trustees, two of whom were appointed by the state government and the other three by election. In 1972, the Water Trust was recommended to be disbanded, and for the Government to assume control over the creeks system. In 1980, the Water Trust was formally dissolved (Charles Sturt University 2019; Henery 2022; State of New South Wales 1980).

Additionally, due to the Water Act of 1912, dams had to be licensed. The Government Gazette of the State of NSW shows that the still extant Hartwood Weir was licensed in 1914 (section 3.1.3.4.3), and Wanganella Weir was licensed in 1927 (section 3.1.3.4.2). The two weirs are currently owned and operated by the following organisations:

- WaterNSW – Hartwood Weir
- Edward River Council – Wanganella Weir.

3.1.4 Aerial imagery review

3.1.4.1 Wanganella Weir

Historical aerial imagery dating to 1976 (Figure 3-17) confirms that the weir is situated within this small allotment which was then owned by the former Windouran Shire Council on Billabong Creek. This Council subsequently became part of the former Conargo Shire Council in 2001, which then (along with the former Deniliquin Council) became the current Edward River Council in 2016. Several tracks are shown running up to the weir, and was likely a crossing point for those using the weir, as one of the tracks leads between Billabong Creek and a roadway south of the creek. As a Council-owned weir, it was likely a publicly accessible facility. The weir is situated in an area of medium density tree cover, on both sides of Billabong Creek, with cleared land beyond the trees.

Figure 3-17. 1976 aerial imagery with the location of Wanganella Weir in purple and Wanganella flood bypass channel area in green (NSW Government n.d.)

Despite being within the gazetted township of Wanganella, land to the north comprised travelling stock and cattle reserve land. Historical aerial imagery shows that this area is covered in a medium density of trees, covering much of the inside of the bend in Billabong Creek. The land to the south of the weir is predominantly cleared of trees, comprising a rural landscape. Several fence lines are faintly visible on the south and west

side of the curve in Billabong Creek. A drainage line of Billabong Creek is faintly visible south of the weir. No structures are apparent in the 1976 aerial imagery surrounding the weir.

Recent aerial imagery shows the weir as being situated between two unnamed roadways, one leading northwest from Zara Road (a dirt road) in the south, and the other southeast from an unnamed dirt road to north of the creek. Imagery of the area is extremely low in resolution, so no details can be clearly seen. However, Billabong Creek is lined by trees on both its banks, with an area of cleared land to the south between the creek and Zara Road. In the north, there is an area covered in a higher density of trees. The drainage line is visible, crossing Zara Road to the southwest of the weir. There are no obvious structures present immediately surrounding the weir, nor in the nearby area.

3.1.4.2 Hartwood Weir

Historical aerial imagery dating to 1968 (Figure 3-18) shows that the landscape surrounding Billabong Creek and the Hartwood Weir is rural in nature. Several tracks are visible across the landscape. Fence lines can be seen along the boundaries detailed in the historical mapping. The weir itself is situated in an area of medium density tree cover, on both sides of Billabong Creek. Two tracks head northwards across allotment 27, before joining and traversing in a northeasterly direction to the weir. Although there are no obvious paths visible on the opposite bank, the weir was likely a crossing point in Billabong Creek.

The surrounding landscape is entirely rural in nature. Trees are generally found along the creek, and within the bends of Billabong Creek. Outside of this, the land has been cleared for pastoral or faming purposes. Two fence lines, one to the north of Billabong Creek and one to the south, run across the cleared land, generally in a northnortheast-southsouthwest direction. No other structures are visible in the area in the 1968 aerial imagery.

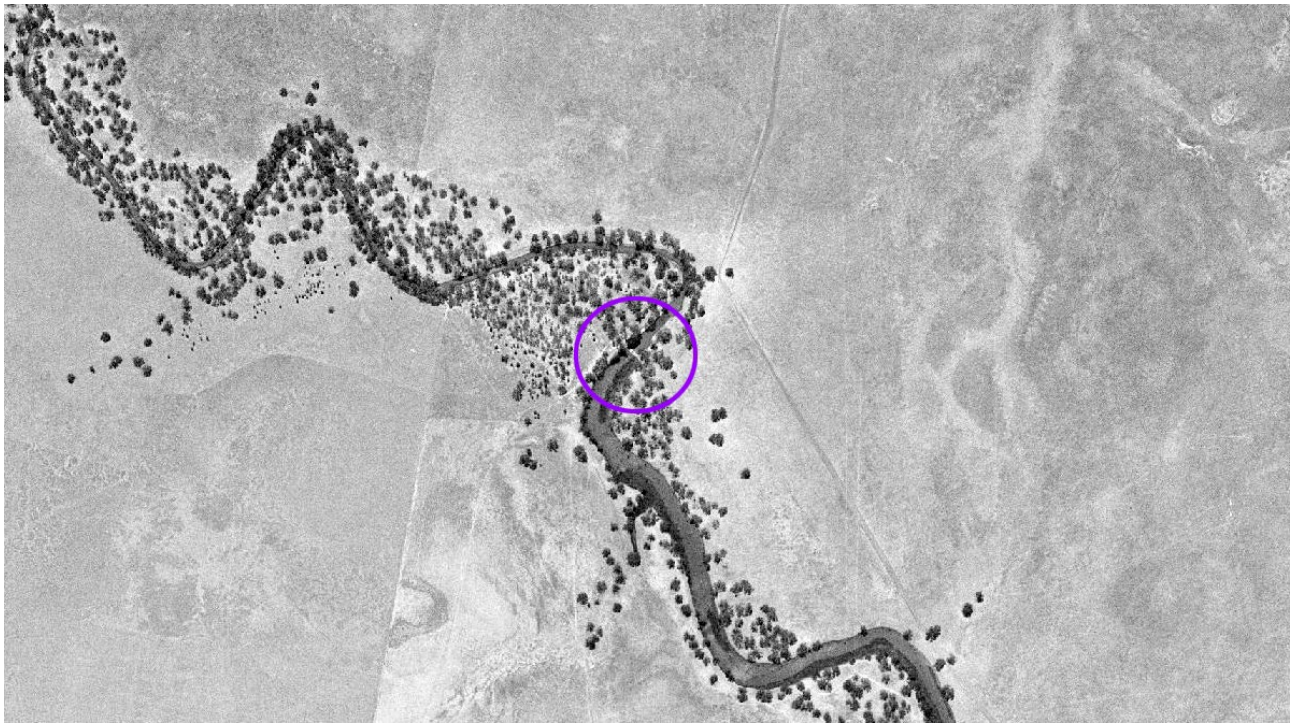

Figure 3-18. 1968 aerial imagery with the location of Hartwood Weir in purple (NSW Government n.d.)

Recent aerial imagery shows that the landscape surrounding the weir is still rural in nature, with cleared land and open fields on both sides of Billabong Creek, beyond the tree line. Tracks running through the adjacent properties show that the weir is still used as a crossing point today. Billabong Creek is still host to moderate tree coverage, including surrounding the weir itself. The fence line between what was allotment 27 and 28

now comprises an irrigation channel, with a small structure at the head of the channel, adjacent to Billabong Creek. No structures are visible adjacent to the weir itself, or in the nearby surrounding landscape.

3.1.5 Timeline

A timeline of the region surrounding the study area (Table 3-3) provides a summary of major historical occurrences across the region over time.

3.1.6 Additional information

During the Aboriginal cultural heritage pedestrian survey for this proposal two potential heritage features were identified. These comprise the Old Bridge and the Timber Structure, both found to the north of Hartwood Weir. They were identified by Meaghan Aitchison (Project Archaeologist, Jacobs) in May 2022. Old Bridge is assessed in section 5.2, while the Timber Structure is assessed section 5.3.

Table 3-3. Timeline of the region

Date	Event
1829-1830	Charles Sturt explored the Murrumbidgee River.
1838-1839	Charles Sturt explored the Murray River (then known as the Hume River), crossing Edward Rivers (which he named 'Delangen Creek') on 8 June 1839.
Late-1830s	Thomas Broughton Carne of Coonargo (Conargo) and James Scott Hindmarsh of Wanganella settled in the region during this period.
1841	James McLaurin and John Webster explored Delangen Creek, renaming it Edward River after their employer, Edward Howe. George Shaw took up Currabunganung Station. The Murrumbidgee District held 147 stations, with a population of 1,139 persons, 1,517 horses, 62,848 head of cattle, 180,654 sheep, and 1,795 acres of land under cultivation.
1842	Benjamin Boyd purchased Colac Station and its flocks from Augustus Morris in June 1842when he called into Port Phillip on his way to Port Jackson. Later in 1842, Morris explored the salt bush country of the Riverina, from Urana in the east and Deniliquin in the south, along both the Edward and Billabong to the Murrumbidgee junction, taking up stations throughout the Deniliquin area. This included Boyd's Deniliquin head station.
1844	The Murrumbidgee District held 172 stations, with a population of 1,473 free persons and 236 bonded persons, 2,315 horses, 93,158 head of cattle, 226,682 sheep, and 2,400 acres of land under cultivation. Hindmarsh became insolvent, and his properties (his run included what would become Wanganella Station) were placed under sequestration. They were subsequently put up for auction, along with his sheep and cattle, by March 1844.
1845	By this time, Boyd owned acquired over 1,750,000 acres of land in the Riverina area. The 'Wanderer' inn, named after Boyd's yacht, was the earliest building to be established in what is now the township of Deniliquin. James McLaurin, along with his father and three brothers, purchased the an abandoned run near Deniliquin, which they named Cornalla.
1846	Boyd held a vast pastoral estate through the Riverina, Monaro, central and southwest Victoria, making him one of the largest landholders outside of the Crown at the time. Deniliquin Station itself comprised 700,000 acres of land on the Lower Edward River down to Moulamein and back north to the Billabong and south to the Niemur River.
1848	The village of The Sandhills (Deniliquin) was constituted against Boyd's wishes. It already held a public post office, a lockup, and several mechanics, along with the Wanderer inn and blacksmith's shop. Alexander Innes purchased Wanganella Station from Hindmarsh by this date.
1849	The Surveyor-General provided a design for 'Deniliquin on the Kyallite River' (Edward River). This plan suggests that Deniliquin was intended to be a large township.

Date	Event
	Boyd left Sydney on the Wanderer as his pastoral empire had started to crumble due to a combination of their isolation and poor management.
1850	The Sandhills was officially gazetted and renamed as Deniliquin.
Early-1850s	The McLaurins purchased Derulamein, which had once been part of Deniliquin Station.
1851	George Shaw had taken up Red Plains Station by this time.
1852	Patrick Brougham and William Brodribb purchased Currabunganung Station from Shaw.
1853	Patterson hosted Queen Elizabeth II and Prince Phillip at Hartwood Station homestead.
1854-1855	William Adams Brodribb appears to have purchased Wanganella Station from Innes, only arriving there with a herd of sheep and cattle on 1 March 1857.
1855	Deniliquin (or The Woolshed), South Deniliquin and Lower Deniliquin were put up for sale by the Royal Bank of Australia Estate, along with other stations in the region such as Carnago (Conargo).
1856	John Peter purchased Lower Deniliquin Station from the Royal Bank of Australia Estate by this date. James Tyson purchased much of Boyd's Deniliquin Station, including South Deniliquin, Conargo and Deniliquin.
1858	Messrs Peppin & Sons purchased South Wanganella, along with 8,000 sheep, from Brodribb. Robert Dun and James Butchart purchased Lower Deniliquin Station from John Peter.
1859	The district surveyor laid out a reserve on Billabong Creek on Brodribb's Wanganella Station (North Wanganella).
1861	Messrs Thomas and Gideon Lang purchased North Wanganella, along with 20,000 sheep, 600 head of cattle and 50 horses, from Brodribb. Robert and Alexander Landale purchased several Deniliquin Stations from Tyson. They split the properties, with Robert renaming Upper Deniliquin as Mundiwa. Alexander took the property to the north, Wandook.
1862	The Department of Lands issued notice that a site has been selected for the township of Wanganella, then known as 'Wangonilla'. The township had a shoemaker's shop, with 'a neat bridge' over Billabong Creek, and a hotel by 1865, and a store, a school, and two public houses by 1872. A Union Church was opened there in 1876. Butchart was registered as the sole owner of Boonoke (or Old Man Plain) Station. John Hunter and Myles Patterson began occupying Boonoke Station. By this time, Tyson had sold most of his Deniliquin holdings.
1863	The Pattersons restocked Boonoke with sheep.

Date	Event
1865	South Wanganella Station is known to have been improved by this year, with the entirety of the property having been fenced with wire. The license for Boonoke was transferred to the Pattersons on 26 June 1865. Currabunganung was subdivided into two stations. Henry Millar purchased North Currabunganung, while Patrick Brougham purchased South Currabunganung. Brougham purchased Red Plains (Mayrung) around this time. The three stations (North Currabunganung, South Currabunganung, and Red Plains) became known collectively as Hartwood. Richard Blackwood purchased Hartwood from Brougham.
1866	John Brougham purchased North Currabunganung from Millar.
1871	John Hunter and Myles Patterson's partnership dissolved, with Myles Patterson retaining Boonoke Station.
1872	Peppin & Sons purchased Boonoke Station from Myles Patterson.
1876	George Peppin died, leaving Frederick Peppin to run Peppin & Sons.
1878	Messrs Austin and Millear purchased Wanganella and South Boonoke from Peppin & Sons, continuing the development of the Wanganella Stud. Franc Sadleir Falkiner purchased North Boonoke from Peppin & Sons.
1885	Blackwood subdivided Hartwoods into two parts, but retained the homestead and the woolshed in his leasehold area.
1894	Austin and Millear divided Wanganella Station equally between them, with Austin retaining the old homestead. Millear built a new homestead on his half of the station, naming his property Wanganella Estate.
1898	The Hay Land Board District approved the Trustees of Wangonilla Commons' request that a timber overshot dam or weir to be built on Billabong Creek.
1899	Franc Sadleir Falkiner formed FS Falkiner & Sons Ltd. Robert Blackwood attempted to sell Hartwood, with no success.
1910	FS Falkiner & Sons Ltd purchased Wanganella Estate and its stud flock from the Millear family.
1912	FS Falkiner & Sons Ltd applied for a license to build a dam on Moulamein (Billabong) Creek portion 31 of the Parish of Conargo and portion 17 of the Parish of Belmore, for an overshot dam no less than 60 feet (18 m) in length, nor greater than 7 feet (2.1 m) in height above the creek level, with drop boards no longer than 1 foot (0.3 m) in length.
1913	John Hunter Patterson III purchased Hartwood Station from Robert Blackwood.

Date	Event
1916	Hartwood Weir was built in 1915-1916. 'Feb 1916 A.C. Fitznead Engineer' is engraved in the concrete on the right bank upstream abutment. Arthur Churchill Fitznead was engineer for both the Windouran and Conargo Shire Councils from 1907 until July 1941.
1916	The Hay Land Board District ruled that the Windouran Shire Council's application for the overshot dam be postponed, to enable the Council to obtain title to the land on which they wished to construct the dam (Wanganella Weir).
1920	Windouran Shire Council's application for a weir on Billabong Creek, built on land applied for under special lease 20-7, was approved and a special lease of 2 acres of land be granted for the purposes of building Wanganella Weir. The crest of the weir was to be no less than 73 feet (22 m), with a level fixed at 8.85 feet (2.7 m) below an established benchmark, with drop boards no more than one foot (0.3 m) in height used over the crest level of the central portion of the weir.
1927	The Hay Land Board District approved the Windouran Shire Council's request that a weir, no less than 66 feet (20.11 m) with a level fixed at 8.88 feet (2.7 m) below the benchmark and drop boards to a height of no more than 2 feet 6 inches (0.76 m) over the crest level, be built on Billabong Creek. Wanganella Weir was subsequently built that same year for the conservation of water for the township of Wanganella.
1930	Henry Harvey Dare, Commissioner of the Water Conservation and Irrigation Commission, advised that the Yanko, Colombo and Billabong Creeks Water Trust had acquired Hartwood Weir under the Water Act of 1912. (Patterson was trustee for the Water Trust from 1928 to 1963.)
1952	Patterson is recorded as selling part of Hartwood Station to Donald Norman Armytage.
1958	FS Falkiner & Sons Ltd purchased the remainder of the Wanganella property from the Austin family.
1964	Harold Raymond and Mary Elizabeth Doolin purchased Hartwood Station after the death of Patterson III.
1971	Cleckheaton (a yarn company) purchased all the issued capital of FS Falkiner & Sons Pty Ltd, including Boonoke Station.
1978	News Limited bought FS Falkiner & Sons Pty Ltd, which included Boonoke Station.
1979	The Clive Brothers purchased Hartwood Weir after the death of Harold Doolin.
1982	Simon Doble purchased Hartwood Weir from the Clive Brothers.
2000	Australian Food & Agriculture Company Limited purchased FS Falkiner & Sons Pty Ltd in its entirety, which also included Boonoke Station.
2008	The Wanganella and Boonoke stud sheep were reunited as one flock under Australian Food & Agriculture Company Limited. Nature Conservation Trust of NSW purchased Hartwood Station under the Farmer Exit Assistance program from Doble.
2011	John Angove and Matt Truccolo of Anglopac Construction Group purchased Hartwood Station from the Nature Conservation Trust of NSW.
2020	Ross and Claire Martin purchased Hartwood Station from Angove and Truccolo.

3.1.7 Predictive statement

Following the desktop assessment, the following predictive summary statements are applicable for the study area:

- Water infrastructure, most prominently the Wanganella and Hartwood Weirs, comprise a site type that is found in the study area, as the background history and aerial imagery reviews show.
- While the main homestead complexes associated with the weirs are not situated near the study area, there is still a likelihood of evidence of pastoralism to be present within the study area. These would comprise evidence of historic pastoralism, such as fences, brushyards, stockyards, sheds or outbuildings, and other infrastructure associated with the watering of sheep, cattle and horses. There may also be archaeological evidence of camp sites or dumpsites used by stock workers in or near the weirs, due to the presence of more stable water sources.
- There is a low to moderate potential for previously unidentified historical heritage items, as described above, to be present within the study area. This is due to the history of these areas, the sparse nature of pastoral activities, and the aerial imagery not showing any structures other than the weirs themselves.

3.1.8 Desktop assessment summary

The study area is situated entirely in rural countryside, along Billabong Creek. The land in surrounding the region has been used for grazing sheep and cattle since the late-1830s and early-1840s. The pastoral stations with which the weirs are related have passed through numerous hands, including that of Benjamin Boyd, James Scott Hindmarsh, Clark Irving, Henry Ricketson, William Adams Brodribb, Robert Dun and James Butchart, and others. Much of the land was also taken up by pastoral companies, including Peppin & Sons and FS Falkiner & Sons Ltd, Cleckheaton, News Limited, and Australian Food & Agriculture. The land use surrounding the weirs remains generally unchanged to the present day, as the surrounding stations are still being primarily used for grazing and cropping purposes.

There is a history of weir building along Billabong Creek, dating back to at least 1858, where newspaper reports noted that station holders along the creek had been constructing dams and reservoirs for years. This was in an effort to have enough water for their sheep and cattle, as well as for domestic purposes. However, this practice was not approved of by all station owners along the creek, as it deprived other station owners of water. Numerous legal proceedings ensued over the 1860s and into the 1890s. However, the introduction of the 1912 Water Act and the licensing of dams (and weirs) quieted the issue. Subsequent to the Act, the four weirs within the study area were built:

- Hartwood Weir was likely licensed to John Hunter Patterson III in 1914, and built in 1915-1916
- Wanganella Weir was licensed to Windouran Shire Council in 1916 and built in 1927 after they gained the necessary special lease land.

A register search of the study area shows that there is only one listed heritage item within proximity to the study area. This is Hartwood Weir (WaterNSW S170 4550110), which is listed on the WaterNSW Section 170 State Agency Heritage and Conservation register. While no official heritage curtilage is specified for this heritage item, the works are proposed on the weir itself. Given the early dates and associated history of the Hartwood Weir and the Wanganella Weir in the study area, these were subject to field survey to inform and update the preliminary significance assessment previously undertaken by Jacobs (Seawright 2022), and to identify any potential for historical archaeological remains associated with the weirs, their construction and their use.

Due to there being a low to moderate potential for previously unidentified historical heritage items to be present within the study area, a field survey of the study area was also undertaken.

3.2 Field survey results

3.2.1 Built heritage

The field survey recorded four built heritage items identified during desktop assessment, comprising Hartwood Weir, Old Bridge, Timber Structure, and Wanganella Weir. The details of the field survey results for the Hartwood Weir study area are found in sections 4.1, 4.2 and 4.3, and that for the Wanganella Weir study area in section 4.4.

No further previously unidentified heritage items were identified during the field survey within the study area.

3.2.2 Archaeology

No areas of archaeological potential were identified within either study area during the field survey.

3.2.3 Views and vistas

No views or vistas were visible from the weirs, with the view of the areas surrounding the four potential heritage features being constrained by trees situated close to the creek banks. There are a large amount of mature River Red Gums and Black Box trees on either side of Billabong Creek at Hartwood Weir.

3.2.4 Effective Survey Coverage

3.2.4.1 Hartwood Weir

Effective survey coverage of the study area at Hartwood Weir was approximately 100 per cent of the study area land surface to the west of Billabong Creek. Due to a change in the study area since the fieldwork was undertaken on 17 and 18 April 2023, approximately 30 per cent of the study area to the east of the creek was covered during the survey. This gives a total effective survey coverage of 65 per cent. The ground surface visibility was approximately 50 per cent on the west side of the creek and 30 per cent on the east side.

3.2.4.2 Wanganella Weir

Effective survey coverage of the study area at Wanganella Weir was 100 per cent of the study area land surface to the south of Billabong Creek. Due to a change in the study area since the fieldwork was undertaken on 17 and 19 April 2023, approximately 30 per cent of the study area to the north of the creek was covered during the survey. This gives a total effective survey coverage of 65 per cent. There was a ground surface visibility of approximately 70 per cent to the north of the creek and 20 per cent to the south.

3.2.5 Mapping

The location of both known and potential heritage features within the study area at Hartwood Weir are shown in Figure 3-19. Potential heritage features within the study area at Wanganella are shown in Figure 3-20.

Figure 3.19 - Hartwood Weir heritage plan

Figure 3-19. Heritage features identified within the study area near Hartwood Weir

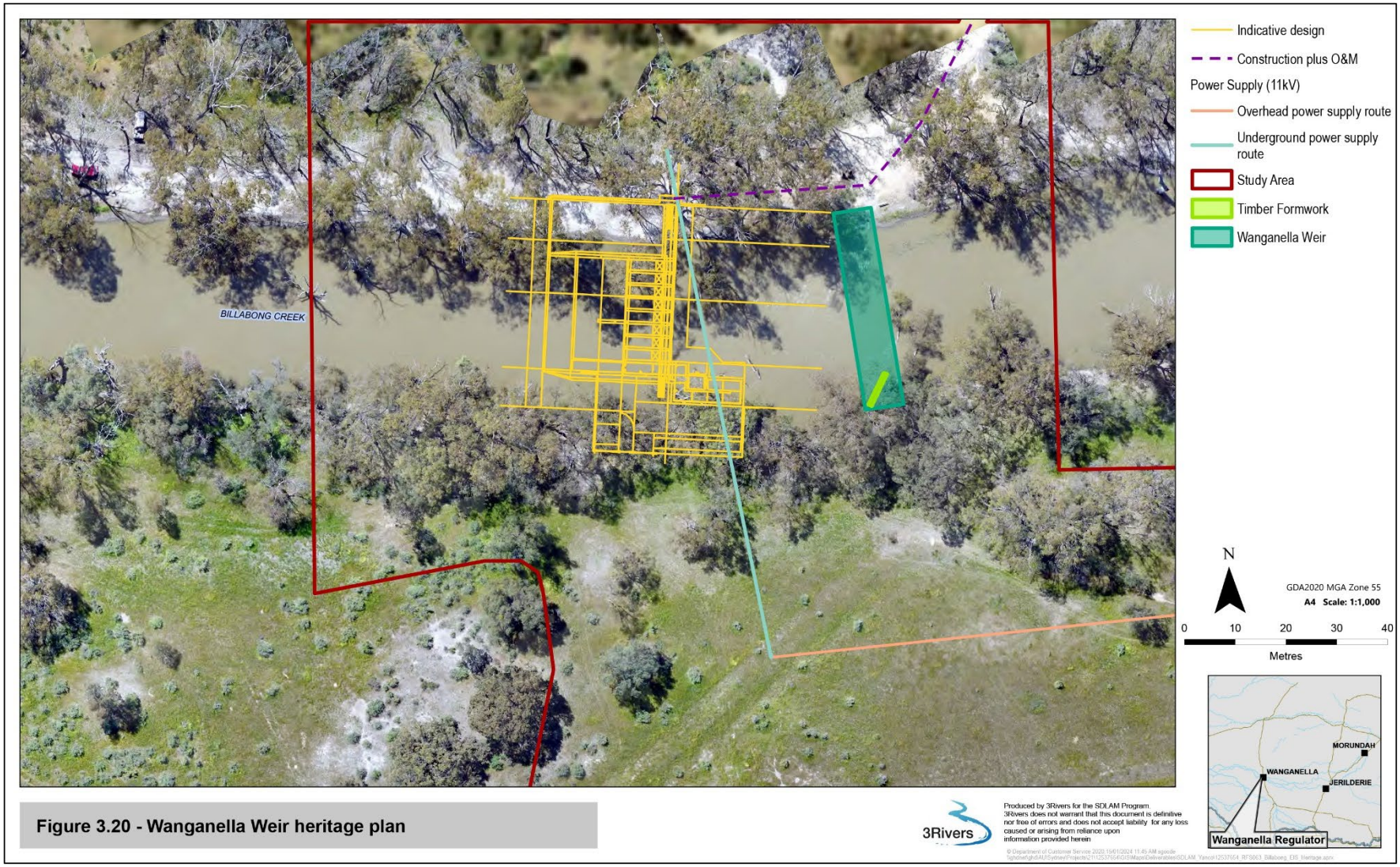

Figure 3.20 - Wanganella Weir heritage plan

Figure 3-20. Heritage features identified within the study area at Wanganella Weir

3.2.6 Field survey conclusions

The field survey recorded four heritage features within the study area, comprising Hartwood Weir (WaterNSW S170 4550110), and the potential heritage features Old Bridge and Timber Structure, within the study area at Hartwood Weir, and the potential Wanganella Weir heritage feature within the study area at Wanganella Weir. No areas of archaeological potential were identified within the study area during the field survey, and no additional historical heritage items were identified during the field survey.

4. Heritage items

4.1 Hartwood Weir (WaterNSW S170 4550110)

4.1.1 Site description

Hartwood Weir is listed on the WaterNSW S170 Register with ID 4550110. It is located on Billabong Creek within allotments 1/-/DP1144789, 2/-/DP1144789 and 3/-/DP181995.

The weir is approximately 2.5 m high by 15 m across the length of the crest, and comprises a concrete regulator weir with 12 bays (each 1.8m wide), with red gum drop boards, steel frames and lock-down bars, a steel walkway, with brick-block concrete abutment walls (6.4m x over 4.6m) with a downstream apron base slab, and downstream brick pitching on both banks.

4.1.2 Site summary history

Hartwood Weir is the one of the oldest weirs in the Yanco Creek System, and is situated on Billabong Creek between the localities of Hartwood and Conargo. Hartwood Weir was privately built from 1915-1916 by the Patterson family (Heritage NSW 2019). It is situated on the former Hartwood Station, which comprised 41,618 acres of freehold land when Dalgety and Company Limited sold the land on behalf of Richard Blackwood's sons to John Hunter Patterson Junior in 1913 (*Australasian* 5 April 1913, p. 5). Patterson was an influential irrigator in the district, being elected as a trustee for the Yanko, Colombo and Billabong Creeks Water Trust from 1928 to 1963 (Heritage NSW 2019). After acquiring Hartwood, Patterson greatly augmented the station's water supply, turning the run into a showpiece station; this would have included the construction of the weir from 1915-1916 (Boadle 1988).

Patterson gained approval from the Hay Land Board District under the 1912 Water Act for installation of a pump on Billabong Creek in 1914, and a pump and a dam on Yanko Creek in 1915 (*Government Gazette of the State of NSW*, 13 May 1914, p. 2834; 17 February 1915, p. 1006; 25 August 1915, p. 4972). He also applied for a license for numerous dams on Billabong Creek on his land across the district (*Government Gazette of the State of NSW*, 13 May 1914, p. 2834; 10 February 1915, p. 732; 17 February 1915, p. 1005; 16 June 1915, p. 3501; 25 August 1915, p. 4972). He subsequently laid out fine formal gardens with his wife, Matilda, after their marriage on 8 March 1916. Patterson served on the Graziers' Association of Southern Riverina in a variety of capacities (1919-1962), was on the Australian Meat Board (1936-1946), president of the Graziers' Federal Council of Australia in 1944, a Conargo Shire councillor (1914-1948), and president of the Australian Club, Melbourne (1954-1957) (Boadle 1988).

WaterNSW records note the year of construction for the weir as 1975. However, this date relates to repair work carried out subsequent to flood damage caused in 1974 (Heritage NSW 2019). As noted in other sources, the weir was constructed in 1915-16, with this date and the engineers name ('Feb 1916 A.C. Fitznead Engineer') being engraved in the concrete on the right bank upstream abutment (Figure 3-14). Arthur Churchill Fitznead was originally an engineer for the NSW Public Works Department (c.1891-1907), and for the Murray, Windouran and Conargo Shire Councils from the inception of the local governments in 1907; he remained engineer for both the Windouran and Conargo Shire Councils until July 1941.

Hartwood Weir was the first such weir acquired by the Yanko, Colombo and Billabong Creeks Water Trust in 1930, for whom Patterson was a trustee at the time (*Government Gazette of the State of NSW*, 12 December 1930, p. 4875; *Narrandera Argus and Riverina Advertiser*, 29 June 1937, p. 2), under the Water Conservation and Irrigation Commission during its 1930s program of structure acquisitions. As a long-term trustee, Patterson's impact on the Yanko, Colombo and Billabong Creeks Water Trust's direction and development of the irrigation schemes within the area was substantial (Heritage NSW 2019).

Hartwood Weir is visible in historical heritage imagery dating to 1968, in a rural landscape adjacent to an area of medium density tree cover on both sides of Billabong Creek (Figure 3-18). At some point during the late

1990s, modifications were made to the weir, and the steel lock bars and handrails were replaced. Modern aerial imagery confirms that little has changed in the area immediately surrounding the weir. Despite such modifications and repairs over time, the weir structure remains substantially intact.

4.1.3 Physical analysis

Hartwood Weir (Figure 4-1) was inspected from both the western and eastern banks of the creek, with the survey primarily focussing on the west bank as it allowed for the greatest ground surface visibility. A dirt track leads up to the weir from the west, and another can be seen heading east from the east bank of the weir. The weir comprised a concrete structure, brick-block concrete abutment walls, and a steel walkway crossing the crest of the weir (Figure 4-2). The body of the weir could not be inspected, as it was covered in running water (Figure 4-3). As such, the number of bays could not be confirmed, and the weir's apron base slab and drop boards could not be examined. However, the movement of the water over the weir crest suggests that all drop boards may still be in place. The abutment wingwalls are extant on both banks of the creek, but are in a poor condition. The concrete is cracked, with a section of wingwall clearly broken. Star pickets, some with degraded bunting, mark the edge of the abutments (Figure 4-2, Figure 4-4). The walkway is still in place, held in position by steel struts. Rust was observed along the centre section of the walkway, above where the creek flows over the weir's submerged crest (Figure 4-2, Figure 4-3).

Figure 4-1. Hartwood Weir and surrounding landscape, facing east (Photograph by Brendan Wong)

Figure 4-2. Close up view of Hartwood Weir, facing east (Photograph by Brendan Wong)

Figure 4-3. View of Hartwood Weir, facing southeast (Photograph by Brendan Wong)

Figure 4-4. View of Hartwood Weir, facing northwest (Photograph by Brendan Wong)

The apron base slab can be identified as being extant in a photograph taken on 30 January 2024 by Water Group NSW DCCEEW. This photograph was taken during a period when the water flow level was lower than the height of apron base slab (Figure 4-5).

Figure 4-5. Water Group NSW DCCEEW photograph of Hartwood Weir, taken on 30 January 2024

A scatter of red brick and concrete fragments was identified approximately 3.5 m from the water's edge on the west side of the weir (Figure 4-6). The scatter was identified adjacent to a dirt track near the weir (Figure 4-7). There were no brick structures identified within proximity to the weir, and no footprint of any potential building was identified. The scatter therefore does not appear to be *in situ*, as it appears to have been mounded into its current location, possibly by an excavator or loader. During the fieldwork, the client advised that this may have once part of an old pumphouse structure. The exact location of any former brick structure associated with the debris was not known, but a modern pumphouse is situated approximately 170 m upstream from Hartwood Weir. As this comprises a brick scatter related to a relatively modern pumphouse which is not *in situ*, it will not be assessed further.

Figure 4-6. Red brick and concrete fragments near Hartwood Weir, facing west (Photograph by Brendan Wong)

Figure 4-7. Red brick and concrete fragment scatter area at the edge of a dirt path, facing north (Photograph by Brendan Wong)

Hartwood Weir, despite being in **poor condition**, is still operational. No historical artefacts were noted on the ground surface and no structures, aside from the weir itself were present on the east bank of the weir. Additionally, no areas of archaeological potential associated with the former pumphouse were identified during the field survey within the vicinity of the weir.

4.2 Old Bridge

4.2.1 Site description

The remains of an old, submerged timber bridge were identified in May 2022 as part of an earlier Aboriginal cultural heritage field survey by Meaghan Aitchison for the proposal. It is located on Billabong Creek between allotments 28/-/DP756330 and 1/-/DP707463, approximately 145 m north of Hartwood Weir.

4.2.2 Site summary history

As with Hartwood Weir, the Old Bridge is situated on the former Hartwood Station, which comprised 41,618 acres of freehold land when Dalgety and Company Limited sold the land on behalf of Richard Blackwood's sons to John Hunter Patterson Junior in 1913 (*Australasian* 5 April 1913, p. 5). After acquiring Hartwood, Patterson greatly augmented the station's water supply, turning the run into a showpiece station. The Old Bridge appears to be a former crossing of Billabong Creek between the former allotments 150 and 28 of North Currabunganung. This does not appear to have been a Council bridge, such as road bridges across Billabong Creek (eg. *The Riverine Grazier*, 20 February 1912, p. 4; 16 September 1913, p. 4; *The Independent*, 26 April 1912, p. 4; 14 June 1912, p. 2), or a Public Works footbridge (*Government Gazette of the State of NSW*, 1 June 1928, p. 2571). Due to its location, it likely was a private bridge for crossing between the two allotments on either side of Billabong Creek. While the weir and a suspension bridge are noted by the National Trust of Australia (NSW) (1985) as relics on Billabong Creek in their Hartwood Station listing, there is no mention of a timber bridge on the waterway. It is not mentioned by Heritage NSW (2019) in the Hartwood Weir S170 listing, nor in the *Heritage assessment of 304 river structures, southern region and 36 River structures, northern region for Section 170 heritage conservation register: Southern New South Wales Structures* (Austral Archaeology 2003). The age of the Old Bridge is therefore unknown.

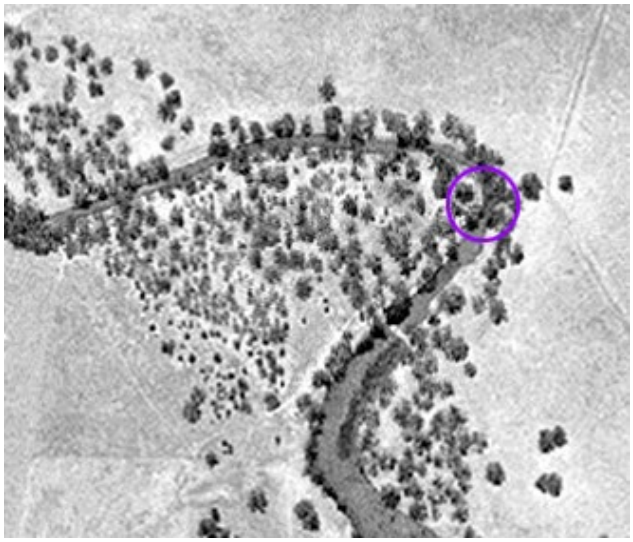

Figure 4-8. Historical aerial imagery dating to 1968, with the location of the Old Bridge in purple (NSW Government n.d.)

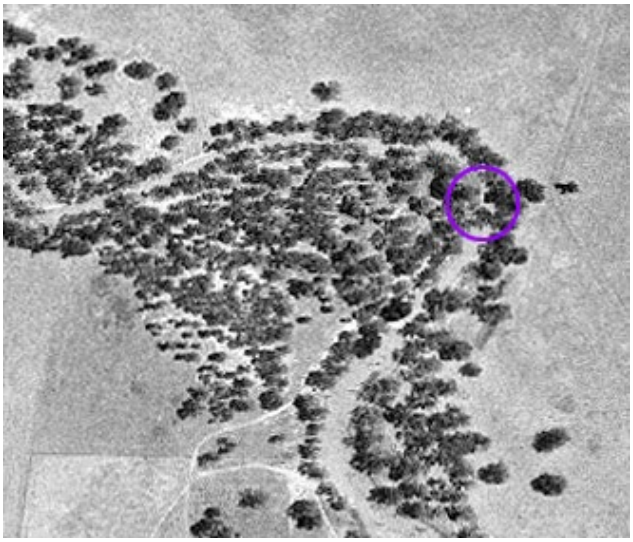

Figure 4-9. Historical aerial imagery dating to 1976, with the location of the Old Bridge in purple (NSW Government n.d.)

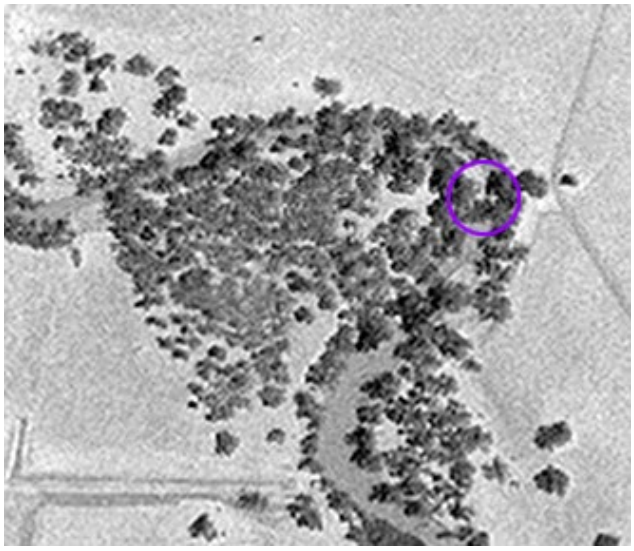

Figure 4-10. Historical aerial imagery dating to 1991, with the location of the Old Bridge in purple (NSW Government n.d.)

Figure 4-11. Historical aerial imagery dating to 1996, with the location of the Old Bridge in purple (NSW Government n.d.)

Historical aerial imagery dated between 1968 and 1996 (Figure 4-8 - Figure 4-11) shows that, between 1968 and 1991, a track ran from the north to the bend in Billabong Creek near the Old Bridge, before turning to the southeast. Tree cover to the west of the bridge is too dense to identify whether a similar track was found on the west bank of the creek. By 1996, the track to the east of the bridge no longer appears to be in use. While there are no clear tracks leading to the bridge itself, it is possible that the tracks led to this area for ease of access to this crossing point, prior to 1996. Due to the low resolution of the aerial imagery, it is not possible to positively identify the presence of the Old Bridge in the aerial photographs. However, a tree canopy covers the location of the bridge from 1976 (Figure 4-9) to 1991 (Figure 4-10), and a lighter coloured area is present at the bridge's location in the water in 1996 (Figure 4-11).

Figure 4-12. NSW DCCEEW photograph of the Old Bridge and stone crossing during a dry period

Figure 4-13. Water Group NSW DCCEEW photograph of the Old Bridge, taken on 30 January 2024

An undated photograph provided by NSW DCCEEW, shows the Old Bridge at a point in time when the water level was the lowest the client had seen at the site (Figure 4-12). It shows that the bridge comprised timber planks which were fixed perpendicularly to two large connecting logs. A stone crossing extends from the east bank to the middle of the creek, created by partially damming the creek with piled stones. The Old Bridge bridged the gap between the stone crossing and the west bank. This can also be seen in a photograph taken on 30 January 2024 by Water Group NSW DCCEEW (Figure 4-13), although the deck of the bridge has deteriorated.

4.2.3 Physical analysis

The Old Bridge (Figure 4-14 - Figure 4-15) comprised the remains of a timber bridge superstructure, including several planks, submerged in middle of the creek. Its location in the middle of the waterway did not allow for detailed observation of the remains during the field survey. However, it appears to have once been an old crossing place, as tracks can be seen leading to the location of the former bridge. The Old Bridge was found to be underwater during the non-Aboriginal heritage field survey, so no additional survey or photographs of this items could take place.

Figure 4-14. Old Bridge planks, facing west (Photograph by Meaghan Aitchison)

Figure 4-15. Close up of Old Bridge planks, facing west (Photograph by Meaghan Aitchison)

The width between creek banks at this location is approximately 15-20 m, suggesting that this bridge would have been relatively small in scale. Due to the timber planks of the bridge being submerged in the water, with no sign of any bridge approaches, these remains are assumed to be in an **extremely poor condition**.

4.3 Timber Structure

4.3.1 Site description

The remains of a timber structure were identified in May 2022 as part of an earlier Aboriginal cultural heritage field survey for this proposal. It is located on Billabong Creek between allotments 28/-/DP756330 and 1/-/DP707463, approximately 90 m north of Hartwood Weir.

4.3.2 Site summary history

The Timber Structure is situated on the former Hartwood Station which comprised 41,618 acres of freehold land when Dalgety and Company Limited sold the land on behalf of Richard Blackwood's sons to John Hunter Patterson Junior in 1913 (*Australasian* (5 April 1913, p. 5). After acquiring Hartwood, Patterson greatly augmented the station's water supply, turning the run into a showpiece station. The Timber Structure may have been a former jetty, boat landing or some type of creek crossing on Billabong Creek, with one for each of the former allotments 150 and 28 of North Currabunganung. While the weir and a suspension bridge are noted by the National Trust of Australia (NSW) (1985) as relics on Billabong Creek in their Hartwood Station listing, there is no mention of a jetties or piers on the waterway. No jetties or boat landings are mentioned in the Hartwood Weir S170 listing, nor in the *Heritage assessment of 304 river structures, southern region and 36 River structures, northern region for Section 170 heritage conservation register: Southern New South Wales Structures* (Austral Archaeology 2003). The age of the Timber Structure is unknown.

Historical aerial imagery dated between 1968 and 1996 (Figure 4-16 - Figure 4-19) shows that, between 1968 and 1991, a track ran from the north to the bend in Billabong Creek near the Old Bridge, before turning to the southeast. However, there is no clear evidence of any tracks leading from this main track to the timber structure situated to the south of the bridge. Tree cover to the west of the bridge is too dense to identify whether a similar track was found on the west bank of the creek. By 1996, the track to the east of the bridge no longer appears to be in use. Due to the low resolution of the aerial imagery, it is not possible to positively identify the presence of the Timber Structure in the aerial photographs.

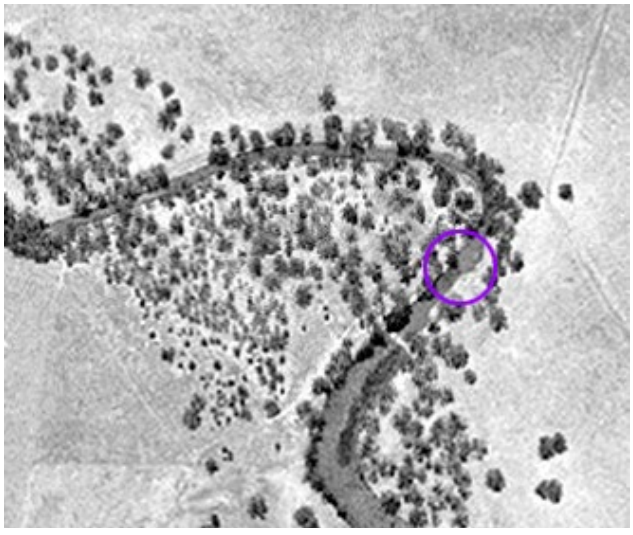

Figure 4-16. Historical aerial imagery dating to 1968, with the location of the Timber Structure in purple (NSW Government n.d.)

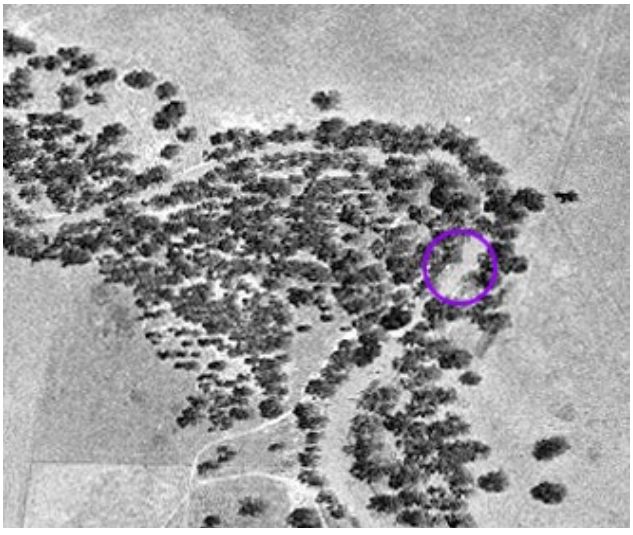

Figure 4-17. Historical aerial imagery dating to 1976, with the location of the Timber Structure in purple (NSW Government n.d.)

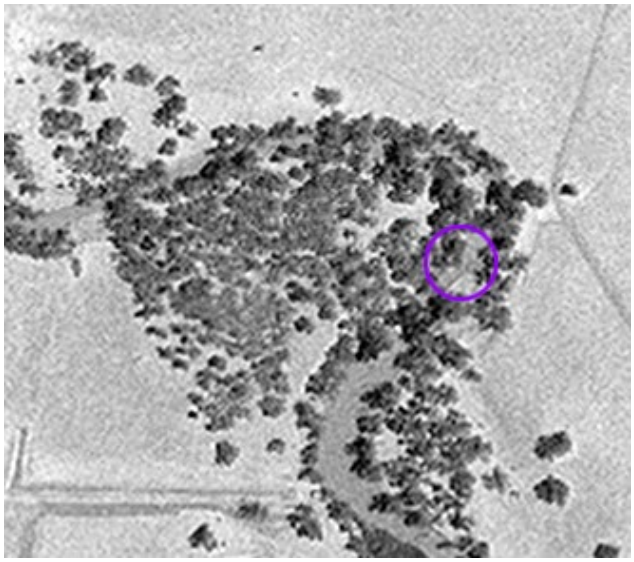

Figure 4-18. Historical aerial imagery dating to 1991, with the location of the Timber Structure in purple (NSW Government n.d.)

Figure 4-19. Historical aerial imagery dating to 1996, with the location of the Timber Structure in purple (NSW Government n.d.)

4.3.3 Physical analysis

The Timber Structure (Figure 4-20, Figure 4-21) comprises a series of timber uprights in rows, with six uprights being extant on the east side of the creek, and three on the west side of the creek. There were also additional timber posts found on the creek banks, one of which held a bolt. The rows of uprights in the creek were set approximately 1 m apart, while the posts on the east bank were set approximately 2 m apart. While it is unclear as to the exact nature of the structure, this may have originally been a boat landing or a ferry crossing. The timber structure was found to be underwater during the non-Aboriginal heritage field survey, so no additional survey of this item could take place. It appears to be in an extremely poor condition due to the loss of all decking associated with a potential pier.

Figure 4-20. Timber uprights and posts on the east bank, facing southwest (Photograph by Brendan Wong)

Figure 4-21. View of timber uprights on the west bank, facing southwest (Photograph by Brendan Wong)

4.4 Wanganella Weir

4.4.1 Site description

Wanganella Weir was considered by Jacobs in terms of preliminary advice as part of the Yanco Creek Modernisation Project (Seawright 2022). Mapping shows that the weir is located on Billabong Creek within part of allotment 7005/-/DP1024202. However, allotments 7015/-/DP1053753 and 7006/-/DP1055647, which sit within a former alignment of Billabong Creek, as seen on the NSW Government's ePlanning Spatial Viewer, appear to have once been associated with the weir.

The weir is a concrete crest weir, adjustable through use of drop boards. It is approximately 2 m high by 30 m across the length of the crest, with 10 drop board bays. None of the drop boards are extant. Wanganella Weir still provides a weir-pool for town water supply.

4.4.2 Site summary history

The site of the township of Wanganella (then called Wangonilla) was selected by the Department of Lands in 1862. It slowly grew over time, and by the late-1890s, it was reported that the people of Wangonilla had long wanted a dam or weir on Billabong Creek to service the township. The *NSW Government Gazette* (2 December 1898, p. 9372; 13 June 1899, p. 4547) recorded the request and approval by the Hay Land Board District for an application by the Trustees of Wangonilla Commons to build a timber overshot dam or weir. By the early-1900s, a more permanent dam was required by the township. In 1916, the *Independent* (17 May 1916, p. 2) reported that the Hay Land Board District ruled that the Windouran Shire Council's application for the overshot dam, which was to be 94 feet (28.65 m) in length, be postponed, to enable the Council to obtain title to the land on which they wished to construct the dam.

A second application for an overshot dam was given a five-year license to the Windouran Shire Council in 1916 under the Water Act of 1912 (*NSW Government Gazette*, 1 December 1916, p. 7069). However, the *NSW Government Gazette* (27 August 1920, p. 4979) provides a list of applicants for licenses, one of these applicants was the Windouran Shire Council, who wished to gain approval for a weir on Billabong Creek. The weir was to be built on land applied for under special lease 20-7. Inquiries into the applications were to be held by the Local Land Board on 29 September 1920.

The *Government Gazette of the State of NSW* (24 December 1920, p. 7583) subsequently announced that the Council's application was granted, and that a special lease of 2 acres of land be granted for the purposes of building the weir on Billabong Creek. The crest of the weir was to be no less than 73 feet (22 m), with a level fixed at 8.85 feet (2.7 m) below an established benchmark. Drop boards of no more than one foot (0.3 m) in height may be used over the crest level of the central portion of the weir, and were not to be fixed in place. The operation of the weir was to be overseen by the Water Conservation and Irrigation Commission.

In January 1927, the Water Conservation and Irrigation Commission received an application for a license for the aforementioned special lease allotment for the weir from the Windouran Shire Council, with public inquiries into the applications occurring in February (*Government Gazette of the State of NSW*, 14 January 1927, p. 136). The Windouran Shire Council's application was approved in April by the Hay Land Board District under the 1912 Water Act, with the weir being no less than 66 feet (20.11 m) with a level fixed at 8.88 feet (2.7 m) below the benchmark and drop boards to a height of no more than 2 feet 6 inches (0.76 m) over the crest level (*Government Gazette of the State of NSW*, 1 April 1927, p. 1667).

Wanganella Weir was subsequently built in 1927 for the conservation of water for the township of Wanganella (NSW Department of Primary Industries 2006, p. 60). The weir is visible in historical aerial imagery dating to 1976, in an area of medium density tree cover on both sides of Billabong Creek, with several tracks running up to the weir, which was likely a crossing point (Figure 3-17). While the weir is not shown on historical maps, the 1970 Town of Wanganella map shows the general location of the weir as being an approximately 2 acres allotment, Special License 49.2, being owned by the Windouran Shire Council

(Figure 3-11). This special allotment is likely the location of the weir, particularly as the land on both sides of the creek was noted as being Water Trust land. Modern aerial imagery shows little change in the vicinity of the weir from historical imagery.

4.4.3 Physical analysis

Wanganella Weir was inspected from both the northern and southern banks, with the survey primarily focussing on the northern bank due to the amount of vegetation blocking access to the southern side of the weir (Figure 4-22, Figure 4-26 - Figure 4-27). A formed gravel track from the Cobb Highway at Wanganella allows access to the northern side of the weir. This area has informal camping sites for 200 m either side of the weir which appears to be used frequently. The weir comprised a concrete structure which originally had abutment wingwalls on both banks, and a ramp on the north bank (Figure 4-23 - Figure 4-24), although only those features on the north bank are still *in situ*. Ten concrete piers, several of which are broken, are visible in the water, with no drop boards or walkway extant (Figure 4-25 - Figure 4-26). These piers define the 11 bays of the weir. There are slots clearly visible in the piers, which would have held drop boards. Without these drop boards, water runs freely between the piers. The abutment walls on the southern bank are broken, with a large section several metres from the weir, but some timber formwork (possibly an old bank retaining wall) was still present (Figure 4-25, Figure 4-28 - Figure 4-29). The body of the weir below the piers could not be inspected, as it was covered in water. As such, features such as the weir's apron base slab, could not be examined. The piers themselves could not be examined in detail, with no walkway with which to access them. The visible concrete structures of the weir are cracked, with several sections clearly broken, particularly on the south bank (Figure 4-25).

Figure 4-22. View of Wanganella Weir from the north bank, facing south (Photograph by Brendan Wong)

Figure 4-23. Wanganella Weir's concrete north bank ramp, facing west (Photograph by Brendan Wong)

Figure 4-24. Wanganella Weir's ramp and abutment wall, facing west (Photograph by Brendan Wong)

Figure 4-25. Close up view of Wanganella Weir, facing south (Photograph by Brendan Wong)

Figure 4-26. View of Wanganella Weir from the south bank, facing northeast (Photograph by Brendan Wong)

Figure 4-27. View of Wanganella Weir from the south bank, facing northeast (Photograph by Brendan Wong)

Figure 4-28. Wanganella Weir with timber formwork visible, facing south (Photograph by Brendan Wong)

Figure 4-29. Wanganella Weir with timber formwork visible, facing north (Photograph by Brendan Wong)

Wanganella Weir is in an **extremely poor condition**. There were no historical artefacts or structures present on either bank of the creek, aside from the weir itself. Additionally, no areas of archaeological potential were identified during the field survey.

5. Significance assessments

5.1 Hartwood Weir (WaterNSW S170 4550110)

5.1.1 Statement of significance

5.1.1.1 Significance assessment details

The significance assessment details (Table 5-1) are based on the wording of the NSW Heritage Office Heritage Data Form for Hartwood Weir (WaterNSW S170 4550110) (Heritage NSW 2019) found in Appendix A, with results of the current assessment in **bold**.

Table 5-1. Significance assessment of Hartwood Weir (WaterNSW S170 4550110)

Criterion	Heritage assessment
Historical significance SHR criteria (a)	Hartwood Weir is one of the oldest weirs in the area, **built in 1915-1916**. It was also the first to be handed over to the **Yanko, Colombo and Billabong Creeks Water Trust in 1937 under the** Water Conservation and Irrigation Commission in a program of asset acquisition in the late 1930s. Hartwood is one of the oldest properties in the district, dating back to the 19th century when it was a large sheep run. **The weir was therefore of significance to the history both Hartwood Station and to the local region.**
Historical associative significance SHR criteria (b)	The weir is closely associated with an established family in the area (the Pattersons) and closely associated with a particularly influential and long-serving member of the relevant Trust (Mr. **John Hunter** Patterson). **The weir was built by Arthur Churchill Fitznead, an engineer for the NSW Public Works Department (c.1891-1907), for the Murray, Windouran and Conargo Shire Councils from the inception of the local governments in 1907 until the 1940s.** It also shares an indirect association with John Monash **who was involved in water disputes as an expert witness in 1897 in the Riverina area, which included Hartwood Station**.
Aesthetic significance SHR criteria (c)	Hartwood Weir shows little aesthetic value, and appears to be a typical concrete weir built by the Conargo Shire engineer. **It does not meet Criterion C.**
Social significance SHR criteria (d)	There is strong local interest in the history of Hartwood property and its associated structures (e.g. the Hartwood woolshed on Billabong Creek). **While the weir is not situated within the current extent of the Hartwood property, this local interest in the Patterson family would include the weir as one of the surviving weirs demonstrating Patterson's influence (particularly relating to water management) across the district.**
Technical/Research significance SHR criteria (e)	Hartwood Weir does not appear to have any potential to yield information that would contribute to an understanding of the history of the area. **It does not meet Criterion E.**
Rarity SHR criteria (f)	Hartwood Weir does not appear to have any uncommon, rare or endangered aspects. **It does not meet Criterion F.**
Representativeness SHR criteria (g)	This structure is a good example of concrete weir construction in the early twentieth century, in particular, the use of brick block as an aggregate. Crushed bricks were used at times when the gravel most commonly used – and which did not occur in the region – was unavailable. **While the weir is in a poor condition, it is still an operational example of a weir of this type within the local area.**

5.1.1.2 Comparative analysis

The Hartwood Weir is a minor weir on Billabong Creek, in comparison to:

- The 85.34 m long Gogeldrie Weir (SHR 00961/S170 4550102/Leeton LEP 2014 I3) on the Murrumbidgee River:
  - This weir was built in 1959 as a major component of the Coleambally Irrigation Scheme, and was one of the last major schemes into public irrigation by the government to enable agriculture to expand in the Coleambally south of the Murrumbidgee.
  - It is described as:

    '[...] *one of seven major weirs on the Murrumbidgee River. It is approximately 63 kilometres downstream of Narrandera. The weir is 85.34m (280') between abutments. The weir structure comprises concrete sill floor reinforced with steel sheet piling cut-off walls, the floor is surmounted by concrete piers and steel superstructure providing supports for the steel sluice gates. There are six gates each measuring 6.1m (20') high and 12.2m (40') wide, weighing 24 tonnes. The gates are opened individually by electric motors placed centrally between piers*' (Heritage NSW 2000).
  - The Statement of Significance for the weir states:

    '*Gogeldrie Weir is associated with the Coleambally Irrigation Area and also part of the Murrumbidgee Irrigation Area. It is a major component in the Coleambally Irrigation Scheme being the diversion weir that controls and diverts water from the Murrumbidgee River to the Coleambally area. The weir is a landmark in the region*' (Heritage NSW 2000).
- The 75.59 m long Yanco Weir (SHR 00969/S170 4550194/Leeton LEP 2014 I2) on the Murrumbidgee River:
  - This weir was built in 1929 to divert flows from the Murrumbidgee River to the Yanko, Colombo and Billabong Creeks System for irrigation, and is one of the earliest weirs built on the Murrumbidgee River to regulate the flow of water to the Murrumbidgee Irrigation Area.
  - It is described as:

    '*The 1929 Yanco Weir is located approximately 14 km downstream of Narrandera. The Weir measures 75.590 m between abutments. It consists of concrete sill floor surmounted by several concrete piers of about 3.580 high. The concrete sill floor, originally reinforced with timber piles and sheet pilings, has been further reinforced with concrete piles and sheet piling during the 1980 reconstruction. The weir has been concreted over due to the commencement in usage of the new weir constructed nearby. The immediate grounds of the 1929 weir contain evidence of early usage, with remnants of many early structures such as the poles used for manual operation of the weir gates, scales showing past flood water level, etc*' (Heritage NSW 2015).
  - The Statement of Significance for the weir states:

    '*The 1929 Yanco Weir is one of the earliest weirs built on the Murrumbidgee River to regulate the flow of water to the Murrumbidgee Irrigation Area. It is associated with the historical development of the area and provides a good source for interpretation of the changing needs of the irrigation system. The site contains many remnants of early structures related to the early weir*' (Heritage NSW 2015).
- The 82.3 m long Berembed Weir (SHR 00957/S170 4550013) on the Murrumbidgee River:
  - This weir was built in 1909-1910 to divert water from the Murrumbidgee River into the Main Canal via an offtake regulator, built under the *Barren Jack and Murrumbidgee Canals Construction Act 1906*.
  - It is described as:

'*The Weir is founded on a solid granite bar extending across the river. It is 82.3m (270') between abutments, and is divided into a sluiceway 12.19m (40') wide, a lock chamber 12.19m (40') wide, and a concrete weir 50.29m (165') wide. The sluiceway and lock chamber area each controlled at their upstream ends by single iron-framed sluice gates of the "Stoney" pattern manufactured by Ransome & Rapier of Ipswich, England. The total lift of the gates is 10.67m (35'). The original lock-gates at the downstream end of the lock chamber have been removed. The off-take regulator has 10 gates. The gates were originally of tallow-wood and were each in 3 leaves. These gates and the lifting gear were constructed at the Government Fitzroy Dock in Sydney. The gates have since been replaced (?). The site contains other early structures such as staff cottage, timber pilings, wicket memorial, and rare native flora and fauna*' (Heritage NSW 2020).

- The Statement of Significance for the weir states:

  '*Berembed Division Weir is an integral and important part of the ambitious scheme launched under the Barren Jack and Murrimbidgee Canals Act 1906. It is an important structure in the control and diversion of water flow into the Main Canal to the Murrimbidgee Irrigation Area and surrounding districts*' (Heritage NSW 2020).

- The 72.5 m long Lock & Weir 15 (Balranald LEP 2010 I5/RNE 101503) on the Murray River
  - This lock and weir structure was built in 1929 by the New South Wales Public Works Department.
  - It is described as:

    '*Lock and Weir Nos 1-10 and 15 have similar features, whereas Lock and Weir No 11 is of a different type. The 12 structures are located at various sites along the River Murray over a total river distance of almost 1700 kilometres. The length of each weir depends upon the width of the river. The locks are located out of the main stream, close to one bank of the river. Lock No 11 is situated in a separate channel excavated across a sharp bend in the river. A feature of the weirs is that part (Nos 1-10 and 15) or all (No 11) of the structure can be dismantled and removed, to allow an unobstructed passage for the higher river flows. Weir and Lock Nos 1 to 10 and 15 are of the type recommended by Captain Johnston*' (NSW DCCEEW n.d.).

  - The Statement of Significance for the weir states:

    '*The weirs and locks are associated with several stages in Australian history and at least one landmark event.* […] *Eleven of the weirs (Nos 1-10 and 15) are of a type recommended by Captain Johnson, Corps of Engineers, USA, who was engaged in 1912 by the South Australian Government to report on a scheme for 'locking' the River Murray. A feature of the design of the weirs is that they can be dismantled during flood times in order to provide a minimum of interference with the river flow, the only permanent features being some concrete piers* […] *Public Works Department, NSW - This department was responsible for the construction of lock & weir Nos 10 and 15. The department has a very long and illustrious history in the construction of major public works including many large dams such as Hume Dam (concrete spillway portion)*' (NSW DCCEEW n.d.).

Hartwood Weir is quite different to the four larger weirs (three of which are listed on the SHR and one on the Balranald LEP), being at a much smaller scale on a creek, rather than on a major river like the others on the Murrumbidgee and Murray. While it is one of the oldest weirs, the Berembed Weir being the oldest, it was also built for private use, unlike the large-scale weirs along the Murrumbidgee and Murray Rivers. Hartwood Weir is, however, a weir of importance to the local history of the region under the historical themes of 'Developing local, regional and national economies' (Pastoralism) and the 'Building settlements, towns and cities' (Utilities).

5.1.1.3 Hartwood Weir (WaterNSW S170 4550110) statement of significance

Hartwood Weir (1916) comprises a concrete crest weir on Billabong Creek (adjustable through use of drop boards), which is still in operation. It is one of the oldest weirs in the area. Hartwood Weir is historically

significant as it demonstrates in the development of local economies in relation to pastoralism, as well as the construction of utilities, as part of John Hunter Patterson's wide scale augmenting of the water supply to Hartwood Station in the early 1900s, in a local context. The weir was transferred to Yanko, Colombo and Billabong Creeks Water Trust in 1937 under the Water Conservation and Irrigation Commission's program of assets acquisition in the late 1930s. It not only has historical association to John Hunters Patterson, but to the Arthur Churchill Fitznead, engineer for the NSW Public Works Department (c.1891-1907), and the Windouran and Conargo Shire Councils (1907-1941).

The weir is of social significance to the local community, given that there is a strong local interest in the Hartwood property and its structures. Finally, the weir has representative significance as a good example of an early 20th century weir, particularly in its use of brick block as aggregate. Despite modifications, such as the steel walkway, the weir remains substantially intact and provides tangible evidence of the continuity of pastoral water management in the local region, from the mid-1910s until today. **Hartwood Weir has local heritage significance.**

5.2 Old Bridge

5.2.1 Statement of significance

5.2.1.1 Significance assessment details

The significance assessment details (Table 5-2) are based on the results of the Aboriginal cultural heritage pedestrian survey which was undertaken in May 2022.

Table 5-2. Significance assessment of Old Bridge

Criterion	Heritage assessment
Historical significance SHR criteria (a)	The Old Bridge is a former crossing of Billabong Creek between the former allotments 150 and 28 of North Currabunganung, and would therefore have been a private bridge used by the landowner. The date of the site is not known, but historical aerial imagery suggests that it was in use by 1968, but no longer being used by 1996. As it is a relatively minor, private creek crossing that does not contribute to the history or demonstrate any pattern of local history, Old Bridge does not meet Criterion A.
Historical associative significance SHR criteria (b)	The Old Bridge is not connected to any known individual, and does not meet Criterion B.
Aesthetic significance SHR criteria (c)	The NSW DCCEEW photograph of the Old Bridge shows that it does not meet Criterion C.
Social significance SHR criteria (d)	The Old Bridge is not publicly accessible with no known significance to the local community, and therefore does not meet Criterion D.
Technical/Research significance SHR criteria (e)	The NSW DCCEEW photograph of the Old Bridge shows that it does not meet Criterion E.
Rarity SHR criteria (f)	The NSW DCCEEW photograph of the Old Bridge shows that it does not meet Criterion F.
Representativeness SHR criteria (g)	The NSW DCCEEW photograph of the Old Bridge shows that it does not meet Criterion G.

5.2.1.2 Comparative analysis

There are hundreds of bridges listed on the SHR across NSW. There are no bridges registered within the Edward River LGA. There are several registered bridges within 100 km of the Old Bridge site all being large-scale (100 m or larger) road and/or rail bridges crossing large waterways such as the Murray River and the Murrumbidgee River. As such, these three bridges are not comparable to the private, small-scale timber Old Bridge. The closest bridges which are comparable to that of the Old Bridge are:

- Ganmurra Bridge (Wagga Wagga LEP 2010 I306) at Currawarna, approximately 160 km to the east of the Old Bridge:
  - The Ganmurra Bridge, which dates to the 1940s, comprised a bridge over a small, unnamed ephemeral waterway on Ganmurra Road, which (despite being on a roadway) is not used.
  - It is described as:

    '*A dilapidated timber bridge, no longer in use*' (Heritage NSW 2012a).

    This bridge is not visible on aerial imagery, due to thick vegetation cover, so it is unknown whether it is still extant.
  - The Statement of Significance for the bridge states:

    '*Historical and social significance as an interesting example of a mid-20th century timber bridge, in the locality of the now vanished community of Ganmurra. Local significance*' (Heritage NSW 2012a).
  - While historical aerial imagery of the area does not clearly show the bridge, it would have been around 25-35 m in length to have crossed the waterway.
- Timber Bridge (Wagga Wagga LEP 2010 I307) at Collingullie, approximately 170 km to the east of the Old Bridge:
  - The Timber Bridge, which is undated but was extant from 1966 in historical aerial imagery of the area, is a bridge over Beavers Island Creek along a former northern alignment of MacDonnell Street. Neither the northern portion of MacDonnell Street, nor the bridge, is currently in use by the public.
  - It is described as:

    '*A single lane timber bridge across an arm of the Murrumbidgee River [currently dry], constructed of sawn and round timbers with concrete piers. Still in private u*se' (Heritage NSW 2012b).
  - However, the bridge is not visible in modern aerial imagery (MetroMap 2022), and no longer appears to be extant.
  - The Statement of Significance for the bridge states:

    '*This bridge illustrates a once typical solution to the problems of settling river flat and floodplain areas, using mainly bush and sawn timbers. Local significance*' (Heritage NSW 2012b).
- Historical aerial imagery suggests that the bridge was around 20-30 m in length to be able to have crossed the creek.

According to the Wagga Wagga Council, they have no photographs of either Ganmurra Bridge and Timber Bridge, so no visual or design comparison can be undertaken. However, the Old Bridge appears to have been a smaller structure than either Ganmurra Bridge or Timber Bridge which, as road bridges, both would have spanned their related waterways. The Old Bridge appears to have been a small, private bridge used by landowner/s to cross Billabong Creek to span the gap between the stone crossing/partial dam and the west bank of Billabong Creek. It is unknown who built any of the bridges, and historical aerial imagery is not clear enough to identify the Old Bridge. As such, it cannot be dated.

In comparison, while the Timber Bridge is not dated, Ganmurra Bridge was dated to the 1940s. Importantly, as road bridges, Ganmurra Bridge and Timber Bridge would both have been important to their respective local communities as vehicular crossing points. While there is little history available for any of the three bridges, both the LEP-listed bridges were extant at the time they were registered (although, according to their respective listings, only the Timber Bridge was still in use as a private bridge when it was registered).

5.2.1.3 Old Bridge statement of significance

The Old Bridge site does not appear to historically significant, as it is a relatively minor, private creek crossing that does not contribute to the history or demonstrate any pattern of local history. This bridge is not of aesthetic, technical/research significance, nor is it rare or representative. This bridge is therefore not considered to be of state or local significance.

5.3 Timber Structure

5.3.1 Statement of significance

5.3.1.1 Significance assessment details

The significance assessment details (Table 5-3) are based on the results of the Aboriginal cultural heritage pedestrian survey which was undertaken in May 2022.

Table 5-3. Significance assessment of Timber Structure

Criterion	Heritage assessment
Historical significance SHR criteria (a)	The Timber Structure may be the remains of a jetty, pier, boat landing or creek crossing. Given the limited remains, the minor nature of the infrastructure (even when intact) and the lack of clear historical evidence, it is not of historical significance and does not meet Criterion A.
Historical associative significance SHR criteria (b)	Does not meet Criterion B.
Aesthetic significance SHR criteria (c)	Does not meet Criterion C.
Social significance SHR criteria (d)	Does not meet Criterion D.
Technical/Research significance SHR criteria (e)	Does not meet Criterion E.
Rarity SHR criteria (f)	Does not meet Criterion F.
Representativeness SHR criteria (g)	Does not meet Criterion G.

5.3.1.2 Comparative analysis

There are 22 heritage places listed as piers or jetties, also 36 heritage places related to water landings, on the SHR in NSW, primarily around Sydney and along the east coast and/or large river mouths at the coast. There are no similar heritage items listed on the SHR in the NSW interior. As such, it is difficult to compare this feature to similar heritage items found within NSW. However, there are two similar listed heritage items in the

northwest corner of Victoria, on Lindsay Creek within Murray-Sunset National Park, which are former ferry crossings:

- Former Ferry Crossing, Nyah Punt (VHI H7527-0002) at Nyah on the Murray River, approximately 175 km to the west of the Timber Structure:
  - The Nyah Former Ferry Crossing, which was not dated, is a cutting down to the Murray River at Nyah. It is not visible on historical aerial imagery of the area, and thus likely pre-dates 1945.
  - It is described on the VHI site card as:

    'Cutting down to river on both sides of river (Vic & NSW). On Victorian side, modern concrete ramp marks site. No physical remains visible' (Kenderdine 1993a).
  - There was no Statement of Significance for the site provided in the site card.
  - No history of this place has been included on the site card.
- Lindsay Creek North Ferry Crossing (VHI H7129-0001) near Berribee Homestead on Lindsay Creek, approximately 400 km to the west of the Timber Structure:
  - The Lindsay Creek Ferry Crossing, which dates to after the construction of Lock 6 in around 1927 until the mid-1970s, comprised a ferry crossing point over Lindsay Creek in Victoria.
  - It is described on the VHI site card as:

    'Extant remains of mechanisms of crossing including pulley, iron piping, pulley remains, wire rope and many piles' (Kenderdine 1993b).
  - The Statement of Significance for the water crossing site on the site card states the following:

    'Has historical significance as a site that demonstrates the needs of crossing stock and passengers across the physical barrier that the creek represents to transport and communication. The most substantial ferry crossing remains examined undertaken as part of the 'River Shipping' project' (Kenderdine 1993b).
  - A subsequent survey which was undertaken in 2021 found that it comprised a landing area with the rusted remains of an unknown structure onto which a River Red Gum had fallen along with cables, a timber cable housing with a metal insert, rusted star pickets, and a concrete-filled can, which may have been used as an anchor. A ferry crossing cable was still *in situ*, wrapped around a large tree (R8 Joint Venture 2022).

The Timber Structure can be compared to river crossing infrastructure, such as at Nyah and Berribee Homestead. The limited information found relating to the Timber Structure is more in line with that of the Nyah site, which while registered, did not have an accompanying Statement of Significance. However, the remains at all three site differs significantly, with the Timber Structure comprising what might have been the remains of jetties or piers along with several posts, the site at Nyah comprising a cutting down to the Murray River and no other physical remains, while the site on Lindsay Creek comprises land-based features. No timber uprights were noted as part of the 2021 survey of the site at Berribee Homestead. There are several posts associated with the Timber Structure, comprising the land-based features of the site, one of which was found with a bolt in it. However, the site's usage is not as clearly understood as that of the crossing at Berribee Homestead.

5.3.1.3 Timber Structure statement of significance

The Timber Structure may be the remains of a jetty, pier, boat landing or creek crossing. Given the limited remains, the minor nature of the infrastructure (even when intact) and the lack of clear historical evidence, it is not of historical significance. It also does not meet any other heritage significance criterion. This Timber Structure is therefore not considered to be of state or local significance.

5.4 Wanganella Weir

5.4.1 Statement of significance

5.4.1.1 Significance assessment details

The significance assessment (Table 5-4) is an update of the preliminary heritage assessment of the weirs prepared by Jacobs (Seawright 2022), with results of the current assessment in **bold**.

Table 5-4. Significance assessment of Wanganella Weir

Criterion	Heritage assessment
Historical significance SHR criteria (a)	Wanganella Weir was built in 1927, and is almost 100 years old. The history of Wanganella Weir is linked to that of the Windouran Shire Council and the people of Wangonilla. Requests for a dam or weir going back to at least 1898, when the Trustees of Wangonilla Commons requested that a timber overshot dam or weir to be built on Billabong Creek. Windouran Shire Council applied for a license for an overshot dam or weir in 1916, and again in 1920. The weir, which was built much later, was constructed on a special lease of 2 acres of land over Billabong Creek. However, the weir does not appear to have been otherwise particularly significant to the development of any particular industry, nor to any important phase or event in the history of the township. **It does not meet Criterion A.**
Historical associative significance SHR criteria (b)	There is no special association between Wanganella Weir and the life or works of any individual or family, and is one of many public works by the Windouran Shire Council. **It does not meet Criterion B.**
Aesthetic significance SHR criteria (c)	Wanganella Weir shows little aesthetic value, and appears to be a typical overshot dam authorised by the Hay Land Board under the 1912 Water Act. **It does not meet Criterion C.**
Social significance SHR criteria (d)	Wanganella Weir may have some importance to the local community as a publicly available swimming area and camping spot centred around an historical weir, built for the township of Wanganella. **Despite its extremely poor condition,** it is still an operational weir, providing water to the township.
Technical/Research significance SHR criteria (e)	Wanganella Weir does not appear to have any potential to yield information that would contribute to an understanding of the history of the area. **It does not meet Criterion E.**
Rarity SHR criteria (f)	Wanganella Weir does not appear to have any uncommon, rare or endangered aspects. **It does not meet Criterion F.**
Representativeness SHR criteria (g)	Wanganella Weir does not appear to demonstrate any principal characteristics of NSW's historical weirs in its current state. **It does not meet Criterion G.**

5.4.1.2 Comparative analysis

The Wanganella Weir is a minor weir on Billabong Creek, in comparison to Gogeldrie Weir (SHR 00961/S170 4550102/Leeton LEP 2014 I3), Yanco Weir (SHR 00969/S170 4550194/Leeton LEP 2014 I2), Berembed Weir (SHR 00957/S170 4550013), and Lock & Weir 15 (Balranald LEP 2010 I5/RNE 101503). These weirs are described in section 5.1.1.2, and the details are not replicated here.

Wanganella Weir is quite different to the four larger weirs (three of which are listed on the SHR and one on the Balranald LEP), being at a much smaller scale on a creek. It is also one of the youngest of these weirs,

being a couple of years younger than Yanco Weir and Lock & Weir 15, it was also built for use primarily by the township of Wanganella, unlike the large-scale weirs situated along the Murrumbidgee and Murray Rivers. Wanganella Weir is, however, a weir of importance to the people of Wanganella, being a public weir built for the Windouran Shire Council which is currently owned and maintained by the Edward River Council, under the 'Building settlements, towns and cities' (Utilities) themes.

5.4.1.3 Wanganella Weir statement of significance

Wanganella Weir (1927) is a concrete adjustable crest weir on Billabong Creek, which is still in operation. It provides water to the township of Wanganella, and is a local swimming spot and camping area. The weir may be of social significance to the local community, given that it is an operational weir owned and maintained by the Edward River Council, which is also currently used for swimming, with the land around the weir being a camping spot. While the weir currently has no facilities beyond rubbish bins, the Edward River Council have plans to develop the camping reserve area by providing seating and surface improvements and developing a walk from Wanganella village to the weir.

Despite its extremely poor condition, the weir provides tangible evidence of the social aspect of community water management infrastructure within the local region. **Wanganella Weir has local heritage significance.**

5.5 Significance assessments summary

Both Hartwood Weir and Wanganella Weir have been assessed as being of **local significance**, despite their respective poor and extremely poor conditions. Neither the Old Bridge nor the Timber Structure, both of which are in extremely poor condition, are assessed as being of heritage significance. No additional potential heritage items or areas of archaeological potential were identified during the field survey. As such, the proposed works for both Hartwood Weir and Wanganella Weir is found in section 6, and a SOHI is provided for both Hartwood Weir and Wanganella Weir in section 7.

6. Proposed works

Refer to section 1.4 for a summary of the proposal, which includes the location of the proposal, key features of the proposal, timing, and operation details.

6.1 Hartwood Weir (WaterNSW S170 4550110)

6.1.1 The proposal

The proposal would directly impact upon the Hartwood Weir (WaterNSW S170 4550110) heritage item. These pre-construction and construction works would comprise:

- Demolition of a substantial portion of the heritage item (the weir structures within the creek), including:
  - Removal of both wingwalls (abutments) down to the level of the existing floor of the weir structure.
  - Removal of the drop boards, walkways, and concrete diaphragm walls down to the concrete base slab (apron level). The broken concrete surface will be roughly trimmed only.
- The base slab and approximately 300 mm of the step at the edge of the base slab on the waterway face of the wingwalls of the existing structure will be retained.
- Reinstatement of the wingwall removal area with placement of fill (rock) to reinstate creek banks and appropriate beaching protection of any new earthworks.

Further works that may have indirect impact upon the Hartwood Weir (WaterNSW S170 4550110) heritage item include:

- Construction and use of a temporary crane pad/laydown area, approximately 10 m north of the existing weir crest and immediately adjacent to the red brick and concrete fragment scatter.

6.1.2 Consideration of alternative options

In accordance with the principles and guidelines of Section 170A (1) of the Heritage Act, alternatives to demolition of the weir were considered by NSW DCCEEW. The two primary reasons for the demolition of Hartwood Weir are:

- The new regulator would not be able to control flows as intended if the weir was retained.
- The weir would remain as a barrier to upstream fish movement and DPI-Fisheries have requested its removal to allow upstream fish passage.

Partial demolition or breaching of Hartwood Weir was also considered, but it was determined that these options were not viable as:

- The partially demolished weir would be a navigation hazard.
- The partial demolition of the weir would accelerate the further deterioration of the already poor condition weir structures, potentially resulting in damage to the new downstream regulators in the event of a catastrophic failure of the existing partially demolished weir.
- Maintenance of the partially demolished structure would result in poor constructability outcomes as well as posing safety issues.

While the proposal would not be the best conservation solution for Hartwood Weir (WaterNSW S170 4550110), and does not promote ongoing use and upkeep of the historical weir, the impacts to the weir are unavoidable.

6.2 Wanganella Weir

6.2.1 The proposal

The proposal would directly impact upon the Wanganella Weir heritage item. These pre-construction and construction works would comprise:

- Demolition of a substantial portion of the heritage item (the weir structures within the creek), including:
  - Removal of the northern wingwall (abutment) only down to the level of the existing floor of the structure.
  - Removal of drop boards, any steelwork and concrete diaphragm walls down to the concrete base slab (apron level). This will involve the removal and trimming of the concrete wall at the face of the southern wingwall. The broken concrete surface will be roughly trimmed only.
- The base slab, the southern wingwall (due to bank stability issues), and approximately 300 mm of a step at the edge of the base slab on the waterway face of the northern wingwall, of the existing structure will be retained.
- Reinstatement of the wingwall removal area with placement of fill (rock) to reinstate northern creek bank and appropriate beaching protection of any new earthworks.

Further works which may have indirect impact upon the Wanganella Weir heritage item include:

- Construction and use of an access track on the northern bank adjacent to the concrete ramp and abutment walls.

6.2.2 Consideration of alternatives

In accordance with the principles and guidelines of Section 170A (1) of the Heritage Act, alternatives to demolition of the weir were considered by NSW DCCEEW. The two primary reasons for the demolition of Wanganella Weir are:

- The new regulator would not be able to control flows as intended if the weir was retained.
- The weir would remain as a barrier to upstream fish movement and DPI-Fisheries have requested its removal to allow upstream fish passage.

Partial demolition or breaching of Wanganella Weir was also considered, but it was determined that these options were not viable as:

- The partially demolished weir would be a navigation hazard.
- The partial demolition of the weir would accelerate the further deterioration of the already poor condition weir structures, potentially resulting in damage to the new downstream regulators in the event of a catastrophic failure of the existing partially demolished weir.
- Maintenance of the partially demolished structure would result in poor constructability outcomes as well as posing safety issues.

While the proposal would not be the best conservation solution for Wanganella Weir, and does not promote ongoing use and upkeep of the historical weir, the impacts to the weir are unavoidable.

7. Heritage impact assessments

7.1 Hartwood Weir (WaterNSW S170 4550110)

7.1.1 Site details

Hartwood Weir is located on Billabong Creek at allotments 1/-/DP1144789, 2/-/DP1144789 and 3/-/DP181995, which is situated between two parcels of land at 4144 Conargo Road Hartwood. The heritage item is listed on the WaterNSW S170 register as ID 4550110.

The item is of local significance, and it meets criterion A (historical), B (associative), D (social) and G (representativeness).

Kate Lenertz (Heritage Specialist, WaterNSW) advised that WaterNSW was attempting to have this heritage item removed from their S170 Heritage and Conservation Register (pers. comm., 20 December 2022). However, as of 19 June 2024, this heritage item is still appearing as an S170 listing on the SHI, although the Recommended Management section states, 'To be removed from the s170 Register' (Heritage NSW 2019). The weir must therefore be treated according to its current status as being an S170-listed heritage item of local significance.

7.1.2 Matters for consideration

7.1.2.1 Fabric and spatial arrangements

Substantial demolition is proposed as is discussed in Section 1.

7.1.2.2 Setting, views and vistas

The setting, views and vistas would not be impacted as the works propose substantial demolition, rather than works within the setting or viewlines of the heritage item. This consideration does not apply.

7.1.2.3 Landscape

This consideration does not apply.

7.1.2.4 Use

The proposed works are to enable a continuation of the existing use of the heritage item as a water management control.

7.1.2.5 Demolition

There would be no enhancement of heritage significance due to the direct impacts to the heritage item. The proposed demolition of the weir structures within the creek at Hartwood Weir (WaterNSW S170 4550110) would cause direct impact to the heritage item. This would include the removal of the original headwall, 12 bays, and all remaining red gum drop boards that form the weir structure within the creek. Only a small step at the edge of the base slab on the waterway face of the wingwalls, along with the base slab in the creek bed, would be retained. An excavator will be used to demolish the remainder of the weir structure, and a dump truck use to remove the demolition rubble from the site. A concrete saw will be used to remove the engraving on the right bank abutment.

The remaining portions of the weir provide some representation of the heritage significance of the original weir. Their retention marks the location of the historically-significant Hartwood Weir, which was one of the oldest weirs in the area, which has historical associative significance with the Patterson family. The abutments

show that the weir was situated within the original extent of the socially-significant Hartwood property. The brick-block concrete abutment walls are of representative significance, as they retain some of the representative significance of early 20th century weirs built using brick block as an aggregate. The remaining step (approximately 300 mm in height) at the edge of the base slab would comprise the only remaining feature of the weir, neither of which would serve as a visible reminder of the former weir. As such, the demolition would impact upon the heritage significance and fabric of the heritage item, and result in the heritage item no longer being a weir.

In accordance with the principles and guidelines of Section 170A (1) of the Heritage Act, alternatives to demolition of Hartwood Weir were considered by NSW DCCEEW (see Section 6.1.2), but it was determined that these options were not viable. As this impact to the heritage fabric of the weir cannot be avoided, further assessment and archival recording would be completed.

7.1.2.6 Curtilage

This consideration does not apply.

7.1.2.7 Moveable heritage

This consideration does not apply.

7.1.2.8 Aboriginal cultural heritage

This consideration does not apply as there are no Aboriginal cultural heritage values associated with this heritage item. For full details of Aboriginal heritage assessment for the proposal refer to Appendix M of the EIS (*Yanco Creek Modernisation Project: Part 2 – Billabong Creek Regulators, New South Wales, Aboriginal Cultural Heritage Assessment* (Austral Archaeology 2024)).

7.1.2.9 Historical archaeology

There are no known or suspected areas of archaeological potential within the heritage item boundary to be impacted by the proposal, therefore no further archaeological investigations are proposed.

7.1.2.10 Natural heritage

This consideration does not apply as there are no natural heritage values associated with this heritage item.

7.1.2.11 Conservation areas

This consideration does not apply as the heritage item is not part of a conservation area.

7.1.3 Conclusion

While the base slab, which comprises the main subsurface portion of the weir situated within the creek bed, and a small step at the edge of the base slab on the waterway face of the wingwalls in both creek banks would remain, the proposed works would still be of medium – large scale and of moderate – high intensity. This would cause permanent and irreversible changes to the heritage item. There would not be any remaining features above the waterline to serve as a visual reminder of the location of the historical weir. As such, the overall level of impact on Hartwood Weir (WaterNSW S170 4550110) would be **major**.

7.2 Wanganella Weir

7.2.1 Site details

Wanganella Weir is located on Billabong Creek within part of allotment 7005/-/DP1024202. However, allotments 7015/-/DP1053753 and 7006/-/DP1055647, which is situated off the Cobb Highway, Wanganella.

The heritage item is not currently listed, but has been assessed as being of local significance as it meets criterion D (social).

There are no known or suspected areas of archaeological potential within the heritage item boundary to be impacted by the proposal, therefore no further archaeological investigations are proposed.

7.2.2 Matters for consideration

7.2.2.1 Fabric and spatial arrangements

Substantial demolition is proposed as is discussed in Section 1.

7.2.2.2 Setting, views and vistas

The setting, views and vistas would not be impacted as the works propose substantial demolition, rather than works within the setting or viewlines of the heritage item. This consideration does not apply.

7.2.2.3 Landscape

This consideration does not apply.

7.2.2.4 Use

The proposed works are to enable a continuation of the existing use of the heritage item as a water management control.

7.2.2.5 Demolition

There would be no enhancement of heritage significance due to the direct impacts to the heritage item. The proposed demolition of the weir structures within the creek at Wanganella Weir would comprise direct impact to the heritage item. This would include the removal of the original headwall, and the remaining piers of the original 11 bays that form the weir structures within the creek. The southern abutment wall, timber formwork, and apron base block would be retained. An excavator will be used to demolish the remainder of the weir structure, and a dump truck use to remove the demolition rubble from the site. Construction of the new regulator may impact upon any remaining timber formwork on the south bank of the weir.

The remaining portions of the weir provide some representation of the heritage significance of the original weir. Their retention marks the location of the socially-significant Wanganella Weir, around which a publicly available swimming area and camping spot have evolved. The southern wingwall, timber formwork, small step (approximately 300 mm in height) at the edge of the base slab, along with the base slab in the creek bed, would comprise the only remaining feature of the weir. Of these, the southern wingwall and timber formwork may be damaged by heavy vehicle operation during the demolition of the main body of the weir. Despite the visible presence of these two weir features, the demolition would impact upon the heritage significance and fabric of the heritage item, and result in the heritage item no longer comprising a weir.

In accordance with the principles and guidelines of Section 170A (1) of the Heritage Act, alternatives to demolition of Wanganella Weir were considered by NSW DCCEEW (see Section 6.2.2), but it was determined

that these options were not viable. As this impact to the heritage fabric of the weir cannot be avoided, further assessment and archival recording would be completed.

Additionally, the use of the access track adjacent to the north bank of the heritage item may have indirect impact to the heritage item, while the construction of the new regulator may impact upon any remaining timber formwork. These impacts may occur prior to demolition of the weir structures, due to the use of construction machinery and vehicles within close proximity to the heritage feature.

7.2.2.6 Curtilage

This consideration does not apply.

7.2.2.7 Moveable heritage

This consideration does not apply.

7.2.2.8 Aboriginal cultural heritage

This consideration does not apply as there are no Aboriginal cultural heritage values associated with this heritage item. For full details of Aboriginal heritage assessment for the proposal refer to Appendix M of the EIS (*Yanco Creek Modernisation Project: Part 2 – Billabong Creek Regulators, New South Wales, Aboriginal Cultural Heritage Assessment* (Austral Archaeology 2024)).

7.2.2.9 Historical archaeology

There are no known or suspected areas of archaeological potential within the heritage item boundary to be impacted by the proposal, therefore no further archaeological investigations are proposed.

7.2.2.10 Natural heritage

This consideration does not apply as there are no natural heritage values associated with this heritage item.

7.2.3 Conclusion

While the base slab, which comprises the main subsurface portion of the weir situated within the creek bed, and the wingwall and ramp in both creek banks would remain, the proposed works would still be of medium – large scale and of moderate – high intensity. This would cause permanent and irreversible changes to the heritage item. The retention of the southern wingwall and timber formwork would serve as a visual reminder of the location of the historical weir. Despite this, the overall level of impact on Wanganella Weir would be **major**.

7.3 Operational impacts

As construction works would comprise the demolition of the majority of the Hartwood Weir (WaterNSW S170 4550110) and Wanganella Weir heritage items, there would be no operational impacts as the heritage item weir structures within the creek would already be removed prior to operation. Additionally, any previously unidentified historical heritage items and archaeological sites would already be discovered during the construction phase. As such, there would be no operational impacts to non-Aboriginal heritage.

Operation of the proposal would result in a change to the upstream extent of the hydraulic influence of the existing weirs. Preliminary modelling shows that there will be changes to the existing weir pool extents and small changes to the areas providing slow, moderate, fast, and very fast water velocity.

There would also be small changes to the areas providing slow, moderate, fast, and very fast water velocity downstream of the new regulators. The remaining features of the weirs comprise a small step at the edge of

the base slab and the apron base block at Hartwood Weir and the southern wingwall, timber formwork, small step at the edge of the base slab and the apron base block at Wanganella Weir. As these features were constructed to be subject to water flows of various levels and speeds, they would not be subject to any additional hydrological impacts from changes to the water flow by the construction of the new regulators. Hydrological modelling shows that the velocities of the water flows within the weir pools adjacent to the remaining features of the two existing weirs will not change, and will remain at speeds comparable to the current water flows at both weirs.

Therefore, no heritage features would be subject to operational impacts from the two new regulators.

7.4 Cumulative impacts

Cumulative impacts are the combined, successive and incremental effects of harm to historical heritage objects, places, and archaeological sites as a result of multiple activities in a particular location, area or region, generally as a result of development. The assessment of cumulative impact of the proposed works must consider both previous approvals and future applications, including other works as part of the current NSW DCCEEW program, as per the *Guidelines for Preparing a Statement of Heritage Impact* (Department of Planning and Environment 2023).

The other projects in the region were reviewed to determine if the proposal has the potential to result in significant cumulative impacts. The projects reviewed across the EIS included the Yanco Creek Modernisation Project, the Reconnecting River Country Program, Yanco Delta Wind Farm, Yanco Solar Farm, and Bullawah Wind Farm, as well as the other water projects which form part of NSW DCCEEW's Sustainable Diversion Limit Adjustment Mechanism (SDLAM) program. See Chapter 24 of the EIS for details of these projects, and the cumulative impact assessment methodology.

In 2003, Austral Archaeology (2003) undertook a heritage assessment of 304 river structures within southern NSW and 36 across northern NSW for potential registering on the s170 heritage register, on behalf of State Water (a predecessor agency to WaterNSW). These heritage items were found across NSW, with the majority identified within the southern portion of the state. These assets include a range of public infrastructure such as dams, weirs, regulators, levees, culverts, crossings, channels and related buildings.

Of the 304 river structures assessed in the southern region, 45 of the river structures were assessed as being of state or local significance. Three of these heritage items were of high state-level significance, two of which were weirs. Six were of moderate state-level significance, all of which were weirs – including Hartwood Weir (WaterNSW s170 4550110), the subject of the current proposal. A total of 17 river structures were of high local-level significance, seven of which were weirs or regulators. Finally, 19 river structures were of moderate local-level significance, nine of which were weirs or regulators. In summary, of the total number of water structures that were assessed, there were 24 weirs or regulators considered to be of significance in the southern region, which includes the current proposal area and the broader SDLAM program region. This provides a baseline of data for heritage weirs and other river structures within NSW by which cumulative impact can be assessed.

NSW DCCEEW's SDLAM program currently comprises five projects across the Murray Darling Basin with future applications (see Table 7-1). Across the Yanco Creek Modernisation, Murrumbidgee and Murray National Park, Koondrook-Perricoota Flow Enabling Works, and Mid-Murray Anabranches Constraints Demonstration Reach Projects, four heritage-listed weirs are proposed to be demolished, along with nine non-listed weirs or regulators, four non-listed culvert, one non-listed block bank, one non-listed penstock gate associated with a regulator, a non-listed rock crossing, and ten non-listed bridges.

Table 7-1. SDLAM Projects and potential historical weir demolitions

Project	Historical weirs to be removed
Yanco Creek Modernisation Project	One s170-listed weir of local significance in poor condition, and one non-listed weir of local significance in extremely poor condition, will be demolished on Billabong Creek (current project).
Lower Murray - Locks 8 & 9 Project	Two non-listed weirs, which were assessed as not holding local or state heritage significance, will be demolished along Carrs, Capitts and Bunberoo Creeks.
Murrumbidgee and Murray National Park Project	Two s170-listed weirs of local significance in poor operational condition, noting that the heritage fabric of both are in very good condition, will be demolished at Yanga National Park. Four non-listed regulators and one non-listed culvert, none of which were assessed by Austral Archaeology as having any heritage significance, will be demolished at Millewa National Park.
Koondrook-Perricoota Flow Enabling Works Project	One s170-listed regulator which had undergone substantial change since its 2003 assessment, two non-listed regulators, and a non-listed offtake, none of which meet the threshold for local or state heritage significance, will be demolished.
Mid-Murray Anabranches Constraints Demonstration Reach Project	No known weirs will be demolished; two culverts and a block bank will be removed, and one bridge and one culvert replaced, along Native Dog Creek, none of which were assessed by Austral Archaeology as having heritage values. No known weirs will be demolished; four bridges and a penstock gate will be removed, and five bridges and a rock crossing replaced, along Bullatale Creek. Five timber and composite timber bridges were assessed as having local heritage values.

Based on the known information, there are a total of four heritage-listed weirs, and one non-listed weir assessed as being of local significance, to be demolished as part of the SDLAM program. As the number of weirs to be demolished as part of SDLAM are still to be confirmed for the Mid-Murray Anacranches Constraints Demonstration Reach Project, the program may impact upon other weirs, regulators, and other types of water infrastructure with heritage values.

The four s170-listed weirs and one of local heritage significance being demolished as part of the SDLAM program comprises 20.83 per cent of state or local significant heritage weirs or regulators in the southern region.

This is mitigated in a limited fashion by one of the s170-listed weirs having subsequently been assessed as not being of heritage significance and the other four heritage weirs only being of local significance, rather than state level significance. Additionally, two of these weirs were shown to be substantially altered, or in a poor condition, while the other two were in poor operational condition although their heritage fabric was in very good condition. As such, the proposal is likely to result in a **moderate** cumulative impact to heritage water infrastructure assets, as long as the mitigation and management measures outlined in section 8 are undertaken.

8. Mitigation and management of impacts

8.1 Approach to mitigation and management

The following management measures will be implemented during works to manage potential impact to heritage items from construction work in their vicinity. These mitigation and management measures include general management measures that will be undertaken for the pre-construction and construction phases (HH1). They also cover site-specific measures for the S170-listed Hartwood Weir (HH2) and locally significant Wanganella Weir (HH3). Residual impacts to non-Aboriginal heritage have also been assessed (section 8.3).

8.2 Mitigation and management measures

Table 8-1 lists the mitigation and management measures that would be implemented to manage potential impacts to non-Aboriginal heritage by the proposal.

Table 8-1. Non-Aboriginal heritage mitigation and management measures

ID	Impact	Environmental safeguard	Responsibility	Timing
HH1	Impacts to registered and previously unidentified historical heritage items or archaeological sites	**Management of historical heritage during pre-construction and construction** ▪ Prior to construction commencing, all personnel working on site will be provided a site-specific cultural heritage induction (e.g. Project induction toolbox talks and staff inductions). This will include the heritage sensitivities of work sites and the procedures for the management of non-Aboriginal cultural heritage during construction, such as the discovery of historical artefacts, features or deposits, or the discovery of human remains. ▪ An unexpected finds protocol that specifies measures to avoid and minimise impacts on any previously unidentified historical archaeological sites and values discovered during pre-construction and construction will be prepared. If unexpected items are discovered during construction, all work will cease in the area. The Contractor will inform the site supervisor and Project Manager, and an Historical Archaeologist will be engaged to assess the item's significance. The Project Manager must advise a WaterNSW heritage officer of any unexpected finds on WaterNSW land or in relation to a WaterNSW asset, as per Section 146 of the Heritage Act.	NSW DCCEEW, Contractor	Pre-construction, Construction

ID	Impact	Environmental safeguard	Responsibility	Timing
HH2	Impacts to Hartwood Weir (WaterNSW S170 4550110)	**Management of Hartwood Weir (WaterNSW S170 4550110) during pre-construction** ▪ NSW DCCEEW will record the asset prior to demolition in accordance with Heritage NSW's *How to Prepare Archives Records of Heritage Items, Guidelines for Photographic Recording of Heritage Sites, Buildings and Structures*, and the updates to technology and practice which have occurred since the 2006 guidelines were issued. The archival recording should result in three sets of a digital photographic report, along with digital materials. DCCEEW will provide WaterNSW with a draft copy for review, prior to lodging this recording with the Heritage NSW library, State Library of NSW and the local council library (***Guideline 3.57***). NSW DCCEEW and WaterNSW will also retain a copy of the final report for their own records. ▪ Explore options in conjunction with WaterNSW for the installation of interpretation of Hartwood Weir to provide information about the heritage significance of the site, fabric, value and history of the site, supported by digital content, including consideration of expenditure and ongoing maintenance. The interpretation display should include the engraving (from the right bank abutment), which is proposed to be removed as part of demolition. For example, interpretation options may include (but are not limited to): - signage - embedded interpretation - artworks - interpretive display. Places for interpretive display/s may include location/s determined by WaterNSW and/or NSW DCCEEW. Recommendations from the Edward River Council and/or other local stakeholders may be taken into consideration in the determination of the preferred location/s. Provision of 14 days prior written notification of the proposed demolition of the heritage item will be made to the Heritage Council of NSW by NSW DCCEEW and WaterNSW.	WaterNSW, NSW DCCEEW, Contractor	Pre-construction
HH3	Impacts to Wanganella Weir	**Management of Wanganella Weir during pre-construction** ▪ The asset will be recorded prior to demolition in accordance with Heritage NSW's preferred method of archival recording, as described in HH2. A draft version of the report should be provided to WaterNSW	NSW DCCEEW, Contractor	Pre-construction

ID	Impact	Environmental safeguard	Responsibility	Timing
		for review. NSW DCCEEW will provide WaterNSW with a draft copy for review, prior to lodging this recording with the Heritage NSW library, State Library of NSW and the local council library. NSW DCCEEW and WaterNSW will also retain a copy of the final report for their own records. ▪ Explore options in conjunction with WaterNSW for the installation of interpretation (for example but not limited to signage, embedded interpretation, artworks, interpretive display) at the Wanganella Weir (near the southern wingwall and timber formwork) to provide information about the heritage significance of the site, fabric, value and history of the site, supported by digital content, including consideration of expenditure and ongoing maintenance. ▪ Prior to its demolition, measures to manage indirect historical heritage impacts to the remaining elements of the weir (the southern wingwall and timber formwork) will be implemented, including physical barrier protection and/or exclusion zones, until the works in the vicinity of the remaining weir features have been completed.		

8.3 Residual impacts

Despite the photographic recording of the heritage items prior to demolition, the information about the fabric and nature is not the same heritage significance as the *in situ* retention of the heritage fabric itself. The use of interpretive signage at each weir location can provide and represent this information, but again the significance of each heritage item will be substantially reduced. Therefore, the residual impacts to the two heritage weirs would remain as **major**.

9. Conclusion

This report presents the findings of the Billabong Creek Regulators Non-Aboriginal Heritage Assessment, which assesses the proposal at Hartwood and Wanganella. This report assesses potential impacts on non-Aboriginal heritage to address the SEARs (section 1.5), specifically:

- Provide a heritage assessment including but not limited to an assessment of impacts to State and local heritage. Where impacts to State or locally significant heritage items are identified, the assessment shall:
  - Outline the proposed mitigation and management measures (including measures to avoid significant impacts and an evaluation of the effectiveness of the mitigation measures) generally consistent with the *NSW Heritage Manual* (NSW Heritage Office 1996).
  - Be undertaken by a suitably qualified heritage consultant(s) (note: where archaeological excavations are proposed the relevant consultant must meet the NSW Heritage Council's Excavation Director criteria).
  - Include a statement of heritage impact for all heritage items (including significance assessment).
  - Where potential archaeological impacts have been identified develop an appropriate archaeological assessment methodology, including research design.

The location of where these have been addressed in this report are found in Table 1-1. A summary of the key findings of this assessment is provided below.

There is one listed heritage item within the study area at Hartwood Weir: Hartwood Weir (WaterNSW S170 4550110), which been assessed as being of **local significance**. There is one previously unidentified heritage item that intersects with the study area at Wanganella: Wanganella Weir has been assessed as being of **local significance**. Two potential heritage items in the study area near Hartwood Weir, the Old Bridge and the Timber Structure, were assessed as not being of heritage significance. No additional areas of archaeological potential were identified in the study area.

The results of the SOHI assessed that the proposal, which comprises the demolition of both heritage items, is unable to be avoided. This is due to an inability to control water flows if the weirs are retained, the retention of the weirs would comprise a barrier to upstream fish movement, and partially demolished weirs would be a navigation hazard which would pose safety issues, as well as accelerating further deterioration of the remaining weir structures. This would comprise a **major impact** to both heritage items. The operation of the new regulators at both locations would not impact further upon the heritage items, due to the demolition of the weir structures within the creek. No potential cumulative impacts relevant to non-Aboriginal heritage were identified.

General mitigation and management measures are provided for the pre-construction and construction (HH1) phases of the proposal, along with site-specific mitigation and management measures to be applied to the heritage item during pre-construction and construction (HH2 and HH3). While they cannot lower the residual impact to the heritage item, which remains a **major impact**, they should be undertaken to adhere to Section 170 of the Heritage Act. Full details of these mitigation and management measures are found in Table 8-1.

10. References

Arrowsmith, J. 1844 *Sketch shewing the squatting districts in New South Wales, 1844*. London: Luke James Hansard.

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Appendix A. Hartwood Weir S170 Data Sheet

Item name: **Hartwood Weir**

Location: Conargo Rd Conargo 2710 Edward River

Address: Conargo Rd **Planning:**

Suburb/nearest town: Conargo 2710

Local govt area: Edward River **Parish:**

State: NSW **County:**

Other/former names:

Area/group/complex: **Group ID:**

Aboriginal area:

Curtilage/boundary:

Item type: Built **Group:** Utilities - Water **Category:** Weir

Owner: State Government

Admin codes: Billabong Creek **Code 2:** **Code 3:**

Current use: Provides pool in Billabong Creek for diversion through Forest Creek Regulator

Former uses: As above

Assessed significance: **Endorsed significance:**

Statement of significance: This weir has little heritage significance.

Historical notes of provenance: Hartwood Weir is one of the oldest weirs in the area and shares a strong association with one of the more influential early irrigating families (the Pattersons). Additionally, the Hartwood property was central to the early water disputes in the area (the young John Monash, who, as an expert witness / engineer, was an important figure in the litigating of these disputes, incorporated Hartwood into his itinerary in 1897) (Holgate and Taplin 2001).

Records note the year of construction for the weir as 1975. However, this date seems to relate only to repair work carried out subsequent to flood damage caused in 1974 (WCIC 1974:62). In fact the weir was constructed in 1915-16 (the words "Feb 1916 A.C. Fitznead Engineer" are engraved in the concrete on the right bank U/S abutment, indicating the date of construction and supervising engineer). Pre-1929 photos also exist (Tolhurst and McKay 2002:36). Hartwood Weir was privately constructed but it was the first such weir to be handed over to the Yanko, Colombo and Billabong Creeks Water Trust (in 1937) under its program of structures acquisition in the late 1930s (Tolhurst and McKay 2002:88). Prior to the weir's passing to the Trust it had been in the possession of the Patterson family. J. H. Patterson was an influential irrigator in the District being an elected trustee from 1928 to 1963. His impact on the direction and development of the irrigation schemes of the area was enormous (Tolhurst and McKay 2002:41, 88).

Themes:

National theme	State theme	Local theme
4. Settlement	Utilities	
		(none)

Designer: Privately constructed (see 'Historical Notes' below on the Patterson family)

Builder: Privately constructed (see 'Historical Notes' below on the engraving in the weir's concrete)

Year started: **Year completed:** 1915 **Circa:** No

Physical description: 12 bay (each 1.8m wide) open flow concrete (brick-block aggregate) regulator
Red gum drop boards
Steel frames and lock-down bars – manual lift
Steel walkway which provides access across the creek and serves as a working platform for handling drop boards
Brick-block concrete abutments (6.4m x over 4.6m) and D/S apron
D/S pitching (bricks) on both banks

Item name: **Hartwood Weir**

Location: Conargo Rd Conargo 2710 Edward River

Physical condition level: Fair

Physical condition:

Archaeological potential level:

Archaeological potential Detail:

Modification dates: At some point during the late 1990s, the steel lock bars and handrails were replaced.

The access decking has also been replaced.

Recommended management: To be removed from the s170 Register.

Management:

Management category	Management name

Further comments:

Criteria a): [Historical significance] Hartwood Weir is one of the oldest weirs in the area. It was also the first to be handed over to the WCIC in a program of assets acquisition in the late 1930s. Hartwood is one of the oldest properties in the district, dating back to the 19th century when it was a large sheep run.

Criteria b): [Historical association significance] The weir is closely associated with an established family in the area (the Pattersons) and closely associated with a particularly influential and long-serving member of the relevant Trust (Mr. J. H. Patterson). It also shares an indirect association with John Monash.

Criteria c): [Aesthetic/ Technical significance]

Criteria d): [Social/Cultural significance] There is strong local interest in the history of Hartwood property and its associated structures (e.g. the Hartwood woolshed on Billabong Creek)

Criteria e): [Research significance]

Criteria f): [Rarity]

Criteria g): [Representative] This structure is a good example of concrete weir construction in the early twentieth century, in particular, the use of brick block as an aggregate. Crushed bricks were used at times when the gravel most commonly used – and which did not occur in the region – was unavailable.

Intactness/Integrity:

References:

Author	Title	Year
Austral Archeology	Heritage Assessment of 304 River Structures - Volume 4 H-M	2003

Item name: **Hartwood Weir**

Location: Conargo Rd Conargo 2710 Edward River

Studies:	Author	Title	Number	Year
	Austral Archaeology Pty I	Heritage Assessment of 304 River Structures - Southern Reg	S104	2003

Parcels:	Parcel code	Lot number	Section number	Plan code	Plan number
	PART LOT	2		DP	1144789

Latitude: **Longitude:**

Location validity: **Spatial accuracy:**

Map name: **Map scale:**

AMG zone: 55H **Easting:** 344530 **Northing:** 13909502

Listing:	Name	Title	Number	ListingDate
	Hartwood Weir	Heritage Act - s.170 NSW State agency heritage r	4550110	

Data entry: Data first entered: 25/08/2009 Data updated: 28/06/2019 Status: Basic

Item name: **Hartwood Weir**

Location: Conargo Rd Conargo 2710 Edward River

Image:

Caption: Hartwood Weir facing U/S from left bank
Copy right: LS
Image by: Austral Archeology
Image date:
Image number: Year: 2002
Image url: http://www.environment.nsw.gov.au/maritimeheritageapp/resources/Heritage/shi/455/Hartwood Weir 1.jpg
Thumbnail url: http://www.environment.nsw.gov.au/maritimeheritageapp/resources/Heritage/shi/455/t_hartwood weir 1.jpg

Image:

Item name: **Hartwood Weir**

Location: Conargo Rd Conargo 2710 Edward River

Caption: Hartwood Weir facing U/S from right bank
Copy right: LS
Image by: Austral Archeology
Image date:
Image number: Year: 2002
Image url: http://www.environment.nsw.gov.au/maritimeheritageapp/resources/Heritage/shi/455/Hartwood Weir 2.jpg
Thumbnail url: http://www.environment.nsw.gov.au/maritimeheritageapp/resources/Heritage/shi/455/t_hartwood weir 2.jpg

Image:

Item name: **Hartwood Weir**

Location: Conargo Rd Conargo 2710 Edward River

Caption: Hartwood Weir – engraving on right bank abutment
Copy right: LS
Image by: Austral Archeology
Image date:
Image number: Year: 2002
Image url: http://www.environment.nsw.gov.au/maritimeheritageapp/resources/Heritage/shi/455/Hartwood Weir 3.jpg
Thumbnail url: http://www.environment.nsw.gov.au/maritimeheritageapp/resources/Heritage/shi/455/t_hartwood weir 3.jpg