Victorian Murray Floodplain Restoration Project

Guttrum Benwell Historical Heritage Desktop Assessment

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Lower Murray Urban and Rural Water Corporation

Victorian Murray Floodplain Restoration Project

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A	07/05/20	Draft for VMFRP review	C. Seawright	R. Overberg S. Hale	M. Shaw D. Lavery
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Abbreviations

CHL	Commonwealth Heritage List
EMP	Environmental Management Plan
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
the Heritage Act	*Heritage Act 2017*
HHA	Historical Heritage Assessment
HIA	Heritage Impact Assessment
HO	Heritage Overlay
HV	Heritage Victoria
LGA	Local Government Area
mAHD	metres above Australian Height Datum
NHL	National Heritage List
NT	National Trust of Australia (Victoria)
the project	Guttrum Benwell Floodplain Restoration Project
R8	R8 joint venture
RNE	Register of the National Estate
VHI	Victorian Heritage Inventory
VHR	Victorian Heritage Register
VMFRP	Victorian Murray Floodplain Restoration Project
WHL	World Heritage List

Executive Summary

Project overview

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

The Guttrum Benwell Floodplain Restoration Project (the project) is predominantly located within the Benwell and Guttrum State Forests, and the localities of Myall, and Koondrook, within the Gannawarra Local Government Area (LGA).

The project is designed to facilitate managed inundation to address the hydrological deficit in the inundation regime caused by river regulation, particularly the reduced frequency and duration of floods. The managed inundation aims to replicate a natural inundation regime equivalent to a 24,000 to 26,000 ML/d flow in the Murray River. The planned inundation events will require a much lower volume of water than that involved in a natural inundation event as the proposed infrastructure will enable pumping to deliver water to target areas in the floodplain, whilst still achieving a similar duration and depth of inundation as a natural event.

The main components of the project include environmental water delivery infrastructure and access tracks. The current project design, as assessed in this report, involves the construction of one large and seven small regulators, four pipelines, two drop structures, three pump stations on the Murray River, erosion control works and a series of containment banks to divert, retain and release water in the Guttrum and Benwell Forests.

Design and in some cases the type and location of infrastructure is currently being refined as part of the design process. An area of investigation has been established and assessed in this report that provides a buffer around the current design of the development footprint and access tracks to allow for future changes. Any changes occurring outside of this area of investigation would require further assessment to identify their potential to impact on historic heritage values.

Construction would involve use of vehicles and machinery such as trucks, excavators, and access equipment such as forklifts.

Desktop review

There are no listed historical heritage places that intersect with the area of investigation or the inundation area. Examination of the prior historical heritage assessments has identified several places of potential historical heritage value within the area of investigation:

- Benwell Floodgates (the old Murrabit-Benjeroop Irrigation Trust regulator) – located within the area of investigation at the intersection of River Track, Regulator Track and the Murray River
- Benwell Bank – located within the area of investigation near where River Track and Hall Road meet, and then eastwards across the southern edge of Benwell Forest to allotment 2\LP209485 at the end of Millar Road
- Timber Structure Across Channel – located within the area of investigation where River Track meets the Murray River, to the northeast of Benwell Floodgates
- Smith's Drain – intersects with the current area of investigation along Millar Road to the north of Smiths Drain Track

- Artefact: Grating from Firebox of Boiler – an isolated artefact that was located within the area of investigation near the intersection of Millar Road, River Track and the Murray River.

The following are also within the inundation area:

- Benwell Bank – immediately adjacent to the inundation area in the Benwell State Forest
- Smith's Drain – intersects with the inundation area in the Guttrum State Forest
- Spot Mill Site – intersects with the inundation area in the Guttrum State Forest.

As such, there is moderate potential for previously unidentified historical heritage items to be present within the area of investigation and the inundation area, from the background history of the area. Site types most likely to be identified in the area of investigation and the inundation area would be heritage places or archaeological sites associated with early agricultural or pastoral activities, logging and milling, river shipping, sand quarries, and water management practices.

Impact assessment

There are no listed historical heritage places that intersect with the area of investigation. However, works (Section 3.1) may impact upon the historical heritage values of unlisted potential historical heritage places: Benwell Floodgates, Benwell Bank, Timber Structure Across Channel, Smith's Drain, and Artefact: Grating from Firebox of Boiler.

The proposed inundation area (Section 3.2) may also impact upon Benwell Bank, Smith's Drain and Spot Mill Site.

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

Approvals, mitigation measures and recommendations

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

If the scope or area of works changes from that assessed in this report, this heritage assessment, including the approval requirements and recommendations in Table 1, will need to be reviewed and updated.

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

Place	Statutory requirements	Recommendations	Mitigation measures
Entire area of investigation	Discovery of archaeological sites - under Section 127 of the *Heritage Act 2017*, If an archaeological site is discovered during construction or excavation on any land, the person in charge of the construction or excavation must as soon as practicable report the discovery to Heritage Victoria (HV).	Whilst there are no registered historical heritage places that intersect with either the area of investigation and inundation area, there are some identified heritage sites which have not been listed on State and Commonwealth Heritage Registers. There is also a moderate potential for previously unidentified historical heritage items or archaeological sites to be present within these areas, as identified in Section 2.4. Therefore, due to the possibility for unlisted historical heritage places and unidentified historic archaeology to be impacted, it is recommended that a Historical Heritage Assessment (HHA) be undertaken for the project. This should include a targeted field survey of the area of investigation to identify further historical archaeological sites and any unidentified historical heritage places, and a significance assessment of these potential historical places. If any historical heritage items or archaeological sites are identified as part of the HHA, a Heritage Impact Assessment (HIA) would be required which would include the: ▪ Assessment of impacts on all historical heritage sites ▪ Detailed identification of mitigation measures and approval requirements ▪ Heritage Impact Statement(s). All historical archaeological places are protected under the *Heritage Act 2017*, whether they are registered or not. Further historical research to ascertain the likely presence of any historical archaeological places or material within the area of investigation is recommended to reduce the risk of delays to the project. Such delays would include the stoppage of works to avoid damage or destruction of historical archaeological sites and materials while the appropriate approvals are sought. This would enable VMFRP to proactively consider the nomination of historical heritage archaeological deposits ahead of the works, which would provide	General mitigation measures to be implemented across the area of investigation: ▪ Historical heritage awareness training should be completed as part of the site induction for all personnel and/or contractors prior to the commencement of construction works to ensure: - an understanding of where all heritage places are located within the area of investigation - an understanding of the potential heritage places that may be impacted during the project - the procedures required to be undertaken in the event of discovery of historical heritage material, features or deposits, or the discovery of human remains ▪ If an archaeological site is discovered during construction or excavation on any land, the person in charge of the construction or excavation must as soon as practicable report the discovery to HV ▪ A copy of this report should be kept onsite and on file with the project records. All contractors and/or project staff should be made aware of the heritage status of the heritage places in the area of investigation prior to works taking place.

Place	Statutory requirements	Recommendations	Mitigation measures
		VMFRP with more certainty in relation to timeframes and statutory obligations. The completion of the HIA for the project would mitigate these issues.	
Benwell Floodgates	No Consents are currently required for works at this location. However, while not currently listed on the VHI, these historical heritage places were assessed as having local significance and were recommended for inclusion on the VHI (Kaufman and Ballinger 2014). As such, these places should be treated as if they will be listed on the VHI. This would require, liaison with HV, registration of the items (if accepted by HV) and then application for Consent to disturb if necessary.	Although Benwell Floodgates is not listed on the heritage register, based on the assessment undertaken by Kaufman and Ballinger (2014) it is recommended that this heritage place should be avoided during works. It is recommended that consultation with HV be undertaken to ascertain the status of this heritage place on the VHI.	As there is potential for the fabric and significance of the these heritage places to be directly impacted by works, it is recommended that the following mitigation measures be implemented to avoid any adverse impacts where possible to the heritage values of the site, as assessed by Kaufman and Ballinger (2014). Avoidance of the heritage places should be undertaken, if possible: ▪ Prior to any works, including any vegetation clearance, site establishment or construction works in the area, protective barrier fencing will be erected between the historical structures and the works area, to fence it and thereby avoid inadvertent impact; the fencing would be installed for the duration of works for the project and removed following completion. Should impact to the heritage places be unavoidable: ▪ Prior to the start of works, an archival photographic recording of the sections of the heritage places to be impacted should be carried out, in accordance with the guidelines, *Photographic Recording for Heritage Places and Objects* (Heritage Victoria 2006) Works are to be undertaken in such a way as to minimise direct contact by construction vehicles or machinery with the historical structures. Prior to any works, including any vegetation clearance, site establishment or construction works in the area, where the historical structures will not be impacted, protective barrier fencing will be erected between the remaining historical structures outside the works area, to fence it and thereby avoid inadvertent impact; the fencing would be installed for the duration of works for the project and removed following completion.
Smith's Drain		Although Smith's Drain is not listed on the heritage register, based on the assessment undertaken by Kaufman and Ballinger (2014) it is recommended that this heritage place should be avoided during works. It is recommended that consultation with HV be undertaken to ascertain the status of this heritage place on the VHI.	
Benwell Bank	No planning permits are currently required for works at this location. However, while not currently listed on the HO, these historical heritage places were assessed as having local significance and were recommended for inclusion on the HO (Kaufman and Ballinger 2014). A site revisit is recommended to these sites to record conditions, and reassess their heritage significance.	Although Benwell Bank is not listed on the heritage register, based on the assessment undertaken by Kaufman and Ballinger (2014) it is recommended that this heritage place should be avoided during works. It is recommended that consultation with the Gannawarra Shire City Council be undertaken to ascertain the status of this heritage place on the HO.	
Timber Structure Across Channel		Although Timber Structure Across Channel is not listed on the heritage register, based on the assessment undertaken by Kaufman and Ballinger (2014) it is recommended that this heritage place should be avoided during works. It is recommended that consultation with the Gannawarra Shire City Council be undertaken to ascertain the status of this heritage place on the HO.	
Spot Mill Site		Although Spot Mill Site is not listed on the heritage register, based on the assessment undertaken by Kaufman and Ballinger (2014) it is recommended that this heritage place should be avoided during works.	

Place	Statutory requirements	Recommendations	Mitigation measures
		It is recommended that consultation with the Gannawarra Shire City Council be undertaken to ascertain the status of this heritage place on the HO.	
Artefact: Grating from Firebox of Boiler	As a single artefact with no discernible associated archaeological site, this place is not recommended for inclusion on any heritage register.	It is recommended that, during the recommended field survey, a search for Artefact: Grating from Firebox of Boiler be undertaken. If identified, the artefact should be recorded and collected to avoid loss of the artefact.	There is no mitigation measure proposed for this artefact.

Important note about your report

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

The sole purpose of this report and the associated services performed by R8 is to complete an Desktop Heritage Report for VMFRP in accordance with the scope of services agreed between R8 and VMFRP.

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

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

1. Introduction

1.1 Project background

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

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

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

1.2 Project location

The Guttrum Benwell Floodplain Restoration Project (the project) is predominantly located within the Benwell and Guttrum State Forests, and the localities of Myall, and Koondrook, within the Gannawarra Local Government Area (LGA).

The following terms are used to describe the project area (refer to Figure 1.1-Figure 1.9):

- Area of investigation - this includes the development footprint, as well as a buffer around the development footprint and access tracks to allow for potential design refinements. The area of investigation extends along the Murray River north of Koondrook-Murrabit Road between Cassidy Lane and Hall Road. The area of investigation also includes potential containment bank locations which are subject to further risk assessment and therefore yet to be confirmed.
- Development footprint - this is the indicative area that the project infrastructure will occupy based on the current design. This includes the kiosk station associated with the potential power supply but does not include power poles, stays or cables, containment banks or tracks used for access during construction and operation.
- Construction footprint - this includes the project infrastructure (included in the development footprint) as well as the indicative area of land required to construct the infrastructure based on the current design. This includes access tracks.
- Inundation area - area of land subject to flooding during managed events, up to a specific design water level. The inundation area comprises the majority of the Guttrum Benwell State Forests which extends along the Murray River north of Koondrook-Murrabit Road between Cassidy Lane and Hall Road. The inundation area in the Guttrum State Forest comprises the upper and lower wetland complexes including Reed Bed Swamp, Little Reed Bed Swamp and Guttrum Swamp. The Benwell State Forest inundation area comprises Benwell Swamp, a wetland complex representing a large portion of the Forest, and a wetland complex in the south-western corner of the forest, separated by a higher ridge and existing track.

1.3 Purpose of assessment

The purpose of this desktop historical heritage due diligence assessment is to:

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

1.4 Desktop assessment

This desktop assessment involved the following activities:

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

1.5 Authorship

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

1.6 Assumptions and limitations

The constraints are as follows:

- The assessment was undertaken using the mapping shown in Figure 1.1-Figure 1.9, which was created with data current to 8 April 2020
- No field investigation was undertaken
- The register searches were undertaken on 1 May 2020 and any findings within this report are based on those search results. As such, this report is accurate as to the date of that generation.

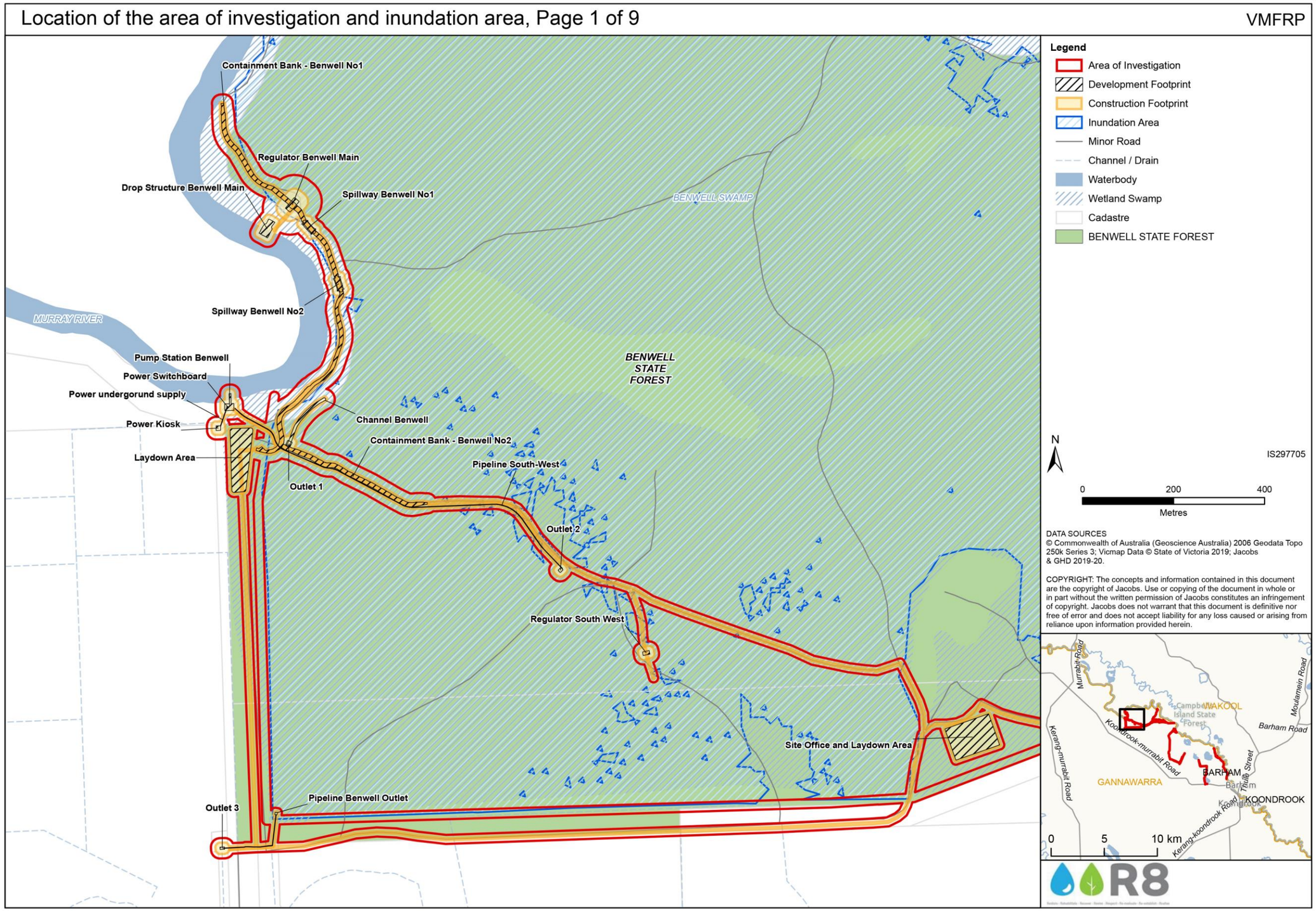

Figure 1.1: Location of the area of investigation and inundation area at Benwell State Forest (1 of 9)

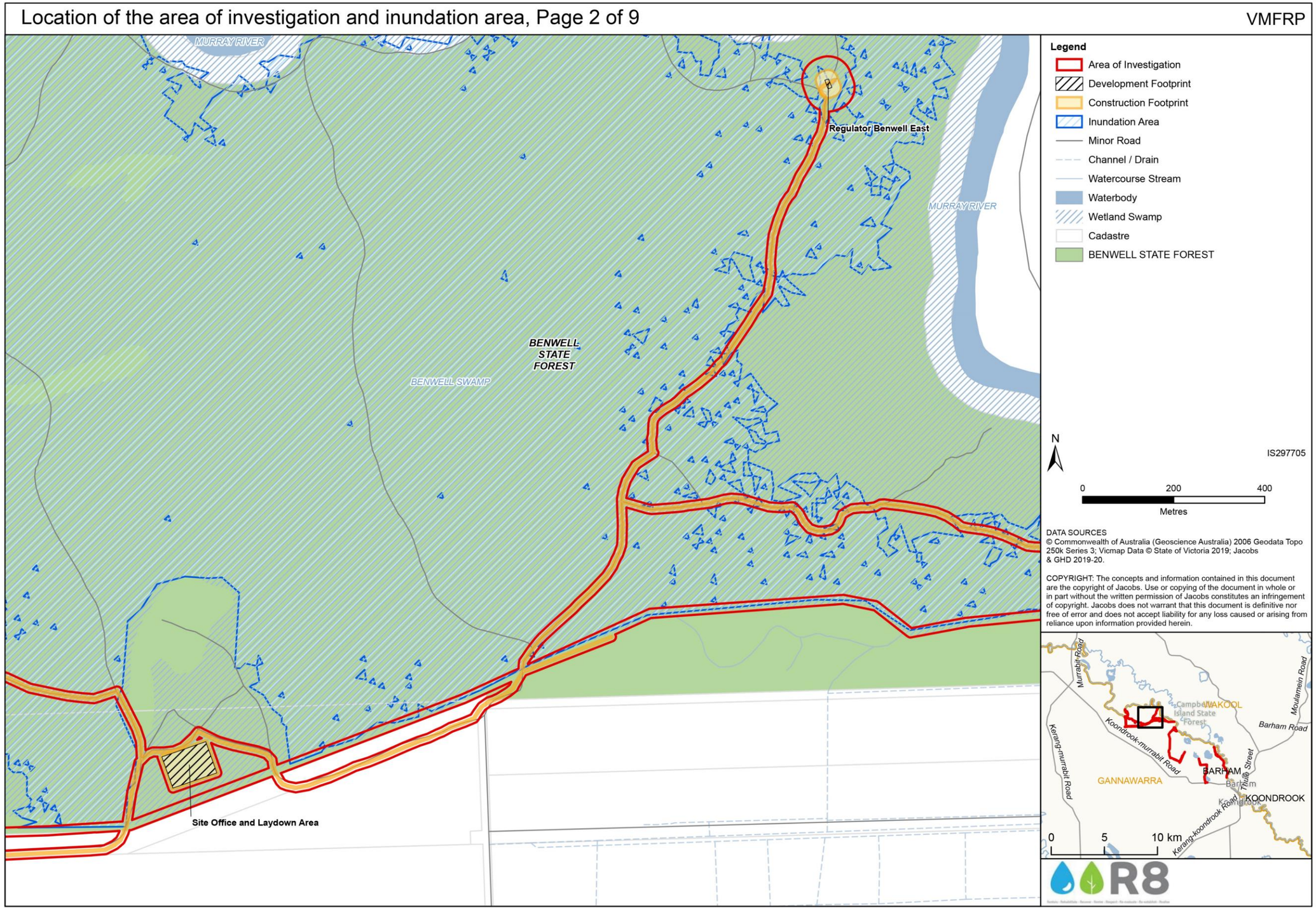

Figure 1.2: Location of the area of investigation and inundation area at Benwell State Forest (2 of 9)

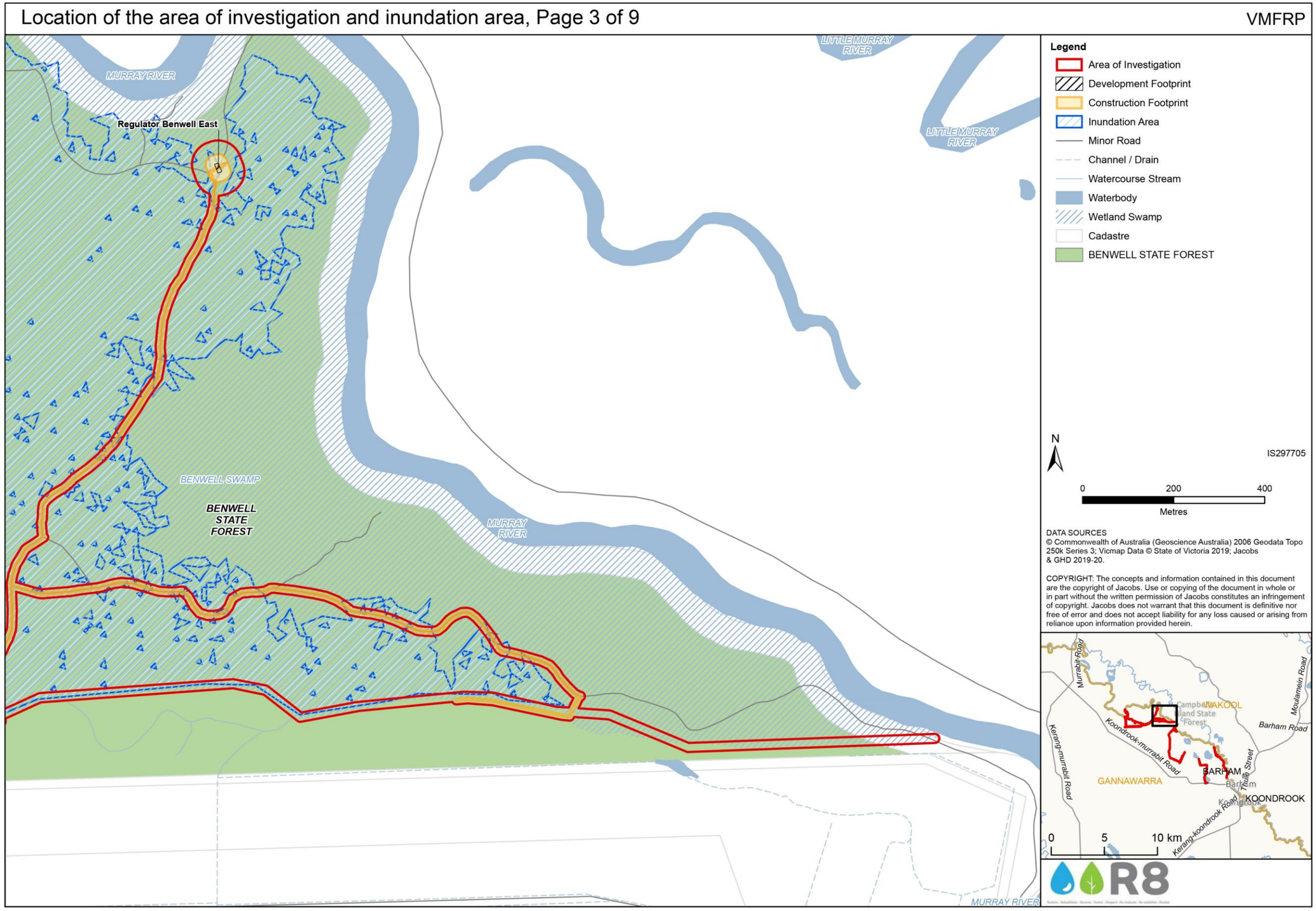

Figure 1.3: Location of the area of investigation and inundation area at Benwell State Forest (3 of 9)

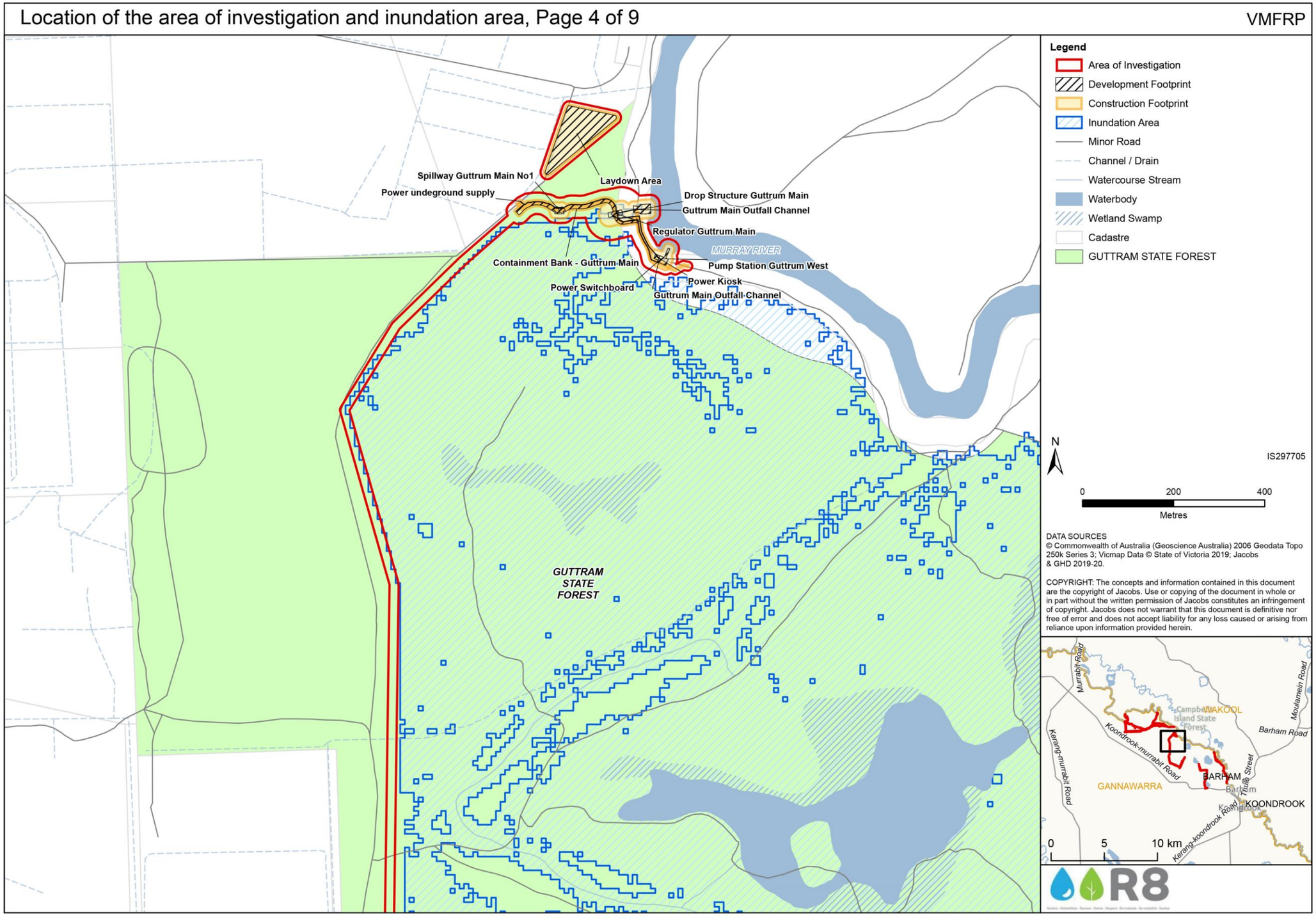

Figure 1.4: Location of the area of investigation and inundation area at Guttrum State Forest (4 of 9)

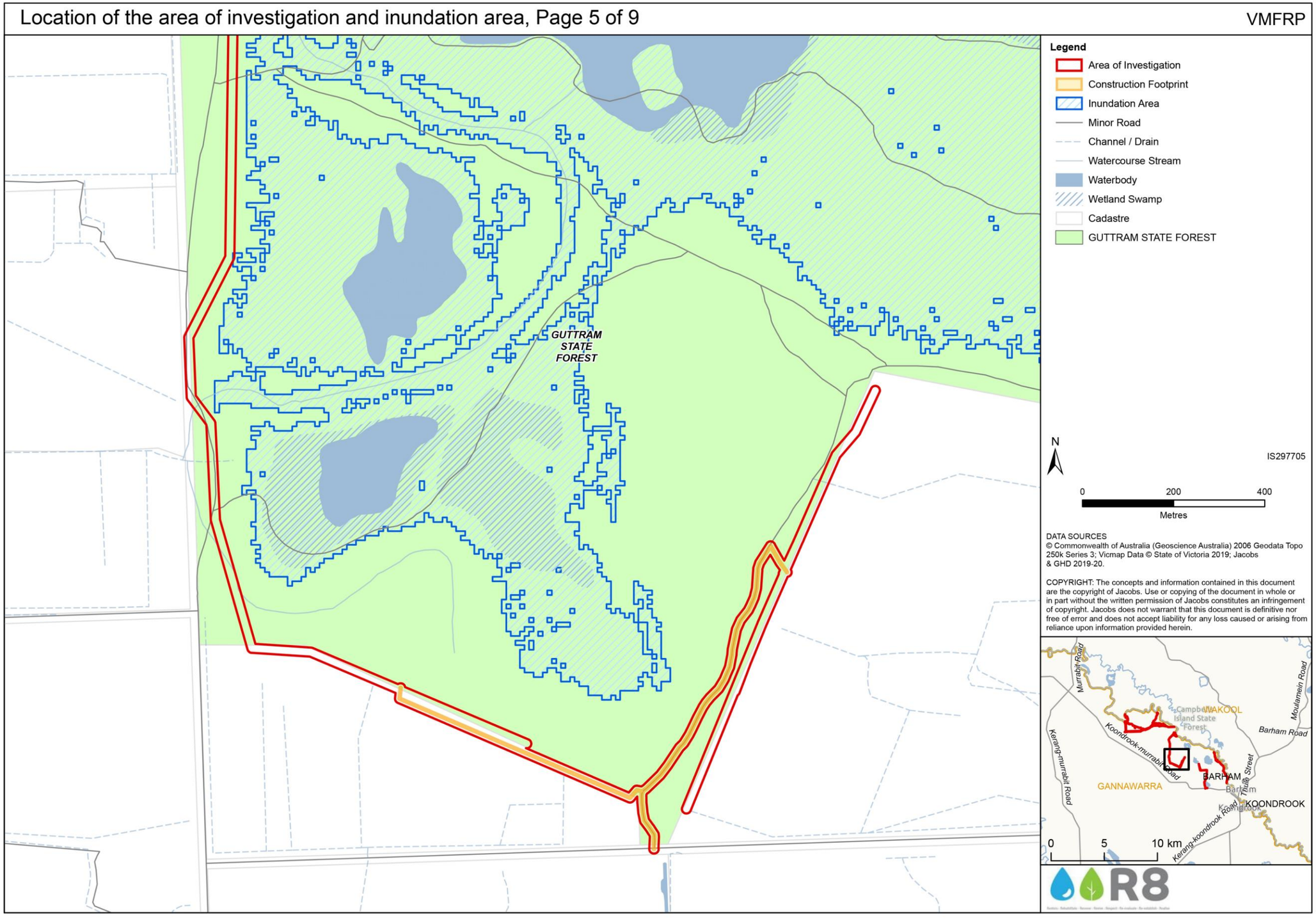

Figure 1.5: Location of the area of investigation and inundation area at Guttrum State Forest (5 of 9)

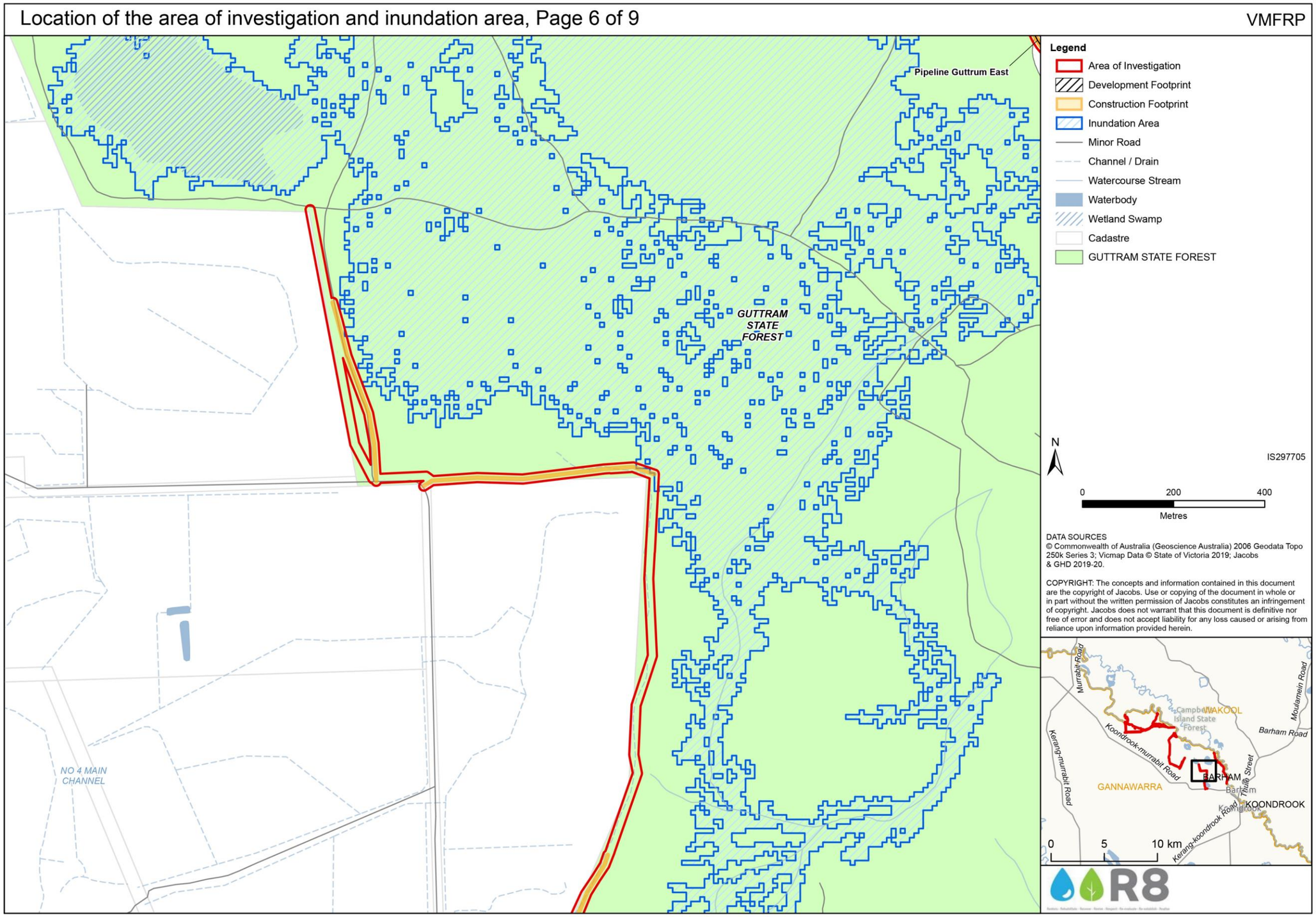

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Figure 1.6: Location of the area of investigation and inundation area at Guttrum State Forest (6 of 9)

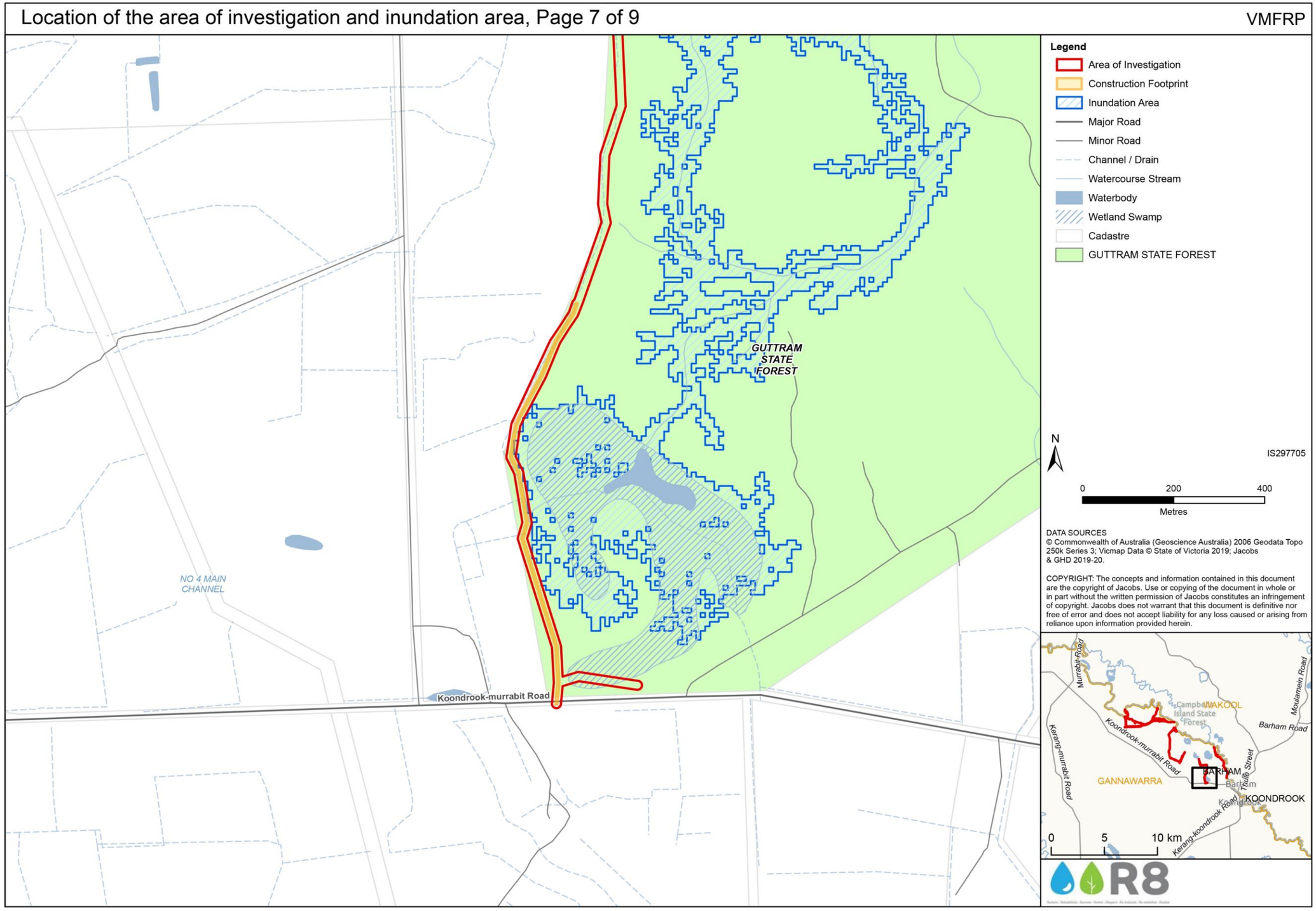

Figure 1.7: Location of the area of investigation and inundation area at Guttrum State Forest (7 of 9)

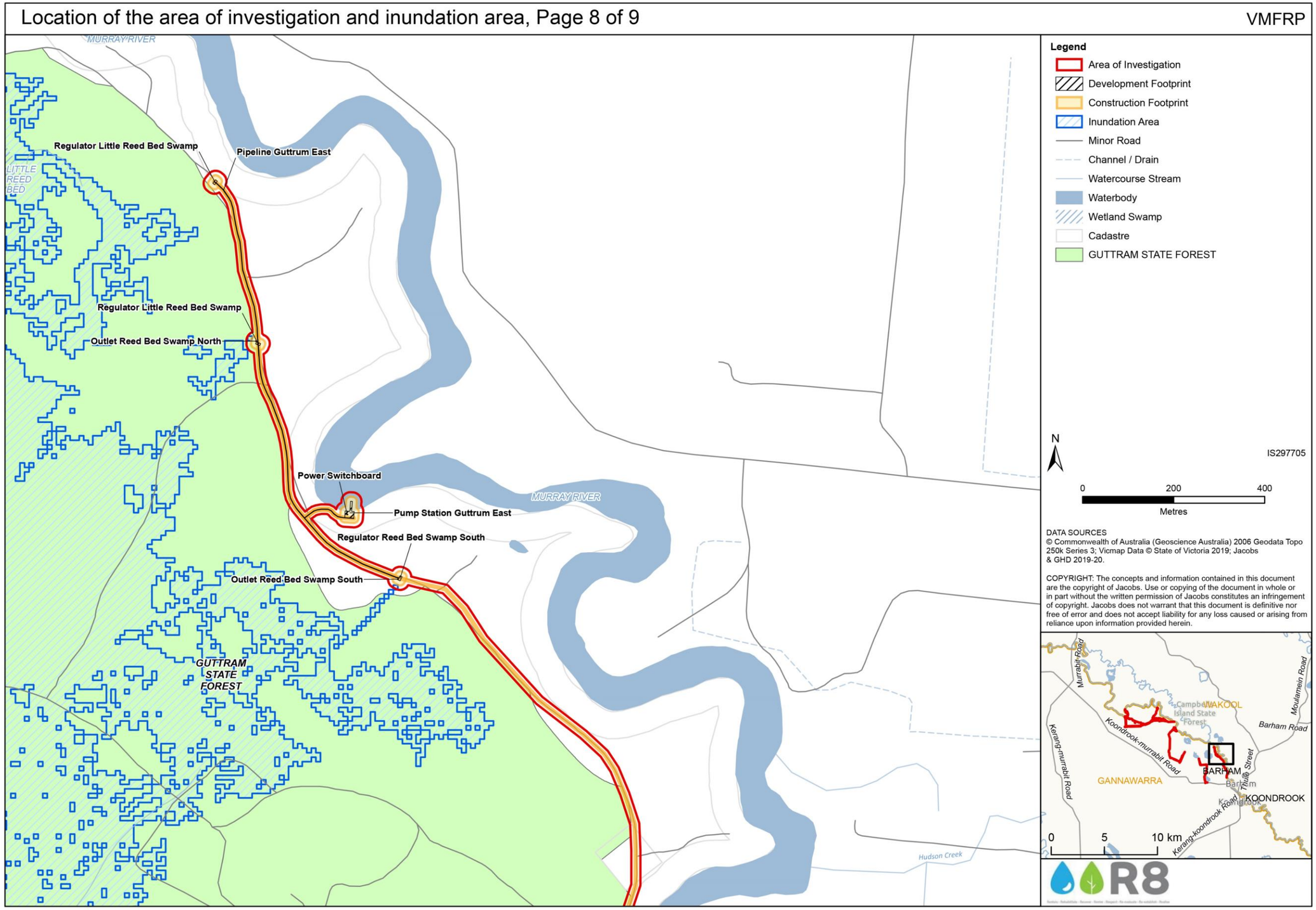

Figure 1.8: Location of the area of investigation and inundation area at Guttrum State Forest (8 of 9)

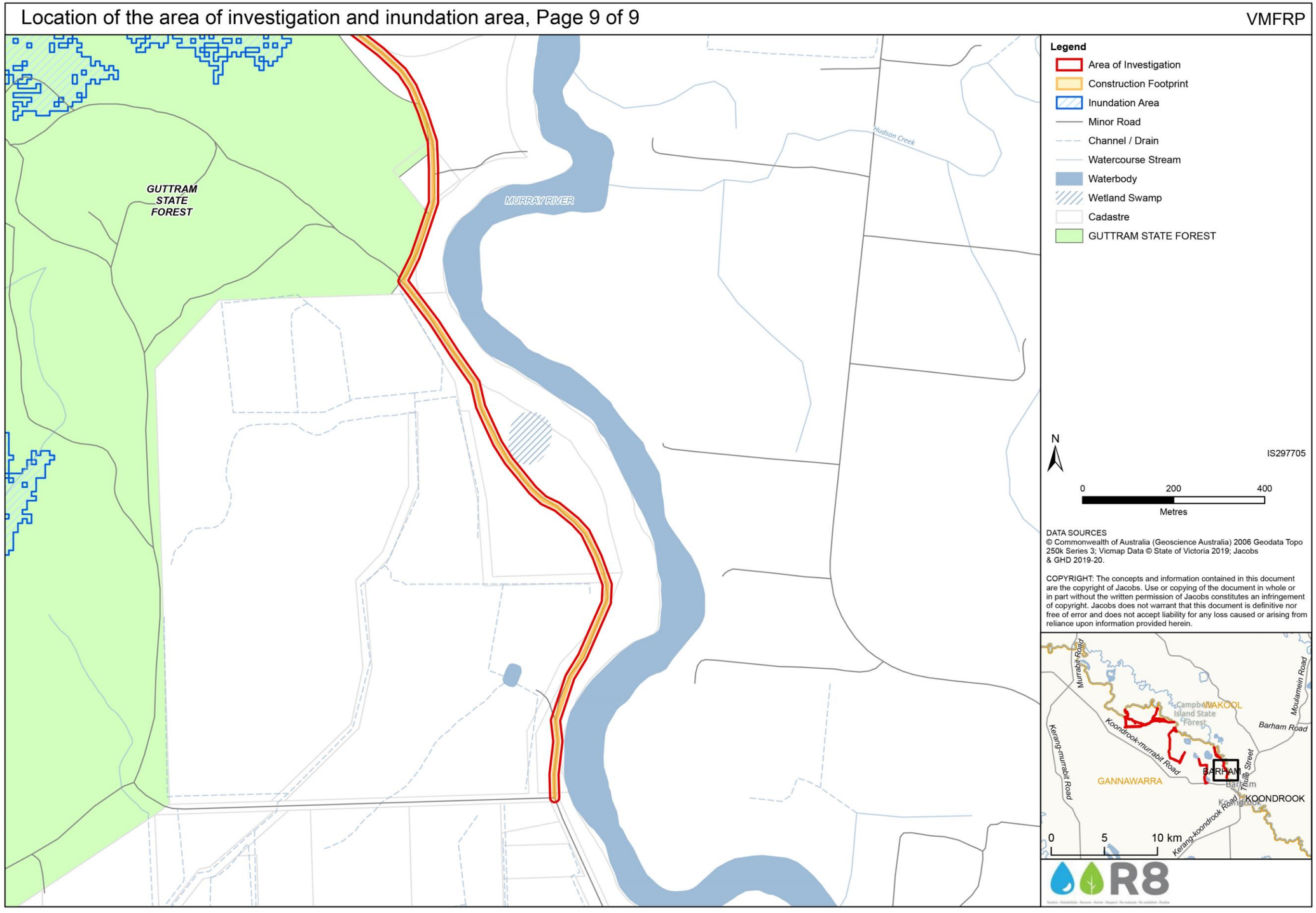

Figure 1.9: Location of the area of investigation and inundation area at Guttrum State Forest (9 of 9)

2. Desktop review

2.1 Heritage context

2.1.1 Register searches

The following heritage registers were searched on 1 May 2020 by Caroline Seawright (Project Archaeologist, R8) to determine whether any known historical heritage places were present within or in proximity to the area of investigation and to the inundation area:

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

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

2.1.2 Previous historical heritage assessments

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

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

Author	Summary
Ward (1996)	TBA Planners commissioned the report on the Koondrook Historical Area as part of the Strategy Plan and Planning Scheme Review that was being undertaken for the Gannawarra Shire in 1996. The study area comprised both the natural and built environment along the Murray River and Gunbower Creek located predominantly on Crown land and having the Koondrook township centre as its principal central feature and is approximately 655 m to the southeast of the current project area. The most important components of the area comprise: ▪ the former Shire tramway infrastructure including sidings, station building of 1913/14, and platform and weighbridge ▪ the wharf site and associated shipping shed and platform ▪ the sawmill, which remains operational and is linked with the tram station via Arbuthnot's siding ▪ the shops and non-residential buildings in Punt Road and Main Street ▪ the redgums along the river and creek frontages which symbolise the industrial base of the township, and ▪ the lift span bridge over the Murray River to Barham, erected in 1904 on the site of the earlier punt. The closest portion of this heritage area to the current area of investigation is approximately 707 m to the southeast of the southeast end of the area of investigation is described as: *'Murray Parade follows the river bank, now with the occasional palm tree amongst the eucalypts, past the site of a pumping station and abandoned caretakers (?) residence. It runs past modern houses to the north of Lily Street where the forest environment continues to the envisaged north boundary of the heritage area'* (Ward 1996).

Author	Summary
	It does not appear that either the Guttrum or the Benwell State Forests were examined, as they are both located outside the study area.
Ballinger (2008)	Robyn Ballinger prepared the Stage One Heritage Study on behalf of the Gannawarra Shire in 2008. Volume one comprises a thematic history of the Shire and does not identify either individual places of historical heritage importance or heritage conservation areas. While the Gunbower State Forest is mentioned in relation to steam driven pumps being installed by the Cohuna Irrigation Trust along the Murray River with earthen channels running through the forest in the late 1880s, the report does not mention either Benwell or Guttrum State Forests. However, it mentions barges hauling timber, railway sleepers, and logs for the fellers and saw millers working within the 'red gum forests of Koondrook and Gunbower Island' in 1922, which is likely to apply to the current area of investigation. It also mentions that local timber from Koondrook red gum forests was also used in the town to build paddle steamers and boats. As such, both the Benwell and Guttrum forests are likely to have been subject to historic logging, which 'had taken a significant toll on forests by the early 1870s' (Ballinger 2008, p. 61).
Kaufman and Ballinger (2014)	LRGM – Services undertook an historical cultural heritage assessment of the Benwell and Guttrum State Forests on behalf of the North Central Catchment Management Authority, as part of their Guttrum and Benwell State Forests Flood Enhancement Project. The work areas intersect with parts of the current area of investigation, and do not comprise a full investigation of these two forests. The desktop research identified that there were no registered historical heritage places within either forest. However, there two potential historical heritage places within the forests as identified in an unpublished volume of the Gannawarra Shire heritage study: ▪ Benwell Floodgates ▪ Smith's Drain. Additionally, community consultation revealed a small number of new historic sites including: ▪ Benwell Bank ▪ Two sand quarries ▪ Possible pumping site in association with Smith's Drain. Community concerns about historic cultural heritage in the Benwell and Guttrum State Forests appeared to be focussed primarily on the Benwell Floodgates and associated channels, the Benwell Bank, and Smith's Drain. The locations of several heritage features were identified within Benwell State Forest: ▪ Benwell Floodgates (the old Murrabit-Benjeroop Irrigation Trust regulator or the Myall Regulator), comprising a six-gate regulator situated on a former irrigation supply channel (with an interpretive panel). It is timber-framed, and the gates consist of steel panels, raised and lowered via long lengths of threaded round steel; five of the six original gates remain *in situ*. It was noted as being in good condition in a relatively undisturbed site. It was assessed as being of local significance and as meeting the following heritage significance criterion: A (historical), B (rarity), C (scientific), and D (aesthetic). It was recommended for listing on the HO and the VHI. This place is located within the area of investigation at the intersection of River Track, Regulator Track and the Murray River ▪ Benwell Bank, comprising an earthen levee bank extending along the southern boundary of the forest to allotment 2\LP209485 at the end of Millar Road. No archaeological sites associated with the bank or its construction were located. It was assessed as being of local heritage significance. This place is located within the area of investigation and the inundation area near where River Track and Hall Road meet ▪ Sand Quarry, comprising a largely rehabilitated former quarry in the form of a large, irregular grassy depression penetrated by numerous minor tracks. It was assessed as being of local heritage significance. This place is located outside the current area of investigation ▪ Timber Structure Across Channel, comprising two upright posts, bush timber poles, with a top rail of bush timber situated across a natural channel. It was assessed as being of local heritage significance. This place is located within the area of investigation where River Track meets the Murray River, to the northeast of Benwell Floodgates. And within Guttrum State Forest: ▪ Smith's Drain, comprising the drain between the Murray River and Millar Road and the former pump location on the Murray River. It was assessed as being of local significance and was recommended for listing on the as an archaeological site on the VHI. This place intersects with the current area of investigation along Millar Road to the north of Smiths Drain Track

Author	Summary
	▪ Artefact: Grating from Firebox of Boiler, comprising an isolated artefact (a broken steel firebar (grating) from a firebox of a boiler for a steam engine) that was found during fieldwork; no discernible associated archaeological site was identified. As a single artefact, the significance of this item was not assessed. The report stated that the artefact will be subject to threats, constituting continued environmental decay (rusting), which suggests that the artefact may have been left *in situ*. The artefact was within the area of investigation near the intersection of Millar Road, River Track and the Murray River ▪ Sand Quarry, comprising a large, relatively regular depression and several low faces that has been subject to relatively recent rehabilitation works. It was assessed as being of local heritage significance. This place is located outside the current area of investigation at Sawpit Track ▪ Spot Mill Site, comprising piles of offcuts, with no evidence of archaeological deposits relating to the operation of the mill. It was described as being 'relatively modern'. As part of the Forestry Activities Sites, the Spot Mill Site was assessed as being of local heritage significance. This place is located outside the current area of investigation to the east of a waterhole near Little Reed Bed, but within the inundation area. In addition to the features listed above, recognition was made of the following minor structures and features that recur throughout the forests and contribute to the historic landscape that comprised the Benwell and Guttrum State Forests: ▪ Forestry Activities Sites – evidence includes tree stumps from sawlog harvesting, slot stumps, waste offcuts from sleeper cutting, ringbarked trees, etc ▪ Other Irrigation/Flood Control Structures – evidence includes earthen levee banks, particularly around the perimeters of the units, an assortment of excavated channels and drains, and old floodgates. The report also stated that the following site types were likely to be identified within these forests: ▪ Previously unknown hut sites, with domestic artefact scatters, building materials, bottle dumps, buried wall footings, etc ▪ Industrial sites such as sawmills, with buried tools and machinery parts, sawpits, machinery footings, etc ▪ Subsurface remains of former irrigation or flood control infrastructure such as regulators and weirs.

2.2 Historical context

2.2.1 Historical background

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

The area of investigation is situated within the former Gannawarra Run, which comprised 103,680 acres of land licensed to Archibald Macarthur Campbell from 1846. Campbell had earlier built Gannawarra Station on the property, in 1844 (Ballinger 2008; McKinna *et al* 2012; Spreadborough and Anderson 1983). In 1855, the run was licenced to both Campbell and AR Cruikshank, then by James Magarey in 1858, followed by JB Hughes in 1860. In 1863, the National Bank of Australasia took up the licence, before it was transferred to Henry Miller in 1866. It was then passed onto Benjamin Rochfort, then William John Turner Clarke, during 1870, and finally to Charles Brown Fisher of Melbourne in 1873. Although the run was forfeited in 1879 when the region was opened for selection, Fisher was accused of using dummy bidders to buy the land and sell it to him later in an attempt to monopolise the best land in the region (Ballinger 2008; Spreadborough and Anderson 1983, p. 166). As of 2008, parts of the Gannawarra Station Complex were still extant, including the homestead which had been moved to its present location in c1860 (Ballinger 2008; McKinna et al 2012). The Station Complex is outside the area of investigation for this project.

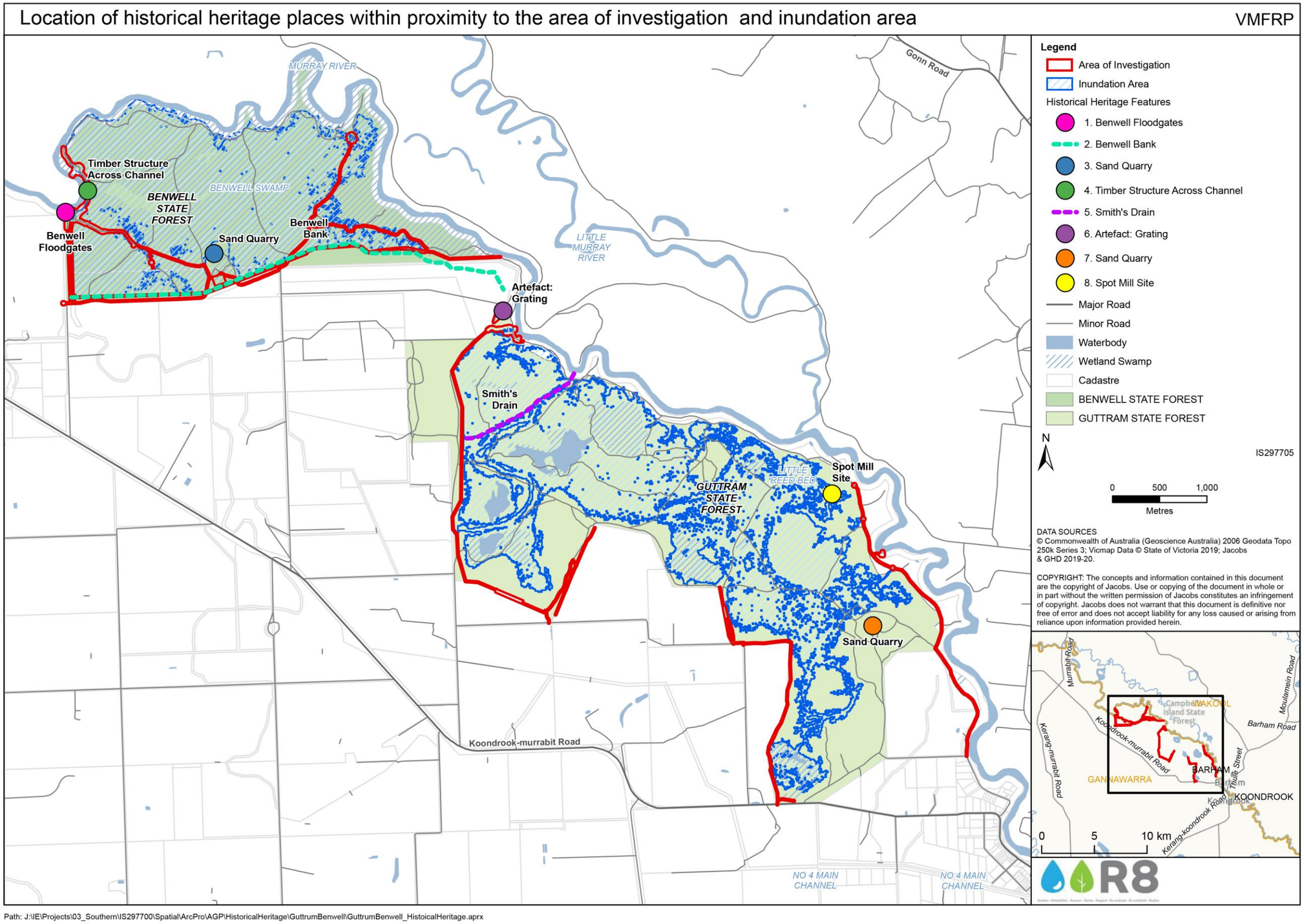

Figure 2.1: Location of historical heritage places within proximity to the area of investigation and inundation area

The present-day township of Koondrook was originally settled when timber cutters began operations on Gunbower Island to the southeast and in the Koondrook area from c.1873, when it was known as 'The Junction'; a stopping point for Murray River paddle steamers. This township was surveyed c.1877, and was subsequently renamed as Koondrook in 1878. The town benefited from its proximity to the nearby River Red Gum forests, as timber was in high demand for railway sleepers, and for the construction of barges and paddleboats in the area between 1881 and 1923. A river landing was constructed at Koondrook in 1877-1878 to allow river traffic to stop at the new township. This provided opportunities for the town, such as the opening of a flour mill in 1878, which drew grain from both sides of the river for transport along the Murray River via river boat. Additionally, Henry William began to supply wood to passing steamers in 1878 and Thomas Buzza opened a saw mill in the area. A wharf was built of local timber in 1882 (McKinna *et al* 2012; Victorian Places 2015). Both the Benwell and Guttrum State Forest areas were assigned as Timber Reserves in 1884 (Department of Lands and Survey 1884).

Koondrook in Victoria and Barham in New South Wales are closely linked to each other, Barham having been settled on the opposite bank of the Murray River in the early 1880s, and so a punt was established between the two townships in 1884, to assist with travel between the two townships (McKinna *et al* 2012; Victorian Places 2015). However, the pastoralists were reluctant to use the punt as it was slow, and not highly suited for the safety of sheep during transportation (McKinna *et al* 2012).

A school in Koondrook was opened by 1880, followed by a hotel in 1882. The Koondrook Irrigation Trust was established shortly after in 1885 to provide water for the extensive grazers and dairies, as one of four Trusts aimed at providing irrigation to the wider Kerang district (McKinna *et al* 2012; Victorian Places 2015). Koondrook was proclaimed a town in 1888 (McKinna *et al* 2012). Other significant infrastructure and businesses were established from the 1880s, including the Arbuthnot Sawmill which was opened in 1889 and provided the wood to build Murray River paddle steamers, a creamery, an irrigation pump site by the Murray River, and a private tramway between Koondrook and Kerang. The tramway service transported school children and members of sporting teams, and freight, produce and large numbers of sleepers cut from Gunbower Island (McKinna *et al* 2012; Victorian Places 2015). River traffic began to decline in the 1880s, with the establishment of railway line to Kerang in 1884. The Koondrook-Kerang tramway was taken over by Victorian Railways in 1952. The tramway closed for passengers in 1977, and to freight in 1978 and was finally closed completely in 1981 (McKinna *et al* 2012; VicSig 2018; Victorian Places 2015).

Smiths Drain is a former irrigation channel that was built in the late 1880s to divide the Guttrum Swamp semi-permanent wetland and deliver water from the Murray River to irrigators situated to south of the forest (North Central Catchment Management Authority 2014, p. 58). It was built by the Smith brothers, who owned adjoining properties at Guttrum Forest, and the drain was established by 1887 (Kaufman and Ballinger 2014, p. 52). The Benjeroop and Murrabit Irrigation and Water Supply Trust (established in 1886) adopted a scheme to pump from the Murray River via Myall and Reedy Creek to irrigation channels within the Benjeroop and Murrabit region. The main supply channel with a regulator (sluice gates, known as the Benwell Floodgates) to control the volume of water from the Murray was constructed in 1887. In the same year, a weir with a sluice was built on Reedy Creek in the Benwell Reserve (Kaufman and Ballinger 2014, pp. 48-49). In 1887-1888, the Benjeroop and Murrabit Irrigation Trust embanked part of the Murray River at Benwell forest as a method of flood prevention, constructed a dam at the Murray River inlet in Guttrum forest, and built a weir in Guttrum forest to create a water storage for irrigation. However, part of the Guttrum embankment was removed later in 1888 as flooding had increased in some farming properties. Since the 1888 work, Benwell and Guttrum forests became known as Guttrum and Benwell Swamps, due to the amount of water (and birdlife) present (Kaufman and Ballinger 2014, pp. 24-25).

The Barham-Koondrook Lift Bridge, which comprised a central section that could be raised and lowered so paddle steamers could pass underneath as they travelled along the Murray River to/from Echuca, was constructed in 1904. The bridge is still extant today. Barges were involved in regular work hauling timber, railway sleepers and logs for the fellers and saw millers in the forests of Koondrook and Gunbower Island during the 1920s (McKinna *et al* 2012; Victorian Places 2015).

With the introduction of the Water Act 1905 most irrigation areas fell under the control of the State Rivers and Water Supply Commission. Under the administration of the State Rivers and Water Supply Commission, the Torrumbarry System was developed between 1906 and 1915 along the same lines as adopted by the Irrigation Trusts, an extension of irrigation served by pumping units. However, this approach changed due to the ability to control the water supply from the River Murray with the opening of the Torrumbarry Weir-Lock in 1923 which boosted irrigation supply to the Koondrook district, including it as part of the Torrumbarry Irrigation Area (McCoy 1988; McKinna *et al* 2012; North Central Catchment Management Authority 2014, p. 24). From 1931, some farmers in the area took up tobacco farming on the nearby sand hills in the region due to the raising of import tariffs and the reduction on tobacco excise (Ballinger 2008). In 1937, Benwell and Guttrum Swamps were drained so that works within both forests could take place (Kaufman and Ballinger 2014, p. 27).

The small township of Myall is to the southwest of the area of investigation at the Benwell forest. Most of the village settlers were connected to the early selectors after the Myall Irrigation Trust was formed in 1887. It was not until the *Settlement of Land Act* 1893 that land was subdivided into 18-20 acre blocks, and families were given cash advances to take up irrigation allotments in Myall village. The first school in Myall opened in 1896, along with the opening of a Baptist church, prior to closer settlement opening up further irrigated blocks to supported citrus and dairying in 1905. Myall primary school (No 3271) opened there in 1915. Part of their accomplishments after settling was to open a town hall – the Myall town hall was established in the township in 1912. The celebration accompanying the opening of Myall Hall included a concert, ball and large feast in an outdoor marquee. Following this, dances and balls were held there, along with religious, social and sporting events. Moving pictures were also played at the hall. Myall railway siding opened with the construction of the Kerang to Myall railway line in 1925. In 1962, the small township held a 'switch on' ceremony to celebrate the bringing of electricity to the district. Myall primary school closed in 1993, and in 1995 the school was moved to Koondrook where it houses the Barham and Koondrook Historical Society. The hall is still extant in its original today (Ballinger 2008, pp. 54-55; Regional Arts Victoria 2012; Research Data Australia n.d.).

Today, modern aerial imagery shows that Koondrook comprises a regional town opposite the larger township of Barham in NSW. The westernmost extent of Koondrook's low density housing is located immediately adjacent to the south-eastern end of the area of investigation along the Murray River. However, the majority of area of investigation is predominantly situated on the edge, and within, the Benwell and Guttrum State Forests. As such, the area of investigation is likely to have been impacted by agriculture, timber harvesting, stock grazing and river transport, and, in the southeast, from residential settlement northwest of Koondrook.

2.2.2 Historical maps and aerial imagery review

In 1870, the assistant surveyor's map of the Murray River at Campbell's Island (Campbells Island) shows the present-day area of investigation and inundation area as comprising extensive level reed flats that are inundated during heavy floods, rich saltwort plains with heavy clay soil with good herbage during the winter and spring months. Land along the Murray River at Campbells Island is noted as being inundated during floods. Beachamp's Hut is located to the north of Campbells Island, and Beachamp's Station stock yards are mapped to the west of the island. No structures relating to this, or any other run, have been marked to the south of the Murray River (Figure 2.2).

The County of Gunbower map from 1884 show that there were no townships extant in the area of investigation, although there was a roadway running to the southeast of the Guttrum and Benwell areas, following the same alignment as today's Koondrook-Murrabit Road. Other than a small allotment excluded from the Guttrum State Forest, both Guttrum and Benwell comprised timber reserves. A small area to the southwest of Benwell timber reserve, which intersects with the area of investigation in the southwest, is noted as being put up for auction. No townships are mapped near the area of investigation, with the closest one being Kerang, approximately 20 km to the southwest of the area of investigation (Figure 2.3).

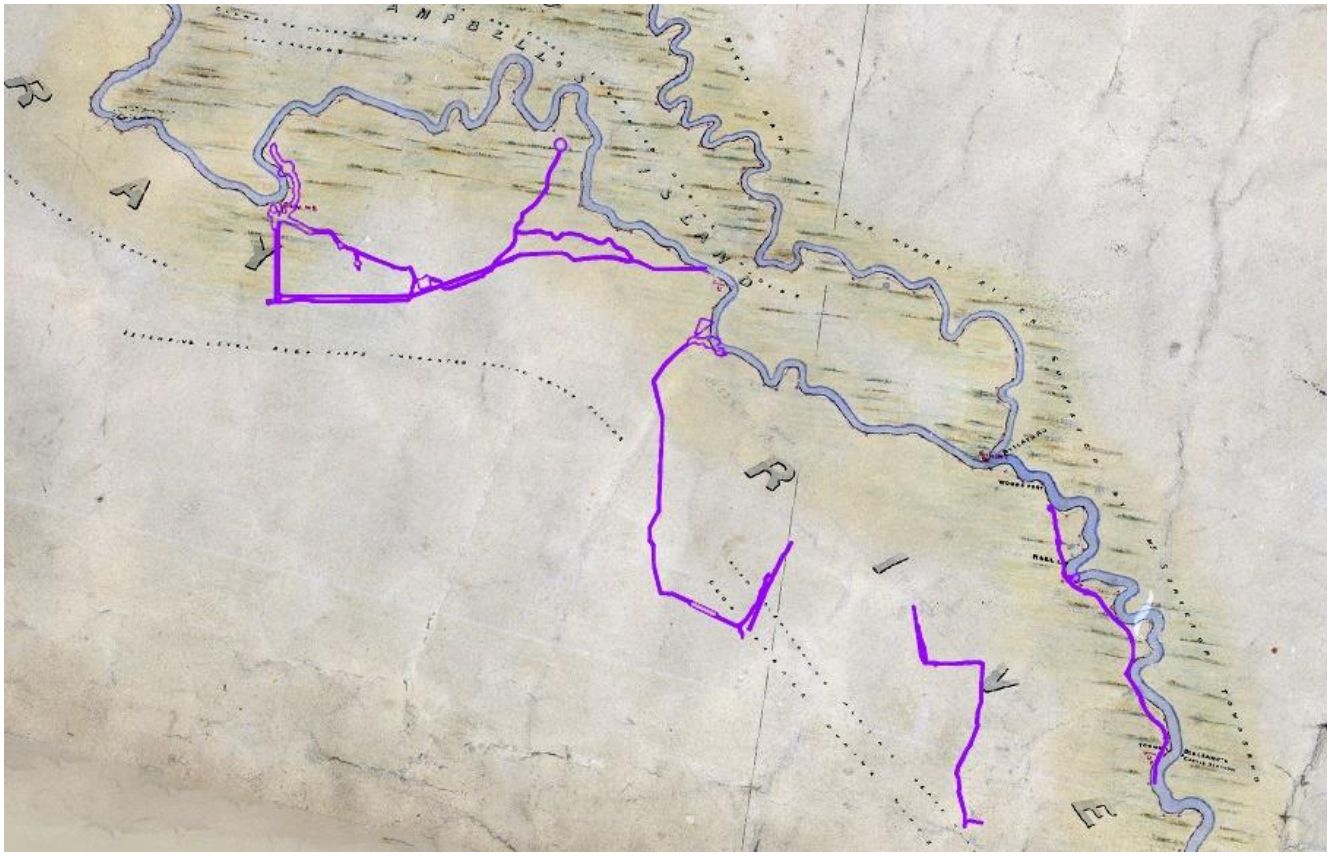

Figure 2.2: Surveyor's map of land to the south of Campbells Island, with approximate area of investigation location in purple (Urquhart 1870)

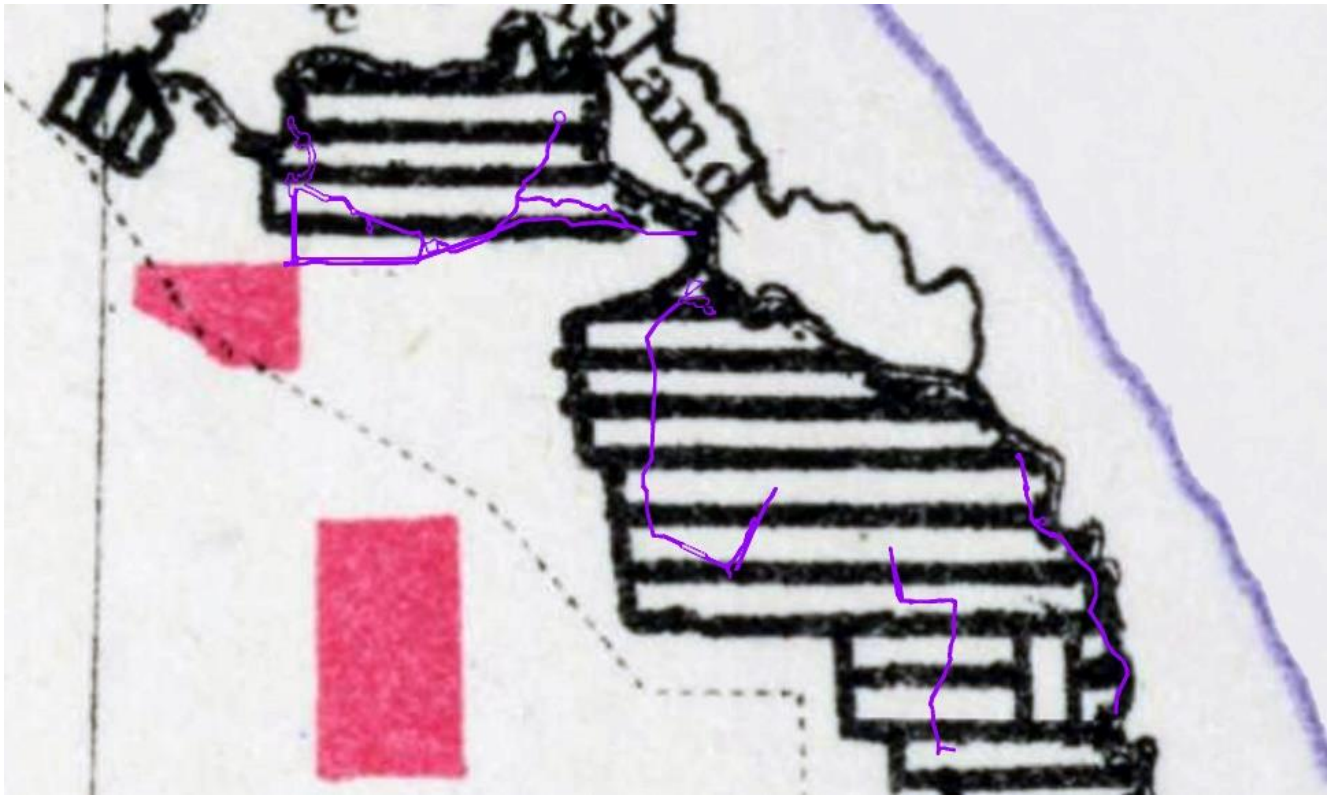

Figure 2.3: 1884 Gunbower county map, with approximate location of the area of investigation outlined in purple (Department of Lands and Survey 1884)

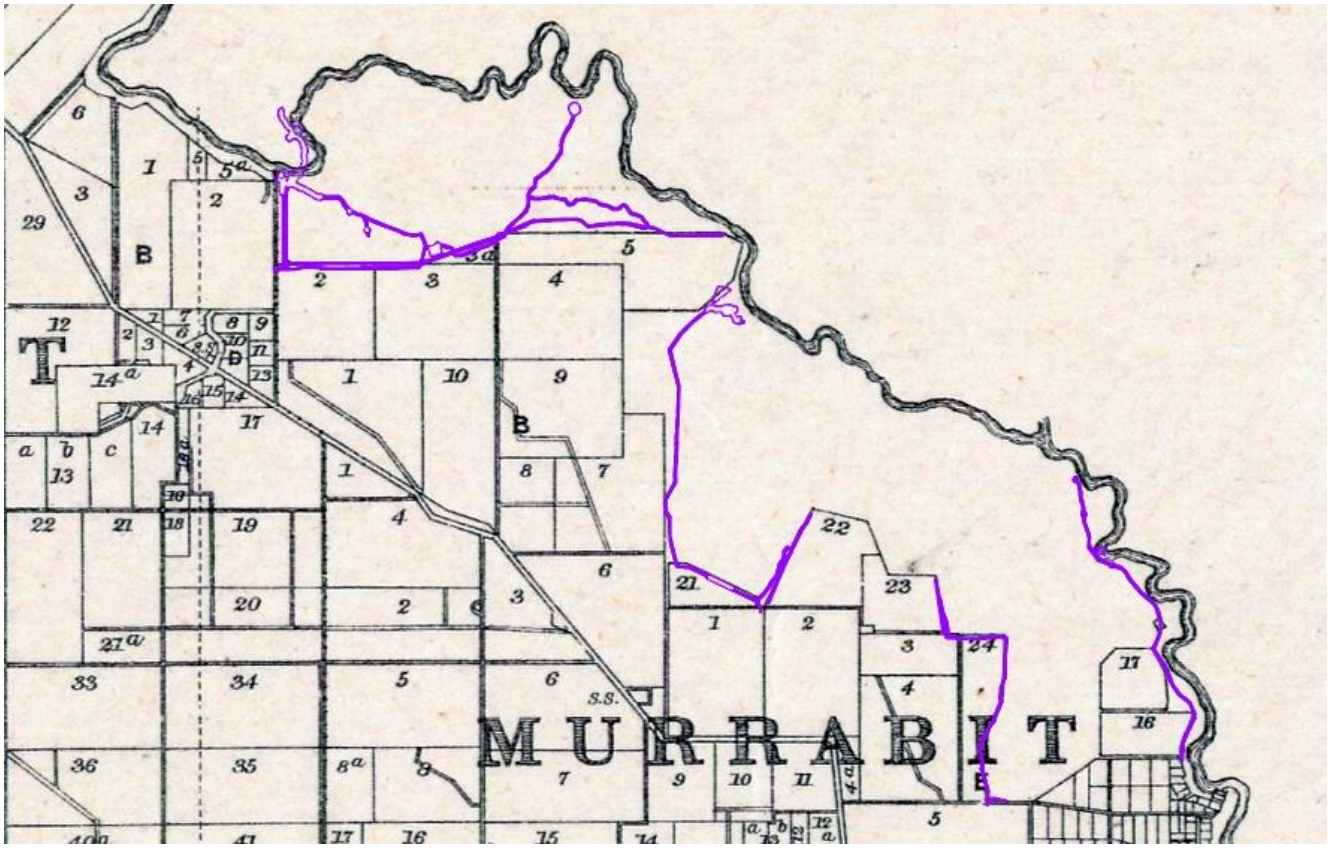

Figure 2.4: 1916 Gunbower county map, with approximate location of the area of investigation outlined in purple (Department of Crown Lands and Survey 1916)

By 1916, the County of Gunbower map is much more detailed, with areas outside the Guttrum and Benwell forests being subdivided into rural allotments for sale. The area noted as having been put up for auction in 1884 comprises a small section of small allotments within the rural setting, which comprised the township of Myall. Allotments within the township of Koondrook are also visible to the southeast (Figure 2.4).

By the early 1920s, the Parish of Murrabit map shows that the area of investigation is located within, or on roadways adjacent to, State Forest. The activity area is shown running along the road reserves of River Track, Millar Road, and Cassidy Lane, along with an unnamed road reserve. Part of the Benwell State Forest that intersects with the area of investigation in the north is noted as a Rifle Range that stretches between an unnamed roadway and the Murray River along a northwest/southeast alignment from the northern end of Watson Lane (Figure 2.5).

The portions of project area runs adjacent to several rural allotments, with the original owners noted as Albert Hall (allotment 2), A Cormack (allotment 3), W Watson Junior (allotment 3A), Jas Watson (allotment 5), G Keir (allotment 7, part of Koondrook Estate) within Section B; and LG Lyons (allotment 21), AP Lewis (allotment 22), OG Shepard (allotment 23), M Doolan (allotment 3), an unowned allotment (allotment 24), and JH Winkley (allotment 5) within Section E; and C Biggs (allotments 16B, 16C), AH Simons (allotment 17A), and a small unnumbered allotment to the north, within the township of Koondrook.

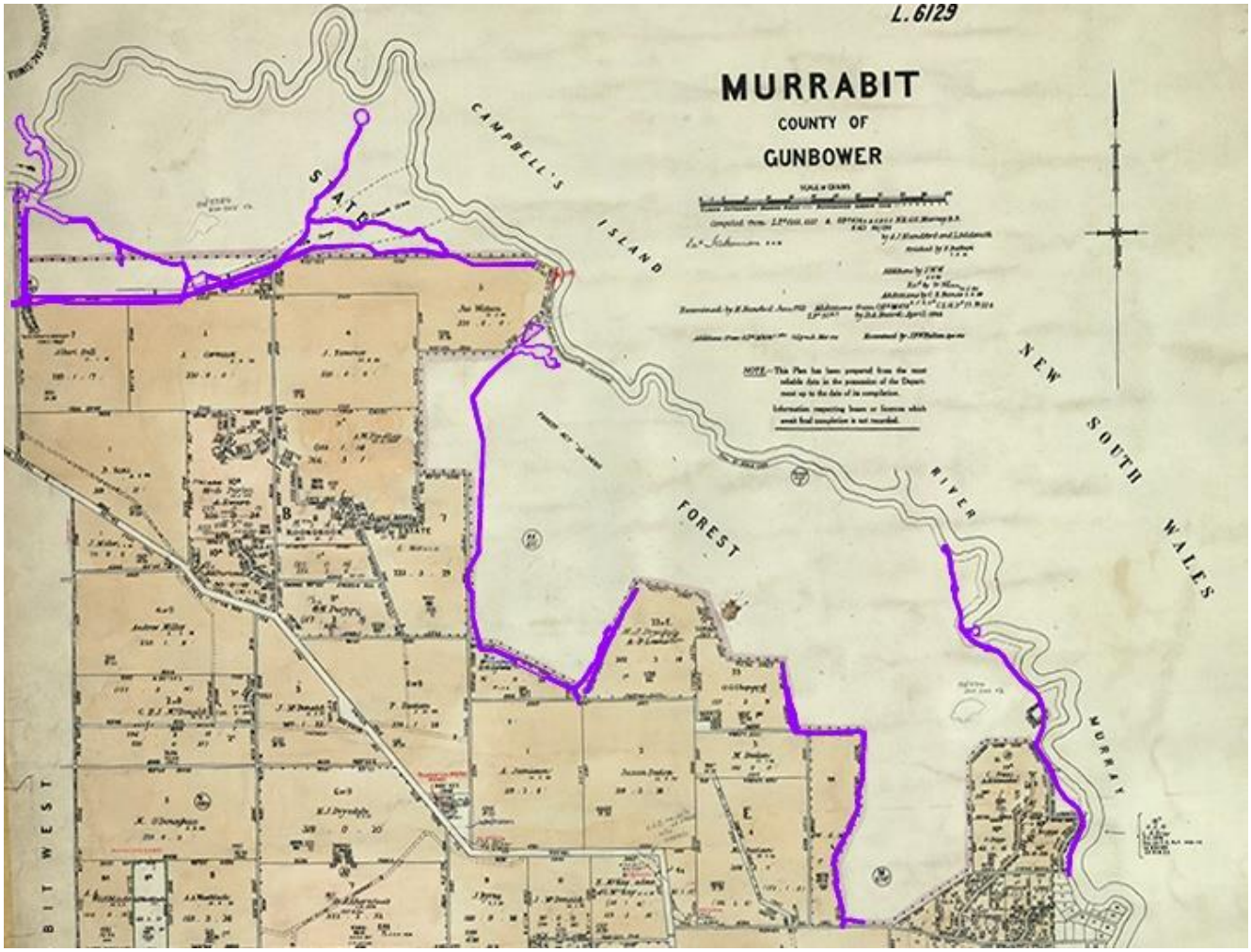

Figure 2.5: 1923 Parish of Murrabit map, with approximate location of the area of investigation outlined in purple (Victoria Department of Crown Lands and Survey 1923)

While little had changed by 1930s, the 1931 Parish of Murrabit map has the outline of both Benwell Swamp and 'Gutteram' (Guttrum) Swamp annotated on the map. The area of investigation intersects with much of the area marked as Benwell Swamp, and a small section Guttrum Swamp at its eastern edge. While Guttrum Swamp is primarily within State Forest, Benwell Swamp extents into allotments owned by Jas Watson (allotment 5), J Taverner (allotment 4), and AW Findlay (allotment 9B, part of Koondrook Estate) (Figure 2.6).

The 1931 Parish of Murrabit West map shows that there are two allotments situated immediately to the west of the area of investigation. These comprised allotments 2 and 5A, both originally owned by E McIntosh. The township of Myall is visible to the southwest of the area of investigation, to the south of McIntosh's rural allotments (Figure 2.6).

The 1935 County of Gunbower map confirms the locations of aforementioned allotments, the location of the township of Myall, the Benwell and Guttrum State Forest, and the Rifle Range within Benwell State Forest (Figure 2.7).

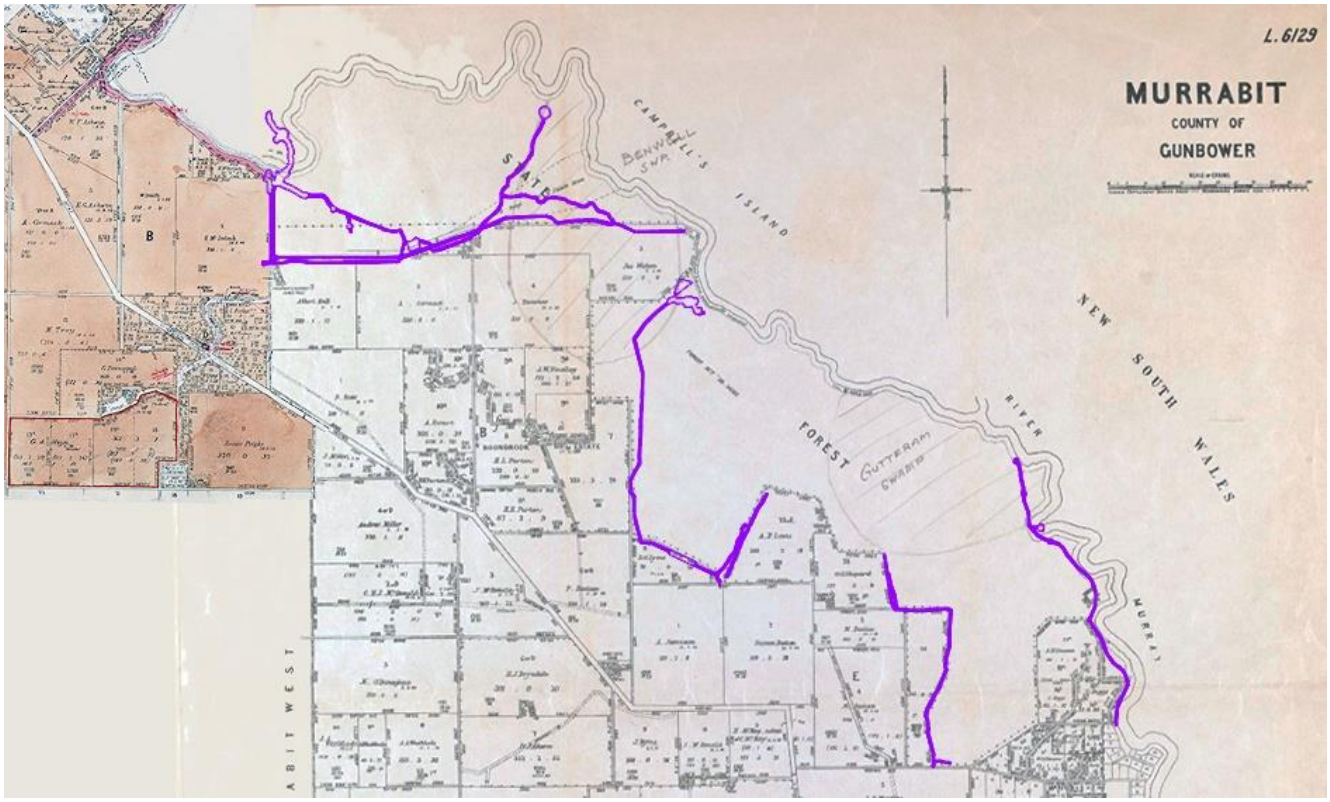

Figure 2.6: 1931 Parish of Murrabit and 1934 Parish of Murrabit West map composite, showing allotments and approximate location of the area of investigation (Victoria Department of Crown Lands and Survey 1931)

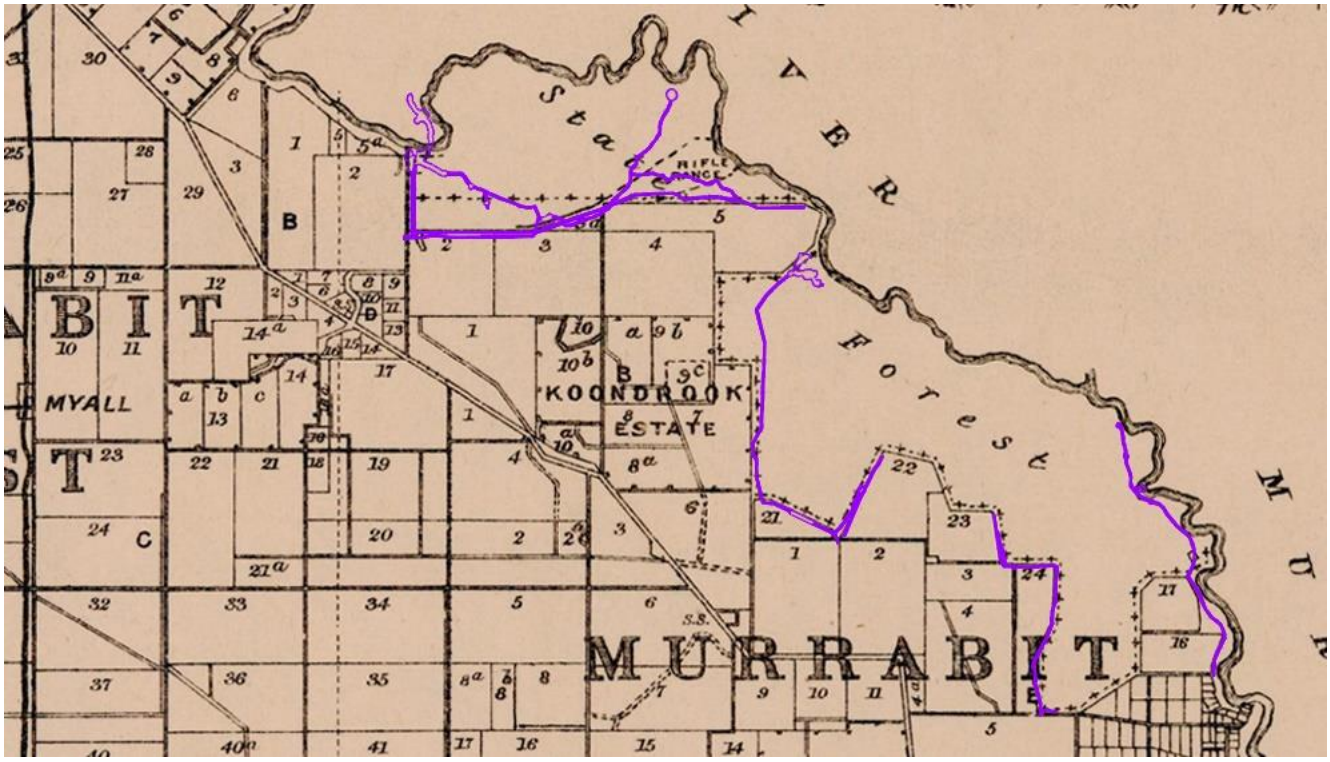

Figure 2.7: 1935 Gunbower county map, with approximate location of the area of investigation outlined in purple (Victoria Department of Crown Lands and Survey 1935)

Figure 2.8: 1945 aerial imagery with approximate location of the area of investigation outlined in purple (Aerial Survey of Victoria 1945)

Aerial imagery from 1945 shows that area of investigation comprises floodplain between the Murray River and the Koondrook-Murrabit Road, with Benwell Swamp and Southwest Benwell Swamp in the Benwell State Forest, and Guttrum, Red Bed, and Little Red Bed Swamps in the Guttrum State Forest, and several smaller unnamed waterways, flood runners, lagoons and billabongs throughout. The two state forests are predominantly covered in trees, excepting in the southwestern corner of the Benwell State Forest. Outside of these forests, the land is a patchwork of farmland, waterways and irrigation channels to the north of Koondrook-Murrabit Road (Figure 2.8).

Aerial imagery dating to 1958 shows that little has changed since 1945, although there appears to have been some further tree growth in the cleared section of the Benwell State Forest (Figure 2.9).

In both aerial images, the area of investigation skirts the edges of both State Forests along roadways or rural property lines, except where it crosses through the Benwell State Forest in the northwest. There are no apparent structures visible within the area of investigation, although some pathways are visible within the tree-covered areas of both historical aerials. There may have been bridges present where tracks cross creeks and other waterways.

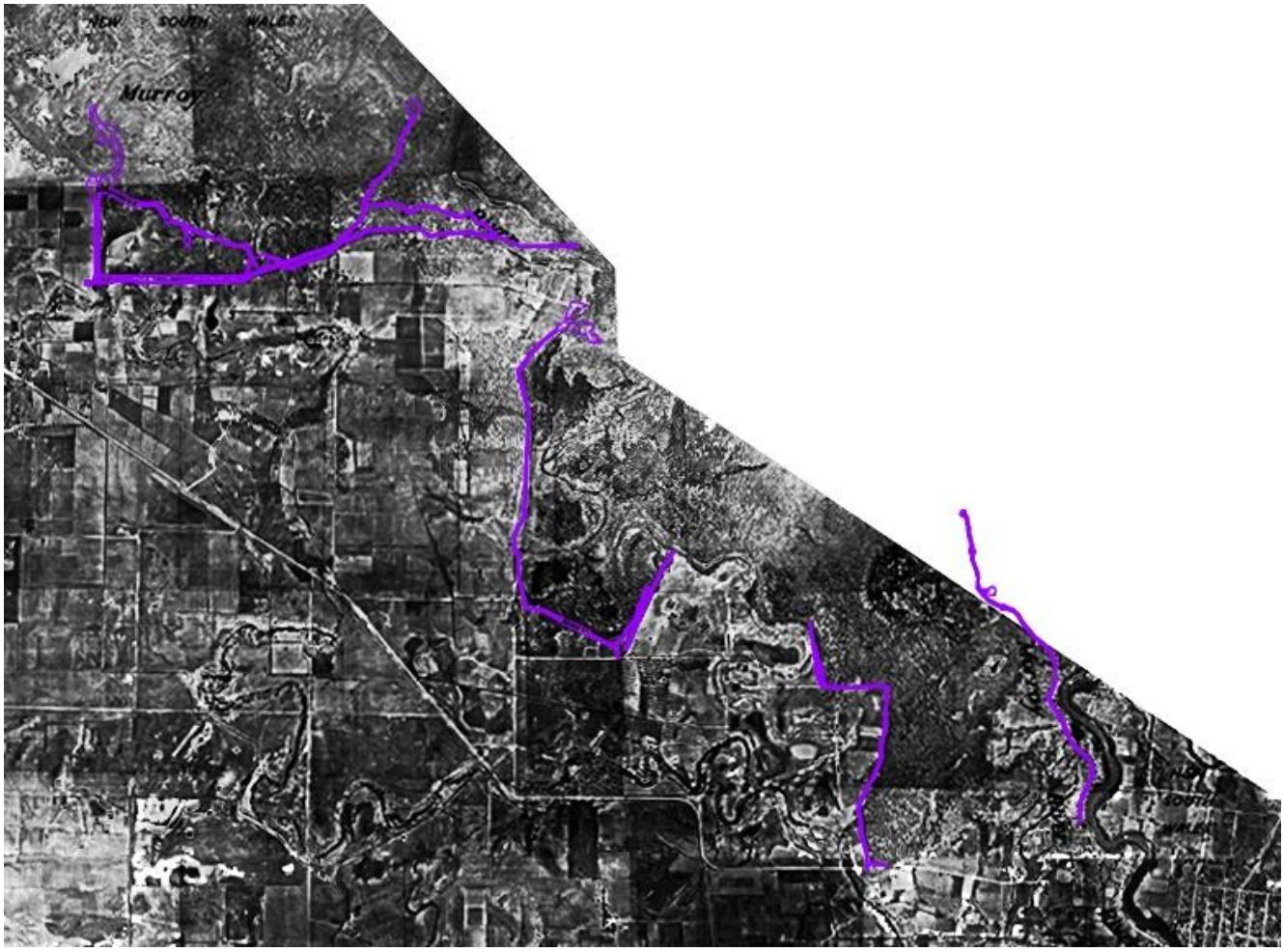

Figure 2.9: 1958 aerial imagery with approximate location of the area of investigation outlined in purple (Aerial Survey of Victoria 1958a; 1958b)

Today, modern aerial imagery shows that the area of investigation tends to follow existing roadways and access tracks within and adjacent to Benwell State Forest, and adjacent to Guttrum State Forest. These accessways tend to be within the tree line of the forest, and adjacent to open farmland. While no structures are visible within the thick tree cover of the State Forests, some modern structures visible within the area of investigation within farmland at the end of Hall Road, and at the end of Millar Road. No additional structures appear to be present within the dense tree cover found across the area of investigation.

2.3 Predictive statement

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

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

2.4 Summary of desktop findings

There are no listed historical heritage places that intersect with the area of investigation or the inundation area. Examination of the previous historical heritage assessments has identified several areas of potential historical heritage places within the area of investigation:

- Benwell Floodgates (the old Murrabit-Benjeroop Irrigation Trust regulator) – located within the area of investigation at the intersection of River Track, Regulator Track and the Murray River
- Benwell Bank – located within the area of investigation near where River Track and Hall Road meet, and heads eastwards across the southern edge of Benwell forest to allotment 2\LP209485 at the end of Millar Road
- Timber Structure Across Channel – located within the area of investigation where River Track meets the Murray River, to the northeast of Benwell Floodgates
- Smith's Drain – intersects with the current area of investigation along Millar Road to the north of Smiths Drain Track
- Artefact: Grating from Firebox of Boiler – an isolated artefact that was located within the area of investigation near the intersection of Millar Road, River Track and the Murray River.

The following are within the inundation area:

- Benwell Bank – immediately adjacent to the inundation area in the Benwell State Forest
- Smith's Drain – intersects with the inundation area in the Guttrum State Forest
- Spot Mill Site – intersects with the inundation area in the Guttrum State Forest.

As such, there is moderate potential for previously unidentified historical heritage items to be present within the area of investigation and the inundation area, from the background history of the area. Site types most likely to be identified in the area of investigation and the inundation area would be heritage places or archaeological sites associated with early agricultural or pastoral activities, logging and milling, river shipping, sand quarries, and water management practices.

3. Impact assessment

3.1 Proposed works assessed in this report

The Guttrum and Benwell Forests Floodplain Restoration Project is located on the mid-Murray floodplain of northern Victoria. Guttrum and Benwell Forests form part of a wider regional ecosystem with Campbells Island directly opposite in New South Wales and the Gunbower-Koondrook-Perricoota Forest icon site immediately upstream.

The project is designed to facilitate managed inundation to address the hydrological deficit in the inundation regime caused by river regulation, particularly the reduced frequency and duration of floods. The managed inundation aims to replicate a natural inundation regime equivalent to a 24,000 to 26,000 ML/d flow in the Murray River across approximately 1,149 ha of the Guttrum and Benwell State Forests. The planned inundation events will require a much lower volume of water than that involved in a natural inundation event as the proposed infrastructure will enable pumping to deliver water to target areas in the floodplain, whilst still achieving a similar degree of inundation as a natural event.

The proposed works for the Guttrum and Benwell Forests floodplains and wetlands are designed to provide a pumped inflows from the Murray River through a series of pump stations on the river. The works will result in inundation of approximately 668 ha in Guttrum Forest and 481 ha in Benwell Forest.

The main components of the project including structures and access tracks, based on the current design for the project, are summarised in Table 3.1. This includes the proposed construction of one large and six small regulators, seven pipelines, two drop structures, three pump stations, erosion control works and a series of containment banks to divert, retain and release water in the Guttrum and Benwell Forests (refer to Figure 1.1-Figure 1.9).

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

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

Table 3.1: Summary of proposed works at Guttrum and Benwell Forests

Forest	Main components
Guttrum	▪ Four small regulators: – Guttrum Main Regulator – Reed Bed Swamp Regulators - North – Reed Bed Swamp Regulators - South – Little Reed Bed Swamp Regulator

Forest	Main components
	▪ Two Pump Stations located adjacent the Murray River: – Guttrum East Pump Station – Guttrum West Pump Station ▪ Two main pipeline systems: – Pipeline from Guttrum East Pump Station to three locations within the Reed Bed Swamp complex of wetlands (via three separate pipelines) – Pipeline from Guttrum West Pump Station to the Guttrum Main outfall channel. ▪ Four outlet structures: – Little Reed Bed Swamp Outlet – Reed Bed Swamp North Outlet – Reed Bed Swamp South Outlet – Guttrum West Outlet (encompassed in Guttrum Main Regulator structure) ▪ One drop structure on the Murray River connecting to Guttrum Main Regulator ▪ One spillway on Guttrum Main Regulator Containment Bank ▪ Four containment banks: – Guttrum Main Regulator including access track – Minor containment bank on Little Reed Bed Swamp Regulator – Minor containment bank on Reed Bed Swamp North Regulator – Minor containment bank on Reed Bed Swamp South Regulator ▪ Works associated with power supply to pump stations including new poles, stays, cables/ power lines and kiosk substations ▪ Levees - Subject to further risk assessment and therefore requirement and location have not been confirmed.
Benwell	▪ One large regulator; Benwell Main Regulator ▪ Two small regulators: – Benwell East Regulator – South-west Natural Flood Conveyance ▪ One pump station located adjacent to Murray River; Benwell Pump Station. ▪ Three pipelines: – Pipeline from Benwell Pump Station to Benwell Regulator Track Regulator and drainage path – Pipeline from Benwell Regulator Track Regulator to South West Benwell Swamp – Emergency Outlet Pipeline from the South West Benwell Swamp to the Benwell Drainage and Outfall System adjacent to the forest ▪ One drop structure on the Murray River connecting from the Benwell Main Regulator ▪ Two Containment banks: – Benwell Containment Bank 1 at Benwell Main Regulator – Benwell Containment Bank 2 between Benwell Main Swamp and South West Benwell Swamp ▪ Two spillways associated with the Benwell Main Regulator ▪ Works associated with power supply to pump stations including new poles, stays, cables/ power lines and kiosk substations ▪ Levees - Subject to further risk assessment and therefore required and location have not been confirmed.

3.2 Potential impacts

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

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

Heritage place	Impact assessment
Benwell Floodgates	**Proposed works** Proposed works may impact upon the historical, rarity, scientific and aesthetic heritage significance (Table 2.1) of Benwell Floodgates, as identified by Kaufman and Ballinger (2014). The place, recommended for HO and VHI listing, comprises a six-gate regulator situated on a former irrigation supply channel (with an interpretive panel). The fabric of the floodgates may also be impacted by works. As such, works associated with the proposed Benwell pump station, including the power supply, outlet, pipelines, access track, levee and containment bank (Section 3.1) and laydown area construction, may impact upon the physical fabric of features associated with this potential historical heritage place.
Benwell Bank	**Proposed works** Proposed works may impact upon the significance (Table 2.1) of Benwell Bank, as identified by Kaufman and Ballinger (2014), which comprises the an earthen levee bank extending along the southern boundary of Benwell State Forest. As such, the proposed levee and track works (Section 3.1) may impact upon the physical fabric of the extant levee bank that comprises this potential historical heritage place. **Inundation area** The levee bank is immediately adjacent to the inundation area along the southern boundary of Benwell State Forest. As such, the levee bank will be impacted by erosion from the inundation which is further detailed in Section 3.1.
Timber Structure Across Channel	**Proposed works** Proposed works may impact upon the historic significance (Table 2.1) of Timber Structure Across Channel, as identified by Kaufman and Ballinger (2014), which comprises two upright posts, bush timber poles, with a top rail of bush timber situated across a natural channel. As such, the proposed Benwell Main Drop Structure, including track and regulator works (Section 3.1), may impact upon the physical fabric of the timber structure.
Smith's Drain	**Proposed works** Proposed works may impact upon the historic significance (Table 2.1) of Smith's Drain, as identified by Kaufman and Ballinger (2014), which comprises a drain between the Murray River and Millar Road and the former pump location on the Murray River. Smith's Drain was recommended for listing on the VHI. As such, the proposed levee works (Section 3.1) may impact upon the physical fabric of this potential historical heritage place. **Inundation area** Smith's Drain intersects with the inundation area within the Guttrum State Forest to the northwest of Smiths Drain Track. As such, the levee bank will be impacted by erosion from the inundation which is further detailed in Section 3.1.
Artefact: Grating from Firebox of Boiler	**Proposed works** Proposed works will occur within the vicinity of the place where this artefact was recorded. It is unknown whether the artefact was collected or not, although the mention of the threat to the artefact (decay/rusting) suggests that it may have been left *in situ*. As such, the proposed laydown area construction may impact upon the artefact, should it remain *in situ*.
Spot Mill Site	**Inundation area** The physical location of the Spot Mill Site is immediately east of a waterhole situated to the southeast of Little Reed Bed. The physical remains of the site consist of piles of offcuts. As such, the heritage place will be impacted by erosion from the inundation which is further detailed in Section 3.1.

4. Approval requirements

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

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

Project element	Statutory requirements
Entire area of investigation	Discovery of archaeological sites - under Section 127 of the *Heritage Act 2017*, If an archaeological site is discovered during construction or excavation on any land, the person in charge of the construction or excavation must as soon as practicable report the discovery to HV.
Benwell Floodgates	No Consents are currently required for works at this location. However, while not currently listed on the VHI, these historical heritage places were assessed as having local significance and were recommended for inclusion on the VHI (Kaufman and Ballinger 2014). As such, these places should be treated as if they will be listed on the VHI. This would require, liaison with HV, registration of the items (if accepted by HV) and then application for Consent to disturb if necessary.
Smith's Drain	
Benwell Bank	No planning permits are currently required for works at this location. However, while not currently listed on the HO, these historical heritage places were assessed as having local significance and were recommended for inclusion on the HO (Kaufman and Ballinger 2014). A site revisit is recommended to these sites to record conditions and reassess their heritage significance.
Timber Structure Across Channel	
Spot Mill Site	
Artefact: Grating from Firebox of Boiler	As a single artefact with no discernible associated archaeological site, this place is not recommended for inclusion on any heritage register.

5. Historical heritage recommendations

5.1 Recommendations and project risk

Whilst there are no registered historical heritage places that intersect with either the area of investigation and inundation area, there are some identified heritage sites which have not been registered. There is also a moderate potential for previously unidentified historical heritage items or archaeological sites to be present within these areas. Therefore, due to the possibility for unlisted historical heritage places and unidentified historic archaeology to be impacted, it is recommended that a Historical Heritage Assessment (HHA) be undertaken for the project.

This should include a targeted field survey of the area of investigation to identify further historical archaeological sites and any unidentified historical heritage places, and a significance assessment of these potential historical places.

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

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

All historical archaeological places are protected under the *Heritage Act 2017*, whether they are registered or not.

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

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

5.2 Site-specific recommendations

5.2.1 Unregistered historical heritage places

Benwell Floodgates, Smith's Drain, Benwell Bank, Timber Structure Across Channel, and Spot Mill Site are not listed on any heritage registers, however as they have been identified in the previous assessment undertaken by Kaufman and Ballinger (2014) it is recommended that they be included in a heritage survey which would include an inspection and recording of any remnant features. Advice regarding any heritage values can then be provided to inform design and construction of the proposed works.

It is recommended that consultation with HV be undertaken to ascertain the status of Benwell Floodgates and Smith's Drain on the VHI.

It is recommended that consultation with the Gannawarra Shire City Council be undertaken to ascertain the status of Benwell Bank, Timber Structure Across Channel, and Spot Mill Site on the HO.

It is recommended that, during the recommended field survey, a search for Artefact: Grating from Firebox of Boiler be undertaken. If reidentified, the artefact should be recorded and collected to avoid loss of the artefact.

6. Mitigation measures

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

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

Proposed activities	Project element	Mitigation measures
General activities	Entire area of investigation	General mitigation measures to be implemented across the area of investigation: ▪ Historical heritage awareness training should be completed as part of the site induction for all personnel and/or contractors prior to the commencement of construction works to ensure: - an understanding of where all heritage places are located within the area of investigation - an understanding of the potential heritage places that may be impacted during the project - the procedures required to be undertaken in the event of discovery of historical heritage material, features or deposits, or the discovery of human remains ▪ If an archaeological site is discovered during construction or excavation on any land, the person in charge of the construction or excavation must as soon as practicable report the discovery to HV ▪ A copy of this report should be kept onsite and on file with the project records. All contractors and/or project staff should be made aware of the heritage status of the heritage places in the area of investigation prior to works taking place.
Benwell pump station, including the power supply, outlet, pipelines, access track, levee and containment bank works	Benwell Floodgates	As there is potential for the fabric and significance of the these heritage places to be directly impacted by works, it is recommended that the following mitigation measures be implemented to avoid any adverse impacts where possible to the heritage values of the site, as assessed by Kaufman and Ballinger (2014). Avoidance of the heritage places should be undertaken, if possible: ▪ Prior to any works, including any vegetation clearance, site establishment or construction works in the area, protective barrier fencing will be erected between the historical structures and the works area, to fence it and thereby avoid inadvertent impact; the fencing would be installed for the duration of works for the project and removed following completion. Should impact to the heritage places be unavoidable: ▪ Prior to the start of works, an archival photographic recording of the sections of the heritage places to be impacted should be carried out, in accordance with the guidelines, *Photographic Recording for Heritage Places and Objects* (Heritage Victoria 2006) ▪ Works are to be undertaken in such a way as to minimise direct contact by construction vehicles or machinery with the historical structures. Prior to any works, including any vegetation clearance, site establishment or construction works in the area, where the historical structures will not be impacted, protective barrier fencing will be erected between the remaining historical structures outside the works area, to fence it and thereby avoid inadvertent impact; the fencing would be installed for the duration of works for the project and removed following completion.
Levee works Inundation	Smith's Drain	
Earthen levee bank and track works Inundation	Benwell Bank	
Benwell Main Drop Structure, including track and regulator works	Timber Structure Across Channel	
Inundation	Spot Mill Site	

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