Department of Climate Change, Energy, the Environment and Water

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Tuppal Creek Restoration Project Roadway Crossings Works – Addendum REF

Addendum Review of Environmental Factors

January 2024

Acknowledgement of Country

The Department of Climate Change, Energy, the Environment and Water acknowledges that it stands on Aboriginal land. We acknowledge the Traditional Custodians of the land and we show our respect for Elders past, present and emerging through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.

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Revision	Date	Prepared by	Reviewed by
A – Draft	05/06/2023	Pat Russell, Jennifer Shaw, Adeline Reid	Mike Luger
1 – Final	05/09/2023	Simon Cornell	Mike Luger

Declaration

This Review of Environmental Factors (REF) has been prepared by 3Rivers, a joint venture between Jacobs Group (Australia) and GHD, on behalf of the NSW DCCEEW – Infrastructure. The addendum REF has been prepared to assess the environmental impacts to satisfy the requirements of Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and considers the factors listed in section 171 of the Environmental Planning & Assessment Regulation 2021 (EP&A Regs).

The addendum REF provides a true and fair assessment of the extension of the work area for the Tuppal Creek Restoration Project Roadway Crossing Works (the 'proposed modification') in relation to its likely effects on the environment. It examines and takes into account to the fullest extent possible all matters affecting or likely to affect the environment as a result of the proposed modification.

Based on the information provided in the addendum REF, it is concluded that:

1. the proposed activity is not likely to have a significant impact on the environment, and an Environmental Impact Assessment is not required.
2. the proposed activity will not be carried out in a declared area of outstanding biodiversity value and is not likely to significantly affect threatened species, populations or ecological communities, or their habitats or impact biodiversity values. A Species Impact Statement (SIS) is not required.
3. The proposed modification is not likely to significantly affect any matters of national environmental significance, nor is the activity being carried out on or is it likely to impact Commonwealth land.

Based on the information presented in this addendum REF, it is concluded that by adopting the mitigation measures identified in this assessment, it is unlikely that the would be significant adverse environmental impacts associated with the project. Subject to the adoption of the measures to avoid, minimise or manage environmental impacts listed in this REF, the proposed activity is recommended for approval.

Author and qualifications
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Certification

I, Julian Ardas, certify that I have reviewed the contents of this addendum REF document as a representative of Water Infrastructure NSW and agree that, to the best of my knowledge, it accords with the *Environmental Planning and Assessment Act 1979*, the Environmental Planning and Assessment Regulation 2021 (EP&A Regulation), and the Guidelines for Division 5.1 Assessments (Department of Planning and Environment, 2022) made under section 170 of the EP&A Regulation.

Signature:

Date:

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1 Introduction

1.1 Project overview

1.1.1 The proposed modification

NSW Department of Climate Change, Energy, the Environment and Water, Water -Infrastructure (Water – Infrastructure) proposes to modify the Tuppal Creek Restoration Project Roadway Crossing Works (the project) to extend the proposed work areas beyond the areas previously assessed and approved for construction (the proposed modification). The proposed modification is required as refinements to the project design have identified the need for additional ground disturbance, vegetation clearance and temporary works, to that described in the previously approved Tuppal Creek Restoration Project Roadway Crossing Works REF (the existing REF) (refer to Section 1.1.2).

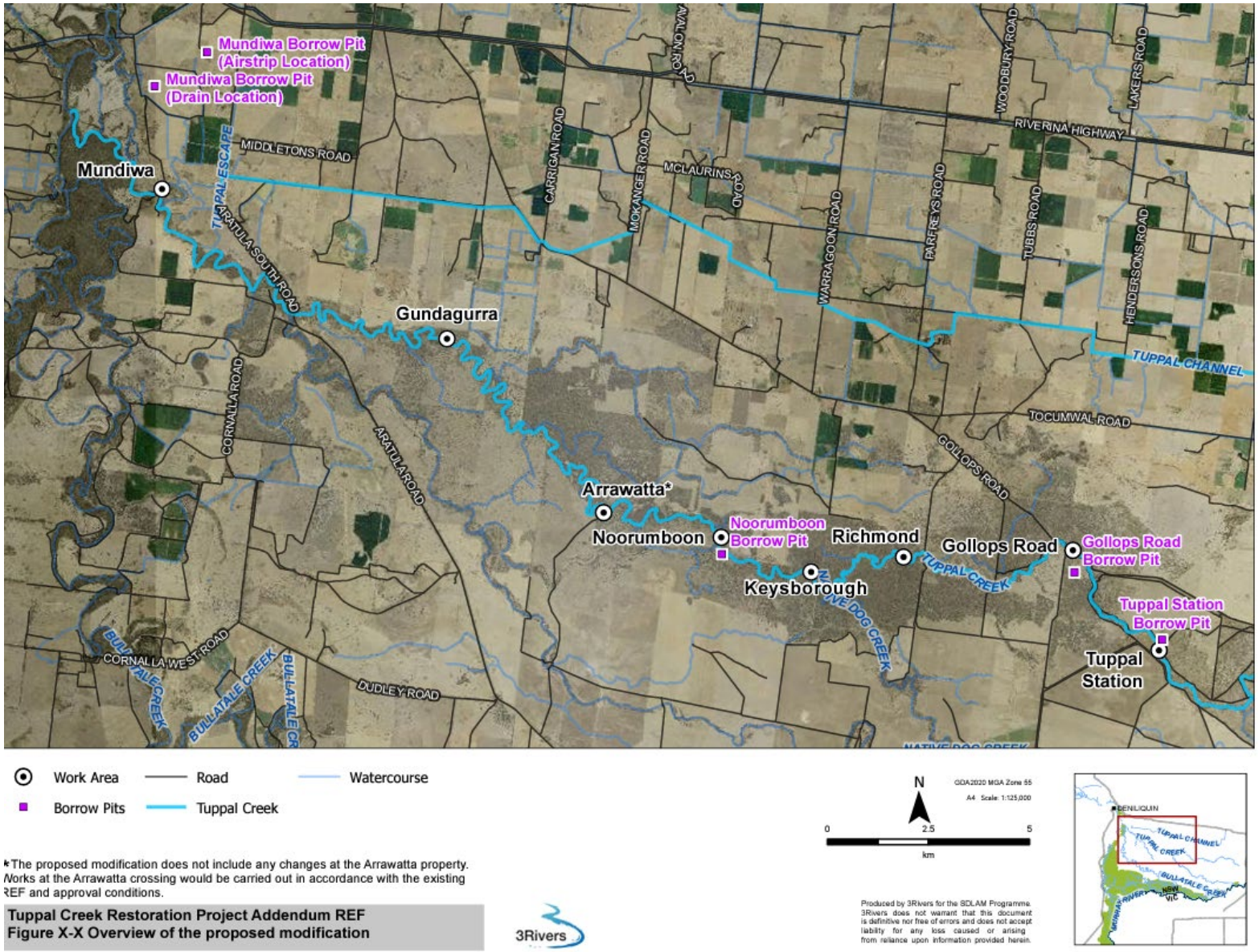
The proposed modification would be located along Tuppal Creek in south-western NSW, within the Murray River Council and Edward River Council local government areas, on land zoned RU1 – Primary Production under the Murray Local Environmental Plan 2011 (Murray LEP) and the Conargo Local Environmental Plan 2013 (Conargo LEP).

The proposed modification would include:

- Extending the work areas approved in the existing REF to allow the current design of the project to be constructed, including:
  - Extending work areas at seven of the proposed crossing locations (Mundiwa, Gundagurra, Noorumboon, Keysborough, Richmond, Gollops Road and Tuppal Station)
  - Increased vegetation clearance associated with additional ground disturbance for current crossing designs
- Establishment of borrow pits at the following locations:
  - North of the Mundiwa crossing site, on the Mundiwa property (Mundiwa Drain borrow pit)
  - North east of the Mundiwa crossing site, on the Mundiwa property (Mundiwa Airstrip borrow pit)
  - South of the Noorumboon crossing site, on the Noorumboon property (Noorumboon borrow pit)
  - South of the Gollops Road crossing site, on the Tuppal Station property (Gollops Road borrow pit)

  - North of the Tuppal Station crossing site, on the Tuppal Station property (Tuppal Station borrow pit)
- Potential temporary works installed next to the crossing sites, to allow construction access across the creek.

An overview of the proposed modification is shown on Figure 1.



*The proposed modification does not include any changes at the Arrawatta property. Works at the Arrawatta crossing would be carried out in accordance with the existing REF and approval conditions.

Tuppal Creek Restoration Project Addendum REF
Figure X-X Overview of the proposed modification

3Rivers

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Figure 1 Location of the proposed modification

1.1.2 Background information

Environmental assessment and design development

The existing REF was prepared by the then NSW Department of Planning, Industry and Environment (DPIE) - Environment, Energy and Sciences Group (EES) in July 2020 and approved in September 2020. The existing REF was developed to gain approval for the upgrade, replacement or construction of eight crossings along Tuppal Creek to enable future, controlled environmental flow events to be delivered through the creek, whilst maintaining landholder access across private property. Importantly, the existing REF was approved on the basis of defined study areas, as final designs for the proposed crossings had not yet been developed. The existing REF is provided in Appendix C.

Following approval of the existing REF, design development and delivery of the project was handed to Water - Infrastructure, to be delivered as part of the Mid-Murray Anabranches project under the Sustainable Diversion Limit Adjustment Mechanism (SDLAM) program. The SDLAM program aims to achieve similar or improved environmental outcomes for rivers, wetlands and wildlife using less water as part of the Murray-Darling Basin Plan. Under the SDLAM program, the Mid-Murray Anabranches project has a general aim of removing existing constraints within a number of ephemeral creeks on the Murray River floodplain, enabling controlled environmental flow events to be passed through the creeks, while responding to the needs of impacted private landowners.

During design development, it was identified that with the exception of the Arrawatta crossing, the study areas approved in the existing REF were no longer sufficient to allow construction of the project to be carried out. Additional assessment and environmental approvals are therefore required to extend seven of the eight proposed work areas for the Tuppal Creek Restoration Project, before construction can commence. Additional assessment and approval is also required to allow works to be carried out at areas additional to those assessed in the existing REF, namely the Mundiwa, Noorumboon, Tuppal Station and Gollops Road borrow pit work areas.

Further to these extended work areas, the existing REF did not assess a defined design footprint (capturing the extent of ground disturbance), and the impacts captured do not accommodate the current design footprint. As a result, additional ground disturbance is required at the seven crossing locations within the existing work areas that have already been approved. Due to these refinements to the design footprint (and extended work areas), addendum biodiversity and Aboriginal cultural heritage assessments have been undertaken which consider the current design footprint and proposed work areas, and their impact to vegetation clearance and Aboriginal cultural heritage (in addition to the extended work areas and borrow pits).

Additional temporary works involving installation of a sidetrack to allow for construction access across the creek may also be required at some of the crossing sites. This would be determined by the contractor during the pre-construction phase.

An overview of the proposed modification is shown on Figure 1.

The proposed extended work areas, additional borrow pit areas and design footprints are shown on Figure 2 to Figure 9.

Existing approvals

The existing REF provides the following description of the approved works:

"The NSW Department of Planning, Industry and Environment (DPIE), Environment, Energy and Science (EES), formerly the Office of Environment Heritage) is proposing to upgrade, replace or construct eight crossings along Tuppal Creek in southern New South Wales. The upgraded crossings will allow increased environmental flows to be delivered along the length of the Tuppal Creek, while maintaining landholder access across private property that straddles the creek.

[...]

The activity would involve the replacement of five pipe culvert creek crossings with clear span bridges (Gollops Road, Richmond, Noorumboon, Gundagurra, Mundiwa) and one with a low-level rock crossing (Arrawatta). Pipe culverts would be removed at each site. It would also include the construction of new clear span bridges at secondary crossing sites at Tuppal Station and Keysborough properties."

The existing REF further notes that:

"The assessment footprints for this investigation included an area greater than the expected construction footprint to account for potential alterations that may occur as part of the site-specific detailed designs. However, detailed mapping and assessment was only undertaken for those trees identified by MIL as being directly impacted by construction and did not consider the broader assessment footprints."

Approval of the works described in the existing REF was subject to a number of associated conditions and approvals placed on the project across various documents. The proposed modification should be considered in reference to the following associated approval documents, provided in Appendix C:

- Review of Environmental Factors Determination Report – Tuppal Creek Restoration Project Roadway Crossing Works
- Conditions of Determination - Tuppal Creek Restoration Project Roadway Crossing Works
- Tree Clearing Protocol and DPIE Approval

- Notification to Department of Primary Industries Fisheries (DPI (Fisheries)) for dredging/reclamation work (pursuant to section 199 of the *Fisheries Management Act 1994* (FM Act))
- DPI (Fisheries) conditions placed on the existing REF under section 199 of the FM Act.

A summary of the safeguards and existing REF determination and agency consultation conditions are provided in Section 7.4.

The proposed modification would extend the work areas for seven of the eight crossing sites identified in the existing REF. No modification is required at the Arrawatta crossing, and works carried out at this site would be subject to the approval conditions as outlined in the existing REF and associated approval documents in Appendix C. Consequently, this Addendum REF does not provide any additional assessment or safeguards for the Arrawatta crossing.

1.2 Project location

The purpose of this Addendum REF is to describe the proposed modification, document the likely impacts of the proposed modification on the environment, and detail measures to mitigate impacts that cannot be avoided. This Addendum REF is the key document which Water - Infrastructure would use to discharge its duty under section 5.5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act), including taking into account those factors listed under section 171 of the Environmental Planning and Assessment Regulation 2021 (EP&A Regulation) (refer to Appendix A).

The findings of this Addendum REF would be considered when assessing:

- Whether the proposed modification is likely to have a significant impact on the environment and therefore the requirement for an environmental impact statement to be prepared and approval sought from the Minister for Planning under division 5.2 of the EP&A Act.
- The significance of any impact on threatened species as defined by the *Biodiversity Conservation Act 2016* (BC Act) and FM Act (referred to in section 1.7 of the EP&A Act) and therefore the requirement for a species impact statement or a biodiversity development assessment report.
- The potential for the proposed modification to significantly impact on matters of national environmental significance or Commonwealth land and the requirement to make a referral to the Australian Government Department of Climate Change, Energy, the Environment and Water (DCCEEW) for a decision by the Commonwealth Minister for the Environment and Water on whether assessment and approval is required under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

In the event of any discrepancy between Appendices C to E and this REF, this REF takes precedence.

2 Project need and justification

2.1 Proposed modification objectives

Section 6.3 of the existing REF identifies the objectives of the project. The existing REF notes that the objective of the project is to allow increased environmental flows to be delivered down Tuppal Creek by removing barriers (existing crossings) within the creek while maintaining access for private landholders. The existing REF notes that the overall aim of the project is to:

"improve the ecosystem health of the creek systems while allowing landholders continued access to their properties and fire-fighting equipment to cross creeks if required during increased environmental flows."

The objectives of the proposed modification are considered to be consistent with the objectives outlined in the existing REF.

The proposed modification would also support the objectives of the Mid-Murray Anabranches project and the broader SDLAM program, as described in Section 1.1.2.

The proposed modification is required to extend the approved work areas required for the current design of the project to be constructed. The proposed modification is therefore required to achieve the objectives of the project (as described in Section 6.3 of the existing REF) and the broader objectives of the Mid-Murray Anabranches project as part of the SDLAM program.

2.2 Existing infrastructure

Existing infrastructure relevant to the proposed modification is described in Section 6.2 of the existing REF. The description of existing infrastructure provided in the existing REF is considered to be consistent with current conditions.

The proposed modification would impact seven of the eight crossing sites identified in the existing REF. No modification is required at the Arrawatta crossing, and works carried out at this site would be subject to the existing approval conditions (Appendix C).

Borrow pits for the proposed modification would be located in areas of previously disturbed agricultural land. No existing infrastructure is present in the location of the proposed borrow pits. There is an existing depression in the location of the proposed Mundiwa borrow pit (drain location), currently used for drainage.

2.3 Options and alternatives considered

The following options were considered for the proposed modification:

- Option 1 – The 'do nothing' option. This option would involve carrying out the project as described in the existing REF. No additional vegetation clearance would be permitted, and the project design would need to be amended to be consistent with the study areas and vegetation impacts identified in the existing REF and associated approval documents.
- Option 2 – The proposed modification. This option would involve extending the work areas approved for construction of the project beyond those identified in the existing REF. This option would also involve additional vegetation clearance and ground disturbance to that assessed and approved in the existing REF.

2.4 Preferred option

Option 2, carrying out the proposed modification, is the preferred option. The proposed modification would extend the approved work areas, allowing the proposed works to be carried out in accordance with the current design and enabling the project objectives to be met. Should this option not be selected, the project would be unable to proceed with the current design. It should also be noted that during development of the detailed designs, Aboriginal heritage and ecological constraints have been considered and avoided where practicable to minimise impacts.

3 Project description

3.1 Proposed works

Water - Infrastructure proposes to modify the scope of the project to extend the approved work areas for construction. The proposed modification would involve:

- Extending the work areas approved in the existing REF to allow the current design of the project to be constructed, including:
  - Extending work areas at seven of the proposed crossing locations (Mundiwa, Gundagurra, Noorumboon, Keysborough, Richmond, Gollops Road and Tuppal Station)
  - Increased vegetation clearance associated with additional ground disturbance for current crossing designs
- Establishing five borrow pits at the following locations:
  - North of the Mundiwa crossing site, on the Mundiwa property (Mundiwa Drain borrow pit location)
  - North east of the Mundiwa crossing site, on the Mundiwa property (Mundiwa Airstrip borrow pit location)
  - South of the Noorumboon crossing site, on the Noorumboon property (Noorumboon borrow pit)
  - South of the Gollops Road crossing site, on the Tuppal Station property (Gollops Road borrow pit)
  - North of the Tuppal Station crossing site, on the Tuppal Station property (Tuppal Station borrow pit).
- Potential temporary works installed next to the crossing sites, to allow construction access across the creek.

An overview of the proposed modification is provided in Figure 1. The proposed modification as it relates to each individual site under the project is shown on Figure 2 to Figure 10.

Figure 2 Proposed modification – Tuppal Station crossing (1T) and borrow pit

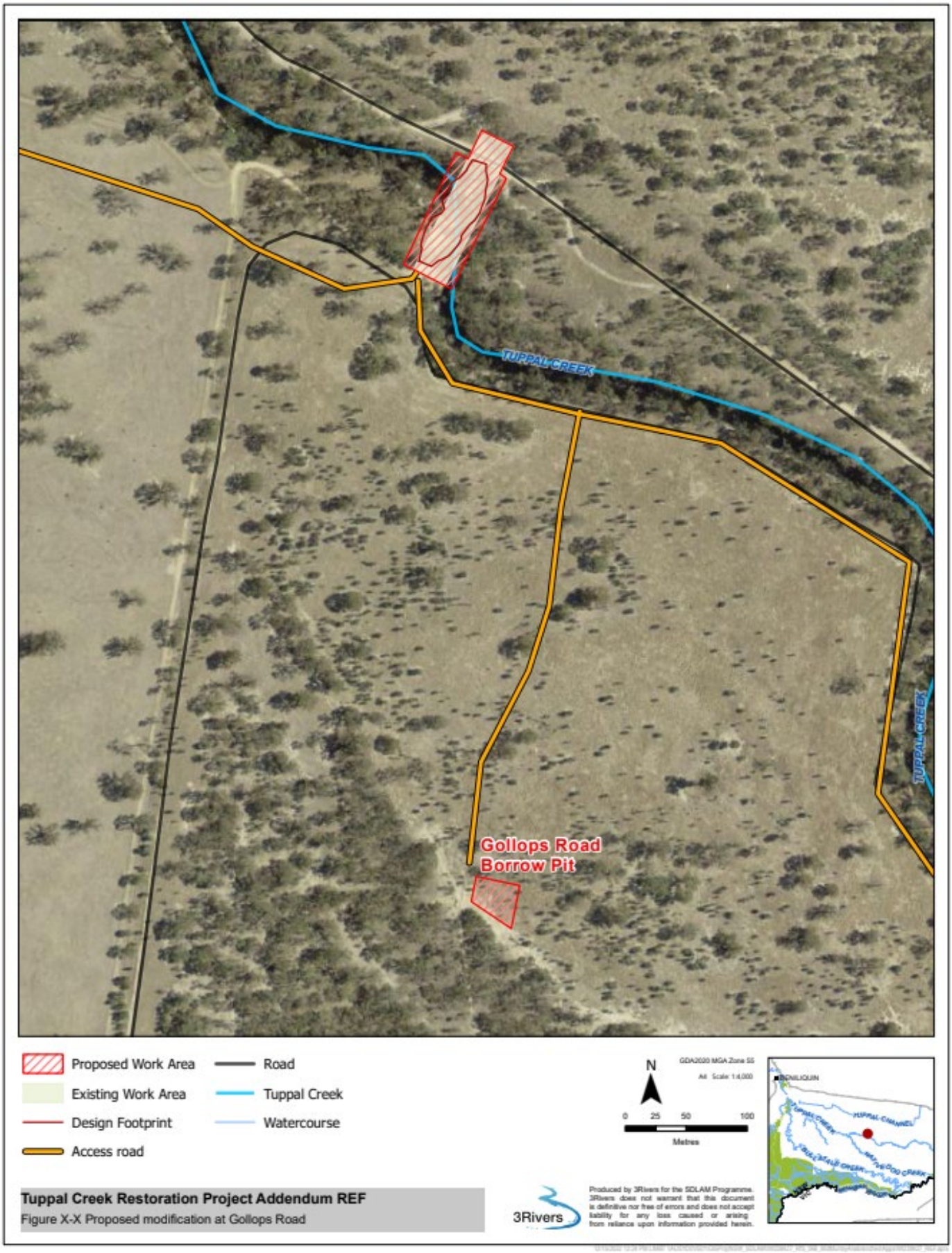

Figure 3 Proposed modification – Gollops Road crossing (2T) and borrow pit

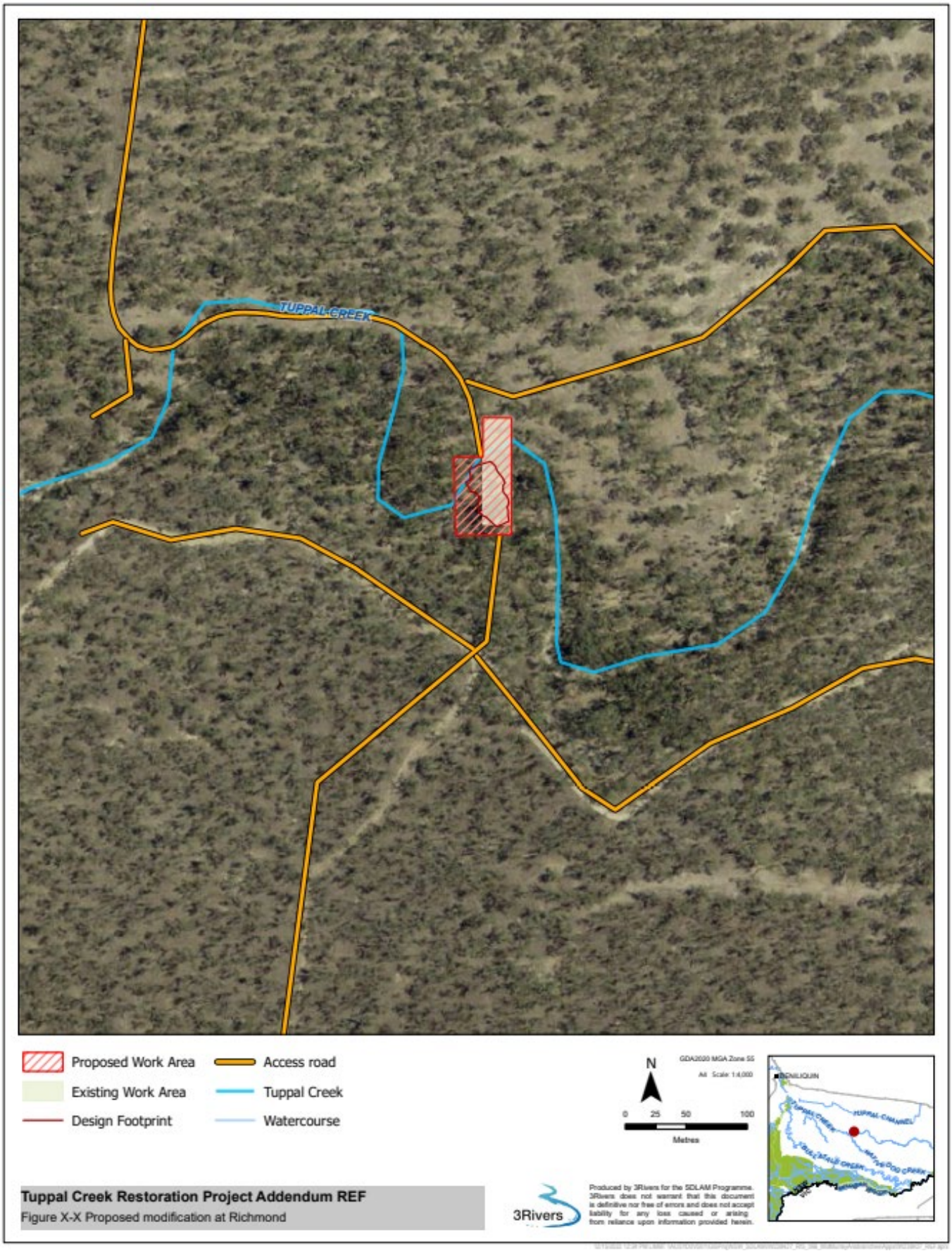

Figure 4 Proposed modification – Richmond crossing (3T)

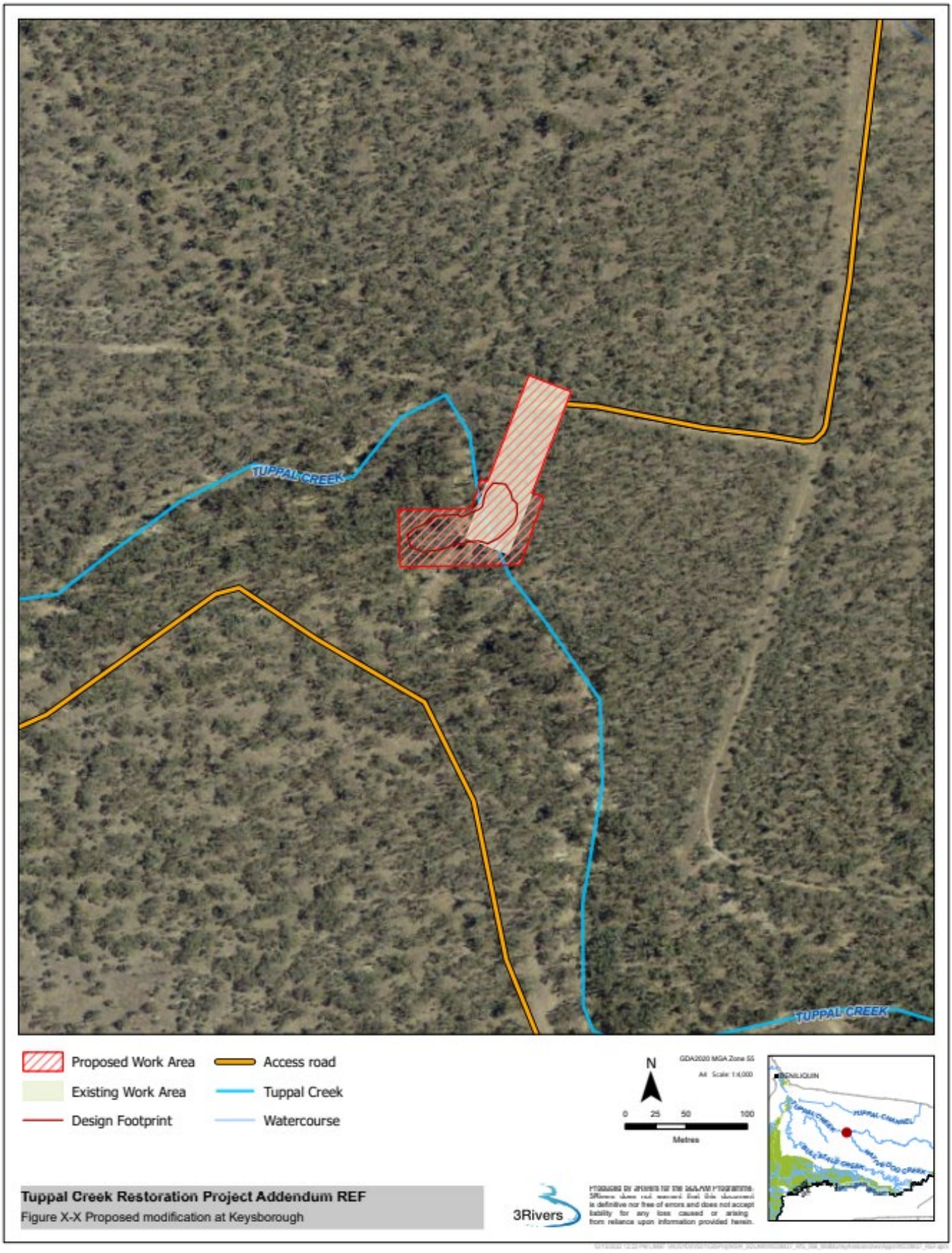

Figure 5 Proposed modification – Keysborough crossing (4T)

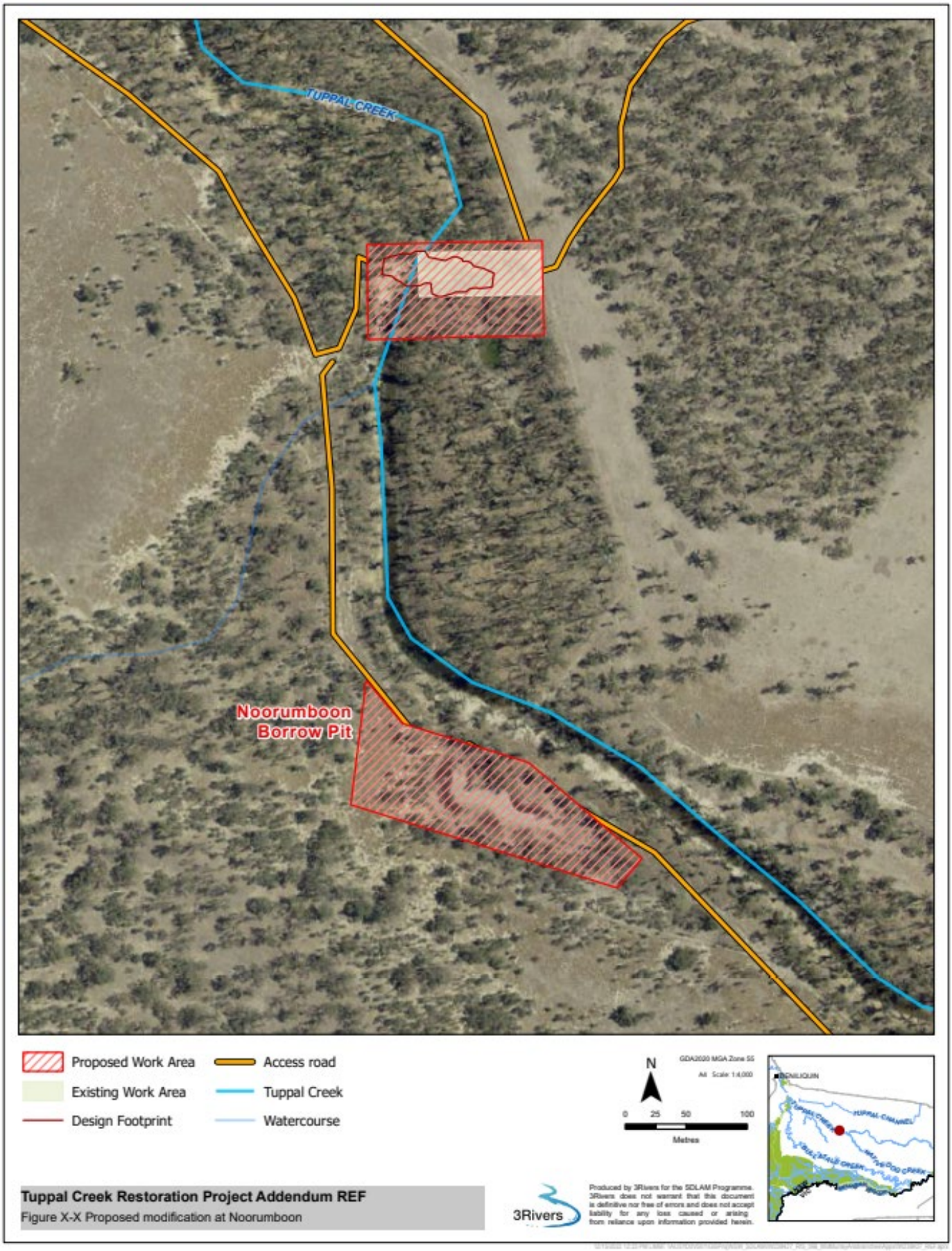

Figure 6 Proposed modification – Noorumboon crossing (5T) and borrow pit

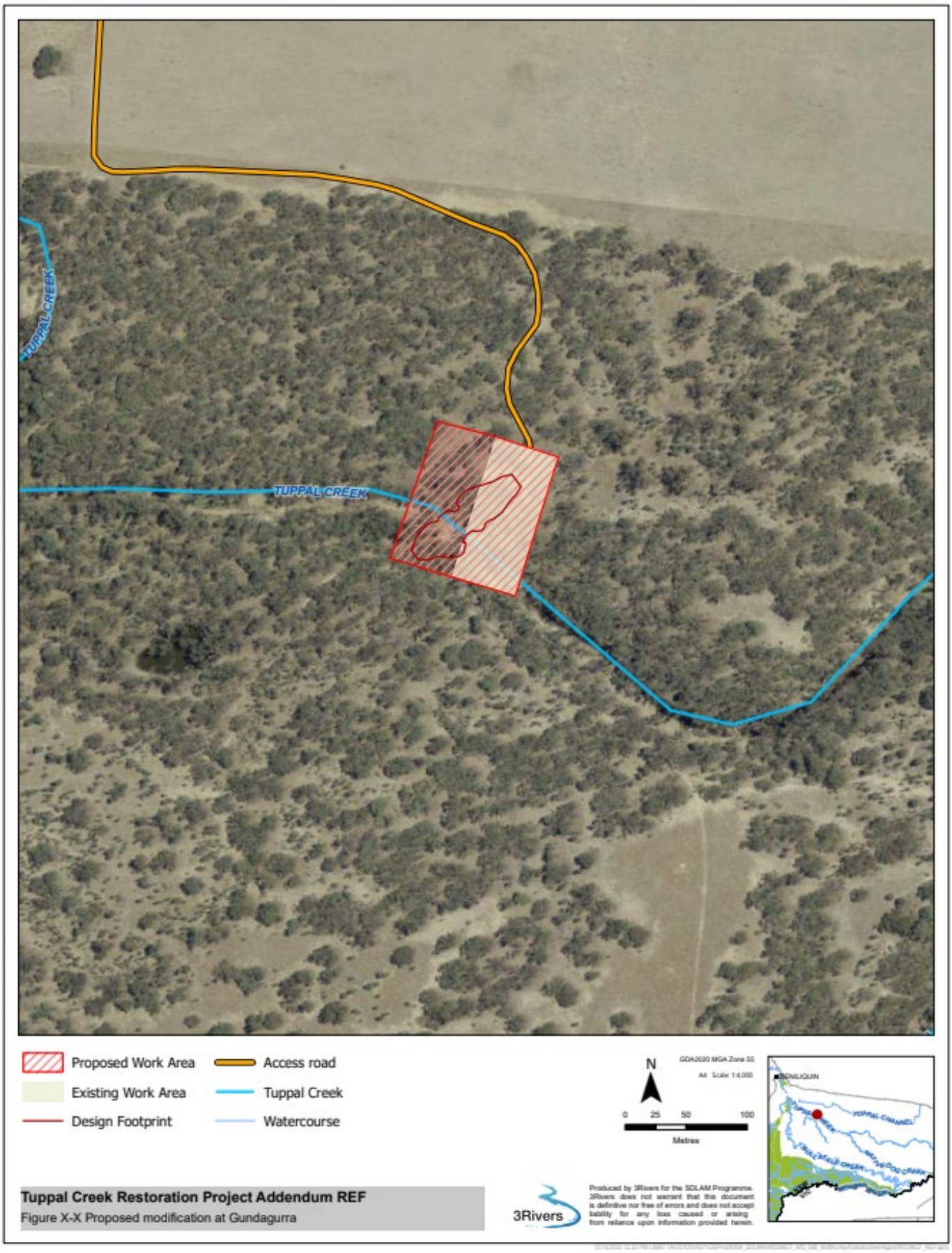

Figure 7 Proposed modification – Gundagurra crossing (7T)

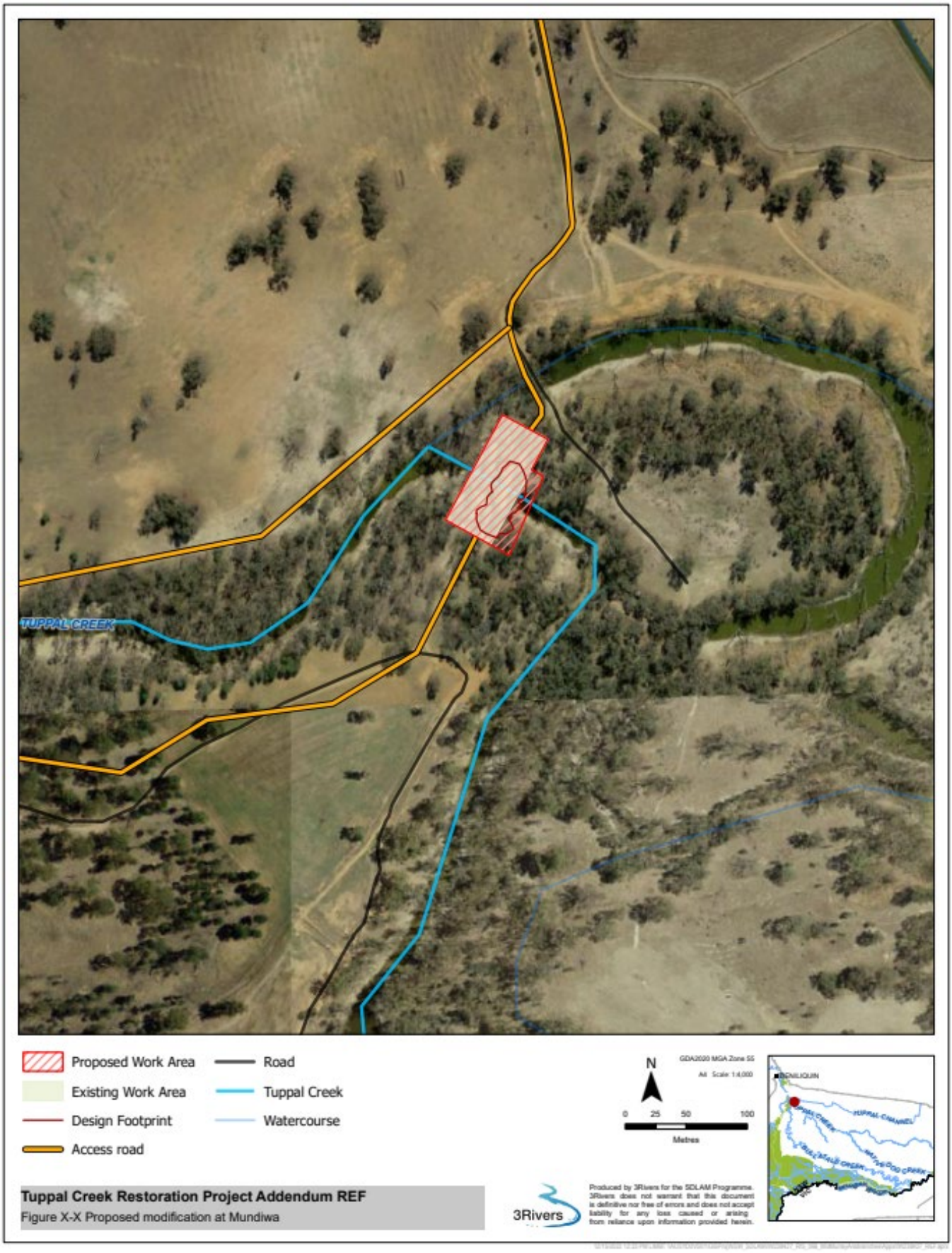

Figure 8 Proposed modification – Mundiwa crossing (8T)

Figure 9 Proposed modification – Mundiwa Drain borrow pit

Figure 10 Proposed modification – Mundiwa Airstrip borrow pit

3.2 Construction methodology

The general construction methodology is described in Section 6.2 of the existing REF. The existing REF assumed that fill material would be imported to site for the construction of the approaches to the crossing structures. The modification proposes borrow pits near the crossing locations as a source of fill material.

Aside from the need for greater ground disturbance, borrow pits and the removal of additional vegetation (as outlined in Section 6.1 of this Addendum REF), no significant changes to the construction methodology would be required as a result of the proposed modification.

3.3 Access and ancillary facilities

Access and ancillary facility arrangements are generally described in Section 6.2 of the existing REF.

The existing REF noted that the existing track network allows for access to all crossing sites. During constructability reviews, it was identified that works at the crossing sites would require access to both sides of the creek banks. As such, the contractor's construction staging may require a new temporary sidetrack to be constructed within the waterway at some, or all of the crossing sites. The sidetracks would be located directly next to the crossings, within the proposed work areas and would involve installation of a culvert to maintain flows/ fish passage during construction. Safeguards to mitigate impacts of the proposed sidetracks are included in Section 7.2 of this Addendum REF.

Access to the proposed borrow pit locations would be via existing unsealed access tracks, as determined in consultation with the relevant landholders. If required to maintain access during wet weather, addition of crushed rock material or minor grading of sections of the tracks within the existing disturbance footprint would be undertaken, as determined by the contractor. No widening of access tracks would be required.

Any additional ancillary facilities would be located entirely within the extended work areas and would not require further vegetation removal to that assessed in this Addendum REF. Ancillary facilities would include:

- Amenities facilities
- Site office
- Facilities for waste disposal
- Equipment and materials laydown.

Landholders have requested that any excess resources generated during construction such as timber, fill and rock material be kept on the property. Suitable temporary location/s would be determined by the landholder in already highly disturbed area/s accessible via existing tracks. The construction contractor would be responsible for moving the material to the nominated location/s and once placed there, it would become the property and responsibility of the landholder. If agreed to by the landholder, excess fill and rock material may also be placed within the borrow pit on their property (for properties where borrow pits are proposed).

3.4 Operation

The proposed modification includes the use of borrow pits, which would be repurposed as farm dams during operation.

The proposed modification would not impact on the operation of the project crossings. Following construction completion, the project would be operated in accordance with the provisions of the existing REF.

3.5 Timing and staging

The proposed modification would be carried out during construction of the project as described in the existing REF. Section 6.2 of the existing REF states that:

"The construction timetable for the proposed activities is unknown at this stage. It is recommended that these are undertaken during periods of low flow and outside the breeding season for the Superb Parrot (September to January). While there are no residential areas adjacent to the work sites, the risk of disturbance to third parties is considered low. Working hours during the activity will be between 7 am and 5 pm Monday to Saturday."

It is expected that construction of the project, would commence in early 2024 and be completed by mid-2024, conditions permitting.

3.6 Capital investment value

The existing REF does not describe the capital investment value of the proposed works. Given the nature of the works, it is estimated that the approved project would have a capital investment value of about $4.5 million. The proposed modification would have a negligible impact on the capital investment value of the project.

3.7 Public utility adjustment

The proposed modification would not impact any additional public utilities to those identified in the existing REF. The existing REF does not identify any public utilities which would be impacted by the proposed works.

3.8 Land access and acquisition

The proposed modification would not impact land access or acquisition. Land access would be carried out in accordance with the existing REF, in consultation with the landowners.

Since the determination of the existing REF, Water - Infrastructure have undertaken further consultation with Edward River Council regarding asset ownership of the Gollops Road crossing (2T). While the northern side of the crossing would be partially within the road reserve, Edward River Council has agreed that the asset would be owned by the Tuppal Station private landholder and would also provide continued access to the neighbouring private property to the west.

4 Statutory context

4.1 NSW legislation

4.1.1 Environmental Planning and Assessment Act 1979

This Addendum REF has been prepared in accordance with Part 5 Division 5.1 of the EP&A Act. It examines and takes into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed modification, in accordance with section 5.5 of the EP&A Act.

Section 171(1) of the EP&A Regulation requires that a determining authority must take into account the environmental factors specified in the environmental factors guidelines that apply to the activity. Accordingly, this REF has taken into account the environmental factors specified in the Guidelines for Division 5.1 Assessments (Department of Planning and Environment, 2022).

4.1.2 Environmental Planning Instruments

State Environmental Planning Policy (Transport and Infrastructure) 2021

State Environmental Planning Policy (Transport and Infrastructure) 2021 (Transport and Infrastructure SEPP) is the key legislative framework which facilitates the effective delivery of infrastructure across the state, replacing State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) on 1 March 2022.

The existing REF was approved as development not requiring consent in accordance with Division 17 (roads and traffic) and Division 25 (waterway or foreshore management activities) of the ISEPP. While the provisions of the ISEPP are no longer in force, the works described and approved by the existing REF are considered consistent with the equivalent Division 17 (roads and traffic) and Division 25 (waterway or foreshore management activities) of the Transport and Infrastructure SEPP.

The proposed modification is required to extend the proposed work areas for the Tuppal Creek Restoration Project Roadway Crossing Works, and is considered consistent with the nature of the works described in the existing REF. The proposed modification is therefore considered to be works for the purpose of roads or road infrastructure activities and/or development for the purpose of waterway or foreshore management activities under Division 17 and Division 25 of the Transport and Infrastructure SEPP respectively.

Under the Conargo LEP, development for the purpose of roads and/or environmental protection works (in connection with waterway or foreshore management activities) may be carried out on land zoned RU1 without development consent. Under the Murray LEP, development for the purpose of roads may be carried out on land zoned RU1 with development consent and development for the purpose of environmental protection works may be carried out without development consent. Regardless of the provisions of the Conargo and Murray LEPs, in accordance with Clause 2.108 and Clause 2.164 of the Transport and Infrastructure SEPP respectively, a public authority may carry out development for the purpose of roads or road infrastructure facilities and/or waterway or foreshore management activities on any land without consent.

The proposed modification is therefore considered to be development permitted without consent under Division 17 and Division 25 of the Transport and Infrastructure SEPP and may be assessed under Division 5.1 of the EP&A Act.

State Environmental Planning Policy (Biodiversity and Conservation) 2021

Chapter 5 of State Environmental Planning Policy (Biodiversity and Conservation) 2021 (Biodiversity and Conservation SEPP) contains provisions for environmental approvals and consultation relating to activities proposed on the riverine land of the Murray River (formerly administered under the Murray Regional Environmental Plan No 2–Riverine Land).

Although there are no approval requirements under the Chapter 5 of the Biodiversity and Conservation SEPP that are relevant to the proposed modification, provisions to carry out consultation are considered in Chapter 5 of this Addendum REF.

4.1.3 Fisheries Management Act 1994

The FM Act provides for the conservation, protection and management of fisheries, aquatic systems and habitats in NSW. The FM Act establishes mechanisms for the listing of threatened species, populations and ecological communities or key threatening processes, the declaration of critical habitat and the consideration and assessment of threatened species impacts in the development assessment process.

Threatened species conservation

The FM Act includes provisions to list threatened species of fish and marine vegetation, including endangered populations, ecological communities and key threatening processes. If the proposed modification is likely to significantly impact on the threatened species, populations or ecological communities, then a species impact statement is required.

The proposed modification is considered unlikely to significantly impact on a threatened species, population or ecological community (refer to Section 6.1 and Appendix D).

Dredging and reclamation

The FM Act contains provisions to conserve the biodiversity of fish and aquatic vegetation and to protect fish habitat by providing for the management of dredging work and reclamation work. Dredging includes the excavation, moving and removal of material from areas such as streams, wetlands or lakes. Reclamation includes filling, depositing material or draining water from streams, wetlands or lakes.

Any new bridges, culverts, causeways (both piped and un-piped) or other road-crossings of waterways (temporary or permanent) which require placing material on the bed of the waterway (i.e. reclamation) and/or which may obstruct the free passage of fish would require notification to DPI Fisheries under the FM Act. The removal of woody debris and snags from a watercourse is considered dredging under the FM Act and also requires notification to DPI Fisheries.

Before carrying out dredging or reclamation work, a public authority must give the Minister notice in writing of the proposed work (section 199(1)(a)) and consider any matters that are raised by the Minister within 21 days of the notice (section 199(1)(b)). Further notification of the Minister is required where Water - Infrastructure proposes to carry out the works despite any matters raised by the Minister (section 199(2)).

As identified in Section 1.1.2 and provided in Appendix C, a notification under section 199 of the FM Act for the Tuppal Creek Restoration Project has previously been issued to DPI (Fisheries), and conditions provided. The proposed modification is not expected to increase the amount of dredging and reclamation required to construct the project by any more than a minor degree. However, condition No. 2 of the DPI (Fisheries) permit states the following:

'EES must ensure that all works authorised are restricted to the works area indicated in your email dated 15 May 2020 and associated REF. Other works which have not been described, excepting those activities required by this concurrence, are not to be undertaken without written consultation with DPI Fisheries.'

As the conditions provided by DPI (Fisheries) are specific to the work areas assessed in the existing REF, an updated notification under section 199 of the FM Act should be provided to DPI (Fisheries) for the proposed modification before construction commences.

In addition, any works, including the temporary sidetracks proposed across waterways and associated relocation of woody debris or snags may constitute dredging and reclamation under the FM Act. Where sidetracks are proposed across waterways DPI Fisheries must be consulted to determine whether any further assessment or approval under the FM Act is required.

Fish passage

The FM Act includes provisions to ensure the maintenance and restoration of fish passage as part of the construction of new, or the modification of existing, in-stream structures. Section 219 of the Act

provides that works within a waterway that may result in the temporary or permanent blockage of fish passage require a permit.

As discussed above, proposals that will require dredging or reclamation works (as defined under the FM Act) or which would result in temporary or permanent barriers to fish passage must be discussed with DPI Fisheries to determine whether any further assessment or approval or formal notification is required under the FM Act.

Any new culverts proposed as part of the sidetrack construction would require notification to DPI Fisheries under the FM Act, and would need to be designed in consultation with DPI Fisheries.

In addition, if fish rescue and translocations are required as part of coffer dam and dewatering, they would be released into adjacent waters downstream of the proposed work areas. Translocating fish to other waterways presents a risk of spreading disease and non-target species, and would require a permit under section 37 of the FM Act.

4.2 Other NSW legislation

Other NSW legislation applicable to the proposed modification is discussed in Table 1

Table 1 Other NSW legislation applicable to the proposed modification

Legislation	Relevance to the proposed modification
Heritage Act 1977	The *Heritage Act 1977* aims to ensure that the heritage of NSW is adequately identified and conserved. The Act provides protection to items, such as places, buildings, works, relics, moveable objects, precincts or land that have been identified, assessed and listed on the State Heritage Register. Section 60 of the Act requires approval from the Heritage Council of NSW for certain works to items that are listed on the State Heritage Register. The proposed modification would not impact any items listed on the State Heritage Register (refer to Section 6.3).
Biodiversity Conservation Act 2016 (BC Act)	The BC Act provides for listing of threatened species, populations and ecological communities as well as critical habitat and key threatening processes. An assessment of the expected impacts of the proposed modification on biodiversity is provided in Section 6.1. The proposed modification is not expected to have a significant impact on threatened species, populations and ecological communities, critical habitat, or key threatening processes listed under the BC Act. The proposed modification would not trigger the Biodiversity Offset

Legislation	Relevance to the proposed modification
	Scheme, and a species impact statement or a biodiversity development assessment report is not required.
Water Management Act 2000 (WM Act)	Section 91E of the WM Act sets out provisions relevant to undertaking controlled activities (certain activities carried out on waterfront land, such as erecting structures, removing and depositing material and activities which affect water flow). Section 91E outlines that carrying out a controlled activity in, on or under waterfront land without a controlled activity approval is an offence that is subject to the Tier 2 penalty. However, Clause 38 of the Water Management (General) Regulation 2011 specifies that a public authority is exempt from section 91E (1) of the WM Act in relation to all controlled activities that it carries out in, on or under waterfront land. As Water - Infrastructure is a public authority and is the proponent for the proposed modification, a controlled activity approval under section 91E of the WM Act is not required. In addition, appropriate approvals under the WM Act would be sought for the use of proposed borrow pits as farm dams following construction, where borrow pits would not meet the requirements for landholder harvestable rights.
National Parks and Wildlife Act 1974 (NPW Act)	The NPW Act includes provisions to protect Aboriginal objects and places, making it an offence to harm or desecrate such objects or places (section 86) unless authorised by an Aboriginal heritage impact permit (section 87). The issue of an Aboriginal heritage impact permit (AHIP) is authorised under section 90 of the NPW Act. Water - Infrastructure would seek an AHIP from Heritage NSW covering the entire proposed work areas, except Richmond crossing, and including to destroy the Mundiwa Isolated Artefact (AHIMS #54-6-0085).
Protection of the Environment Operations Act 1997 (POEO Act)	The POEO Act provides for the issuance of an environment protection licence for scheduled activities (being activities listed in Schedule 1 of the POEO Act), and generally the control of water, air and noise pollution and the management of wastes. The proposed modification is not considered a scheduled activity under the POEO Act. Under the POEO Act, the construction contractor and Water - Infrastructure are obliged to notify the NSW Environment Protection Authority if a pollution incident occurs that causes or threatens material harm to the environment.

4.3 Commonwealth legislation

Commonwealth legislation applicable to the proposed modification is discussed in Table 2.

Table 2 Commonwealth legislation relevant to the proposed modification

Legislation	Relevance to the proposed modification
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	The EPBC Act prescribes the Commonwealth's role in environmental assessment, biodiversity conservation and the management of protected areas and species, populations and communities and heritage items. The approval of the Commonwealth Minister for the Environment and Water is required for an action which has, would have, or is likely to have, a significant impact on 'matters of national environmental significance'. Any potential to significantly impact on these matters is likely to require a referral to the DCCEEW, for a decision as to whether it is a controlled action requiring approval under the EPBC Act. The impact of the Tuppal Creek Restoration Project on matters of national environmental significance is discussed in Section 8 of the existing REF. The proposed modification is considered consistent with the assessment provided in the existing REF and is therefore not expected to impact on matters of national environmental significance.
Native Title Act 1993 (NT Act)	Native title is the recognition that Aboriginal and Torres Strait Islander people have rights and interests to land and waters according to their traditional law and customs as set out in Australian Law. Native title is governed by the NT Act. An indigenous land use agreement, established under the NT Act, is a voluntary agreement between native title parties and other people or bodies about the use and management of areas of land and/or waters. It can be made over areas where native title has been determined to exist in at least part of the area, where a native title claim has been made or no native title claim has been made. A search of the National Native Title Tribunal registers carried out on 28/02/2023 did not reveal any current native title applications, determinations or indigenous land use agreements relevant to the proposed modification.

4.4 Summary of licences and approvals

The proposed modification is considered to be development for the purpose of a roads or road infrastructure activities and/or development for the purpose of waterway or foreshore management activities and is being carried out by or on behalf of a public authority. Under Division 17 and Division 25 of the Transport and Infrastructure SEPP, the proposed modification is permissible without consent. The proposed modification is not State significant infrastructure or State significant development. The proposed modification can be assessed under Division 5.1 of the EP&A Act.

Water - Infrastructure is the proponent and determining authority for the proposed modification. This Addendum REF fulfils Water – Infrastructure's obligations under section 5.5 of the EP&A Act, including to examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment as a result of the proposed modification.

A summary of the licences and approvals required for the proposed modification is provided in Table 3.

Table 3 summary of licences and approvals

Legislation	Key considerations	Summary of requirements
Fisheries Management Act 1994	A notification under section 199 of the FM Act for the project has previously been issued to DPI (Fisheries), and conditions provided (Appendix C). Existing conditions state that works outside the previously approved areas require further written consultation with DPI (Fisheries). Additionally, activities involved in construction of the proposed temporary sidetracks consist of dredging and reclamation under the FM Act.	Under section 199 of the FM Act and existing REF conditions provided, DPI (Fisheries) must be notified of changes in work areas and other works that have not been captured by the existing REF. This notification should also include discussion of the proposed sidetracks.
	Proposals which would result in temporary or permanent barriers to fish passage must be discussed with DPI Fisheries to determine whether any further assessment or approval or formal notification is required under the FM Act. The existing REF identified potential temporary barriers to fish passage during construction through the use of coffer dams. Additionally,	Temporary or permanent blockage of fish passage by a public authority requires a notification to DPI Fisheries under section 199 of the FM Act. The proposed instream temporary works required for construction should be discussed with DPI Fisheries. A permit to temporarily block fish passage during construction may be required,

Legislation	Key considerations	Summary of requirements
	the modification may pose obstructions to fish passage (i.e. the proposed sidetracks). Any fish rescue and translocations should be released into adjacent waters downstream of the proposed work areas.	depending on the outcomes of consultation with DPI Fisheries. Translocating fish to other waterways presents a risk of spreading disease and non-target species, and would require a permit under section 37 of the FM Act.
Water Management Act 2000	Harvestable rights allow landholders (owners or occupiers of land) to capture and store a proportion of the rainfall runoff from their landholding in one or more harvestable rights dams without a water access licence, water supply work approval or water use approval under the WM Act. Harvestable rights dams can be located on non-permanent minor streams, hillsides or gullies. They cannot be located on or within 40 metres of a third-order or higher order stream, a declared floodplain, or within 3 kilometres upstream of a wetland of international importance (listed under the Ramsar Convention). Each landholding has a maximum harvestable right dam capacity, which depends upon the location and size of the landholding.	Appropriate approvals under the WM Act would be sought for the use of proposed borrow pits as farm dams following construction, where borrow pits would not meet the requirements for landholder harvestable rights.
National Parks and Wildlife Act 1974	The proposed modification would result in impacts to known Aboriginal cultural heritage sites protected under section 86 of the NPW Act.	Water - Infrastructure would seek an AHIP under section 90 of the NPW Act from Heritage NSW, covering the entire proposed work areas, except Richmond crossing (3T), and including to destroy the Mundiwa Isolated Artefact (AHIMS #54-6-0085).

5 Consultation

5.1 Community and stakeholder consultation

Consultation carried out for the project is described in Section 4 and Section 5 of the existing REF.

Since the determination of the existing REF, Water -Infrastructure have undertaken further consultation with Edward River Council regarding asset ownership of the Gollops Road crossing (2T) as discussed in Section 3.8.

Additional consultation with Aboriginal stakeholders as part of the ACHAR addendum preparation has been undertaken in accordance with the Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW, 2010). As part of the collaboration with Aboriginal stakeholders, a barbeque and presentation was also held on 21 June 2023, where the SDLAM program (including Tuppal Creek) Aboriginal cultural heritage surveys/ test excavation findings were presented and next steps discussed.

Water - Infrastructure will continue to consult with impacted landowners and other stakeholders during design and construction.

5.2 Transport and Infrastructure SEPP consultation

Part 2.2, Division 1 of the Transport and Infrastructure SEPP contains provisions for consultation with public authorities prior to the commencement of certain types of development. Table 4 lists the consultation requirements under the Transport and Infrastructure SEPP.

Table 4 Transport and Infrastructure SEPP Consultation

Is consultation required the Transport and Infrastructure SEPP?	Yes	No
Will the proposed activity have a substantial impact on stormwater management services provided by a council?.	☐	☒
Is the proposed activity likely to generate traffic to an extent that will strain the capacity of the road system in a local government area?.	☐	☒
Will the proposed activity involve connection to, and a substantial impact on the capacity of, any part of a sewerage system owned by a council?	☐	☒

Is consultation required the Transport and Infrastructure SEPP?	Yes	No
Will the proposed activity involve connection to, and use of a substantial volume of water from, any part of a water supply system owned by a council?	☐	☒
Will the proposed activity involve the installation of a temporary structure on, or the enclosing of, a public place that is under a council's management or control that is likely to cause a disruption to pedestrian or vehicular traffic that is not minor or inconsequential?	☐	☒
Will the proposed activity involve excavation that is not minor or inconsequential of the surface of, or a footpath adjacent to, a road for which a council is the roads authority under the *Roads Act 1993* (if the public authority that is carrying out the development, or on whose behalf it is being carried out, is not responsible for the maintenance of the road or footpath)?	☐	☒
Is the proposed activity likely to affect the heritage significance of a local heritage item, or of a heritage conservation area, that is not also a State heritage item, in a way that is more than minor or inconsequential?	☐	☒
Is the proposed activity located on flood liable land? If so, will the works change flooding patterns to more than a minor extent?	☐	☒
Is the proposed activity land that is within a coastal vulnerability area and is inconsistent with a certified coastal management program that applies to that land?	☐	☒
Is the proposed activity located on flood liable land and permissible without development consent under the following provision of Part 2.3 of the Transport and Infrastructure SEPP: (a) Division 1 (Air transport facilities), (b) Division 2 (Correctional centres and correctional complexes), (c) Division 6 (Emergency services facilities and bush fire hazard reduction), (d) Division 10 (Health services facilities), (e) Division 14 (Public administration buildings and buildings of the Crown), (f) Division 15 (Railways), (g) Division 16 (Research and monitoring stations), (h) Division 17 (Roads and traffic), (i) Division 20 (Stormwater management systems). * This section does not apply in relation to the carrying out of minor alterations or additions to, or the demolition of, a building, emergency works or routine maintenance.	☐	☒

Is consultation required the Transport and Infrastructure SEPP?	Yes	No
Is the proposed activity located adjacent to a national park, nature reserve or other area reserved under the *National Parks and Wildlife Act 1974*, or on land acquired under that Act?	☐	☒
Is the proposed activity located on land in Zone E1 National Parks and Nature Reserves?	☐	☒
Does the proposed activity include a fixed or floating structure in or over navigable waters?	☐	☒
Will the proposed activity increase the amount of artificial light in the night sky within the dark sky region as identified on the dark sky region map?	☐	☒
Is the proposed activity located on defence communications facility buffer land within the meaning of clause 5.15 of the Standard Instrument?	☐	☒
Is the proposed activity within a mine subsidence district within the meaning of the Mine Subsidence Compensation Act 1961?	☐	☒

5.3 Biodiversity and Conservation SEPP consultation

Clause 5.10(1) of the Biodiversity and Conservation SEPP provides that, for activities proposed within the riverine land of the River Murray, consultation must be carried out as follows:

> *(a) if development consent is required—by the consent authority before determining the development application, or*
>
> *(b) if development consent is not required—by the public authority or person carrying out the development, before carrying out the development.*

Clause 5.10(2) provides that consultation by an authority or person with a listed agency must be carried out as follows:

> *(a) The authority or person must write to the listed agency giving a description of the proposed development*
>
> *(b) The authority or person must request the listed agency to comment on the proposed development within 21 days from the date the agency receives the notice*
>
> *(c) The authority or person must consider any comments made on the proposed development by the listed agency within those 21 days.*

Clause 5.11(1) defines the general provisions for consultation under the Biodiversity and Conservation SEPP. The applicability of these provisions to the proposed modification is outlined in Table 5

Table 5 Biodiversity and Conservation SEPP consultation

Consultation under Biodiversity and Conservation SEPP (clause 5.11(1))	Response
(a) Where development is contrary to the aims, objectives or principles of this Chapter and may have a significant environmental effect along the Murray River—the P&D (Vic), C&NR (Vic) and the adjacent local Council in Victoria must be consulted.	Not applicable – The proposed modification is considered to be consistent with the aims and objectives of Chapter 5 of the Biodiversity and Conservation SEPP and is not expected to have a significant environmental effect along the Murray River.
(b) Where development may affect boating safety—Transport for NSW must be consulted.	Not applicable – The proposed modification would not affect boating safety.

As outlined in Table 5 consultation under the Biodiversity and Conservation SEPP is not required for the proposed modification.

5.4 Ongoing stakeholder and community consultation

Water - Infrastructure would continue to consult with impacted landowners and other stakeholders during design and construction as required.

6 Environmental assessment

6.1 Terrestrial biodiversity

A biodiversity assessment for the proposed modification is provided in the Tuppal Creek Restoration Project Roadway Crossing Works – Addendum Biodiversity Assessment Report (Appendix D).

As the operational and aquatic biodiversity impacts of the project are expected to be consistent with the assessment provided in the existing REF and biodiversity assessment, the addendum biodiversity assessment focusses on assessment of the expected direct construction impacts of the current design on terrestrial biodiversity values.

As discussed in Section 1.1.2, the existing REF and associated biodiversity assessment did not assess a defined design footprint (i.e. defined area of ground disturbance). During design development, it was identified that the vegetation impacts previously approved at the seven crossing locations would not be sufficient to allow for construction of the current design, and that further ground disturbance would be required. The Addendum Biodiversity Assessment Report has therefore assessed the revised total amount of vegetation removal required for the project, including the proposed modification, and supersedes the terrestrial biodiversity construction impact assessment in the previous assessment by Biosis. The following sections provide a summary of the assessment provided in Appendix D.

The assessment is supported by biodiversity surveys carried out by Biosis in 2019 and 3Rivers in 2022. Previous surveys performed by Biosis (2020) were carried out between 19-20 November 2019 and investigated the suitability of habitat for threatened species, ground-truthed vegetation communities and assessed vegetation likely to be removed within the study areas by Biosis (hereafter referred to as the previous study area).

A further survey was carried out by 3Rivers between 22-25 March 2022 and 7-9 March 2023 to provide an updated biodiversity assessment from the existing REF and identify the additional vegetation to be removed within the proposed work areas (refer to Figure 11 to Figure 18). The proposed work areas were used as the basis for the addendum biodiversity assessment study area (referred to as the study area in this chapter) and includes five additional borrow pit locations (refer to Figure 18 to Figure 23).

The addendum biodiversity assessment focuses on the revised total amount of vegetation clearing and plant community types (PCTs) associated with the study area at Tuppal Station (1T), Gollops Road (2T), Richmond (3T), Keysborough (4T), Noorumboon (5T), Gundagurra (7T), Mundiwa (8T) and

the borrow pit locations. As discussed in Section 2.2, the Arrawatta (6T) crossing study area did not required additional assessment from the existing REF.

The likely presence of threatened species was determined through habitat assessment, taking a precautionary approach likely to include species that are difficult to detect (i.e. cryptic species). A species was assumed to be present if suitable habitat was observed in the study area, and if that species was known to occur regionally. No detailed floristic surveys or fauna surveys were carried out.

The addendum biodiversity assessment is based on a worst-case scenario, which assumes that all vegetation within the study areas would be removed during construction of the proposed modification. The actual extent of vegetation removal required for the proposed modification would most likely be lower than what has been assessed in this Addendum REF. Opportunities to minimise vegetation removal required for the proposed modification would be explored during construction of the proposed modification.

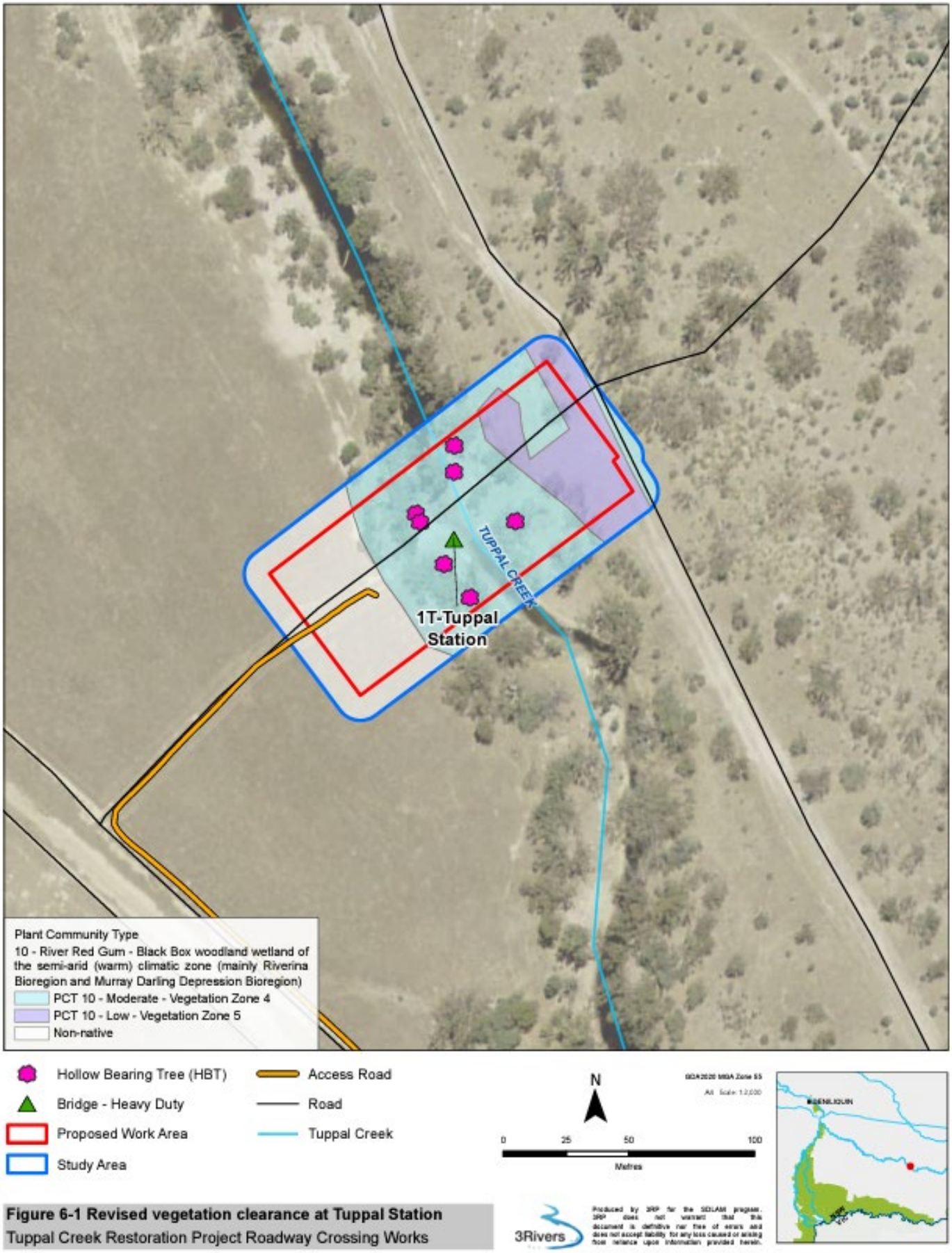

Figure 6-1 Revised vegetation clearance at Tuppal Station
Tuppal Creek Restoration Project Roadway Crossing Works

Figure 11 Study area and PCTs at Tuppal Station crossing (1T)

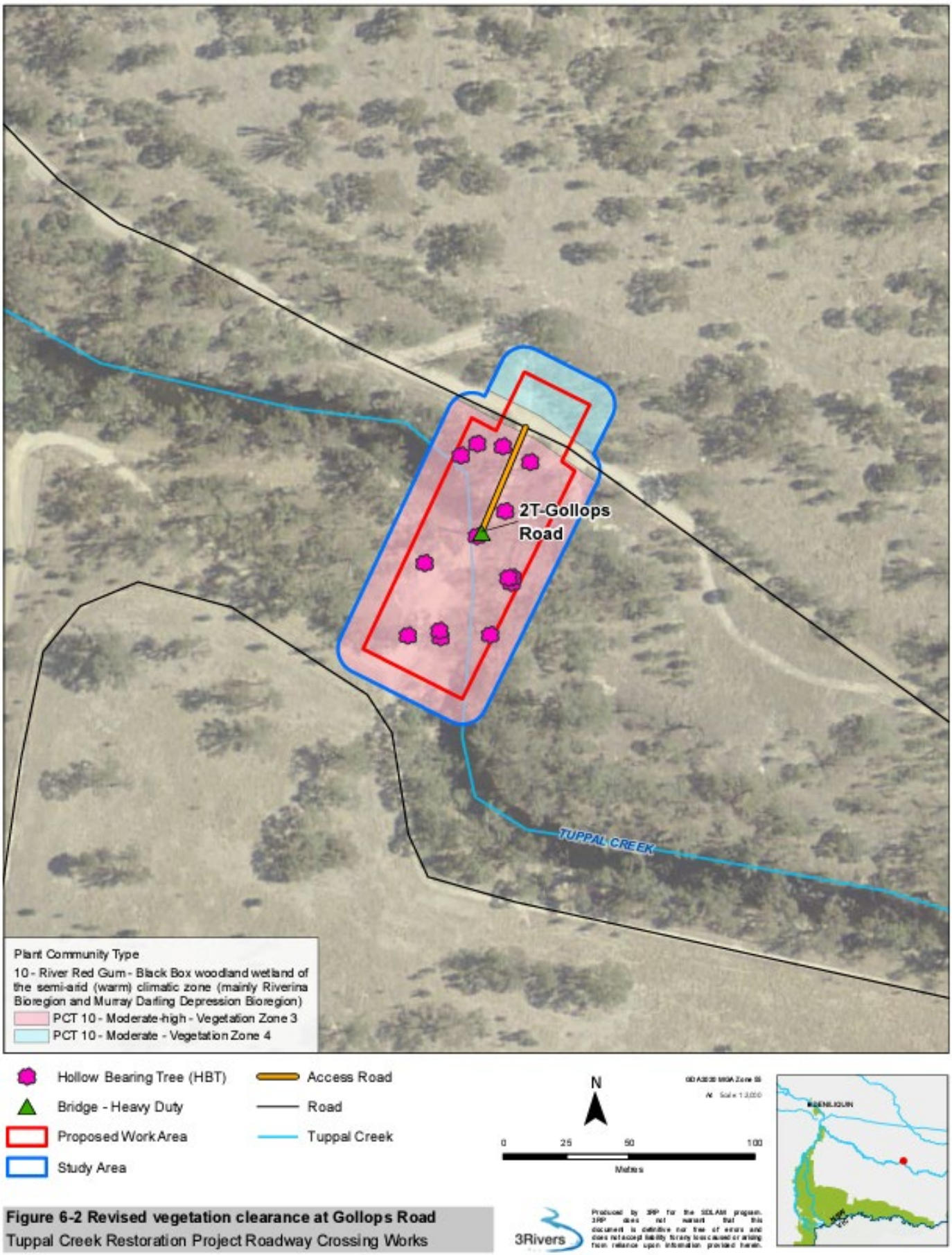

Figure 6-2 Revised vegetation clearance at Gollops Road
Tuppal Creek Restoration Project Roadway Crossing Works

Figure 12 Study area and PCTs at Gollops Road crossing (2T)

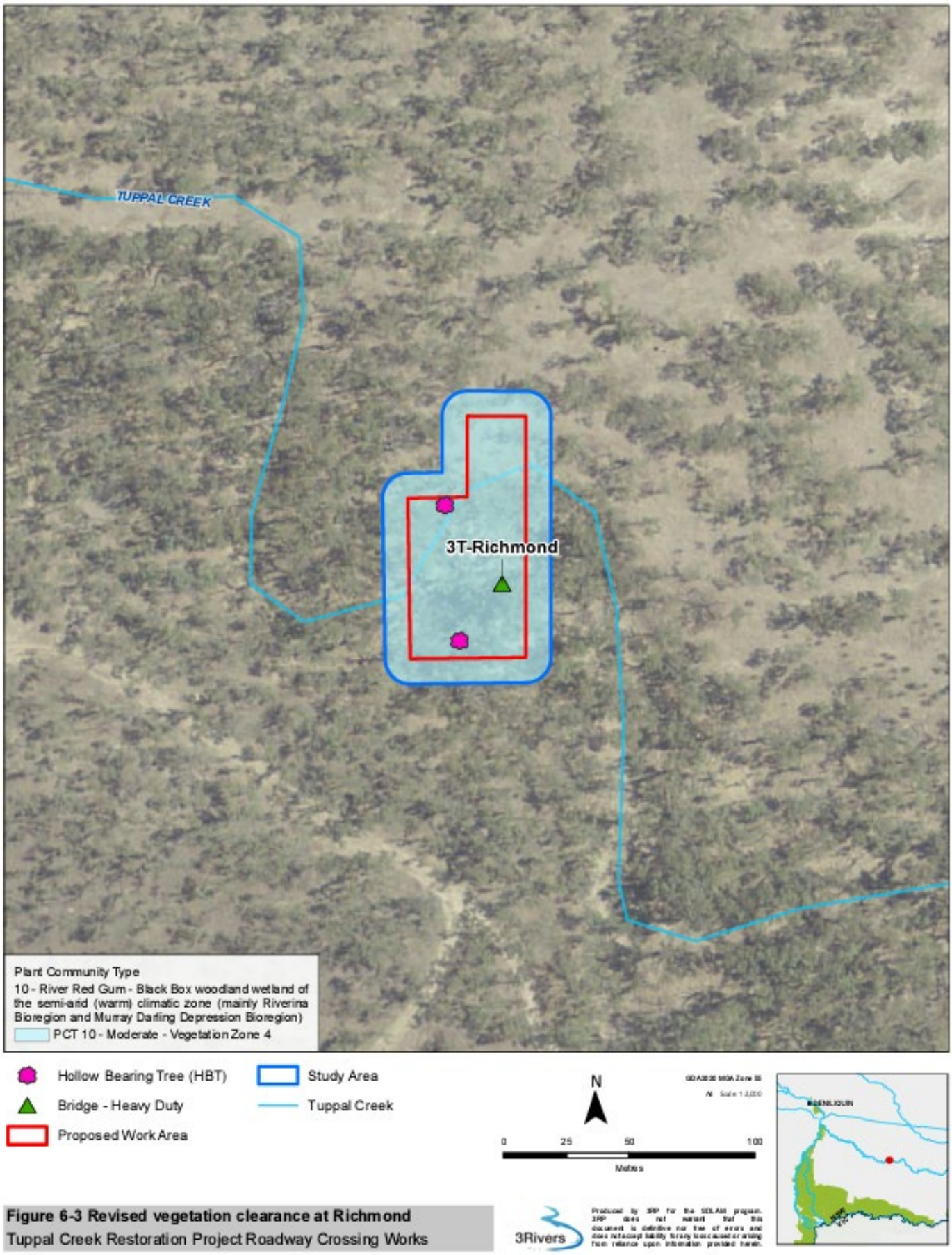

Figure 13 Study area and PCTs at Richmond crossing (3T)

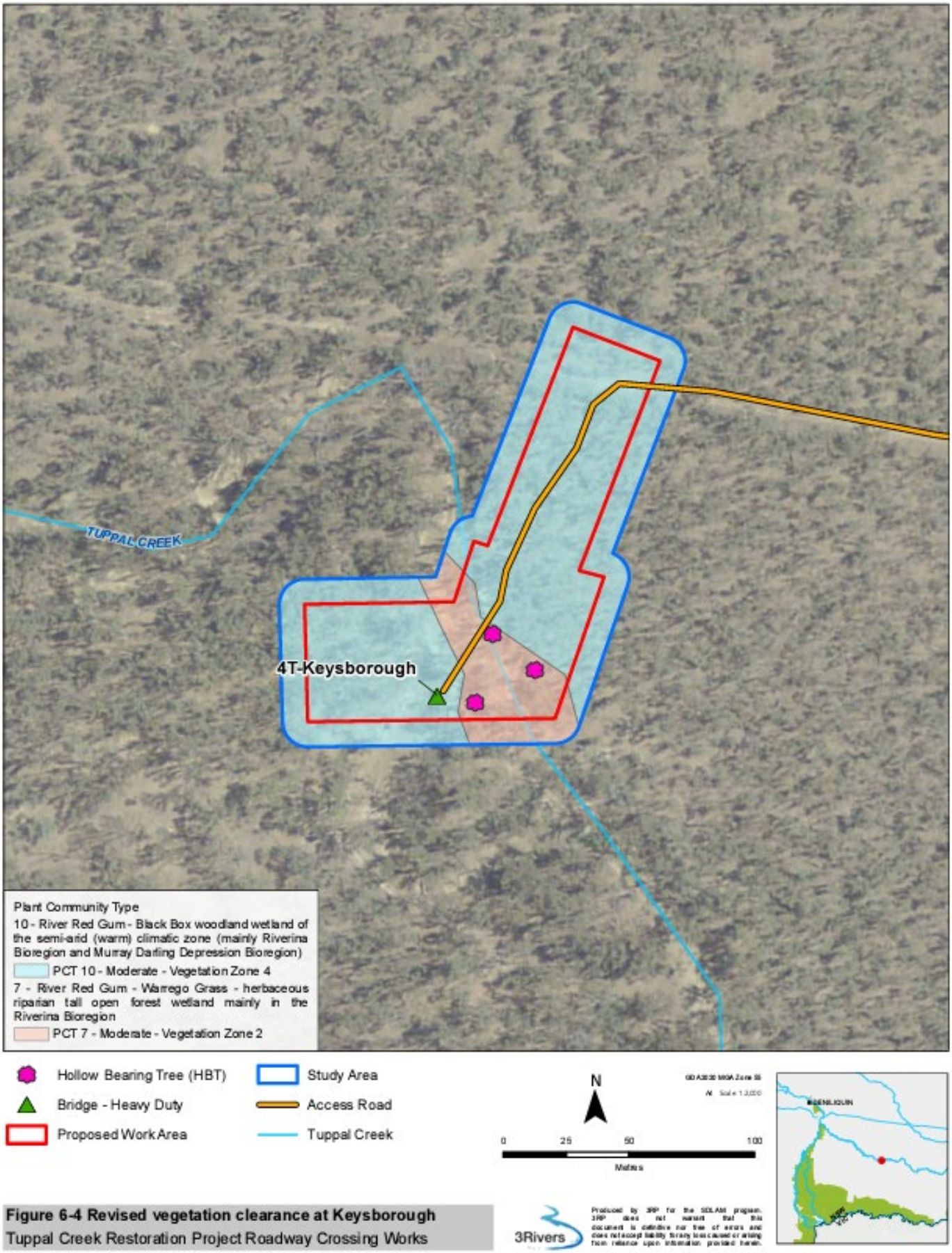

Figure 14 Study area and PCTs at Keysborough crossing (4T)

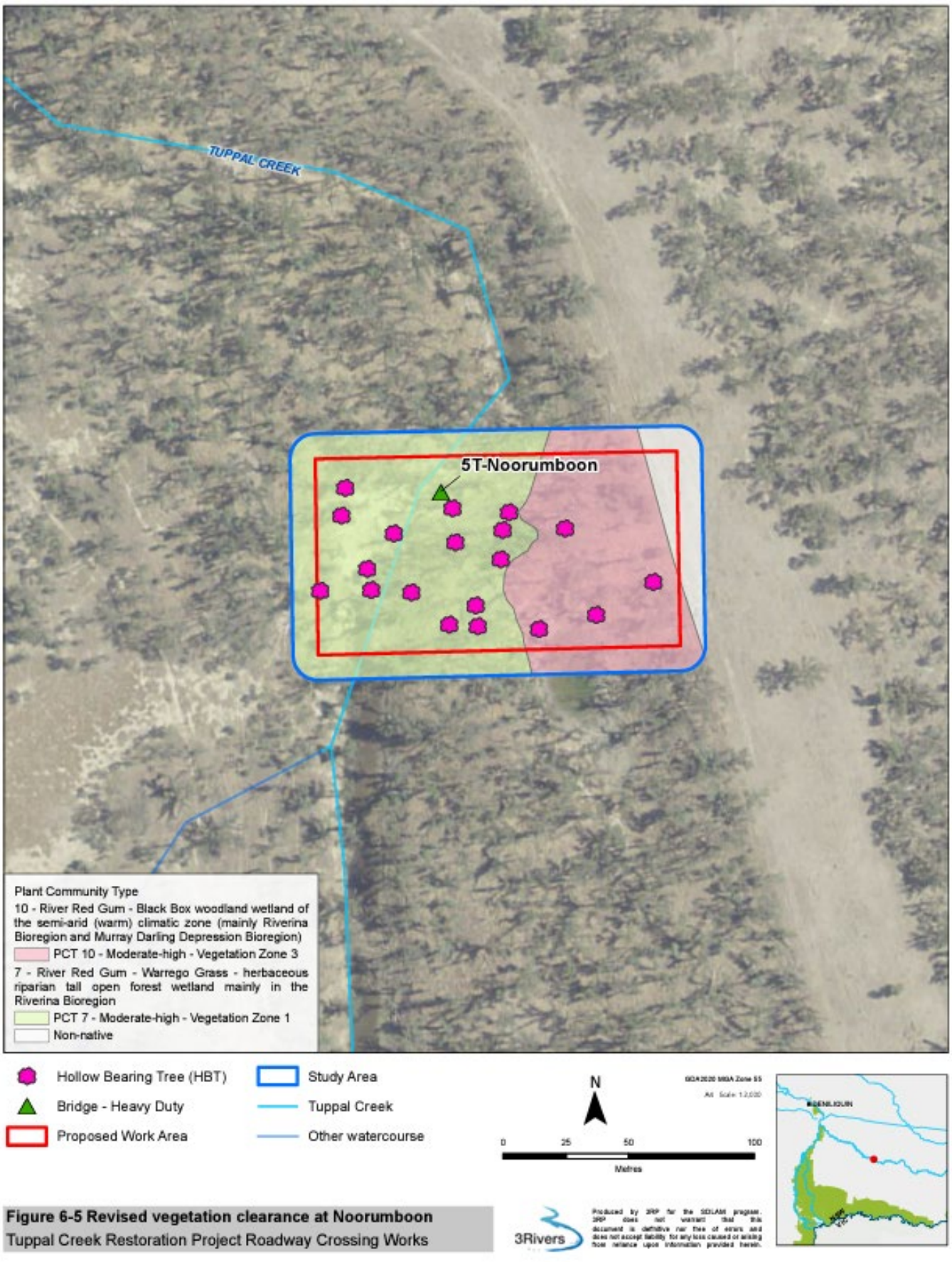

Figure 6-5 Revised vegetation clearance at Noorumboon
Tuppal Creek Restoration Project Roadway Crossing Works

Figure 15 Study area and PCTs at Noorumboon crossing (5T)

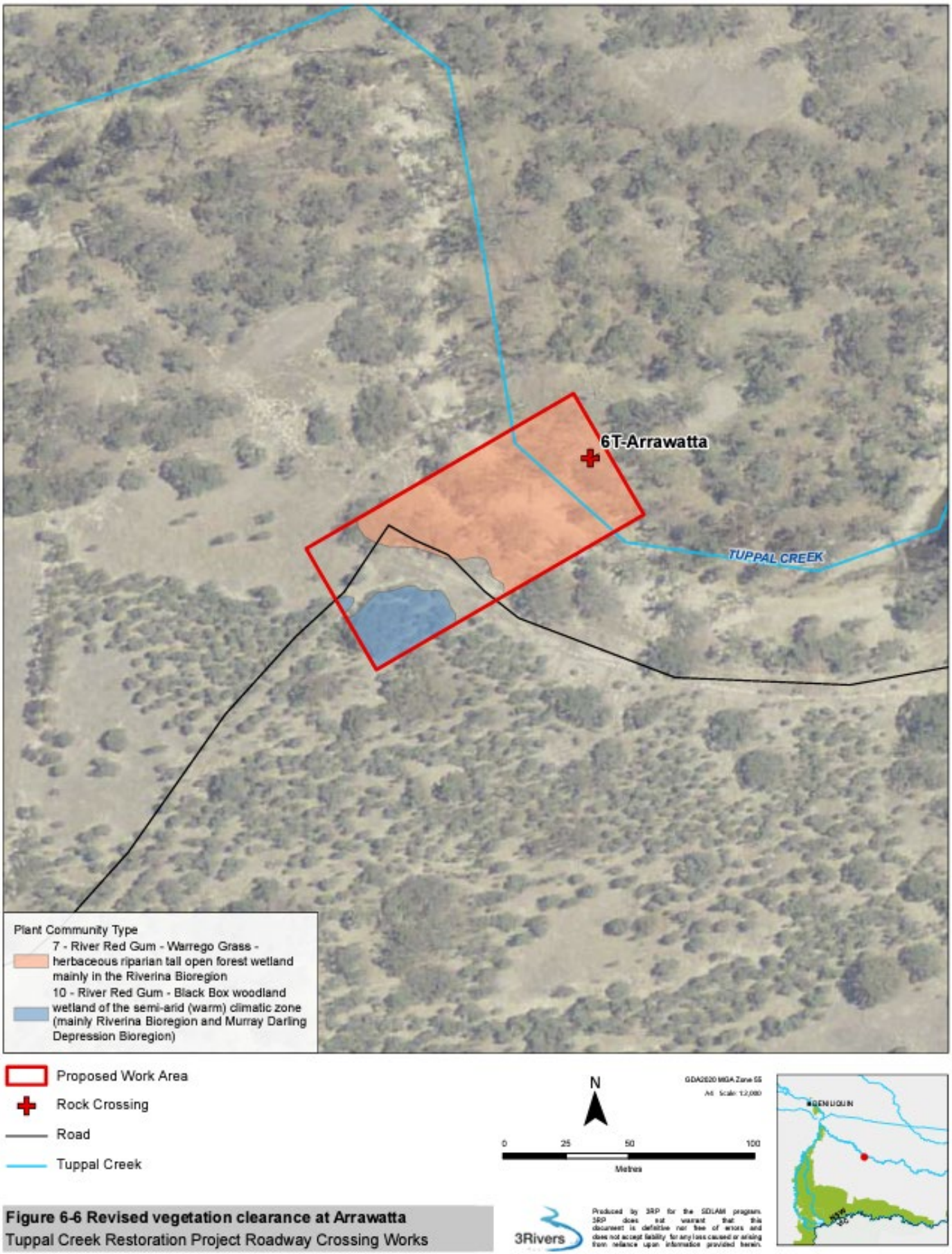

Figure 16 Study area and PCTs at Arrawatta crossing (6T)

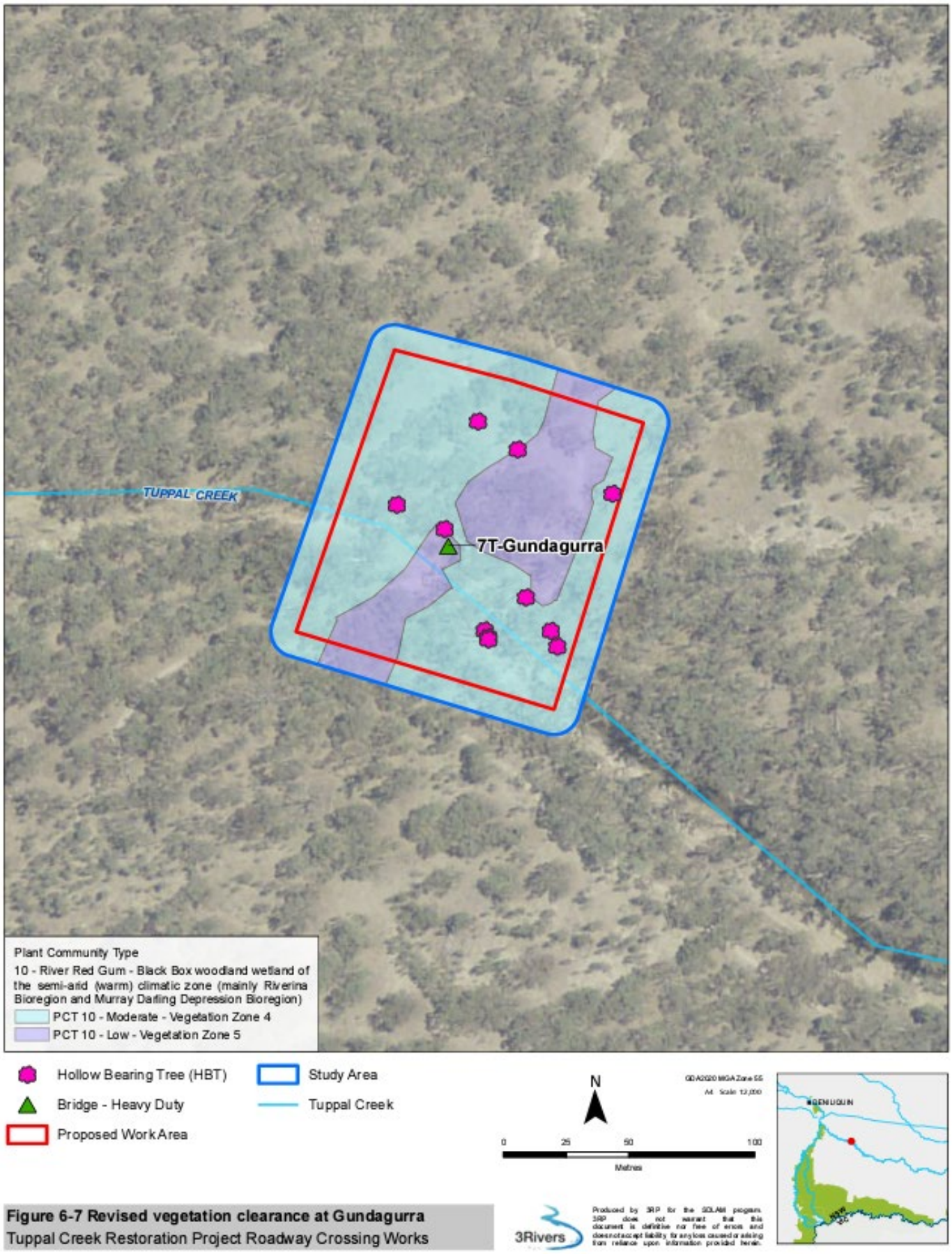

Figure 6-7 Revised vegetation clearance at Gundagurra
Tuppal Creek Restoration Project Roadway Crossing Works

Figure 17 Study area and PCTs at Gundagurra crossing (7T)

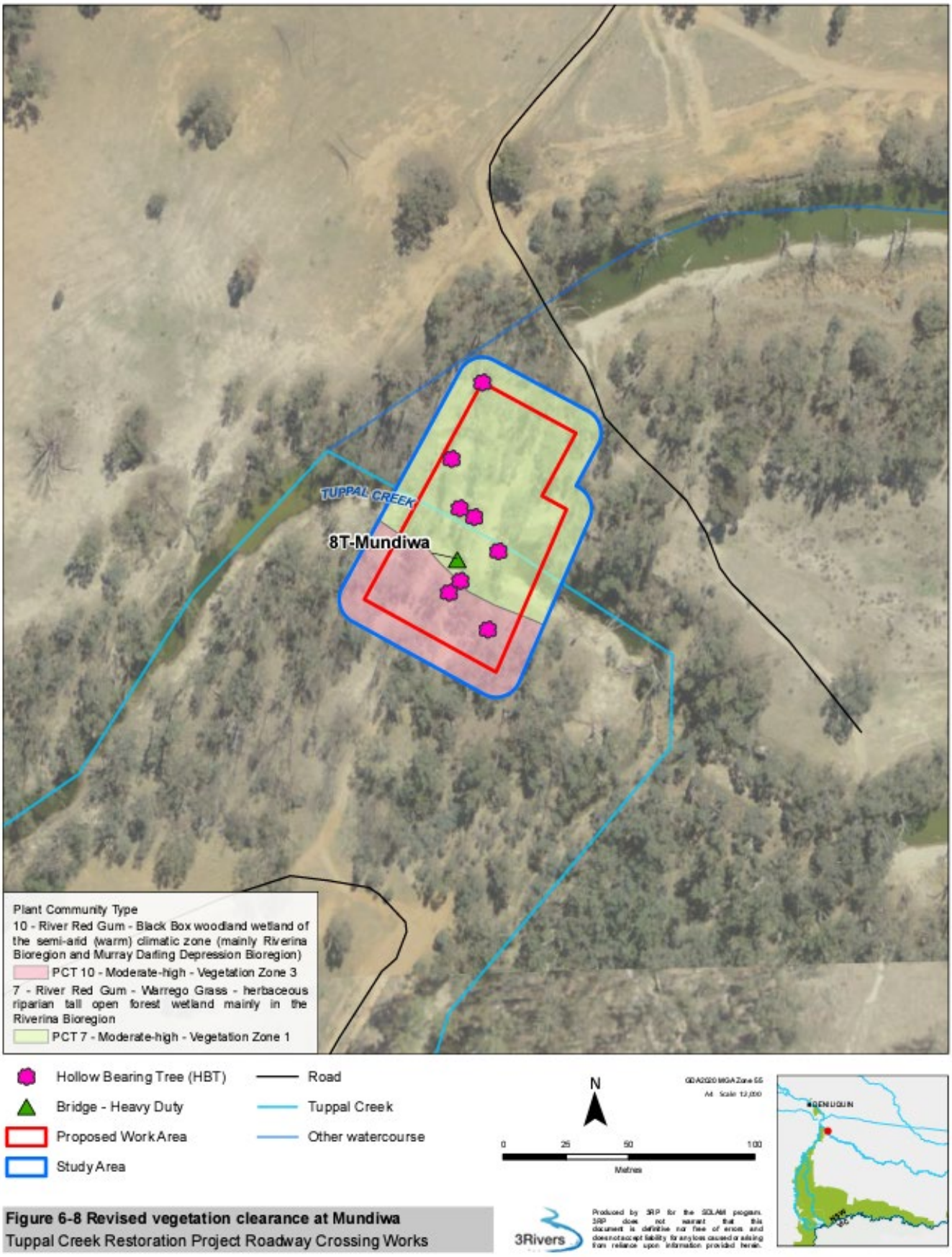

Figure 6-8 Revised vegetation clearance at Mundiwa
Tuppal Creek Restoration Project Roadway Crossing Works

Figure 18 Study area and PCTs at Mundiwa crossing (8T)

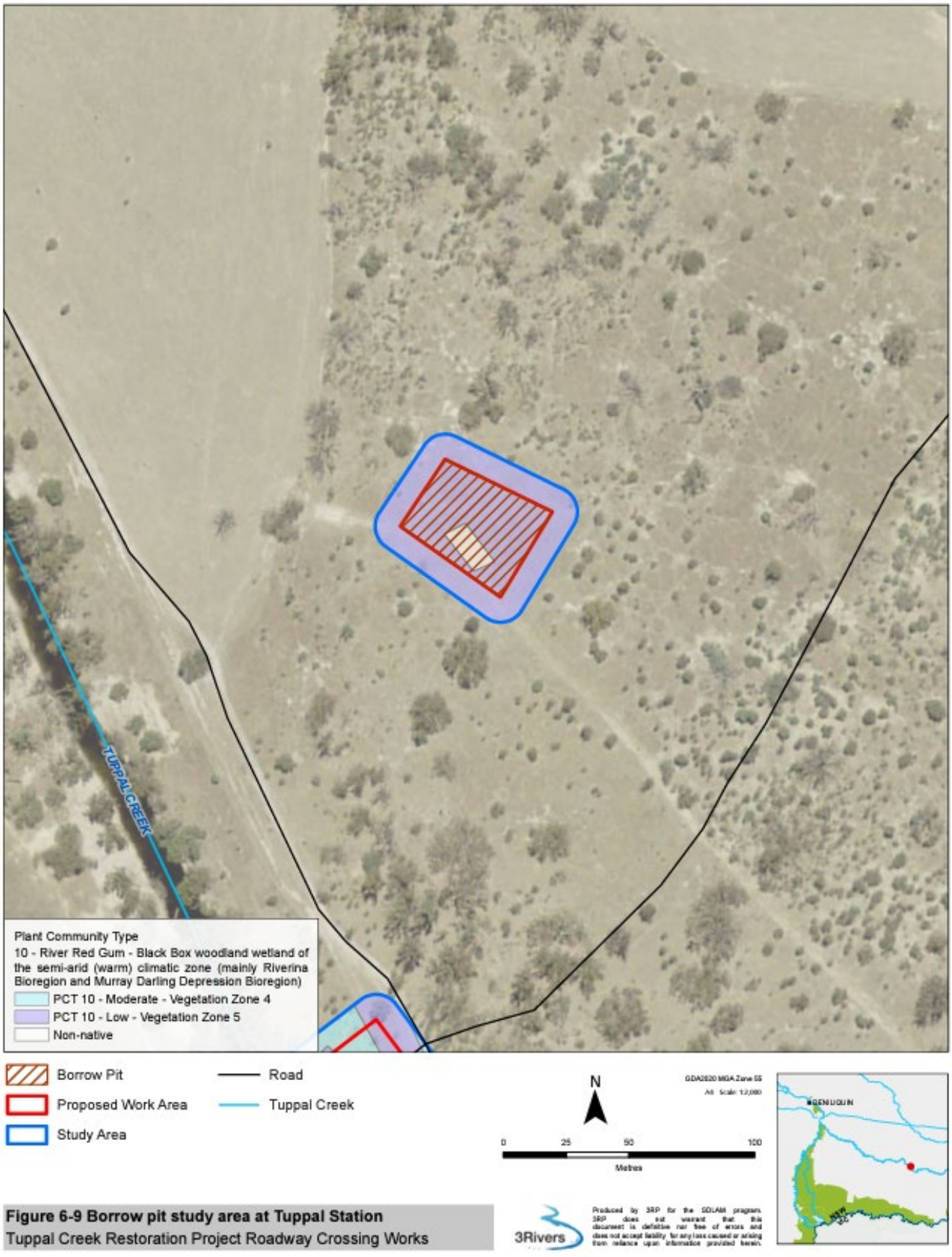

Figure 6-9 Borrow pit study area at Tuppal Station
Tuppal Creek Restoration Project Roadway Crossing Works

Figure 19 Study area and PCTs at Tuppal Station borrow pit

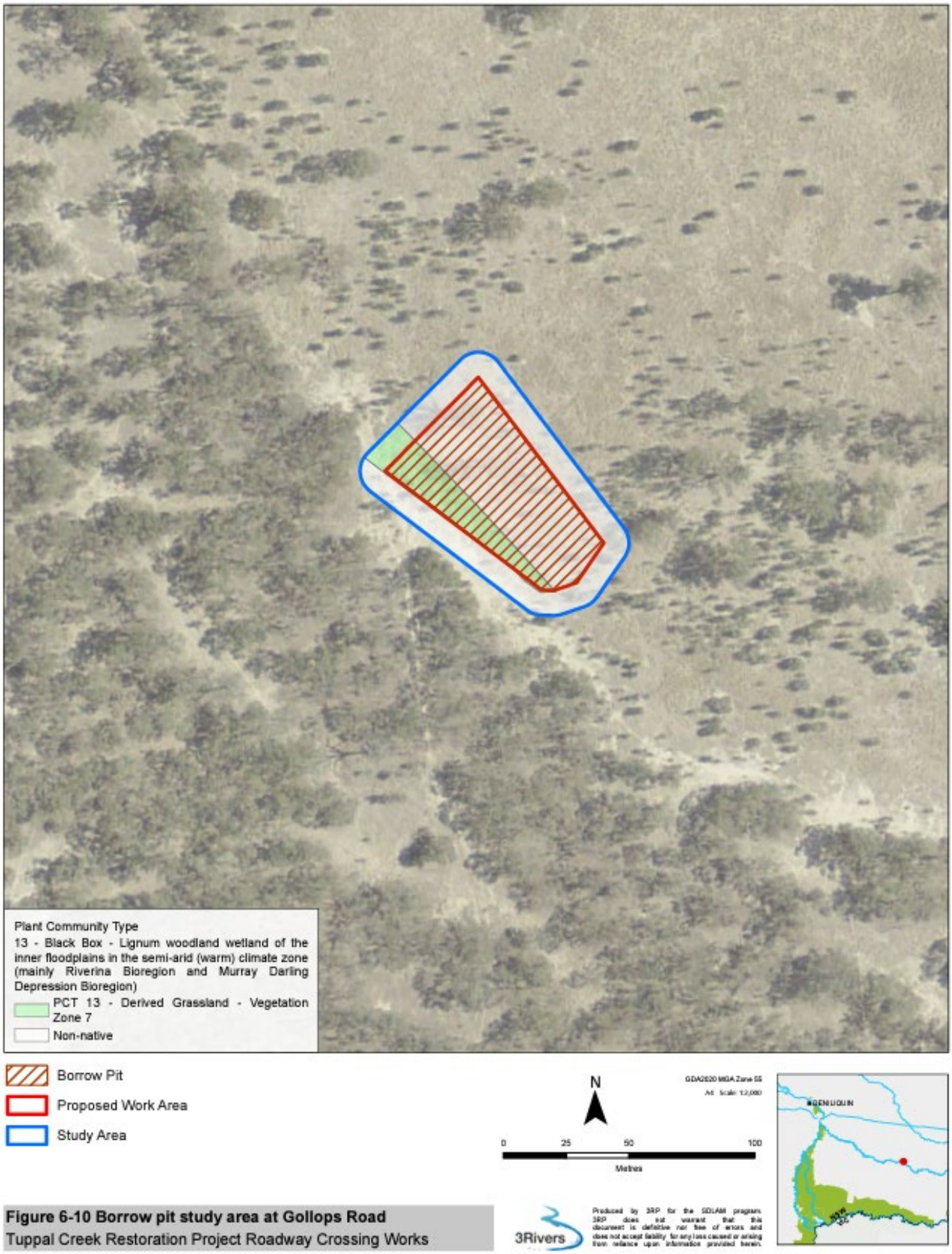

Figure 6-10 Borrow pit study area at Gollops Road
Tuppal Creek Restoration Project Roadway Crossing Works

Figure 20 Study area and PCTs at Gollops Road borrow pit

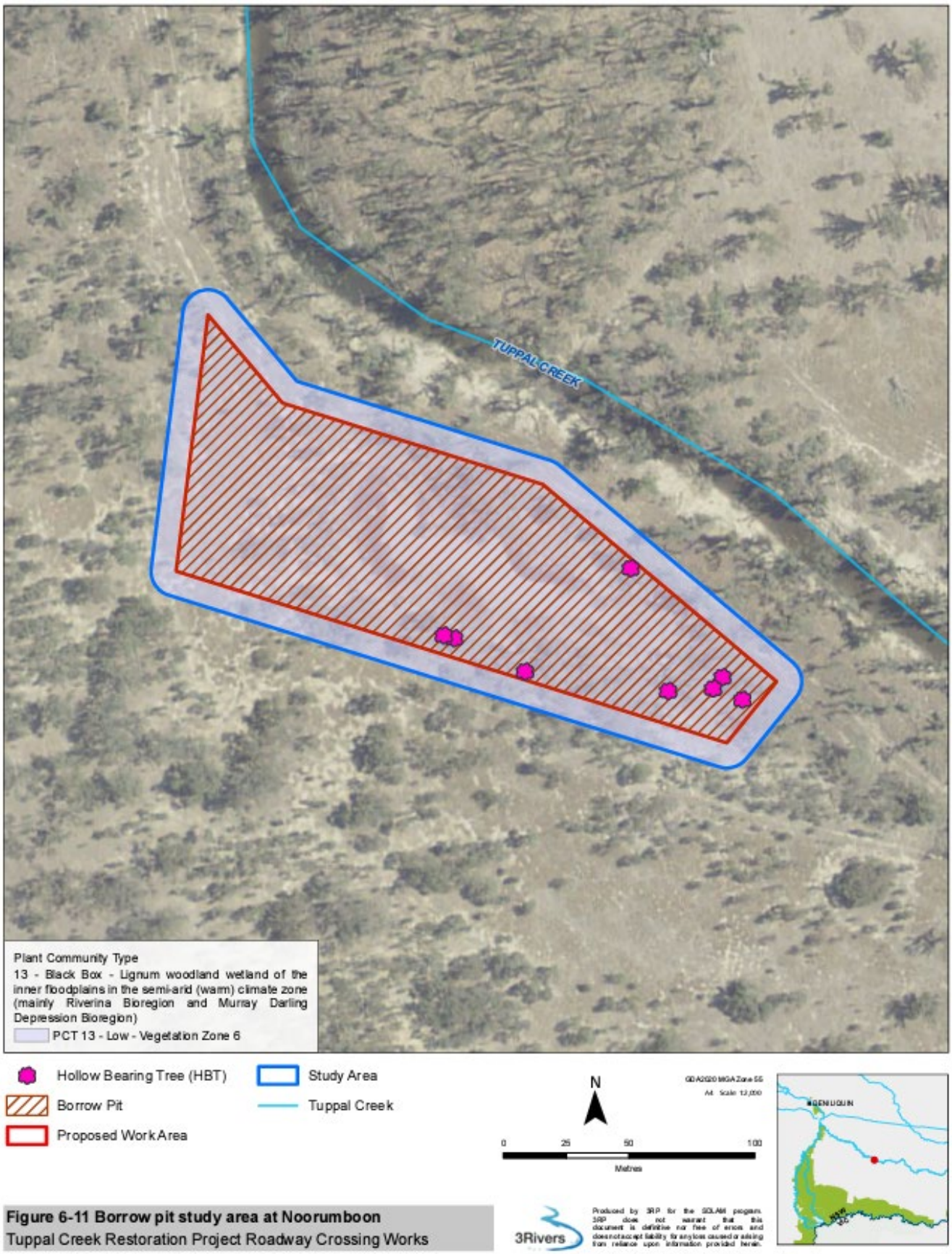

Figure 21 Study area and PCTs at Noorumboon borrow pit

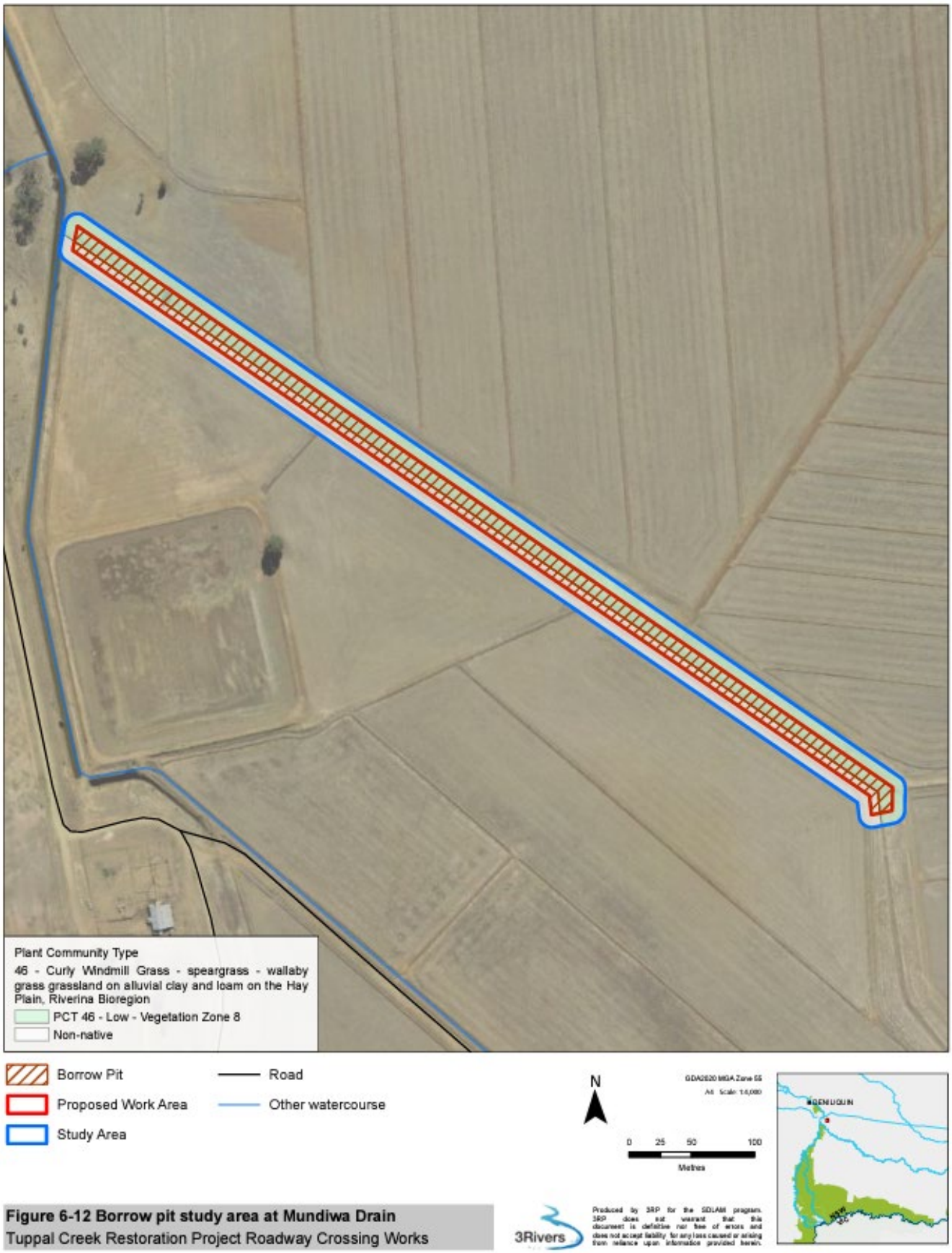

Figure 6-12 Borrow pit study area at Mundiwa Drain
Tuppal Creek Restoration Project Roadway Crossing Works

Figure 22 Study area and PCTs at Mundiwa Drain borrow pit

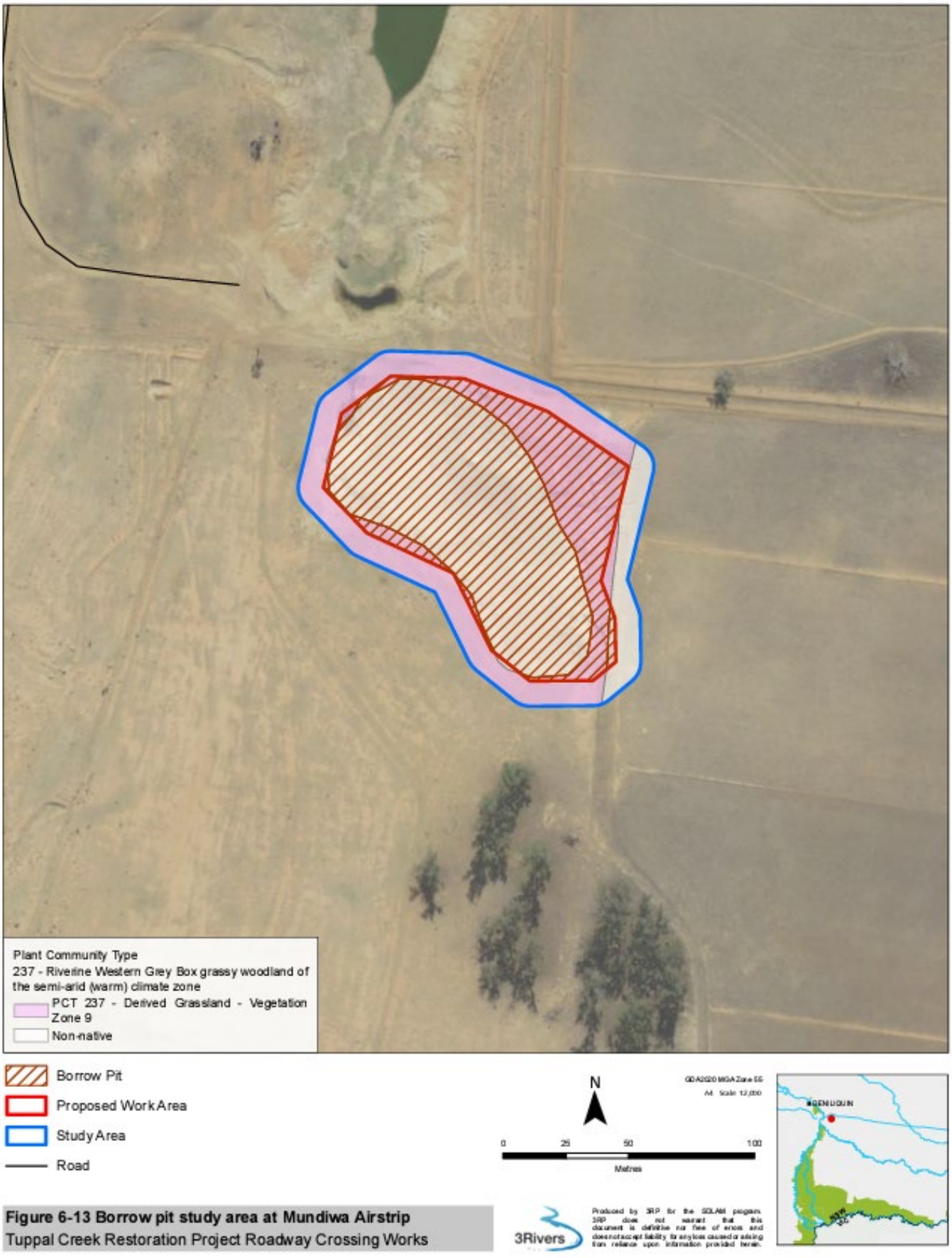

Figure 6-13 Borrow pit study area at Mundiwa Airstrip
Tuppal Creek Restoration Project Roadway Crossing Works

Figure 23 Study area and PCTs at Mundiwa Airstrip borrow pit

6.1.1 Existing environment

Environmental context

Topography, geology and soils

The proposed modification would be located on land within the Riverina Interim Biogeographic Regionalisation for Australia (IBRA) Bioregion and the Murray Fans IBRA sub-region, which generally comprises of areas of floodplains along meandering channels. The study area is located across five NSW (Mitchell) Landscapes; Murray Source-bordering Dunes; Murray Depression Plains; Murray Lakes, Swamps and Lunettes; Murray Scalded Plains; Murray Channels and Floodplains.

Geology at the study area is dominated by Quaternary Alluvium, with red brown earths, grey clays and deep sands. Soils at the study area are vulnerable to erosion, and much of the topsoil has been previously impacted by erosion and soil compaction through vehicle and livestock movement.

Waterways, wetlands and hydrology

The study area is located on the Murray River floodplain adjacent to Tuppal Creek, a third order (Strahler) effluent stream which conveys breakaway flows from the Murray River downstream of Tocumwal to the Edward River, upstream of Deniliquin.

Historically, Tuppal Creek was an ephemeral system that flowed intermittently for short periods. However, due to changes in land development and water regulation, the natural water flow of Tuppal Creek has been modified, resulting in degradation of the creek and surrounding ecological condition. Its present degraded condition is most likely due to the cumulative impacts of unseasonal flows, loss of connection with the floodplain, habitat modification, poor water quality, high salinity, unrestricted grazing and bank erosion.

Tuppal Creek is mapped as Key Fish Habitat and as potential habitat for a number of threatened aquatic species, including Murray Cod, Flathead Galaxias and Silver Perch.

The proposed modification would be located within 10 kilometres of the Barmah-Millewa Forest, which is a part of the Barmah Forest Ramsar site (Victoria) and the NSW Central Murray Forests Ramsar site (NSW).

Vegetation and habitat

Ecological surveys carried out by Biosis (2020) to support approval of the existing REF characterised the vegetation type and condition relevant to the existing REF, including the presence of PCTs. Where suitable, vegetation mapping produced for the existing REF has been reviewed and applied to the additional assessment provided in Appendix D and this Addendum REF. For locations where the previous study areas have been extended (and were therefore not mapped in the existing REF), vegetation classification data obtained during ecological surveys carried out by 3Rivers in

March 2022 and March 2023 has been used. In addition, the State Vegetation Type Map (SVTM): Riverina Region Version v1.2 - VIS_ID 4469 (DPIE, 2016) was also reviewed to determine the baseline vegetation classification.

Native vegetation and fauna habitat within the study area has been influenced by historical agricultural practices and alterations in hydrological regimes. Riparian vegetation across the majority of the study area is dominated by *Eucalyptus camaldulensis* (River Red Gum) and *Eucalyptus largiflorens* (Black Box). Five PCTs were identified within the study area and their presence was confirmed during ecological surveys carried out by 3Rivers. These comprise:

- PCT 7 – River Red Gum - Warrego Grass - herbaceous riparian tall open forest wetland mainly in the Riverina Bioregion
- PCT 10 – River Red Gum - Black Box woodland wetland of the semi-arid (warm) climatic zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion).
- PCT 13 – Black Box - Lignum woodland wetland of the inner floodplains in the semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (assumed presence from regional mapping)
- PCT 46 – Curly Windmill Grass - speargrass - wallaby grass grassland on alluvial clay and loam on the Hay Plain, Riverina Bioregion
- PCT 237 - Riverine Western Grey Box grassy woodland of the semi-arid (warm) climate zone.

PCT 7 is characterised by a River Red Gum dominated canopy, up to 20 metres. The understorey shrub layer is sparse to absent, consisting of a mix of native grasses, herbs and aquatic species, including *Typha orientalis* (Broad-leafed Cumbungi), *Juncus amabilis* (Hollow Rush), *Juncus flavidus* (Gold Rush), *Carex inversa* (Knob sedge), *Walwhalleya proluta* (Rigid Panic), *Paspalidium jubiflorum* (Warrego Summer Grass), *Persicaria lapathifolia* (Pale Knotweed), *Calocephalus citreus* (Lemon Beauty-heads) and *Leiocarpa panetoides* (Woolly Buttons). PCT 7 is present in a moderate – high condition within the study area at Noorumboon (5T) and Mundiwa (8T), and a moderate condition at Keysborough (4T).

Within the study areas, PCT 10 is characterised by a mixed eucalypt canopy, up to 20 metres consisting of River Red Gum and Black Box over a sparse to absent mid-storey shrub layer. The understorey is sparse but consists of a mix of salt bushes, herbs and grasses including *Duma florulenta* (Tangled Lignum), *Sclerolaena muricata var. muricata* (Black Rolly-polly), *Paspalidium jubiflorum* (Warrego Summer Grass), *Austrostipa aristiglumis* (Plains Grass), Walwhalleya proluta (Rigid Panic), *Dianella longifolia var. longifolia* (Blue Flax-lily), *Goodenia gracilis* (Slender Goodenia) and *Einadia nutans* (Ruby Salt-bush). PCT 10 is generally located slightly higher in the landscape above riparian communities dominated by River Red Gum, although along Tuppal Creek Black Box does grade into riparian areas and often forms a co-dominant canopy species within the riparian

zone. PCT 10 presents a low, moderate, and moderate-high condition within the study area at the following sites:

- Moderate-high condition: Gollops Road (2T), Noorumboon (5T), and Mundiwa (8T)
- Moderate condition: Gollops Road (2T), Richmond (3T), Keysborough (4T) and Gundagarra (7T)
- Low condition: Tuppal Station (1T), Tuppal Station Borrow Pit and Gundagarra (7T).

PCT 13 is woodland, open forest or open woodland averaging about 15 metres high, dominated by a sparse to dense stands of *Duma florulenta* (Tangled Lignum), *Chenopodium nitrariaceum* (Nitre Goosefoot) and *Acacia stenophylla* (River Cooba). The ground cover includes low shrubs, grass and forb species. PCT 13 occurs on clay or clay-loam, often gilgaied, soils on inner floodplains and on alluvial plains mostly in depressions that are frequently flooded. Mainly located in the semi-arid (warm) climate zone in the Riverina and Murray Darling Depression and southern Cobar Peneplain Bioregions. PCT 13 is present within the study area and exhibits derived grassland located at Gollops Road Borrow Pit, and a low condition located at Noorumboon Borrow Pit.

PCT 46 is characterised as an open to closed tussock grassland generally about 0.3 metres high dominated by Curly Windmill Grass (*Enteropogon ramosus*), corkscrew grass (*Austrostipa nodosa and/or Austrostipa scabra*) and a number of wallaby grass species (*Rytidosperma spp.*) with a range of forbs including *Rhodanthe corymbiflora, Crassula colorata var. acuminata, Erodium crinitum, Oxalis perennans, Sida trichopoda, Sida corrugata, Goodenia pusilliflora, Goodenia fascicularis, Calotis scabiosifolia var. scabiosifolia, Calocephalus sonderi, Bulbine semibarbata* and *Daucus glochidiatus*. A very sparse shrub layer may be present including *Sclerolaena stelligera, Maireana excavata* and *Maireana aphylla*. PCT 46 is exists on medium brown to grey clays and loams on level alluvial plains on the western Riverine Plain (Hay Plain) near Hay and north-east of Deniliquin in the Riverina Bioregion. This PCT contains a high proportion of annual exotic species in Spring dominated by Wimmera Rye Grass (*Lolium rigidum*) and Wild Oats (*Avena fatua*). PCT 46 is situated within the Mundiwa Drain borrow pit study area, existing as a low quality, fragmented and isolated patch, adjacent to cultivated land.

PCT 237 consists of tall woodland with trees up to 20 metres high dominated by Western Grey Box (*Eucalyptus microcarpa*) often with River Red Gum of Black Box and often grading into Yellow Box (*Eucalyptus melliodora*) and Buloke (*Allocasuarina luehmannii*) with absent or very sparse shrubs. Golden Dust Wattle (*Acacia acinacea*) may be present along with the low shrub *Maireana enchylaenoides*. The ground cover may be dense or sparse depending on time since rain. It includes grass species such as *Rytidosperma caespitosum, Rytidosperma laeve, Paspalidium jubiflorum* and *Chloris truncata*. The rush *Juncus flavidus* and the sedge *Carex inversa* are often present, along with small chenopod shrubs such as *Atriplex semibaccata* and *Einadia nutans subsp. nutans*. Forb species include Sida corrugata, Oxalis perennans and Rumex brownii. This PCT occurs on lighter soils, and grey clays on slight rises on floodplains. River Red Gum forests mainly dominate along the Murray

and Murrumbidgee Rivers of south-western NSW from near east Albury to west of the Millewa forests near Deniliquin. Within the study area, this PCT was distinguished as a derived grassland within the Mundiwa Airstrip Borrow Pit study area location, containing one individual Buloke tree where the majority of the canopy layer had been historically cleared. There was also evidence of *Eucalyptus microcarpa* trees near the site. The ground layer contained key diagnostic species including *Austrostipa scabra, Sclerolaena muricata, Enteropogon ramosus* and *Salsola australis* within the Mundiwa Airstrip Borrow Pit study area location.

Threatened ecological communities

Searches of the relevant online databases and regional PCT mapping identified 12 threatened ecological communities listed under the BC Act and EPBC Act, which have the potential to occur within the study area. A list of the identified threatened ecological communities is provided in the Addendum Biodiversity Assessment Report (refer to Appendix D).

The habitat within the study area has largely been cleared and used for agricultural practices. A search of BioNet Vegetation Classification Database (DPIE, 2022) identified that there are no threatened ecological communities listed under the BC Act or EPBC Act in relation to PCT 7, PCT 10 or PCT 13. However, there are threatened ecological communities related to PCT 46 and PCT 237.

Importantly, results from the surveys undertaken by Biosis (2020) and 3Rivers in March 2022 and 2023 concluded that there were no threatened ecological communities present within the study area or the previous study area.

Threatened flora

Searches of the relevant online databases identified four threatened flora species with a moderate likelihood of occurring in the study areas, these are:

- *Amphibromus fluitans* (River Swamp Wallaby-grass) – Listed as Vulnerable under the EPBC and BC Acts
- *Cullen parvum* (Small Scurf-pea) – Listed as Endangered under the BC Act
- *Swainsona murrayana* (Slender Darling-pea) – Listed as Vulnerable under the EPBC and BC Acts
- *Swainsona sericea* (Silky Swainson-pea) – Listed as Vulnerable under the BC Act.

No threatened flora species were recorded during the field surveys carried out initially by Biosis in November 2019 or by 3Rivers in March 2022 and March 2023

Many of the species identified from literature and database research favour habitats that are not represented in the study area. Due to the historic disturbance that has occurred and the lack of suitable habitat for threatened flora species, these species are considered to have a low likelihood of occurrence.

Threatened fauna

Searches of the relevant online databases identified 59 threatened fauna species which have the potential to occur within the locality of the study area. Of these species, the majority are considered to have a low likelihood of utilising the vegetation or aquatic habitats within the study area. A total of 25 species are considered to have a moderate to high likelihood of occurring within the study area, utilising suitable terrestrial or aquatic habitats. These include six aquatic species, 16 bird species and two mammal species. A full list of these species is provided in Appendix D. Surveys carried out by Biosis in 2019 and 3Rivers in 2022 and 2023 did not identify any threatened fauna species within the study areas.

The riparian woodland habitat present within the study areas would provide suitable habitat for threatened terrestrial species. Bird species would also be expected to utilise vegetation for nesting and roosting and to forage on flowering trees. Bat species, such as the Southern Myotis and the Yellow-bellied Sheathtail-bat, may roost in hollow-bearing trees and culverts within the study areas. There are some artificial human made structures within the study areas comprising of instream culverts. These artificial structures would not provide suitable roosting habitat for microbat species that are known to occur or are highly likely to occur within the study areas due to their small size. Inspection of these structures during surveys, where practicable, concluded that there were no species present at the time.

Significance assessments have been carried out for species which have the potential to occur within the locality of the study areas and are provided in Appendix D.

Migratory species

Searches of the relevant online databases identified 13 migratory bird species as having the potential to occur within the study areas. Of the species identified, one migratory species, the Sharp-tailed Sandpiper (Calidris acuminata), is considered to have a moderate potential of occurring within the study areas.

While migratory bird species do use the habitats within the locality, the study areas would not be classed as 'important habitats' as defined under the EPBC Act Policy Statement 1.1 Significant Impact Guidelines (Department of Environment, 2013), in that the study areas do not contain:

- Habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species
- Habitat utilised by a migratory species which is at the limit of the species range
- Habitat within an area where the species is declining.

Weeds, pests and pathogens

A total of 12 weed species were identified during biodiversity surveys of the study areas by 3Rivers. The following weed species were identified:

- *Avena fatua* (Common Wild Oats)
- *Bromus catharticus* (Prairie Grass)
- *Cirsium vulgare* (Spear Thistle)
- *Cucumis myriocarpus subsp. myriocarpus* (Paddy Melon)
- *Echium plantagineum* (Paterson's Curse)
- *Heliotropium europaeum* (European heliotrope)
- *Lolium rigidum* (Wimmera Ryegrass)
- *Marrubium vulgare* (Horehound)
- *Polygonum aviculare* (Wire Weed)
- *Solanum nigrum* (Blackberry Nightshade)
- *Trifolium angustifolium* (Narrow-leaved Clover)
- *Xanthium spinosum* (Bathurst Burr).

No weeds identified within the study areas are considered to represent a key threatening process under the BC Act. No Regional or State priority weeds, or Weeds of National Significance were identified.

Two of the identified weed species (*Marrumbium vulgare* and *Xanthium spinosum*) are listed as weeds of concern under the *Biosecurity Act 2015* for the Riverina Region. These species are also listed in the Riverina Regional Strategic Weed Management Plan 2023-2027 (Local Land Services, 2022) as weeds of high community concern/priority. Xanthium spinosum is also considered to be a high threat weed under the Biodiversity Assessment Method Calculator.

The study areas are likely to provide habitat for a range of pest fauna species, including rabbits, foxes and cats.

The presence of pathogens was not observed or tested for during the biodiversity surveys.

6.1.2 Impacts

Vegetation and habitat

The proposed modification would be primarily constructed within previously disturbed areas, with minimal requirement for vegetation removal. Ancillary facilities for the proposed modification would be accommodated within existing disturbed areas and would not require any additional vegetation removal to that described and assessed in this Addendum REF.

While impacts to native vegetation have been avoided where possible, the revised total amount of vegetation removal required due to the proposed modification would be about 10.5 hectares, comprising:

- 1.2 hectares of PCT 7
- 4.6 hectares of PCT 10
- 1.8 hectares of PCT 13
- 0.8 hectares of PCT 46
- 0.3 hectares of PCT 237
- 1.8 hectares of non-native vegetation.

PCTs and hollow-bearing trees identified for removal as a result of the proposed modification are shown on Figure 1 to Figure 23. As described in Section 6.1, this assessment is based on a worst-case scenario which assumes that all vegetation within the proposed work areas would be removed during construction. No vegetation removal or disturbance would occur outside of the proposed work areas.

Table 6 provides a summary of the expected revised total vegetation impacts of the project due to the proposed modification. A comparison against the impact assessment provided in the existing REF is also provided. Further details are provided in Appendix D.

Table 6 Comparison of vegetation impacts between the proposed modification and the existing REF

Site	Impacts assessed in the existing REF	Revised total impacts due to the proposed modification
Tuppal Station crossing (1T)	• Removal of 20-25 small River Red Gum and Black Box saplings • Disturbance of native understorey species	• Removal of seven hollow bearing trees, including River Red Gum, Black Box and a stag • Removal of one small stag (dead standing tree) • Disturbance of native understorey species.
Gollops Road crossing (2T)	• Disturbance of scattered native understorey species and aquatic vegetation	• Removal of up to 14 hollow bearing trees including 13 River Red Gum trees and one stag – Opportunity to retain and trim one of the identified trees • Removal of one large Black Box • Disturbance of native understorey species.
Richmond crossing (3T)	• Removal of regenerating, native understorey species	• Potential removal of two hollow bearing trees including River Red Gum trees and one stag– Potential to retain this tree • Removal of two mature River Red Gums • Removal of two mature Black Box – Potential to retain one of these trees • Removal of up to seven juvenile Black Box – Potential to retain five juvenile trees • Trimming of one large River Red Gum • Disturbance of native understorey species.

Site	Impacts assessed in the existing REF	Revised total impacts due to the proposed modification
Keysborough crossing (4T)	• Removal of scattered understorey and aquatic species on the edge of Tuppal Creek	• Removal of three hollow bearing trees including two River Red Gums and one stag • Removal of one hollow bearing River Red Gum • Removal of two large River Red Gums and two mature River Red Gums • Potential removal of two mature River Red Gums to allow access to the work area • Potential removal of one large River Red Gum which contains a clay nest (25 cm diameter). • Removal of three Black Box • Disturbance of native understorey species.
Noorumboon crossing (5T)	• Removal of one large hollow-bearing River Red Gum (dead) • Clearing of understorey regrowth vegetation	• Removal of 19 hollow bearing trees including 14 River Red Gum trees and five stags • Removal of one mature River Red Gum containing medium size stick nest (40cm diameter) • Removal of one large River Red Gum • Disturbance of native understorey species.

Site	Impacts assessed in the existing REF	Revised total impacts due to the proposed modification
Gundagurra crossing (7T)	• Removal of one large hollow bearing stag tree • Removal of four Black Box • Clearing of native understorey vegetation	• Potential removal of two hollow bearing River Red Gums • Removal of two large River Red Gums • Potential removal of two large River Red Gums for asset protection • Removal of seven River Red Gum seedlings • Removal of eight juvenile River Red Gums. • It should be noted that clearing has been carried out by the landholder at this work area since the initial surveys in 2019 to inform the existing REF.
Mundiwa crossing (8T)	• Removal of one hollow bearing tree • Clearing of regrowth vegetation	• Removal of eight hollow bearing trees including seven River Red Gum trees and one stag • Trimming of two hollow bearing trees for construction access • Removal of two large River Red Gums • Trimming of one large River Red Gum for construction access • Potential trimming of one mature River Red Gum • Disturbance of native understorey species.
Tuppal Station borrow pit	Not in scope	• Largely situated within existing cleared land • Disturbance would impact groundcover and the seed bank within the soil located within low quality PCT 10.
Gollops Road borrow pit	Not in scope	• Largely situated within existing cropping land • Disturbance would impact groundcover and the seed bank within the soil located within low quality PCT 13 derived grassland • No overstorey or mid-storey vegetation is proposed to be removed.

Site	Impacts assessed in the existing REF	Revised total impacts due to the proposed modification
Noorumboon borrow pit	Not in scope	• Eight hollow bearing Black Box trees for potential removal (0.5 – 1.2 metres diameter at breast height) • Native understorey species is proposed to be disturbed.
Mundiwa Drain borrow pit	Not in scope	• Largely situated within existing cropping land • Disturbance would impact groundcover and the seed bank, if present, within the soil located within low quality PCT 46 • No overstorey or mid-storey vegetation is proposed to be removed.
Mundiwa Airstrip borrow pit	Not in scope	• Largely situated within existing borrow pit area • Disturbance would impact groundcover and the seed bank, if present, within the soil located within low quality PCT 237 derived grassland • No overstorey or mid-storey vegetation is proposed to be removed.

Vegetation which would be impacted by the proposed modification currently provides suitable foraging and nesting habitat for various fauna species, notably woodland birds. Canopy species (River Red Gums and Black Box) generally provide summer food resources, however, can flower opportunistically throughout the year. Due to minimal habitat being removed and the presence of contiguous riparian vegetation within and surrounding the study areas, it is unlikely that the proposed vegetation removals would have more than a minor impact on preferred habitat for local or migratory species.

The removal of up to 72 hollow bearing trees (compared to the three assessed in the existing REF) would directly remove potential breeding habitat for small birds and arboreal mammals. Any species using tree hollows at the time of construction would be displaced. However, with extensive preferred habitat in the adjacent contiguous riparian vegetation and the connected Murray Valley National Park to the south of the project area, the degree of impact resulting from vegetation removal and the removal of hollows in the locality is considered minor.

The above assessment is based on a worst-case scenario which assumes that all vegetation within the proposed work areas (shown in Figure 11 to Figure 23) would be removed during construction. The actual extent of vegetation removal required for the proposed modification would most likely be lower than what has been assessed in this Addendum REF. Opportunities to minimise vegetation removal required for the proposed modification would be explored during construction of the proposed modification.

Wildlife connectivity and habitat fragmentation

Vegetation removal required for the proposed modification is considered to be minor and would be limited to discreet locations at each of the proposed work areas. The proposed modification would not separate the existing woodland into two patches or impact the existing vegetation connectivity along Tuppal Creek. The extent of the clearing is considered minor and would not impact the mobility of resident or migratory fauna within the patch or into the other vegetation surrounding the study areas.

Injury and mortality

There is the potential for direct impacts to fauna though vehicles strikes or entrapment within machinery or work areas during construction of the proposed modification, which may result in fauna injury or death. However, given the proposed work areas would be small and limited to previously disturbed areas, this risk is considered negligible.

Fauna injury or death has the greatest potential to occur during the vegetation clearing required for construction and the extent of this impact will be proportionate to the extent of vegetation that is cleared. Some mobile species, such as birds, may be able to move away from the path of clearing and may not be greatly affected unless they are nesting. Other, less mobile species (such as ground

dwelling reptiles and mammals), or those that are nocturnal and nest or roost in trees during the day (such as arboreal mammals and micro bat species), may find it difficult to move rapidly when disturbed. Pre-clearance checks, as identified in Section 6.1.3, would reduce the risk of fauna injury or death during vegetation clearing.

Threatened flora, fauna and migratory species

As described above, the proposed modification is expected to require the removal of up to 72 hollow bearing trees which currently provide suitable habitat for a range of threatened fauna species listed under the BC Act and EPBC Act. Hollow trees identified for removal may provide roosting opportunities for hollow-dependant species including arboreal mammals, birds and reptiles. The proposed modification would also require the removal of around 8.7 hectares of native vegetation, as described above.

Despite the requirement for vegetation removal, the proposed modification is expected have no more than a minor impact on threatened flora and fauna (including ecological communities and migratory species) as:

- The extent of vegetation to be removed is not considered to be important to the survival or recovery of any identified species
- The proposed work areas would be located primarily in previously disturbed areas which already experience fragmented habitat due to previous development
- The locality surrounding the proposed work areas contains large, contiguous patches of habitat similar to that which would be removed for the proposed modification
- Species which may be impacted by the proposed modification are either migratory or otherwise capable of short-distance dispersal to available similar habitat within the locality
- The proposed modification does not significantly contribute to a key threatening process for the identified terrestrial species
- While the predicted impacts could be considered part of a key threatening process for threatened aquatic species and ecological communities, the proposed modification is considered unlikely to result in significant impacts, given the limited extent and short duration of the construction works and the aim to improve the overall riparian and aquatic habitat in the long term.

Significance assessments

Assessments of significance have been prepared for threatened species which are considered to have a moderate-to-high likelihood of occurring within the study areas, based on the presence of suitable habitat for these species. The assessment identified potential suitable habitat for additional species not identified within the existing REF.

The proposed modification is considered unlikely to have a significant impact on any threatened species or ecological communities listed under the BC Act or the EPBC Act. The proposed modification is also considered unlikely to have a significant impact on any matters of national environmental significance.

Given the localised nature of the impacts in relation to adjacent available habitat, impacts associated with the proposed modification are expected to be minimal and temporary. In the longer term the proposed modification would support the passage of water and fish through Tuppal Creek, which is expected to improve the health of the creek ecosystem and associated riparian vegetation.

Full details of significance assessments carried out for the proposed modification are provided in Appendix D.

Weeds, pests and pathogens

Construction of the proposed modification may contribute to the proliferation of weed species through vegetation removal, soil disturbance, and seed (and other propagule) dispersal through the movement of construction machinery. Impacts from weed invasion would likely be realised months following construction and would gradually increase over time. Proliferation of weed species has the potential to impact on the quality and integrity of surrounding native vegetation and may spread to agricultural land surrounding the study areas.

Under the Biosecurity Act 2015, land managers are required to follow the regional and non-regional duties which have been allocated to each weed species. Table 7 describes the control requirements for weed species within the proposed work areas (as identified in Section 6.1.1).

Table 7 Weeds identified within the proposed work areas and their control methods

Species	Control methods
Avena fatua (Common Wild Oats)	• Small infestations can be removed by hand pulling • Mowing can prevent seed-set in heavy to moderate infestations • Herbicide treatment. Apply herbicides to actively growing plants. Directions specified on the labels and material safety data sheets must be adhered to.
Bromus catharticus (Prairie Grass)	• Physical removal of plants. It is recommended removing the plant when it is young • Herbicide treatment. Apply herbicides to actively growing plants. Directions specified on the labels and material safety data sheets must be adhered to.

Species	Control methods
Cirsium vulgare (Spear Thistle)	• Physical removal of plants. It is recommended removing the plant when it is young to prevent deep taproots forming • Cultivation can be effective if done when plants are at the seedling or rosette stage. Do not cultivate seeding plants as this will spread the seeds • Maintaining vigorous competitive pastures, especially in autumn can limit the number of seedlings that survive • Biological control is available for this species • Herbicide treatment. Apply herbicides to actively growing plants. Directions specified on the labels and material safety data sheets must be adhered to.
Cucumis myriocarpus subsp. *myriocarpus* (Paddy Melon)	• Seedling melons are best sprayed before vining. Isolated melon patches can also be chipped out to prevent the spread. Mature fruit should be removed from the paddock • Multiple applications of herbicide may be required to control repeated germinations. Directions specified on the labels and material safety data sheets must be adhered to.
Echium plantagineum (Paterson's Curse)	• Hand removal and cutting have been suggested for the control of single plants and small patches • Mowing has been recommended, especially in combination with other control measures • Many chemicals have been found to be effective in controlling Paterson's Curse. Multiple applications of herbicide may be required to control repeated germinations. Directions specified on the labels and material safety data sheets must be adhered to.
Heliotropium europaeum (European heliotrope)	• Hand removal and cutting have been suggested for the control of single plants and small patches • Multiple applications of herbicide may be required to control repeated germinations. Directions specified on the labels and material safety data sheets must be adhered to. To improve the effectiveness of chemical control, herbicides should be applied to European heliotrope when it is young and actively growing. Avoid spraying stressed plants.
Lolium rigidum (Wimmera Ryegrass)	• Hand pull or spray with grass selective herbicide. For larger plants up to flowering, increase rates of grass selective herbicide. Directions specified on the labels and material safety data sheets must be adhered to.
Marrubium vulgare (Horehound)	• Chemical and biological controls are available for horehound • Dense infestations can be controlled through cultivation, where appropriate • Herbicide control, applying when plants are actively growing, usually in spring and autumn. Directions specified on the labels and material safety data sheets must be adhered to.

Species	Control methods
Polygonum aviculare (Wire Weed)	• Hand removal and cutting have been suggested for the control of single plants and small patches • Multiple applications of herbicide may be required to control repeated germinations. Directions specified on the labels and material safety data sheets must be adhered to.
Solanum nigrum (Blackberry Nightshade)	• Hand removal and cutting have been suggested for the control of single plants and small patches • Multiple applications of herbicide may be required to control repeated germinations. Directions specified on the labels and material safety data sheets must be adhered to.
Trifolium angustifolium (Narrow-leaved Clover)	• Hand removal and cutting have been suggested for the control of single plants and small patches • Multiple applications of herbicide may be required to control repeated germinations. Directions specified on the labels and material safety data sheets must be adhered to.
Xanthium spinosum (Bathurst Burr)	• Chemical control: Bathurst Burr is susceptible to some herbicides, particularly on young plants. Directions specified on the labels and material safety data sheets must be adhered to • Mechanical control: Repeated cultivation of seedlings after each germination event is effective on arable land. Mechanical slashing should be undertaken before the burrs have formed.

Environmental safeguards outlined in Section 6.1.3 and Section 7.2 would be implemented to control the spread of weeds across the proposed work area. With the correct implementation of environmental safeguards, the proposed modification is expected to have a negligible impact on weed dispersal.

The proposed modification is unlikely to contribute to increased levels of pest species in the locality of the study areas. Construction of the proposed modification has the potential to temporarily disperse pest species due to noise and human presence, however the proposed modification is unlikely to increase the value of the habitat for pest species in the locality of the study area over the long-term.

There is the potential for pathogens to occur within the proposed work areas. The most likely causes of pathogen dispersal and importation associated with the proposed modification includes earthworks, movement of soil, and attachment of plant matter to vehicles and machinery. Pathogens would be managed within the construction area in accordance with the Biosecurity Act 2015.

Waterways, wetlands and hydrology

As noted in Section 6.1.1, the proposed modification would be located within 10 kilometres of the Barmah-Millewa Forest, which is a part of the Barmah Forest Ramsar site (Victoria) and the NSW Central Murray Forests Ramsar site (NSW). The proposed modification would not impact on the ecology of these Ramsar wetlands. Further, Tuppal Creek has no direct hydraulic connection into these wetlands.

The project is situated within a floodplain with flooding and temporary inundation occurring in various areas during high rainfall events. The project is not expected to have a considerable impact on hydrological processes that sustain threatened species and/or threatened ecological communities. The project has potential to impact on water quality and hydrology, including:

- The release of poor-quality sediment laden water into watercourses within and adjacent to the proposed work areas when there are rainfall events during construction
- A reduction in stream bank stability following vegetation removal/trimming, resulting in bank erosion and sedimentation of watercourses along Tuppal Creek
- Accidental release of contaminants during construction and maintenance (i.e., chemicals, fuel, oil, hydraulic fluid) into watercourses.

The extent of these potential impacts is limited to direct impacts on woodland and potential indirect impacts to waterways if not mitigated appropriately. The impacts would be short term and only occur during the construction phase.

There is potential for the project to have minor impacts on water quality, water bodies and hydrological processes that sustain threatened species, including the Flathead Galaxias, Murray Crayfish, Murray Cod, Silver Perch, Southern Pygmy Perch and Trout Cod. These species have potential to inhabit Tuppal Creek. However, the discharge of fine sediments and contaminants are likely to be short 'pulse' events and the fine sediments would be rapidly flushed out of the system. This would most likely result in negligible impact to threatened species if present. The direct removal, lopping or trimming of woodland trees is minimal and would be minimised to reduce impacts on waterways.

Noise and vibration and dust

The proposed modification may result in a negligible, localised increase in noise and vibration from machinery during vegetation removal when compared with the assessment provided in the existing REF (refer to Section 6.3).

Noise and vibration impacts during construction may result in fauna temporarily avoiding habitats adjacent to the proposed work areas, however these impacts are expected to be localised and temporary, and are not considered likely to have a significant, long-term impact on fauna. The

magnitude of this impact would be low and mitigation measures are not deemed necessary. The proposed modification would not require night works, which removes the potential for disturbance to fauna residing within or near the proposed work areas during dusk and dawn periods, as well as nocturnal fauna.

Elevated levels of dust is likely to be generated during construction. Deposition of dust would be temporary, highly localised and is unlikely to generate additional impacts to those assessed in the existing REF.

Operation

The proposed modification is limited to extending the proposed work areas and vegetation removal required for construction and would not impact operation. Operation of the project would be in accordance with the assessment provided and approved conditions of the existing REF.

6.1.3 Safeguards

Safeguards to minimise the impacts of the proposed modification on biodiversity are provided in Table 8. A consolidated list of safeguards for the project is provided in Table 15.

Table 8 Environmental safeguards for biodiversity

Ref	Impact	Safeguard	Responsibility	Timing
B1	Impact to native plants and animals including threatened species	Within the proposed work areas additional mitigation measures will include: • Measures to minimise the area of construction disturbance and therefore clearing of hollow bearing trees, other trees, shrubs, grass and groundcover • Where feasible, stockpiling and laydown areas to be established within existing cleared areas to avoid or minimise impacts to vegetation • Machinery and stockpiling is to be situated away from the dripline of retained trees • Parking of vehicles and machinery is to occur within existing cleared areas only.	Contractor	Construction
B2	Impact to native plants and animals including	Construction crews will be made aware that any native fauna species encountered must be allowed to leave site without being harassed and a local wildlife rescue	Contractor	Construction

Ref	Impact	Safeguard	Responsibility	Timing
	threatened species	organisation must be called for assistance where necessary.		
B3	Impact to native plants and animals including threatened species	A procedure for dealing with unexpected presence of threatened species will be implemented during construction, including cessation of work and notification of the contractors appointed environmental representative and DPE and determination of appropriate mitigation measures (including relevant relocation measures).	Contractor	Construction
B4	Wildlife impacts from vehicle strike	Drivers must stay vigilant for fauna during machinery operation and vehicle movements.	Contractor	Construction
B5	Impacts from borrow pit areas	The following mitigation measures will be implemented during excavations within borrow pit areas to reduce impacts to vegetation: • Incorporate specific vegetation management measures into the site induction, toolbox talk and pre-start meetings • Install highly visible barriers around the perimeter of the proposed work areas.	Contractor	Construction
B6	Operation of borrow pit areas	The following mitigation measures will be implemented during the operation of the borrow pit areas: • To minimise erosion and sedimentation, borrow pit areas will not be formed with a steep gradients • All requirements of the water license must be met • All requirements of biosecurity legislation and guidelines for weed and pest species management must be met	Water-Infrastructure/ Contractor/asset owner	Operation

Ref	Impact	Safeguard	Responsibility	Timing
		• If possible, consider utilising some of the borrow pit or areas of the borrow pits for wildlife habitat.		

6.2 Aboriginal cultural heritage

An Aboriginal Due Diligence Assessment was prepared with the existing REF. Following approval of the existing REF, design development and delivery of the project was handed to Water - Infrastructure.

Approval of the REF was conditional on undertaking an Aboriginal Cultural Heritage Assessment Report (ACHAR). As a result, Water - Infrastructure commissioned an ACHAR (the existing ACHAR) for the project, using the general study areas, bridge locations and laydown locations from the existing REF (Aboriginal Cultural Heritage Management, 2022). As it was not specified in the existing REF, the existing ACHAR assumed an area of ground disturbance of 17 metres either side of the creek from the identified bridge location, and roughly 10 to 15 metres wide. As discussed in Section 1.1.2, during design development, it was identified that with the exception of the Arrawatta crossing, the study areas approved in the existing REF were no longer sufficient to allow construction of the project to be carried out. In addition to extending the work areas (i.e. study areas), the areas of ground disturbance (i.e. design footprint) would be larger than the existing ACHAR assumed. As such, the need for an ACHAR addendum was identified to assess the extended work areas and current design footprint. In addition, the original AHIP application submitted for Mundiwa Isolated Artefact (AHIMS # 54-6-0085) in April 2022 (based on the existing ACHAR) was withdrawn.

An ACHAR addendum has been prepared and is provided as Appendix E. The ACHAR addendum has re-assessed the entirety of the proposed work areas and has considered the findings of previous Aboriginal cultural heritage assessments. Therefore, with the exception of the Arrawatta crossing, the ACHAR addendum essentially supersedes all previous Aboriginal cultural heritage assessments for the project. The study area for the addendum ACHAR is the proposed work areas but also includes consideration of Aboriginal artefacts recorded nearby. A summary of the ACHAR addendum findings is included below.

6.2.1 Existing environment

Environmental context

Across a majority of the region, the topography is relatively flat with the ground surface consisting of floodplain sedimentary deposits. These deposits are formed by hydrological features, such as watercourses, wetlands, and lakes, but in some areas have also been influenced by aeolian (wind-blown) events which have contributed to the development of dunes, of sand or silty sand. There has been heavy modification within the ACHA study area since European settlement. The Murray River is a highly modified feature in the landscape and has played an important role in shaping the present-day landforms of the region. Prior to European settlement and large-scale water management, the Murray River would have experienced variable seasonal flooding each year. During periods of flooding, inundated areas would have supported many food resources for Aboriginal people, such as fish, shellfish other aquatic animals and water birds.

Tuppal Creek was originally an anabranch that connected the Murray and Edward rivers but is today a 60 kilometre long ephemeral watercourse with a starting elevation of 116 metres, decreasing in elevation to 93.8 metres at its confluence with the Edward River (Aboriginal Cultural Heritage Management, 2022).

This surface geological unit is described as having a surface of unconsolidated grey humic soil, over clayey very fine-grained sand. This is on top of light brown clayey silt. These deposits are quaternary formations and are associated with the flow of the Murray River. The soils are alluvial floodplain deposits that contain silt and sand. It is also formed from very fine to medium-grained lithic and quartz materials. The classification of the soil that is associated with the geological units located in the study area is a Vertosols soil. There are no outcrops of the underlying geology located the study area; therefore, there is no material that could be used to produce lithic tools or tools in the area of food processing. The study area lies entirely within the Murray Channels and Floodplains soil landscape, which is comprised of alluvial (water) deposited soils associated with active channels and streams (Mitchell, 2002).

The climate of the Riverina bioregion, including the study areas, is classified as having a mild to warm temperature with moderately low rainfall. The study area, due to its proximity to Tuppal Creek and the Edward and Murray Rivers, would have provided a suitable location for long-term occupation.

Ethnohistory

The Riverina has been the home to many Aboriginal communities for at least 50,000 years (Hiscock, 2008). These Riverina communities include the Wiradjuri, Nari-Nari, Mudi-Mudi, Gurendji, Yitha, Bangerang, Yorta-Yorta, Barapa-Barapa, Wamba-Wamba, Wadi-Wadi and Dadi-Dadi people (Tindale, 1940) (Eardley, 1999). The Bangerang, Yorta-Yorta, Barapa, Wamba-Wamba, Wadi-Wadi and Dadi-

Dadi people resided close to the Murray River, with the study areas located within the boundary of the Yorta (Australian Institute of Aboriginal and Torres Strait Islander Studies, 2019).

The Murray River catchment has an extensive history of human habitation with evidence of human occupation at Kow Swamp in the Central Murray Valley indicating that humans have occupied the region for at least 15,000 to 9,000 years (Macumber and Thorne, 1975). Over this time the geophysical landscape of the Central Murray Region continuously changed, with the watercourses following many different paths. The Murray Basin was able to support large populations of Aboriginal people due to the number of permanent watercourses and the associated food and material resources. With the large variety of food resources, human groups could be semi-sedentary along the river although seasonal migration was also undertaken, with (Aboriginal Cultural Heritage Management, 2022) suggesting that it is 'likely' that the Bangerang people joined in the seasonal migration made by Wiradjuri and Monaro people to the Alpine country each year to feast on Bogong moths (Aboriginal Cultural Heritage Management, 2022). Resources along the river also included materials that were used for the creation of canoes, nets, stone tools, and other items for the collection and transportation of goods (Atkinson and Berryman, 1983).

Before the first European explorers arrived in the area, an epidemic of smallpox had already spread throughout the Indigenous population, possibly decreasing it by around 50 per cent (Atkinson and Berryman, 1983). The effects of this population decline were observed by Curr (1883) who recorded a large number of abandoned mounds, with some trees growing from them. Curr believed that there was an Indigenous population of approximately 1,200 in the region prior to the epidemic (Atkinson and Berryman, 1983).

Heritage database search

A number of searches of the Heritage NSW Aboriginal Heritage Information Management System (AHIMS) database have been undertaken as part of previous assessments. However, updated searches were done on 13 April 2023 and 5 May 2023 as part of the ACHAR Addendum preparation, identifying 51 Aboriginal sites. These searches applied a 20-kilometre radius around the proposed work areas. AHIMS recorded sites and types within the study area are summarised in Table 9 and shown in Figure 24 to Figure 34.

Table 9 Summary of AHIMS search results (Austral, 2023)

Site type	Quantity	Percentage (%)
Modified tree	27	52.9
Artefact	10	19.6
Earth Mound	6	11.8

Site type	Quantity	Percentage (%)
Earth Mound, Hearth	4	7.8
Potential Archaeological Deposit (PAD)	2	3.9
Burial	1	2.0
Burial, Earth Mound, PAD	1	2.0
Total	**51**	**100.0**

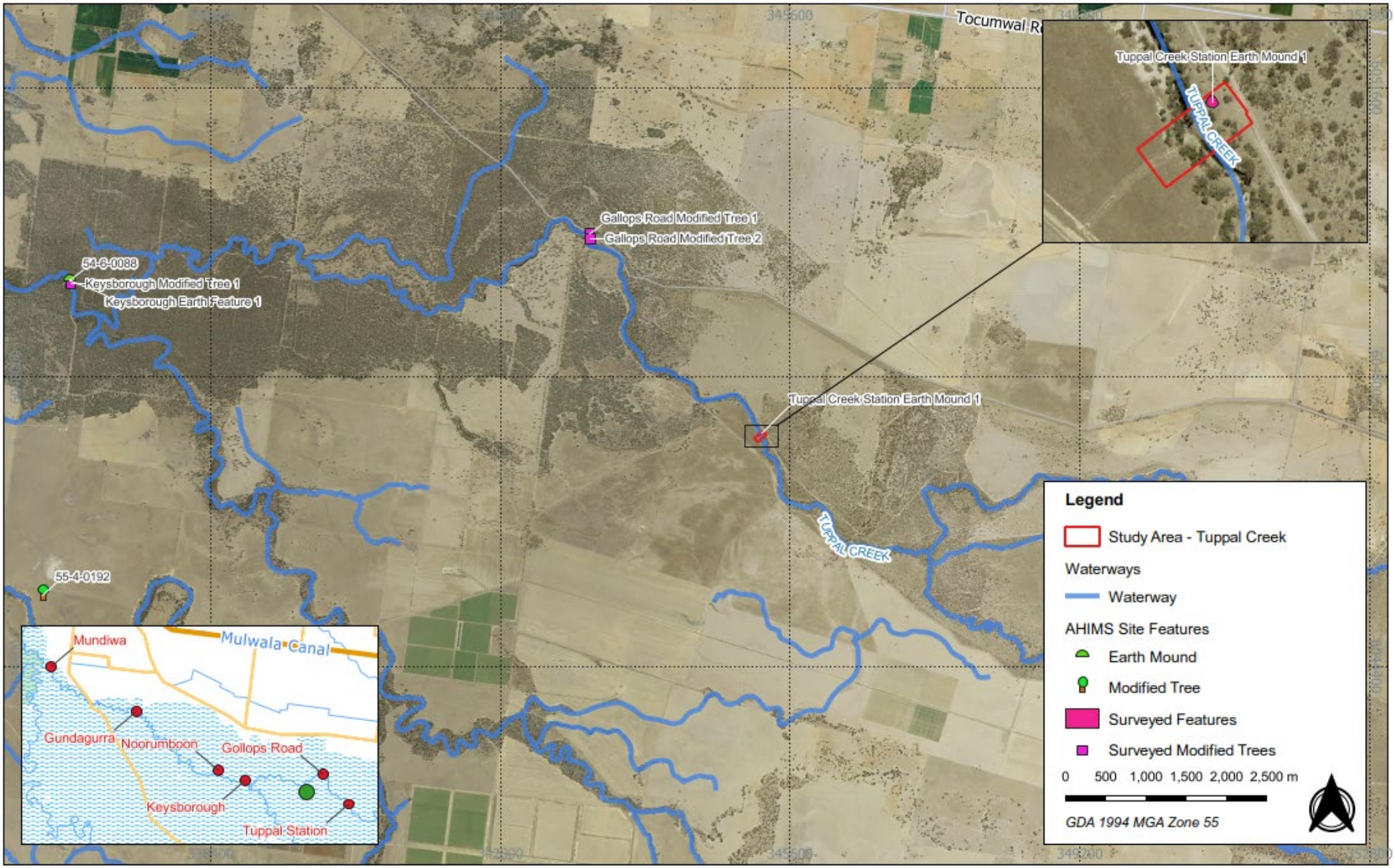

Figure 24 Tuppal Station crossing (1T) AHIMS results

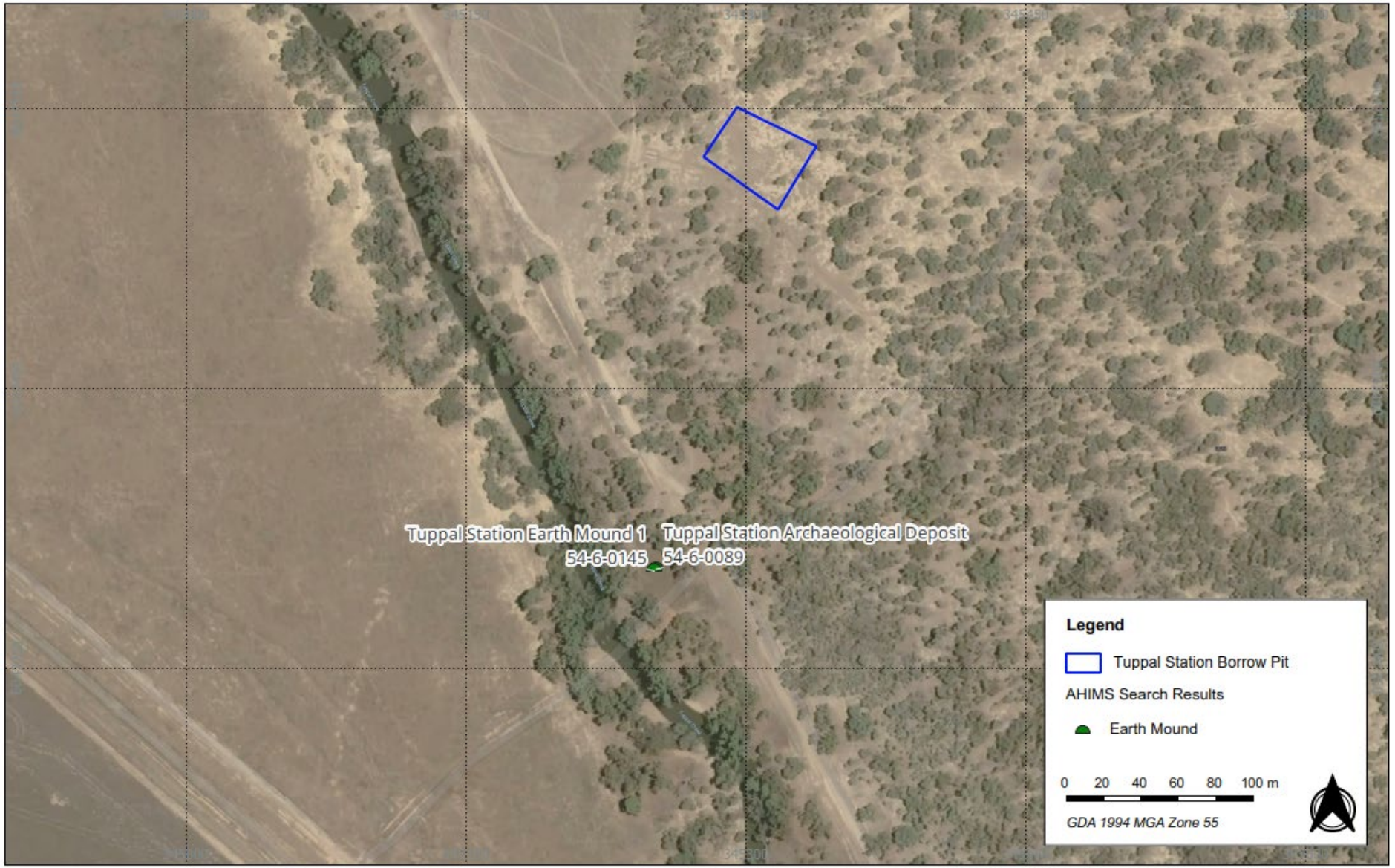

Figure 25 Tuppal Station borrow pit AHIMS results

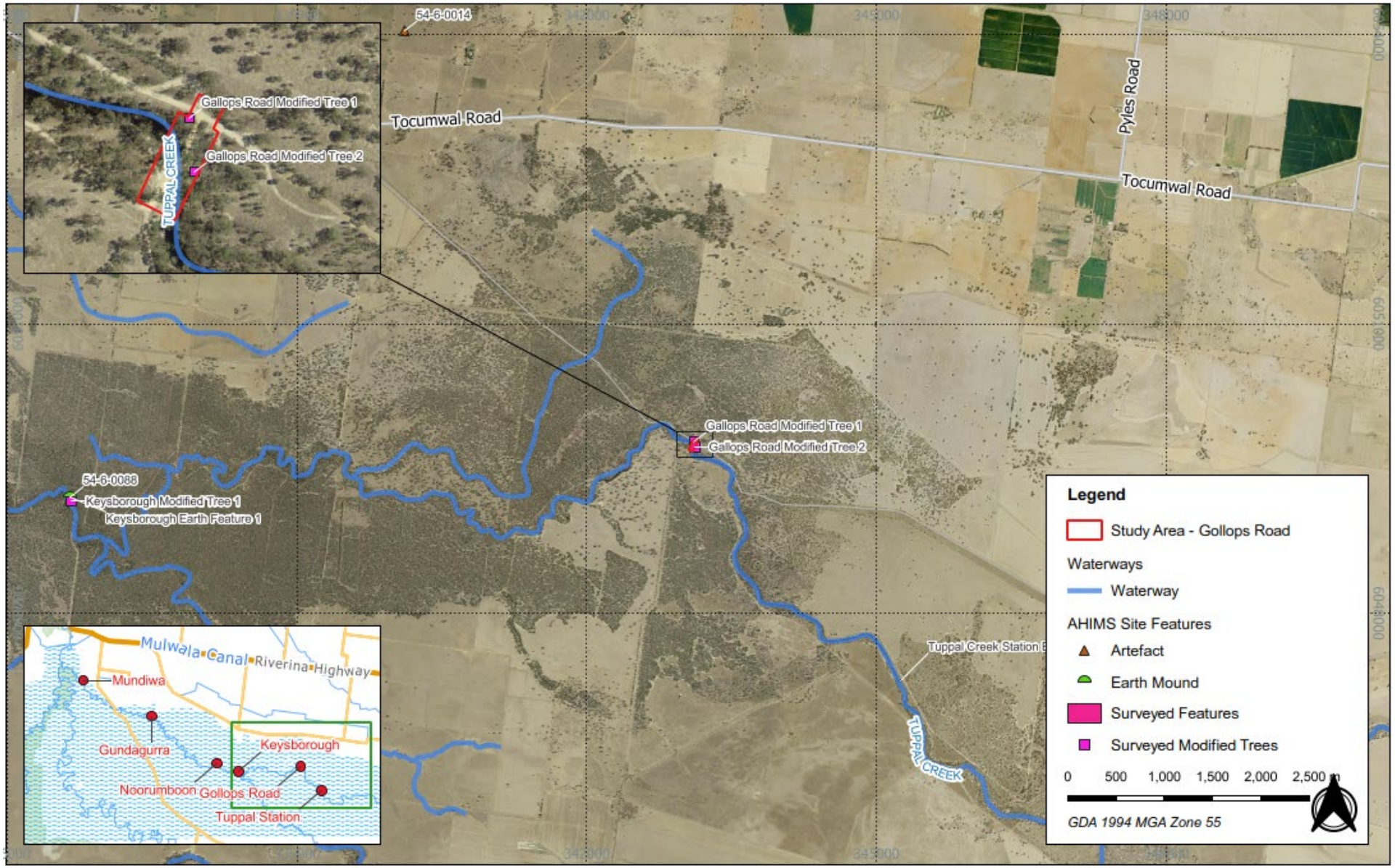

Figure 26 Gollops Road crossing (2T) AHIMS results

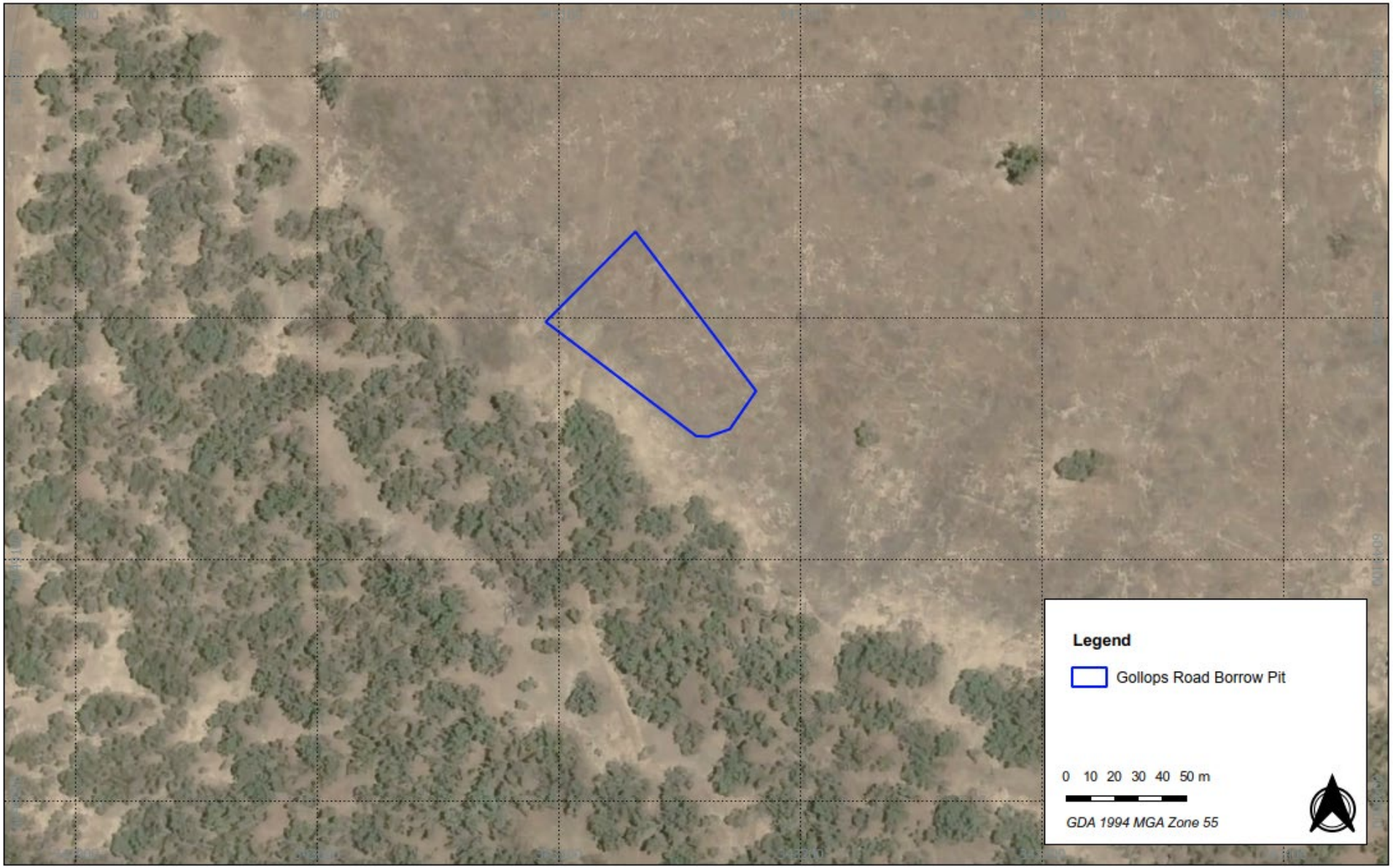

Figure 27 Gollops Road borrow pit AHIMS results

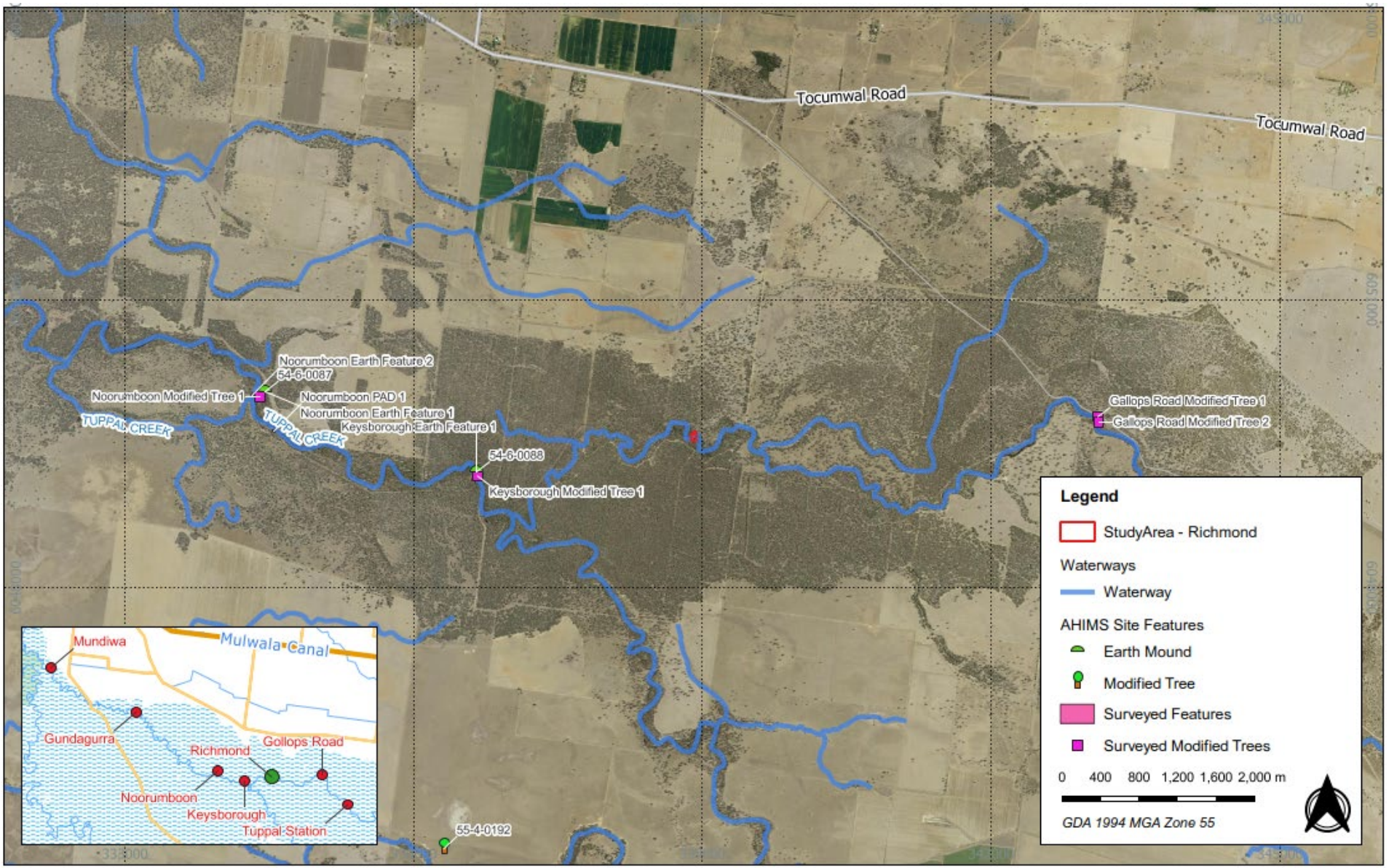

Figure 28 Richmond crossing (3T) AHIMS results

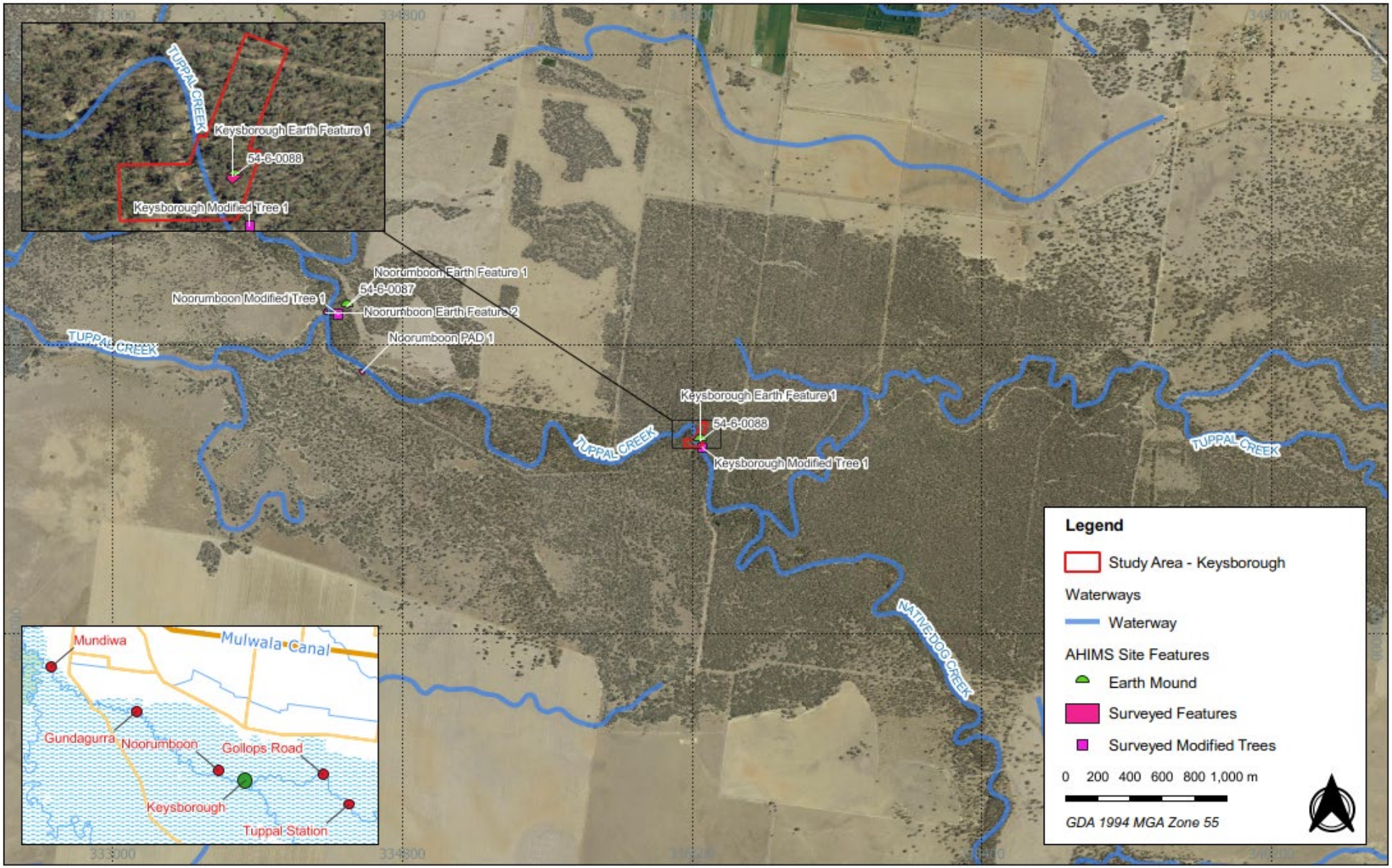

Figure 29 Keysborough crossing (4T) AHIMS results

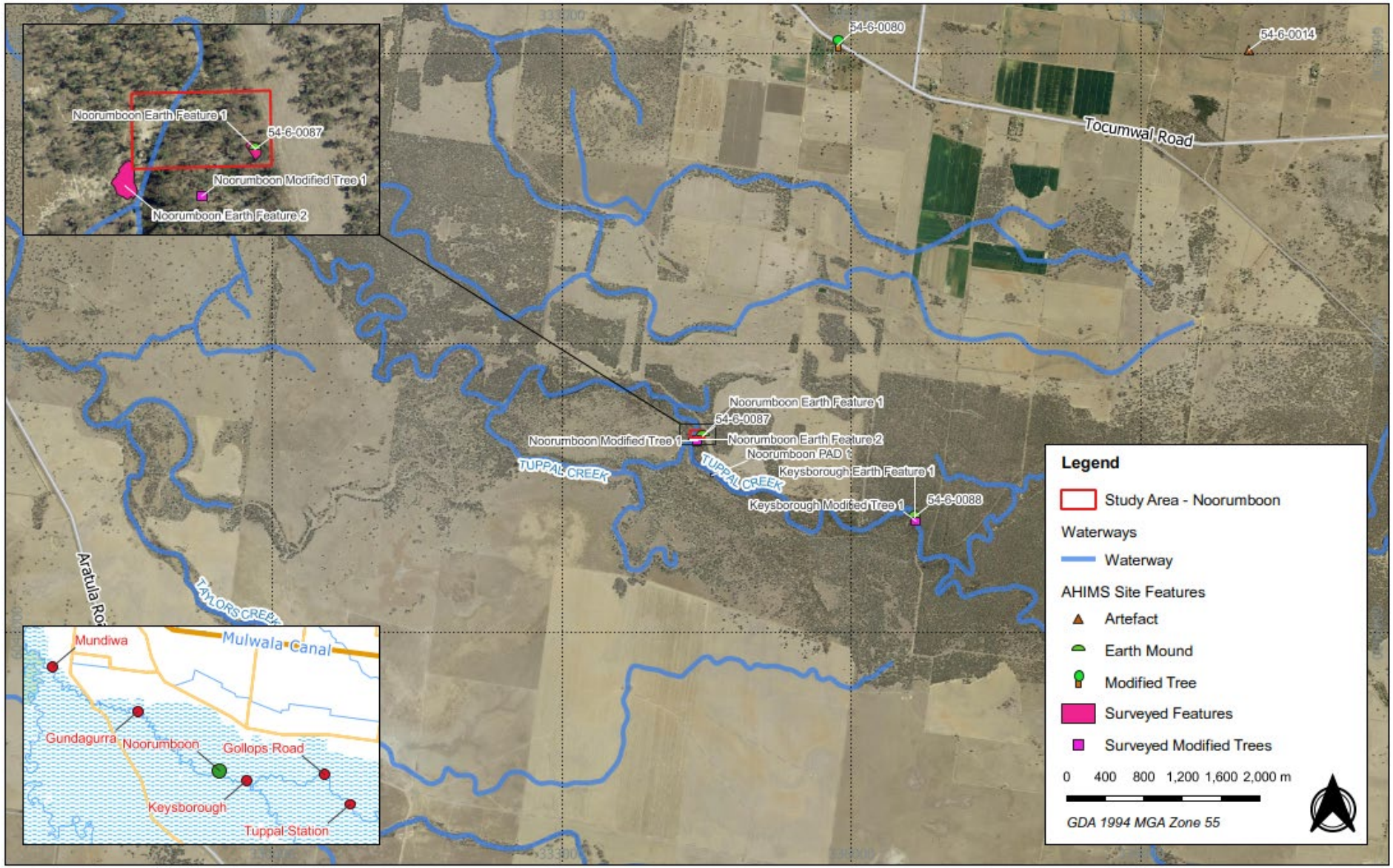

Figure 30 Noorumboon crossing (5T) AHIMS results

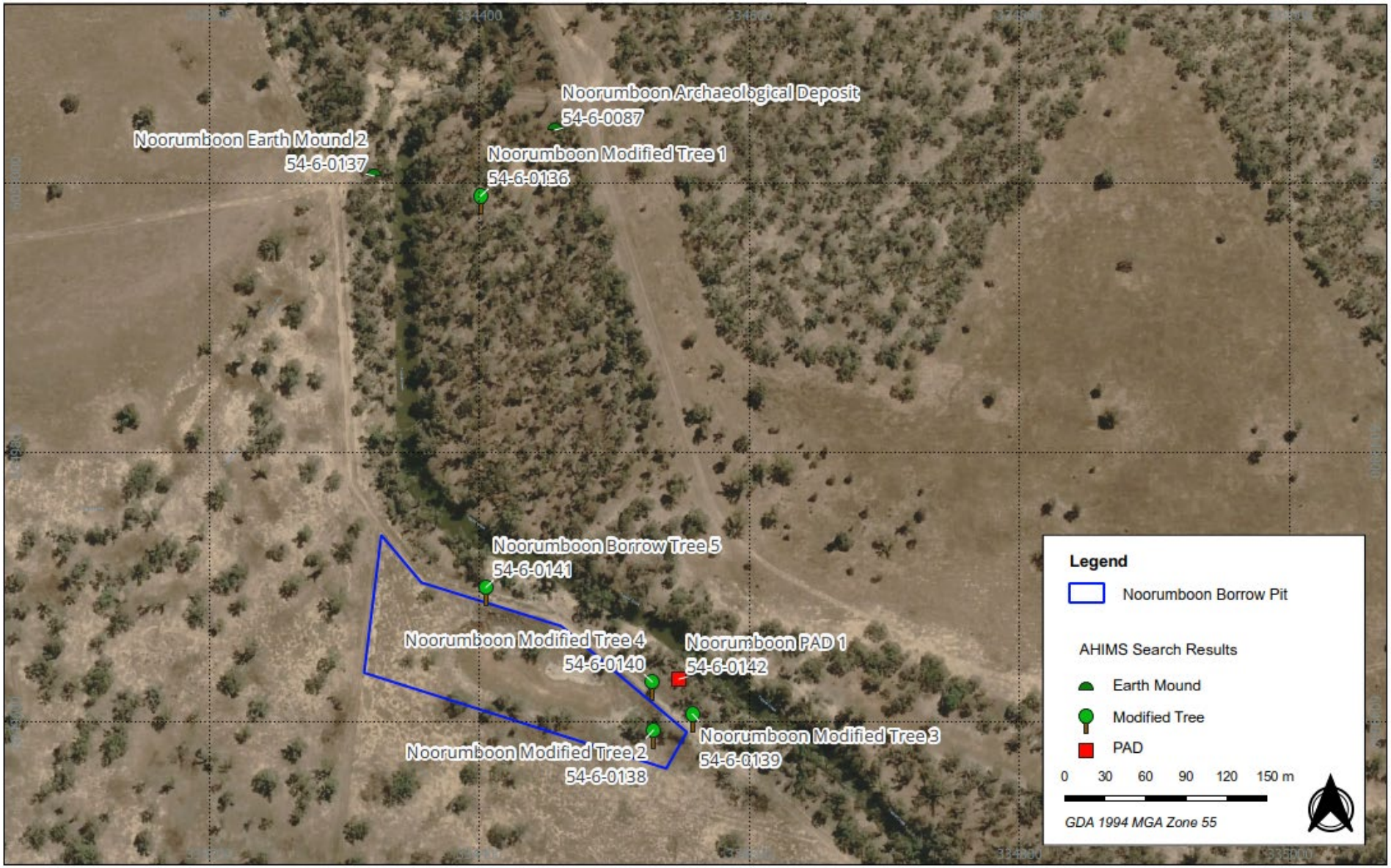

Figure 31 Noorumboon borrow pit AHIMS results

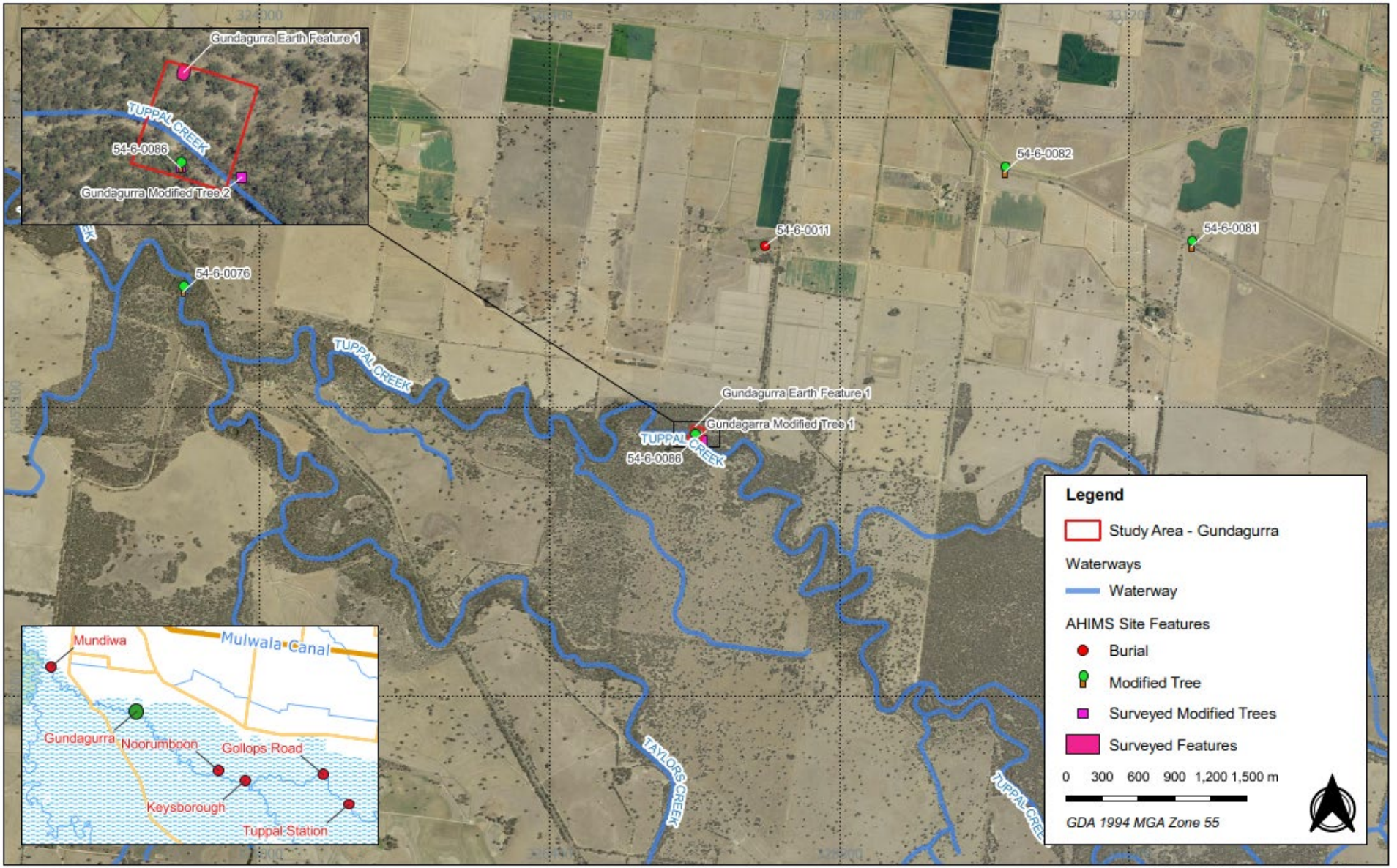

Figure 32 Gundagurra crossing (7T) AHIMS results

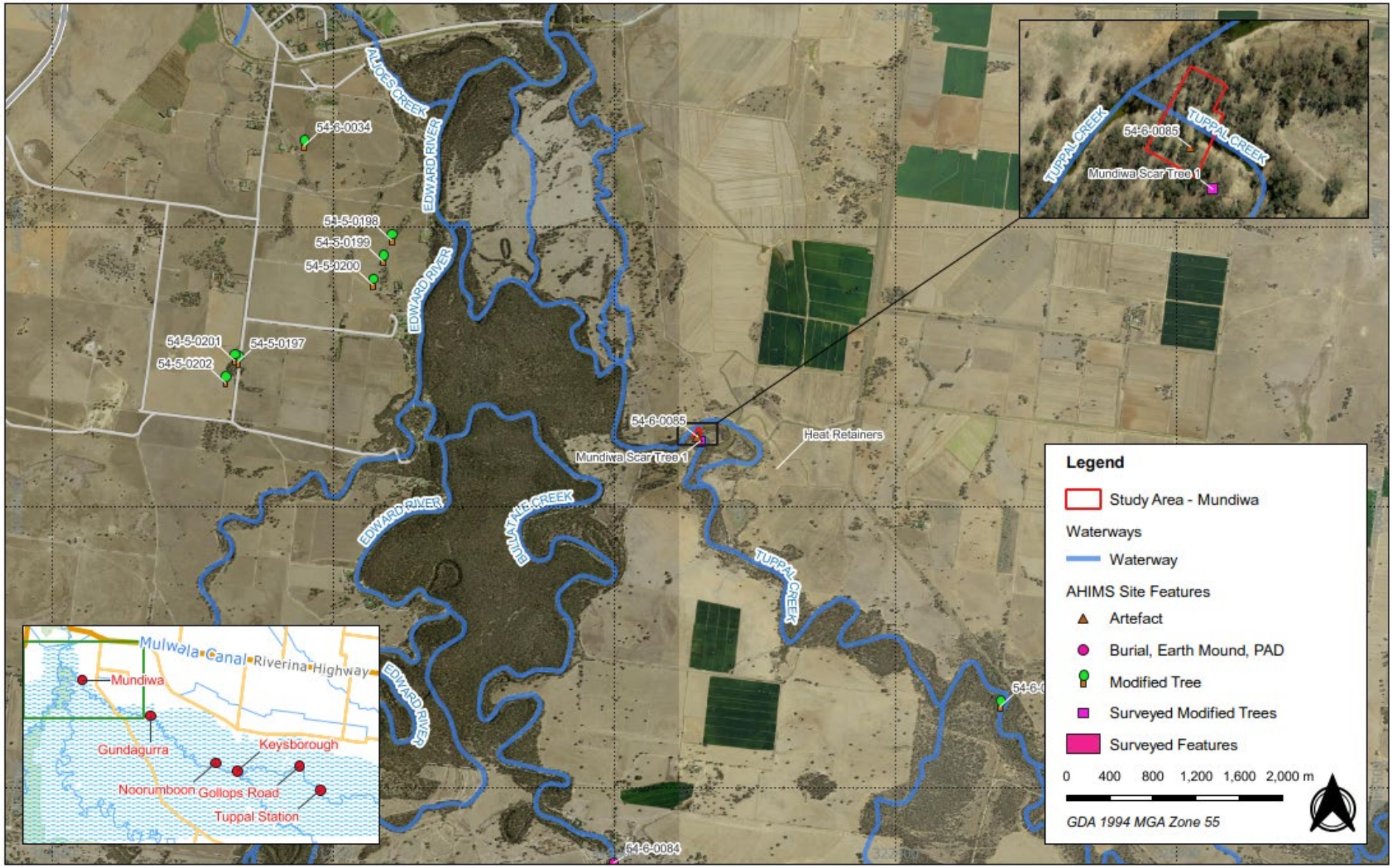

Figure 33 Mundiwa crossing (8T) AHIMS results

Figure 34 Mundiwa borrow pits AHIMS results

Archaeological investigations

Archaeological pedestrian surveys were undertaken within the study areas by qualified archaeologists, to determine the presence of surface and potential subsurface heritage items. The archaeologists were generally accompanied by a Water - Infrastructure cultural heritage representative, Water - Infrastructure community engagement officer and Registered Aboriginal Party (RAP) representatives. The surveys were undertaken on the following dates (consultancies included in brackets):

- 27-29 June 2022 (3Rivers)
- 5-14 September 2022 (3Rivers)
- 20 April 2023 (Austral).

After the June 2022 surveys, the results were reviewed in order to determine the need to carry out sub-surface testing, and a design review process was carried out to reduce the potential impacts of the project on Aboriginal cultural heritage through design.

Sub-surface test excavations were then undertaken, focussing on areas identified as having moderate and high archaeological potential that would be impacted by the project. Weather and access constraints meant that test excavations were only able to be undertaken at the Gundagarra, Keysborough and Tuppal Station study areas. Test excavations were undertaken in September 2022. Each day the archaeologists were accompanied by four to six RAP representatives, a Water - Infrastructure cultural heritage representative and a Water - Infrastructure community engagement officer.

The additional site visit on 20 April 2023 was undertaken with the aim of ground-truthing the previous surveys to confirm the sites and PADs for the ACHAR addendum.

Archaeological results

Pedestrian surveys

Seventeen new Aboriginal heritage sites were identified during the 3Rivers surveys, in addition to the five sites previously recorded by (Aboriginal Cultural Heritage Management, 2022) within and adjacent to the study areas. Most of these sites were then ground-truthed by Austral in April 2023. In addition, areas of archaeological potential have been revised from those presented in the existing ACHAR. The 22 sites recorded within and adjacent to the study areas are summarised Table 10 and shown in Figure 24 to Figure 34. However, only seven sites are located within the proposed work areas.

In summary, the main Aboriginal heritage site types recorded within and adjacent to the study areas were modified trees, earth features, Potential Archaeological Deposits (PAD) and isolated artefacts.

It should be noted that two sites identified by previous consultants could not be relocated during the survey in April 2023 however, they have been included in Table 10for completeness.

Table 10 Aboriginal cultural heritage items recorded within or just outside the proposed work areas

Location	Site name	Austral survey	Located within the proposed work areas?
Tuppal Station crossing (1T)	Tuppal Creek Station Archaeological Deposit/ Tuppal Station Earth Mound (AHIMS # 54-6-0145)	Could not relocate during survey	N/A - Mapped within the proposed work area, but could not be relocated
Tuppal Station borrow pit	N/A – no Aboriginal sites identified	N/A	N/A
Gollops Road crossing (2T)	Gollops Road Modified Tree 1 (AHIMS # 54-6-0560)	Confirmed	Yes
	Gollops Road Modified Tree 2 (AHIMS # 54-6-0144)	Confirmed	Yes
Gollops Road borrow pit	N/A – no Aboriginal sites identified	N/A	N/A
Richmond crossing (3T)	N/A – no Aboriginal sites identified	N/A	N/A
Keysborough crossing (4T)	Keysborough Archaeological Deposit / Keysborough Earth Feature (AHIMS # 54-6-0088)	Confirmed – Earth mound	Yes
	Keysborough Modified Tree 1 (AHIMS # 54-6-0143)	Confirmed	No
Noorumboon crossing (5T)	Noorumboon Archaeological Deposit 1/ Earth Feature 1 (AHIMS # 54-6-0087)	Confirmed – Earth mound	Yes
	Noorumboon Modified Tree 1 (AHIMS # 54-6-0136)	Confirmed	No
	Noorumboon Earth Feature 2 (AHIMS # 54-6-0137)	Confirmed – Earth mound	No
Noorumboon borrow pit	Noorumboon Modified Tree 2 (AHIMS # 54-6-0138)	Did not inspect	Yes

Location	Site name	Austral survey	Located within the proposed work areas?
	Noorumboon Modified Tree 3 (AHIMS # 54-6-0139)	Did not inspect	No
	Noorumboon Modified Tree 4 (AHIMS # 54-6-0140)	Did not inspect	No
	Noorumboon Modified Tree 5/ Borrow Tree 5 (AHIMS # 54-6-0141)	Did not inspect	No
	Noorumboon PAD 1 (AHIMS # 54-6-0142)	Did not inspect	No
Gundagurra crossing (7T)	Gundagurra Scarred Tree 1 (AHIMS #54-6-0086)	Confirmed	Yes
	Gundagurra Scarred Tree 2 (AHIMS # 54-6-0134)	Confirmed	No
	Gundagurra Earth Feature 1 (AHIMS # 54-6-0135)	Could not relocate during survey	N/A - Mapped within the proposed work areas, but could not be relocated
Mundiwa crossing (8T)	Mundiwa Isolated Artefact (ISO) (AHIMS # 54-6-0085) *identified and registered during Aboriginal Cultural Heritage Management's test excavations.	Confirmed	Yes
	Mundiwa Modified Tree 1 /Scar Tree 1 (AHIMS # 54-6-0147)	Confirmed	No
Mundiwa borrow pit	Mundiwa Scar Tree 2 (AHIMS # 54-6-0148)	Confirmed	No
	Mundiwa ISO 1 (AHIMS # 54-6-0149) *the location for this site is currently being amended by Heritage NSW in the AHIMS database.	Did not inspect	No

Location	Site name	Austral survey	Located within the proposed work areas?
	Mundiwa PAD 1 (AHIMS # 54-6-0150)	Did not inspect	No
	Mundiwa Burrow Pit Artefact Scatter 1 (AHIMS # 54-6-0146)	Did not inspect	No

Test excavations

In 2022, 3Rivers conducted test excavation in areas thought to have archaeological potential in the Gundagurra crossing, Keysborough crossing and Tuppal crossing study areas. Austral has re-analysed the three stone artefacts found by 3Rivers at these text excavations (one at Gundagurra crossing and two at Keysborough crossing) and determined that only one of them is an artefact. This artefact was recorded in the Keysborough crossing study area and is a proximal silcrete flake.

In terms of non-lithic (stone) cultural material, 3Rivers' testing retrieved 164 materials from 11 test pits across the three study areas. The Tuppal Station study area contained the largest amount of material, followed by Keysborough. Of all the materials uncovered, burnt clay balls were the most prominent, making up 59.1 per cent of the raw material assemblage.

Archaeological analysis

The archaeological investigations within the study areas along Tuppal Creek have identified concentrations of artefacts within an alluvial terrace landform. The artefact, site types and raw materials are representative of other sites both locally and more broadly within the lower Murray region. The artefacts within the study areas were predominantly retrieved from depths of 0-100 mm.

The material recovered from the test pits at the Gundagurra, Keysborough and Tuppal Station study areas are more likely representative of geomorphic processes, rather than cultural deposition activities. Over time, small pieces of mound material move through culturally sterile soil surrounding the mound due to the actions of flood water, wind and erosion of soils. In the absence of a stratified deposit associated with the burnt clay located in the test pits, their presence can be attributed to these processes. An alternate explanation is natural fire events. The test pits are located on land that has been used for agricultural purposes and is prone to bushfires, both of which can create burnt clay which looks similar to clay balls made through cultural means. Without further context, it cannot be confirmed whether the burnt clay recovered from the test pits is natural or is of cultural origin; however, it can be stated that the burnt clay is not a subsurface extension of the earth mound features recorded during the surveys.

Revised assessments of archaeological sensitivity and potential as applicable are shown in Figure 35 to Figure 45.

Figure 35 Tuppal Station crossing (1T) archaeological potential

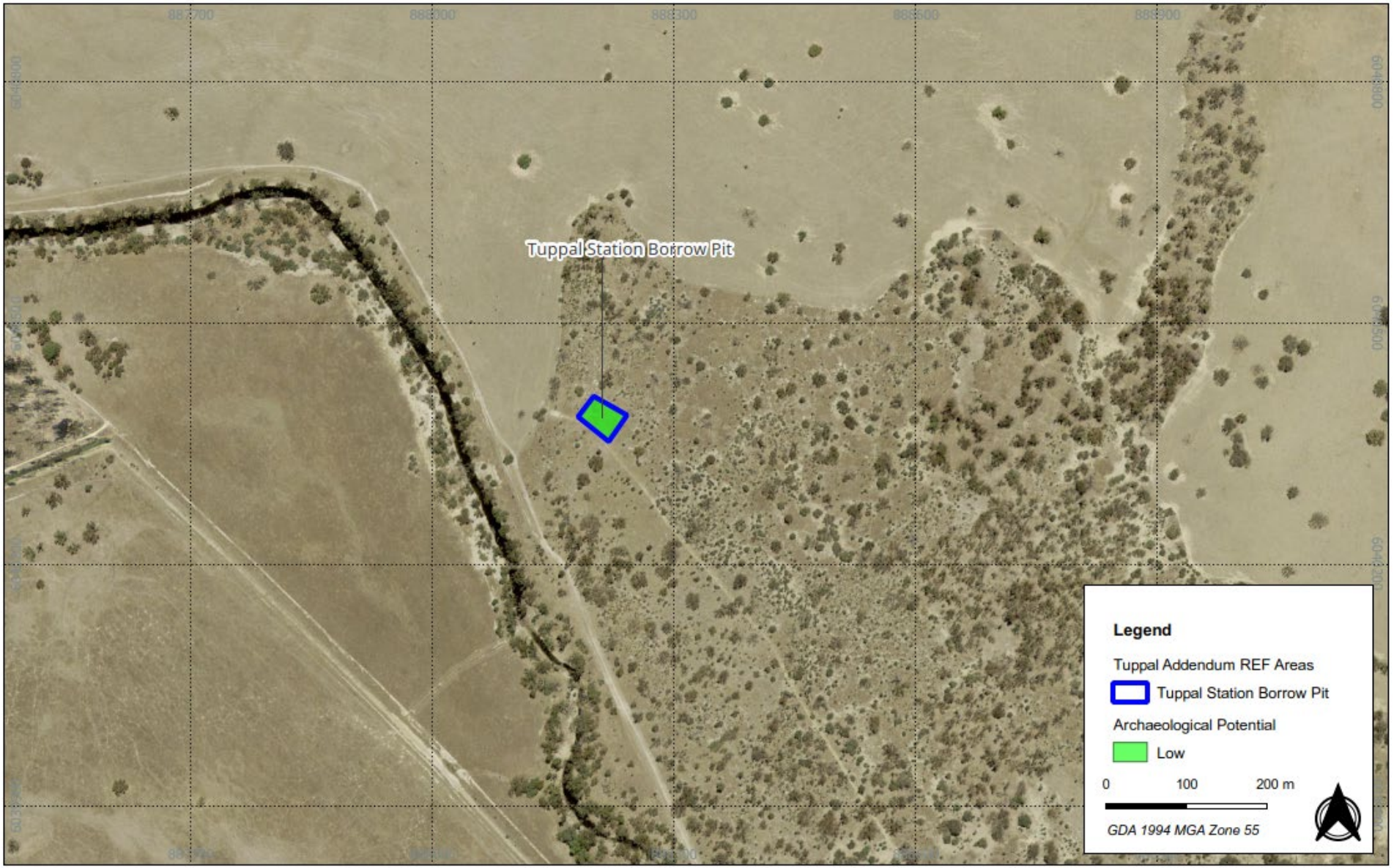

Figure 36 Tuppal Station borrow pit archaeological potential

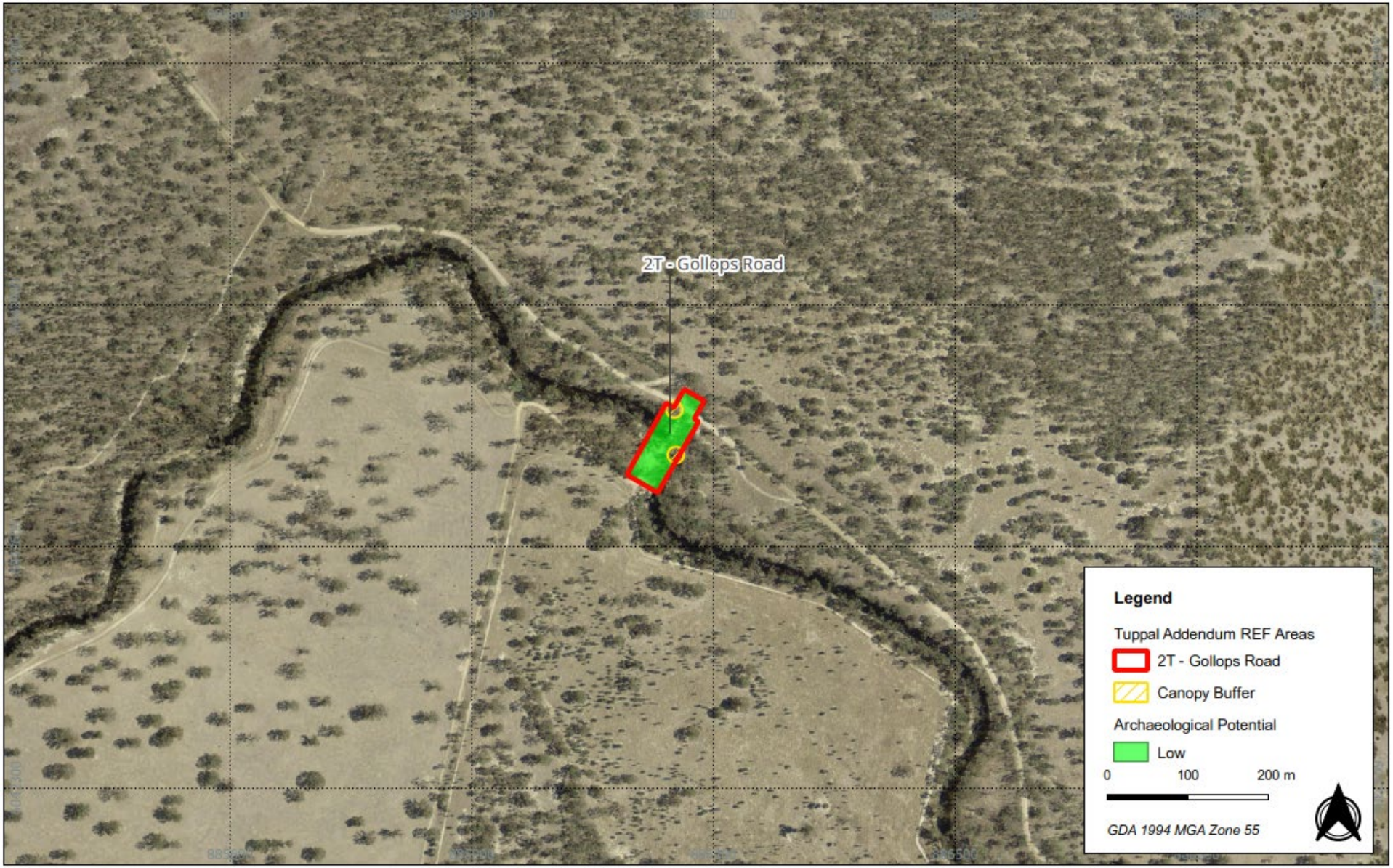

Figure 37 Gollops Road crossing (2T) archaeological sensitivity

Figure 38 Gollops Road borrow pit archaeological potential

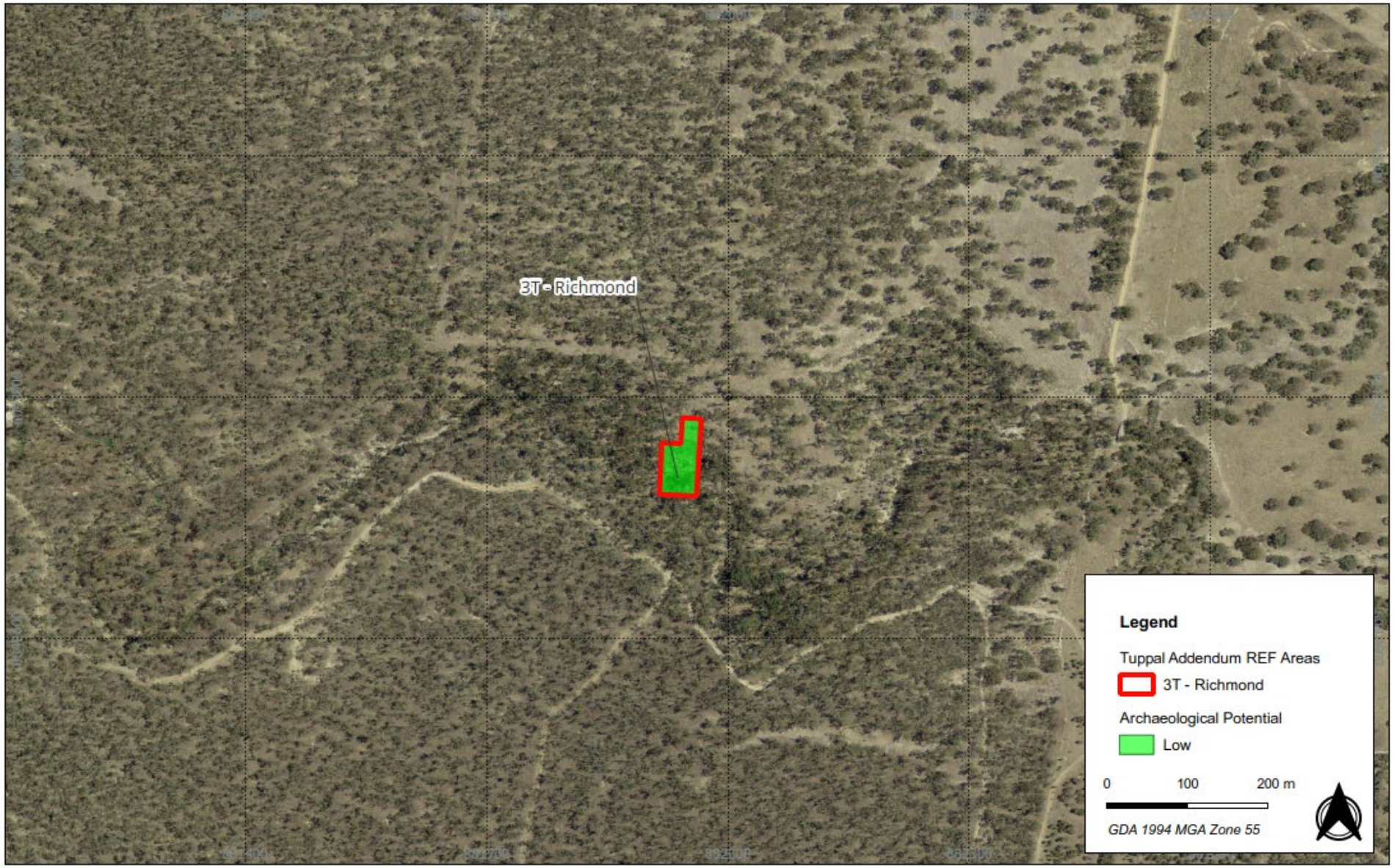

Figure 39 Richmond crossing (3T) archaeological sensitivity

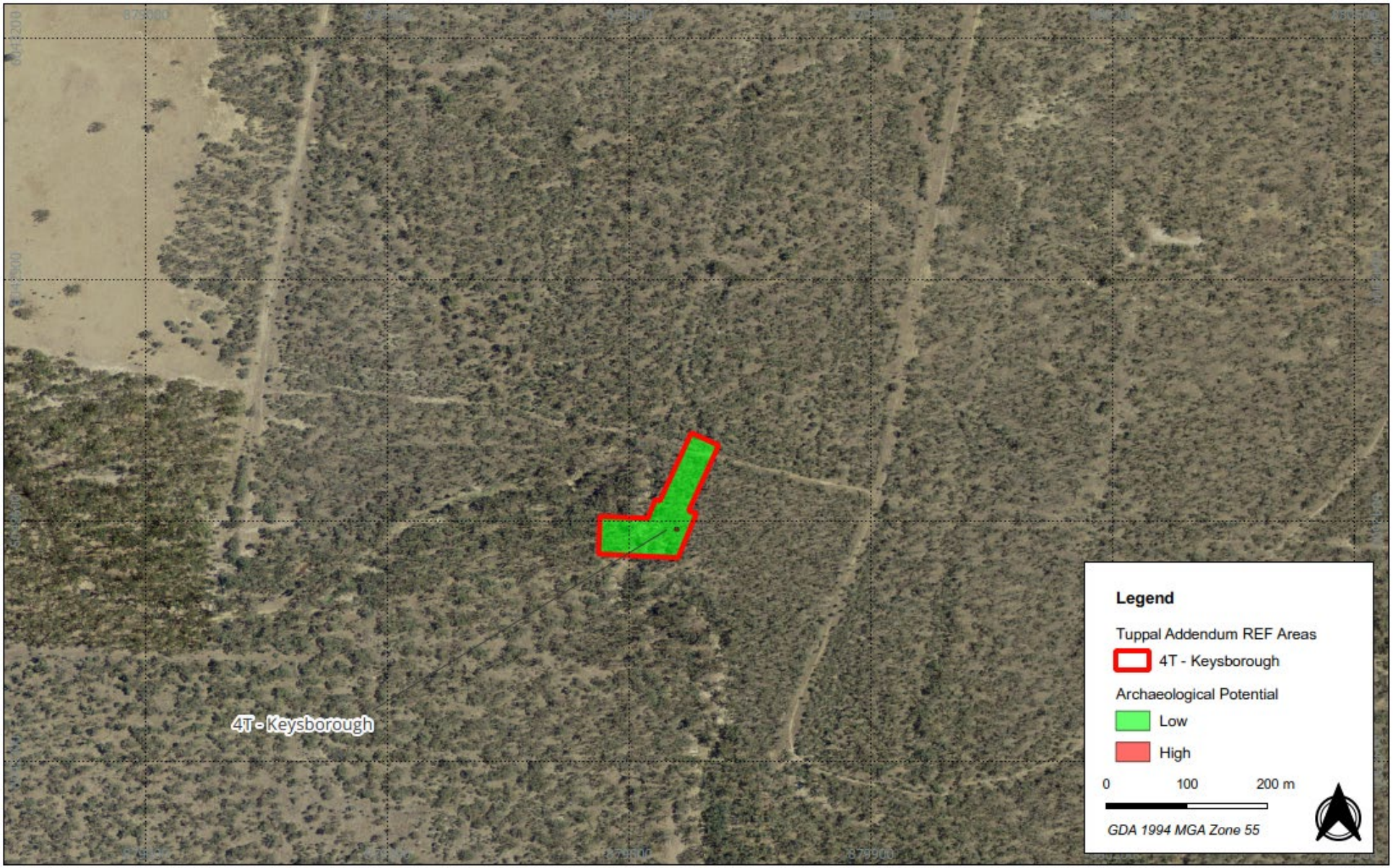

Figure 40 Keysborough crossing (4T) archaeological sensitivity

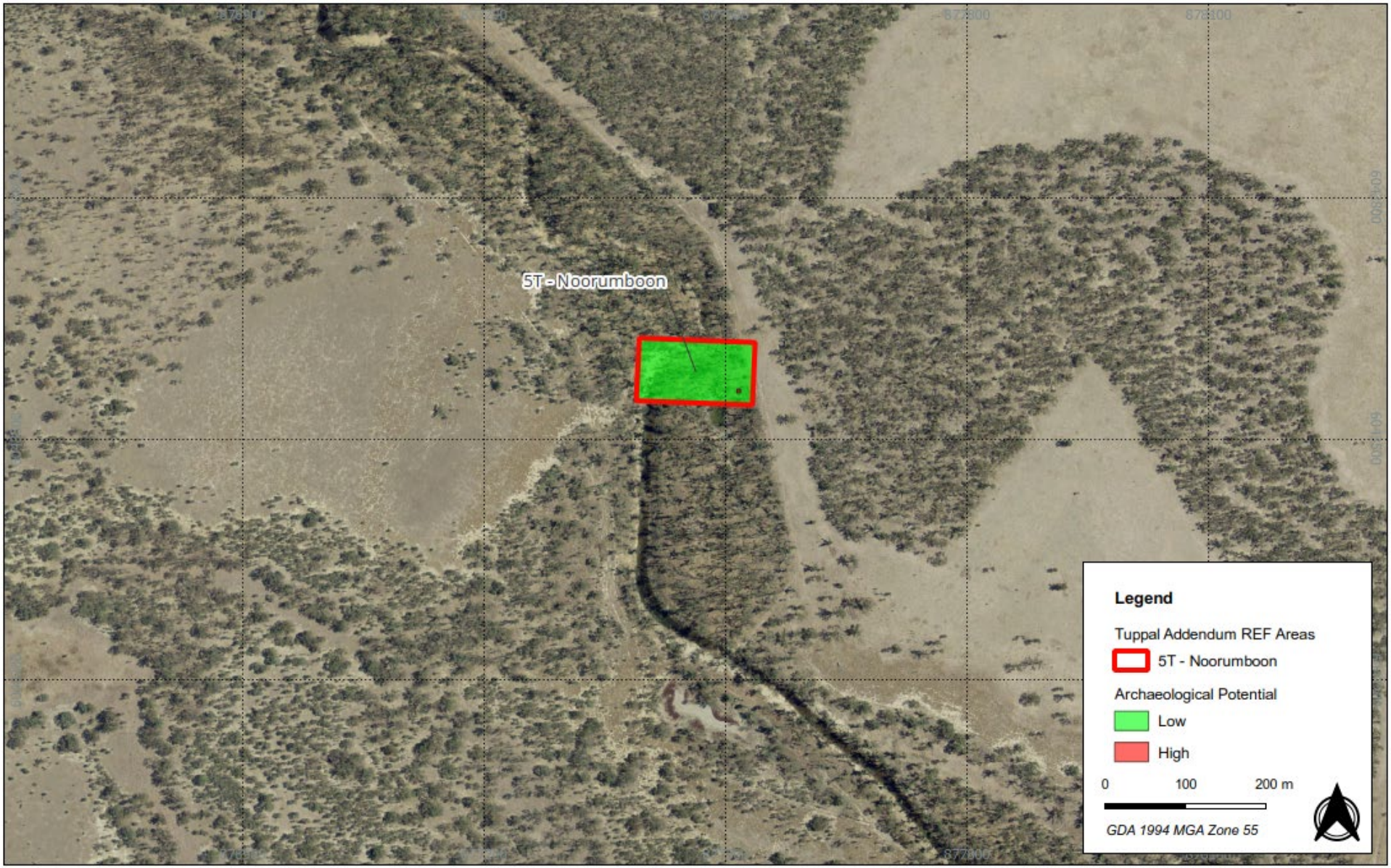

Figure 41 Noorumboon crossing (5T) archaeological sensitivity

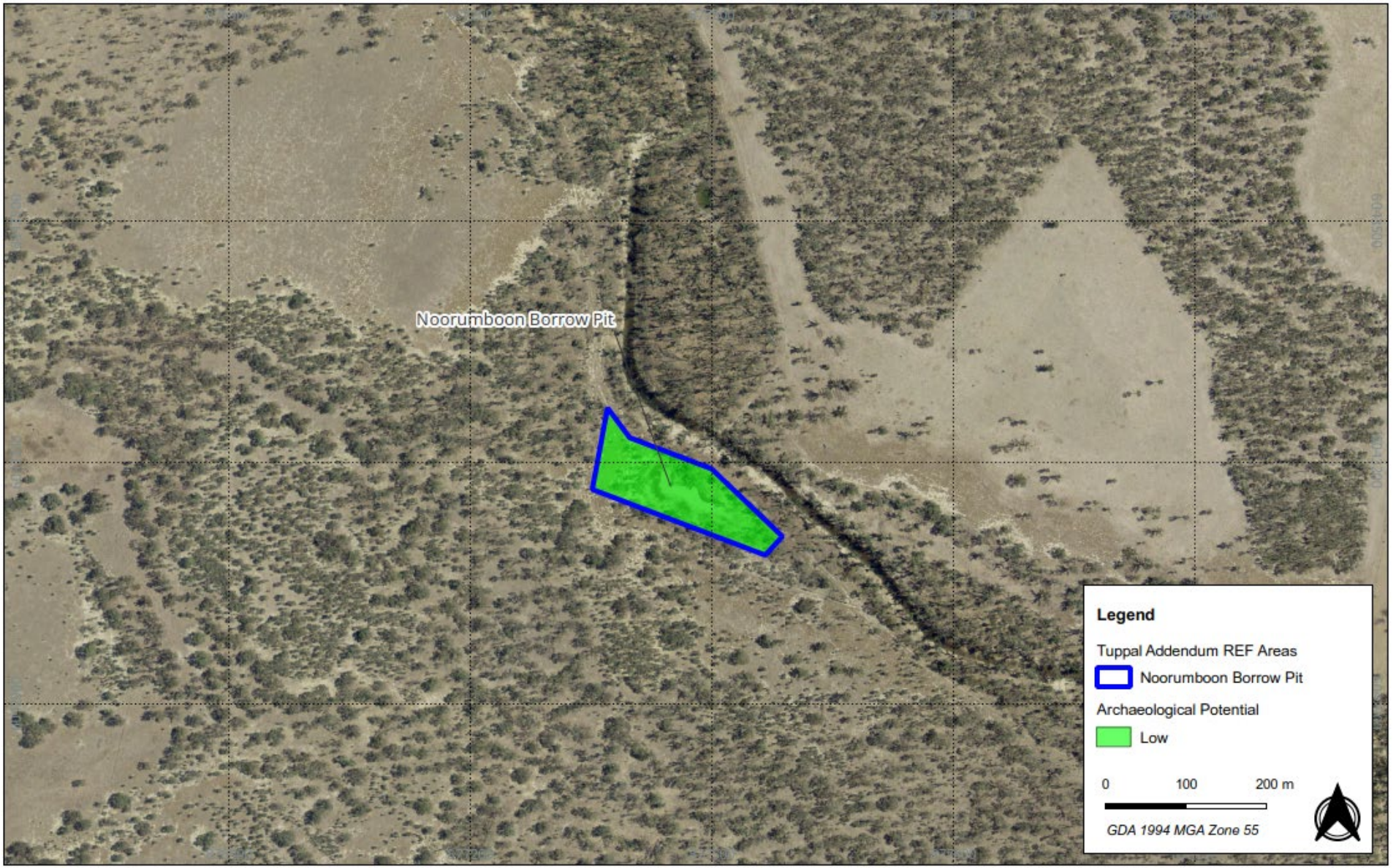

Figure 42 Noorumboon borrow pit archaeological sensitivity

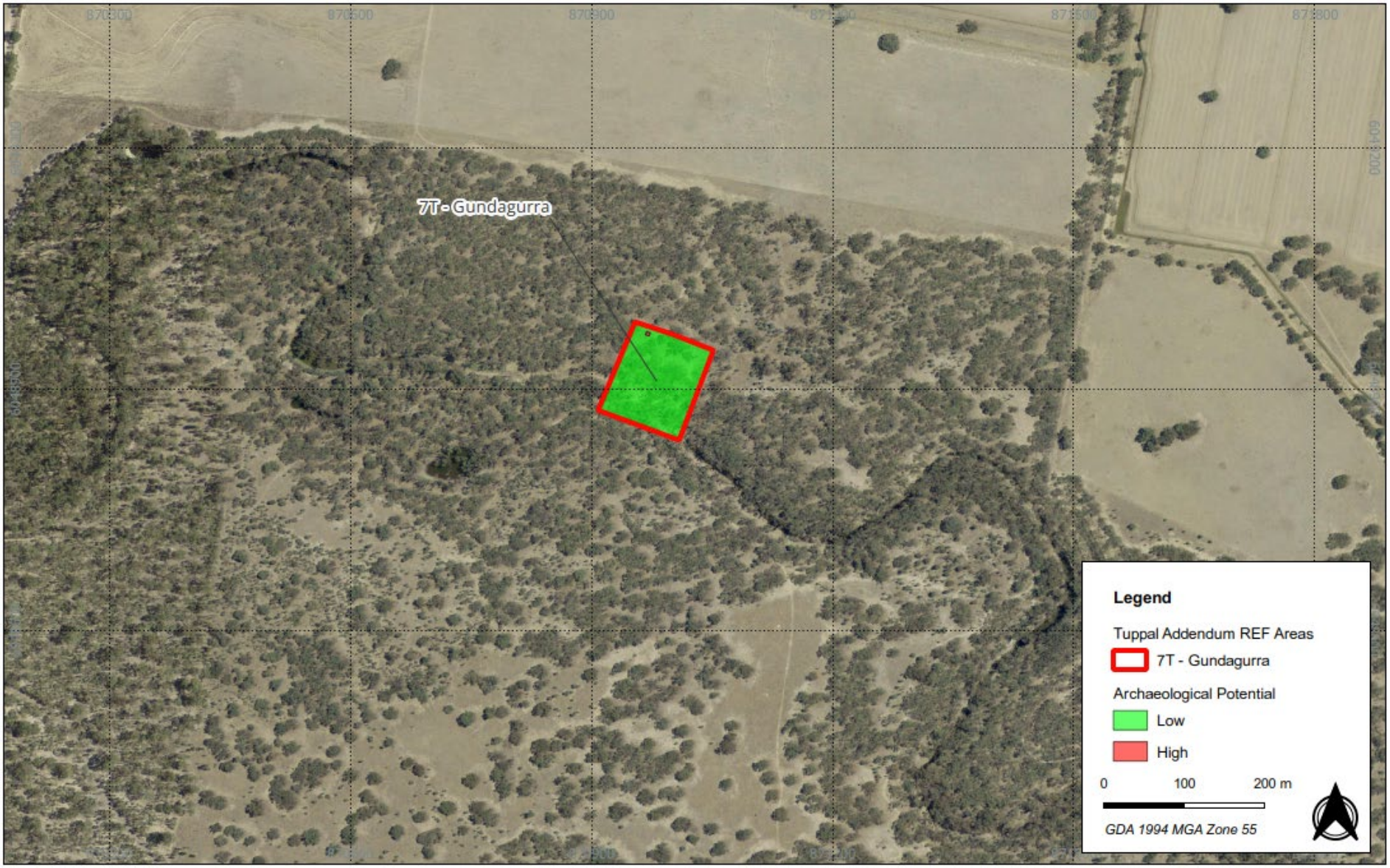

Figure 43 Gundagurra crossing (7T) archaeological sensitivity

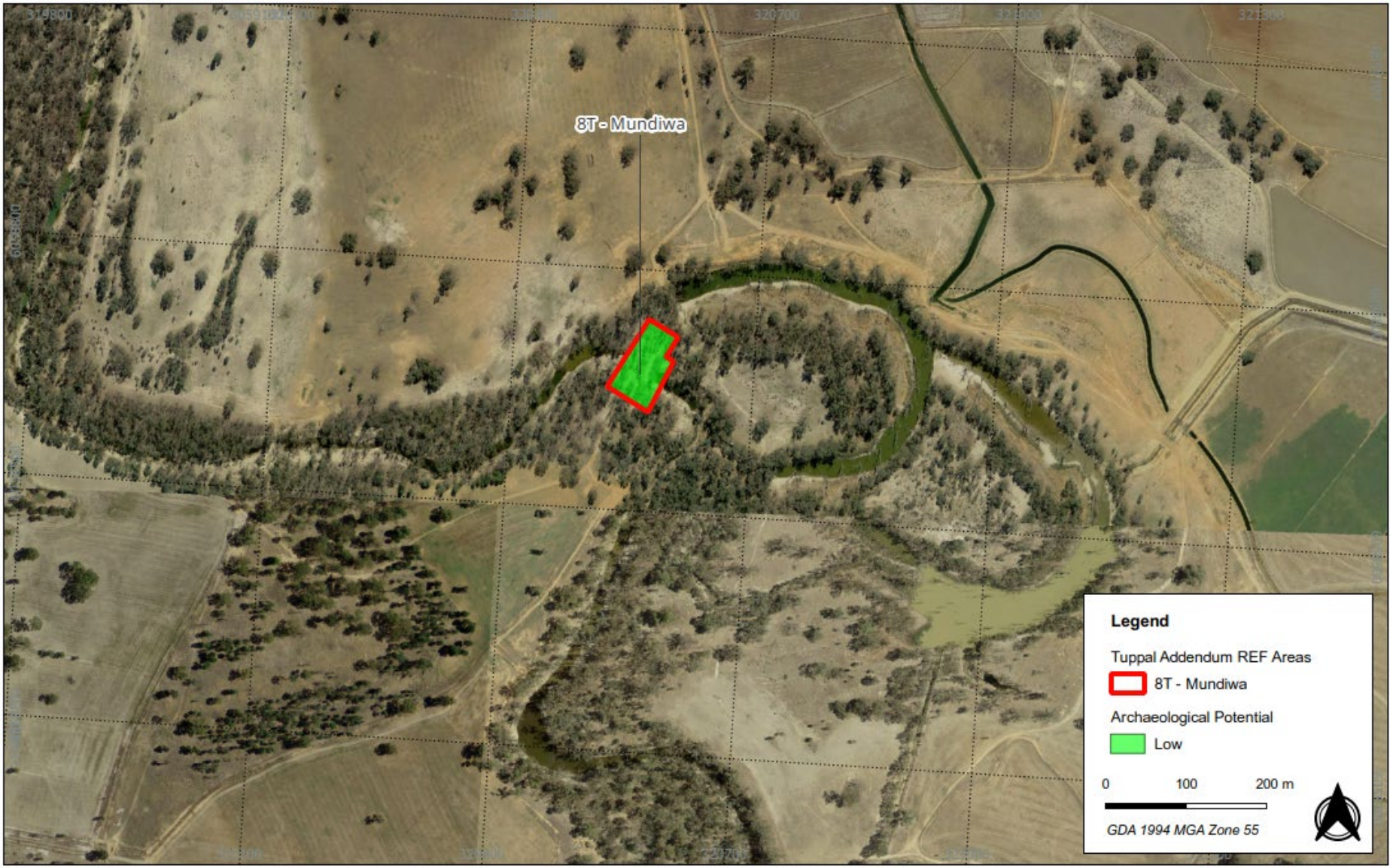

Figure 44 Mundiwa crossing (8T) archaeological sensitivity

Figure 45 Mundiwa borrow pits archaeological potential

Assessment of significance

An assessment of significance seeks to determine and establish the importance or value that a place, site or item may have to the community at large. The concept of cultural significance is intrinsically connected to the physical fabric of the item or place, its location, setting and relationship with other items in its surrounds. Statements of significance for identified Aboriginal sites within the study areas have been formulated using the Burra Charter significance values and relevant NSW guidelines and are captured in Table 11.

The significance of the 22 Aboriginal sites recorded in the study areas along Tuppal Creek ranges from low to high. Overall, modified trees are the most common site type and have moderate to high cultural, scientific and educational potential. Earth mounds in the study areas haves high cultural, research and scientific potential, while artefact scatters and isolated artefacts which are less common in the study areas were assessed to be of low scientific and cultural significance.

Table 11 Statements of significance for Aboriginal sites within the study area

Site name	Statement of significance
Tuppal Station Archaeological Deposit/ Earth Mound 1 (AHIMS # 54-6-0145)	N/A - could not be re-located during surveys.
Gollops Road Modified Tree 1 (AHIMS # 54-6-0560)	Gollops Road Modified Tree 1 (AHIMS # 54-6-0560) is a ring tree in good condition and is within 50 metres of another ring tree. This form of tree modification is uncommon within the surrounding region; and are a declining cultural site since they are dependent on the life of the tree. It offers moderate educational or research potential. Ring trees are also possibly associated with linguistic boundaries or ritualistic purposes such as women's business. Therefore, Gollops Road Modified Tree 1 (AHIMS # 54-6-0560) is a site of high significance.
Gollops Road Modified Tree 2 (AHIMS # 54-6-0144)	Gollops Road Modified Tree 2 (AHIMS # 54-6-0144) is a ring tree in good condition and is within 50 metres of another ring tree. This form of tree modification is uncommon within the surrounding region; and are a declining cultural site since they are dependent on the life of the tree. It offers moderate educational or research potential. Ring trees are also possibly associated with linguistic boundaries or ritualistic purposes such as women's business. Therefore, Gallops Road Modified Tree 2 (AHIMS # 54-6-0144) is a site of high significance.

Site name	Statement of significance
Keysborough PAD/ Earth Feature 1 (AHIMS #54-6-0088)	Keysborough Archaeological Deposit (AHIMS # 54-6-0088) contains high scientific value at a local level. This earth mound is isolated from other earth mounds and is associated with the creek. Keysborough Archaeological Deposit contains both high educational and research potential as well as being a representative example of an earth mound.
Keysborough Modified Tree 1 (AHIMS # 54-6-0143)	Keysborough Modified Tree 1 (AHIMS # 54-6-0143) is a scar tree in good condition and is not associated with any other sites. This form of scar tree is common within the surrounding region; however, scar trees are a declining cultural site since they are dependent on the life of the tree. It offers very little educational or research potential. Therefore, Keysborough Modified Tree 1 (AHIMS # 54-6-0143) has a moderate scientific value at a local level.
Noorumboon PAD/ Earth Feature 1 (AHIMS # 54-6-0087)	Noorumboon Earth Feature (AHIMS # 54-6-0087) contains high scientific value at a local level. This earth mound is isolated from other earth mounds and its associated creek. Noorumboon Earth Feature (AHIMS # 54-6-0087) contains both high educational and research potential as well as being a representative example of an earth mound.
Noorumboon Modified Tree 1 (AHIMS # 54-6-0136)	Noorumboon Modified Tree 1 (AHIMS # 54-6-0136) is a scar tree in poor condition and is not associated with any other sites. This form of scar tree is common within the surrounding region; however, scar trees are a declining cultural site since they are dependent on the life of the tree. It offers very little educational or research potential. Therefore, Noorumboon Modified Tree 1 (AHIMS # 54-6-0136) has a moderate scientific value at a local level.
Noorumboon Earth Feature 2 (AHIMS # 54-6-0137)	Noorumboon Earth Feature 2 (AHIMS # 54-6-0137) contains high scientific value at a local level. This earth mound is isolated from other earth mounds and is associated with the creek. Noorumboon Earth Feature 2 (AHIMS # 54-6-0137) contains both high educational and research potential as well as being a representative example of an earth mound.
Noorumboon Modified Tree 2 (AHIMS # 54-6-0138)	Noorumboon Modified Tree 2 (AHIMS # 54-6-0138) is a scar tree in good condition and is a part of a group of three scar trees associated with Noorumboon Borrow Pit. This form of scar tree is common within the surrounding region; however, scar trees are a declining cultural site since they are dependent on the life of the tree. It offers very little educational or research potential. Therefore, Noorumboon Modified Tree 2 (AHIMS # 54-6-0138) has a moderate scientific value at a local level.
Noorumboon Modified Tree 3	Noorumboon Modified Tree 3 (AHIMS # 54-6-0139) is a scar tree in good condition and is a part of a group of three scar trees associated with Noorumboon Borrow Pit. This form of scar tree is common within the surrounding region; however, scar trees are a

Site name	Statement of significance
(AHIMS # 54-6-0139)	declining cultural site since they are dependent on the life of the tree. It offers very little educational or research potential. Therefore, Noorumboon Modified Tree 3 (AHIMS # 54-6-0139) has a moderate scientific value at a local level.
Noorumboon Modified Tree 4 (AHIMS # 54-6-0140)	Noorumboon Modified Tree 4 (AHIMS # 54-6-0140) is a scar tree in poor condition and is a part of a group of three scar trees associated with Noorumboon Borrow Pit. This form of scar tree is common within the surrounding region; however, scar trees are a declining cultural site since they are dependent on the life of the tree. It offers very little educational or research potential. Therefore, Noorumboon Modified Tree 4 (AHIMS # 54-6-0140) has a moderate scientific value at a local level.
Noorumboon Modified Tree/ Borrow Tree 5 (AHIMS # 54-6-0141)	Noorumboon Modified Tree 5 (AHIMS # 54-6-0141) is a scar tree in good condition and is within 75 meters of the group of three scar trees associated with Noorumboon Borrow Pit. This form of scar tree is common within the surrounding region; however, scar trees are a declining cultural site since they are dependent on the life of the tree. It offers very little educational or research potential. Therefore, Noorumboon Modified Tree 5 (AHIMS # 54-6-0141) has a moderate scientific value at a local level.
Noorumboon PAD 1 (AHIMS # 54-6-0142)	Noorumboon PAD 1 (AHIMS # 54-6-0142) is associated with the group of three scar trees located at Noorumboon Burrow Pit; however, it cannot be assessed for scientific values since the extent and nature of the site has not been determined.
Gundagurra Scarred Tree (AHIMS # 54-6-0086)	Gundagurra Scarred Tree (AHIMS # 54-6-0086) is a scar tree in good condition and is not associated with any other sites. This form of scar tree is common within the surrounding region; however, scar trees are a declining cultural site since they are dependent on the life of the tree. It offers very little educational or research potential. Therefore, Gundagurra Scarred Tree (AHIMS # 54-6-0086) has a moderate scientific value at a local level.
Gundagurra Scarred Tree 2 (AHIMS # 54-6-0134)	Gundagurra Scarred Tree 2 (AHIMS # 54-6-0134) is a scar tree in good condition and is within 50 meters of another scar tree. This form of scar tree is common within the surrounding region; however, scar trees are a declining cultural site since they are dependent on the life of the tree. It offers very little educational or research potential. Therefore, Gundagurra Scarred Tree 2 (AHIMS # 54-6-0134) has a moderate scientific value at a local level.
Gundagurra Earth Feature 1 (AHIMS # 54-6-0135)	N/A – could not be re-located during surveys.

Site name	Statement of significance
Mundiwa Isolated Artefact (AHIMS # 54-6-0085)	Mundiwa Isolated Artefact (AHIMS # 54-6-0085) is a quartz flake that was identified in a disturbed context as a part of Aboriginal Cultural Heritage Management's test excavation. The artefact does not have characteristics that are unique or rare within the region. Due to the artefact being isolated from other sites it does not provide research or educational potential. Therefore, Mundiwa Isolated Artefact (AHIMS # 54-6-0085) is of low scientific significance.
Mundiwa Modified Tree / Scar Tree 1 (AHIMS # 54-6-0147)	Mundiwa Modified Tree 1 (AHIMS # 54-6-0147) is a scar tree in good condition and is not associated with any other sites. This form of scar tree is common within the surrounding region; however, scar trees are a declining cultural site since they are dependent on the life of the tree. It offers very little educational or research potential. Therefore, Mundiwa Modified Tree 1 (AHIMS # 54-6-047) has a moderate scientific value at a local level.
Mundiwa Scar Tree 2 (AHIMS # 54-6-0148)	Mundiwa Scar Tree 2 (AHIMS # 54-6-0148) is a scar tree in good condition and is not associated with any other sites. This form of scar tree is common within the surrounding region; however, scar trees are a declining cultural site since they are dependent on the life of the tree. It offers very little educational or research potential. Therefore, Mundiwa Scar Tree 2 (AHIMS # 54-6-0148) has a moderate scientific value at a local level.
Mundiwa ISO 1 (AHIMS # 54-6-0149)	Mundiwa ISO 1 (AHIMS # 54-6-0149) is a ground stone axe. The artefact does not have characteristics that are unique or rare within the region. Due to the artefact being isolated from other sites it does not provide research or educational potential. Therefore Mundiwa ISO 1 (AHIMS # 54-6-0149) is of low scientific significance.
Mundiwa PAD 1 (AHIMS # 54-6-0150)	Mudiwa PAD 1 (AHIMS # 54-6-0150) cannot be assessed for scientific values since the extent and nature of the site has not been determined.
Mundiwa Artefact Scatter 1/ Borrow Pit Artefact Scatter (AHIMS # 54-6-0146)	Mundiwa Artefact Scatter 1 (AHIMS # 54-6-0146) consists of two quartz flakes. The artefacts do not have characteristics that are unique or rare within the region. Due to the artefacts being isolated from other sites it does not provide research or educational potential. Therefore Mundiwa Artefact Scatter 1 (AHIMS # 54-6-0146) is considered to be of low scientific significance.

6.2.2 Impacts

The study areas are located within an area of predominantly rural farmland which has been utilised as pastoral gazing land, for agricultural purposes and for the transport of vehicles and stock over

different parts of Tuppal Creek. As such, most impacts to the area have been caused by human development, with previous agricultural and pastoral processes having limited but not insignificant effects on the Aboriginal cultural heritage material that was likely to be present in the study areas.

Steps to minimise potential harm to Aboriginal sites were undertaken during earlier project stages and the design process, including:

- The location of each crossing either already has an existing crossing or once contained a crossing. The aim of these selections was to avoid impacting on undisturbed creek banks and adjacent areas which would be required to create new accesses.
- Bridge design consists of precast elements to reduce the construction footprint required for in situ concreting activities.
- Civil bridge approach design extents were minimised and optimised to reduce the design footprint to avoid known and potential Aboriginal cultural heritage impacts via an iterative process.

While some impacts could be avoided, the project may still result in harm to Aboriginal cultural material at areas of ground disturbance within the proposed work areas. As outlined in Table 10, of the 22 Aboriginal sites identified within and near to the proposed work areas, 13 sites are located outside of the proposed work areas and would not be at risk of impact.

The locations of recorded Aboriginal sites in relation to the design extent are provided in Figure 48 to Figure 49. Of the nine sites that are within the proposed work areas, two were unable to be located by Austral during their field survey and, therefore, no mitigation is required. Figure 49 shows that Mundiwa Isolated Artefact (AHIMS # 54-6-0085) is within the design extent direct, which would make impact to this item unavoidable. As noted in Table 11, Mundiwa Isolated Artefact (AHIMS # 54-6-0085) has been assessed to be an item of low significance. The other six items within the proposed work areas would be able to be protected by implementing the mitigation measures identified in Table 12.

An AHIP would be sought for the entirety of the proposed work areas, except Richmond crossing (3T), including approval to destroy Mundiwa Isolated Artefact (AHIMS # 54-6-0085). Additional safeguards are included in Table 13 and Table 15.

Table 12 Assessment of harm to identified Aboriginal sites

Site name	Type of harm	Degree of harm	Consequence of harm	Mitigation strategy / recommendation
Tuppal Station Archaeological Deposit/ Earth Mound 1 (AHIMS # 54-6-0145)	N/A - could not be located during surveys.	None	No loss of value	Nil – item not relocated. This item will be included in the AHIP application to enable disturbance of the area where this item was recorded.
Gollops Road Modified Tree 1 (AHIMS # 54-6-0560)	None	None	No loss of value	Avoid impact by fencing the drip line of the tree to create an exclusion zone within the proposed work area.
Gollops Road Modified Tree 2 (AHIMS # 54-6-0144)	None	None	No loss of value	Avoid impact by fencing the drip line of the tree to create an exclusion zone within the proposed work area.
Keysborough Archaeological Deposit / Earth Feature 1 (AHIMS #54-6-0088)	None	None	No loss of value	Avoid impact by fencing a 2-metre buffer around the item to create an exclusion zone within the proposed work area.
Keysborough Modified Tree 1 (AHIMS # 54-6-0143)	None	None	No loss of value	Avoid impact by fencing the drip line of the tree if it is considered at risk. (Note: The item is outside the proposed work area.)
Noorumboon Archaeological Deposit/ Earth Feature 1 (AHIMS # 54-6-0087)	None	None	No loss of value	Avoid impact by fencing a 2-metre buffer around the item to create an exclusion zone within the proposed work area.
Noorumboon Modified Tree 1 (AHIMS # 54-6-0136)	None	None	No loss of value	Avoid impact by fencing the drip line of the tree if it is considered at risk. (Note: The item is outside the proposed work area.)
Noorumboon Earth Feature 2 (AHIMS # 54-6-0137)	None	None	No loss of value	Avoid impact by fencing a 2-metre buffer around the item. (Note: The item is outside the proposed work area.)

Site name	Type of harm	Degree of harm	Consequence of harm	Mitigation strategy / recommendation
Noorumboon Modified Tree 2 (AHIMS # 54-6-0138)	None	None	No loss of value	Avoid impact by fencing the drip line of the tree to create an exclusion zone within the proposed work area.
Noorumboon Modified Tree 3 (AHIMS # 54-6-0139)	None	None	No loss of value	Avoid impact by fencing the drip line of the tree if it is considered at risk. (Note: The item is outside the proposed work area.)
Noorumboon Modified Tree 4 (AHIMS # 54-6-0140)	None	None	No loss of value	Avoid impact by fencing the drip line of the tree if it is considered at risk. (Note: The item is outside the proposed work area.)
Noorumboon Modified Tree/ Borrow Tree 5 (AHIMS # 54-6-0141)	None	None	No loss of value	Avoid impact by fencing the drip line of the tree if it is considered at risk. (Note: The item is outside the proposed work area.)
Noorumboon PAD 1 (AHIMS # 54-6-0142)	None	None	No loss of value	Avoid impact by fencing a 2-metre buffer around the item if it is considered at risk. (Note: The item is outside the proposed work area.)
Gundagurra Scarred Tree 1 (AHIMS #54-6-0086)	None	None	No loss of value	Avoid impact by fencing the drip line of the tree to create an exclusion zone within the proposed work area.
Gundagurra Scarred Tree 2 (AHIMS # 54-6-0134)	None	None	No loss of value	Avoid impact by fencing the drip line of the tree if it is considered at risk. (Note: The item is outside the proposed work area.)
Gundagurra Earth Feature 1 (AHIMS # 54-6-0135)	N/A - could not be located during surveys.	None	No loss of value	Nil – item not relocated. This item will be included in the AHIP application to enable disturbance of the area where this item was recorded.

Site name	Type of harm	Degree of harm	Consequence of harm	Mitigation strategy / recommendation
Mundiwa Isolated Artefact (AHIMS # 54-6-0085)	Direct	Total	Total loss of value	Submit an AHIP application seeking to destroy this item.
Mundiwa Modified Tree /Scar Tree 1 (AHIMS # 54-6-0147)	None	None	No loss of value	Avoid impact by fencing the drip line of the tree if it is considered at risk. (Note: The item is outside the proposed work area.)
Mundiwa Scar Tree 2 (AHIMS # 54-6-0148)	None	None	No loss of value	Avoid impact by fencing the drip line of the tree if it is considered at risk. (Note: The item is outside the proposed work area.)
Mundiwa ISO 1 (AHIMS # 54-6-0149)	None	None	No loss of value	Avoid impact by fencing a 2-metre buffer around the item if it is considered at risk. (Note: The item is outside the proposed work area.)
Mundiwa PAD 1 (AHIMS # 54-6-0150)	None	None	No loss of value	Avoid impact by fencing a 2-metre buffer around the item if it is considered at risk. (Note: The item is outside the proposed work area.)
Mundiwa Artefact Scatter 1/ Borrow Pit Artefact Scatter (AHIMS # 54-6-0146)	None	None	No loss of value	Avoid impact by fencing a 2-metre buffer around the item if it is considered at risk. (Note: The item is outside the proposed work area.)

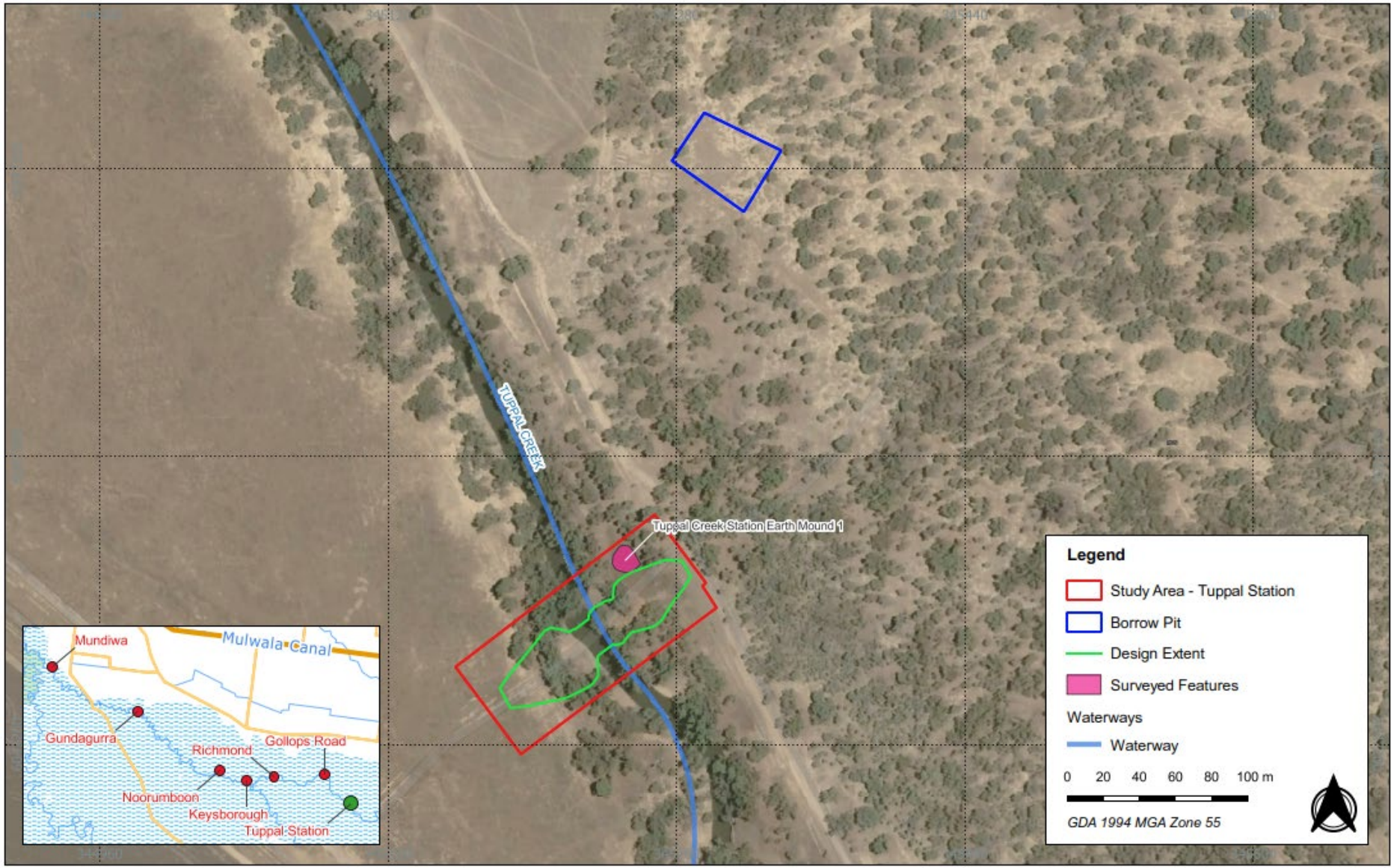

Figure 46 Location of recorded Aboriginal sites relative to the design extent at Tuppal Station crossing (1T) and borrow pit

*Note: Tuppal Station Earth Mound 1 (AHIMS # 54-6-0145) was unable to be located during surveys.

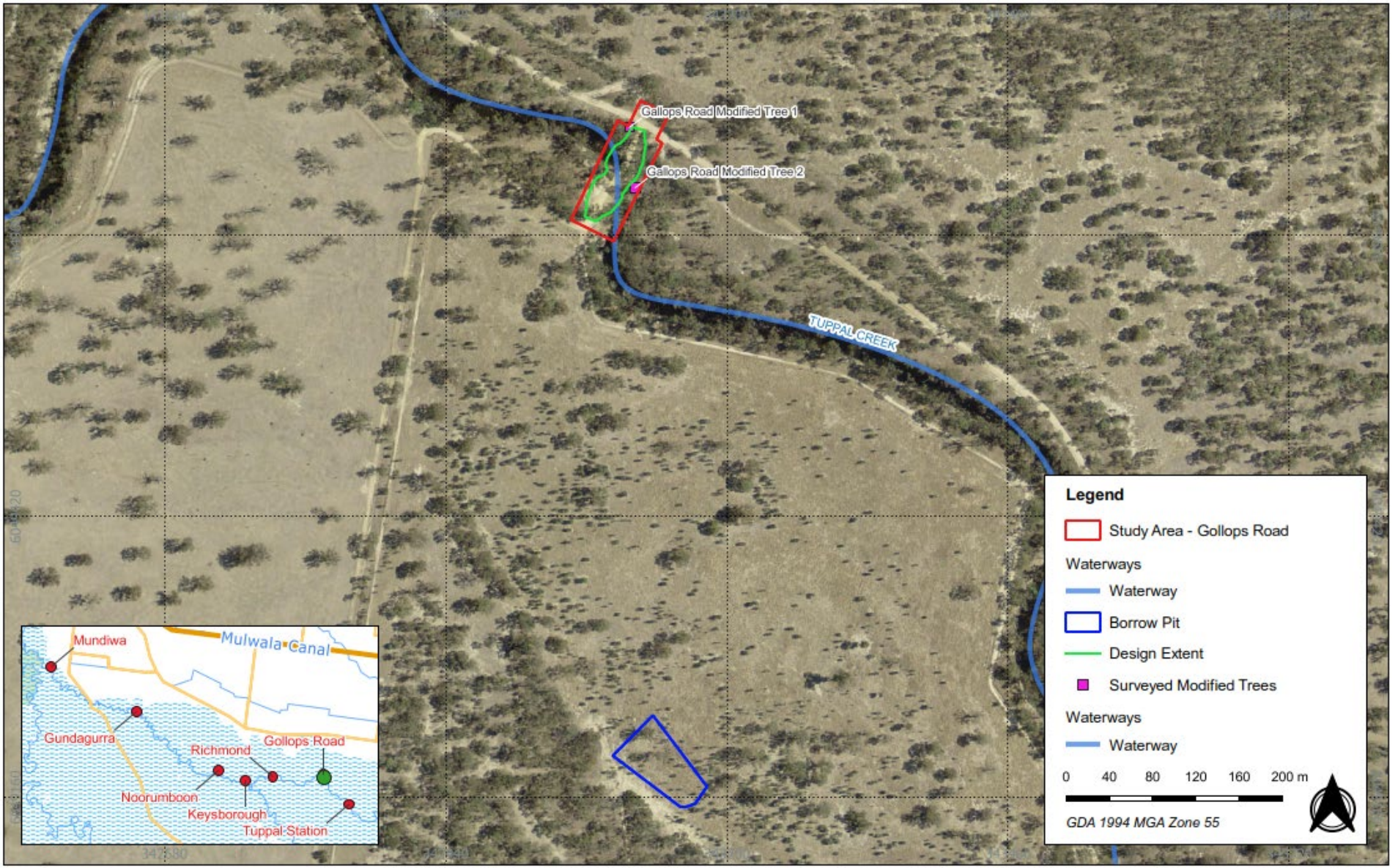

Figure 47 Location of recorded Aboriginal sites relative to the design extent at Gollops Road crossing (2T) and borrow pit

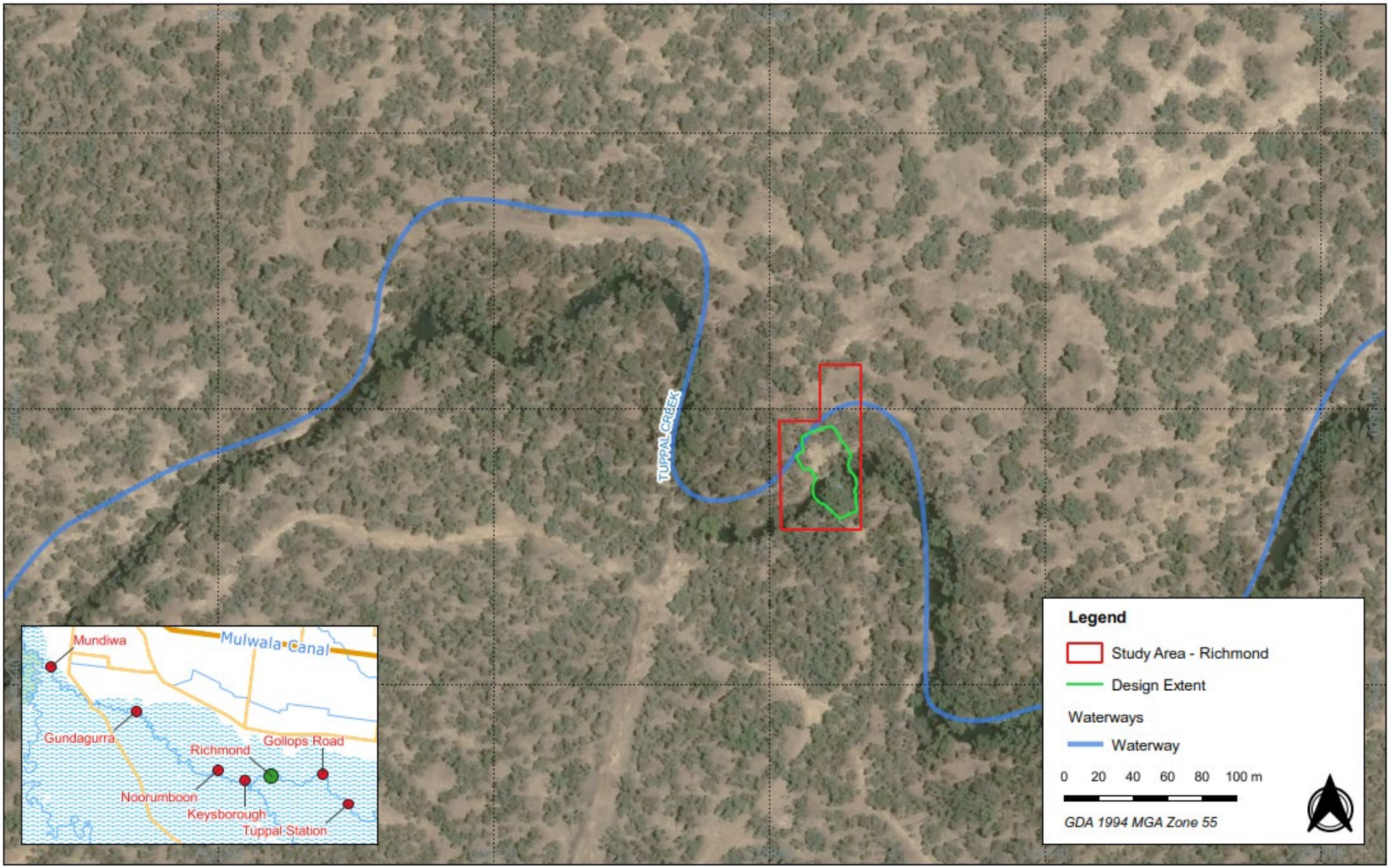

Figure 48 Location of recorded Aboriginal sites relative to the design extent at Richmond crossing (3T)

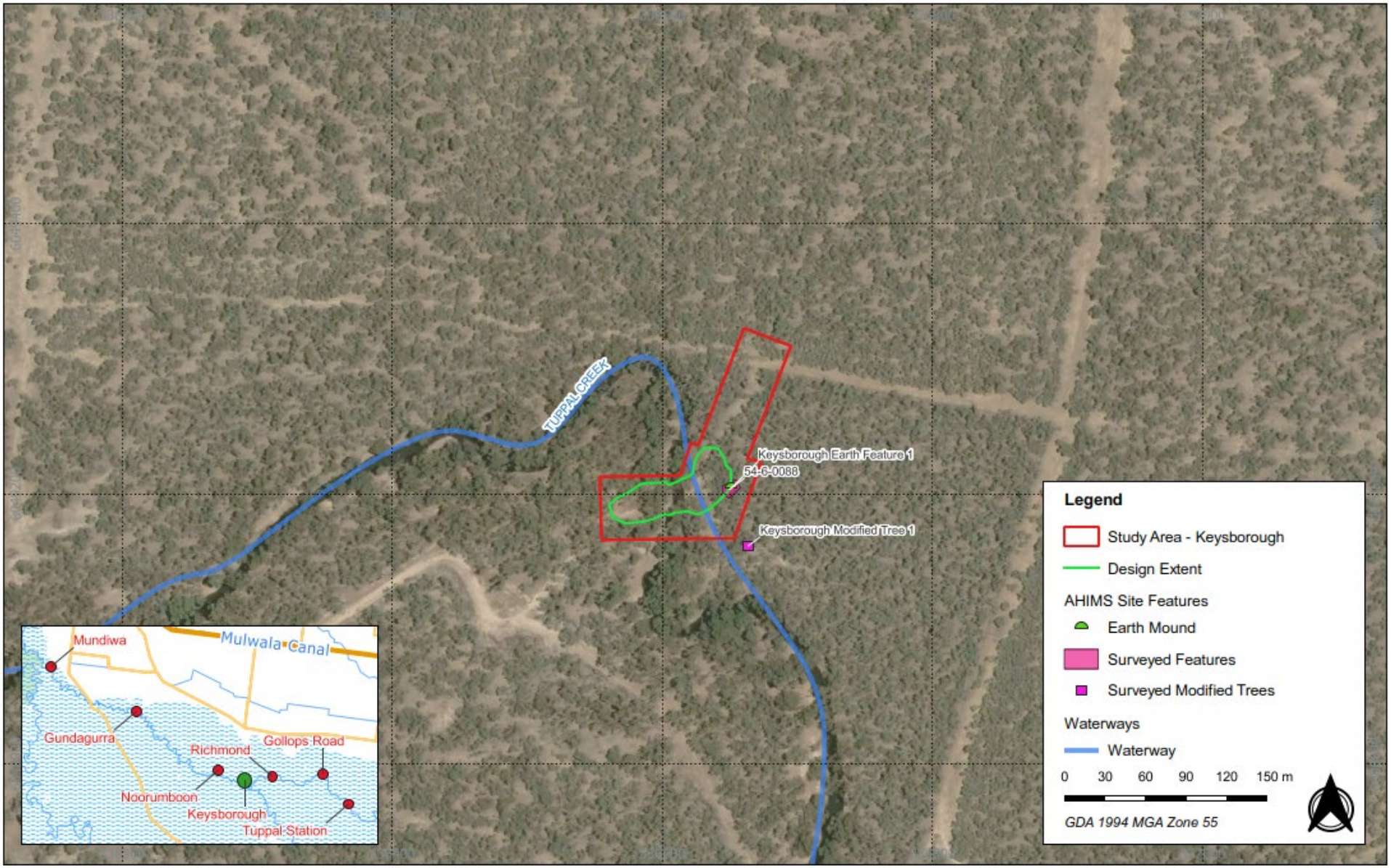

Figure 49 Location of recorded Aboriginal sites relative to the design extent at Keysborough crossing (4T)

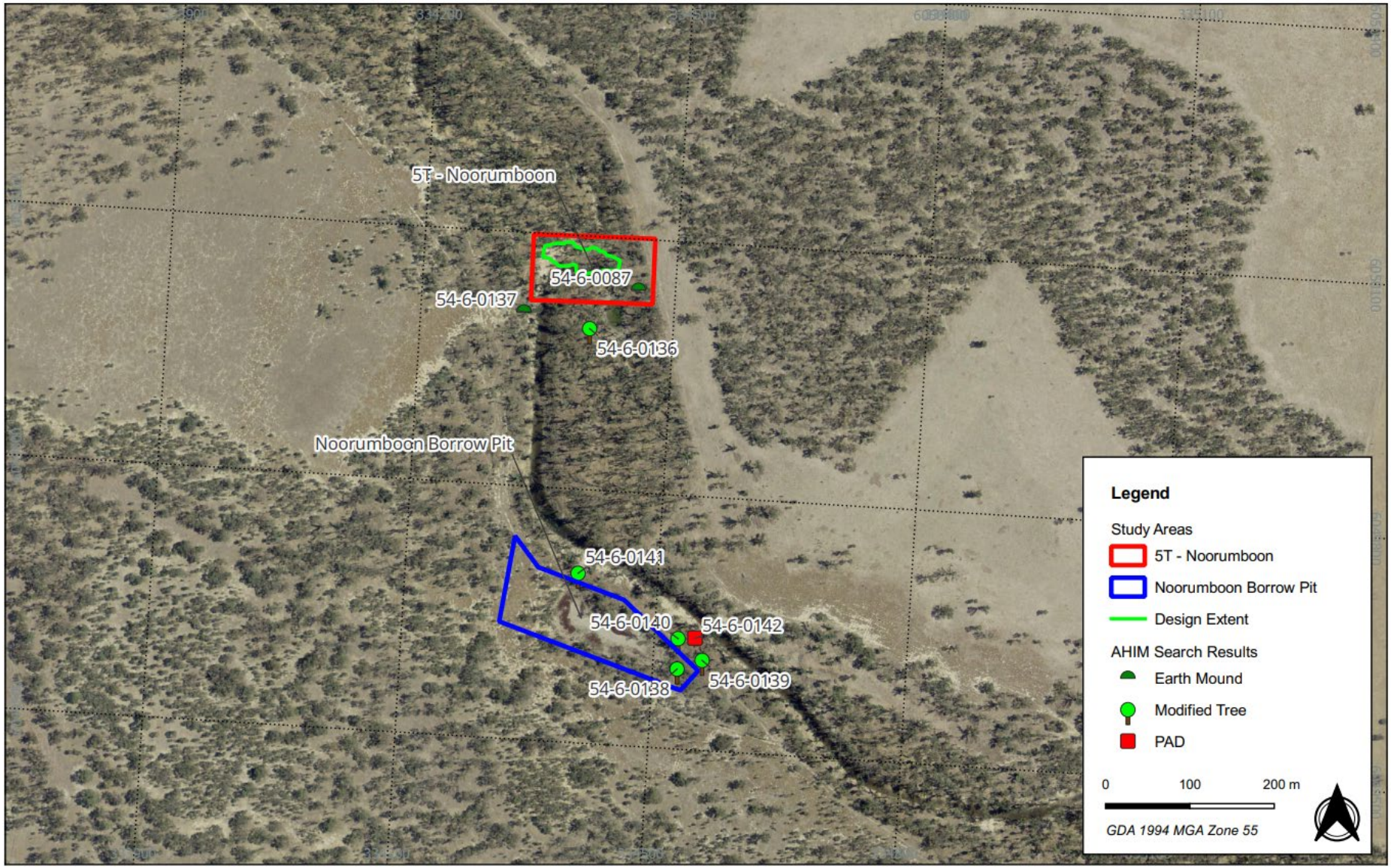

Figure 50 Location of recorded Aboriginal sites relative to the design extent at Noorumboon crossing (5T) and borrow pit

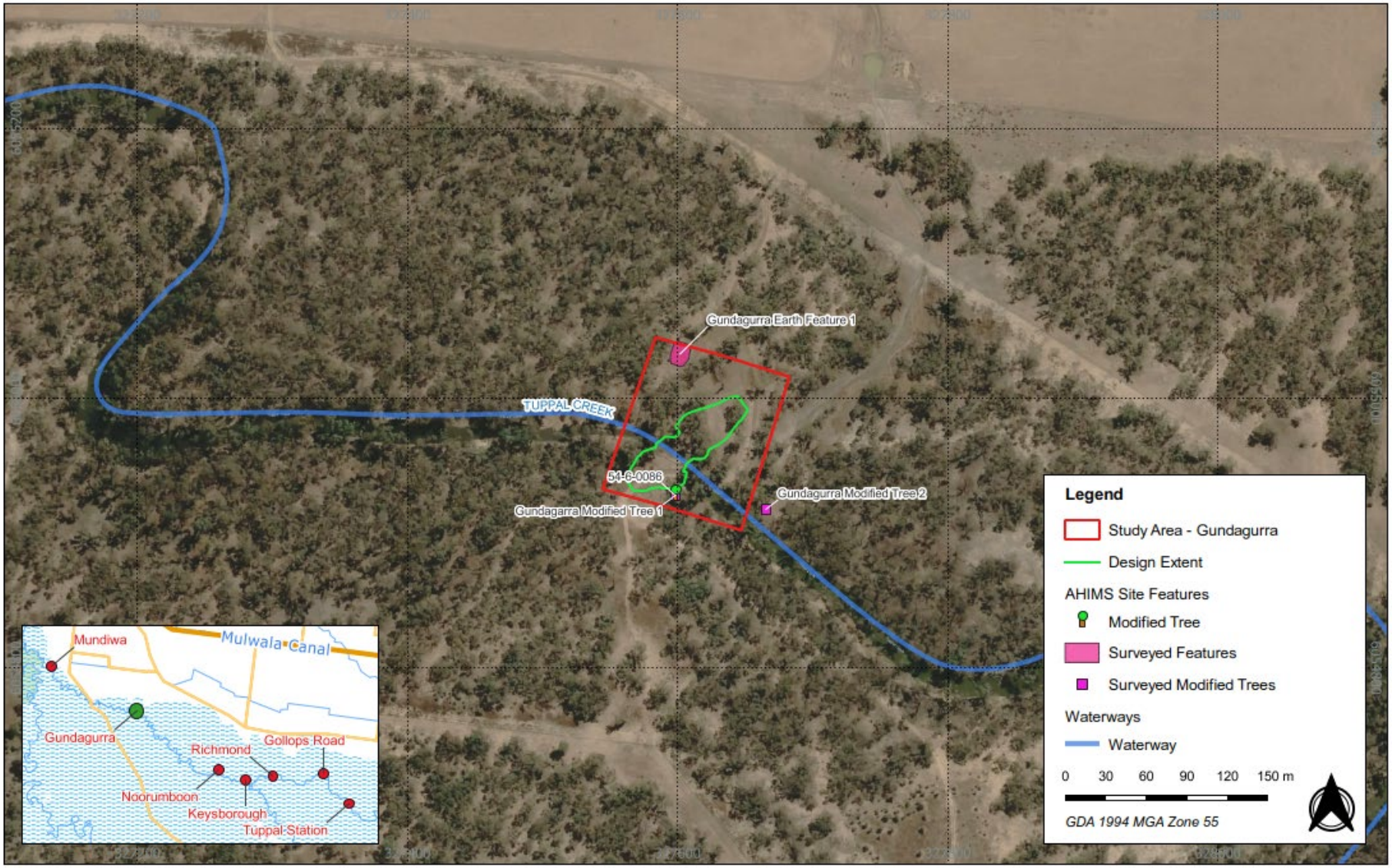

Figure 51 Location of recorded Aboriginal sites relative to the design extent at Gundagurra crossing (7T)

*Note: Gundagurra Earth Mound 1 (AHIMS # 54-6-0135) was unable to be located during surveys.

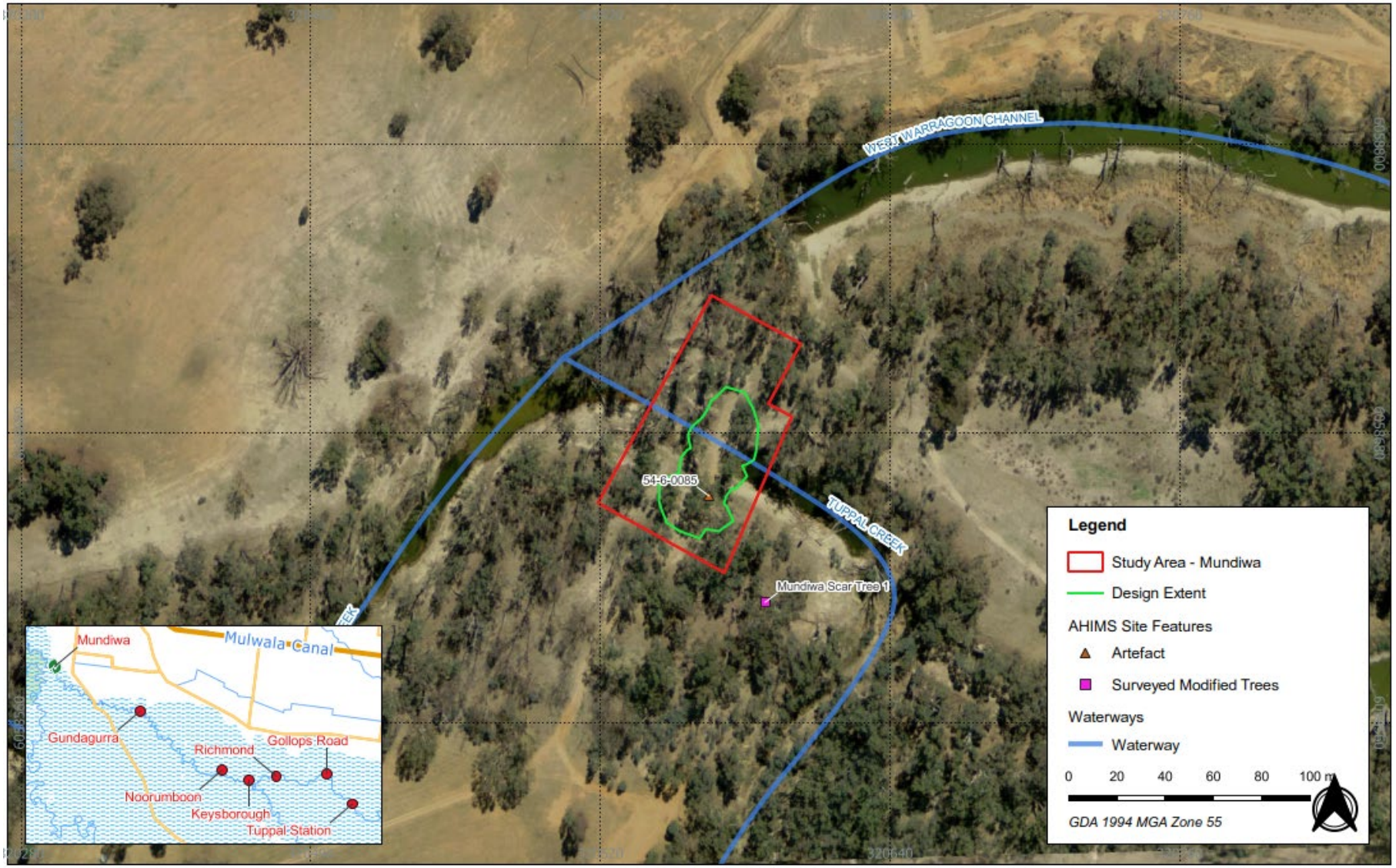

Figure 52 Location of recorded Aboriginal sites relative to the design extent at Mundiwa crossing (8T)

*Note - no impacts to the Mundiwa borrow pits, as such no figure provided.

6.2.3 Safeguards

Safeguards to minimise the impacts of the proposed modification on Aboriginal cultural heritage are provided in Table 13. A consolidated list of safeguards for the project is provided in Table 15.

Table 13 Environmental safeguards for Aboriginal cultural heritage

Ref	Impact	Safeguard	Responsibility	Timing
AH1	Aboriginal cultural heritage	Before any works occur, Water - Infrastructure must apply to Heritage NSW for an AHIP for all proposed work areas, except Richmond crossing (3T), and should be obtained to allow the movement of Aboriginal heritage objects prior to construction and ensure that recommended management strategies in Table 12 are followed. This includes the Mundiwa Isolated Artefact (AHIMS # 54-6-0085). This site is protected under section 90 of the NSW *National Parks and Wildlife Act 1974*. It is recommended that the following mitigation measures are implemented as part of the AHIP: A condition of the AHIP should be to salvage Aboriginal cultural material in the direct areas of impact (the proposed crossing construction sites) at the Mundiwa Isolated Artefact (AHIMS # 54-6-0085). All Aboriginal objects collected during the archaeological testing and anticipated salvage works (under the approved AHIP) will be reburied onsite at the nominated location.	Water - Infrastructure	Prior to construction

Ref	Impact	Safeguard	Responsibility	Timing
AH2	Aboriginal cultural heritage	It is recommended that Water - Infrastructure continues to inform the Aboriginal stakeholders about the management of Aboriginal cultural heritage within the proposed work areas throughout the completion of the project. The consultation outlined as part of this ACHA is valid for 6 months and must be maintained by the proponent for it to remain continuous. If a gap of more than 6 months occurs, then the consultation will not be suitable to support an AHIP for the project.	Water - Infrastructure	Prior to construction Construction
AH3	Aboriginal cultural heritage	Fencing off the proposed work areas should be implemented to prevent accidental harm occurring to areas outside of the proposed work areas.	Contractor	Construction

6.3 Other impacts

The existing environment of other environment factors, in addition to an assessment of the expected impact of the proposed modification on these factors, is described in Table 14. It is considered that no additional environmental safeguards to those outlined in the existing REF and associated approval documents are required for the factors listed in Table 14 as a result of the proposed modification.

Table 14 Assessment of other environmental impacts

Environmental factor	Existing environment	Impacts of the proposed modification	Safeguards
Topography, geology and soils	A description of the existing environment relevant to the proposed modification, including a description of topography, geology and soils, is provided in Section 8 of the existing REF and in Section 6.1.1 of this Addendum REF. The description provided in the existing REF is considered to be consistent with current conditions.	Construction The likely impacts of the proposed modification on topography, geology and soils are expected to be consistent with those outlined and assessed in the existing REF. While the proposed modification may require a larger amount of earthworks than identified in the existing REF, this is not considered to represent more than a minor additional impact on topography, geology and soils. Operation The proposed modification is limited to extending the proposed work areas required for construction and would not impact operation. Operation of the Tuppal Creek Restoration project would be in accordance with the assessment provided and approved conditions of the existing REF.	No additional safeguards proposed as a result of the proposed modification.
Surface water and drainage	A description of the existing environment relevant to the proposed modification, including a description of surface water and drainage, is provided in Section 8 of the existing REF and in Section 6.1.1 of this Addendum REF. The	Construction The likely impacts of the proposed modification on surface water and drainage are expected to be consistent with those outlined and assessed in the existing REF. The proposed modification involves extending the REF work areas and additional vegetation clearance when compared with the existing REF. Additional vegetation clearance required for the proposed modification may have a minor impact on erosion and sedimentation at each of the	No additional safeguards proposed as a result of the proposed modification.

Environmental factor	Existing environment	Impacts of the proposed modification	Safeguards
	description provided in the existing REF is considered to be consistent with current conditions.	proposed work areas. However, with the implementation of erosion and sedimentation control measures as described in Section 7.3, the proposed modification is not considered to represent an increased impact on erosion and sedimentation when compared with the existing REF. No additional impacts on surface water and drainage are expected as a result of the proposed modification. Operation The proposed modification is limited to extending the proposed work areas required for construction and would not impact operation. Operation of the Tuppal Creek Restoration Project would be in accordance with the assessment provided and approved conditions of the existing REF.	
Groundwater	A description of the existing environment relevant to the proposed modification, including a description of groundwater, is provided in Section 8 of the existing REF. The description provided in the existing REF is considered to be consistent with current conditions.	Construction The likely impacts of the proposed modification on groundwater are expected to be consistent with those outlined and assessed in the existing REF. The proposed modification involves extending the REF work areas and additional vegetation clearance when compared with the existing REF. No additional impacts on groundwater are expected as a result of the proposed modification. Operation	No additional safeguards proposed as a result of the proposed modification.

Environmental factor	Existing environment	Impacts of the proposed modification	Safeguards
		The proposed modification is limited to extending the proposed work areas required for construction and would not impact operation. Operation of the Tuppal Creek Restoration Project would be in accordance with the assessment provided and approved conditions of the existing REF.	
Aquatic biodiversity	A description of the existing environment relevant to the proposed modification, including a description of aquatic biodiversity, is provided in Section 8 of the existing REF. The description provided in the existing REF is considered to be consistent with current conditions.	Construction The proposed modification includes potential new temporary sidetracks to be constructed within the waterway at some, or all of the crossing sites, and would be designed in consultation with DPI Fisheries. The sidetracks would be located directly next to the crossings, contained within the proposed work areas and would involve installation of a culvert to maintain flows/ fish passage during construction. Removal of material from the creek bed is not proposed as part of these temporary works. If required, the foundation for the culvert would be achieved by using geotextiles and/or geogrids with clean ballast rock placed on top. Where the alignment (vertical/horizontal) of the sidetrack requires the cutting/removal of sections of the natural creek bank, this material would be stockpiled for later re-use in restoring the creek banks. The sidetracks may require temporary relocation of snags, large woody debris or boulders from the watercourse during construction. These would be returned to the watercourse during reinstatement, at locations where scour risk can be avoided in consultation with DPI Fisheries. The existing REF assessed clearing/disturbance to aquatic species regenerating on the edge of the creek and creek banks during removal	Refer to Table 15 for updated safeguards.

Environmental factor	Existing environment	Impacts of the proposed modification	Safeguards
		works and construction of the crossings. Tests of significance concluded that the proposed activities are unlikely to result in a significant impact on the FM Act listed aquatic species with the potential to occur in the vicinity of the works, or their habitats, given the localised nature of the impacts in relation to adjacent available habitat. Additional impacts to aquatic biodiversity due to the proposed modification would be temporary and incremental to those assessed in the existing REF. As discussed in Section 4.1.3, works proposed as part of the temporary sidetrack construction and use may constitute dredging and reclamation under the FM Act and DPI Fisheries must be consulted with. Design of the culverts must also be done in consultation with DPI Fisheries and additional approvals to obstruct the movement of fish may be required. Modifications to the safeguards in the existing REF to manage potential additional impacts to aquatic biodiversity as a result of the proposed modification are included in Section 7.2. Operation While the design of the proposed crossings has been revised since approval of the existing REF, the design changes assessed in this Addendum REF are not considered to represent a change in the aquatic biodiversity impacts of the Tuppal Creek Restoration Project. The proposed modification is limited to extending the proposed work areas and temporary works required for construction and would not impact operation. Operation of the Tuppal Creek Restoration Project	

Environmental factor	Existing environment	Impacts of the proposed modification	Safeguards
		would be in accordance with the assessment provided and approved conditions of the existing REF.	
Air quality	A description of the existing environment relevant to the proposed modification, including a description of air quality, is provided in Section 8 of the existing REF. The description provided in the existing REF is considered to be consistent with current conditions.	Construction The proposed modification may result in a negligible, localised increase in machinery emissions and the generation of dust during vegetation removal. These impacts are expected to be consistent with those outlined and assessed in the existing REF. No further assessment of air quality impacts is considered to be required as a result of the proposed modification. Operation The proposed modification is limited to extending the proposed work areas required for construction and would not impact operation. Operation of the Tuppal Creek Restoration Project would be in accordance with the assessment provided and approved conditions of the existing REF.	No additional safeguards proposed as a result of the proposed modification.
Waste, contamination and hazardous materials	A description of the existing environment relevant to the proposed modification, including a description of waste contamination and hazardous materials, is provided in Section 8 of the existing REF. The	Construction The likely impacts of the proposed modification on waste are expected to be consistent with those outlined and assessed in the existing REF. Apart from the requirement to remove (or otherwise relocate) additional vegetative material produced through vegetation clearing, the proposed modification would not increase the amount waste, contamination or hazardous materials produced or exposed to that assessed in the existing REF.	No additional safeguards proposed as a result of the proposed modification.

Environmental factor	Existing environment	Impacts of the proposed modification	Safeguards
	description provided in the existing REF is considered to be consistent with current conditions.	Waste would be disposed of at a suitably licensed facility during and following construction. Three landfills have been identified as potential locations for the disposal of wastes, namely Deniliquin Landfill Depot, Pretty Pine Landfill and Blighty Waste Disposal. Operation The proposed modification is limited to extending the proposed work areas required for construction and would not impact operation. Operation of the Tuppal Creek Restoration Project would be in accordance with the assessment provided and approved conditions of the existing REF.	
Historic heritage	A description of the existing environment relevant to the proposed modification, including a description of historic heritage, is provided in Section 8 of the existing REF. The description provided in the existing REF is considered to be consistent with current conditions.	The likely impacts of the proposed modification on historic heritage are expected to be consistent with those outlined and assessed in the existing REF. No previously identified items of historic heritage significance are located near the proposed modification. The proposed modification is therefore not expected to impact on any items of historic heritage significance.	No additional safeguards proposed as a result of the proposed modification.
Noise and vibration	A description of the existing environment relevant to the proposed modification,	Construction	No additional safeguards proposed as a result

Environmental factor	Existing environment	Impacts of the proposed modification	Safeguards
	including a description of noise and vibration, is provided in Section 8 of the existing REF. The description provided in the existing REF is considered to be consistent with current conditions.	The proposed modification may result in a negligible, localised increase in noise and vibration from machinery during vegetation removal when compared with the assessment provided in the existing REF. While the need for additional vegetation removal may extend the duration of noise and vibration impacts, the overall level of impact is expected to be consistent with that outlined and assessed in the existing REF. No further assessment of noise and vibration impacts is considered to be required as a result of the proposed modification. Operation The proposed modification is limited to extending the proposed work areas required for construction and would not impact operation. Operation of the Tuppal Creek Restoration project would be in accordance with the assessment provided and approved conditions of the existing REF.	of the proposed modification.
Traffic and access	A description of the existing environment relevant to the proposed modification, including a description of traffic and access, is provided in Section 8 of the existing REF. The description provided in the existing REF is considered	Construction The likely impacts of the proposed modification on traffic and access are expected to be consistent with those outlined and assessed in the existing REF. The proposed modification would be carried out in accordance with the traffic and access provisions of the existing REF. Operation The proposed modification is limited to extending the proposed work areas required for construction and would not impact operation.	No additional safeguards proposed as a result of the proposed modification.

Environmental factor	Existing environment	Impacts of the proposed modification	Safeguards
	to be consistent with current conditions.	Operation of the Tuppal Creek Restoration project would be in accordance with the assessment provided and approved conditions of the existing REF.	
Visual amenity	A description of the existing environment relevant to the proposed modification, including a description of visual amenity, is provided in Section 8 of the existing REF. The description provided in the existing REF is considered to be consistent with current conditions.	Construction The proposed modification may result in a minor, localised impact on visual amenity at each of the work areas through the removal of additional vegetation to that identified in the existing REF. Given the work sites are located on private property along the Tuppal Creek, away from public view, the proposed modification is expected to have only a minor, localised impact on visual amenity as a result of additional vegetation clearance required for construction. The existing REF notes that *"the [Tuppal Creek Restoration Project] may enhance the visual or scenic values of the landscape (through improved creek health)."* The proposed modification is considered to be consistent with this assessment. Operation The proposed modification is limited to extending the proposed work areas required for construction and would not impact operation. Operation of the Tuppal Creek Restoration project would be in accordance with the assessment provided and approved conditions of the existing REF.	No additional safeguards proposed as a result of the proposed modification.
Hazard	A description of the existing environment relevant to the	Construction	No additional safeguards

Environmental factor	Existing environment	Impacts of the proposed modification	Safeguards
	proposed modification, including a description of potential hazards, is provided in Section 8 of the existing REF. The description provided in the existing REF is considered to be consistent with current conditions.	Hazards arising from the proposed modification are expected to be consistent with those outlined in the existing REF. The proposed modification would not increase hazardous conditions or result in a reduction in safety when compared with the assessment provided in the existing REF. Operation The proposed modification is limited to extending the proposed work areas required for construction and would not impact operation. Operation of the Tuppal Creek Restoration project would be in accordance with the assessment provided and approved conditions of the existing REF.	proposed as a result of the proposed modification.
Socio-economic	A description of the existing environment relevant to the proposed modification, including a description of socio-economic factors, is provided in Section 8 of the existing REF. The description provided in the existing REF is considered to be consistent with current conditions.	Construction The likely impacts of the proposed modification on socio-economic factors are expected to be consistent with those outlined and assessed in the existing REF. The proposed modification is not expected to impact on socio-economic factors. Operation The proposed modification is limited to extending the proposed work areas required for construction and would not impact operation. Operation of the Tuppal Creek Restoration project would be in accordance with the assessment provided and approved conditions of the existing REF.	No additional safeguards proposed as a result of the proposed modification.

Environmental factor	Existing environment	Impacts of the proposed modification	Safeguards
Cumulative	A description of the existing environment relevant to the proposed modification, including a description of cumulative impacts, is provided in Section 8 of the existing REF. The description provided in the existing REF is considered to be consistent with current conditions.	Construction The likelihood of the proposed modification to result in cumulative impacts is considered to be consistent with the assessment provided in the existing REF. The proposed modification involves extending the REF work areas and additional vegetation clearance when compared with the existing REF, and is not expected to have a cumulative impact on, or be cumulatively impacted by other developments. Operation The proposed modification is limited to extending the proposed work areas required for construction and would not impact operation. Operation of the Tuppal Creek Restoration project would be in accordance with the assessment provided and approved conditions of the existing REF.	No additional safeguards proposed as a result of the proposed modification.

7 Environmental management

7.1 Construction environmental management

A construction environmental management plan (CEMP) is to be prepared by the successful construction contractor for the Tuppal Creek Restoration Project prior to commencement. The CEMP will detail effective, site-specific mitigation measures (based on the existing REF and this Addendum REF) to monitor and control environmental impacts throughout the construction phase of the project and to ensure compliance with all legislation approval requirements.

7.2 Operational environmental management

Environmental safeguards identified in the existing REF are reproduced in Table 15. Additions or revisions to these safeguards, or new safeguards as a result of the proposed modification are identified in bold, underlined text. Environmental safeguards identified in the existing REF which are either considered to be redundant or no longer applicable to the project are identified in strikethrough text, and a reason for safeguard removal provided (marked with an asterisk (*) and in italics). As a result, Table 15 represents the final consolidated list of safeguards for the project.

The existing REF determining conditions and agency consultation conditions are also provided in Table 16 and Table 17 respectively. These conditions have been replicated in this section to provide a consolidated set of safeguards and conditions relevant to the project and proposed modification, but can also be found in Appendix C.

Table 15 Consolidated list of safeguards

Ref	Safeguards	Responsibility	Timing
Physical impacts			
N/A	Ensure that a CEMP is prepared prior to any construction works commencing. The CEMP should include all relevant REF safeguards.	Contractor	Prior to construction
N/A	Minimise ground disturbance and vegetation removal.	Contractor	Construction
N/A	~~Avoid all established trees, particularly large hollow-bearing trees that are not marked for removal.~~ **Revised total vegetation clearing assessed by this Addendum REF.*		
N/A	Construct any turn-around bays required for heavy machinery or laydown sites in areas already clear of woody vegetation.	Contractor	Construction
N/A	Adhere to the proposed work areas ~~final construction footprint and laydown sites~~ identified in this Addendum REF. **Work areas have been revised from the existing REF.*	Contractor	Construction
N/A	~~Wherever possible, build from existing tracks and within the construction footprint.~~ **Work areas have been revised from the existing REF. Refer to revised safeguard above.*		
N/A	Upon completion of construction, all ancillary and temporary works outside of the design footprint shall be decommissioned. This will include: Removal of any all foreign material including all ballast rock and culverts from the creek invert Reforming or remediation any sections of the creek banks that are impacted or modified by proposed activities to resemble pre-construction condition and form Replacement of any/all stripped topsoil Maintenance of erosion and control measures to protect the remediated site, until site is revegetated.	Contractor	Post-construction

Ref	Safeguards	Responsibility	Timing
	**Safeguard updated to include additional controls for ancillary and temporary works.*		
N/A	Minimise disturbance to any riparian vegetation.	Contractor	Construction
N/A	Stockpile any material excavated from the bed of the creek separately from other materials and return to the creek bed during reinstatement.	Contractor	Construction Post-construction
N/A	Temporarily relocate any large woody debris, snags or boulders within the construction footprint and return to the creek post-construction at locations where scour risk can be avoided, in consultation with DPI Fisheries. The contractor shall not traffic across undisturbed aquatic/ riparian areas to relocate woody debris, snags or boulders. Snag removal must be undertaken in accordance with the DPI Fisheries best Practice Guideline (2013) *Policy and guidelines for fish habitat conservation and management*. **Safeguard updated to include consultation requirements and guidelines.*	Contractor	Construction Post-construction
G1	The temporary sidetracks must: Not extend outside the limits of the proposed work areas Be of the minimum width necessary to pass construction traffic Avoid the removal of trees, particularly large or hollow bearing trees. Trimming of limbs (to provide clearance) is to be adopted (rather than removal/clearing) wherever possible Be undertaken in consultation with DPI Fisheries and/or FM Act notification requirements Minimise the extent of disturbance to the banks of the creek. Subject to approval from DPI Fisheries, the following design aspects should be incorporated into the sidetrack culvert design:	Contractor	Prior to construction Construction

Ref	Safeguards	Responsibility	Timing
	A culvert shall be installed in the creek to provide free flow conditions so that fish passage is not disrupted. The culvert shall be of a diameter that provides the same waterway area as the existing culvert at the site. Where there is no existing culvert at the site then the culvert shall be sized so that there is no hydraulic step (i.e. from U/S to D/S) Backfill around and over the culvert shall be clean hard rock ballast material. The height of the ballast material shall be not less than 300 mm above the nominated environmental water level at the site Removal of material from the bed of the creek is not permitted. Where the Contractor wants to construct a foundation for the culvert then that shall be achieved by using (1) geotextiles and/or geogrids or (2) pushing clean ballast rock into the foundation until sufficient resistance is achieved Where the alignment (vertical/horizontal) of the sidetrack requires the cutting/removal of the natural creek bank then this material shall be stockpiled for later re-use Material shall not be stockpiled in the natural waterway channel - i.e. use available areas on high ground such as the nominated disposal sites.		
Chemical impacts			
N/A	Inspect and service all construction machinery prior to construction.	Contractor	Prior to construction
N/A	Carry all appropriate spill containment equipment in all construction vehicles to prevent contaminants from entering natural water channels or soil.	Contractor	Construction
N/A	Avoid servicing machinery on site.	Contractor	Construction
N/A	Undertake refuelling far away from watercourses and drainage lines.	Contractor	Construction
N/A	If leakages occur, remove the contaminated soil material from site and dispose of it appropriately.	Contractor	Construction

Ref	Safeguards	Responsibility	Timing
N/A	Store and handle oils in compliance with AS 1940.	Contractor	Construction
N/A	Apply Environment Protection Authority Vehicle Emission Standards.	Contractor	Construction
N/A	Fit all machinery with appropriate mufflers and service them regularly to minimise noise and emissions.	Contractor	Construction
Biological - ground disturbance and vegetation clearing impacts			
N/A	~~Construct any turn-around bays required for heavy machinery or laydown sites in areas already clear of woody vegetation.~~ **Repeated safeguard*		
N/A	~~Adhere to final construction footprint and laydown sites identified in this REF.~~ **Repeated safeguard*		
N/A	~~Store all materials on hard surfaces in already disturbed areas (i.e. identified laydown sites).~~ **Laydown areas in existing REF are no longer applicable. Suitable locations will be determined by the construction contractor.*	Contractor	Construction
N/A	~~Avoid all established trees, particularly large hollow-bearing trees that are not marked for removal.~~ **Repeated safeguard*		
N/A	Clearly define boundaries of work areas prior to construction.	Contractor	Prior to construction
N/A	If possible, avoid construction in woodland areas during Superb Parrot breeding season (September to January).	Contractor	Prior to construction Construction

Ref	Safeguards	Responsibility	Timing
N/A	Wash machinery down off-site to remove soil and weed seeds.	Contractor	Construction
N/A	Implement strict weed and pathogen protocols during construction, such as: All vehicles and personnel must enter the site at the designated entry points All earth moving equipment and vehicles must be free of soil and plant material prior to entering the site. No machine/vehicle shall enter the site unless there is signed certification to state that the machine/vehicle has been 'weeds and seeds' cleaned All plant and vehicles and must be checked to ensure compliance with hygiene procedures. If they are found to not comply, they will not be permitted to the site All earthmoving equipment and vehicles involved in stripping and handling weed infestations on site must be free of soil and plant material prior to removal from site All soil and gravel to be imported from 'clean' sites - i.e. not contaminated with weeds Machine/vehicle 'weeds and seeds' clean down records will be kept as follows: A log of all plant and equipment entering and leaving the site. Site pre entry certification Site exit certification. **Recommended protocols included.*	Contractor	Construction
B1	Within the proposed work areas, additional mitigation measures will include: Measures to minimise the area of construction disturbance and therefore clearing of hollow bearing trees, other trees, shrubs, grass and groundcover Where feasible, stockpiling and laydown areas to be established within existing cleared areas to avoid or minimise impacts to vegetation Machinery and stockpiling is to be situated away from the dripline of retained trees	Contractor	Construction

Ref	Safeguards	Responsibility	Timing
	Parking of vehicles and machinery is to occur within existing cleared areas only.		
B2	Construction crews will be made aware that any native fauna species encountered must be allowed to leave site without being harassed and a local wildlife rescue organisation must be called for assistance where necessary.	Contractor	Construction
B3	A procedure for dealing with unexpected presence of threatened species will be implemented during construction, including cessation of work and notification of the contractor's appointed environmental representative and DPE and determination of appropriate mitigation measures (including relevant relocation measures).	Contractor	Construction
B4	Drivers must stay vigilant for fauna during machinery operation and vehicle movements.	Contractor	Construction
B5	The following mitigation measures will be implemented during excavations within borrow pit areas to reduce impacts to vegetation: Incorporate specific vegetation management measures into the site induction, toolbox talk and pre-start meetings Install highly visible barriers around the perimeter of the proposed work areas.	Contractor	Construction
B6	The following mitigation measures will be implemented during the operation of the borrow pit areas: To minimise erosion and sedimentation, borrow pit areas will not be formed with a steep gradients All requirements of the water license must be met All requirements of biosecurity legislation and guidelines for weed and pest species management must be met If possible, consider utilising some of the borrow pit or areas of the borrow pits for wildlife habitat.	Contractor, Water - Infrastructure, landholder	Operation
Biological – aquatic impacts			

Ref	Safeguards	Responsibility	Timing
N/A	~~Temporarily relocate any large woody debris or boulders within the construction footprint and return to the creek postconstruction.~~ *Repeated safeguard		
N/A	Implement sediment and erosion control measures in accordance with 'the Blue Book' *Managing Urban Stormwater, Soils and Construction Vol 1 and 2A* (Landcom, 2004).	Contractor	Construction
N/A	Apply DLWC guidelines on erosion control and drainage.	Contractor	Construction
N/A	Follow standard precautions and mitigation measures provided in Section 3.3.2 of the *Policy and guidelines for fish habitat conservation and management* (Fairfull, 2013). **Reference to policy included.*	Contractor	Construction
N/A	~~Reform or remediate any sections of creek banks that are impacted or modified by proposed activities to resemble pre-construction condition and form.~~ **Repeated safeguard*		
N/A	~~Minimise disturbance to any riparian vegetation.~~ **Repeated safeguard*		
N/A	~~Stockpile any material excavated from the bed of the creek separately from other materials and return to the creek bed during reinstatement.~~ **Repeated safeguard*		
N/A	If stockpiling of sediment is required, locate laydown site as far away as possible from the creek and manage it so that it is secure against flooding to at least the 1:10 year flood interval.	Contractor	Construction
N/A	Manage any runoff from stockpiled sediment ~~must~~ to prevent any sediment from entering the creek.	Contractor	Construction

Ref	Safeguards	Responsibility	Timing
	**Typo in the existing REF*		
N/A	Restrict instream works to calm weather conditions. Works to be undertaken consistent with the *Guidelines for instream works on waterfront land* (NSW Office of Water, 2012). **Relevant guidelines added.*	Contractor	Construction
N/A	Restrict instream works to periods of low flow.	Contractor	Construction
N/A	If construction during low flow periods is not feasible: Deploy silt curtains or a coffer dam where required to protect water quality Install flow diversion measures if necessary and remove as soon as practicable post-construction Rescue and translocate any fish trapped in coffer dams to suitable habitat downstream of the proposed work areas. Translocating fish to other waterways presents a risk of spreading disease and non-target species, and would require a permit under section 37 of the FM Act.	Contractor	Construction
Natural resources impacts			
N/A	~~Reform or remediate any sections of creek banks that are impacted or modified by proposed activities to resemble pre-construction condition and form.~~ **Repeated safeguard*		
N/A	~~Stockpile any material excavated from the bed of the creek separately from other materials and return to the creek bed during reinstatement.~~ **Repeated safeguard*		
N/A	~~Temporarily relocate any large woody debris or boulders located within the construction footprint and return to the creek during reinstatement.~~ **Repeated safeguard*		

Ref	Safeguards	Responsibility	Timing
N/A	~~Ensure~~ Where feasible, refuelling or servicing of machinery ~~does not occur within 100 metres of the river, mapped creek lines and wetlands~~ is to occur outside of the riparian zone with bunding in place. **Updated to include more practical controls.*	Contractor	Construction
Community			
N/A	Prohibit public access to each crossing during construction, and until such time that the areas are made safe.	Contractor	Construction
N/A	Ensure earthmoving contractors have fire suppression equipment onsite during all stages of operations.	Contractor	Construction
N/A	Suspend work ~~will~~ on days of Total Fire Bans. *Typo in existing REF	Contractor	Construction
N/A	Fit all machinery with appropriate mufflers to minimise noise.	Contractor	Construction
N/A	If excessive dust is experienced, use water to minimise dust emission.	Contractor	Construction
Aboriginal Cultural Heritage			
N/A	Should any Aboriginal objects be encountered during works: Cease works in the vicinity and ~~DPIE EES~~ Heritage NSW ~~should~~ must be notified as soon as possible, as per section 89A of the NPW Act. Do not move the find until assessed by a qualified archaeologist. Further investigations and an AHIP may be required prior to certain activities recommencing. If it is determined to be an Aboriginal object, the archaeologist will provide further recommendations. *DPIE EES no longer exists. Process clarified as per ACHAR Addendum recommendations.	Contractor	Construction
N/A	If human remains are found:	Contractor	Construction

Ref	Safeguards	Responsibility	Timing
	1. Immediately cease all work at that location and not further move or disturb the remains. 2. Notify the NSW Police, who will then notify the Coroner's Office. Following this, if the remains are believed to be of Aboriginal origin, then the Aboriginal stakeholders and Heritage NSW must be notified ~~DPIE EES' Environmental Line on 131 555~~ as soon as practicable and provide details of the remains and their location. 3. Not recommence work at that location unless authorised in writing by Heritage NSW ~~DPIE EES~~. **DPIE EES no longer exists. Process clarified as per ACHAR Addendum recommendations.*		
AH1	Before any works occur, Water - Infrastructure must apply to Heritage NSW for an Aboriginal Heritage Impact Permit (AHIP) covering the entire proposed work areas and including to destroy Mundiwa Isolated Artefact (AHIMS #54-6-0085). This site is protected under the section 90 of the NSW *National Parks and Wildlife Act 1974* (NPW Act). It is recommended that the following mitigation measures are implemented as part of the AHIP: If, while undertaking the activity, an Aboriginal object is identified, it is a legal requirement under section 89A of the NPW Act to notify Heritage NSW, as soon as possible. Further investigations and an AHIP may be required prior to certain activities recommencing. If, human skeletal remains are encountered, all work must cease immediately and NSW Police must be contacted, they will then notify the Coroner's Office. Following this, if the remains are believed to be of Aboriginal origin, then the Aboriginal stakeholders and Heritage NSW must be notified.	Water - Infrastructure	Prior to construction
AH2	It is recommended that Water - Infrastructure continues to inform the Aboriginal stakeholders about the management of Aboriginal cultural heritage within the proposed work areas throughout the completion of the project. The consultation outlined as part of this ACHA is valid for 6 months and must be maintained by the proponent for it to remain continuous. If a gap of more than 6 months occurs, then the consultation will not be suitable to support an AHIP for the project.	Water - Infrastructure	Prior to construction Construction

Ref	Safeguards	Responsibility	Timing
AH3	Fencing off the proposed AHIP impact area (i.e. the proposed work areas) should be implemented to prevent accidental harm occurring to areas outside of the proposed work areas.	Contractor	Construction

Table 16 Existing REF determining conditions

Type	Ref	Condition	Comments
General conditions			
Duration and scope of determination	1	The applicant must have substantially commenced the activity within 3 years of the date of this approval.	Seeking to modify the existing approval via this Addendum REF, with the commencement date as per this Addendum REF approval condition.
	2	This determination only applies to those areas described in Section 6.2 of the REF and Figures 2.1 to 2.8 of Attachment 1 of the REF. The applicant must determine whether any other approvals are required for any associated works that are to occur outside this area.	Seeking to modify the existing approval via this Addendum REF. New works areas are as per this Addendum REF.
Emergency works	3	Notwithstanding any other conditions in this approval, in the event that emergency works are required to be undertaken by the applicant, the applicant must take all reasonable steps to ensure that these occur as expeditiously as possible. Emergency works are generally works of a temporary and reversible nature that are urgently required to arrest an imminent threat to life, safety, public liability, and/or threat to fabric or property.	

Type	Ref	Condition	Comments
	4	In the event that emergency works are undertaken the applicant must notify Environment Line on 131 555 as soon as practicable. Once notification has been made the applicant must also notify the BCD North West Branch Director to seek direction on any further procedures to be implemented.	Water - Infrastructure as the proponent should now be notified instead of BCD North West Branch.
Undertaking the activity	5	The 'activity' detailed in the REF titled *Tuppal Creek Restoration Project Roadway Crossing Works* submitted to BCD on 13 August 2020 must be undertaken: 1. at the location identified in the REF; and 2. in accordance with the description of the activity and environmental safeguards or mitigation measures listed in the REF; and 3. as required or amended by the conditions of this determination.	Seeking to modify the existing approval via this Addendum REF for the project, as now described in Section 3.
	6	In the event of any inconsistency between the REF and the conditions of this determination, the conditions of the determination shall prevail.	Seeking to modify the existing approval via this Addendum REF.
	7	This determination, and the conditions of this determination, do not relieve the applicant of any obligation to obtain other statutory approvals necessary to undertake the activity, including but not limited to any approvals required under the Commonwealth *Environment Protection and Biodiversity Act 1999*.	
	8	The applicant must comply with all other directions of relevant authorities while undertaking the activity.	
	9	The applicant must undertake the activity in accordance with the requirements of the *Work Health and Safety Act* 2011, including codes of practice adopted under the Act, and the *Work Health and Safety Regulation* 2011. Any contractors on the site are to have appropriate insurance, including public liability insurance.	

Type	Ref	Condition	Comments
	10	The applicant must provide the following to the BCD South West Branch Director or delegate prior to commencement of the activity: 4. the contact details and qualifications of a person who will be present on site to supervise the activity 5. a list of tradespersons, contractors or subcontractors who will be involved in undertaking the activity. The list must include the trade licence number and information on the expertise and experience of the tradesperson or contractor.	Water - Infrastructure will be the new delegate as the proponent.
Tree clearing protocol	11	Clearing of hollow bearing trees is to be restricted to the three trees identified in the REF.	No longer relevant. Seeking to modify the existing approval via this Addendum REF.
	12	Clearing of hollow bearing trees is to be conducted in accordance with a tree clearing protocol to be developed by the applicant and submitted to BCD North West Branch Director for approval at least six weeks prior to the commencement of the activity.	Tree clearing protocol to be implemented by the contractor to the satisfaction of Water - Infrastructure.
	13	Pre-clearing surveys are to be conducted by a suitably qualified ecologist to ensure that Superb Parrots *(Polytelis swainsonii)* or Southern Myotis *(Myotis Macropus)* are not utilising trees to be cleared.	
Aboriginal cultural heritage	14	If there is to be any modification to the construction footprint of the Gollops Road crossing identified in the REF further Aboriginal Cultural Heritage assessment will be required in this area.	Not relevant as further Aboriginal Cultural Heritage assessment has been undertaken for the proposed modification and included in Appendix E.
Prior to commencement of activity conditions			

Type	Ref	Condition	Comments
Environmental management plan	15	An Environmental Management Plan (EMP) identifying the potential risks of the activity and how these will be managed must be prepared by the applicant and submitted to the BCD South West Branch Director or delegate for approval at least six weeks prior to the commencement of the activity.	EMP is referred to as a CEMP in this Addendum REF. The contractor will be required to prepare the CEMP and submit to Water - Infrastructure for approval. The contractor will then be responsible for implementation of the CEMP.
	16	The applicant must comply with all measures identified in the approved EMP.	As above.
	17	The EMP must detail the procedures to be applied during and after the completion of the activity including, but not limited to, the following components: • location of active work and storage areas • measures to protect areas of environmental sensitivity including reporting and communication pathways • measures to protect Aboriginal Cultural Heritage including reporting and communication pathways • environmental safeguards, including water pollution controls, waste management, and management of hazardous substances • site rehabilitation including management of contaminated materials and soils • vehicle and pedestrian access arrangements, including parking • public safety, including location, design and timeframes of information signage and public relations media releases by the applicant	As above.

Type	Ref	Condition	Comments
		• contact protocols outlining procedures and any notifications to be given before works commence, together with contact details for the project manager and the BCD South West Branch Director • site induction and training arrangements • site monitoring and reporting • protocols for incidents and emergencies and contingency planning, including reporting pathways.	
Incident and emergency preparedness and management	18	An incident management plan must be prepared and kept on site by the applicant. The Plan must be submitted for approval by the BCD South West Branch Director or delegate prior to the commencement of the activity.	The contractor will be required to prepare an emergency response plan and issue to Water - Infrastructure for approval. The contractor will then be responsible for implementation of the emergency response plan.
	19	The applicant must implement the approved incident management plan.	As above.
	20	The content of the incident management plan must be developed in consultation with the BCD South West Director or delegate and must detail procedures to be followed in the event of an emergency or similar event including bushfires. These procedures must include, but are not limited to, the following: • measures to ensure all workers are made aware of the plan and its provisions and be trained in the use of emergency equipment and procedures for evacuation and seeking refuge • equipment to be tested in accordance with manufacturer's recommendations during training of employees	As above.

Type	Ref	Condition	Comments
		• the plan is to be displayed in a prominent location and should clearly highlight recommended actions and 24-hour contacts • the plan must be reviewed/updated within 1 month following any incidents.	
Stormwater, erosion, and sediment controls	21	At least six weeks prior to the commencement of the activity, the applicant must submit an erosion and sediment control plan approval by the BCD South West Director. The plan must be prepared using the guidelines *Managing Urban Stormwater: Soils and Construction* (Landcom 2004) and other relevant guidelines.	The contractor will be required to prepare an erosion and sediment control plan as a sub-plan to the CEMP, covering all works, and issue to Water - Infrastructure for approval.
	22	The applicant must comply with the approved erosion and sediment control plan.	The contractor will then be responsible for implementation of the erosion and sediment control plan.
Vegetation management	23	A vegetation management plan must be prepared and submitted for approval of the BCD South West Branch Director or delegate prior to the commencement of the activity.	The contractor will be required to prepare a vegetation management plan as a sub-plan to the CEMP and issue to Water - Infrastructure for approval.
	24	The vegetation management plan must identify the precise extent, location and type of vegetation to be cleared, and areas to be revegetated or regenerated at the conclusion of the activity.	As above.
	25	The applicant must only clear areas as identified in the approved vegetation management plan.	As above.

Type	Ref	Condition	Comments
	26	Prior to commencing clearing, the applicant must clearly mark the areas not approved for clearing via stakes or other suitable markers as identified in the vegetation management plan.	As above.
Operational conditions			
Availability of REF determination and conditions	27	A copy of the REF, this determination and attached schedule of conditions must be kept at the site to which the REF applies.	Contractor will also need to keep a copy of this Addendum REF and any additional conditions due to the proposed modification.
	28	The REF, this determination and attached schedule of conditions must be produced to any authorised officer of BCD who asks to see it.	These documents must be available to Water - Infrastructure as the new proponent.
	29	The REF, this determination and attached schedule of conditions must be available for inspection by any employee or agent of the applicant working at the site.	
Discovery of unknown Aboriginal and historic heritage values	30	If, during the course of the activity: any Aboriginal objects, as defined under the *National Parks and Wildlife Act 1979*, are uncovered or discovered; and/or any relics, as defined under the *Heritage Act 1977*, are uncovered or discovered The applicant must cease work immediately and notify the Environment Line on 131 555, unless the objects and/or relics are subject to the Aboriginal Heritage Impact Permit or a valid Heritage Permit. Work must not recommence until written advice to do so has been provided by BCD North West Branch Director and the Department of Premier and Cabinet Heritage Branch.	Refer to updated unexpected finds safeguard in Table 15. Approval would be required from Water - Infrastructure to proceed. Procedures would also need to comply with any requirements of the area based AHIP being sought for the project.

Type	Ref	Condition	Comments
	31	This determination does not authorise the disturbance or movement of any human skeletal remains. If, during the course of the activity, any human skeletal remains are located the applicant must: • immediately cease the activity and not further harm these remains; • secure the area so as to avoid further harm to the remains; • notify the local police and Environment Line on 131555 as soon as practicable and at that time provide any available details about the nature and location of the remains; • notify the BCD South West Branch Director and BCD North West Branch Director; • notify the Department of Premier and Cabinet Heritage Branch; and • recommence the activity only after receiving confirmation in writing from the local police or Department of Premier and Cabinet Heritage Branch that it is appropriate to do so.	As above.
Discovery of unknown biodiversity values	32	If, during the course of undertaking the activity, the applicant becomes aware of the presence of threatened species or endangered ecological communities, or their habitats, that were not identified and assessed in the REF and which are likely to be affected by the activity, the applicant must: • immediately cease all work likely to affect the threatened species or endangered ecological communities, or their habitats; • inform the BCD North West Branch Director or the local NSW Primary Industries office (for threatened fish) as relevant. Notification must be made as soon as practicable by phone, electronically or in writing; and • not recommence work likely to affect the threatened species or endangered ecological communities, or their habitats until receiving written advice from BCD North West Branch Director or delegate and/or NSW Primary Industries to do so.	Water - Infrastructure should be notified as the project proponent.

Type	Ref	Condition	Comments
Equipment and materials storage	33	The applicant must store any machinery, equipment or material required for the activity in existing cleared areas or areas determined to be cleared in accordance with the REF.	No longer relevant. Seeking to modify the existing approval via this Addendum REF.
Fire prevention control	34	The applicant must ensure that fire-fighting equipment is provided on site during periods of declared high fire danger.	
	35	Machinery which may result in sparking or ignition must not be operated during total fire bans.	
	36	The applicant must store fuel and other similar flammable materials, such as gas cylinders and paint, in appropriate fire-resistant storage containers.	
Notification of environmental harm	37	The applicant or its employees (including any contractors) must notify BCD North West Branch Director of incidents causing or threatening material harm to the environment as soon as practicable after the person becomes aware of the incident.	Water - Infrastructure should be notified as the project proponent.
	38	Notifications must be made by telephoning the Environment Line service on 131 555.	
	39	Once notification has been made the applicant must also contact the BCD North West Branch Director to seek direction on any further procedures to be implemented.	Water - Infrastructure should be notified as the project proponent.
	40	The applicant must provide written details of the notification to the BCD North West Branch Director within 7 days of the date on which the incident occurred.	Water - Infrastructure should be notified as the project proponent.
Waste management	41	Waste generated at the site from works undertaken as part of the activity must be managed in accordance with the Protection of the Environment (Waste) Regulation 2014.	

Type	Ref	Condition	Comments
Waterway protection	42	Except as may be expressly provided in any other condition of this determination, the applicant must comply with section 120 of the *Protection of the Environment Operations Act 1997.*	
Post activity conditions			
Site rehabilitation	43	Any area damaged by vehicular or other access to the site must be repaired and rehabilitated to the satisfaction of the BCD South West Branch Director or delegate.	Site rehabilitation must be done to the satisfaction of Water - Infrastructure.
	44	The applicant must only use locally sourced indigenous plant species for site restoration works, unless otherwise agreed in writing by the BCD South West Branch Director or delegate.	Site rehabilitation must be done to the satisfaction of Water - Infrastructure.

Table 17 Existing REF DPI Fisheries conditions

Ref	Condition	Comments
Administrative condition		
1	The Works Notification form (attached) must be completed and sent to the Fisheries Officer at Deniliquin (Shaun Burke, Ph: 03 5881 9928 or Mob: 0429 919 309 or shaun.burke@dpi.nsw.gov.au and the Contact Officer (contact details listed below) 3 days BEFORE the commencement of works authorised by this permit. *Reason - To remove any doubt that the Permit Holder understands and accepts the Conditions before work commences and to ensure that local Fisheries NSW staff are aware that works authorised by this permit are about to commence.*	The contractor would be responsible for notifying. Refer to Appendix C for a copy of the form.

Ref	Condition	Comments
2	EES must ensure that all works authorised are restricted to the works area indicated in your email dated 15 May 2020 and associated REF. Other works which have not been described, excepting those activities required by this concurrence, are not to be undertaken without written consultation with DPI (Fisheries). *Reason -This concurrence has been granted following an assessment of the potential impacts of the described works upon the aquatic and neighbouring environments. Other works, which were not described in the application have not been assessed and may have significant adverse impacts.*	Additional notification to be undertaken by the contractor as discussed in Section 4.4.
3	This concurrence (or a true copy) and other authorities such as landholder's consent must be carried by the referral holder or sub-contractor operating on-site at all times during work activity in the area identified by assessment documentation. *Reason - A DPI Fisheries Compliance Officer may wish to check compliance of works with imposed conditions.*	
Specific condition – Sediment and erosion control plan		
4	Erosion and sediment mitigation devices are to be erected in a manner consistent with currently accepted Best Management Practice (i.e. Managing Urban Stormwater: Soils and Construction 4th Edition Landcom, 2004) to prevent the entry of sediment into the waterway prior to any earthworks being undertaken. These are to be maintained in good working order for the duration of the construction works and subsequently until the site has been stabilised and the risk of erosion and sediment movement from the site is minimal. In particular: a) On completion of works all disturbed soil is to be levelled and smoothed and sown with a mixture of sterile grass seeds to encourage rapid revegetation and planted out with native endemic riparian vegetation.	

Ref	Condition	Comments
	Reason - To ensure that sediment generated by the exposure of soil is not transported into the main water body	
Specific condition – Dewatering plan		
5	The site shall not be dewatered, unless a Dewatering Management Plan is prepared and approved by the contact officer or submitted as part of the Construction Environmental Management Plan. Any Dewatering Management Plan shall specifically consider any potential off-site impacts as a result of the dewatering operations and contain mitigation controls to effectively treat any discharge waters to prevent offsite pollution of any receiving waters. *Reason - Dewatering poses a significant risk to aquatic animals and needs to be carefully managed.*	
Specific condition – Work in waters		
6	Machinery is not to enter, or work from the waterway unless in accordance with works proposed in your application for the permit and the requirements of this permit. *Reason - To ensure minimal risk of water pollution from oil or petroleum products and to minimise disturbance to the streambed substrate.*	Seeking to modify the existing approval via this Addendum REF. Additional notification to be undertaken by the contractor as discussed in Section 4.4.
7	Prior to use at the site and / or entry into the waterway, machinery is to be appropriately cleaned, degreased and serviced. Spill kits are to be available on site at all times during works. *Reason - To reduce the threat of an unintended pollution incident impacting upon the aquatic environment.*	
Specific condition – Avoiding harm to snags and riparian vegetation		

Ref	Condition	Comments
8	When working near riparian vegetation or water land these areas need to be identified and appropriately delineated as “No Go” areas (with the aim of avoiding harm to these areas). Harm to riparian vegetation or water land outside the work footprint approved under the authority of this permit is not permitted and any harm caused is to be documented and reported to the contact officer. Any harm caused is to be restored in accordance with directions provided by the Departmental Contact Officer. *Reason - To ensure that impacts on aquatic habitats and the riparian zone are minimised.*	Additional notification to be undertaken by the contractor as discussed in Section 4.4.
9	Material storage and stockpiling is not to be undertaken on water land or riparian vegetation. Stockpiling must be undertaken in a manner to avoid harm to these types of vegetation or water land. Stockpiles should also be located 20 metres away from adjacent water land. Stockpiles and/or dewatering areas should be appropriately controlled by sediment fencing or other materials prescribed in the “Blue Book” to ensure sediments do not enter the waterway. *Reason - To ensure that impacts on aquatic habitats and the riparian are minimised. “Degradation of native riparian vegetation along NSW water courses” (excluding estuarine and marine waters) is listed as a Key Threatening Process under the provisions of the FM Act*	
10	No snags are to be removed, realigned or relocated without first obtaining the written authority of the Departmental Contact Officer. *Reason – “Removal of large woody debris from NSW rivers and streams” is listed as a Key Threatening Process under the provisions of the FM Act. This approval has been granted on the basis that snags are not to be removed.*	
11	On completion of the works the site is to be rehabilitated and stabilised including: a) Surplus construction materials and temporary structures (other than silt fences and other erosion and sediment control devices) installed during the course of the works are to be removed.	

Ref	Condition	Comments
	b) Disturbed areas are to be replanted with native endemic riparian species (such as *Phragmites australis* and *Juncus usitatus*,) along the toe and top of the bank of the waterway for five metres either side of the work footprint (10 metres in total for either bank). *Reason - To ensure that habitats are restored as quickly as possible, public safety is not compromised, aesthetic values are not degraded and sediment inputs into the waterway are reduced*	
Specific condition – Fish kill contingency		
12	A visual inspection of the waterway for dead or distressed fish (indicated by fish gasping at the water surface, fish crowding in pools or at the creek's banks) is to be undertaken daily during the works. Observations of dead or distressed fish are to be immediately reported to the Contact Officer by the Permit Holder. In such a case all works are to cease until the issue is rectified and approval is given to proceed. If requested, the Permit Holder is to commit resources to the satisfaction of the Contact Officer for an effective fish rescue, if in the view of that officer, a fish kill event is imminent and likely to occur within or adjacent to the works area due to conditions associated with weather, water quality and other parameters. *Reason - DPI Fisheries needs to be aware of fish kills so that it can assess the cause and mitigate further incidents in consultation with relevant authorities. They are also potentially contentious incidents from the public perspective. Work practices may need to be modified to reduce the impacts upon the aquatic environment.*	

8 Conclusion

8.1 Justification

A modification to the approved Tuppal Creek Restoration Project that extends the proposed work areas is required to enable construction of the project to be carried out. The proposed modification will allow the objectives of the Tuppal Creek Restoration Project as described in Section 6.3 of the existing REF to be achieved.

The proposed modification would result in additional impacts to the environment to those approved in the existing REF. Most notably, the proposed modification would require the removal of up to 72 hollow bearing trees (increased from three) and around 8.7 hectares of native vegetation (native vegetation impact area calculation was not provided in the existing REF, so cannot provide a direct comparison) as described in Section 6 of this Addendum REF.

The proposed work areas and likely Aboriginal cultural heritage material present have been subject to impacts from agricultural and pastoral processes, and have been re-assessed as having low archaeological significance. An AHIP application will be made for the entirety of the proposed work areas except Richmond crossing (3T). The AHIP application will seek to harm one identified Aboriginal site, namely Mundiwa Isolated Artefact (AHIMS # 54-6-0085), which is assessed to be of low significance.

The proposed modification is considered justified as it is required to achieve the objectives of the Tuppal Creek Restoration Project and would have only a minor additional impact on the environment when compared with the existing REF.

8.2 Ecological sustainable development

Ecologically sustainable development is development that improves the total quality of life, both now and in the future. Achieving ecologically sustainable development is guided by four main principles. The principles, and how the proposed modification relates to them, are discussed below.

8.2.1 The precautionary principle

The precautionary principle deals with reconciling scientific uncertainty about environmental impacts with certainty in decision-making. It provides that where there is a threat of serious or

irreversible environmental damage, the absence of full scientific certainty should not be used as a reason to postpone measures to prevent environmental degradation.

This Addendum REF has assessed the potential environmental impacts of the proposed modification and identified additional environmental safeguards to control these impacts. The proposed modification is not considered to present a threat of serious or irreversible environmental damage. Scientific uncertainty would not postpone the implementation of any safeguards identified in this Addendum REF.

8.2.2 Inter-generational equity

Social equity is concerned with the distribution of economic, social and environmental costs and benefits. Inter-generational equity introduces a temporal element with a focus on minimising the distribution of costs to future generations.

The proposed modification is not expected to adversely impact on the health, diversity or productivity of the environment for future generations. The Tuppal Creek Restoration Project (and consequently the proposed modification) aim to improve the ecosystem health of Tuppal Creek and is therefore considered to represent a positive impact on intergenerational equity by maintaining ecosystem health for future generations.

8.2.3 Conservation of biological diversity and ecological integrity

The conservation of biological diversity and ecological integrity provides that the diversity of genes, species, populations and communities, as well as the ecosystems and habitats to which they belong, must be maintained and improved to ensure their survival.

An assessment of the existing ecological conditions at each of the proposed work sites has been carried out to identify and manage any potential impact of the proposed modification on local biodiversity and ecological integrity. The potential impacts of the proposed modification on biodiversity would be limited to the construction phase and would involve the removal of up to 72 hollow bearing trees and around 8.7 hectares of native vegetation. The proposed modification is not considered to represent a significant impact on a threatened or migratory species listed under the EPBC Act, or any threatened species listed under the BC Act.

In the long term, the proposed modification is expected to improve the ecological integrity of the Tuppal Creek system and surrounding biodiversity by supporting the objectives of the Tuppal Creek Restoration Project.

8.2.4 Improved valuation and pricing of environmental resources

The principle of internalising environmental costs into decision making requires consideration of all environmental resources which may be affected by the carrying out of a project, including air, water, land and living things.

This Addendum REF has examined the potential environmental impacts of the proposed modification (including on air, water, land and living things) and identified safeguards where there is the potential for adverse impacts. The implementation of safeguards to protect environmental resources is considered to represent the internalisation of environmental costs by Water - Infrastructure as a result of the proposed modification.

8.3 Conclusion

Currently, construction of the Tuppal Creek Restoration Project is constrained by approved work areas that are too small to build the proposed infrastructure as designed. The proposed modification would extend the proposed work areas.

The proposed modification meets the objectives of the Tuppal Creek Restoration Project by allowing the works described in the existing REF to be carried out with the current design and construction methodology.

The proposed modification would increase the amount of vegetation clearance carried out for the project, including increasing the number of hollow-bearing trees removed from three to up to 72. Environmental safeguards provided in this Addendum REF would ameliorate or minimise these expected impacts.

This Addendum REF has examined and considered all relevant location, state and commonwealth legislation and policies, and all matters affecting and likely to affect the environment as a result of the proposed modification.

This Addendum REF has been prepared in accordance with section 5.5 of the EP&A Act. It has concluded that the proposed modification is unlikely to have a significant impact on the environment, therefore an environmental impact statement under section 5.7 of the EP&A Act is not required.

This Addendum REF has considered whether there is likely to be a significant impact on State listed threatened species, ecological communities and their habitats and concluded that a significant impact is not likely.

In addition, the proposed modification is unlikely to have a significant impact on matters of national environmental significance or Commonwealth land within the meaning of the EPBC Act, therefore a referral to the DCCEEW is not required.

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10 Terms and abbreviations

Term	Definition
ACHAR	Aboriginal Cultural Heritage Assessment Report
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal heritage impact permit
BC Act	*Biodiversity Conservation Act 2016*
Biodiversity and Conservation SEPP	State Environmental Planning Policy (Biodiversity and Conservation) 2021
CEMP	Construction environmental management plan
Conargo LEP	Conargo Local Environmental Plan 2013
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DPE	Department of Planning and Environment
DPI (Fisheries)	Department of Primary Industries - Fisheries
DPIE	Department of Planning, Industry and Environment (now the Department of Planning and Environment (DPE))
DPIE EES	Department of Planning, Industry and Environment – Environment, Energy and Sciences Group (now the Department of Planning and Environment (DPE))
EMP	Environmental management plan
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	Environmental Planning and Assessment Regulation 2021
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
the existing REF	Tuppal Creek Restoration Project Roadway Crossing Works REF
FM Act	*Fisheries Management Act 1994*
IBRA	Interim Biogeographic Regionalisation for Australia

Term	Definition
Transport and Infrastructure SEPP	State Environmental Planning Policy (Transport and Infrastructure) 2021
Murray LEP	Murray Local Environmental Plan 2011
NPW Act	*National Parks and Wildlife Act 1974*
NSW	New South Wales
NT Act	*Native Title Act 1993*
PCT	Plant community type
the Project	Tuppal Creek Restoration Project Roadway Crossing Works
POEO Act	*Protection of the Environment Operations Act 1997*
REF	Review of environmental factors
SDLAM	Sustainable Diversion Limit Adjustment Mechanism
WI	Water - Infrastructure
WM Act	*Water Management Act 2000*
1T	Tuppal Station crossing
2T	Gollops Road crossing
3T	Richmond crossing
4T	Keysborough crossing
5T	Noorumboon crossing
6T	Arrawatta crossing
7T	Gundagurra crossing
8T	Mundiwa crossing

Appendix A Section 171 Environmental Factors Checklist

The following factors listed in section 171(2) of the EP&A Regulation, have also been considered to assess the likely impacts of the Proposed Activity on the environment. These are provided in the table below. These considerations are required to comply with sections 5.5 and 5.7 of the EP&A Act.

Environmental Factor	Impact
(a) the environmental impact on the community	Minor.
(b) the transformation of the locality	The proposed modification would have only a minor environmental impact on the community, limited to an increased requirement for vegetation clearing, ground disturbance, and impacts of items of Aboriginal cultural heritage significance.
(c) the environmental impact on the ecosystems of the locality	Nil.
(d) reduction of the aesthetic, recreational, scientific or other environmental quality or value of the locality	Nil.
(e) the effects on any locality, place or building that has— (i) aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance, or (ii) other special value for present or future generations	The proposed modification would not reduce the aesthetic, recreation, scientific or other environmental quality or value of the locality.
(f) the impact on the habitat of protected animals, within the meaning of the Biodiversity Conservation Act 2016	Minor.
(g) the endangering of a species of animal, plant or other form of life, whether living on land, in water or in the air	The proposed modification would have a minor impact on a place that has archaeological, cultural, historical and social significance as it would seek an AHIP to impact Aboriginal cultural heritage.

Environmental Factor	Impact
(h) long-term effects on the environment	Minor.
(i) degradation of the quality of the environment	The proposed modification would require the removal of up to 72 hollow bearing trees which currently provide suitable habitat for species listed under the BC Act. The proposed modification would also require the removal of up to 8.7 hectares of native vegetation.
(j) risk to the safety of the environment	Despite the requirement for vegetation removal, the proposed modification is expected have no more than a minor impact on threatened flora and fauna, as described in Section 6.1.2 of this Addendum REF.
(k) reduction in the range of beneficial uses of the environment	
(l) pollution of the environment	Nil.
(m) environmental problems associated with the disposal of waste	The proposed modification would not endanger a species of animal, plant or other form of life.
(n) increased demands on natural or other resources that are, or are likely to become, in short supply	Positive.
(o) the cumulative environmental effect with other existing or likely future activities	The proposed modification is expected to have a long-term positive effect on the environment of Tuppal Creek by enabling the removal of existing constraints to water and fish passage through the creek.
(p) the impact on coastal processes and coastal hazards, including those under projected climate change conditions	Nil / Positive.
(q) applicable local strategic planning statements, regional strategic plans or district strategic plans made under the Act, Division 3.1	The proposed modification would not degrade the quality of the environment of Tuppal Creek. The proposed modification is expected to improve the quality of the environment by enabling the removal of existing constraints to water and fish passage through the creek.

Environmental Factor	Impact
(r) other relevant environmental factors.	Nil.

Appendix B Matters of national environmental significance checklist

Under Chapter 2, Part 3 of the EPBC Act, the following matters of environmental significance are required to be considered to:

- Assist in determining whether the proposed activity should be referred to the DCCEEW and,
- For nationally listed threatened species, ecological communities and migratory species, whether the impacts are significant and should be assessed via an environmental impact statement).

Environmental factor	Impact
Any impact on a World Heritage property?	The proposed modification would not impact on a World Heritage property.
Any impact on a National Heritage place?	The proposed modification would not impact on a National Heritage place.
Any impact on a wetland of international importance (often called 'Ramsar' wetlands)?	The proposed modification would not impact on a wetland of international importance.
Any impact on nationally threatened species, ecological communities or migratory species?	The proposed modification would not impact on nationally threatened species, ecological communities or migratory species.
Any impact on a Commonwealth marine area?	The proposed modification would not impact on a Commonwealth marine area.
Does the proposed activity involve a nuclear action (including uranium mining)?	The proposed modification does not involve a nuclear action.
Additionally, any impact (direct or indirect) on the environment of Commonwealth land?	The proposed modification would not impact on the environment of Commonwealth land.
Any impact on a water resource, in relation to coal seam gas development and large coal mining development?	The proposed modification is not in relation to coal seam gas development or large coal mining development.

Appendix C Tuppal Creek Restoration Project Roadway Crossing Works REF and associate approval documents

Appendix D Addendum Biodiversity Assessment Report

Appendix E Addendum Aboriginal Cultural Heritage Assessment Report