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

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# SDLAM Program: Millewa Forest Supply Project – Access Works

Review of Environmental Factors

Department of Climate Change, Energy, the Environment and Water | July 2025

# Acknowledgement of Country

The NSW 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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SDLAM Program: Millewa Forest Supply Project – Access Works, Review of Environmental Factors

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## Document Status - SDLAM Program: Millewa Forest Supply Project – Access Works, Review of Environmental Factors (DE19-823-MIL-DE-CV-RPT-0001)

| Revision | Date | Prepared by | Reviewed by |
|---|---|---|---|
| Rev A - Draft | 08/07/2025 | R. Walker | M. Luger |
| Rev B – Final | 16/07/2025 | R. Walker | M. Luger |

*This review of environmental factors has been prepared in a template developed by the NSW Department of Climate Change, Energy, the Environment and Water and the NSW National Parks and Wildlife Service specifically for use in assessing the potential environmental impacts of works proposed as part of the Murray and Murrumbidgee Valley National Parks Sustainable Diversion Limit Adjustment Supply Measure Project. It combines key elements of the review of environmental factors templates of each respective organisation.*

# Declaration

This review of environmental factors (REF) has been prepared by 3Rivers, a joint venture between Jacobs Group (Australia) and GHD, on behalf of NSW Department of Climate Change, Energy, the Environment and Water. The REF has been prepared to satisfy the requirements of Division 5.1 of the *Environmental Planning and Assessment Act 1979*. The REF takes into account the environmental factors specified in the *Guidelines for Division 5.1 Assessments* (Department of Planning and Environment, 2022a).

Further, the REF has adequately addressed the matters in Chapter 5 of State Environmental Planning Policy (Biodiversity and Conservation) 2021.

The REF provides an assessment of the proposed upgrades to access tracks, removal of existing crossing structures and construction of crossing structures proposed works within the Millewa Forest (the 'Proposal') 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 Proposal.

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

(1) The Proposal is not likely to have a significant impact on the environment, and an environmental impact statement is not required

(2) The Proposal is not likely to significantly affect threatened species or ecological communities or their habitat, or be carried out in a declared area of outstanding biodiversity value. A species impact statement is not required

(3) The Proposal 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 REF, it is concluded that by adopting the safeguards identified in this assessment, it is unlikely that there would be significant adverse environmental impacts associated with the Proposal. Subject to the adoption of the measures to avoid, minimise or manage environmental impacts listed in this REF, the Proposal is recommended for approval.

| Authors and qualifications |
|---|
| **Designation**<br>**Ruby Walker, Bachelor of Environmental Science and Management,**<br>**Graduate Environmental Consultant, 3Rivers** |

| Reviewer and qualifications | |
|---|---|
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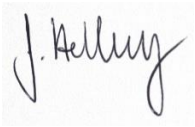
# Certification

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

Signature: 

Date: 9th July 2025

### National Parks and Wildlife Service

I, Glen WHEATLEY, certify that I have reviewed this REF as a representative of the National Parks and Wildlife Service, and agree that, to the best of my knowledge, it accords with the EP&A Act, the EP&A Regulation, and the *Guidelines for Division 5.1 Assessments* (Department of Planning and Environment, 2022a) made under section 170 of the EP&A Regulation.

Signature: 

Date: 16/07/20205

# Executive summary

The NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW) proposes to carry out repair, maintenance and upgrade works across six existing access tracks and associated waterway crossing infrastructure within Millewa Forest in south-western NSW. The works are proposed to improve light and heavy vehicle access, including construction vehicle access requirements, for the Millewa Forest Supply Project ('Project'), as part of the Sustainable Diversion Limit Adjustment Mechanism (SDLAM) Program. It is proposed to replace existing waterway crossing infrastructure and undertake maintenance and repair works to existing access tracks (the 'Proposal') across Millewa Forest.

The trails are primarily located on land reserved under Part 4 of the *National Parks and Wildlife Act 1974* (NPW Act).

Key details of the Proposal are provided in **Table E-1-1**. A comprehensive description of the Proposal is provided in **Section 3**.

Table E-1-1 Key details of the Proposal

| | |
|---|---|
| **Description of the Proposal** | The Proposal includes repair, maintenance and upgrade works to existing park access tracks within the Murray Valley Regional Park and National Park, including regrading, compacting and laying of a new wearing surface (consisting of geofabric membrane and suitable crushed rock/gravel) and replacement of existing waterway crossings such as pipe culverts and wooden bridges throughout the Regional Park and National Park. The proposed works include:<br>• Upgrades to 10 access track section of the existing park management trail system<br>• Replacement of up to 25 existing creek crossing structures with rock crossings or box culverts<br>• Installation of up to 6 temporary bypass structures, comprising of rock crossings or bailey bridges for the duration of construction works for the broader Millewa Forest Supply Project<br>• Establishment and use of two dedicated construction laydown areas including a pre-existing NPWS laydown area<br>The proposed works are required to improve light and heavy vehicle access to existing and proposed water management structures described in the approved Millewa Forest Supply Project Review of Environmental Factors (REF) and Bullatale Inlet Supply Channel Project REF. |
| **Name of NPWS park or reserve** | Murray Valley National Park and Murray Valley Regional Park |

| | |
|---|---|
| **Location of activity**<br>**(e.g. precinct name or nearby street)** | Murray Valley Regional Park and National Park (Millewa & Moira Precincts) |
| **Current and proposed management and ownership authority** | NSW National Parks and Wildlife Services (NPWS) are the current asset owners of all proposed and existing structures including access tracks, bridges and waterway crossings. NPWS as the existing asset owner will remain in ownership of the assets, pre, during and post construction activities. NSW DCCEEW is delegated under separate instruments to be the constructing authority for the performance of the construction works. At completion of the construction and commissioning phases, a formal handover will occur for all permanent assets. |
| **Estimated commencement date** | The Proposal would commence within three months of receipt of all approvals. Construction works are expected to start in the mid-late 2025 prior to the commencement of construction works part of the broader Millewa Forest Supply Project. |
| **Estimated completion date** | The works are expected to be completed within three months post commencement of construction. The anticipate completion date is late 2025. |

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# 1 Introduction

## 1.1 Purpose of this document

3Rivers on behalf of the NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW) has prepared this review of environmental factors (REF) to assess the potential environmental impacts of the Proposal in accordance with the requirements of Division 5.1 the *Environmental Planning and Assessment Act 1979 (EP&A Act)*, section 170 of the Environmental Planning and Assessment Regulation 2021 (EP&A Regulation) and the Guidelines for Division 5.1 Assessments (Department of Planning and Environment, 2022a).

The purpose of this REF is to describe the Proposal, document the likely impacts on the environment, and detail measures to mitigate impacts that cannot be avoided. The REF addresses NSW DCCEEW's obligations under section 5.5 of the EP&A Act, including taking into account the environmental factors listed in Table 1 of the *Guidelines for Division 5.1 Assessments* (Department of Planning and Environment, 2022a).

The findings of the REF will be considered when assessing:

- Whether the Proposal 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 permissibility of the works under the *National Parks and Wildlife Act (NPW Act)* and the authorisation that would be issued under the NPW Act to construct and operate the new infrastructure
- The significance of any impact on threatened species as defined by the *Biodiversity Conservation Act 2016* (BC Act) and *Fisheries Management Act 1994* (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.

## 1.2 Proposal overview

NSW DCCEEW proposes to carry out a package of repair, maintenance and upgrade works to existing access infrastructure that is considered essential for construction access for the Millewa Forest Supply Project which forms part of the Murray and Murrumbidgee Valley National Parks Supply Project under the NSW Sustainable Diversion Limit Adjustment Mechanism Acceleration program (SDLAM Acceleration Program).

The proposed works (the Proposal) would occur within up to 41 Contractor Activity Zones (CAZs) located across Millewa Forest (Murray Valley National Park and Regional Park) and would include the following:

- Upgrades to existing park management trails located throughout Millewa Forest
- Removal of existing crossing structures comprising timber culverts/ bridges and pipe culverts
- Construction and/or installation of up to 22 crossing structures comprising of:
  - Box culverts
  - Rock crossings
  - Temporary bailey bridges

Construction of the Proposal would also require the following activities:

- Establishment and use of two construction laydown areas including one pre-existing NPWS laydown area within the Millewa Forest
- Vegetation clearing within defined CAZs
- Instream works including the excavation/ re-profiling of existing creek beds and banks; plus installation of temporary cofferdams and localised dewatering as required
- General maintenance of existing access roads as required for construction, including trimming of vegetation on overhanging track edges.

The proposed works are described in detail in **Chapter 3** and a summary of the works is provided in **Table 3-1.**

### 1.2.1 Proposal location

The Proposal area is situated in south-western NSW within the Millewa Forest which spans approximately 38,000 hectares (ha) on the northern side of the Murray River, between Deniliquin to the north and Moama to the south. The Millewa Forest is formed by the Murray Valley National Park and Regional Park which are reserved under Part 4 of the *National Parks and Wildlife Act 1974* (NPW Act).

The Proposal area is also located within the approximately 84,000 ha NSW Central Murray Forests Ramsar site, which is formed by the Millewa Forest plus Werai Forest, and Koondrook-Perricoota Forest. In total 14 CAZs are located entirely within the Murray Valley Regional Park, 12 CAZs entirely within the Murray Valley National Park, 4 CAZs are located within both park areas and all work sites are located within the NSW Central Murray Forests Ramsar site.

In addition, the Proposal area is located near to the Barmah Forest Ramsar site, which exists in Victoria on the southern side of the Murray River opposite Millewa Forest.

The Proposal area is located within the traditional lands of the Yorta Yorta and, Bangerang peoples and the Murray River Council Local Government Area (LGA). An overview of the Proposal area is shown in **Figure 1-1**. The locations of the proposed work sites (CAZ) are shown in more detail in **Section 3.2**.

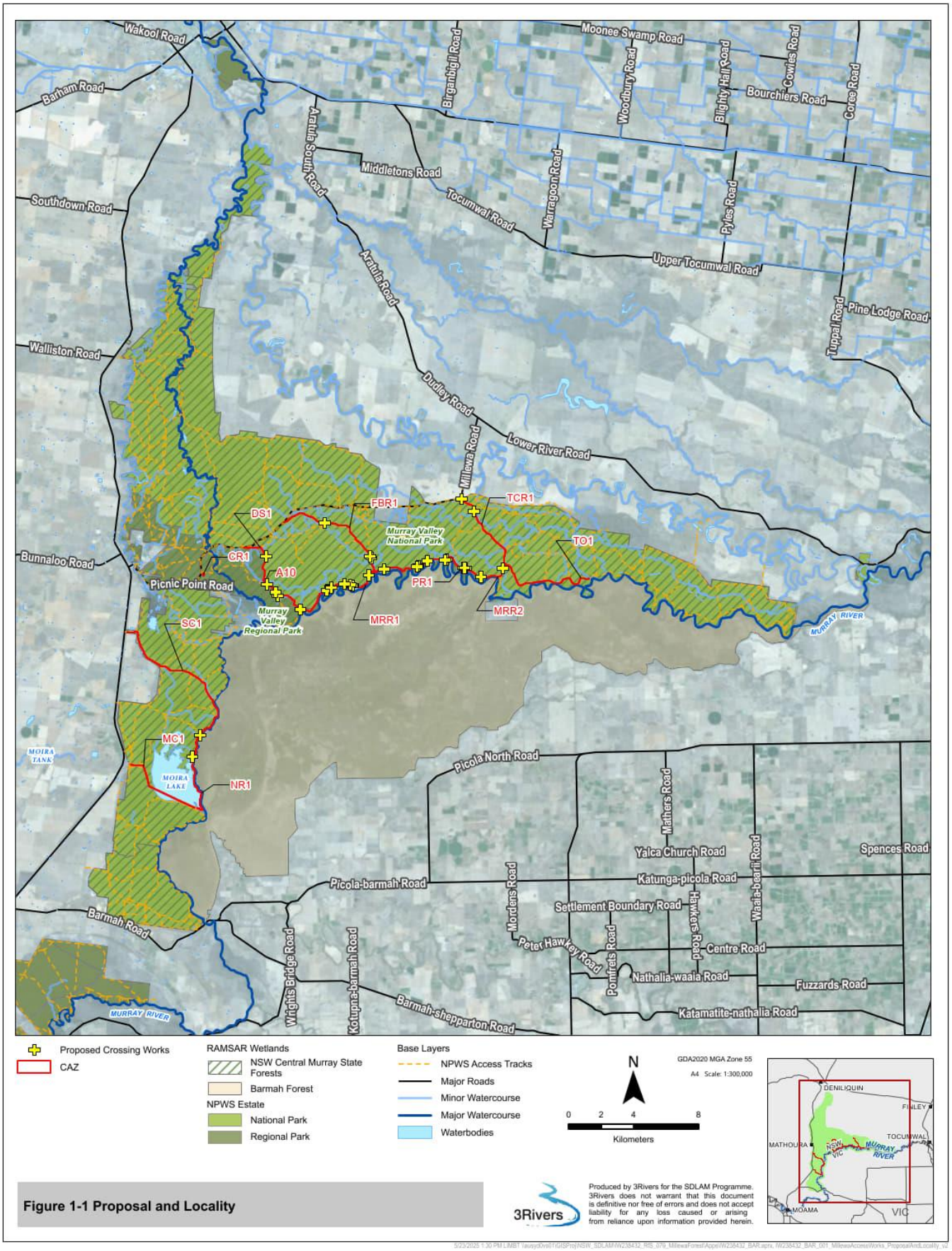



Figure 1-1 Proposal and locality

## 1.3 Background information

### 1.3.1 Sustainable Diversion Limit Adjustment Mechanism

The Murray-Darling Basin Plan (the Basin Plan) aims to improve the management, health and sustainability of the Murray-Darling Basin (the Basin). Central to the Basin Plan are the Sustainable Diversion Limits (SDLs), which limit the amount of water that can be extracted from the Basin, while leaving sufficient water to maintain the environmental health of the Basin.

In 2009, the Murray-Darling Basin Authority determined that the average baseline diversion level, or the existing level of water extraction, for the basin was 13,623 gigalitres. The Murray-Darling Basin Authority also determined that the long-term SDL for the entire basin was 10,873 gigalitres per year, which is 2,750 gigalitres lower than the 2009 baseline diversion level. As part of the Basin Plan, this 2,750 gigalitres of water is proposed to be recovered for the environment through a combination of licence buybacks, water recovery, and efficiency projects.

To provide flexibility, the Basin Plan includes a Sustainable Diversion Limit Adjustment Mechanism (SDLAM) to adjust the SDLs. If the environmental outcomes targeted in the Basin Plan can be achieved with less water, more water can remain in the system for other users, including irrigated agriculture. Similarly, if farming practices can be made more efficient, more water can be made available for the environment. An SDL adjustment can be achieved through the following measures:

- Supply projects — These include projects or activities (works and measures) that improve the efficiency of how water is delivered to the environment. For example, environmental works, such as building or improving river or water management structures or changes to the rules under which a river is operated, which achieve environmental outcomes with less water. These projects therefore deliver equivalent environmental outcomes without requiring additional water to be removed from productive use.
- Efficiency projects — These include projects or activities that change water use practices and save water for the environment. These efficiencies could include improved on-farm efficiencies or water delivery efficiencies (e.g., lining channels to reduce water losses). These projects contribute to the overall water saving target without having to directly purchase water from irrigators.
- Constraints relaxation or management projects — These projects aim to overcome some of the physical barriers and river management practices that impact the delivery of environmental water in the system. Constraints projects provide more flexibility to move environmental water around the Basin when and where it is needed most.

The Murray-Darling Basin Authority has adjusted the target for recovering water from the Basin for the environment from 2,750 gigalitres to 2,680 gigalitres following a review of the Northern Basin. As of 2019, 2,118 gigalitres of this target had been recovered through the purchase of water rights and efficiency measures that have involved the development of new infrastructure. The balance of the target (605 GL) is proposed to be recovered through SDLAM projects, removing the need for further water buybacks.

In 2017, the Murray-Darling Basin states and the Commonwealth Government agreed on a package of 36 SDLAM projects across the southern connected Murray-Darling Basin, with the aim of

recovering 605 gigalitres of water each year for the Murray-Darling river system. The NSW Government is currently developing nine projects in collaboration with local communities, key stakeholders and other Basin states with funding from the Commonwealth Government. The NSW Government has brought forward the implementation of five SDLAM projects through the NSW SDLAM Acceleration Program (the Acceleration Program, refer to **Figure 1-2**). The Acceleration Program will deliver up to 45 gigalitres of the outstanding amount needed to reach the 605 gigalitre target required by the Basin Plan each year. The Murray and Murrumbidgee Valley National Parks SDL Adjustment Supply Project which is formed by the Millewa Forest Supply Project and Yanga National Park Supply Project, is one of the five projects in the Acceleration Program.

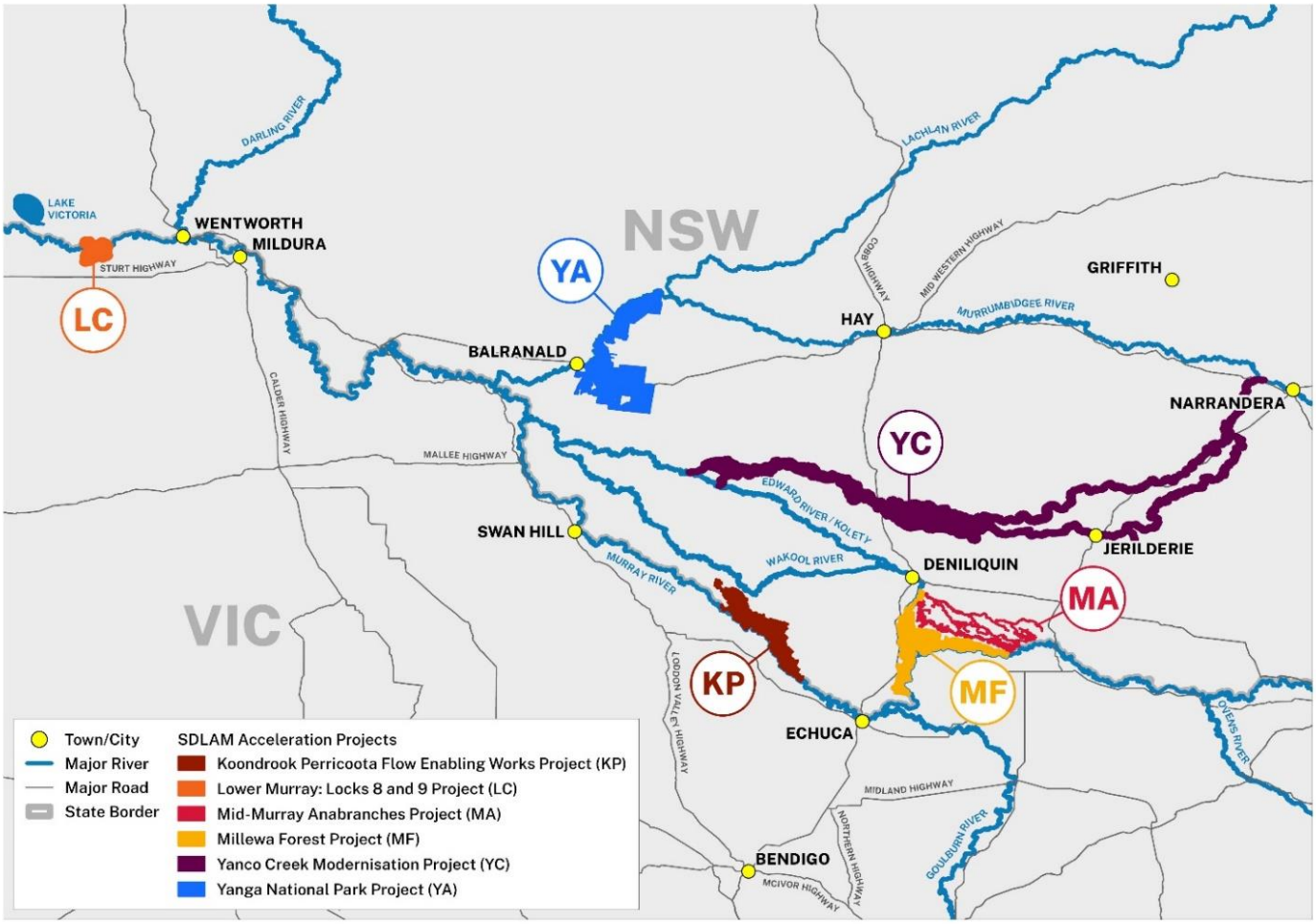



Figure 1-2 Overview of the NSW SDLAM Acceleration Program

## 1.3.2 Millewa Forest Supply Project

Barmah-Millewa Forest is part of the largest complex of tree-dominated floodplain wetlands in southern Australia and is nationally the largest continuous stand of River Red Gum Forest (Murray-Darling Basin Commission, 2007). The size and intact nature of this forested floodplain makes it one of the best representatives of the wetland type (freshwater tree-dominated wetlands) in the bioregion. In addition, the site forms an extensive area of intact floodplain and is one of the few such areas with native vegetation in the bioregion (Hale and Butcher, 2011).

The Murray River at Barmah-Millewa Forest is characterised by the Barmah Choke, an 80 km stretch of the Murray River along which channel depth and width progressively decreases. The Barmah Choke restricts the flow of the Murray River to about 7,000 megalitres per day, estimated at Picnic Point. This is the lowest channel flow capacity of any stretch of the Murray River. Because the Murray River is so narrow at Murray Valley National Park, flows often spill over onto the floodplain. The Barmah Choke results in flooding of the park commencing above flows of about 9,000 megalitres per day at Yarrawonga (Jones et al., 2022).

The Barmah Choke can cause high flows delivered for irrigation in summer to overtop banks and flow onto floodplain areas. These flows can result in unseasonal flooding of River Red Gum Forests and low-lying wetlands that would typically not have occurred prior to river regulation under a natural flow regime (Harrington and Hale, 2011).

Prior to development and river regulation, once the river capacity constraint was breached water moved onto and across the floodplain via a network of braided channels and flood runners (small watercourses which flow only during periods of high flow), usually in winter, spring and early summer.

From the 1930s, the Millewa Forest water channel network was manipulated by the installation of many banks and regulators and, in some cases, construction of artificial channels. These management interventions influenced the movement of water on the floodplain largely to optimise floodplain forestry. Further infrastructure including earth banks (causeways, embankments and sills) and other structures that obstruct and divert flows (weirs, regulators) have been installed along the Murray River and throughout the floodplain to support river regulation, required to optimise River Red Gum forestry and meet irrigation needs.

Millewa Forest Supply Project includes a number of work packages which aim to deliver improvements in water delivery for the important floodplain forest habitats, while also helping to create conditions to support the naturally occurring wet and dry cycles of the floodplain environment. The project in turn will also support a number of endangered species, including birds, fish and aquatic flora.

The Millewa Forest Supply Project involves the modernisation of existing water regulating structures in order to support the delivery of environmental water flows into the Millewa Forest and improve fish passage across the floodplain, whilst providing asset owners with safer and easier to operate infrastructure.

The Proposal would support the delivery of the broader Millewa Forest Supply Project works by improving construction access for the project and ongoing access for NPWS and WaterNSW operational and maintenance activities throughout Millewa Forest.

# 2 Proposal need and justification

## 2.1 Proposal objectives and need

At present, existing unsealed management trails which incorporate a variety of creek crossing structures are located throughout the Millewa Forest and serve both as primary access routes for existing water management infrastructure and fire trails for NPWS.

A number of these trails and crossing structures have been identified as being in poor or degrading condition and therefore are unsafe for current or planned use in future. Additionally, a portion of the existing crossing structures currently act as barriers to water movement and native fish passage across the Millewa Forest floodplain when flows are present.

The Proposal would generally involve upgrading existing unsealed management trails and replacement of aging creek crossing structures with fish and flow friendly structures where possible. The Proposal would provide safe construction access routes, by creating load rated infrastructure, for planned project works in the area, improve potential for water flow and fish passage across the Millewa Forest floodplain, and support access for ongoing management activities within the Millewa Forest.

The primary aims of the Proposal are to:

- Support planned project works through upgrading existing management trails and aging creek crossing structures that are currently preventing and/or limiting access to project areas.
- Remove existing barriers to the movement of water and pathways of native fish through installation of flow and fish friendly crossing structures.
- Provide improved access for ongoing management activities within the Millewa Forest following project construction.

The Proposal is also aligned with objectives 1, 2 and 4 of the Murray and Murrumbidgee Valley National Parks SDLAM Project (of which the Proposal forms part of). The key objectives of the Murray and Murrumbidgee Valley National Parks SDLAM Project are to:

1. Enable smarter use of available environmental water, including the ability to sustain key refuge habitats during drier periods
2. Improve environmental outcomes, primarily for flood-dependent vegetation communities, waterbirds and fish
3. Increase the area of floodplain that can be actively managed using environmental water
4. Modernise ageing infrastructure, removing constraints to the movement of water across the floodplain and reopening pathways for native fish

5. Create a community and government partnership, providing project benefits for irrigators while minimising disruption to floodplain ecosystems.

Completion of the Proposal in addition to other works proposed as part of the Murray and Murrumbidgee Valley National Parks SDLAM Project (which are subject to separate assessments and approvals) would contribute to the 45 gigalitre per annum water saving targeted by the Acceleration Program (refer to **Section 1.3.1**).

The purpose of this REF is to assess the impacts associated with upgrading of existing unsealed access tracks and aging creek crossing structures under this Proposal.

## 2.2 Existing infrastructure

The Millewa Forest water channel network has been manipulated by the installation of earth banks (causeways, embankments and sills) and other structures that obstruct and divert flows (weirs, regulators) since the early 20th century (refer to **Figure 1-1**) for an overview of these structures. A number of these regulator structures are due to be replaced or refurbished under the Millewa Forest Supply Project.

The Proposal generally involve the upgrading of existing unsealed access tracks, replacement of existing creek crossings and installation of temporary crossing structures that would be used to complete works under the broader Millewa Forest Supply Project.

The following sections describe the existing infrastructure subject to the Proposal including existing access tracks sections and existing creek crossing structures.

### 2.2.1 Access tracks

The Murray Valley National and Regional Park precinct contains an extensive network of unsealed access tracks which provide access for land and water management operations across the floodplain.

Ten sections of existing management trails are proposed to be upgraded within the Murray Valley National and Regional Park, to enable planned works (subject to separate approvals) and to support ongoing land and water management activities.

The existing trails generally comprise unsealed single lane access tracks which become unsafe for a range of vehicle types, during and following wet weather conditions (where vehicles are more likely to become bogged). The tracks are also at risk of being further damaged by vehicle use particularly during planned construction works in the area.

Further description of the existing trail sections is outlined in **Table 2-1**.

Table 2-1 Details of existing trail sections proposed to be upgraded

| Existing Trail name | Track Section ID | Description | Example of trail condition |
|---|---|---|---|
| **Moira Cutting** | MC1 | • Unsealed management trail up to 5.2 km in length<br>• Leads from Dora Road, eastwards to the existing Moira Regulator. |  |
| **Narrows Road / Porters Creek Road/ Poverty Point Road** | NR1 | • Unsealed management trail up to 6 km in length<br>• Leads from the eastern side of Moira Regulator northwards to its intersection with Swifts Creek Road<br>• Also provides access to Bunnydigger Regulator and Swifts Regulator. |  |
| | SC1 | • Unsealed management trail up to 10 km in length<br>• Leads along Narrows Road from the intersection with Swifts Creek north, then west along Porters Creek Road and Poverty Point Road. | |

| Existing Trail name | Track Section ID | Description | Example of trail condition |
|---|---|---|---|
| **Pinchgut Regulator Access Track** | PR1 | • Overgrown unsealed management trail approx. 0.2 km in length<br>• Leads from Millewa River Road to Pinchgut Regulator. |  |
| **Toupna Crossing Road** | TCR1 | • Unsealed management trail approx. 5.4 km in length<br>• Leads from Millewa Road in the North-East portion of the park south to join Millewa River Road. |  |

| Existing Trail name | Track Section ID | Description | Example of trail condition |
|---|---|---|---|
| **Fisherman's Bend Road** | FB1 | • Unsealed management trail approx. 7.7 km in length<br>• Leads from Millewa Road to Millewa River Road. |  |
| **Millewa River Road** | DS1 | • Unsealed management trail approx. 10.4 km in length<br>• Forms western portion of Millewa River Road leading from Millewa Road to Nestrons Creek. |  |
| | MRR1 | • Unsealed management trail approx. 4.1 km in length<br>• Forms central portion of Millewa River Road leading from its intersection with Nestrons Creek, eastwards to Fisherman's Bend Road. | |
| | MRR2 | • Unsealed management trail approx. 10 km in length<br>• Forms central portion of Millewa River Road leading from its intersection with Fisherman's Bend Road, eastwards to Toupna Crossing Road. | |
| | TO2 | • Unsealed management trail approx. 6.5 km in length<br>• Forms Eastern portion of Millewa River Road leading from its intersection with Toupna Crossing Road, eastward to its intersection with Lower Toupna Creek. | |

### 2.2.2 Creek crossing structures

The majority of the existing trail sections proposed to be upgraded incorporate a variety of existing creek crossing structures which facilitate access across creeks and adjoining tributaries in the area.

Many of these crossings are in poor condition and unable to support vehicular access or are likely to become damaged by heavy vehicle use during planned construction works. Additionally, some of the existing crossing structures currently act as barriers to water movement and native fish passage across the Millewa Forest floodplain when flows are present.

Existing crossing structures generally comprise of concrete pipe culverts; timber culverts and bridges structures; concrete deck bridges and various other crossing types. Each of these are described in further detail below.

#### 2.2.2.1 Pipe culverts

A total of up to seven existing concrete pipe culverts of varying sizes have been identified as potential risks to construction access along Millewa River Road track sections. Majority of the pipe culverts are partially buried with sediment and present a barrier to fish passage when flows are present.

Further description of each of the pipe culverts is outlined in Table 2-2.

Table 2-2 Description of existing pipe culvert crossings

| CAZ ID | Existing structure description | Photograph of structure |
|---|---|---|
| C24a | • Pipe culvert crossing over an ephemeral flood runner<br>• Located on Millewa River Road (track section ID - MRR1) |  |

| CAZ ID | Existing structure description | Photograph of structure |
|---|---|---|
| C25a | • Pipe culvert crossing over an ephemeral flood runner<br>• Located on Millewa River Road (track section ID - MRR1) |  |
| C29 | • Pipe culvert crossing over an ephemeral flood runner<br>• Located on Millewa River Road (track section ID – MRR2) |  |
| C31 | • Pipe culvert crossing over an ephemeral or intermittent watercourse<br>• Located on Millewa River Road (track section ID – MRR1) |  |

| CAZ ID | Existing structure description | Photograph of structure |
|---|---|---|
| C32 | • Pipe culvert crossing over an ephemeral flood runner<br>• Located on Millewa River Road (track section ID – MRR1) |  |
| C34 | • Pipe culvert crossing over an ephemeral flood runner<br>• Located on Millewa River Road (track section ID – DS1) |  |
| C37 | • Pipe culvert crossing over an ephemeral flood runner<br>• Located on Millewa River Road (track section ID – MMR2) |  |

### 2.2.2.2 Timber culverts and bridges

A total of up to 18 existing timber culverts/bridges have been identified as a risk to construction access along Millewa River Road, Toupna Crossing Road and Fisherman's Bend Road track sections. The structures are of varying sizes and dimensions, some of which provide little to no clearance beneath the structure and act as a barrier to fish passage.

Further description of each of the timber culvert and bridge structures is outlined in **Table 2-3.**

Table 2-3 Description of existing timber culvert and bridge structures

| CAZ ID | Existing structure description | Photos |
|---|---|---|
| C16 | • Timber bridge within the channel of a permanent watercourse (House Creek)<br>• Located on Millewa River Road (track section ID – MRR2) |  |
| C17 | • Low lying timber culvert (partial blocked) within the channel of an ephemeral or intermittent watercourse adjoining to Pinchgut Lagoon<br>• Located on Millewa River Road (track section ID – MRR2) |  |
| C18 | • Low lying timber culvert (partial blocked) within the channel of an ephemeral or intermittent watercourse adjoining to Pinchgut Lagoon<br>• Located on Millewa River Road (track section ID – MRR2) |  |

| CAZ ID | Existing structure description | Photos |
|---|---|---|
| C20 | • Low lying timber culvert (partial blocked) within the channel of an ephemeral flood runner<br>• Located on Millewa River Road (track section ID – MRR2) |  |
| C21 | • Low lying timber culvert within the channel of an ephemeral flood runner<br>• Located on Millewa River Road (track section ID – MRR2) |  |
| C22 | • Low lying timber culvert within the channel of an ephemeral flood runner<br>• Located on Millewa River Road (track section ID – MRR2) |  |

| CAZ ID | Existing structure description | Photos |
|---|---|---|
| C23 | • Timber bridge within the channel of a permanent watercourse (Fisherman's Creek – downstream of Fisherman's Creek Regulator)<br>• Located on Millewa River Road (track section ID – MRR1) |  |
| C24 | • Low lying timber culvert (entirely blocked) within the channel of an ephemeral flood runner<br>• Located on Millewa River Road (track section ID – MRR1) |  |
| C25 | • Low lying timber culvert (entirely blocked) within the channel of an ephemeral flood runner<br>• Located on Millewa River Road (track section ID – MRR1) |  |

| CAZ ID | Existing structure description | Photos |
|---|---|---|
| C26 | • Low lying timber culvert within the channel of an ephemeral flood runner<br>• Located on Fisherman's Bend Road (track section ID – FBR1) |  |
| C28 | • Low lying timber culvert within the channel of an ephemeral or intermittent watercourse (Cornalla Creek)<br>• Located on Fisherman's Bend Road (track section ID – FBR1) |  |
| C30 | • Low lying timber culvert (entirely blocked) within the channel of an ephemeral flood runner<br>• Located on Millewa River Road (track section ID – MRR1) |  |

| CAZ ID | Existing structure description | Photos |
|---|---|---|
| C33 | • Low lying timber culvert within the channel of an ephemeral flood runner<br>• Located on Fisherman's Bend Road (track section ID – FBR1) |  |
| C35 | • Timber culvert within the channel of an ephemeral flood runner<br>• Located on Millewa River Road (track section ID – DS1) |  |
| C40 | • Low lying timber culvert (partially blocked) within the channel of an ephemeral flood runner<br>• Located on Millewa River Road (track section ID – MRR2) |  |

| CAZ ID | Existing structure description | Photos |
|---|---|---|
| C41 | • Low lying timber culvert (entirely blocked) within the channel of an ephemeral flood runner<br>• Located on Millewa River Road (track section ID – DS1) |  |
| C38 | • Timber bridge within the channel of an ephemeral or intermittent watercourse (connecting between Toorolong Creek and Aluminy Creek)<br>• Located on Toupna Crossing Road (track section ID – TCR1) |  |
| C39 | • Timber bridge within the channel of an ephemeral or intermittent watercourse (Tooralong Creek)<br>• Located on Toupna Crossing Road (track section ID – TCR1) |  |

### 2.2.2.3 Concrete bridges

A total of three existing concrete bridges of varying sizes and dimensions have been identified as a risk to construction access along Millewa River Road track sections. The structures generally include a concrete deck, metal guard rails and wooden support piers with rock fill on the approaches. The poor condition of Cornalla (Wild Dog) Creek Bridge has meant the bridge has been closed indefinitely for safety reasons.

Further description of each of the concrete bridge structures is outlined in **Table 2-4.**

Table 2-4 Description of existing concrete bridge structures

| CAZ ID | Existing structure description | Photos |
|---|---|---|
| C19 | • Concrete deck bridge within the channel of an ephemeral or intermittent watercourse adjoining to Pinchgut Lagoon<br>• Located on Millewa River Road (track section ID – MRR2) |  |
| A9 | • Concrete deck bridge within the channel of a permanent watercourse – (Wild Dog Creek)<br>• Located on Millewa River Road (track section ID – DS1) |  |

| CAZ ID | Existing structure description | Photos |
|---|---|---|
| C36 | • Concrete deck bridge within the channel of an ephemeral or intermittent watercourse (Cornalla Creek)<br>• Located on Millewa River Road (track section ID – DS1) |  |

### 2.2.2.4 Other crossing structures

One existing unnamed regulator crossing comprising a concrete box culvert and wooden drop gate is located at A4 on Millewa River Road track section. The regulator is not in operation and currently acts as barrier to fish passage when flows are present. The structure is not expected to present a risk to construction access, however it has the potential to be damaged with sustained use, in which case replacement would be needed.

Two existing rock crossings are located at Swifts Regulator (A15) and Bunnydiggers Regulator (A16) along Narrows Road. The rock crossings provide access past the regulator structures southwards towards Moira Cutting, however they are only accessible during low flow periods and are not suitable for heavy vehicle access. A locked gate is also present at the site of Swifts Regulator which prevents unauthorised access past the structures.

One informal crossing is located at A10 preceding Wild Dog Creek Bridge. Further description of each concrete bridge structure is outlined in **Table 2-5**.

Table 2-5 Descriptions and photos of other crossing structures

| CAZ ID | Existing structure description | Proposed works |
|---|---|---|
| A4 | • Concrete culvert/ Unnamed wooden regulator within the channel of an ephemeral flood runner<br>• Located on Millewa River Road (track section ID – MMR2) |  |

| CAZ ID | Existing structure description | Proposed works |
|---|---|---|
| A10 | • Informal crossing preceding Wild Dog Creek Bridge within ephemeral flood runner<br>• Located on Millewa River Road (track section ID – DS1) |  |
| A15 | • Rock crossing at Swifts Regulator within a permanent watercourse (Swifts Creek)<br>• Located on Narrows Road (track section ID –NR1) |  |
| A16 | • Rock crossing at Bunnydiggers Regulator within a permanent watercourse (Bunnydiggers Creek)<br>• Located on Narrows Road (track section ID –NR1) |  |

### 2.2.3 Crossing Road laydown area

Crossing Road laydown area (CR1) is located in Murray Valley Regional Park at the intersection of Millewa Road and Crossing Road, about 700 m north-east of the intersection of Millewa Road and Picnic Point Road (refer to **Photo 2-1** and **Photo 2-2**). It is noted that this location is heavily disturbed from construction laydown activities in the past.

Photo 2-1 Crossing Road laydown area, looking away from Millewa Road

Photo 2-2 Crossing Road laydown area, looking towards Millewa Road

## 2.3 Options and alternatives considered

The following options were considered for the Proposal:

- **Option 1 - The 'do nothing' approach:** Not undertaking the proposed access works would preclude construction the Millewa Forest Supply Project works. The existing crossings would be retained and access constraints for construction works and for ongoing NPWS and WaterNSW operational and maintenance activities across the Millewa Forest system would remain. This would impede the management of the Millewa Forest including ongoing delivery of

environmental flows to the subject creek systems and watercourses, thereby resulting in the continued degradation of ecosystem health and water quality.

- **Option 2 - Construct the Proposal:** Option 2 would result in the Proposal being carried out across out up to 41 CAZs at identified creek crossing sites and access track sections as described in **Chapter 3** (i.e. the replacement of existing crossing structures and upgrading of track sections). This option would proactively address existing access constraints that may affect the delivery of the Millewa Forest Supply Project and provide additional benefits that align with the aims of the Murray and Murrumbidgee Valley National Parks SDLAM Project.

## 2.4 Justification for preferred option

The ‘do nothing’ option would not address the ongoing deterioration of the access tracks/ crossing structures and would limit the access to construction sites that form part of the broader Millewa Forest Supply Project works. As a result, the ‘do nothing’ option has not been selected, and the proposed access track maintenance and crossing upgrades is the preferred option.

Option 2 - Construction of the Proposal was selected as the preferred option as it would meet the aims 1, 2 and 4 of the Murray and Murrumbidgee Valley National Parks SDLAM Project through achieving the following:

- Support the delivery Millewa Forest Supply Project by improving construction access for the project and ongoing access for NPWS and WaterNSW operational and maintenance activities throughout Millewa Forest
- Make the access tracks more durable and extend the time until the access tracks are likely to require further maintenance
- Remove existing barriers to the movement of water and pathways of native fish through installation of flow and fish friendly crossing structures.

A detailed description of the preferred option is provided in Chapter 3.

# 3 Proposal description

## 3.1 Summary of proposed works

The Proposal would require activity to be carried out at up to 41 CAZs within the Murray Valley National Park and Regional Park. The works would generally include:

- Upgrades to 10 track section CAZs of the existing park management trail system
- Replacement of up to 25 existing creek crossing structures with rock crossings or box culverts at 23 CAZs
- Installation of up to 6 temporary bypass structures, comprising of rock crossings or bailey bridges at 6 CAZs for the duration of construction works for the broader Millewa Forest Supply Project
- Use of 2 CAZs as dedicated construction laydown areas including a pre-existing NPWS laydown area
- General maintenance of existing access roads as required for construction including trimming of vegetation on overhanging track edges.

- A summary of the works that form the Proposal is provided in **Table 3-1** and an overview of the site locations is shown in

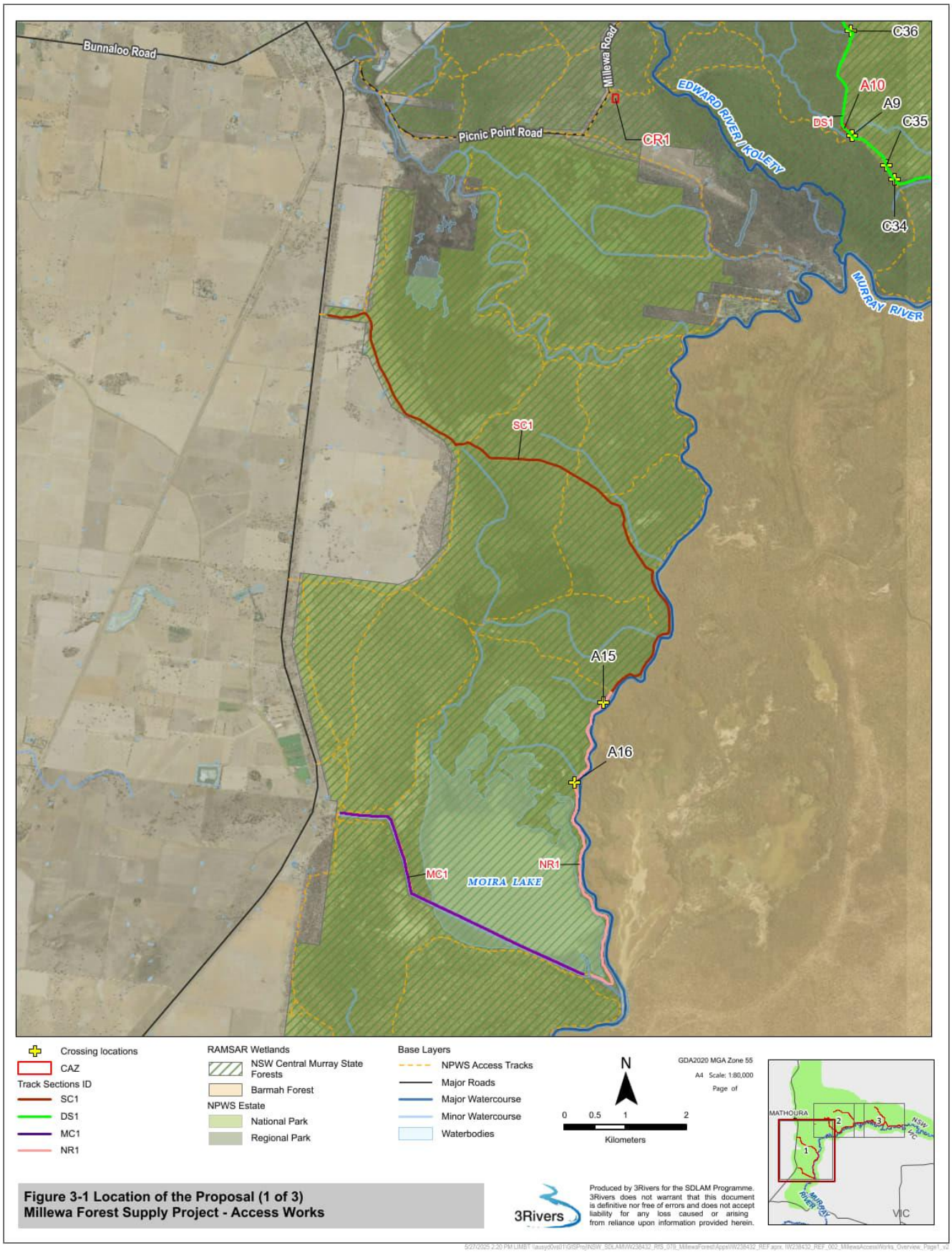



**Figure 3-1 Location of the Proposal (1 of 3)**
**Millewa Forest Supply Project - Access Works**

Figure 3-1.

Table 3-1 Summary of proposed works

| CAZ ID | Description | Proposed works |
|---|---|---|
| **Access track upgrade works** | | |
| MC1 | Unsealed management trail up to 5.2 km in length<br>Track that runs along north side of Moira Cutting<br>Leads from Dora Road, eastwards to the existing Moira Regulator. | Upgrade existing trail |
| NR1 | Unsealed management trail up to 6 km in length<br>Leads from the eastern side of Moira Regulator northwards to its intersection with Swifts Creek Road<br>Also provides access Bunnydigger Regulator and Swifts Regulator. | Upgrade existing trail |
| SC1 | Unsealed management trail up to 10 km in length<br>Leads along Narrows Road from the intersection with Swifts Creek north, then west along Porters Creek Road and Poverty Point Road. | Upgrade existing trail |
| DS1 | Overgrown unsealed management trail approx. 0.2 km in length<br>Leads from Millewa River Road to Pinchgut Regulator. | Upgrade existing trail |
| MRR1 | Unsealed management trail approx. 5.4 km in length<br>Leads from Millewa Road in the North-East portion of the park south to join Millewa River Road. | Upgrade existing trail |
| MRR2 | Unsealed management trail approx. 7.7 km in length<br>Leads from Millewa Road to Millewa River Road. | Upgrade existing trail |
| PR1 | Unsealed management trail approx. 10.4 km in length<br>Forms western portion of Millewa River Road leading from Millewa Road to Nestrons Creek. | Upgrade existing trail |

| CAZ ID | Description | Proposed works |
|---|---|---|
| TCR1 | Unsealed management trail approx. 4.1 km in length<br>Forms central portion of Millewa River Road leading from its intersection with Nestrons Creek, eastwards to Fisherman's Bend Road. | Upgrade existing trail |
| TO1 | Unsealed management trail approx. 10.0 km in length<br>Forms central portion of Millewa River Road leading from its intersection with Fisherman's Bend Road, eastwards to Toupna Crossing Road. | Upgrade existing trail |
| FBR1 | Unsealed management trail approx. 6.5 km in length<br>Forms eastern portion of Millewa River Road leading from its intersection with Toupna Crossing Road, eastward to its intersection with Lower Toupna Creek. | Upgrade existing trail |
| Crossing works | | |
| A9 | Concrete deck bridge within the channel of a permanent watercourse – (Wild Dog Creek)<br>Located on Millewa River Road (track section ID – DS1) | Existing structure to be left in situ and temporary bailey bridge or rock crossing bypass to be installed if needed for contractor access |
| A15 | Rock crossing at Swifts Regulator within a permanent watercourse (Swifts Creek)<br>Located on Narrows Road (track section ID –NR1) | Install temporary bailey bridge |
| A16 | Rock crossing at Bunnydiggers Regulator within a permanent watercourse (Bunnydiggers Creek)<br>Located on Narrows Road (track section ID –NR1) | Install temporary bailey bridge |
| C16 | Timber bridge within the channel of a permanent watercourse (House Creek)<br>Located on Millewa River Road (track section ID – MRR2) | Replace existing structure with a box culvert |

| CAZ ID | Description | Proposed works |
|---|---|---|
| C17 | Low lying timber culvert (partial blocked) within the channel of an ephemeral or intermittent watercourse adjoining to Pinchgut Lagoon<br>Located on Millewa River Road (track section ID – MRR2) | Replace existing structure with a rock crossing |
| C18 | Low lying timber culvert (partial blocked) within the channel of an ephemeral or intermittent watercourse adjoining to Pinchgut Lagoon<br>Located on Millewa River Road (track section ID – MRR2) | Replace existing structure with a box culvert[2] |
| C19 | Concrete deck bridge within the channel of an ephemeral or intermittent watercourse adjoining to Pinchgut Lagoon<br>Located on Millewa River Road (track section ID – MRR2) | Replace existing structure with a box culvert |
| C20 | Low lying timber culvert (partial blocked) within the channel of an ephemeral flood runner<br>Located on Millewa River Road (track section ID – MRR2) | Replace existing structure with a rock crossing |
| C21 | Low lying timber culvert within the channel of an ephemeral flood runner<br>Located on Millewa River Road (track section ID – MRR2) | Replace existing structure with a rock crossing |
| C22 | Low lying timber culvert within the channel of an ephemeral flood runner<br>Located on Millewa River Road (track section ID – MRR2) | Replace existing structure with a box culvert[2] |
| C23 | Timber bridge within the channel of a permanent watercourse (fisherman's Creek – downstream of Fisherman's Creek Regulator)<br>Located on Millewa River Road (track section ID – MRR1) | Replace existing structure with a box culvert[2] |

| CAZ ID | Description | Proposed works |
|---|---|---|
| C24 | Low lying timber culvert (entirely blocked) within the channel of an ephemeral flood runner<br>Located on Millewa River Road (track section ID – MRR1) | Replace existing structure with a rock crossing |
| C24a | Pipe culvert crossing over an ephemeral flood runner<br>Located on Millewa River Road (track section ID - MRR1) | Replace existing structure with a rock crossing |
| C25a | Pipe culvert crossing over an ephemeral flood runner<br>Located on Millewa River Road (track section ID - MRR1) | Replace existing structure with a box culvert[2] |
| C26 | Low lying timber culvert within the channel of an ephemeral flood runner<br>Located on fisherman's Bend Road (track section ID – FBR1) | Replace existing structure with a box culvert[2] |
| C28 | Low lying timber culvert within the channel of an ephemeral or intermittent watercourse (Cornalla Creek)<br>Located on fishermen's Bend Road (track section ID – FBR1) | Replace existing structure with a rock crossing |
| C31 | Pipe culvert crossing over an ephemeral or intermittent watercourse<br>Located on Millewa River Road (track section ID – MRR1) | Replace existing structure with a rock crossing |
| C32 | Pipe culvert crossing over an ephemeral flood runner<br>Located on Millewa River Road (track section ID – MRR | Replace existing structure with a box culvert[2] |
| C33 | Low lying timber culvert within the channel of an ephemeral flood runner<br>Located on fishermen's Bend Road (track section ID – FBR1) | Replace existing structure with a box culvert[2] |

| CAZ ID | Description | Proposed works |
|---|---|---|
| C36 | Concrete deck bridge within the channel of an ephemeral or intermittent watercourse (Cornalla Creek)<br>Located on Millewa River Road (track section ID – DS1) | Install temporary bailey bridge or construct a rock crossing as needed to bypass existing structure for the duration of construction works for the broader Millewa Forest Projects |
| C38 | Timber bridge within the channel of an ephemeral or intermittent watercourse (connecting between Toorolong Creek and Aluminy creek)<br>Located on Toupna Crossing Road (track section ID – TCR1) | Replace existing structure with a box culvert, or leave existing structure in situ and route a bypass rock crossing around it |
| C39 | Timber bridge within the channel of an ephemeral or intermittent watercourse (Tooralong Creek)<br>Located on Toupna Crossing Road (track section ID – TCR1) | Replace existing structure with a box culvert, or leave existing structure in situ and route a bypass rock crossing around it |
| C40 | Low lying timber culvert (partially blocked) within the channel of an ephemeral flood runner<br>Located on Millewa River Road (track section ID – MRR2) | Replace existing structure with a rock crossing |
| **Construction laydown works** | | |
| A10 | Informal crossing preceding Wild Dog Creek Bridge within ephemeral flood runner<br>Located on Millewa River Road (track section ID – DS1) | Establish a temporary laydown area to support other sites |
| CR1 | Crossing Road laydown area (existing NPWS laydown area located in Murray Valley Regional Park at the intersection of Millewa Road and Crossing Road | Use area as temporary laydown for the duration of construction works for the broader Millewa Forest Projects |
| **Other works** | | |
| A4* | Concrete culvert/ Unnamed wooden regulator within the channel of an ephemeral flood runner<br>Located on Millewa River Road (track section ID – MMR2) | No planned works [1] |

| CAZ ID | Description | Proposed works |
|---|---|---|
| C25 | Low lying timber culvert (entirely blocked) within the channel of an ephemeral flood runner<br>Located on Millewa River Road (track section ID – MRR1) | No planned works [1] |
| C29* | Pipe culvert crossing over an ephemeral flood runner<br>Located on Millewa River Road (track section ID – MRR2) | No planned works [1] |
| C30* | Low lying timber culvert (entirely blocked) within the channel of an ephemeral flood runner<br>Located on Millewa River Road (track section ID – MRR1) | No planned works [1] |
| C34* | Pipe culvert crossing over an ephemeral flood runner<br>Located on Millewa River Road (track section ID – DS1) | No planned works [1] |
| C35* | Timber culvert within the channel of an ephemeral flood runner<br>Located on Millewa River Road (track section ID – DS1) | No planned works [1] |
| C37* | Pipe culvert crossing over an ephemeral flood runner<br>Located on Millewa River Road (track section ID – MMR2) | No planned works [1] |
| C41* | Low lying timber culvert (entirely blocked) within the channel of an ephemeral flood runner<br>Located on Millewa River Road (track section ID – DS1) | No planned works [1] |

*Note.*

1 While designs have not been progressed, terrestrial disturbance footprints for these sites have been assessed in this REF. If damage occurs to structure during project, a design solution would be proposed under an Addendum REF.

2 Detailed design and hydraulics / flow velocities not available.

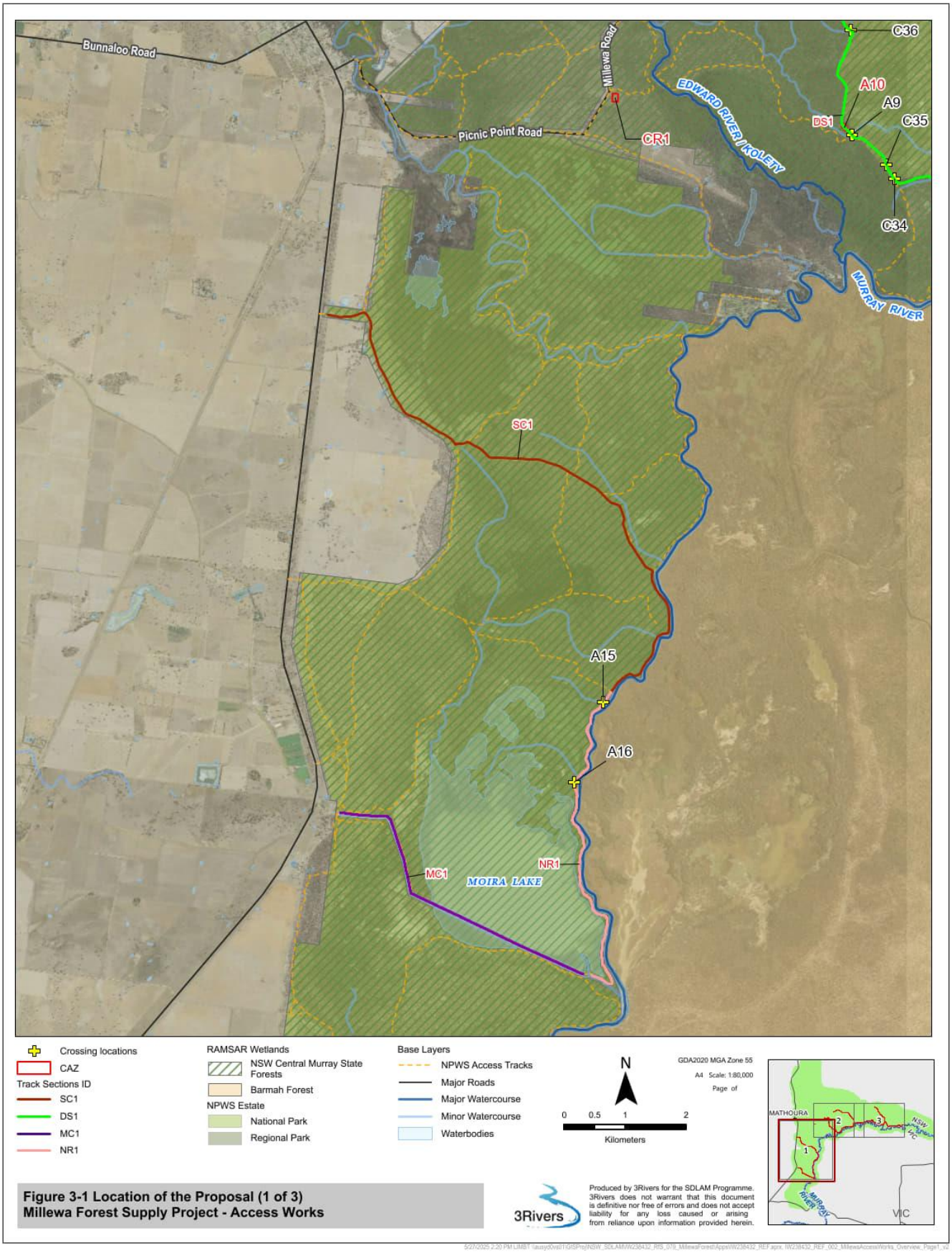



Figure 3-1 Location of the Proposal (1 of 3)

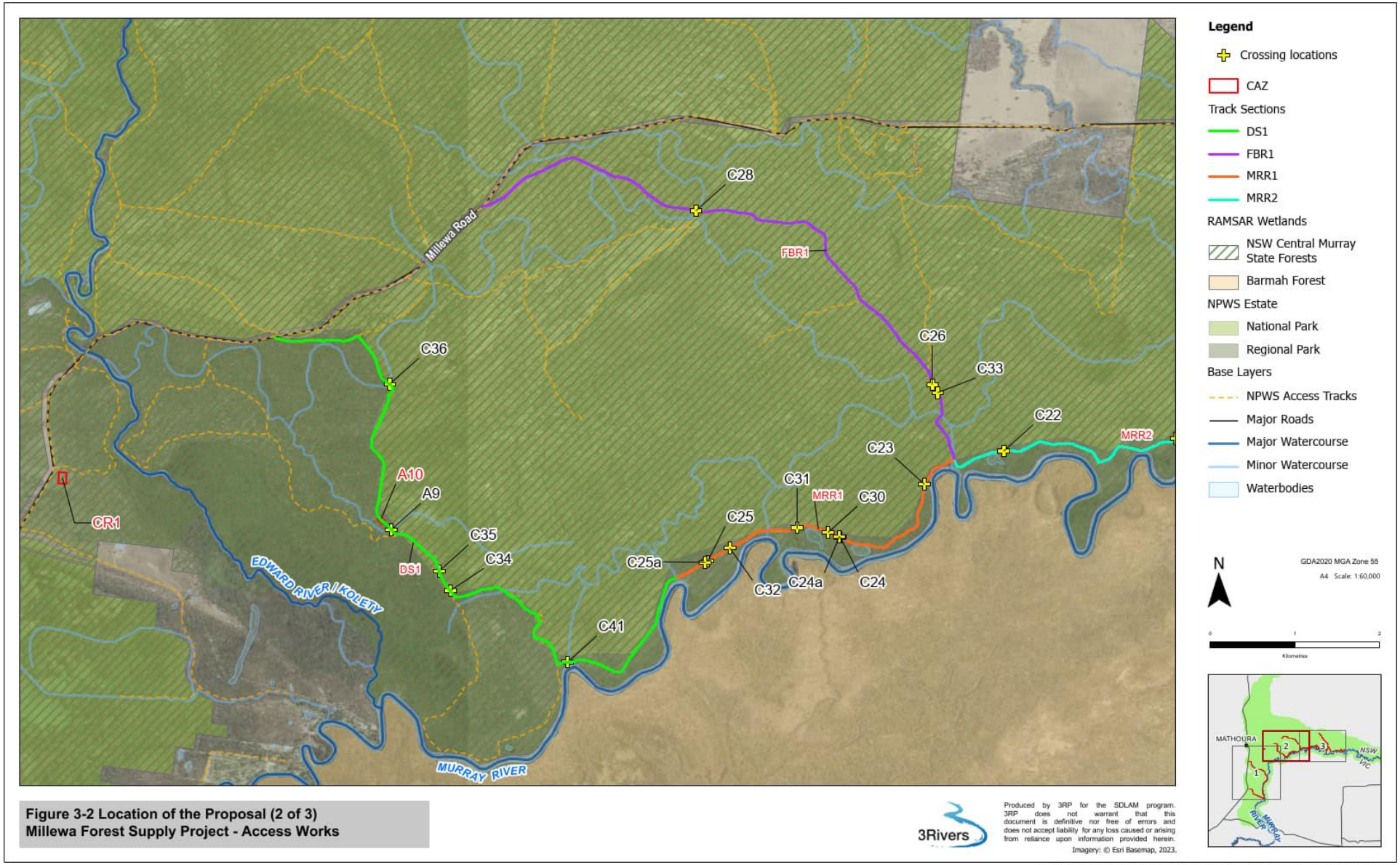



**Figure 3-2 Location of the Proposal (2 of 3)**
**Millewa Forest Supply Project - Access Works**

Figure 3-2 Location of the Proposal (2 of 3)

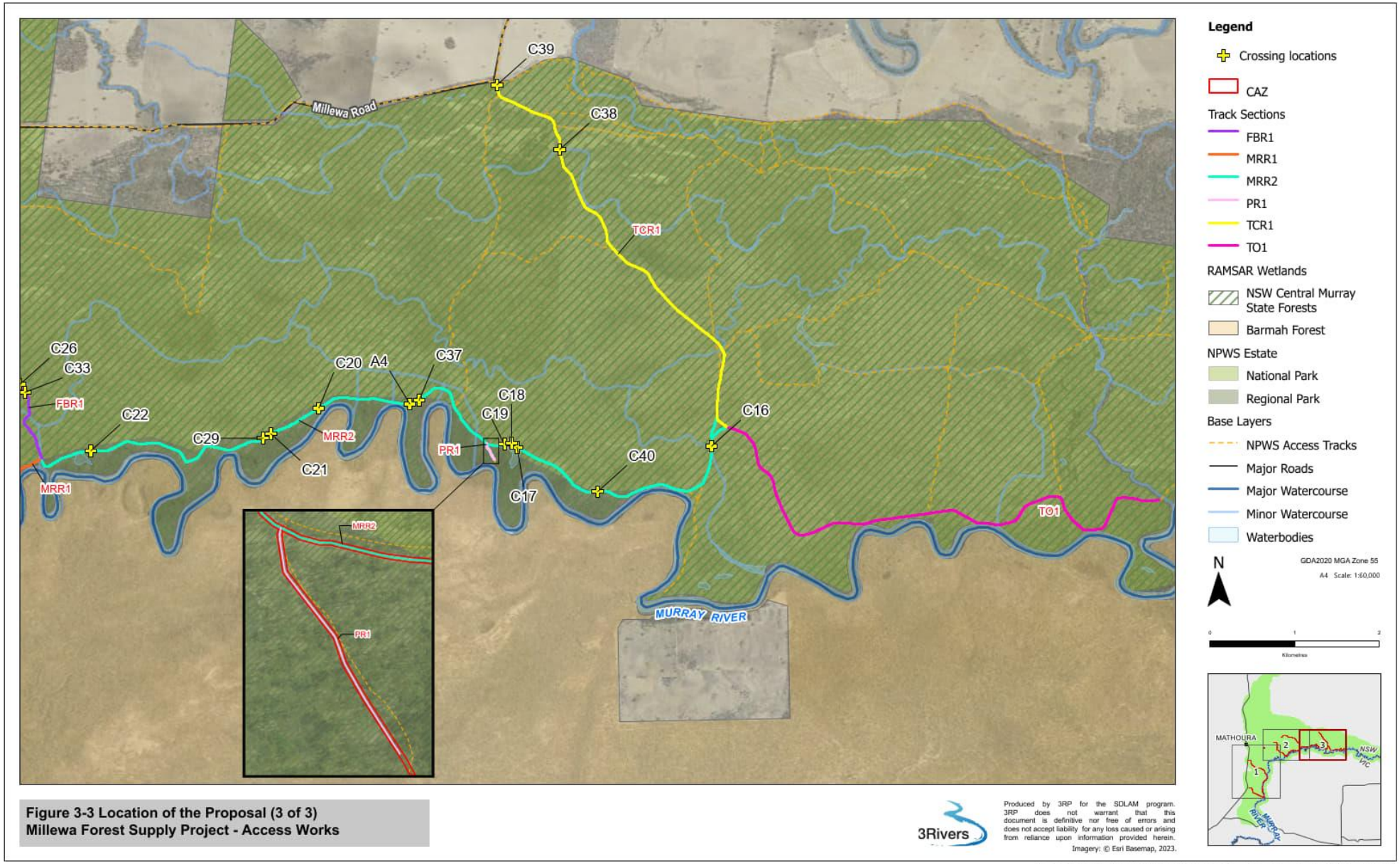



Figure 3-3 Location of the Proposal (3 of 3)

## 3.2 Proposal footprint

The Proposal would directly impact an area of up to about 32.5 ha during the construction phase. However, a significant portion of this area (around 26.9 ha) is comprised of disturbed and cleared land due to the construction, maintenance and use of existing infrastructure including access tracks, culverts and bridges. As a result, the Proposal would require only up to 5.7 ha of vegetation removal with the proposed CAZs.

Locations of each CAZ is shown in **Figure 3-4** to **Figure 3-16** and a breakdown of their areas is provided in **Table 3-2**.

Table 3-2 CAZ area of proposed access track works

| CAZ ID | Vegetated area of CAZ (ha) | Cleared area of CAZ (ha) | Total access track CAZ area (ha) |
|---|---|---|---|
| MC1 | 0.00 | 2.09 | 2.09 |
| NR1 | 0.00 | 2.35 | 2.35 |
| SC1 | 0.00 | 4.15 | 4.15 |
| DS1 | 0.00 | 3.48 | 3.48 |
| MRR1 | 0.00 | 1.66 | 1.66 |
| MRR2 | 0.00 | 3.90 | 3.90 |
| PR1 | 0.10 | 0.00 | 0.10 |
| TCR1 | 0.00 | 2.18 | 2.18 |
| TO1 | 0.00 | 2.67 | 2.67 |
| FBR1 | 0.00 | 3.10 | 3.10 |
| Total | 0.10 | 25.58 | 25.68 |

Table 3-3 CAZ area for proposed crossing works (excluding access tracks works)

| CAZ ID | Vegetated area of CAZ (ha) | Cleared area of CAZ (ha) | Total CAZ area (ha) | CAZ area - excluding existing cleared track area (ha) |
|---|---|---|---|---|
| A4 | 0.18 | 0.03 | 0.21 | 0.18 |
| A10 | 0.36 | 0.03 | 0.39 | 0.36 |
| A9 | 0.24 | 0.03 | 0.27 | 0.24 |
| A15 | 0.08 | 0.01 | 0.10 | 0.08 |
| A16 | 0.08 | 0.01 | 0.10 | 0.08 |

| CAZ ID | Vegetated area of CAZ (ha) | Cleared area of CAZ (ha) | Total CAZ area (ha) | CAZ area - excluding existing cleared track area (ha) |
|---|---|---|---|---|
| C16 | 0.18 | 0.03 | 0.21 | 0.18 |
| C17 | 0.19 | 0.03 | 0.22 | 0.19 |
| C18 | 0.18 | 0.03 | 0.21 | 0.18 |
| C19 | 0.18 | 0.03 | 0.21 | 0.18 |
| C20 | 0.18 | 0.03 | 0.21 | 0.18 |
| C21 | 0.18 | 0.03 | 0.21 | 0.18 |
| C22 | 0.18 | 0.03 | 0.21 | 0.18 |
| C23 | 0.18 | 0.03 | 0.21 | 0.18 |
| C24/ C24a | 0.21 | 0.03 | 0.24 | 0.21 |
| C25/ C25a | 0.23 | 0.04 | 0.27 | 0.23 |
| C26 | 0.29 | 0.03 | 0.32 | 0.29 |
| C28 | 0.17 | 0.02 | 0.19 | 0.17 |
| C29 | 0.18 | 0.03 | 0.21 | 0.18 |
| C30 | 0.18 | 0.03 | 0.21 | 0.18 |
| C31 | 0.18 | 0.03 | 0.21 | 0.18 |
| C32 | 0.18 | 0.03 | 0.21 | 0.18 |
| C33 | 0.18 | 0.03 | 0.21 | 0.18 |
| C34 | 0.18 | 0.03 | 0.21 | 0.18 |
| C35 | 0.18 | 0.03 | 0.21 | 0.18 |
| C36 | 0.18 | 0.03 | 0.21 | 0.18 |
| C37 | 0.21 | 0.03 | 0.24 | 0.21 |
| C38 | 0.14 | 0.02 | 0.16 | 0.14 |
| C39 | 0.13 | 0.02 | 0.14 | 0.13 |
| C40 | 0.18 | 0.03 | 0.21 | 0.18 |
| C41 | 0.18 | 0.03 | 0.21 | 0.18 |
| CR1 | 0.00 | 1.21 | 1.21 | 1.21 |

| CAZ ID | Vegetated area of CAZ (ha) | Cleared area of CAZ (ha) | Total CAZ area (ha) | CAZ area - excluding existing cleared track area (ha) |
|---|---|---|---|---|
| Totals | 5.57 | 2.05 | 7.63 | 6.78 |

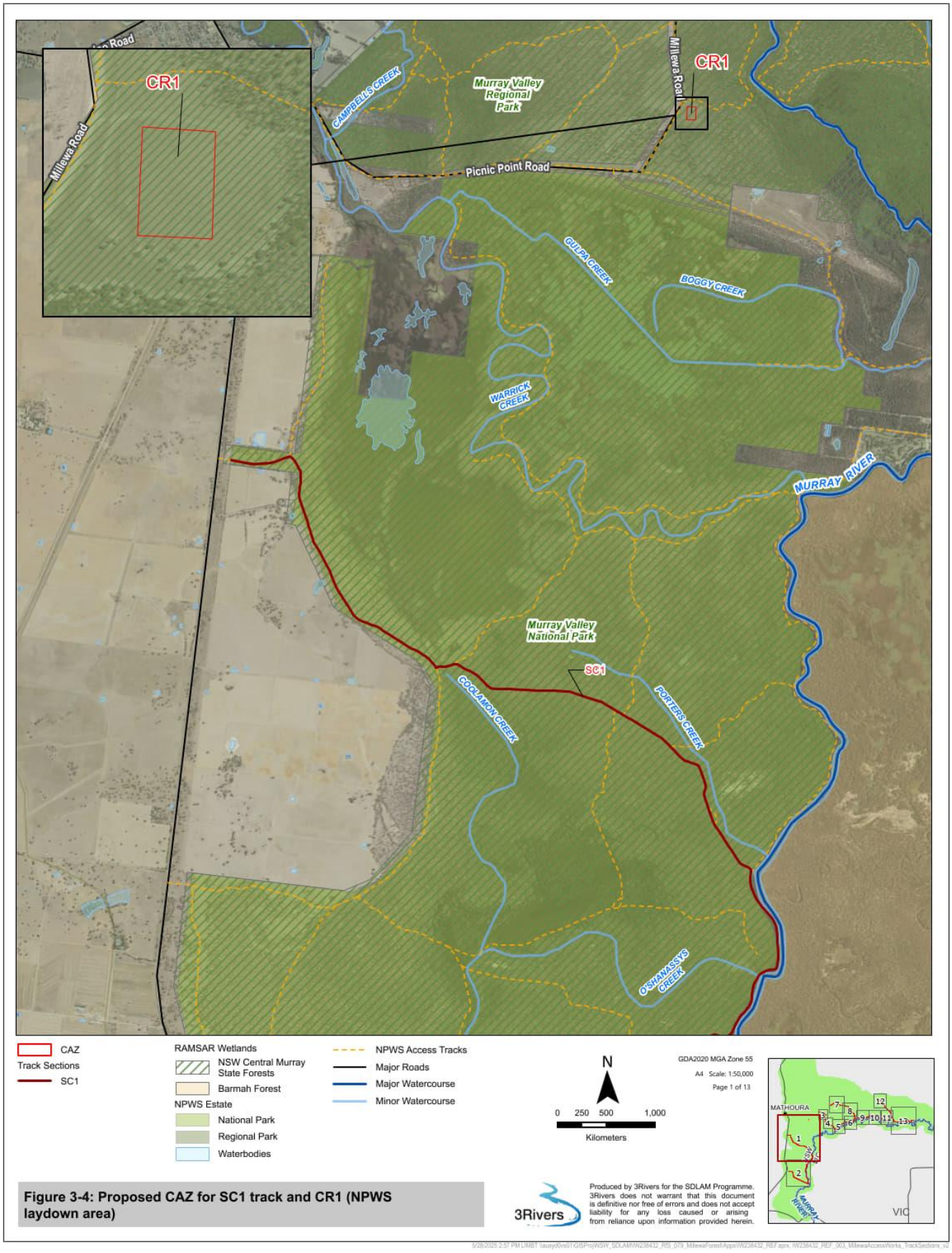



**Figure 3-4: Proposed CAZ for SC1 track and CR1 (NPWS laydown area)**

Figure 3-4 Proposed CAZ for SC1 track and CR1 (NPWS laydown area)

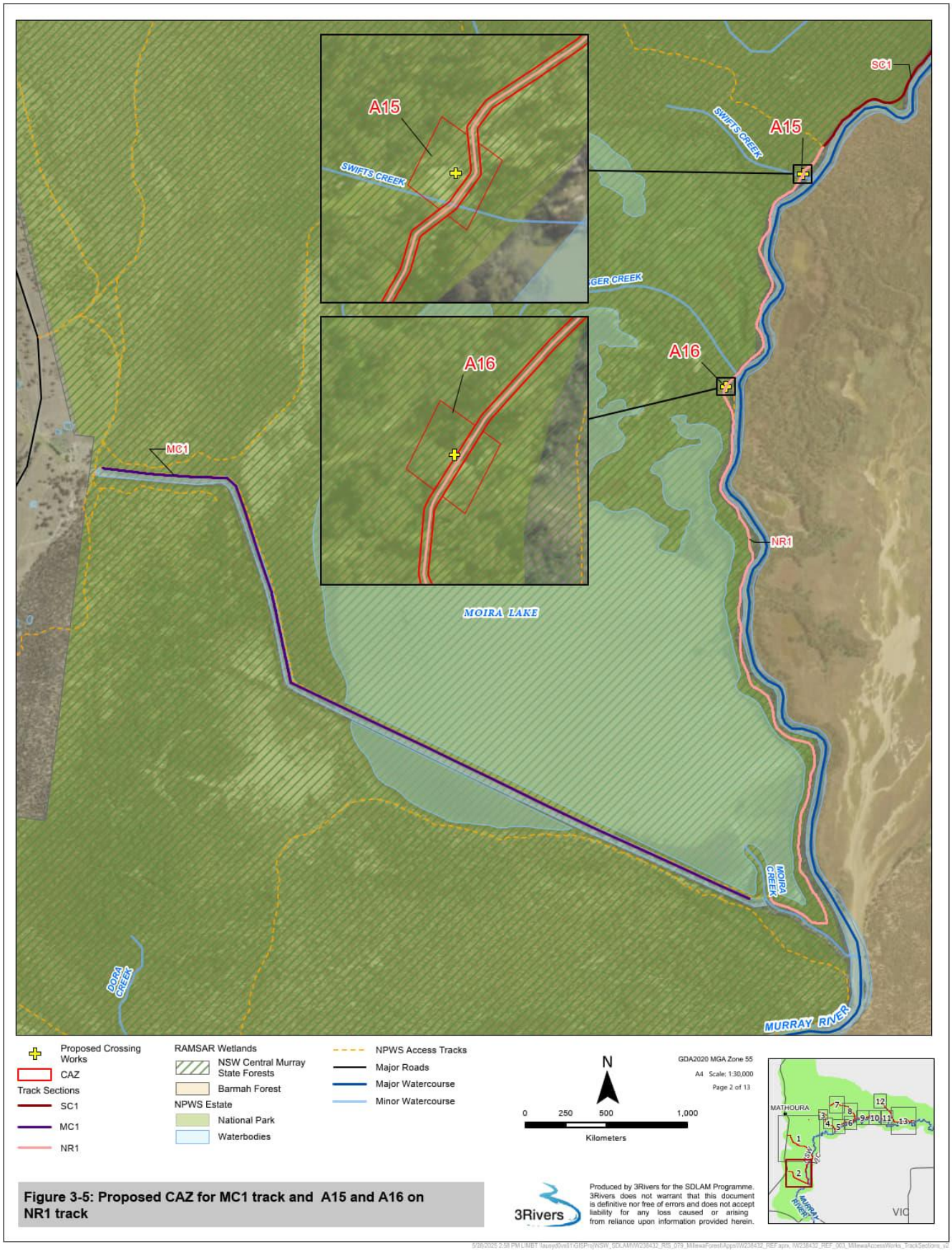



Figure 3-5 Proposed CAZ for MC1 track and A15 and A16 on NR1 track

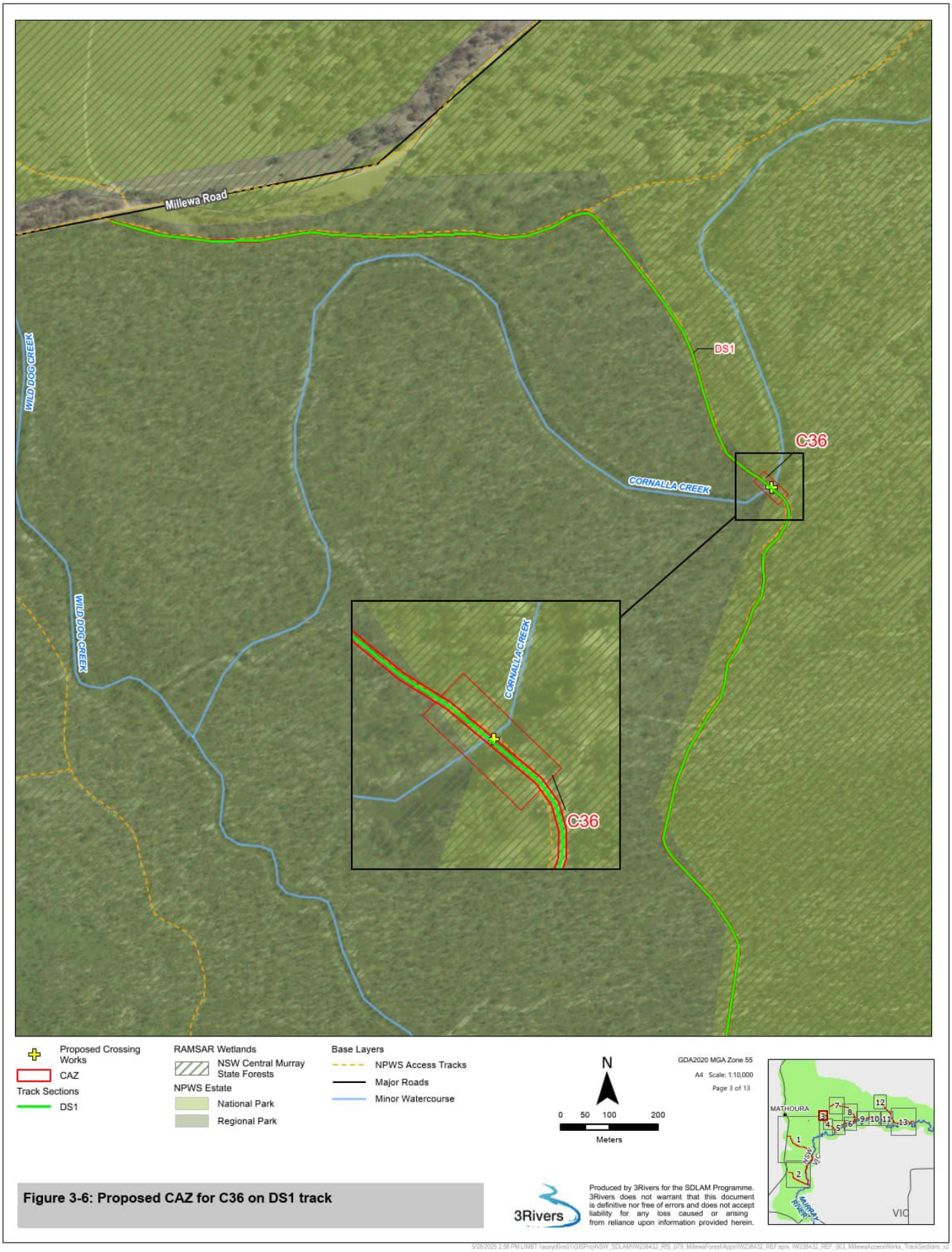



Figure 3-6 Proposed CAZ for C36 on DS1 track

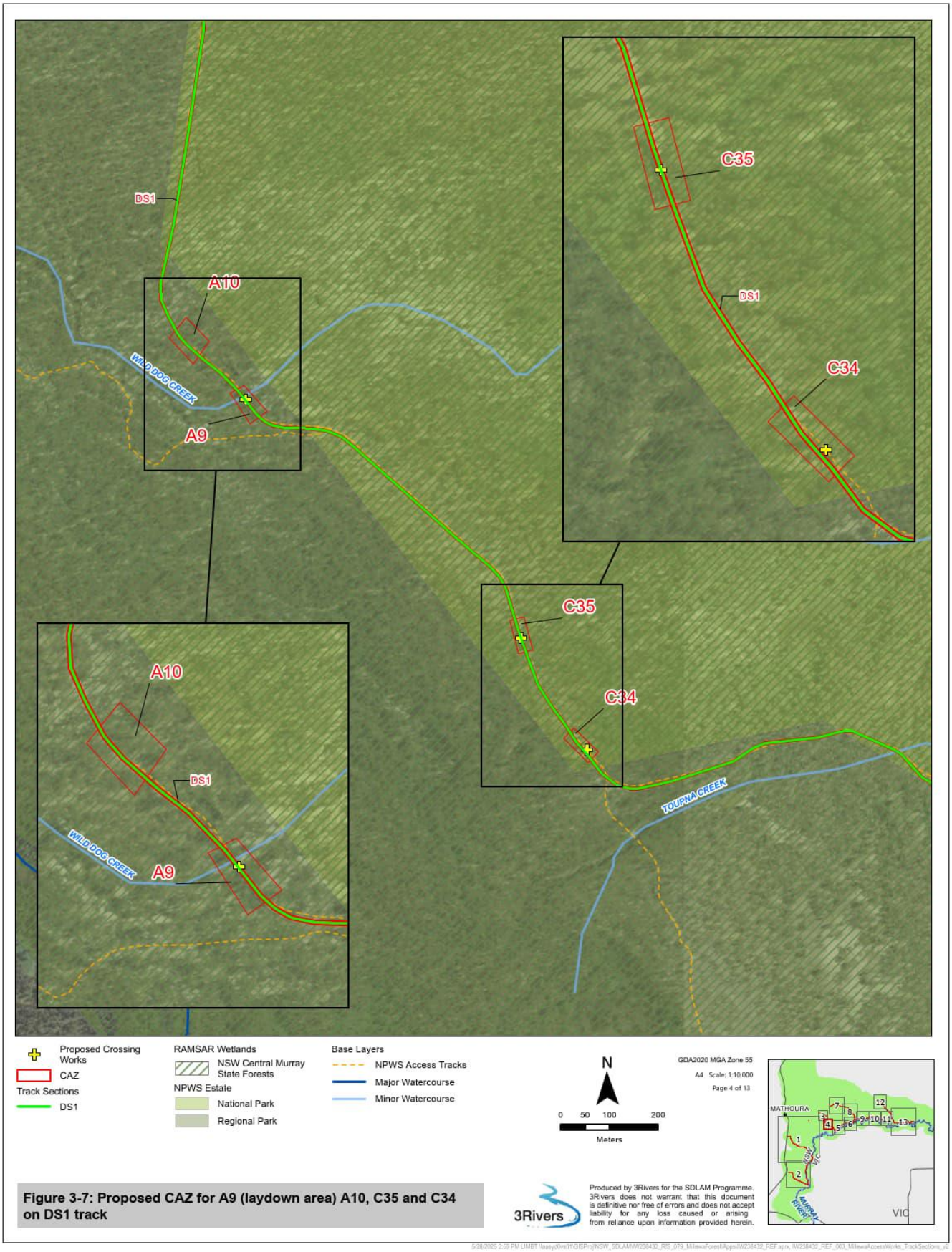



Figure 3-7 Proposed CAZ for A9 (laydown area) A10, C35 and C34 on DS1 track


Figure 3-8 Proposed CAZ for C34 on Douglas Swamp Trail

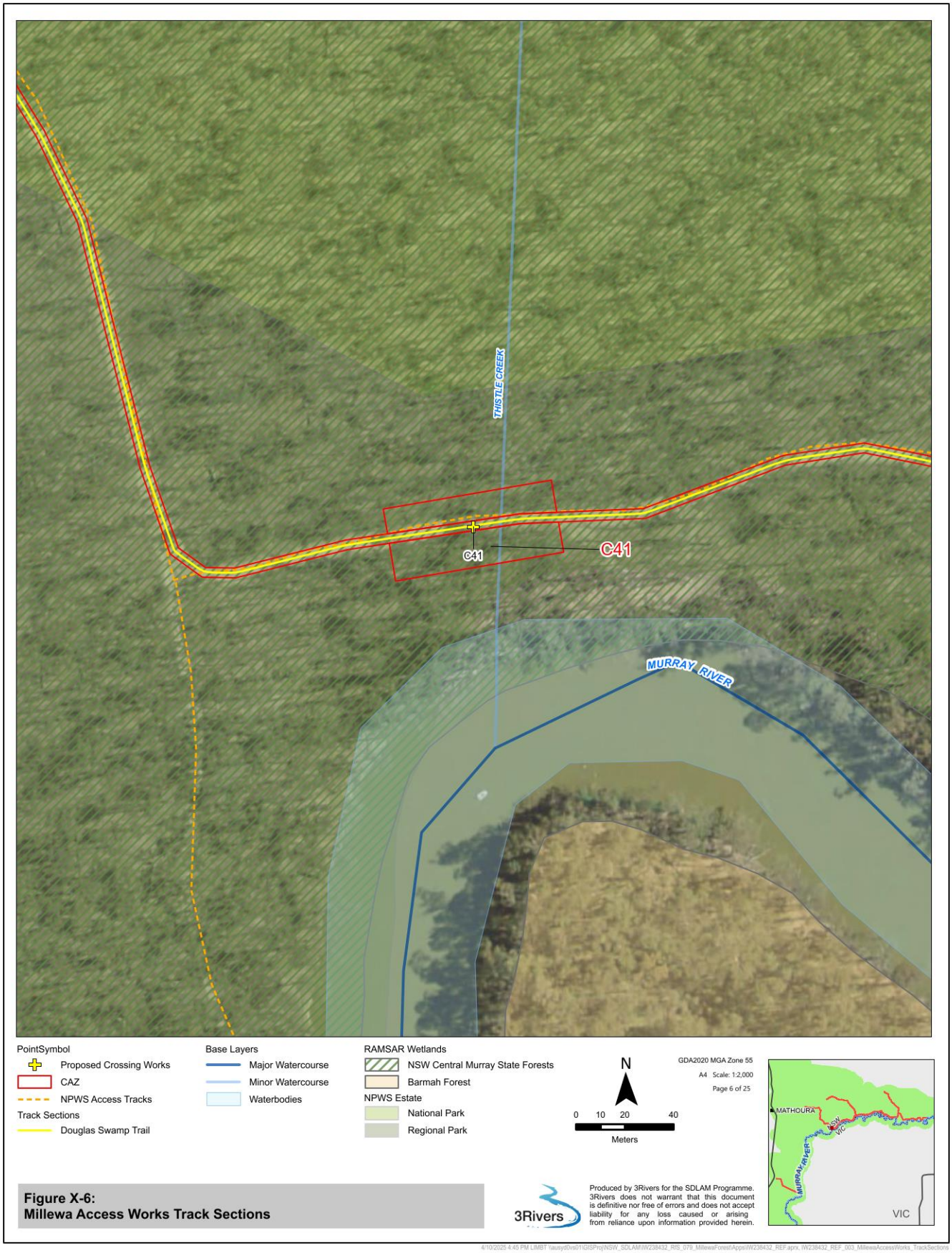



Figure 3-9 Proposed CAZ for C41 on Douglas Swamp Trail


Figure 3-10 Proposed CAZ for C25/25a on MRR1


Figure 3-11 Proposed CAZ C32 MRR1 track

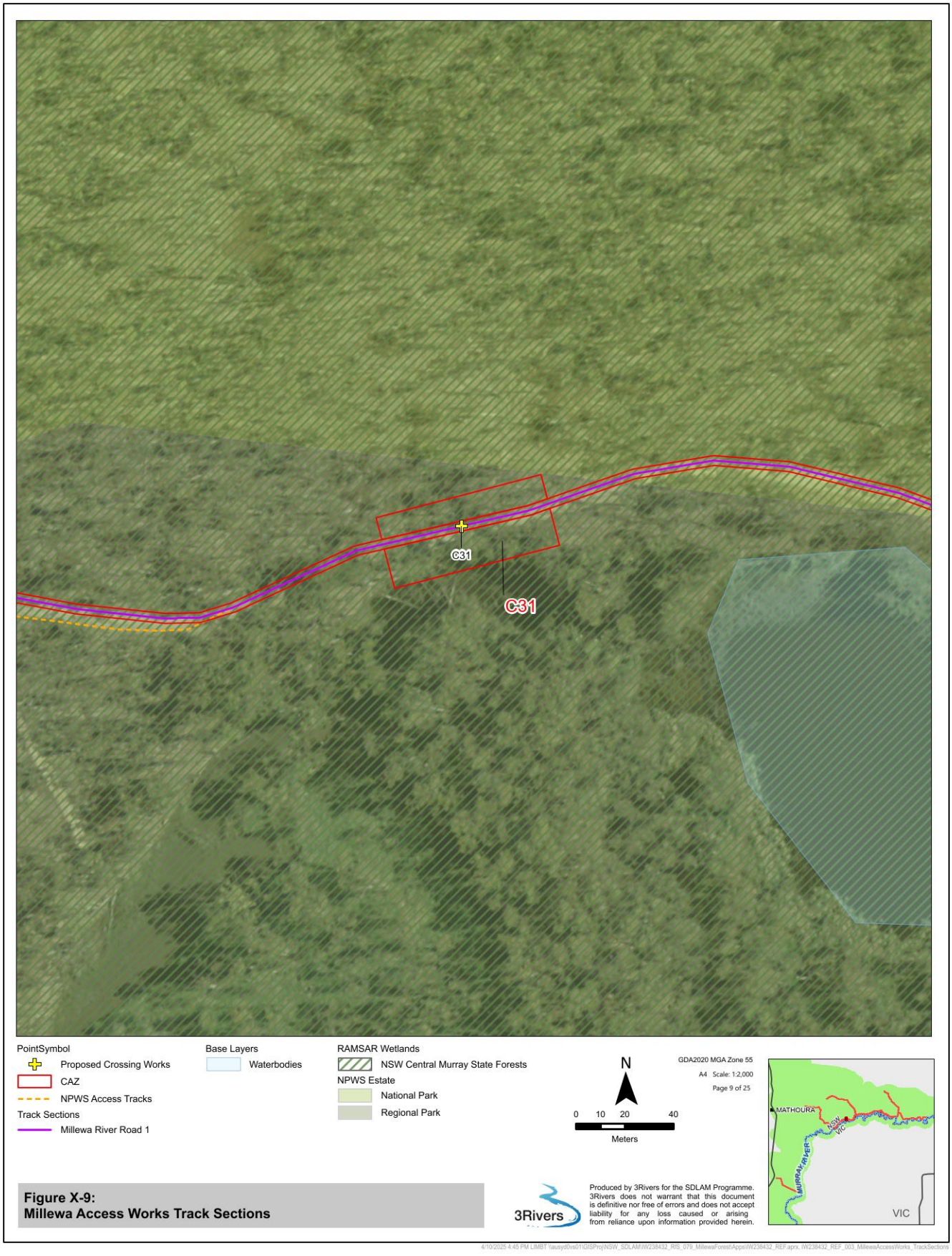



Figure 3-12 Proposed CAZ for C31 on the MRR1 track

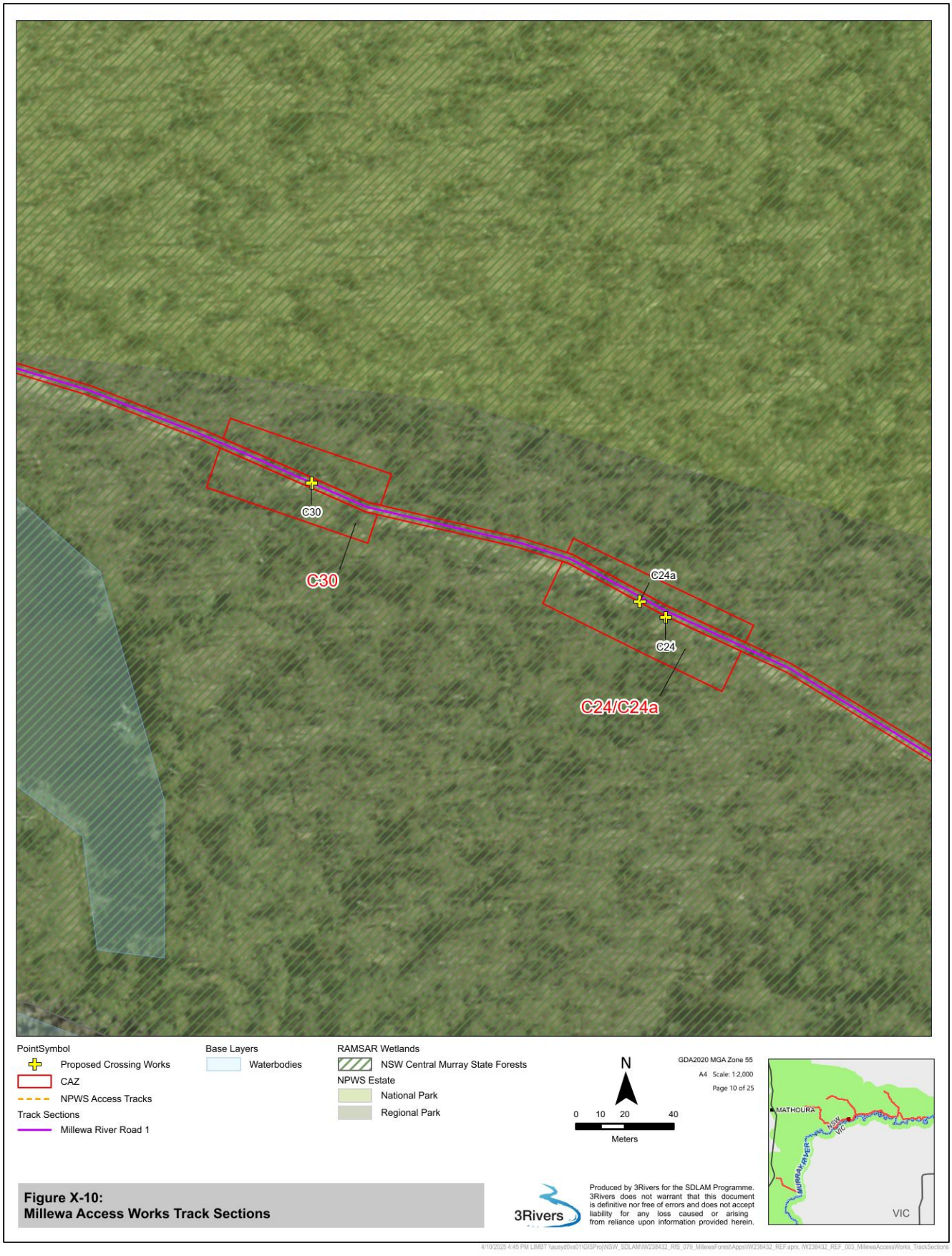



Figure 3-13 Proposed CAZ for C30 and C24/24a on MRR1

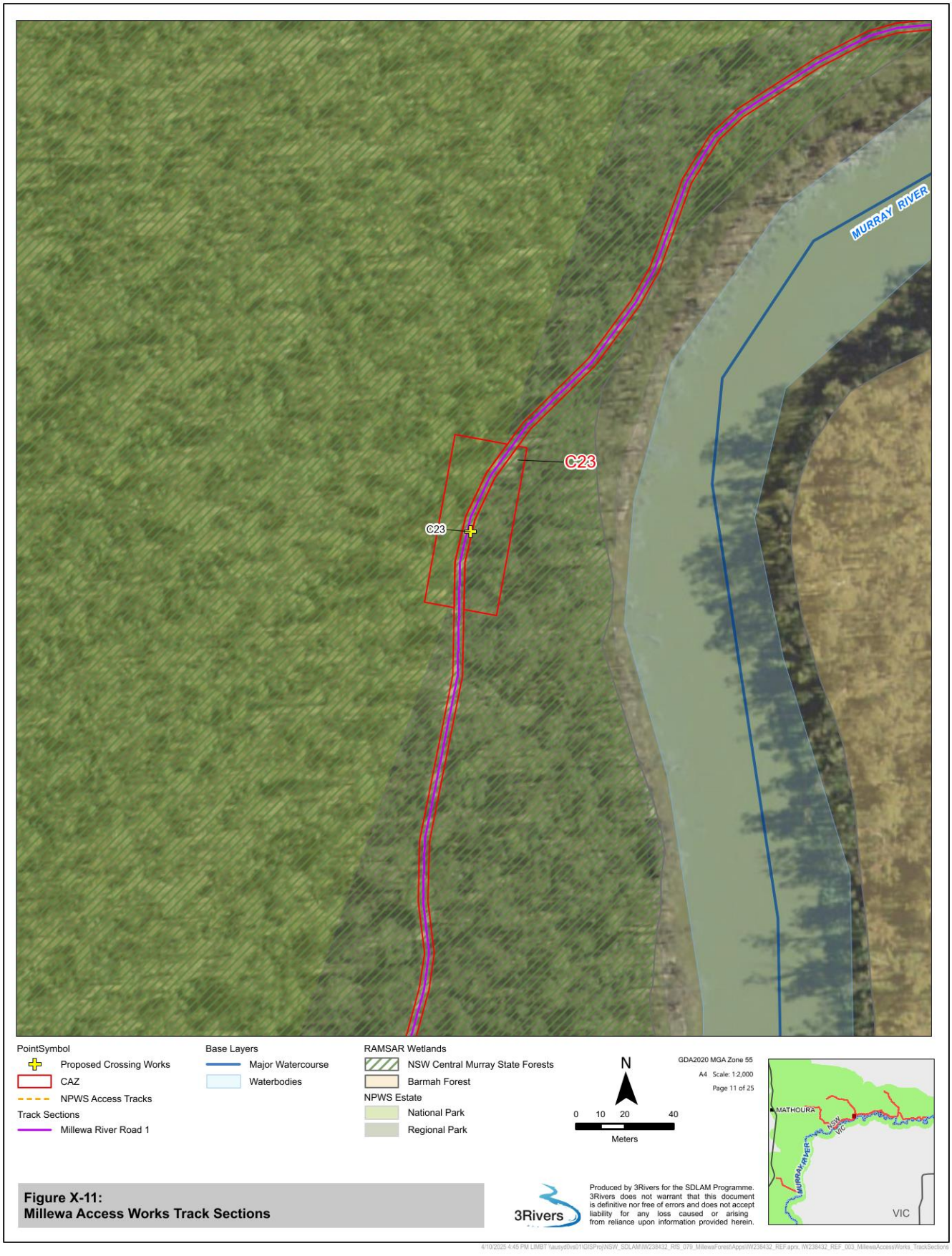



Figure 3-14 Proposed CAZ for C23 on MRR1 track

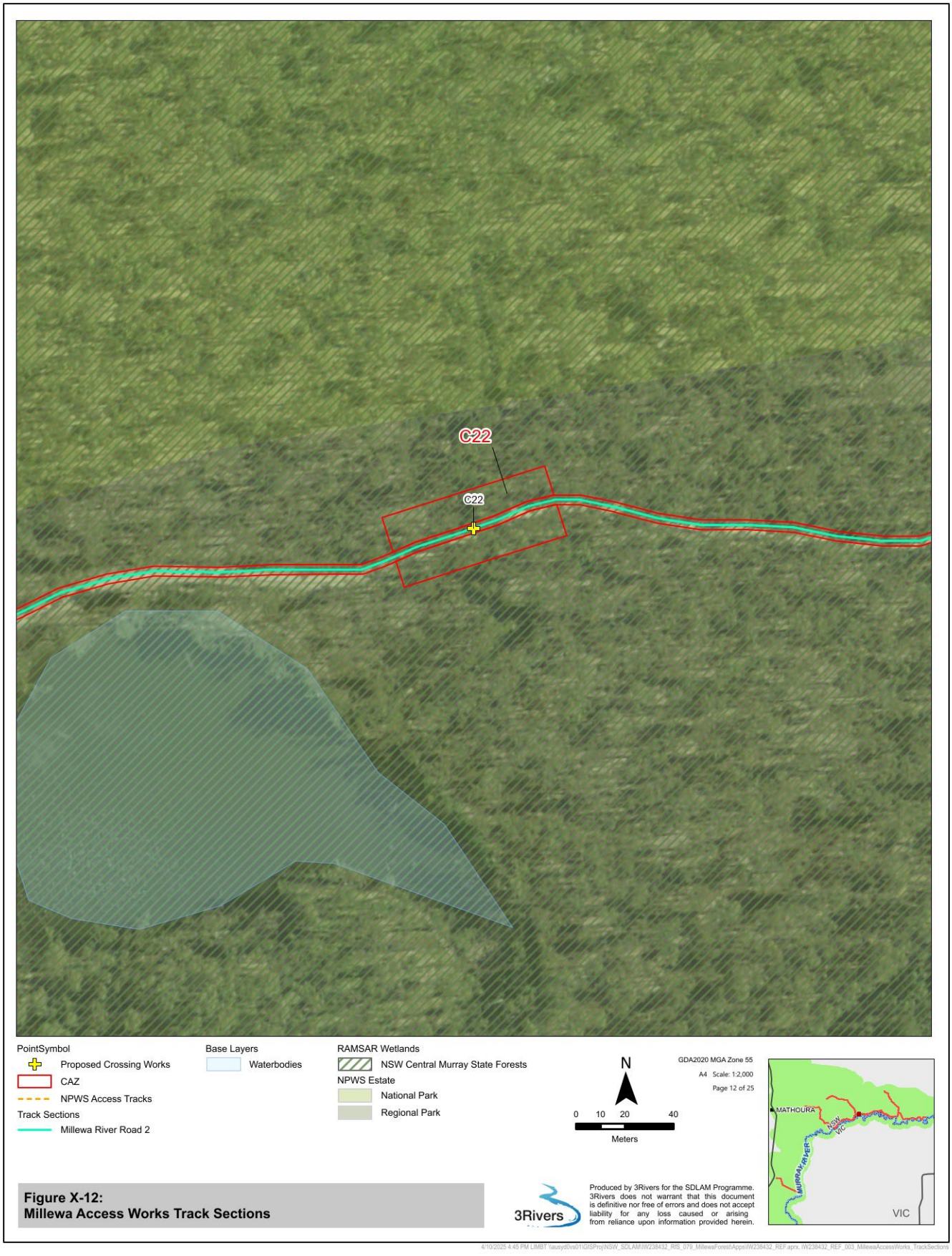



Figure 3-15 Proposed CAZ for C22 on MRR2 track

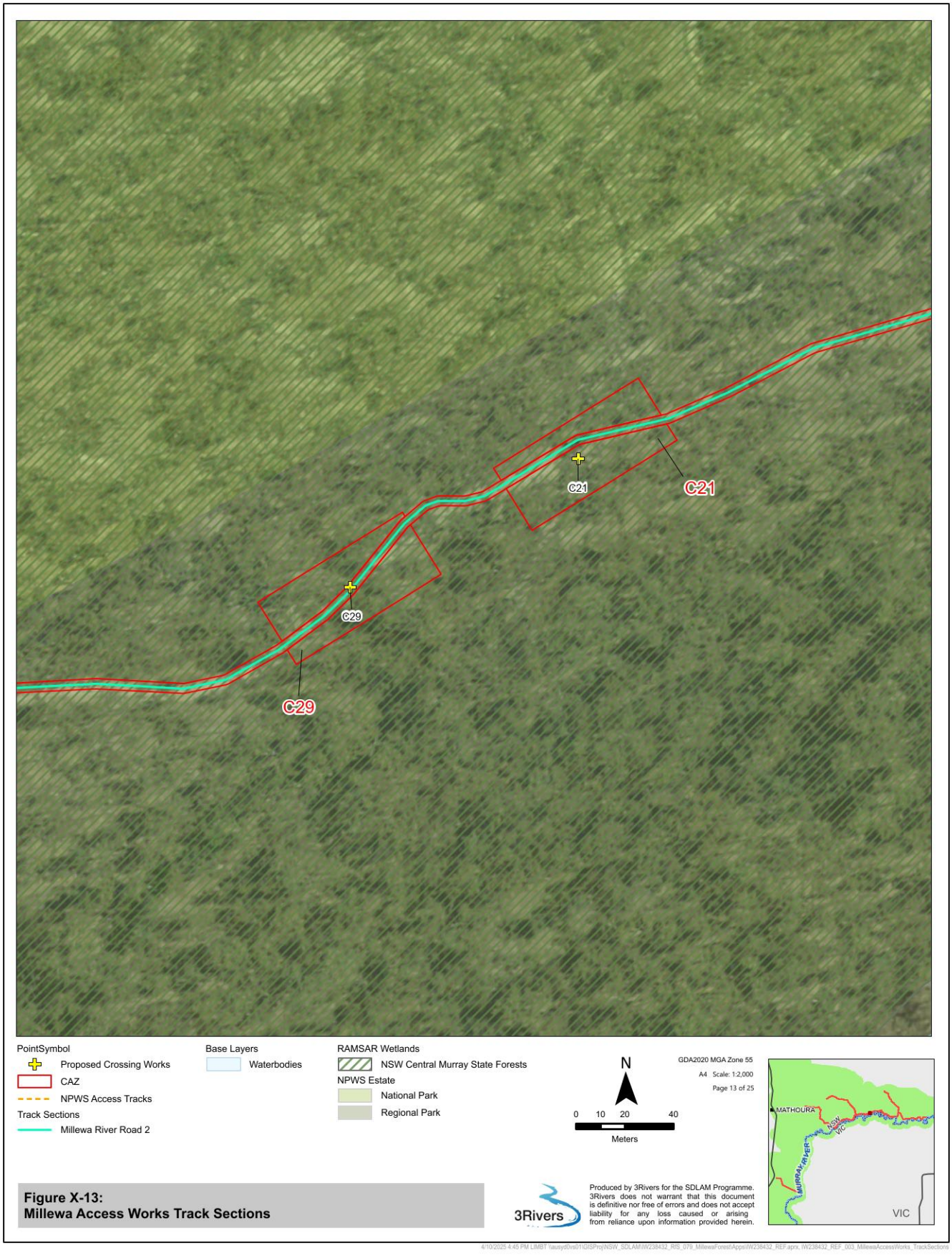



Figure 3-16 Proposed CAZ for C29 and C21 on MRR2 track

## 3.3 Construction methodology

A key requirement during the construction phase of the Proposal is dry in-stream work sites where works are to occur within waterways. Details are provided in the following section of the key steps proposed during the construction phase at each work site including how dry in-stream work sites would be established. Exact construction methods may differ depending on the site-specific conditions present at each site. Detailed construction methods, including consideration of site-specific requirements, would be outlined in a Construction Environmental Management Plan (CEMP) to be developed for the Proposal by the Construction Contractor.

### 3.3.1 Site establishment and ancillary facilities

The Proposal would occur across up to 41 CAZs (refer to **Figure 3-4** to **Figure 3-16**Error! Reference source not found.). This section discusses how CAZs would be established.

Temporary barriers (bollards with bunting/ danger tape) and road closure signs would be erected at the start and end of the CAZs/ track sections to create an exclusion zone. Any identified site environmental constraints and/or high-risk areas near to the work sites would also be demarcated prior to the works starting.

CAZs would typically include the following facilities:

- Satellite compound locations and facilities
- Stockpile locations
- Vehicle / plant parking and material laydown areas
- Defined bunded areas for refuelling plant/equipment and concrete washout
- Portable toilets
- Portable site shed with a lunchroom and first aid.

Vegetation within the CAZs would be cleared as required to create space for plant, equipment and materials laydown and temporary storage. However, each CAZ would primarily utilise existing unsealed access tracks to minimise vegetation clearing where possible.

#### 3.3.1.1 Laydown areas

CAZs A10 and CR1 would be used for temporary laydown, storage and stockpiling of any plant, equipment and materials that cannot be accommodated at the other work sites or is being moved from one work site to another. Vegetation clearing may be required at site A10. However, no vegetation clearing or ground disturbance is proposed at site CR1 and it is noted that this location is heavily disturbed from similar activities in the past.

The use of these laydown areas would reduce congestion at other CAZs where removal and construction works are occurring which would make the works more efficient. Use of the laydown areas would also reduce the number of construction vehicle trips into and out of Murray Valley National Park and Regional Park because it would provide a convenient location for temporary storage of plant, equipment and materials if there is a short delay between use of these items at one work site concluding and them being needed at another work site.

The laydown sites would be restored to as close as possible their original state once no longer required. This would be demonstrated through photographic documentation of the site prior to and after their use.

#### 3.3.1.2 Instream works

Instream works would be required for the removal and or/ construction of crossing structures. Works are planned to occur during periods of no-flow when sites are expected to be dry. Some sites may require cofferdams to be installed upstream and possibly downstream of crossing sites and/or may require dewatering of localised pooling of water as required to create dry conditions.

The final details methods to be used to create dry instream conditions would be confirmed by the construction contractor and would factor in water depths, river flows, water velocity and ground conditions at the time of the works.

### 3.3.2 Plant and equipment

The complete list of plant and equipment required for construction of the Proposal would be confirmed by the contractor prior to work commencing. An indicative list of required plant and equipment includes:

- Excavator
- Compactor roller
- Water cart
- Dump trucks
- Site hut/ lunchroom/ toilets
- Grader / scraper
- Four wheel drive (4WD) utility vehicles
- Fuel trailer
- Crane truck (for precast concrete culvert placement)
- Concrete truck
- Flat bed / tray / low loader truck for site deliveries
- Skip bin
- Minor construction tools and equipment.

### 3.3.3 Vegetation clearing

As discussed in **Section 3.2**, vegetation within the CAZS would be cleared to create space for plant, equipment and materials laydown and temporary storage. This would include about 5.7 ha of native vegetation and minor trimming of vegetation that has grown onto or over the access track footprints and which is impeding or would impede the movement of vehicles including construction plant required to carry out the proposed track maintenance works. While this REF assumes impact to all vegetation within the CAZ as a worst-case scenario, actual vegetation removal is likely to be much less.

### 3.3.4 Earthworks and spoil management

The Proposal would require excavation of material during the removal of the existing structures. Where possible material would be reused as fill material for construction of the new structures. Unsuitable excavation material would be removed from site and disposed of at a suitably licensed waste facility.

Instream works would also include excavation to reprofile the existing creek beds in the location of the proposed structures. The reprofiling works would involve removing existing topsoil, creek bed silt, existing structures as necessary to form a trafficable slope for the crossing. Suitable earth fill material would be placed to form the new bed profile. The excess material would be removed by dump trucks from site and disposed of at a suitably licensed waste facility off-site. The volume is expected to be less than 100 $m^3$ (approximately 10 trucks) per site.

Rock pavement brought to site in dump trucks would be placed to form crossings. Rock would either be stockpiled in the laydown area or delivered as required. Rock pavement volume is expected to be less than 100 $m^3$ (approximately 10 trucks) per site. The excavator would transfer rock between the stockpile and the crossing.

Waste material produced during construction would be disposed of at a suitably licenced facility.

### 3.3.5 Waste management

Construction of the Proposal would generate spoil from earthworks, demolition waste from the removal of existing infrastructure, and construction waste from constructing the new structures. General waste would also be generated by construction personnel. Waste streams would include:

- Green waste from vegetation clearing
- Concrete, metal and fill material from the removal of the existing structures
- Concrete dust, washout and / or slurries from in-situ concrete pours
- Excess spoil material from excavation required for removal and construction of the proposed structures
- Oil, grease, and other liquid waste from the maintenance of construction plant and equipment
- Dried surplus concrete and minor quantities of other surplus construction materials such as scrap metal and incidental chemicals used in construction
- Minor quantities of general wastes and sewage from ancillary facilities.

Small quantities of hazardous wastes may be expected to be generated during construction of the Proposal, and the proposed work would require handling of hazardous chemicals and dangerous goods. Refuelling construction plant would occur on site using a fuel truck or fuel trailer in a bunded area.

Earth removed during the works that is surplus and which can be classified as virgin excavated natural material or excavated natural material could be used for other works proposed in Millewa Forest as part of the Millewa Forest Supply Project, or otherwise disposed off-site at an appropriately licensed waste facility. Refer to **Section 6.14.2.1** for further discussion on the disposal of construction waste.

Cleared vegetation suitable for use in the rehabilitation works (e.g. fallen logs that could provide habitat) would be retained on site for later reuse in accordance with the site rehabilitation plan (refer to Section 9.1Table 6-20). Other cleared vegetation would be mulched and either disposed off-site at a suitably licensed waste facility or, if requested by and agreed with NPWS, made available for NPWS to reuse within Murray Valley National Park and Regional Park.

All other waste produced during construction of the Proposal would be transported offsite and disposed of at a suitably licenced facility.

### 3.3.6 Site rehabilitation

Following completion of construction, work sites would be rehabilitated and revegetated as soon as practicable. A site rehabilitation plan will be prepared as part of the CEMP which will detail how the work sites will be stabilised and revegetated once the works are complete. Site rehabilitation may include:

- Removal of all construction equipment, materials and waste
- Stabilisation and revegetation of disturbed areas of the work sites

Cleared vegetation suitable for use in the rehabilitation works (e.g. fallen logs that could provide habitat) would be retained on site for later reuse in accordance with the site rehabilitation plan (refer to Section 9.1Table 6-20).

### 3.3.7 Access and Traffic management

The CAZs would be accessed from the Cobb Highway, followed by local roads maintained by Murray River Council and existing access tracks within Murray Valley National Park and Regional Park maintained by NPWS including:

- Access to lower Millewa: Poverty Point Road, Porters Creek Road, Millewa Road, Millewa River Road, Narrows Road and Moira Cutting Access Track
- Access to Upper Millewa: Jones Street, Picnic Point Road, Millewa Road, Millewa River Road, Toupna Crossing Road, Fisherman's Bend Road and Pinchgut Regulator Access Track

A site traffic and access management plan would be developed by the contractor to achieve site safety and work efficiency. Measures to minimise traffic movements such as carpooling and arranging for shuttles to and from work sites would be described in the site and traffic management plan. An assessment of the potential traffic and access impacts of the Proposal on the local road network is provided in Section 6.10.

## 3.3.8 General design features

### 3.3.8.1 Rock Crossings

The Proposal would include the construction of up to 12 rock crossings, as outlined in Table 3-1. The proposed rock crossings would be constructed at grade level of the existing waterways and would be of varying lengths and widths depending on the site-specific conditions at each of site. The design of the rock crossings would be standardised across the Proposal. An example of a typical rock crossing design is shown in **Figure 3-17**Error! Reference source not found..

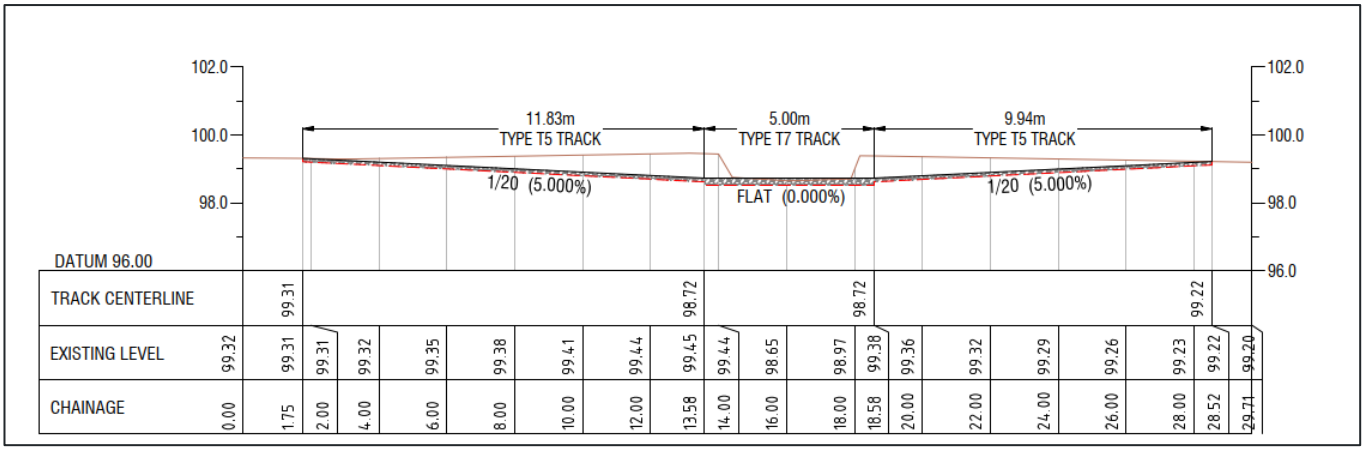



Figure 3-17 Cross-sectional view of typical detail for rock crossing design

### 3.3.8.2 Box Culverts

The Proposal would include the replacement of up to 11 existing crossing structures with box culverts. Box culvert designs would vary based on specific channel requirements and would generally provide a bank to bank crossing over channels. Proposed box culvert designs where practicable would avoid in situ concrete pours and generally comprise a number of pre-cast concrete parallel boxes of varying dimensions plus pre-cast headwalls and wing walls. The replacement culverts would also include placement of rock beaching up and downstream of the culvert openings to reduce soil erosion and scouring. Where required proposed box culverts would be designed to optimise native fish passage when flows are present.

Example of typical design detail for box culvert is provided in **Figure 3-18**Error! Reference source not found. to **Figure 3-20.**

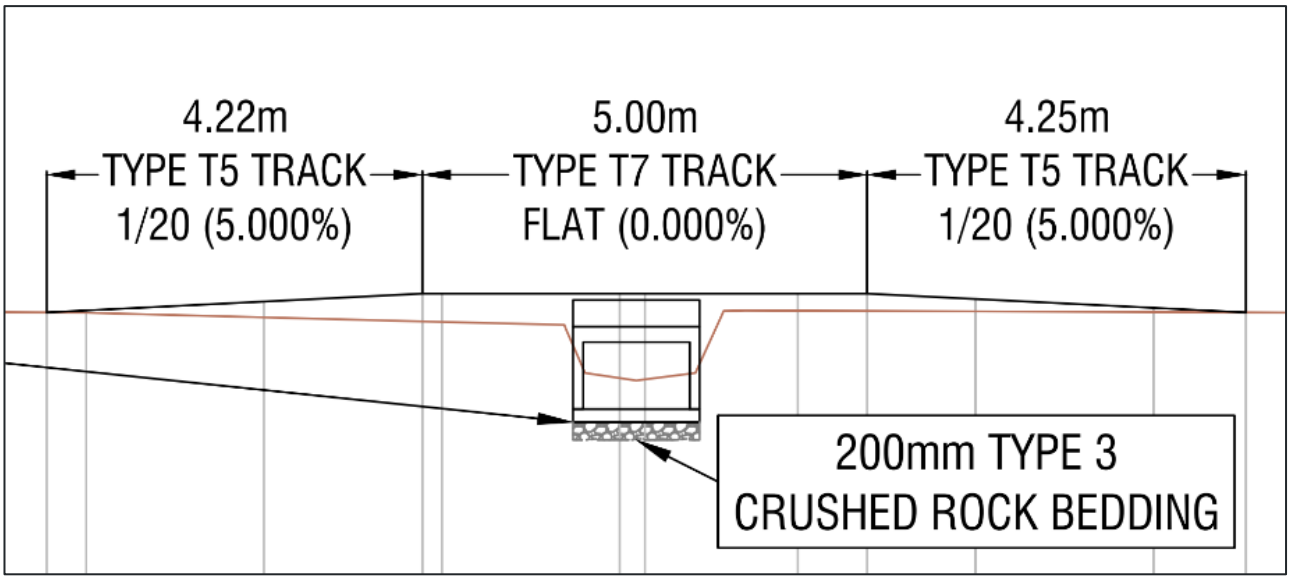



Figure 3-18 Cross-sectional view of typical detail for a box culvert design for a small channel

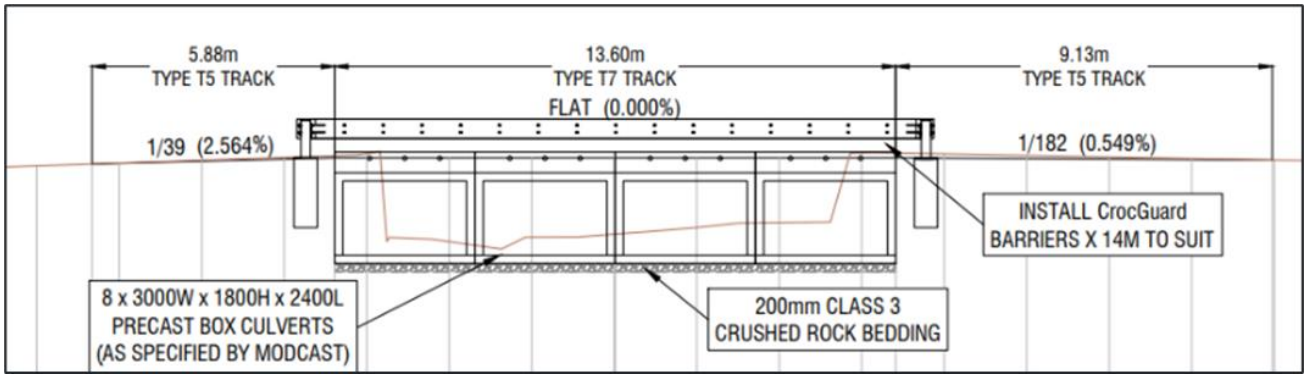



Figure 3-19 Cross-sectional view of typical detail for a box culvert design for a large channel

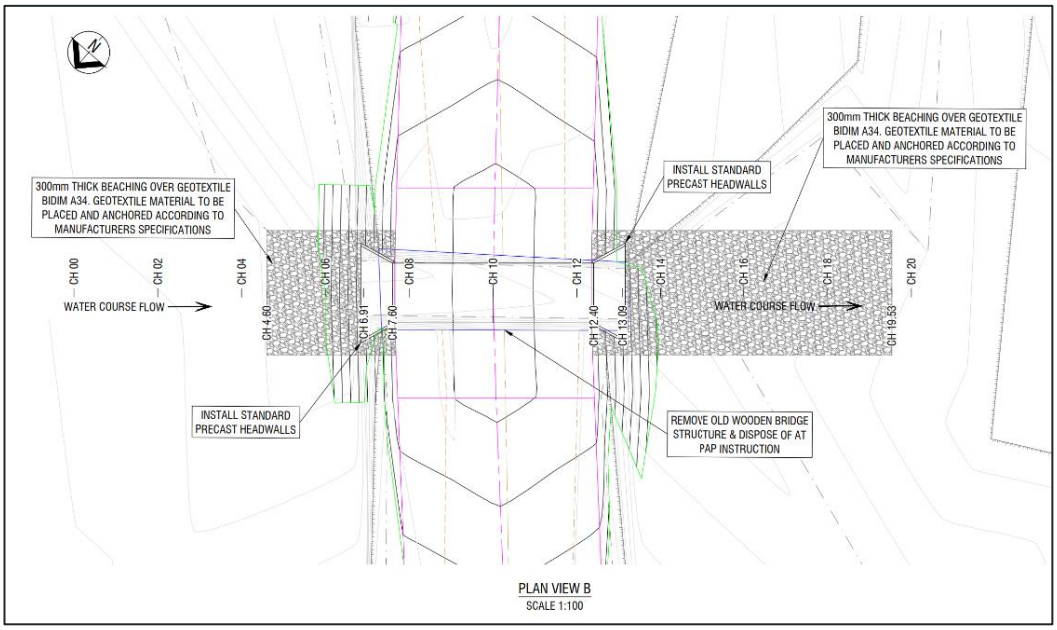



Figure 3-20 Plan view of typical detail for a box culvert design

### 3.3.8.3 Temporary bailey bridges

The Proposal may include the installation of up to four temporary bailey bridges to facilitate heavy vehicle access across creeks and/ or by-pass existing structures not suitable for vehicle access. The bailey bridges would be installed for the duration of the broader Millewa Forest Supply Project works to support construction access and would be removed once project works are complete.

### 3.3.8.4 Access track upgrades

The Proposal would include the upgrading of up to 10 track sections of varying lengths along existing unsealed management trails. Where required, discrete areas of minor vegetation management (i.e. slashing, pruning and removal) would occur within the trail corridor using mechanical methods where small patches of low-lying vegetation in poor condition has encroached into the trail corridor, primarily along the shoulder (verge).

Track treatments would vary depending on specific trail conditions and requirements at the time of Proposal and would follow standardised treatments. Proposed upgrades would generally involve the regrading of the trails to create a suitable camber, followed by the placing of imported clean crushed rock and/or gravel as infill on the trail. The tracks would then be compacted to an appropriate depth using suitable compaction plant such as a multi-tyre and/or drum roller to provide a smooth trafficable surface and match the existing longitudinal drainage. Finally, a grader would grade the trail to create a crossfall. An example of typical track treatment is provided in **Figure 3-21.**

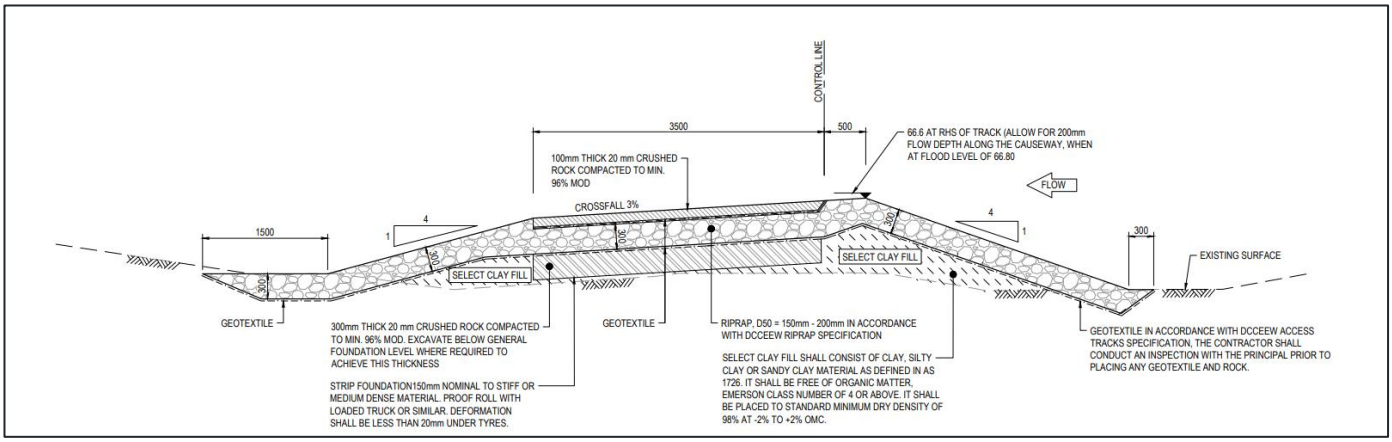



Figure 3-21 Example of typical track treatment design

## 3.4 Procurement

The NSW Procurement Board has established the Accreditation Program for Construction Procurement under which an NSW Government agency accredited by the board may procure construction services. Agencies accredited under the program have greater autonomy to procure construction services than unaccredited agencies. NSW DCCEEW is an accredited agency under the Accreditation Program for Construction Procurement.

NPWS regulates new building and infrastructure works within lands reserved or acquired under the NPW Act in accordance with its *Construction Assessment Procedures* (Office of Environment and Heritage, 2011). The procedures detail the requirements and processes for ensuring that building and infrastructure works, including alterations and additions, demolition and a change of building

use, in the national parks system meet relevant requirements of the Building Code of Australia, the *Disability (Access to Premises – Buildings) Standards 2010* and Australian Standards. The procedures do not apply in certain circumstances, including infrastructure works project-managed by an agency accredited by Treasury NSW (which includes the NSW Procurement Board) where other processes apply. As the NSW is an accredited agency for construction procurement the procedures do not apply to the Proposal.

Accredited agencies have a responsibility to comply with all relevant NSW Government legislation, policies and procedures. Accordingly, the construction works for the Proposal will be required to comply with demolition and construction standards.

## 3.5 Timing and staging

The construction works proposed at each site are expected to take around 3 months to complete, subject to the weather being dry and contractor resourcing. The works on access tracks and the associated crossings would occur in sequence to the Contractor's proposed timing and staging for construction of the Millewa Forest Supply Project. The works at each site could occur at the same time or at different times, which means the total duration of construction could be several months.

## 3.6 Capital investment value

A preliminary estimate of the cost to construct the Proposal has been prepared by NSW DCCEEW and is about $5 million excluding GST.

## 3.7 Public utility adjustment

No public utility adjustments are required to enable the proposed construction works to occur.

## 3.8 Asset ownership and operation

Existing assets described in **Section 2.2** are currently owned by NPWS who would remain in ownership of the assets, before and after construction activities. NSW DCCEEW is delegated under separate instruments to be the constructing authority for the performance of the construction works. At completion of the construction and commissioning phases, a formal handover transaction will occur with all assets.

NSW DCCEEW will hand over the upgraded access tracks and permanent waterway crossing structures to NPWS once they are commissioned. The temporary bailey bridges would be decommissioned and removed from site following construction of the replacement Moria Lake Inlet Regulator as part of the broader Millewa Forest Supply Project. There is no operational component to the works proposed.

## 3.9 Land ownership, tenure, and acquisition

The Proposal is located on land owned by the State of NSW through the Minister administering the NPW Act. The tenure of the land on which the works are proposed is detailed in **Table 3-4**Table 3-4Error! Reference source not found..

No land acquisition is required for the Proposal.

Table 3-4 Land ownership and tenure of the Proposal sites

| Track section ID (Relevant crossing sites) | Location | Lot no. /DP number | Land tenure |
|---|---|---|---|
| **MC1** | Moira Cutting Track | Not applicable | National Park - Reserved land under Part 4 of the NPW Act |
| **NR1 (A15, A16)** | Narrows Road | Not applicable | National Park - Reserved land under Part 4 of the NPW Act |
| **PR1** | Pinchgut Regulator Access Track | 67/756261<br>14/756261 | Regional Park - Reserved land under Part 4 of the NPW Act |
| **TCR1 (C38, C39)** | Toupna Crossing Road | 67/756261 | National Park - Reserved land under Part 4 of the NPW Act |
| **FB1 (C26, C28, C33)** | Fisherman's Bend Road | Not applicable | National Park - Reserved land under Part 4 of the NPW Act |
| **DS1 (A9, A10, C34, C35, C36, C41)** | Millewa River Road | 4/756271<br>11/756271<br>14/756271<br>15/756271<br>16/756271<br>17/756271<br>18/756271<br>19/756271<br>21/756271<br>26/756271<br>30/756271 | National Park - Reserved land under Part 4 of the NPW Act<br>Regional Park - Reserved land under Part 4 of the NPW Act |
| **MRR1 (C23, C24/C24A, C25/C25A C30, C31, C32)** | Millewa River Road | 9/756271<br>10/756271 | National Park - Reserved land under Part 4 of the NPW Act<br>Regional Park - Reserved land under Part 4 of the NPW Act |
| **MRR2 (A4, C16, C17, C18, C19, C20,** | Millewa River Road | 14/756261<br>17/756261 | National Park - Reserved land under Part 4 of the NPW Act |

| Track section ID (Relevant crossing sites) | Location | Lot no. /DP number | Land tenure |
|---|---|---|---|
| C21, C22, C29, C37, C40) | | 21/756261<br>22/756261<br>67/756261<br>68/756261 | |
| TO1 | Millewa River Road | 12/756261<br>13/756261<br>24/756261<br>66/756261<br>89/756328 | National Park - Reserved land under Part 4 of the NPW Act |
| SC1 | Poverty Point Road<br>Porters Creek Road<br>Hut Road | 7001/ DP1023583 | National Park - Reserved land under Part 4 of the NPW Act |
| CR1 | Intersection of Millewa Road and Crossing Road | 2/756303 | Regional Park - Reserved land under Part 4 of the NPW Act |

# 4 Legislative context

## 4.1 Permissibility and assessment pathway

The State Environmental Planning Policy (Transport and Infrastructure) 2021 (the Transport and Infrastructure SEPP) facilitates the effective delivery of infrastructure across NSW.

Clause 2.73(1)(a) of the Transport and Infrastructure SEPP allows development for any purpose to be carried out without consent on land reserved under the NPW Act, or acquired under Part 11 of the NPW Act, if the development is for a use authorised under the NPW Act.

The potential for the Proposal to be authorised under the NPW Act has been considered with respect to:

- the objects of the NPW Act
- the plan(s) of management (or equivalent management plan) for the land on which the Proposal would be carried out
- the lease, license and easement provisions under Part 12 of the NPW Act
- The regulations of use of parks under Part 2 of the National Parks and Wildlife Regulation 2019 (NPW Regulation).

### 4.1.1 National Parks and Wildlife Act 1974

#### 4.1.1.1 Objects of the NPW Act

The Proposal is considered to be consistent with the objects of the NPW Act. Error! Reference source not found. identifies how the Proposal is consistent with the objects of the Act.

Table 4-1 Consistency of the Proposal with the objects of the NPW Act

| Object of the NPW Act (Section 2A of the NPW Act) | | | | Consistency of the Proposal with the objects |
|---|---|---|---|---|
| (1) | The objects of this Act are as follows — | | | |
| | (a) | the conservation of nature, including, but not limited to, the conservation of — | | The Proposal is considered to be consistent with the objects of the NPW Act. Following completion, the works would allow for improved access for key park management and operational activities required to protect and conserve ecological values across the park. The works would also facilitate future access for works proposed under the Millewa Forest Supply Project as part of the Yanga National Park and Millewa Forest Accelerated SDL Adjustment Supply Measures Project; which has a general aim |
| | | (i) | habitat, ecosystems and ecosystem processes, and | |
| | | (ii) | Biological diversity at the community, species and genetic levels, and | |
| | | (iii) | Landforms of significance, including geological features and processes, and | |

| Object of the NPW Act (Section 2A of the NPW Act) | | | | Consistency of the Proposal with the objects |
|---|---|---|---|---|
| | | (iv) | Landscapes and natural features of significance including wilderness and wild rivers, | of improving conditions for the conservation of habitats, ecosystems, and biological diversity. |
| | (b) | the conservation of objects, places or features (including biological diversity) of cultural value within the landscape, including, but not limited to— | | The works would be carried out with consideration of the cultural values of the landscape and are not expected to impact on the conservation of these values.<br>The Proposal would not impact places, objects and features of significance to Aboriginal people, as detailed in **Section 6.6.** The Proposal would also not impact any items of historic heritage, as detailed in **Section 6.7.** |
| | | (i) | places, objects and features of significance to Aboriginal people, and | |
| | | (ii) | places of social value to the people of NSW, and | |
| | | (iii) | places of historic, architectural or scientific significance, | |
| | (c) | Fostering public appreciation, understanding and enjoyment of nature and cultural heritage and their conservation, | | The Proposal would foster public appreciation for the natural and cultural values of the Murray Valley National Park and Murray Valley Regional Park by facilitating the continued effective management of their natural and cultural heritage and by improving access within the park for public park users. |
| | (d) | providing for the management of land reserved under this Act in accordance with the management principles applicable for each type of reservation. | | The replacement crossing structures and upgraded access tracks would provide safer and more efficient access throughout the park including to existing and proposed water management infrastructure.<br>Alignment of the Proposal with the management principles for national parks and regional parks is provided in **Table 4-2.** |
| (2) | The objects of this Act are to be achieved by applying the principles of ecologically sustainable development. | | | **Table 10-1** details how the Proposal aligns with each of the four principles of sustainable development identified in section 193 of the EP&A Regulation. |

#### 4.1.1.2 National Park Estate (Riverina Red Gum Reservations) Act 2010

The *National Park Estate (Riverina Red Gum Reservations) Act 2010* was enacted to facilitate the reservation of certain former State Forest land in the Riverina area to the national park estate under the NPW Act on 1 July 2010. The Act facilitated the reservation of Murray Valley National Park and Murray Valley Regional Park from several former State Forests. The existing waterway crossings were all in existence when Murray Valley National Park and Regional Park were gazetted from former State Forests. Therefore, were not subject to an existing easement, lease, licence or permit at the time of the gazettal.

#### 4.1.1.3 Murray Valley Statement of Management Intent

Murray Valley National Park and Regional Park are managed in accordance with the *Statement of Management Intent: Murray Valley National Park and Murray Valley Regional Park* (Murray Valley SoMI) (NPWS, 2014). Section 6 of the Murray Valley SoMI states that a plan of management will set out the ongoing management objectives for the parks. Currently, no specific management objectives have been defined for Murray Valley National Park or Murray Valley Regional Park. The NPWS's (2021) *Managing Parks Prior to a Plan of Management Policy* states that parks and reserves without a plan of management are to be managed in a manner consistent with the intent of the NPW Act and the precautionary principle.

The Proposal is considered to be consistent with the management principles for national parks and regional parks in sections 30E and 30H respectively of the NPW Act, refer to **Table 4-2.**

Section 6 of the Murray Valley SoMI requires all management activities to be preceded by the preparation of an environmental assessment or heritage assessment where this is a requirement of NPWS policy or legislation. In accordance with this requirement the Proposal is the subject of this REF and the REF has been informed by an Aboriginal cultural heritage assessment report (refer to **Attachment B**).

Table 4-2 Consistency of the Proposal with the management principles for national parks and regional parks in Sections 30E and 30H respectively of the NPW Act

| Management principle | | | | Consistency of the Proposal with the management principle |
|---|---|---|---|---|
| 30E | National parks | | | |
| | (1) | The purpose of reserving land as a national park is to identify, protect and conserve areas containing outstanding or representative ecosystems, natural or cultural features or landscapes or phenomena that provide opportunities for public appreciation and inspiration and sustainable visitor or tourist use and enjoyment so as to enable those areas to be managed in accordance with subsection (2). | | The Proposal would support the protection and conservation of ecosystems, natural features and landscapes at Millewa Forest by improving access for key park management and operational activities.<br>The Proposal would have a minimal impact on visitor and tourist use and enjoyment of Murray Valley National Park. There would be some temporary air quality, noise, traffic and visual impacts during the construction phase of the Proposal (refer to Sections **6.8.2.1**, **6.9.2.1**, **6.10.2.1** and **6.11.2.1**). These impacts would be minor with implementation of the safeguards in **Table 9-1**. |
| | (2) | A national park is to be managed in accordance with the following principles— | | |
| | | (a) | the conservation of biodiversity, the maintenance of ecosystem function, the protection of geological and | The Proposal would support the conservation of biodiversity and maintenance of ecosystem function on park by improving access for key park management activities and facilitating the Project. |

| Management principle | | | | Consistency of the Proposal with the management principle |
|---|---|---|---|---|
| | | | geomorphological features and natural phenomena and the maintenance of natural landscapes, | The Project seeks to improve the management and delivery of regulated and environmental flows across the floodplain.<br>If the Proposal did not occur, there would be an increased risk of future damage to trails and structures (i.e. flood damage) across Millewa Forest and an inability to access parts of the Murray Valley National Park. Over time this could result in degradation of the biodiversity and ecosystems of the forest and floodplain.<br>The Proposal would not impact geological and geomorphological features of Millewa Forest (refer to **Section 6.1**). |
| | | (b) | the conservation of places, objects, features and landscapes of cultural value, | The Proposal would not impact places, objects features and landscapes of cultural value, as detailed in **Sections 6.6** and **6.7**. |
| | | (c) | the protection of the ecological integrity of one or more ecosystems for present and future generations, | The Proposal would support the protection of the ecological integrity of ecosystems at Millewa Forest by improving access for key park management activities. If the Proposal did not occur, there would be an increased risk of future damage to trails and structures (i.e. flood damage) across Millewa Forest and an inability to access parts of the Murray Valley National Park. Over time this could result in degradation of the biodiversity and ecosystems of the forest and floodplain. |
| | | (d) | the promotion of public appreciation and understanding of the national park's natural and cultural values, | Improved vehicle access across Millewa Forest would contribute to NPWS's ability to promote public appreciation and understanding of the park's natural and cultural values. |
| | | (e) | provision for sustainable visitor or tourist use and enjoyment that is compatible with the conservation of the national park's natural and cultural values, | The Proposal would have a minimal impact on visitor and tourist use and enjoyment of Murray Valley National Park. There would be some temporary air quality, noise, traffic and visual impacts during the construction phase of the Proposal (refer to **Sections 6.8.2.1, 6.9.2.1, 6.10.2.1** and **6.11.2.1**). These impacts would be minor with implementation of the safeguards in **Table 9-1**. |
| | | (f) | provision for the sustainable use (including adaptive reuse) | The Proposal would utilise existing park roads and trails throughout the Murray Valley National Park. The |

| Management principle | | | | Consistency of the Proposal with the management principle |
|---|---|---|---|---|
| | | | of any buildings or structures or modified natural areas having regard to the conservation of the national park's natural and cultural values, | Proposal would not impact any buildings or structures or modified natural areas beyond the works to the access tracks and waterway crossings. These assets have little to no natural, heritage and cultural value. The Proposal has sought to strategically utilise existing access tracks and waterway crossings to minimise impacts to the Murray Valley National Park's natural and cultural values.<br>The Proposal would not impact any buildings. |
| | | (fa) | provision for the carrying out of development in any part of a special area (within the meaning of the *Hunter Water Act 1991*) in the national park that is permitted under section 185A having regard to the conservation of the national park's natural and cultural values, | The Proposal is not within a special area as defined in the *Hunter Water Act 1991*. |
| | | (g) | provision for appropriate research and monitoring | The Proposal would not impact the provision of research and monitoring at Murray Valley National Park. The upgraded trails and replacement crossing structures would improve access to key existing environmental watering (The Living Murray) monitoring sites within the National Park such as Reed Beds Swamp. |
| **30H** | **Regional parks** | | | |
| | (1) | | The purpose of reserving land as a regional park is to identify, protect and conserve areas in a natural or modified landscape that are suitable for public recreation and enjoyment so as to enable those areas to be managed in accordance with subsection (2). | As detailed above, the Proposal would support the protection and conservation of landscapes and public recreation and enjoyment at Millewa Forest by improving park access for NPWS staff and public visitors. If the Proposal did not occur, there would be an increased risk of future damage to trails and structures across Millewa Forest and an inability to access parts of the Murray Valley Regional Park, which would likely adversely impact the conservation of landscapes and public access to Murray Valley Regional Park for recreation and enjoyment. |

| Management principle | | | Consistency of the Proposal with the management principle |
|---|---|---|---|
| (2) | A regional park is to be managed in accordance with the following principles– | | |
| | (a) | the provision of opportunities, in an outdoor setting, for recreation and enjoyment in natural or modified landscapes, | The Proposal would have a minimal impact on visitor and tourist use and enjoyment of Murray Valley Regional Park. There would be some temporary air quality, noise, traffic and visual impacts during the construction phase of the Proposal (refer to Sections **6.8.2.1**, **6.9.2.1**, **6.10.2.1** and **6.11.2.1**). Millewa River Road would be closed to visitor traffic during construction of the replacement structures and access track upgrades. Impacts to recreational users of Murray Valley Regional Park would be minor with implementation of the safeguards in **Table 9-1**. |
| | (b) | the identification, interpretation, management and conservation of the park so as to maintain and enhance significant landscape values, | The Proposal would support the management and conservation of significant landscape values at Millewa Forest by improving access for key park management and operational activities. If the Proposal did not occur, there would be an increased risk of future damage to trails and structures (i.e. flood damage) across Millewa Forest and a potential inability to access key parts of the Murray Valley Regional Park. Over time this could inhibit the maintenance and enhancement of significant landscape values across the Regional Park. |
| | (c) | the conservation of natural and cultural values, | As detailed above, the Proposal would contribute to the conservation of natural values across the Regional Park through improved access for key management activities.<br>The Proposal would not impact the cultural values of Murray Valley Regional Park as detailed in **Sections 6.6** and **6.7.** |
| | (d) | the promotion of public appreciation and understanding of the regional park's natural and cultural values, | The Proposal would not impact NPWS's ability to promote public appreciation and understanding of Murray Valley Regional Park's natural and cultural values. |
| | (e) | provision for sustainable visitor or tourist use and enjoyment that is compatible with the conservation of the regional | The Proposal would have a minimal impact on visitor and tourist use and enjoyment of Murray Valley Regional Park. There would be some temporary air quality, noise, traffic and visual impacts during the |

| Management principle | | | | Consistency of the Proposal with the management principle |
|---|---|---|---|---|
| | | | park's natural and cultural values, | construction phase of the Proposal (refer to Sections 6.8.2.1, 6.9.2.1, 6.10.2.1 and 6.11.2.1).<br>Impacts to visitors and tourists would be minor with implementation of the safeguards in Table 9-1. |
| | | (f) | provision for the sustainable use (including adaptive reuse) of any buildings or structures or modified natural areas having regard to the conservation of the regional park's natural and cultural values, | The existing structures do not have any historic heritage significance (refer to Section 6.7).<br>The Proposal would not impact any buildings. |
| | | (g) | provision for the carrying out of development in any part of a special area (within the meaning of the *Hunter Water Act 1991*) in the regional park that is permitted under section 185A having regard to the conservation of the regional park's natural and cultural values. | The Proposal is not within a special area as defined in the *Hunter Water Act 1991*. |

#### 4.1.1.4 Leases, licences and easements under the NPW Act

Part 12 of the NPW Act provides for the granting of a lease, licence or easement for the use of land, buildings or structures within a reserve. No leases and licences (including access provisions) are currently anticipated to be required for the Proposal in accordance with Part 12 of the NPW Act.

#### 4.1.1.5 Protection of Aboriginal objects and Aboriginal places

Part 6 of the NPW Act provides for the protection of Aboriginal objects and Aboriginal places. Sections 86 and 87 of the Act makes it an offence to harm or desecrate Aboriginal objects and Aboriginal places unless the harm or desecration was authorised by an Aboriginal heritage impact permit or due diligence was exercised to determine whether the subject act would harm an Aboriginal object and it was reasonably determined that no Aboriginal object would be harmed. Section 90 of the Act details the requirements for applying for and granting of Aboriginal heritage impact permits.

An Aboriginal cultural heritage assessment report has been prepared in accordance with the *Code of Practice for the Investigation of Aboriginal Objects in NSW* (DECCW 2011) to inform this REF and is provided in Attachment B and summarised in Section 6.6. The assessment determined that the Proposal would not alter any existing Aboriginal cultural heritage or values and, therefore, an Aboriginal heritage impact permit is not required.

#### 4.1.1.6 Assets of intergenerational significance

Part 12A of the NPW Act provides for the declaration of land reserved or acquired for reservation to be an environmental or cultural asset of intergenerational significance and makes it an offence to damage, harm or disturb such assets unless it was carried out in accordance with a conservation action plan, an Aboriginal cultural practice, a planning approval under the EP&A Act or an authorised action under the *Rural Fires Act 1997*.

The Proposal is not located on a declared asset of intergenerational significance site. The Koala (*Phascolarctos cinereus*) is a threatened species asset of intergenerational significance and it has potential habitat at all CAZs and scats were found in the vicinity of Pinchgut and Nestrons regulators (refer to Attachment A). However, Murray Valley National Park and Regional Park are not included in the reserves where the conservation action plan for the Koala applies.

### 4.1.2 National Parks and Wildlife Regulation 2019

The NPW Regulation regulates the use of parks. The NPW Regulation prohibits the following conduct within a park without the consent of a park authority:

- Sections 9 and 10 prohibit the entry and use of heavy and noisy machinery
- Section 14 prohibits interfering with animals or their nests, eggs, habitation or resting place or any beehive
- Section 20 prohibits the construction, operation or use of any structure, installation, engineering, plant or equipment
- Section 21 prohibits the cutting, felling, removal, damage or destruction of vegetation.

Construction of the Proposal will require a consent from NPWS. The construction works will need to be carried out in accordance with the conditions of the consent.

### 4.1.3 Environmental Planning and Assessment Act 1979

This REF has been prepared in accordance with Part 5 Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The REF examines and takes into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the activity, in accordance with section 5.5 of the EP&A Act.

Section 171(1) of the Environmental Planning and Assessment Regulation 2000 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, 2022a).

NPWS has developed guidelines for the preparation of REFs for activities proposed within national parks. The *Guidelines for Preparing a Review of Environmental Factors: How to Assess the Environmental Impacts of Activities Within NSW National Parks* (Department of Planning and Environment, 2021) are designed to help proponents to develop the contents of an REF and also understand post-determination requirements. The guidelines were considered during the development of the template and contents of this REF.

Section 171(4) of the EP&A Regulation requires that an REF must be published on the determining authority's website or the NSW Planning Portal if:

(a) The proposal has a capital investment value of more than $5 million

(b) The proposal requires an approval or permit under:

(i) Sections 144, 201, 205 or 219 of the Fisheries management Act 2016 (FM Act)

(ii) Section 57 of the Heritage Act 1977

(iii) Section 90 of the National Parks and Wildlife Act 1974 (NPW Act)

(iv) Sections 47-49 of the Protection of the Environment Operations Act 1997 (POEO Act).

(c) The determining authority considers the proposal to be in the public interest.

### 4.1.4 State Environmental Planning Policies

#### 4.1.4.1 State Environmental Planning Policy (Transport and Infrastructure) 2021

As discussed in **Section 4.1**, the Proposal is permissible without consent in accordance with clause 2.73(1)(a) of Division 12 of the Transport and Infrastructure SEPP, which addresses land reserved under the NPW Act or acquired under Part 11 of the Act.

#### 4.1.4.2 State Environmental Planning Policy (Biodiversity and Conservation) 2021

The State Environmental Planning Policy (Biodiversity and Conservation) 2021 (Biodiversity and Conservation SEPP) contains provisions to protect the biodiversity values and amenity of trees and other vegetation in non-rural areas of NSW (Chapter 2), encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas (Chapters 3 and 4), conserve and enhance the riverine environment of the Murray River (Chapter 5), and control development in certain water catchments (Chapter 6). Only Chapter 5 of the Biodiversity and Conservation SEPP is relevant to the Proposal.

The objectives of Chapter 5 of the Biodiversity and Conservation SEPP are to ensure that appropriate consideration is given to development with the potential to adversely affect the riverine environment of the Murray River, to establish a consistent and co-ordinated approach to environmental planning and assessment along the Murray River, and to conserve and promote the better management of the natural and cultural heritage values of the riverine environment of the Murray River. Part 5.2 identifies planning principles that a determining authority must take into account when considering a proposed development that may adversely affect the riverine environment of the Murray River. Specific principles are provided in clause 5.9 and include access, bank disturbance, flooding, land degradation, landscape, river related uses, settlement, water quality and wetlands. The specific principles have been considered during preparation of the concept design for the Proposal and this REF as summarised in **Table 4-3.**

Part 5.3 identifies planning requirements and consultation requirements for various types of development. Consultation carried out during preparation of the concept design and REF is discussed in **Chapter 5**.

Table 4-3 Consistency of the Proposal with the specific principles in clause 5.9 of the Biodiversity and Conservation SEPP

| Specific principle | | Consistency of the Proposal with the specific principle |
|---|---|---|
| **Access** | | |
| The waterway and much of the foreshore of the Murray River is a public resource. Alienation or obstruction of this resource by or for private purposes should not be supported. | | The proposed replacement of structures along Millewa River Road would require the temporary closure of a section of the Road. This would limit the public's ability to access the Murray River in a vehicle along the temporarily closed section of Millewa River Road. However, this section of the river foreshore would remain accessible on foot or from the river.<br>The Proposal is not for a private purpose. |
| Development along the main channel of the Murray River should be for public purposes. Moorings in the main channel should be for the purposes of short stay occupation only. | | The Proposal is located on the floodplains of the Murray River and does not include development along the main channel of the Murray River. |
| Human and stock access to the Murray River should be managed to minimise the adverse impacts of uncontrolled access on the stability of the bank and vegetation growth. | | The Proposal does not include development along the Murray River. |
| **Bank disturbance** | | |
| Disturbance to the shape of the bank and riparian vegetation should be kept to a minimum in any development of riverfront land. | | The Proposal would not disturb the banks of the Murray River or remove riparian vegetation from the riverbanks. |
| **Flooding** | | |
| Where land is subject to inundation by floodwater – | | |
| (a) | the benefits to riverine ecosystems of periodic flooding, | The Proposal would support the restoration of a natural flow regime at Millewa Forest by improving access for key park operational activities and support construction of the Millewa Forest Supply Project, which seeks to improve the management and delivery of environmental watering and periodic flooding within Millewa Forest. If the Proposal did not occur, access for future operational activities to enable periodic flooding may be restricted and the construction of the Millewa Forest Supply Project could not occur. The Millewa Forest Supply Project would improve site environmental water managers ability to provide targeted periodic flooding of key flood- |

| Specific principle | | Consistency of the Proposal with the specific principle |
|---|---|---|
| | | dependent ecosystems and prevent unseasonal inundation of Millewa Forest.<br>The Proposal would aid in the management of regulated periodic flooding within Millewa Forest supporting the long-term conservation of flood-dependent ecosystems services and functions. |
| (b) | the hazard risks involved in developing that land, | The Proposal would replace and/or upgrade existing waterway crossing structures and access tracks on small channels within the floodplain. The structures and access tracks are designed to be periodically inundated and would not worsen flood risks given no material changes to the broader inundation regime of the forest is proposed. As a result, no change to flood risks is anticipated during operation. Minimal additional flood risk is anticipated during construction given the short-term and temporary nature of the construction period. |
| (c) | the redistributive effect of the proposed development on floodwater, | The Proposal would have a negligible redistributive effect on floodwaters because the Proposal would be limited to replacement and/or upgrade of existing waterway crossing structures and access tracks on small channels within the floodplain. The structures and access tracks are designed to be periodically inundated and would not worsen flood risks as no material changes to the broader inundation regime of the forest is proposed (See **Section 6.2**). As a result, no redistributive effect is anticipated during operation. Minimal additional flood risk and/or change to flood behaviour is anticipated during construction given the short-term and temporary nature of the construction period. |
| (d) | the availability of other suitable land in the locality not liable to flooding, | The Proposal does not involve the development of new infrastructure where there is not previously infrastructure. The works would see the replacement structures constructed in the same location as the existing. Temporary bypass structures would be located within the CAZ next to existing structures. There is no other suitable land for the Proposal that is not liable to flooding. |
| (e) | the availability of flood free access for essential facilities and services, | The Proposal would not impact access for essential facilities and services. The proposed replacement crossing structures and upgraded access tracks would require the temporary closure of sections of Millewa River Road, Fisherman's Bend Road, Narrows Road and Toupna Crossing Road. The detours that would be put in place would be along access tracks that would be at a |

| Specific principle | | Consistency of the Proposal with the specific principle |
|---|---|---|
| | | similar risk of inundation during a flood compared to the existing access tracks.<br>If NPWS or any other authority required access to these access tracks during the construction works for an essential purpose, this could be facilitated. |
| (f) | the pollution threat represented by any development in the event of a flood, | There is potential for pollution to occur if the construction work sites are flooded. Safeguards that will be implemented during the construction phase to manage this risk are presented in **Table 6-3.** |
| (g) | the cumulative effect of the proposed development on the behaviour of floodwater, and | The Proposal would replace and/or upgrade existing waterway crossing structures and access tracks on small channels within the floodplain. The structures and access tracks are designed to be periodically inundated and would not worsen flood risks as no material changes to the broader inundation regime of the forest is proposed (see **Section 6.2**). As a result, no change to flood risks is anticipated during operation. Minimal additional flood risk is anticipated during construction given the short-term and temporary nature of the construction period. |
| (h) | the cost of providing emergency services and replacing infrastructure in the event of a flood. | The Proposal would not result in a change to the cost of providing emergency services and replacing infrastructure in the event of a flood. |
| Flood mitigation works constructed to protect new urban development should be designed and maintained to meet the technical specifications of the Department of Water Resources. | | The Proposal does not constitute flood mitigation works to protect new urban development. |
| **Land degradation** | | |
| Development should seek to avoid land degradation processes such as erosion, native vegetation decline, pollution of ground or surface water, groundwater accession, salination and soil acidity, and adverse effects on the quality of terrestrial and aquatic habitats. | | Safeguards will be implemented to avoid or minimise the impacts of the Proposal on soils, vegetation and biodiversity, and ground and surface water. Refer to **Table 9-1** for a complete list of the proposed safeguards. |
| **Landscape** | | |
| Measures should be taken to protect and enhance the riverine landscape by maintaining native vegetation along the riverbank and adjacent land, rehabilitating degraded sites and | | The Proposal would not disturb the banks of the Murray River or remove riparian vegetation from the riverbanks.<br>The proposed CAZs are shown in shown in **Section 3.2**.<br>A site rehabilitation plan will be prepared as part of the Contractor's construction environmental management |

| Specific principle | Consistency of the Proposal with the specific principle |
|---|---|
| stabilising and revegetating riverbanks with appropriate species. | plan (CEMP) and will detail how disturbed areas of the CAZs not occupied by or needed to access the structures will be stabilised and revegetated (refer to **Table 6-18**). |
| **River related uses** | |
| Only development which has a demonstrated, essential relationship with the Murray River should be located in or on land adjacent to the Murray River. Other development should be set well back from the bank of the Murray River. | The Proposal does not include works in the Murray River or on the banks of the river. |
| Development which would intensify the use of riverside land should provide public access to the foreshore. | The Proposal does not include works on the banks of the Murray River. The Proposal would not alter public access to the foreshore of the river. |
| **Settlement** | |
| New or expanding settlements (including rural-residential subdivision, tourism and recreational development) should be located– | The Proposal is not residential, tourism or recreational development. |
| (a) on flood free land, | |
| (b) close to existing services and facilities, and | |
| (c) on land that does not compromise the potential of prime crop and pasture land to produce food or fibre. | |
| **Water quality** | |
| All decisions affecting the use or management of riverine land should seek to reduce pollution caused by salts and nutrients entering the Murray River and otherwise improve the quality of water in the Murray River. | The construction works under the Proposal would generally be limited to access track upgrades and the replacement of existing small waterway crossing structures located in minor channels within the floodplain. There are no works proposed within or on the banks of the Murray River and negligible overall operational changes anticipated from the Proposal. Therefore, the Proposal is not anticipated to impact on the water quality of the Murray River. Safeguards to avoid or minimise the potential for water pollution are provided in **Table 6-3.** |
| **Wetlands** | |

| Specific principle | | Consistency of the Proposal with the specific principle |
|---|---|---|
| Wetlands are a natural resource which have ecological, recreational, economic, flood storage and nutrient and pollutant filtering values.<br>Land use and management decisions affecting wetlands should– | | |
| (a) | provide for a hydrological regime appropriate for the maintenance or restoration of the productive capacity of the wetland, | The Proposal would improve access for key park management activities and facilitate future access for works part of the broader Millewa Forest Projects under the Accelerated SDL Adjustment Supply Measures Project; which has a general aim of improving conditions for the conservation of habitats, ecosystems, and biological diversity. |
| (b) | consider the potential impact of surrounding land uses and incorporate measures such as a vegetated buffer which mitigate against any adverse effects, | The Proposal is located in Murray Valley National Park and Regional Park. The proposed CAZs are all surrounded by native vegetation including wetlands. The Proposal includes clearing of vegetation to enable access to and construction of the replacement waterway crossings and access track upgrades. The CAZs have been made as small as feasible to minimise the ecological impacts of the required clearing. A site rehabilitation plan will be prepared as part of the Contractor's CEMP and will detail how disturbed areas of the CAZs not occupied by or needed to access the structures and access tracks will be stabilised and revegetated (refer to **Table 6-18**). |
| (c) | control human and animal access, and | The Proposal would have a negligible impact on human and animal access to wetlands. |
| (d) | conserve native plants and animals. | The Proposal includes clearing of vegetation to enable access to and construction of the proposed waterway crossings and access track upgrades. The CAZs have been made as small as feasible to minimise the ecological impacts of the required clearing. A site rehabilitation plan will be prepared as part of the Contractor's CEMP and will detail how disturbed areas of the CAZs not occupied by or needed to access the structures and access tracks will be stabilised and revegetated (refer to **Table 6-18**). |

## 4.1.5 Strategic plans

### 4.1.5.1 NSW Water Strategy

The NSW Water Strategy (Department of Planning, Industry and Environment, 2021) is a 20-year State-wide strategy to improve the security, reliability and quality of NSW's water resources over the coming decades. The NSW Water Strategy addresses key challenges and opportunities for

water management and service delivery across the State and sets the strategic direction for the NSW water sector over the long-term.

The strategy outlines key priorities. Priority 3 is to improve river, floodplain and aquifer ecosystem health, and system connectivity and is relevant to the Proposal.

#### 4.1.5.2 Murray-Lower Darling Long Term Water Plan

The *Murray-Lower Darling Long Term Water Plan* (Department of Planning, Industry and Environment, 2020a) contains ecological objectives and targets for priority environmental assets and ecosystem functions in the Murray-Lower Darling catchment. The objectives and targets have been identified for native fish, native vegetation, waterbirds and river connectivity. The broad environmental outcomes sought in the plan are to:

- Maintain the extent and improve the health of water-dependent native vegetation and wetlands
- Maintain the diversity of waterbird species and increase their numbers across the catchment
- Maintain the diversity and improve the population of native fish in the catchment
- Maintain and protect a variety of wetland habitats and support the movement of carbon and nutrients throughout the river system
- Maintain the number and type of water-dependent species throughout the catchment.

#### 4.1.5.3 Barmah-Millewa Forest Environmental Water Management Plan

The *Barmah-Millewa Forest Environmental Water Management Plan* (Murray-Darling Basin Authority, 2012) consists of a long-term strategic plan that outlines the environmental water requirements of the Barmah-Millewa Forest and how to broadly achieve them with a combination of environmental water works and measures.

The plan provides context for water planning, delivery, monitoring and consultation processes at Barmah-Millewa Forest and provides a broad description of the proposed operating regimes to maximise ecological outcomes. An operating strategy is provided in Schedule 2 of the plan and it aims to achieve the ecological objectives set for the forests by providing the water requirements for key vegetation communities, including wetlands, giant rush, moira grass plains, River Red Gum Forest and woodland and black box communities. The operating strategy also includes specific flow recommendations to support breeding events of waterbirds, including colonial and non-colonial nesters.

Despite the operating strategy, annual water planning and implementation are responsive to changing water resource conditions, opportunities and environmental priorities throughout the season and from year to year.

### 4.1.6 Local Environmental Planning Instruments

#### 4.1.6.1 Murray Local Environmental Plan 2011

The Proposal would be located within the Murray River Council local government area on land subject to the Murray Local Environmental Plan (LEP) 2011. The Proposal would be located on land zoned C1 - National Parks and Nature Reserves under the LEP.

Under the LEP, development is only permitted without consent on land zoned C1 if it is a use authorised under the NPW Act. The Proposal is permitted without consent subject to the LEP as it has been deemed authorised under the NPW Act.

The Proposal is located within the flood planning area identified in clause 5.21 of the LEP. Clause 5.21(2) states that development consent must not be granted to development on land the consent authority considers to be within the flood planning area unless the consent authority is satisfied the development:

a) Is compatible with the flood function and behaviour on the land, and

b) Will not adversely affect flood behaviour in a way that results in detrimental increases in the potential flood affectation of other development or properties, and

c) Will not adversely affect the safe occupation and efficient evacuation of people or exceed the capacity of existing evacuation routes for the surrounding area in the event of a flood, and

d) Incorporates appropriate measures to manage risk to life in the event of a flood, and

e) Will not adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of riverbanks or watercourses.

As outlined in **Section 6.2**, the Proposal would not adversely impact flood behaviour and would be compatible with the current flood function and behaviour on the land given the Proposal involves replacing existing infrastructure and, in the case the existing small wooden bridge and culvert structures, removing an existing obstruction to flow. Due to the remoteness of the proposed work sites and large distances to the nearest residences, the Proposal would not adversely affect the safe occupation and efficient evacuation of people, would not exceed the capacity of existing evacuation routes, and would not pose a risk to life in the event of a flood.

As outlined in **Section 6.1**, the potential temporary and short-term erosion and sedimentation impacts posed by the ground disturbance and vegetation clearance during construction of the Proposal would be significantly reduced with the adoption of appropriate sedimentation and erosion controls in accordance with the Blue Book as detailed in **Section 6.1.3.** The typically flat terrain would further reduce the risk of soil instability. Therefore, the Proposal would be consistent with clause 5.21(2) of the LEP.

## 4.2 Other NSW legislation

### 4.2.1 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) applies in relation to animals and plants. The purpose of the BC Act is to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development.

The BC Act establishes procedures and criteria for the recognition of areas of outstanding biodiversity value and species and ecological communities that are threatened. Schedules 1 and 2 of the Act list threatened species and ecological communities respectively. The Act also identifies

processes that could adversely affect threatened species or ecological communities or cause species or ecological communities that are not threatened to become threatened. Key threatening processes are listed in Schedule 4 of the Act.

Part 7 of the BC Act identifies biodiversity assessment requirements for approvals under the EP&A Act. In accordance with section 7.2 of the BC Act, development that is an activity subject to environmental impact assessment under Part 5 of the EP&A Act is likely to significantly affect threatened species if it is likely to significantly affect threatened species or ecological communities, or their habitats, according to the test in section 7.3 of the BC Act or if it is carried out in a declared area of outstanding biodiversity value.

Section 7.8 of the BC Act requires that an environmental assessment under Part 5 of the EP&A Act of a Proposal likely to significantly affect threatened species is to include or be accompanied by a species impact statement or, if the proponent so elects, a biodiversity development assessment report.

A biodiversity assessment of the Proposal is provided in **Attachment A** and summarised in **Section 6.4**. The Proposal would not a have significant impact on threatened species or ecological communities, or their habitats, and is not in a declared area of outstanding biodiversity value (refer to **Section 6.4** and **Attachment A**. Accordingly, neither a species impact statement nor biodiversity development assessment report is required.

The relevant requirements of the BC Act are addressed in the biodiversity assessment through:

- Desktop review to determine the threatened species, populations or ecological communities that have been previously recorded within the locality
- Identification, assessment and mapping of listed threatened communities and threatened species (or their habitat)
- Assessment of potential impacts on listed threatened species, populations and ecological communities, including identification of key threatening processes relevant to the construction areas
- Test of significance for potential impacts to threatened species or ecological communities, or their habitats, in accordance with section 7.3 of the BC Act
- Identification of suitable impact mitigation and environmental management measures for listed threatened species, where required.

### 4.2.2 Rural Fires Act 1977

The *Rural Fires Act 1997* provides for the prevention, mitigation and suppression of bush fires, and aims to protect environmental, cultural and community assets from damage arising from fires. The Act establishes an organisational framework for bush fire management planning, with the creation of rural fire districts under section 6 of the Act and bush fire management committees for each of these districts under section 50 of the Act.

Section 52 of the Act requires each bush fire management committee is required to prepare a bush fire risk management plan for their district. The required contents of bush fire risk management plans are identified in section 54 of the Act and include schemes for the reduction of bush fire hazards and restrictions on the use of fire or other particular fire hazards reduction activities.

The Proposal is located within the Mid Murray Zone Bush Fire Risk Management Committee area, which includes the Conargo, Deniliquin, Jerilderie, Murray and Wakool local government areas. The committee prepared a bush fire risk management plan for the area in 2009. Information in the plan that is relevant to Proposal is summarised in Section 6.12.

Under section 3(d) of the Act, the protection of the environment through bush fire prevention activities is required to be carried out having regard to the principles of ecologically sustainable development described in section 6(2) of the *Protection of the Environment Administration Act 1991*.

Section 63 of the *Rural Fires Act 1997* provides that it is the duty of a public authority to prevent the occurrence of bush fires on any land under its ownership or occupancy and to take any steps that a bush fire coordinating committee advises it to take or which are included in an applicable bush fire risk management plan and any other practicable steps to prevent the occurrence of bush fires on, and to minimise the danger of the spread of a bush fire on or from:

a) Any land vested in or under its control or management, or

b) Any highway, road, street, land or thoroughfare, the maintenance of which is charged on the authority.

NPWS's approach to managing fires in parks and reserves is discussed in Section 6.12.

The Act declares the bush fire danger period to run from 1 October to 31 March in the following year (inclusive), which can be modified by the Commissioner of the NSW Rural Fire Service. Total fire bans may be issued by the Minister in the interests of public safety.

The Proposal does not comprise development for which a bush fire safety authority under section 100B of the *Rural Fires Act 1997* would be required.

### 4.2.3 Fisheries Management Act 1994

The *Fisheries Management Act 1994* (FM Act) applies in relation to fish and marine vegetation. The FM Act provides for the conservation, protection and management of fisheries, aquatic systems and habitats in NSW. The Act is relevant as the Proposal would directly and indirectly impact aquatic habitats and species.

The FM Act establishes mechanisms for:

- The listing of threatened species, populations and ecological communities or key threatening processes
- The declaration of critical habitat
- Issuing permits for certain works on 'water land'
- Consideration and assessment of threatened species impacts in the development assessment process.

Part 7 of the FM Act relates to the protection of aquatic habitats, including providing management of dredging and reclamation works within permanently or intermittently flowing watercourses, as well as the temporary or permanent blockage of fish passage within a watercourse.

#### 4.2.3.1 Dredging and reclamation

Section 199 of the FM Act identifies circumstances in which a public authority may carry out dredging or reclamation. Prior to carrying out or authorising the carrying out of dredging work or reclamation work, public authorities must provide the Minister with written notice of the Proposal and consider any matters concerning the Proposal raised by the Minister within 21 days. Further notification is required where a public authority proposes to carry out the works despite any matters raised by the Minister (s.199(2)).

Works associated with construction of the Proposal would require 'dredging' (excavation of water land or removal of material from water land) or 'reclamation' (using material to fill/reclaim or depositing material to construct anything other than water land) as defined under section 198A of the FM Act. Therefore, NSW DCCEEW are required to provide written notification of Proposal to the Minister.

#### 4.2.3.2 Fish Passage

Section 218(5) of the FM Act requires that a public authority that proposes to construct, alter or modify a dam, weir, reservoir (including a floodgate) or similar instream structure on a waterway must notify the Minister administering the FM Act of the proposed action, and, if the Minister so requests, include as part of the works a suitable fishway or fish by-pass (DPI, 2013).

The Proposal would involve the establishment of temporary crossing structures plus the removal and replacement of existing permanent crossing structures which are currently located within waterways identified as potential Key Fish Habitat. Therefore, the Proposal would trigger notification and consultation requirements under section 218(5) of the FM Act. Further details of consultation undertaken with NSW Department of Primary Industries and Regional Development (DPIRD Fisheries) and how this has been incorporated into the Proposal is outlined in Section 5.2.3.

Section 219(5) of the FM Act provides that works within a waterway that may result in the temporary or permanent blockage of fish passage during construction or operation, are required to be carried in accordance with a permit issued by the Minister.

The majority of the waterways already have existing blockages to fish passage present, therefore fish passage would remain unchanged during construction at these locations. At locations where water would be present the use of temporary coffering dam and dewatering may be required which could result in 'temporary blockage of fish passage within watercourses' as defined under section 219 of the FM Act. However, these impacts would be temporary and short-term.

During operation the Proposal would maintain existing fish passage conditions or would improve fish passage at locations where fish friendly designs are to be installed. Generally, fish passage would not be worsened due to the Proposal. Based on advice provided by DPIRD Fisheries on 5 March 2024 and feedback provided on 20 June 2025 a section 219 permit would not be required.

In addition, if fish rescue and translocations were to be required as part of instream construction works including localised dewatering, fish would be released within the same waterways immediately downstream of the proposed work areas. As such, a permit under section 37 of the FM Act would not be required. However, a procedure to prevent the risk of spreading disease and non-target species would be detailed in the Construction Environmental Management Plan (CEMP).

#### 4.2.3.3 Threatened species conservation

Part 7A of the FM Act relates to threatened species conservation. It details the process for the recognition of threatened species, populations and ecological communities and key threatening processes and offences for harming threatened species, populations or ecological communities and damaging their habitat and critical habitat.

Endangered species, populations and ecological communities are listed in Schedule 4 of the Act, critically endangered species and ecological communities are listed in Schedule 4A, vulnerable species and ecological communities are listed in Schedule 5 and key threatening processes are listed in Schedule 6.

If the Proposal is likely to significantly impact on a threatened species, population or ecological community, then a species impact statement is required.

Eleven proposed sites are located within waterways that are Key Fish Habitat and would potentially provide suitable habitat for threatened species including the Murray Cod, Silver Perch, Murray Crayfish and Trout Cod. Additionally, one aquatic Endangered Ecological Community (EEC) listed under the FM Act known as the 'Lower Murray River aquatic ecological community' (Lower Murray River EEC) is within the Proposal area.

The Proposal is not expected to have a significant impact on threatened species, populations or ecological communities listed under the FM Act. The Proposal's potential impacts to threatened species, populations and ecological communities and inclusion of key threatening processes are assessed in **Attachment A** and summarised in **Section 6.5**.

### 4.2.4 Water Management Act 2000

The *Water Management Act 2000* (WM Act) provides for the sustainable and integrated management of the water sources of the State for the benefit of both present and future generations.

Section 89 of the WM Act requires a water use approval for the use of water for a particular purpose at a particular location. A water use approval would be required to extract water for use during the construction phase of the Proposal.

Section 90 of the WM Act requires an approval to undertake a water management work, which includes construction and use of water supply works. The definition of a water supply work includes any work that has, or could have, the effect of impounding water in a water source.

In relation to section 89 and 90, it is noted that, NSW DCCEEW currently holds an existing Water Supply works approval which includes an exemption for performance of works under section *15 (Taking water for environmental work construction)* of the Water Management (General) Regulation 2018 which states:

*A public authority — in relation to the taking of up to 0.5 megalitre of water in any water year (or up to such lesser amount as the Minister may specify) that the Minister is satisfied is for the purpose of constructing on waterfront land a water supply work that will have an environmental benefit, but only if the work is in accordance with a program approved by the Minister in writing that addresses —*

*(a) the amount of water proposed to be taken, and*

*(b) the water source from which the water will be taken.*

Section 91 of the WM Act requires an 'activity approval' to carry out a 'controlled activity' in, on or under waterfront land or to carry out an aquifer interference activity. The definition of a controlled activity includes the carrying out of work, the removal of material or vegetation from land, the deposition of material on land and the carrying out of any other activity that affects the quality or flow of water in a water source. Waterfront land is defined as including the bed and banks of rivers as well as land that is 40 m inland of the highest bank of the river. A river is defined to include any watercourse, whether perennial or intermittent and whether comprising a natural channel or a natural channel artificially improved. The Proposal would be a controlled activity under the WM Act.

However, section 41 of the Water Management (General) Regulation 2018 provides that a public authority is exempt from requiring a controlled activity approval to carry out a controlled activity in, on or under waterfront land. Therefore, as the NSW DCCEEW is the proponent of the Proposal, a controlled activity approval is not required.

### 4.2.5 Heritage Act 1977

The *Heritage Act 1977* provides for the conservation of buildings, works, relics and places that are of historic, scientific, cultural, social, archaeological, architectural, natural or aesthetic significance to the State. Matters protected under the Act include items listed on the State Heritage Register, the heritage schedules of local environmental plans, and/or the conservation registers (or section 170 registers) of NSW government agencies, as well as items subject to an interim heritage order.

Under section 60 of the *Heritage Act 1977*, approval from the Heritage Council of NSW is required before carrying out any work or activities on items listed in the State Heritage Register. The Proposal would not impact on any items listed on the State Heritage Register.

Section 139 of the *Heritage Act 1977* prohibits a person from disturbing or excavating any land on which the person has discovered or exposed a relic, except in accordance with an excavation permit or a notification granting exception for the permit.

Section 146 of the *Heritage Act 1977* requires that if a relic is discovered or located, the Heritage Council of NSW must be notified of the location of the relic.

Section 170 of the *Heritage Act 1977* requires NSW government agencies to maintain a heritage and conservation register of items of environmental heritage that are vested in, owned or occupied by, or subject to the control of, the agency. The Department of Planning and Environment maintains the Historic Heritage Information Management System to meets its obligations under section 170 of the *Heritage Act 1977*. The Historic Heritage Information Management System is a database of records of heritage sites and items that exist in the NSW national parks system. A search of the Historic Heritage Information Management System was completed during preparation of this REF and three potential heritages items were found within the Proposal area (refer to **Section 6.7.1.2**)

Part 3C of the *Heritage Act 1977* protects historic shipwrecks. Shipwrecks that have been located in the coastal waters of NSW or any other waters within the limits of the State for 75 years or more are recognised as historic shipwrecks in accordance with section 47 of the Act. Movement, damage or destruction of historic shipwrecks is not permitted otherwise than in accordance with an historic shipwrecks permit. The Proposal would not directly impact any maritime heritage items.

### 4.2.6 Crown Land Management Act 2016

The *Crown Land Management Act 2016* provides for the ownership, use and management of Crown land in NSW. Ministerial approval is generally required to grant a lease, licence, permit, easement or right of way over a Crown reserve. The Act requires environmental, social, cultural heritage and economic considerations to be taken into account in decision-making about Crown land, in accordance with the objects of the Act and the principles of Crown land management.

The Proposal is not located on Crown land and does not involve any land acquisition or change in land use and does not require the granting of a lease, licence, permit, easement or right of way over a Crown reserve or changes to any existing lease, licence, permit, easement or right of way.

### 4.2.7 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) requires that an environment protection licence be held to undertake a scheduled activity or scheduled development work. The Proposal is not of a kind listed in Schedule 1 of the POEO Act and would not require an environment protection licence under this Act.

Section 43(d) of the POEO Act permits (but does not require) the issue of an environment protection licence for non-scheduled activities. However, compliance with the conditions of such a licence provides a defence to the offence of polluting waters under section 120 of the Act.

Construction activities must comply with the requirements of the POEO Act. Section 139 of the Act relates to the operation of plant and noise pollution and requires that plant be operated in a proper and efficient manner and maintained in an efficient condition.

## 4.3 Commonwealth legislation

### 4.3.1 Environment Protection Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (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 matters of national environmental significance is likely to require a referral to the Commonwealth Department of Climate Change, Energy, the Environment and Water for a decision as to whether it is a controlled action requiring approval under the EPBC Act.

The expected impact of the Proposal on matters of national environmental significance is discussed in **Chapter 7**. The Proposal is located within the NSW Central Murray Forests Ramsar site and there are records of, or suitable habitat for, threatened species and migratory species listed under the

EPBC Act in the vicinity of the Proposal. The Proposal is not expected to have a significant impact on these matters of national environmental significance.

The NSW DCCEEW referred the Millewa Forest SDLAM Project to the Commonwealth Department of Climate Change, Energy, the Environment and Water (EPBC number 2023/09517) and it was determined to not be a controlled action on 27 July 2023.

### 4.3.2 Native Title Act 1993

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 *Native Title Act 1993* (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 Register established under section 192 of the NT Act was carried out on 16 April 2025 shows that Native Title Determination VCD1998/001 (Federal Court file number VID6001/1995) applies to the Proposal sites. The claim was lodged by members of the Yorta Aboriginal Community. A determination was given on 18 December 1998 determining that native title does not exist on the land. There are no current native title claims lodged in relation to land within or adjacent to the Proposal sites and no indigenous land use agreements cover the Proposal site.

## 4.4 Consistency with relevant NSW Government policy

A summary of the Proposal's consistency with NSW government policy is provided in **Table 4-4**.

Table 4-4 Consistency of the Proposal with NSW Government policy

| Policy name | How the Proposal is consistent |
|---|---|
| **NPWS – People and Wildlife Policy** | As per section 47 of the *People and Wildlife Policy*, the protection of wildlife is considered in **Section 6.4** and **Section 6.5** of this REF. Safeguards that will be implemented to avoid, minimise or manage potential terrestrial and aquatic biodiversity impacts as a result of the Proposal are outlined in **Section 6.4.3** and **Section 6.5.3** respectively.<br>The Proposal is consistent with this policy. |
| **NPWS – Vehicle Access Policy** | No new roads are proposed as part of the Proposal. Vehicle access would be undertaken in accordance with the *Vehicle Access Policy*. As discussed in Section **Error! Reference source not found.**, construction vehicles would access the construction work sites as follows from the Cobb Highway:<br>• **Access to lower Millewa**: Poverty Point Road, Porters Creek Road, Millewa Road, Millewa River Road, Narrows Road and Moira Cutting Access Track |

| Policy name | How the Proposal is consistent |
|---|---|
| | • **Access to Upper Millewa**: Jones Street, Picnic Point Road, Millewa Road, Millewa River Road, Toupna Crossing Road, Fisherman's Bend Road and Pinchgut Regulator Access Track<br>A construction traffic management plan will be prepared to manage the movement of construction vehicles to and from the Proposal sites.<br>The Proposal is consistent with this policy.<br>Refer to **Section 6.10** for further details on vehicle access and potential traffic impacts. |
| **DPE – Cultural Heritage Community Consultation Policy** | Consultation for the cultural heritage assessment component of the Proposal has been undertaken in line with the NSW *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (NSW DECCW, 2010) which is understood to supersede this policy. |
| **DPI Fisheries – Policy and Guidelines for Fish Habitat Conservation and Management** | Aquatic habitat condition has been assessed against criteria outlined in the *Policy and Guidelines for Fish Habitat Conservation and Management* ( NSW DPI, 2013)as detailed in Section 6.5.<br>The Proposal is consistent with this policy. |

## 4.5 Summary of licences and approvals

Licences and approvals required for the Proposal are summarised in **Table 4-5**.

Table 4-5 Licences and approvals required by the Proposal

| Legislation | Licence/approval required |
|---|---|
| **EP&A Act** | Planning approval under Part 5 Division 5.1 of the EP&A Act is required. This REF has been prepared to fulfil the requirements of section 5.5 of the EP&A Act. |
| **NPW Act** | Approval from NPWS is required to construct the Proposal:<br>• NSW DCCEEW will seek consent from NPWS to carry out the proposed construction works |
| **NPW Regulation** | Consent is required from NPWS to construct the Proposal. Specifically, consent is required for construction plant and equipment to enter, drive through, and operate within Murray Valley National Park and Regional Park, and to carry out the construction works. |
| **FM Act** | The following notifications would occur and approvals and permits obtained prior to construction starting:<br>• Notification to DPIRD Fisheries of dredging or reclamation work under section 199 of the FM Act. |

### 4.5.1 Publication triggers

As outlined in **Section 4.1.3**, under section 171 (4) of the EP&A Regulation an REF must be published on the determining authority's website or the NSW Planning Portal following determination if the proposal has a capital investment value of more than $5 million or would require an approval or permit identified in section 171(4) of the EP&A Regulation before it may be carried out.

The capital investment value for the Proposal would not be more than $5 million (refer to **Section 3.6**). Additionally, the Proposal would not involve an activity that would trigger the requirement for an approval or permit identified in section 171(4) of the EP&A Regulation (refer to **Table 4-6**).

While the Proposal does not to trigger the aforementioned publication requirements, the REF would be published on the NSW DCCEEW website.

Table 4-6 Triggers for publication of the REF

| Permit or approval | Applicability |
|---|---|
| **FM Act, sections 144, 201, 205 or 219** | Not applicable – The Proposal would not worsen fish passage during construction and operation. Therefore, the Proposal would not require a permit under section 219 of the FM Act. |
| ***Heritage Act 1977*, section 57 (commonly known as a section 60)** | Not applicable – The Proposal would not disturb any items on the State Heritage Register (refer to Section 6.7). |
| **NPW Act, section 90 (Aboriginal heritage impact permit)** | Not applicable – The Proposal would not disturb any known Aboriginal heritage items (refer to Section 6.6). |
| **POEO Act, sections 47–49 or 122** | Not applicable – The Proposal is not a scheduled development work or a scheduled activity and, therefore, does not require an environment protection licence. |

# 5 Consultation

## 5.1 Community and stakeholder consultation

NSW DCCEEW has developed a Communication and Stakeholders Engagement Plan for the Millewa Forest Supply Project. The plan identifies the following project stakeholders that are relevant to the Proposal:

- NPWS, as the park authority responsible for managing Murray Valley National Park and Regional Park and delivery of The Living Murray program at Millewa Forest
- DPIRD Fisheries, as the agency responsible for the administration of the FM Act, which is the principal piece of NSW legislation for managing the State's fishery resource (refer to Section 4.2.3)
- The Biodiversity, Conservation and Science Directorate of the Environment and Heritage Group, a part of NSW DCCEEW
- Yorta Yorta Nation and Bangerang Nation, the traditional custodians of Millewa Forest, as well as other representatives of the local Aboriginal community including the Cummeragunja and Moama Local Aboriginal Land Councils
- Adjoining landholders to Millewa Forest
- Commonwealth Department of Climate Change, Energy, the Environment and Water (Commonwealth DCCEEW), as the Commonwealth agency responsible for administering the EPBC Act including ensuring the protection of Ramsar sites.

NSW DCCEEW has engaged with all of the above stakeholders since it commenced optioneering and preparation of concept designs for the Millewa Forest Supply Project works in early 2021. It has established a stakeholder advisory group as a mechanism to engage with key stakeholders about the progress of the Millewa Forest Supply Project, with representatives of recreational fishers, Murray Tourism Board, NPWS West Branch Regional Advisory Committee, Murray Darling Wetlands Working Group, Cummeragunja Local Aboriginal Land Council and Bullatale Creek Water Trust participating in the group. It has also established a technical advisory group to receive feedback and advice from certain stakeholders on the optioneering and concept design development, with NPWS, Water NSW, DPIRD Fisheries, the Biodiversity, Conservation and Science Directorate, the Commonwealth Environmental Water Office and the Murray-Darling Basin Authority all participating in this group.

Stakeholder consultation activities for the broader Millewa Forest Supply Project relevant to the proposed action include:

- Stakeholder advisory group meetings held on 20 May 2021, 21 July 2021, 28 September 2021 and 11 November 2021 to describe the Proposal and provide updates on the optioneering and concept design development. NSW DCCEEW hosted a site visit on 8 March 2022 to show the group the sites where works are proposed and discuss the concept designs. Cummeragunja Local

Aboriginal Land Council and Bangerang and Yorta traditional custodians were also invited to this site visit

- Cummeragunja Local Aboriginal Land Council and Bangerang Aboriginal Corporation meetings held on 25 August 2021, 22 September 2021 and 11 November 2021 to describe the Proposal and provide updates on the optioneering and concept design development
- Yorta Nation Aboriginal Corporation meetings held on 22 September 2021 and 11 November 2021 to describe the Proposal and provide updates on the optioneering and concept design development
- Technical advisory group meetings held on 27 April 2021, 1 June 2021, 13 July 2021, 24 August 2021 and 23 February 2022 to discuss the objectives and purpose of the project, discuss and evaluate design options, and discuss the findings of the hydrology modelling prepared for the project. A site visit was hosted on 9 March 2022 to show the group the sites where works are proposed and discuss the concept designs
- A basis of design workshop held on 29 October 2021 and attended by NPWS, DPIRD Fisheries, Biodiversity, Conservation and Science Directorate and the Murray-Darling Basin Authority. Matters discussed at the workshop included the objectives of the Millewa Forest Supply Project and the functional requirements of proposed new infrastructure
- A fish movement modelling workshop held on 10 March 2022 and attended by representatives of NPWS, DPIRD Fisheries and the Biodiversity, Conservation and Science Directorate. The workshop was held in Mathoura and included a site visit. A follow-up meeting to progress the fish movement model was held in Buronga on 18 August 2022.

Stakeholder consultation activities undertaken specific to the proposed action include:

- Ongoing consultation with NPWS regarding the proposed works to access tracks and waterway crossings across Millewa Forest.
- DPRID Fisheries consultation regarding the Proposal including culvert sizing and fish passage requirements is ongoing. Designs have been provided to DPRID Fisheries for review.

The NSW DCCEEW will continue to consult with these stakeholders during the detailed design and construction phases of the Proposal.

## 5.2 Statutory consultation – NSW legislation

### 5.2.1 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 5-1 lists the consultation requirements under the Transport and Infrastructure SEPP and identifies whether they apply to the Proposal.

**NOTE: All consultation periods listed below require a 21-day notification period.**
**For each row, if the response is 'yes', consultation with the relevant agency will be required and evidence of that consultation submitted as part of the REF.**

Table 5-1 Transport and Infrastructure SEPP consultation

| Is consultation required under the Transport and Infrastructure SEPP? | Yes | No |
|---|---|---|
| Will the Proposal have a substantial impact on stormwater management services provided by a council? If 'yes', notification to Council is required. | ☐ | ☒ |
| Is the Proposal likely to generate traffic to an extent that will strain the capacity of the road system in a local government area? If 'yes', notification to Council is required. | ☐ | ☒ |
| Will the Proposal involve connection to, and a substantial impact on the capacity of, any part of a sewerage system owned by a council? If 'yes', notification to Council is required. | ☐ | ☒ |
| Will the Proposal involve connection to, and use of a substantial volume of water from, any part of a water supply system owned by a council? If 'yes', notification to Council is required. | ☐ | ☒ |
| Will the Proposal 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? If 'yes', notification to Council is required. | ☐ | ☒ |
| Will the Proposal 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)? If 'yes', notification to Council is required. | ☐ | ☒ |
| Is the Proposal 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? If 'yes', notification to Council is required. | ☐ | ☒ |
| Is the Proposal located on flood liable land? If so, will the works change flooding patterns to more than a minor extent? If 'yes', notification to Council is required. | ☐ | ☒ |
| Is the Proposal land that is within a coastal vulnerability area and is inconsistent with a certified coastal management program that applies to that land? If 'yes', notification to Council is required. | ☐ | ☒ |
| Is the Proposal located on flood liable land and permissible without development consent under the following provision of Part 2.3 of the Transport and Infrastructure SEPP:<br>(a) Division 1 (Air transport facilities),<br>(b) Division 2 (Correctional centres and correctional complexes),<br>(c) Division 6 (Emergency services facilities and bush fire hazard reduction),<br>(d) Division 10 (Health services facilities),<br>(e) Division 14 (Public administration buildings and buildings of the Crown),<br>(f) Division 15 (Railways),<br>(g) Division 16 (Research and monitoring stations), | ☐ | ☒ |

| Is consultation required under the Transport and Infrastructure SEPP? | Yes | No |
|---|---|---|
| (h) Division 17 (Roads and traffic),<br>(i) Division 20 (Stormwater management systems).<br>* 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.<br>If 'yes', consultation with the State Emergency Service is required. | | |
| Is the Proposal 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? If 'yes', consultation with NPWS is required. | ☒ | ☐ |
| Is the Proposal located on land in Zone E1 National Parks and Nature Reserves? If 'yes', consultation with the National Parks is required. | ☒ | ☐ |
| Does the Proposal include a fixed or floating structure in or over navigable waters? If 'yes', notification to Transport for NSW is required. | ☐ | ☒ |
| Will the Proposal increase the amount of artificial light in the night sky within the dark sky region as identified on the dark sky region map? If 'yes', notification to the Director of the Observatory is required. | ☐ | ☒ |
| Is the Proposal located on defence communications facility buffer land within the meaning of clause 5.15 of the Standard Instrument? If 'yes', notification to the Secretary of the Commonwealth Department of Defence is required. | ☐ | ☒ |
| Is the Proposal within a mine subsidence district within the meaning of the Coal Mine Subsidence Compensation Act 2017? If 'yes', notification to Subsidence Advisory is required. | ☐ | ☒ |
| Is the Proposal traffic-generating development as listed in Schedule 3 of the SEPP? If 'yes', notification to Traffic for NSW is required. | ☐ | ☒ |

It is noted that clause 2.17(1)(a) provides an exception to consultation in that NSW DCCEEW as the proponent must notify NPWS as a public authority from whom an approval is required in order for the activity (as development) to be carried out lawfully. As discussed in **Section 4.1**, approval to carry out the Proposal is required from NPWS under the NPW Act and, therefore, the requirement to consult with NPWS under clause 2.15(2)(b) of the TISEPP does not apply.

NSW DCCEEW has involved NPWS West Branch Regional Advisory Committee in consultation for the Proposal through their participating in technical advisory group and stakeholder advisory group meetings and other consultation activities. NPWS has been closely involved with all aspects of the planning, design, consultation and impact-mitigation of the Proposal since its inception.

NSW DCCEEW provided NPWS with a draft copy of this REF for their comment and has taken into consideration comments provided by NPWS.

NSW DCCEEW will continue to liaise with NPWS as the Proposal progresses.

### 5.2.2 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 Murray River, 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 Proposal is outlined in **Table 5-2**.

Table 5-2 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 Proposal 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 Proposal would not affect boating safety. |

As outlined in Table 5-2, consultation under the Biodiversity and Conservation SEPP is not required for the Proposal.

### 5.2.3 Fisheries Management Act 1994

DPIRD Fisheries representatives have been engaged throughout the development of the Proposal. This engagement includes ongoing involvement with the broader Millewa Forest Supply Projects commencing in early 2021, including their participation in the following:

- Technical advisory group meetings
- Basis of design workshop
- Fish movement modelling workshop and field visit
- Operational plan workshops.

The Proposal meet the triggers notification and consultation requirements under section 218 and 219 of the FM Act in relation to section 218 fish passage and dredging.

NSW DCCEEW has undertaken consultation with DPIRD Fisheries to ensure that the proposed crossing designs maintain or improve existing fish passage conditions. DPIRD Fisheries have

reviewed and provided feedback on draft design drawings for the Proposal including designs rock crossings and replacement box culverts (i.e. crossings numbers C16, C18, C19, C22, C23, C25a, C26, C32 and C33).

On 11 April 2025 DPIRD Fisheries confirmed 'no issues with the low-level crossings' i.e. rock crossings. However, further details were required for the initial box culvert designs to ensure where fish passage is deemed necessary (i.e. effectively where the creeks at the Proposal sites are mapped as KFH), that flow velocities remain below 0.4m/s.

NSW DCCEEW and DPIRD Fisheries determined that the crossings most important for fish passage where sites C16, C19, C38 and C39. Subsequently, Hydraflow reports were generated to confirm their suitability for fish passage and designs revised to meet maximum flow velocity requirements. Maximum flow velocities for the revised culverts designs would be 0.47m/s at C16; 0.19m/s at C19, 0.42m/s at C38 and 0.45m/s at C39. On 20 June 2025, DPIRD Fisheries deemed "these designs are suitable from a fish passage perspective".

Revised box culvert designs and associated hydraulics / flow velocities for C25a, C32, C23, C26, C33, C22 and C18 are not available so it is not possible to assess fish passage implications. However, none of the above creeks at the crossing locations are mapped as KFH (except for C23 which is Type 2 Class 2) and hence impacts to fish passage are unlikely. NSW DCCEEW discussed the basis of design of these proposed box culverts with DPIRD Fisheries on 16 May 2025 and DPIRD Fisheries confirmed that for these sites that impacts to fish passage were not "deemed a concern practically."

NSW DCCEEW has satisfied the consultation requirements under section 218 of the FM Act. Collaboration with NSW DPIRD Fisheries has helped in delivering a package of work that optimises fish passage outcomes where possible. On 24 June 2025, NSW DCCEEW provided written notification of the Proposal in addition to copy of the REF for review by DPIRD Fisheries. On 2 July 2025, DPIRD Fisheries, the REF confirmed no objections to the works being undertaken as described.

Additional consultation is required under section 199 of the FM Act as the Proposal would meet the definition of 'dredging' or 'reclamation'. Notification under section 199 of the Act for the Proposal can be viewed in **Attachment C**.

Ongoing consultation will be undertaken by NSW DCCEEW with DPIRD Fisheries which would include reviewing the CEMP, including dewatering details and rehabilitation plans and providing notification prior to the commencement of works.

### 5.2.4 National Parks and Wildlife Act 1974

The Proposal is located on land gazette as national park or regional park in accordance with section 30A of the NPW Act.

Construction and operation of the Proposal requires authorisation under the NPW Act. NSW DCCEEW is engaging with NPWS to provide the information required to receive an authorisation to construct the Proposal (refer to **Section 4.1.2**).

Consultation with Aboriginal stakeholders has occurred during preparation of the Aboriginal Due Diligence assessment reports in accordance with section 60 of the NPW Regulation and is described in **Attachment B** and summarised in **Section 5.3** below.

## 5.3 Consultation with Aboriginal communities

The Proposal is located within the traditional lands of the Yorta and Bangerang Aboriginal communities (Tindale, 1974). The land, water, plants and animals within a landscape are central to Aboriginal spirituality and contribute to Aboriginal identity.

Stakeholder and community engagement amongst Aboriginal traditional owners and communities for the Proposal to date has been guided by the First Nations community and stakeholder engagement plan prepared for the project. NSW DCCEEW is committed to supporting close involvement and participation of Aboriginal people in water infrastructure, research, and management. To date, consultations with the First Nations communities have shown positive outcomes for Aboriginal and Torres Strait Islander communities, who have been provided opportunities for input during the development of the Proposal.

In order to facilitate ongoing community consultation and communication in the plan's delivery, Aboriginal community representatives are invited to participate in the project's stakeholder advisory group, including representatives from the Cummeragunja Local Aboriginal Land Council. This group supports the Proposal regarding consultation and communication with various community stakeholders.

NSW DCCEEW also has a dedicated First Nations engagement team who have engaged with the project's Aboriginal stakeholders through 'one-on-one' conversations, in-person meetings and site visits to provide more comprehensive engagement than is possible through the more formal stakeholder advisory group meetings. Engagement with Aboriginal stakeholders regarding the potential Aboriginal heritage impacts of the Proposal has also followed the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010) required as part of the Aboriginal cultural heritage assessment process in NSW.

A search of the National Native Title Tribunal online register was undertaken in April 2025 and indicated:

- Native Title Determination VCD1998/001 (Federal Court file number VID6001/1995) applies to the Proposal site. The claim was lodged by members of the Yorta Aboriginal community. A determination was given on 18 December 1998 determining that native title does not exist on the land
- There are no current native title claims lodged under the *Native Title Act 1993* in relation to land within or adjacent to the Proposal site
- No Indigenous Land Use Agreements cover the Proposal site.

As a result, notification requirements under the *Native Title Act 1993* do not apply to the Proposal. However, ongoing consultation with relevant Aboriginal communities will be undertaken.

## 5.4 Ongoing stakeholder and community consultation

NSW DCCEEW will continue to consult with stakeholders during the detailed design and construction phases of the Proposal as required. Stakeholders including the local community will be kept informed of any changes to the Proposal resulting from future consultation process or detailed design. Once determined, this REF will be placed on public display for information via NSW DCCEEW website.

NPWS will be notified at least two weeks before construction work begins. The notification will outline the proposed duration of the work and any access changes. Contact details to request further information or ask questions will be included in the notification.

# 6 Environmental assessment

## 6.1 Topography, geology and soils

### 6.1.1 Existing environment

#### 6.1.1.1 Topography

The Proposal is generally located in the Riverina bioregion which is dominated by river channels, floodplains, back plains, swamps, lakes and lunettes that are all of Quaternary age (NSW NPWS 2003). The Majority of the Proposal area is located within the Murray Channels and Floodplains Landscape (Mitchell 2002) while part of the MC1 CAZ is located within the Murray Lakes, Swamps, and Lunettes Landscape.

The Murray Channels and Floodplains (Muc) Mitchell Landscape is characterised by eroded and aggraded landform patterns with extremely low relief (<9 m), which are generally defined as alluvial plains and floodplains (Mitchell 2002; Speight 2009).

The Murray Lakes, Swamps, and Lunettes Landscape is characterised by freshwater lakes and frequently flooded swamps. It also includes the lunettes and sand dunes that formed beaches on these waterbodies, particularly on the eastern side.

An analysis of Digital Elevation Model (DEM) indicates that the creeks and existing crossings are located on valley and depression landforms, while the creekbanks are located on a sloped to ridge landform (Austral 2025 and 2025a).

#### 6.1.1.2 Geology and Soils

The majority of the Proposal area resides within the 'alluvial channel deposits – meander-plain facies' geological unit. This geological unit is described as having a surface of unconsolidated grey humic soil over clayey, very fine-grained sand underlain by light brown clayey silt. This unit contains sedimentary formations associated with the lateral migration and evolution of meandering river systems, such as the adjacent Murray River. These deposits form through a combination of erosion and deposition as channels migrated across the floodplain, leaving behind distinct sedimentary structures that record past river dynamics (Bridge 2003).

Part of the MC1 CAZ is located within claypan and lacustrine deposits. The Lake beds and swamps associated with the Moria cutting area contain grey, cracking clays, while beaches contain sand that ranges in colour from yellow to white. Assessment undertaken previous by Jacobs, found surface geology in the Millewa Forest to contain evaporite deposits which could act as a source of salt in the soil and unsaturated zones depending on their type, extent and solubility which is not known. Salt is also considered likely to accumulate on the surface of Douglas Swamp and Moira Lake following phases of drying out.

Geotechnical investigations within the Millewa Forest were previously undertaken in May 2022 for the Millewa Forest Supply Project. This included drilling boreholes in the vicinity of Moira Regulator, Nestrons Regulator and Pinchgut Regulator which are located close to the Proposal area. Results from these geotechnical investigations are summarised below:

Borehole BH140-RR

- Located near to PR1 access track immediately west of the existing Pinchgut regulator, to a depth of 8 m
- Groundwater not encountered
- Soil description — Alluvium comprising a top layer of silty clay to a depth of about 3.8 m, overlaying silty clay with sand from about 3.8 m to the end of the bore.

Borehole BH143-RR

- Located immediately south of Millewa River Road/ DS1 access track CAZ on the western bank of Nestrons Creek, to a depth of 8 m
- Groundwater not encountered
- Soil description — Alluvium comprising a top layer of sandy clay to a depth of about 0.6 m, overlaying silty clay from about 0.6 m to the end of the bore.

Borehole BH180-MO

- Located near to the eastern side of the existing Moira Regulator nearest to the MC1 access track CAZ, to a depth of 12 m
- Groundwater — Static water level at a depth of 11.5 m
- Soil description — Alluvium comprising a top layer of sandy clay fill material to a depth of about 0.5 m, overlaying silty clay (0.5 to 1.25 m), silty sand (1.25 to 1.8 m), silty clay (1.8 to 6.5 m), sandy clay (6.5 to 8.0 m) and sand from about 8.0 m to the end of the bore.

#### 6.1.1.3 Land and soil hazards

A search of the Australian Soil Resource Information System database carried out on 27 March 2025 did not identify any acid sulfate soils in the proposed CAZs.

A search of the eSPADE database using the DQS - Land and Soil Capability Mapping for NSW dataset was conducted on 29 May 2025 to identify the Proposal area's land and soil capability hazard. It identified that the majority of the Proposal area as having an overall hazard rating of 5 - severe limitations, while part of the MC1 CAZ area had a rating of 7 – extremely severe limitations. This was largely attributed to structural decline and waterlogging hazards which is indicative of very poor soil drainage in the area.

#### 6.1.1.4 Salinity

A search of the eSPADE database on 3 June 2025 using data derived from the NSW State-wide Hydrogeological Landscapes 2020 (First Edition) dataset was undertaken. The Proposal area was found to have a high overall salinity hazard rating. The overall salinity hazard rating is based on the combined ratings of land salinity, salt export, and stream Electrical Conductivity (EC) hazard.

The Proposal would enable the construction of the broader Millewa Forest Supply Project Works which would result in improvements in water delivery for important forest habitats and support the

naturally occurring wet and dry cycles of the floodplain environment. The impacts of the broader Millewa Forest Supply Project Works have already been assessed under a separate approval (3Rivers 2023).

As part of the assessment for the broader Millewa Forest Supply Project Works a preliminary salinity impact assessment was undertaken to assess potential salinity impacts on the Murray River (Jacobs 2023). The factors considered in the assessment included:

- Sources of salt in the area;
- Potential for the project to have hydraulic impact which could mobilize salts into local waterways;
- Whether hydraulic connection exists between salt sources and the Murray River.

The assessment found shallow groundwater to be low-risk salt source in the Millewa Forest as salinity levels range between 500mg/L (EC <850 uS/cm) and 1000 - 1500 mg/L (EC~1700 -2500 uS/cm).

Moira Lake and Douglas Swamp were determined to be a possible salt source due to the potential for salt accumulated in the lakebeds during dry periods to be mobilized by changes to the wetting and drying cycles of the lakes.

Moira Lake is a terminal system, such that salt cannot discharge downstream of the lake via surface flows. However, Douglas Swamp drains into Wild Dog creek, Edward River and eventually the Murray River, therefore significant hydraulic changes could result in salt eventually washing into the Murray River.

The broader Millewa Forest Supply Project Works would result in minor changes to local hydrology including the increase of seasonal inundated area of the Douglas Swamp from 60 to 80 ha - lasting for an additional three months. Conservative estimates of potential salt impacts on the Murray River associated with these hydraulic changes were found to be insignificant.

The Proposal would not result in additional hydrological impacts to those associated with the broader Millewa Forest Supply Project Works which have already assessed under a separate approval.

The Proposal is not anticipated to have any salinity impacts on the Murray River.

## 6.1.2 Impacts

### 6.1.2.1 Construction

The Proposal would result in the disturbance and excavation of surface and subsurface soils up to depths of about 2 m. All works locations are expected to be compacted with an approved fill and laying of crush rocked on flat to gently sloping terrain with minimal to no risk of rockfall.

The main risks to geology and soils would be increased erosion and mobilisation of sedimentation into surrounding areas and waterways from ground disturbance activities including:

- Stripping and stockpiling of topsoil
- Placement and compaction of fill and track grading
- Excavations and reprofiling of streambeds and banks

- Removal of vegetation and ground cover
- Movement of heavy construction vehicles and plant over exposed surfaces and storage of equipment

Other risks to soils would include soil contamination, ground compaction and bank destabilisation. These risks are expected to increase on steeper slopes, during strong winds, heavy rainfall or during flood events.

Proposed replacement structures have been positioned predominantly within already disturbed areas at the existing creek crossings, minimising the extent of stabilising vegetation required for removal during construction and thereby potential for bank destabilisation and associated erosion impacts.

Additionally, works are proposed to occur during dry/ low flow period, when high flow or flooding are unlikely to occur reducing the potential for erosion and sedimentation impacts to occur.

Potential erosion and sedimentation impacts associated with heavy rain fall and resultant runoff would be avoided and minimised through implementation of standard environmental management procedures. Likewise, soil contamination would also be avoided through standard environmental management procedures. In the unlikely event of unseasonal flooding during construction, additional safeguards to minimise sedimentation and erosion impacts may be required.

Ground compaction impacts are also unlikely to occur due to the short duration of the construction works, previous disturbance and proximity of the work sites to existing access roads.

Sedimentation and erosion impact during construction of the proposal are anticipated to be minor and temporary with the implementation of safeguards.

#### 6.1.2.2 Operation

As discussed in **Section 3.3,** design of the proposed crossing structures includes scour protection in the form of rock beaching to mitigate the risk of potential high velocity flows through/ over crossing structures causing downstream erosion and scouring. Additionally, the use of crushed rock/gravel on trafficable surfaces and improved cross drainage is anticipated to reduce the erosion potential of the trails from traffic, wind and water erosion. Site rehabilitation would also take place after construction prior to demobilisation which may include stabilisation and revegetation of disturbed areas of the work sites. Therefore, negative impacts to topography, geology or soils during operation are not anticipated.

### 6.1.3 Safeguards

Measures proposed to avoid, minimise or manage potential topography, geology and soils impacts as a result of the Proposal are detailed in **Table 6-1**.

Table 6-1 Safeguards for topography, geology and soil impacts

| Ref | Impact | Safeguard | Responsibility | Timing |
|---|---|---|---|---|
| T1 | Erosion and sediment | An erosion and sediment control plan will be prepared as part of the Contractor's CEMP. Site specific erosion and sediment control measures will be designed, implemented and maintained in accordance with relevant sections of *Managing Urban Stormwater: Soil and Construction Volume 1* (Landcom, 2004) (the Blue Book). The erosion and sediment control plan will provide details of the cofferdams to be installed upstream and downstream of instream work sites and the strategies that will be implemented to stabilise soils during the construction phase<br>Erosion and sediment control measures to stabilise ground surfaces disturbed during the construction phase and may include but not be limited to:<br>• Sediment fences, coir logs, catch drains and/or bunds along the perimeter of CAZ<br>• Stockpiling materials on site for the shortest time feasible<br>• Covers on truck loads when transporting loose material<br>• Covers on (or watering of) stockpiles<br>• Managing runoff from the work sites including uncovered stockpiles to ensure there is minimal contamination or sediment entering watercourses.<br>• Additionally contingencies for extreme weather or flood conditions during construction.<br>Where feasible, these control measures will be in place before any vegetation clearing or earthwork starts and will remain in place throughout the construction phase until the site rehabilitation plan has been fully implemented. | Contractor | Construction |

### 6.1.4 Residual impacts

Potential impacts relating to soils during the Proposal would be managed through implementation of controls prepared as part of the Contractor's CEMP. These controls would be designed, implemented and managed in accordance with relevant sections of Managing Urban Stormwater:

Soil and Construction Volume 1 (Landcom, 2004) (the Blue Book). The CEMP would also include contingency measures in the event of high flows in the Murray River during the construction works. Implementation of these safeguards would significantly reduce the Proposal's potential for soil contamination, erosion and sedimentation impacts. Together with the short duration of the works, any residual impacts would be temporary and negligible.

## 6.2 Surface water and drainage

### 6.2.1 Existing environment

#### 6.2.1.1 Catchment overview

On a regional scale, the Proposal area is located within the Central Murray River Catchment or Mid-Murray Catchment. The Central Murray River Catchment includes a 1,200 km section of the Murray River extending from the Hume Dam in the east, upstream of Albury, to the confluence of the Murray and Darling rivers at Wentworth, in western New South Wales (NSW DPIE, 2020b). The main water storages and infrastructure within the catchment include Yarrawonga, Torrumbarry and Stevens weirs. Flows in the Murray River under regulated flow conditions are sourced from Hume Dam, which releases water to Yarrawonga Weir and areas downstream (Ecological Associates and SKM, 2011).

The catchment also includes the Edward–Wakool river system, which is large anabranch network of interconnected streams, ephemeral creeks, flood runners and wetlands. Major regional towns and cities situated within the Central Murray River Catchment include Albury–Wodonga, Yarrawonga, Echuca–Moama, Deniliquin, Swan Hill and Mildura (NSW DPI, 2022).

Elevations within the catchment range from about 150 m at the Hume Dam to less than 50 m at the confluence of the Murray and Darling rivers. Average annual rainfall is about 700 millimetres at the eastern end of the central catchment but mostly ranges from 500 millimetres to 300 millimetres from east to west respectively, where rainfall is received predominantly in winter and spring (NSW DPIE, 2020b)

#### 6.2.1.2 Inundation regime of Millewa Forest

The Millewa Forest together with the Barmah Forest supports the largest River Red Gum forest in Australia and is the largest most intact freshwater floodplain system along the Murray River. When flooded, the Forests provides important feeding and breeding habitat for thousands of waterbirds. Regular inundation is essential for health and viability of the Forests and the complex ecosystem it supports.

Flows into the Millewa Forest occur as two main types of flow pattern:

- Channel flow, which features inundation of effluent streams, channels, depressions or leads. Occurs primarily as through-flows with limited overbank flow and ponding in depressions during moderate increases in flow; and

- Broad-area flooding, which features inundation of broad areas across the floodplain. These events occur as lateral, overbank flow from channels, which spread over broader areas and ponds in depressions or returns to channels when flow recedes (MDBC 2005; Maunsell 1992).

Before the Murray River system was regulated by dams and weirs, the Murray regularly spilled onto the floodplain in response to tributary inflows. These 'overbank' flows provided seasonal inundation for adjoining River Red Gum forests, filled wetlands, recharged underground aquifers and reconnected the braided network of ephemeral creeks and flood runners branching out across the floodplain. (Harrington, B and Hale, J 2011)

Low-level flows over summer and autumn under natural conditions gave the riverbanks time to drain, dry, revegetate and stabilise between seasonal high flows. This summer-autumn drying cycle was (and is) particularly important to maintain the structural integrity of the riverbanks and the capacity of the narrow river channel (Harrington, B and Hale, J 2011)

Presently, there is a large number of water regulating structures within the Millewa Forest and inundation frequency, extent and duration are partially controlled by their operation. These regulators are designed to minimise unseasonal flooding of the forests during the irrigation season and to allow water into the forest during the winter/spring. Under regulated conditions, all of the regulating structures are closed to maintain regulated flow within the Murray River in order to pass it downstream for consumptive use (Harrington, B and Hale, J 2011).

When flows in the Murray River downstream of Yarrawonga exceed the capacity of the Barmah Choke the regulators are progressively opened to allow water to enter the forest. Barmah Choke typically restricts the flow of the Murray River to about 7,000 megalitres per day with flooding commencing at flows of about 9,000 megalitres per day at Yarrawonga (Jones et al. 2022). The capacity for Murray River to flow through the choke before spilling over has been reduced from 11,500 ML/day in the 1980s to its current capacity.

At flows between 10 400 and 16 000 megalitres a day, channels, swamps and other low-lying areas, including about 16 percent of the forest, are inundated (Water Technology 2009). Larger floods of over 45 000 megalitres a day are required to inundate about 60 percent of the forest and it is only at flows greater than 60 000 megalitres a day that inundation of most of the forest occurs (Water Technology 2009). Large flow events vary in frequency and duration and are largely driven by large rainfall events.

Water retained within the Barmah-Millewa Forest varies depending on antecedent conditions. When the floodplain is dry, about 30 per cent of floodwaters are lost through seepage or floodplain storage, with about 70 per cent returning to the river. A flow-through system is achieved, once the floodplain receives sufficient water, where about 95 per cent of flows return to the river (MDBA, 2012).

#### 6.2.1.3 Waterways

Waterways within Millewa Forest include major perennial waterways, semi-permanent wetlands and lagoons, and highly ephemeral creeks and flood-runners. In general, many of these waterways have been modified from their original state for flood mitigation, river regulation, and irrigation water extraction. An overview of the main waterways and regulating structures within Millewa Forest is provided in **Figure 6-1.**

In total 32 of the proposed CAZs include a crossing located within a waterway, 19 are located within an ephemeral flood runner and eight are located within an ephemeral or intermittent waterway. These minor creeks and flood runners form anabranches of the main waterways within the Millewa Forest and provide connectivity between major channels and anabranches in the forest during higher flows and flood conditions. Additionally, five crossing sites are located within a permanent waterway such as Cornalla (Wild Dog) Creek and Swifts Creek.

Key waterways and hydrological features are described further below:

### Barmah Choke

Within the Yarrawonga Weir to Wakool Junction reach, the Murray River flows west from Yarrawonga through Tocumwal near to Mathoura, where it reaches an area known as the Barmah Choke.

The Barmah Choke is a narrow section of the River Murray that passes through the Barmah- Millewa Forest. While it is generally referred to as the Barmah Choke, it comprises 3 key flow constriction points, namely the Tocumwal Choke, the Barmah Choke, and the Edward Choke. At the Barmah Choke a large portion of the Murray River flows are directed into the Edward River (at the Edward River offtake) and Gulpa Creek (at the Gulpa Creek offtake).

### Edward River

The Edward River and Gulpa Creek bisect Millewa Forest in a north-south direction, exiting the river at Picnic Point. Floodplain flows also contribute to flow in the Edward River. The Edward River flows eventually reach the confluence with the Wakool River and re-enter the Murray River at Wakool Junction. While the main offtakes from the Murray River are the Edward River and Gulpa Creek, at higher flows, the Tuppal Creek and Bullatale Creeks convey breakaway flows from the Murray River downstream of Tocumwal to the Edward River, upstream of Deniliquin.

### Toupna Creek

Toupna Creek is a forest anabranch that receives water from the Murray River through the large Mary Ada Regulator and six (smaller) secondary regulators – House, Pinchgut, Potts, Fisherman's, Nine Panel and Nestrons (refer to **Figure 6-1**). Crossing site C16 is located on House Creek and C23 on Fisherman's Creek.

Toupna Creek flows in an easterly direction dispersing water across the Millewa Forest floodplain and providing flows downstream to Douglas Swamp via its anabranch Cornalla and Wild Dog Creek. Sites C28 and C36 are located at Cornalla Creek. A9 is located at Wild Dog Creek.

The site environmental water managers currently use the regulators on the waterways connecting the Murray River to Toupna Creek to manage flows in Toupna Creek and downstream to Douglas Swamp as well as for environmental watering of Millewa Forest.

### Douglas Swamp

Douglas Swamp is a wetland mosaic of open water, swamp, rush and reed land that provides important habitat, breeding and feeding opportunities for aquatic fauna and birds. Douglas Swamp is a known waterbird breeding area, one of the criterion for the site's Ramsar status. A hydrology

concern at Douglas Swamp is maintaining the water level in the swamp in late spring and early summer to ensure successful completion of bird breeding events.

Douglas Swamp is bisected by Wild Dog Creek, which conveys water from Toupna Creek to the swamp on its east side and drains freely into the Edward River through a number of culverts and bridge structures under the raised section of Millewa River Road on its western boundary.

### Moira Lake

Moira Lake is a terminal system which does not discharge downstream of the lake via surface flows. It receives flows from the Murray River via 4 inlets including Coolamon Creek, Bunnydigger Creek, Swifts Creek and Moira Creek. Flows into Moira Lake are managed by regulators on Bunnydigger, Swifts and Moira Creek (refer to **Figure 6-1**). A15 is located at the site of Swifts Regulator and A16 at Bunnydiggers Regulator.

Moira Lake Inlet Regulator pumps flows into the Moira cutting which is a constructed channel located on the southern edge of Moira Lake. The levels of the banks of the Moira cutting where it crosses Moira Lake determine the amount of inflow to the lake from the Murray River. The southern bank is consistently higher than the northern bank and is a greater hydraulic restriction on the floodplain than the northern bank. MC1 access track runs along the northern bank and provides access to the western side of Moira Lake Inlet Regulator (3Rivers, 2023b).

Moira Lake naturally would have experienced regular cycle of submergence in winter and spring and desiccation in summer and autumn that corresponds to the natural flood and recession patterns of the Murray River (Leslie and Lugg 1994).

Due to river regulation, Moira Lake experienced a total loss of its regular drying periods in summer and autumn and an overall reduction in the frequency, extent and duration of winter and spring flood events. By 1992, structures had been built on three of the four inlets to Moira Lake from the Murray River to try and reinstate more natural wetting and drying phase. However, without the fourth regulator, the years of inundation over summer and autumn allowed the environment to continue declining, impacting on waterbird and fish breeding. The existing Moira Lake Inlet Regulator was constructed in 1994 to isolate Moira Lake from the Murray River to allow the independent management of the water level (3Rivers, 2023b).

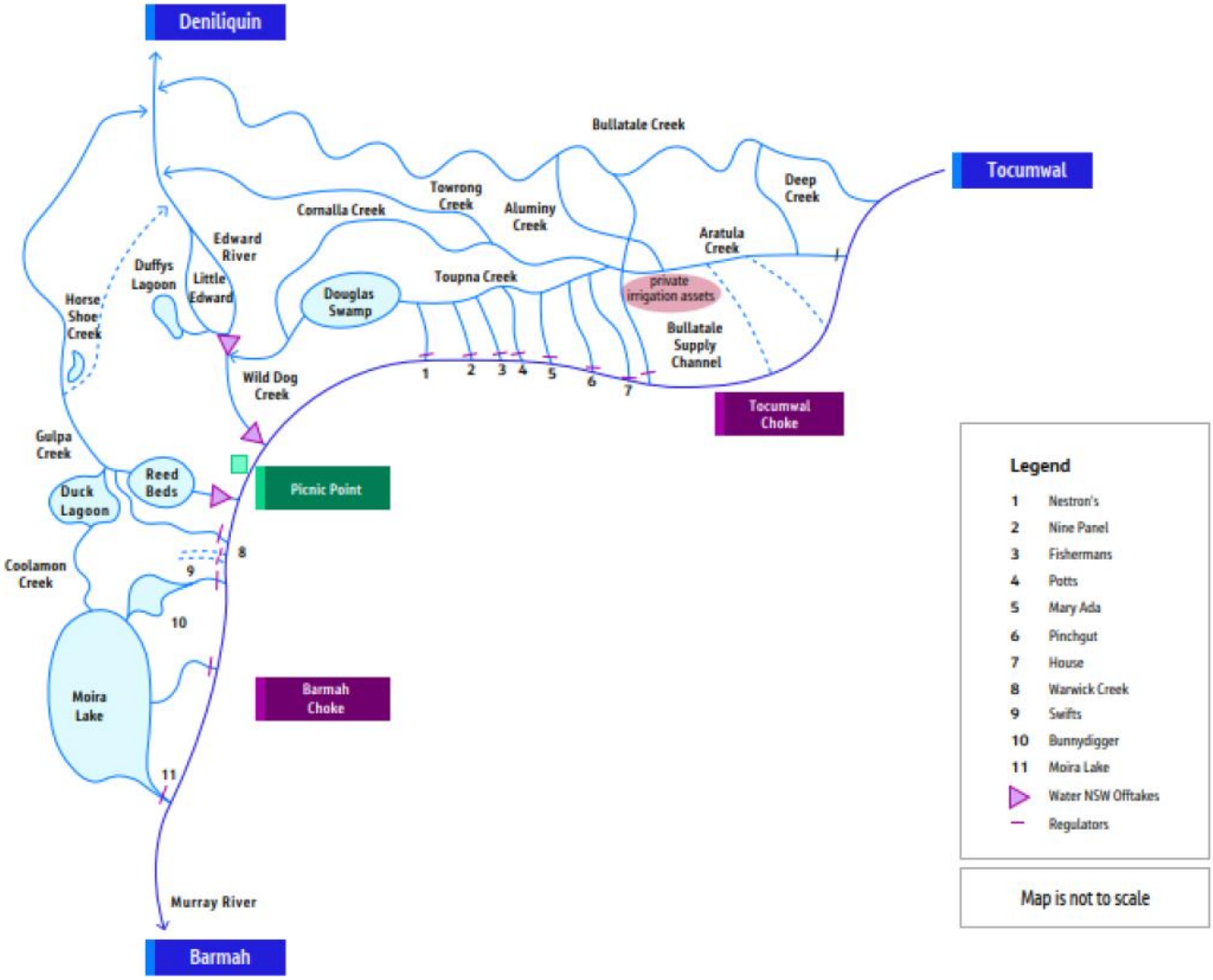



Figure 6-1 Schematic of key waterways and regulating structures in Millewa Forest

### 6.2.1.4 Water quality

Widespread water quality degradation occurred within Millewa Forest following a significant blackwater event in 2010–11 which was triggered by post-drought flooding and warm temperatures. Since then, environmental water has been delivered during cooler months to mitigate risks, and water quality is closely monitored during return flows to the river system.

Millewa Forest has been monitored at various locations and frequencies by the NPWS since 2010, including near some of the Proposal sites. Monitoring sites include those at Wild Dog Creek (about 3 km downstream of sites A9 and A10) and Cornalla Creek (Site C36). Water quality data for these monitoring sites consists of 59 samples collected fortnightly in the spring and summer at Wild Dog Creek and 23 samples collected typically in the summer only for some years for Cornalla Creek.

Key parameters measured include temperature, dissolved oxygen (DO), conductivity, and pH.

Overall dissolved oxygen in these waterways is low to very low with median concentrations falling below the lower recommended limit of 90 percent saturation for protection of aquatic ecosystems. The recommended pH range protection of aquatic ecosystems which is between 6.5 and 7.5 was

met at these sites. Additionally, both sites satisfied the 95th percentile for electrical conductivity of less than 580 µS/cm, as recommended by the Basin Plan.

As samples were seasonally targeted, the results may not be representative of water quality conditions in winter. Since Millewa Forest receives flows from the Murray River, initial water quality within the forest during the winter period would be representative of the Murray River at the time.

Temperature of the Murray River (as measured at Tocumwal Gauge 409202A between mid-1993 to 2024) is reflective of climatic conditions, with the highest average in January and February (around 24.7°C) and lowest in July and August (around 10 to 11°C). Electrical conductivity (EC) (as measured between August 2007 to 2024) is fairly consistent at between 50 to 72µS/cm, which meets the Basin Target (of 412µS/cm) to support healthy water dependent ecosystems (Water Act, 2007).

## 6.2.2 Impacts

### 6.2.2.1 Construction

#### Surface water flows

Instream works would be required for the removal and/ or installation of structures at all crossing sites. Impacts to stream hydrology and water quality during construction largely depends on the presence of water within each CAZ at the time of works. All construction works are planned to occur during low flow periods to avoid impacts to stream flows where possible.

Some surface water flows are expected to be present at sites located on permanent watercourse (A9, A15, A16, C16, C23). Water may be temporarily present at 8 ephemeral watercourses (C17, C18, C19, C28, C31, C36, C38, C39) in the form of localised pooling.

Installation of temporary bailey bridges at A9, A15 and A16 are not expected to require dry instream conditions and therefore use of temporary cofferdams is unlikely to be required. Given flows would be maintained and the short duration of the installation works, there would be no overall impact to stream hydrology at these sites.

Works at sites C16 and C23 may require the use temporary coffering to create dry instream conditions. Coffering would avoid blocking channels entirely where possible or would use a flow pump bypass system to maintain flows. Given flows would be maintained, and the short duration of the removal works, there would be no overall impact to stream hydrology.

Remaining work sites are expected to be dry, only minor localised dewatering may be required where isolated pools of water are present. The use of temporary cofferdams or other instream structures would not be required, negating any potential impacts to stream flow at these sites.

#### Water quality

The proposed construction works have the potential to impact surface water quality if not appropriately managed. Key impacts to surface water quality that must be managed include:

- Erosion and sedimentation at the work sites leading to sediment-laden runoff
- Dust, and litter being blown by the wind from construction sites
- Accidental spills and leaks of toxic or hazardous substances including fuels, oils and concrete washout

- Release of dewatering discharge into downstream waterways

The Proposals potential impact on surface water is described further in **Table 6-2.**

Table 6-2 Water quality impacts

| Risk to water quality | Impact description |
|---|---|
| **Erosion and sedimentation** | As discussed in **Section 6.1.2** construction activities such as vegetation clearing, construction traffic and earthworks increase the risk erosion and sedimentation, as they expose and/or disturb soils that may be mobilised to downstream environments via wind and stormwater runoff. Additionally, excavation of the creek banks can potentially cause short-term localised erosion should a large natural flow event occur during construction.<br><br>Erosion and sedimentation can negatively impact on water quality through increased water turbidity, elevated nutrient levels or release of other pollutants and toxic chemicals into waterways, which can impact on the growth of aquatic plant life and cause abnormalities or death in fish and other organisms.<br><br>No impacts associated with erosion and sedimentation are expected at those sites that will be dry when construction works occur. For those sites where water will be present impacts will be reduced through implementation of appropriate erosion and sediment controls to ensure minimal entrainment of sediment or pollutants into downstream or adjacent waterways. |
| **Dust and litter** | Dust and litter generated from a variety of sources during the construction of the proposed structures including materials transport, stockpiling, concrete works, removal of existing structures and use of construction sites also have potential to be released into waterways if not managed appropriately.<br><br>Safeguards would be implemented to minimise dust and litter during construction of the Proposal (refer to **Table 9-1**). |
| **Accidental spills and leaks** | Hazardous substances such as oils, fuels and concrete washout have potential to harm aquatic life and impact on downstream water users if released into waterways. Release of hazardous substances could occur accidentally during construction as a result of vehicle movements, or spills and leaks from construction plant and equipment.<br><br>However, as discussed in **Section 3.3.1** site establishment would include defined bunded areas for refuelling plant and concrete washout areas, which in conjunction with other safeguards (refer to **Table 9-1**) would make significant impacts surface water quality unlikely to occur. |
| **Dewatering** | As discussed in **Section 3.3.1**, localised dewatering may be required to remove isolated pools of water during construction. Dewatering discharge could result in the release of highly turbid water downstream of sites which could impact on visual amenity and aquatic ecosystems. To minimise the impact of this, works will take place during dry or low flow conditions.<br><br>During construction, dewatering discharges may be required to be pumped downstream and would be in accordance with dewatering requirements detailed in the construction soil and water management plan. |

| Risk to water quality | Impact description |
|---|---|
| | With the implementation of the safeguards outlined in **Table 6-3** the Proposal would not result in a significant impact to the water quality, particularly as dewatering would only occur during construction as required. |

#### 6.2.2.2 Operation

Many of the existing crossing structures in their current condition limit flows and fish passage within the channels they are located due to their narrow openings and/or the accumulation of debris and sediment. Generally, operation of the replacement structures is expected to reduce flow constraints and improve upon flow conditions within channels when compared to current conditions.

All crossing designs would continue to be pass flows and be overtopped during high flow conditions and therefore would not result in material changes to existing inundation regimes (i.e. changes to the frequency, timing, or duration of planned environmental watering events). As temporary bailey bridges would be removed following conclusion of the broader Millewa Forest Supply Project works, no operational impacts are anticipated.

The proposed rock crossing and box culvert structures would result in minor localised changes to in-channel flow conditions. However, this is not anticipated to result in adverse impacts to water quality. The impacts of which is discussed further below:

##### Rock Crossings

At sites where existing culverts will be replaced with a channel-width rock crossing, a greater cross-sectional area would be provided for flows to pass compared to existing conditions, thereby decreasing water velocities. This would align more closely with the natural velocities of channels and will improve fish passage compared to the existing crossings.

At sites where a rock crossing bypass is proposed to be constructed next to existing structures - this would not be adversely impact flows and the existing condition of fish passage or flow connectivity during bank flows would be retained.

##### Box culverts

Hydraflow reports were generated by Advance Survey Design using survey data from the existing channels and with the proposed box culvert designs for sites C16, C19, C38 and C39. Modelling results indicated that the flow velocities in the existing channel during bank full conditions were 0.54m/s at C16; 0.51m/s at C19, 0.42m/s at C38 and 0.31m/s at C39. Under the same flow conditions, culverts would be at full capacity and the maximum flow velocity through the culverts was modelled to be 0.47m/s at C16; 0.19m/s at C19, 0.42m/s at C38 and 0.45m/s at C39.

Hydraulic modelling of flow velocities through proposed culvert structures at C25a, C32, C23, C26, C33, C22 and C18 are not available. In a worst-case scenario, the culvert structures may result in increased flow through velocities. While an increase in flow velocity would reduce the potential for sediment build up in the culverts, it may increase the risk of downstream erosion, although this localised impact has been minimised through inclusion of scour protection as part of the designs.

Generally, box culvert designs would be constructed so that the bottom of the culvert is level with or below the existing level of the creek bed. Designs would also include rock beaching upstream and downstream of the culvert openings to minimise potential soil erosion and scouring impacts

If the new culverts are not maintained, there is potential for flows to be impacted through build-up of sediment and debris. However, this is unlikely to occur as the crossings would subject to routine maintenance in accordance with standard NPWS operational management procedures.

### 6.2.3 Safeguards

Measures proposed to avoid, minimise or manage potential surface water and drainage impacts as a result of the Proposal are detailed in **Table 6-3**.

Table 6-3 Safeguards for surface water and drainage impacts

| Ref | Impact | Safeguard | Responsibility | Timing |
|---|---|---|---|---|
| SW1 | Mobilisation of sediment into waterways | A comprehensive erosion and sediment management plan would be developed and implemented as part of the CEMP. The erosion and sediment management plan would be prepared for the Proposal with specific control measures outlined for each Proposal feature. Sediment control measures may include diversion drains, sediment fencing, coir logs, catch drains and perimeter bunds.<br>If required, siting of sediment basins should consider management of run-off from construction areas and use of captured water for dust suppression. The CEMP would also account for extreme weather or flood conditions during construction. Refer to safeguard T1 in Table 6-1. | Contractor | Construction |
| SW2 | Sedimentation and pollution from instream work | A Construction Soil and Water Management Plan will be prepared as part of the Contractor's CEMP. Site specific control measures will be designed, implemented and maintained in accordance with relevant sections of *Managing Urban Stormwater: Soil and Construction Volume 1* (Landcom, 2004) (the Blue Book).<br>Control measures to manage potential pollution or sedimentation impacts from | Contractor | Detailed design<br><br>Construction |

| Ref | Impact | Safeguard | Responsibility | Timing |
|---|---|---|---|---|
| | | instream works will include but not be limited to:<br>• Floating silt fences<br>• Cofferdams to create dry sites for instream works<br>• Undertake work when flows are low/dry for a suitable duration to complete work<br>• Contouring disturbed areas of waterway beds and banks to reinstate natural contours or otherwise in accordance with the design drawings<br>• Managing runoff from the work sites including uncovered stockpiles to ensure there is minimal contamination or sediment entering watercourses.<br>• Develop contingencies for unexpected moderate to high flows in the Murray River during instream works.<br>Control measures will be in place prior to commencement of any instream works. | | |
| SW3 | Accidental spills and leaks | An emergency spill response procedure will be prepared in accordance with the NSW DCCEEW's incident management protocols to minimise the impact of accidental spillages of fuels, chemicals and fluids during construction<br>Storage of hazardous materials such as oils and chemicals and refuelling activities will occur in bunded areas and as far from waterways as feasible. | Contractor | Detailed design<br>Construction |
| SW4 | Dewatering of in-stream work areas | A Construction Soil and Water Management Plan will be prepared as part of the CEMP and will outline procedures and water quality standards (ANZG, 2018) to be achieved prior to dewatering within the cofferdam areas (dry work areas), if required. | Contractor | Detailed design<br>Construction |
| SW5 | Water release from water | The Construction Soil and Water Management Plan will outline procedures | Contractor | Detailed design |

| Ref | Impact | Safeguard | Responsibility | Timing |
|---|---|---|---|---|
| | quality controls during construction | (as per the Blue Book) and water quality standards (ANZG, 2018) to be achieved prior to discharging water to waterways. | | Construction |
| SW6 | Water quality monitoring | Visual monitoring of local water quality (e.g. turbidity, hydrocarbon spills/slicks) will be carried out daily during construction to identify any potential spills or deficient erosion and sediment controls. Should a change in water quality appear evident samples will be collected and analysed. | Contactor | Construction |
| SW7 | Impacts to flows | Instream construction works are to occur only when flows are low/dry for a suitable duration prior to construction.<br>The Construction Soil and Water Management Plan to be prepared as part of the Contractor's CEMP will include contingencies for unexpected moderate to high flows in the Murray River during instream works. | Contractor | Construction |

### 6.2.4 Residual impacts

Implementation of the safeguards identified in Section 6.2.3 would significantly reduce the potential for mobilisation of sediments and other contaminants during construction. Implementation of the safeguards, together with the small CAZs and short duration of the works, means there is a low potential for adverse impacts to water quality during the construction phase of the Proposal. No impacts are anticipated for during operation. Residual impacts would be negligible.

## 6.3 Groundwater

### 6.3.1 Existing environment

The Proposal area is located on top of the eastern portion of the Lower Murray Alluvium (NSW DPI 2022). The Lower Murray Alluvium comprises two key groundwater aquifers:

- The Lower Murray Shallow Groundwater source which is up to about 70 m deep (correlating to the Shepparton Formation)
- The Lower Murray Deep Groundwater Source which is about 350 m deep and incorporates the Calivil Formation and the Renmark Group.

Groundwater salinity in the Lower Murray Alluvium is considered highly variable with electrical conductivity ranging from 200 to 65,000 µS/cm. Groundwater found within the Lower Murray

Shallow Groundwater source is typically saline and occurs at a depth of about 20 m below ground surface (NSW DPI 2022). Assessments carried out previously for the broader Millewa Forest Works project found shallow groundwater salinity levels to range between 500mg/L (EC <850 µS /cm) and 1000 - 1500 mg/L (EC~1700 -2500 µS /cm) in the Millewa Forest (Jacobs 2023)

The shallow aquifer is considered to be in hydraulic connection to major rivers, creeks, irrigation channels and other water bodies, with groundwater flowing from the east and discharge occurring in the western management zone of the aquifer (CSIRO 2008).

The Murray River between Tocumwal and upstream of the Goulburn River junction is considered to be a medium losing stream in which surface water flows to groundwater. Groundwater discharge to rivers occurs only where the water table is higher than river level and there is connection between the aquifer and the river (CSIRO 2008).

As discussed in **Section 6.1.1**, geotechnical investigations were undertaken in May 2022 for works assessed under the Millewa Forest Supply Project REF (3Rivers, 2023b). Groundwater was encountered in some of the boreholes drilled as detailed below:

**Borehole BH140-RR**

- Located near to PR1 access track immediately west of the existing Pinchgut Regulator, to a depth of 8 m
- Groundwater not encountered

**Borehole BH143-RR**

- Located immediately south of Millewa River Road/ DS1 access track CAZ on the western bank of Nestrons Creek, to a depth of 8 m
- Groundwater not encountered

**Borehole BH180-MO**

- Located near to the eastern side of the existing Moira Lake Inlet Regulator nearest to the MC1 access track CAZ, to a depth of 12 m
- Groundwater — Static water level at a depth of 11.5 m

## 6.3.2 Impacts

### Construction

Surface water flows are responsible for recharging groundwater supplies in the Millewa Forest with significant groundwater recharge occurring only during widespread inundation of the Forest. As discussed in **Section 6.2.2** the Proposal would not significantly impact on surface water flows i.e., increase or reduce inundation extent, frequency or duration therefore would not impact on the recharge of groundwater supplies.

Additionally, groundwater does not typically discharge to surface waters within the Millewa Forest (noting groundwater discharge can only occur where the water table is higher than surface water level) and groundwater depths nearest to the Proposal area are greater than 8 m below ground level. As the proposed works would not require excavation depths greater than 2 m and works

would occur during low flow period when groundwater levels are expected to be low - groundwater ingress is unlikely to occur during construction of the Proposal.

If groundwater is encountered during construction, dewatering may be required. Due to the temporary nature of work this is unlikely to significantly alter groundwater levels. Additionally, previous salinity assessments indicate that shallow groundwater to be low-risk salt source in the Millewa Forest, therefore discharge of dewatered groundwater is unlikely to result in significant salinity impacts to waterways in particularly to the Murray River (refer to **Section 6.1.1.4**).

While unlikely the Proposal could have a minor and temporary impact on groundwater if unexpectantly encountered during construction.

### Operation

As the Proposal would not adversely affect surface water flows during operation, minimal to no impacts on groundwater are anticipated.

## 6.3.3 Safeguards

One safeguard is proposed to avoid, minimise or manage potential risks to groundwater as a result of the Proposal and is detailed in **Table 6-4.**

Table 6-4 Safeguards for groundwater impacts

| Ref | Impact | Safeguard | Responsibility | Timing |
|---|---|---|---|---|
| GW1 | Unexpected groundwater ingress into the work sites during construction | Any groundwater that enters excavations within the CAZ will be tested and, if suitable, pumped into nearby waterways or otherwise pumped into a treatment pond and treated before being discharged into nearby waterways.<br>If treatment ponds are required, they must be located within the CAZ and their location, size and proposed uses must be documented in the construction soil and water management plan.<br>The CEMP will include water quality criteria for any water to be discharged into nearby waterways. | Contractor | Construction |

## 6.3.4 Residual impacts

With implementation of the measure detailed in **Table 6-4** the Proposal is not expected to impact groundwater. Residual impacts would be negligible.

# 6.4 Terrestrial biodiversity

The *Millewa Access Works - Biodiversity Assessment Report* (refer to **Attachment A**) assesses the potential terrestrial biodiversity impacts of the Proposal. The key findings of the assessment are summarised in the following sections.

## 6.4.1 Existing environment

### 6.4.1.1 Plant Community Types (PCTs)

As discussed in **Section 3.2**, the Proposal area covers an extent of up to about 32.5 ha, around 26.9 ha (83 per cent) of this area is comprised of non-native vegetation or of the disturbed/ bare ground that forms the existing access tracks. The remaining extent of the Proposal area includes up to about 5.7 ha (17 per cent) of native vegetation within the CAZs.

Native vegetation in the Proposal area consists of three Plant Community Types (PCTs):

- PCT 2 - River Red Gum-sedge dominated very tall open forest in frequently flooded forest wetland along major rivers and floodplains in south-western NSW
- PCT 5 - River Red Gum herbaceous-grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW South Western Slopes Bioregion and the eastern Riverina Bioregion
- PCT 237 - Riverine Western Grey Box grassy woodland of the semi-arid (warm) climate zone

**Table 6-5** provides details of the condition and area of each PCT within the proposed CAZs. The PCTs identified within both the CAZ and survey area are shown in **Figure 6-2** to **Figure 6-13.**

Table 6-5 Plant community types and vegetation area in each CAZ

| Vegetation zone | PCT / Condition Class | CAZ id | Area within CAZ (ha) |
|---|---|---|---|
| 1 | PCT 2 - High | C25/C25a | 0.23 |
| 2 | PCT 2 - Moderate-High | C34 | 0.18 |
| | | C35 | 0.18 |
| | | C36 | 0.18 |
| 3 | PCT 2 - Moderate | C17 | 0.07 |
| | | C31 | 0.08 |
| 4 | PCT 2 - Low-Moderate | A15 | 0.08 |
| 5 | PCT 2 - Low | A16 | 0.08 |
| | | PR1 | 0.1 |
| 6 | PCT 5 - High | C16 | 0.18 |
| | | C39 | 0.13 |

| Vegetation zone | PCT / Condition Class | CAZ id | Area within CAZ (ha) |
|---|---|---|---|
| 7 | PCT 5 - Moderate-High | A4 | 0.18 |
| | | C17 | 0.12 |
| | | C18 | 0.18 |
| | | C19 | 0.18 |
| | | C20 | 0.18 |
| | | C21 | 0.18 |
| | | C24/C24a | 0.21 |
| | | C29 | 0.18 |
| | | C30 | 0.18 |
| | | C37 | 0.21 |
| | | C40 | 0.12 |
| 8 | PCT 5 - Moderate | A10 | 0.36 |
| | | A9 | 0.24 |
| | | C22 | 0.18 |
| | | C23 | 0.18 |
| | | C26 | 0.29 |
| | | C28 | 0.17 |
| | | C33 | 0.18 ( |
| | | C40 | 0.06 |
| 9 | PCT 5 - Low | C31 | 0.11 ( |
| | | C32 | 0.18 |
| | | C41 | 0.18 ( |
| 10 | PCT 237 - Moderate | C38 | 0.14 |
| **Total PCT 2** | | | **1.18** |
| **Total PCT 5** | | | **4.36** |
| **Total PCT 237** | | | **0.14** |
| **Total Native Vegetation** | | | **5.7** |

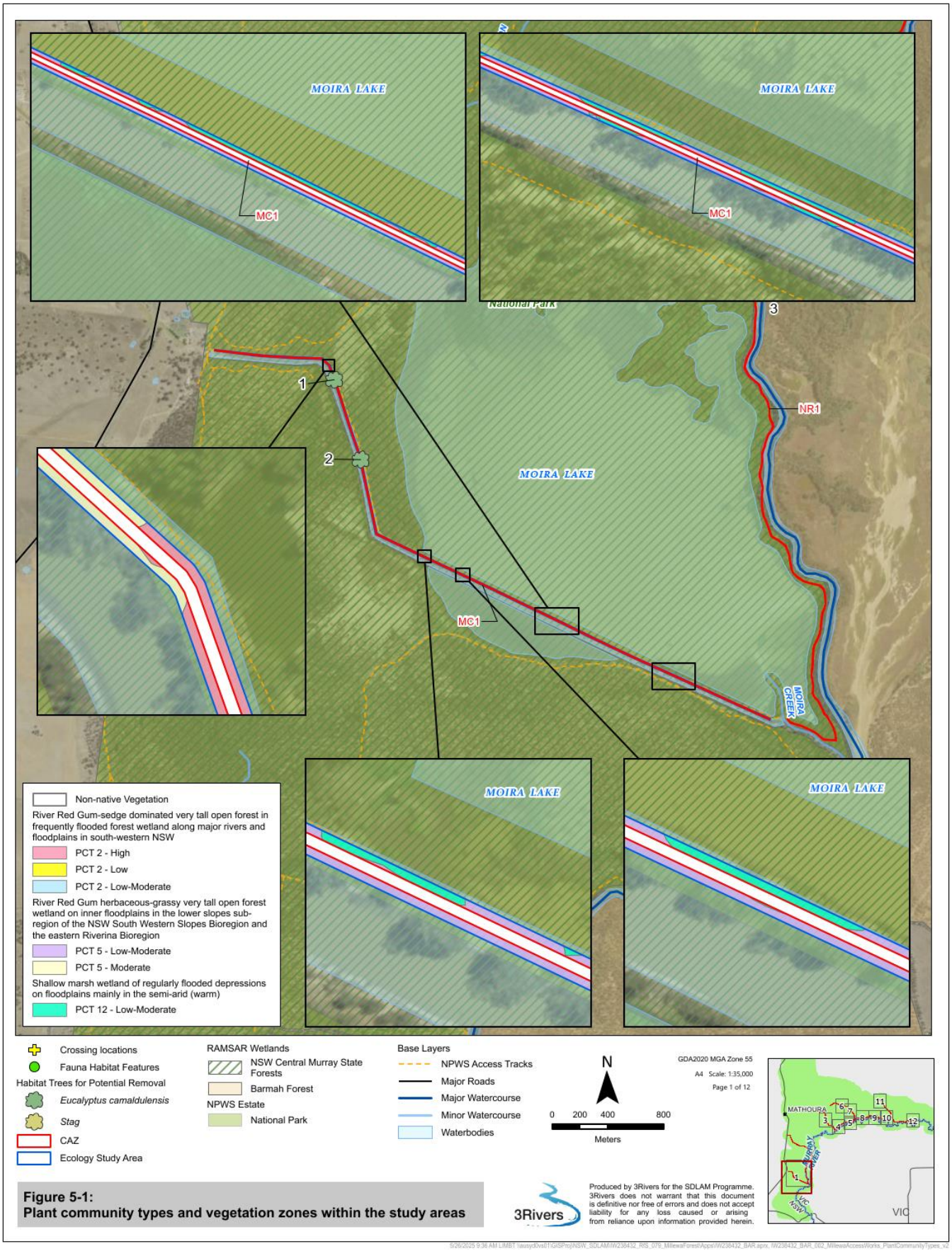



Figure 6-2 Plant community types and habitat trees within the CAZ and survey area

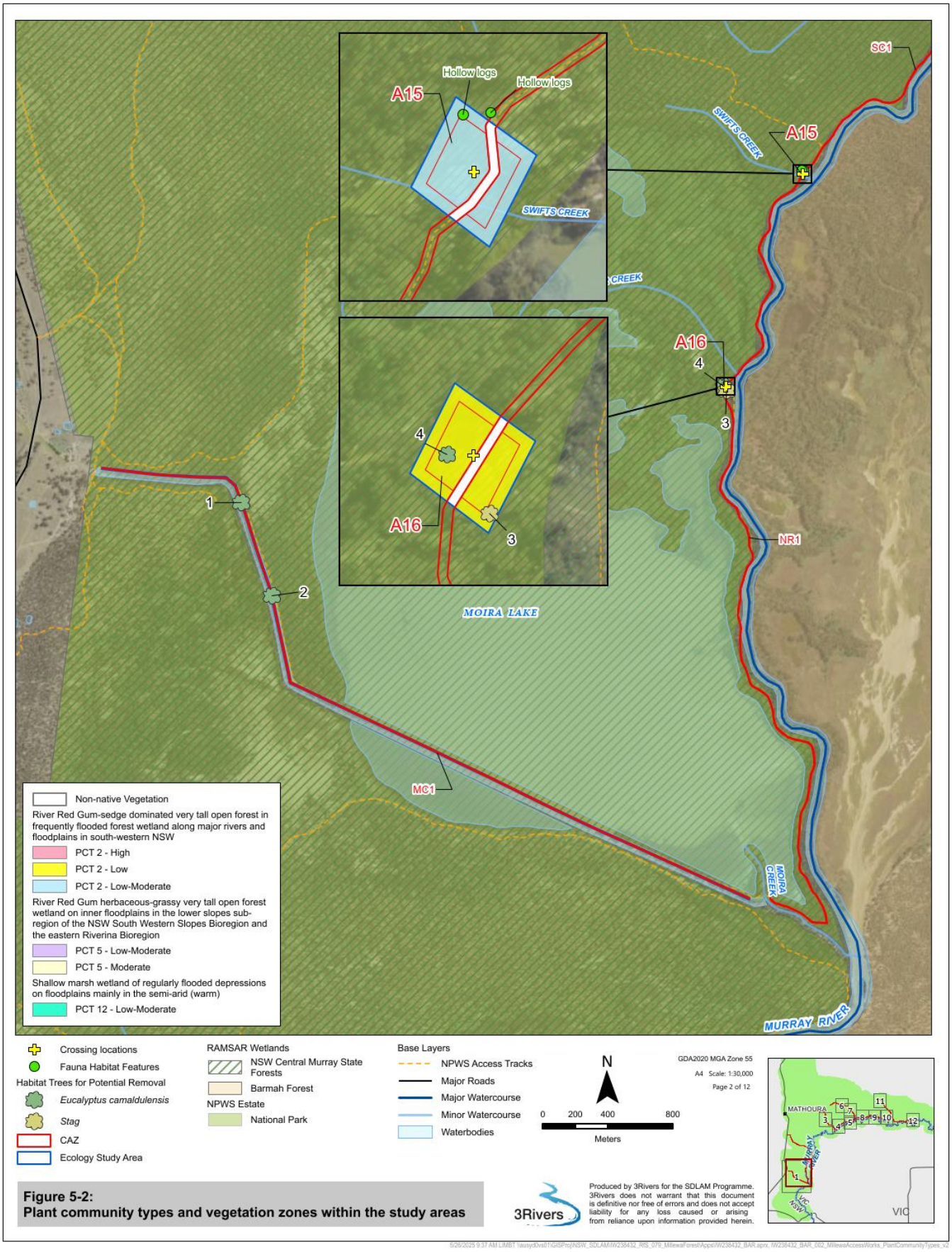



**Figure 5-2:**
**Plant community types and vegetation zones within the study areas**

Figure 6-3 Plant community types and habitat trees within the CAZ and survey area

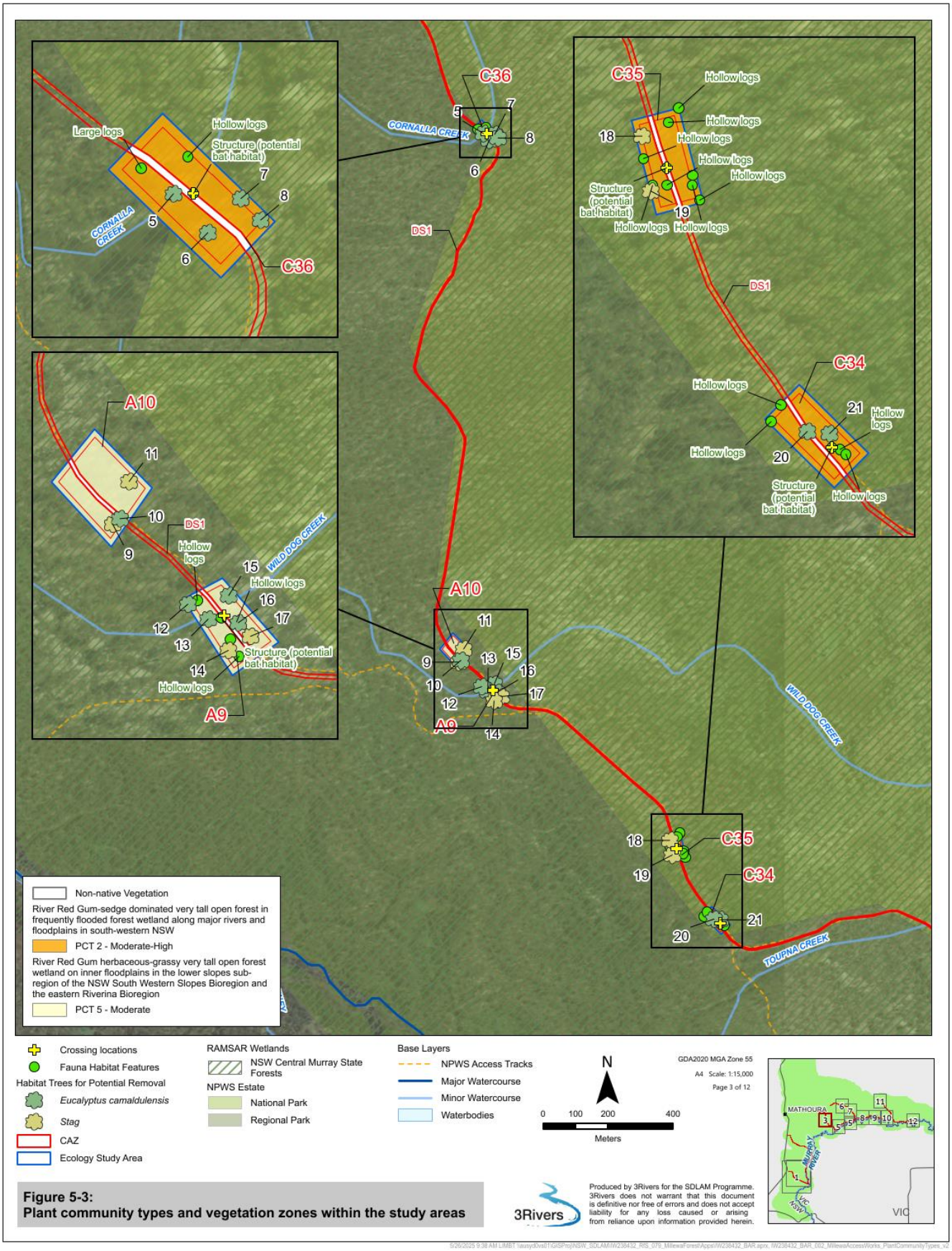



**Figure 5-3:**
**Plant community types and vegetation zones within the study areas**

Figure 6-4 Plant community types and habitat trees within the CAZ and survey area

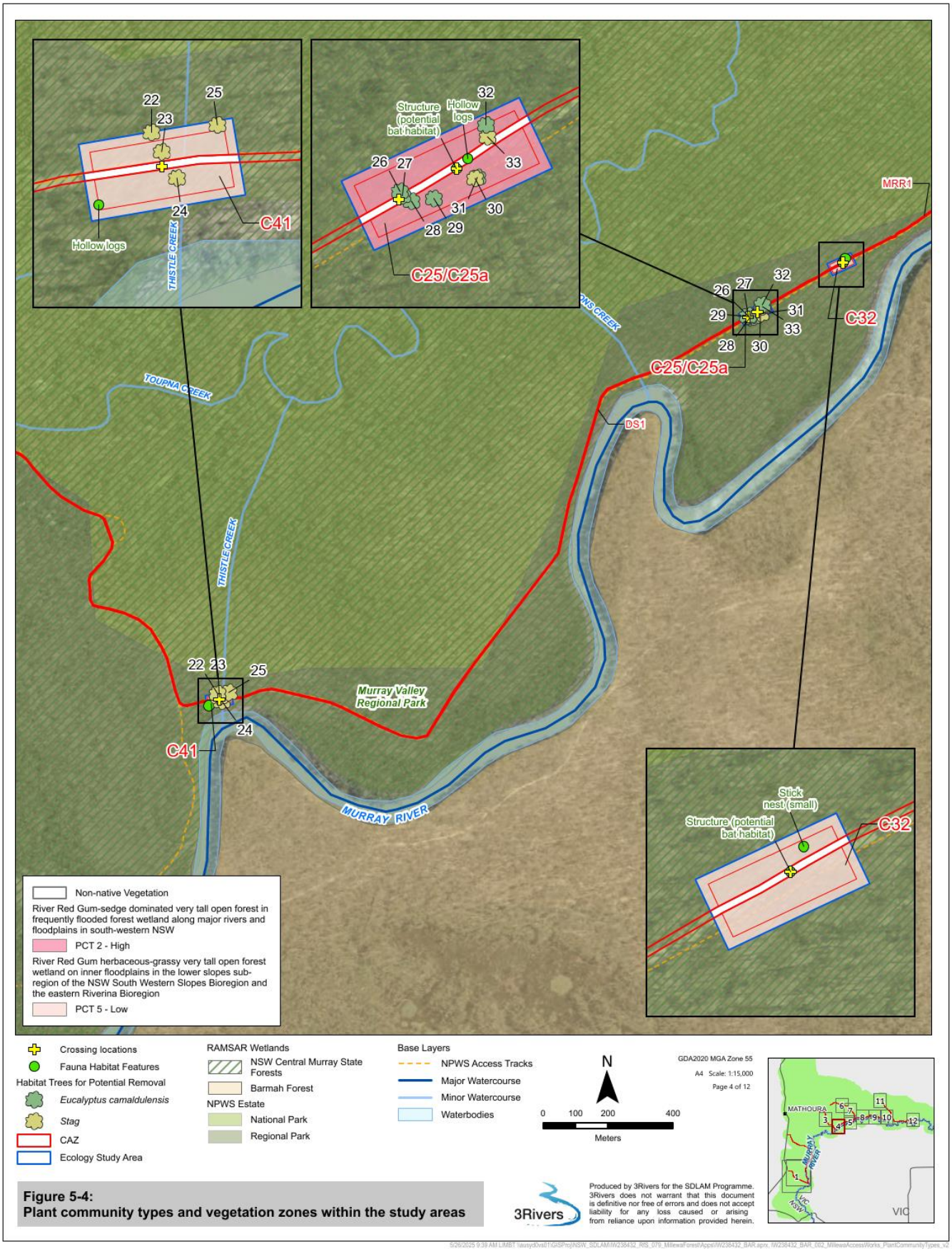



**Figure 5-4:**
**Plant community types and vegetation zones within the study areas**

Figure 6-5 Plant community types and habitat trees within the CAZ and survey area

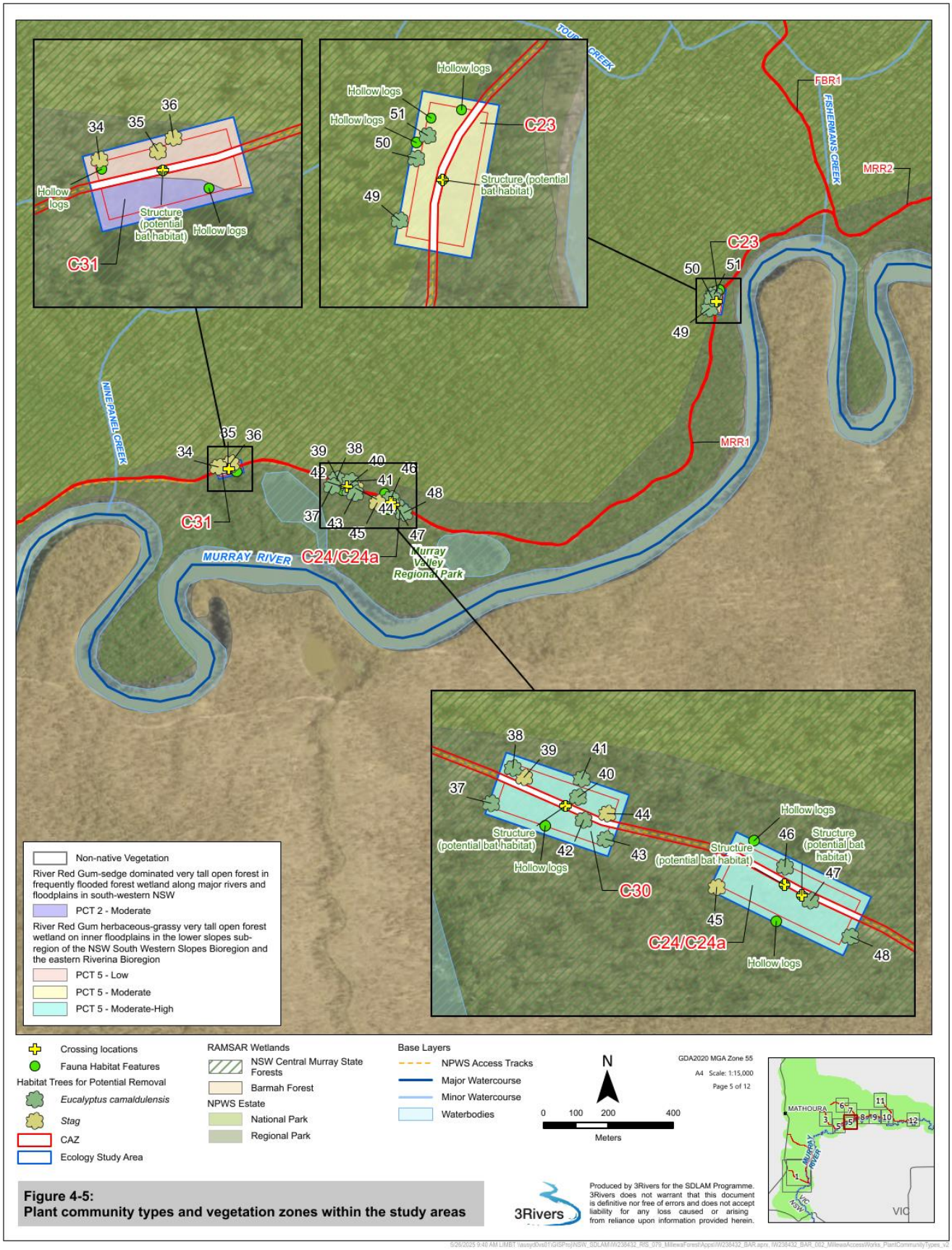



**Figure 4-5:**
**Plant community types and vegetation zones within the study areas**

Figure 6-6 Plant community types and habitat trees within the CAZ and survey area

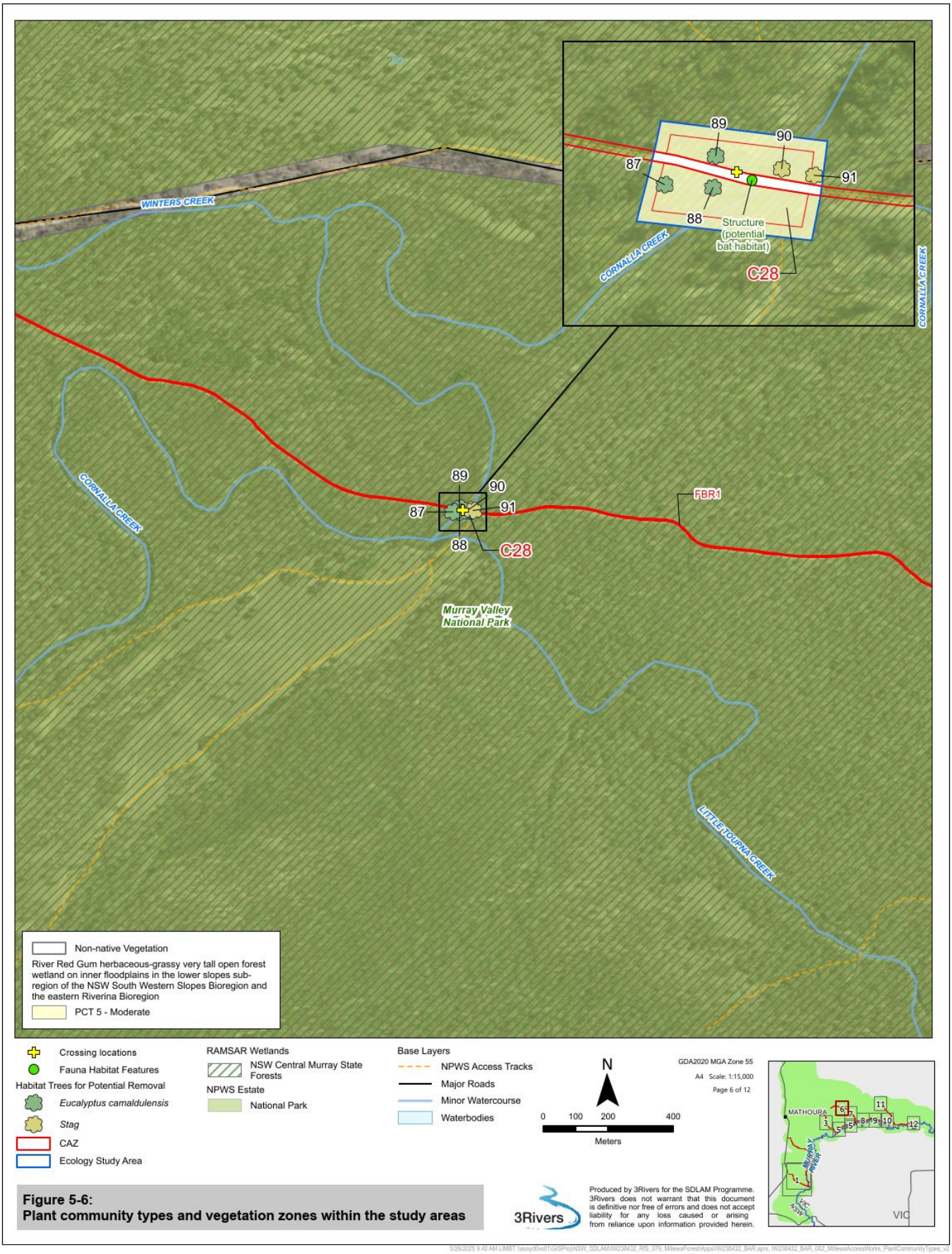



Figure 6-7 Plant community types and habitat trees within the CAZ and survey area

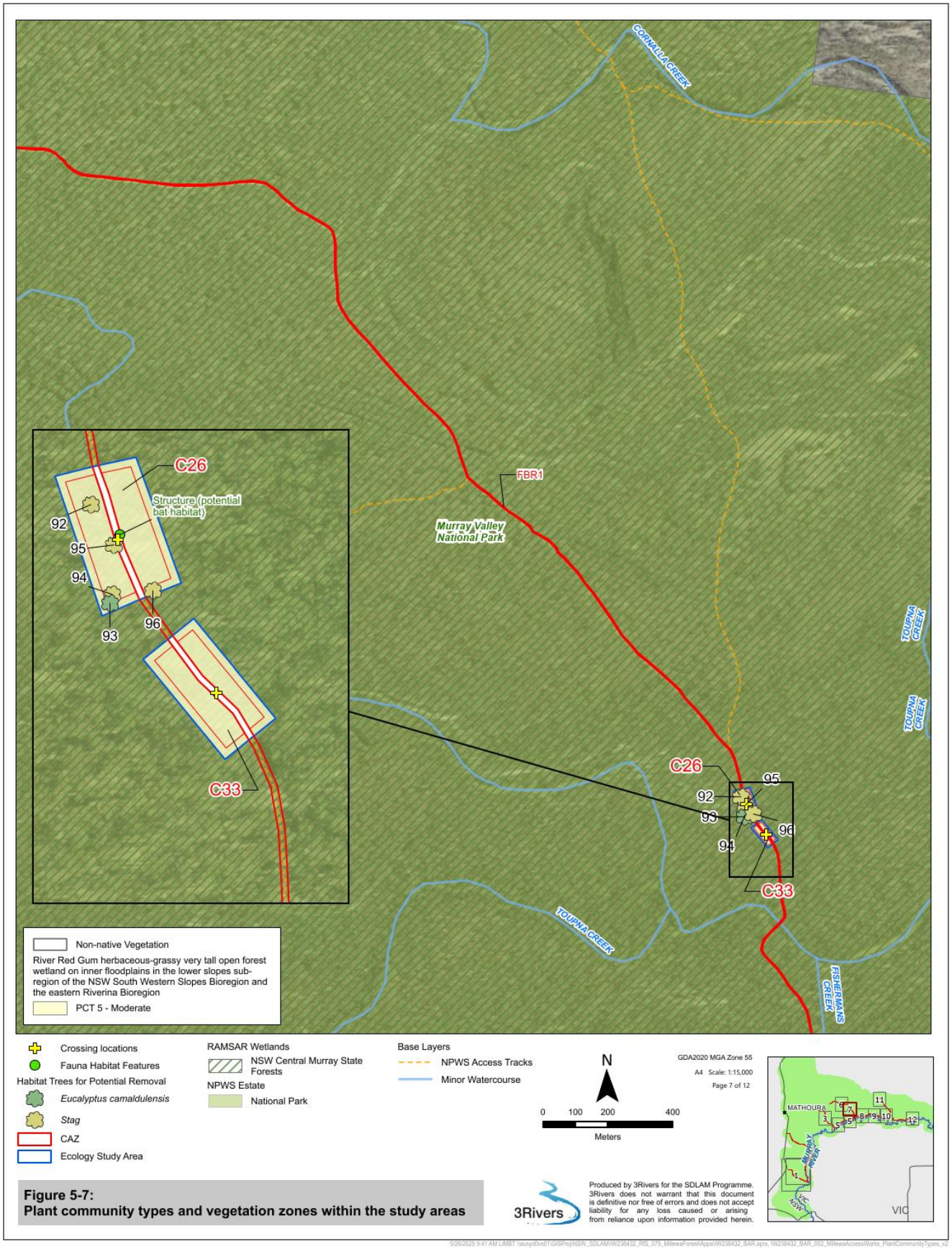



Figure 6-8 Plant community types and habitat trees within the CAZ and survey area

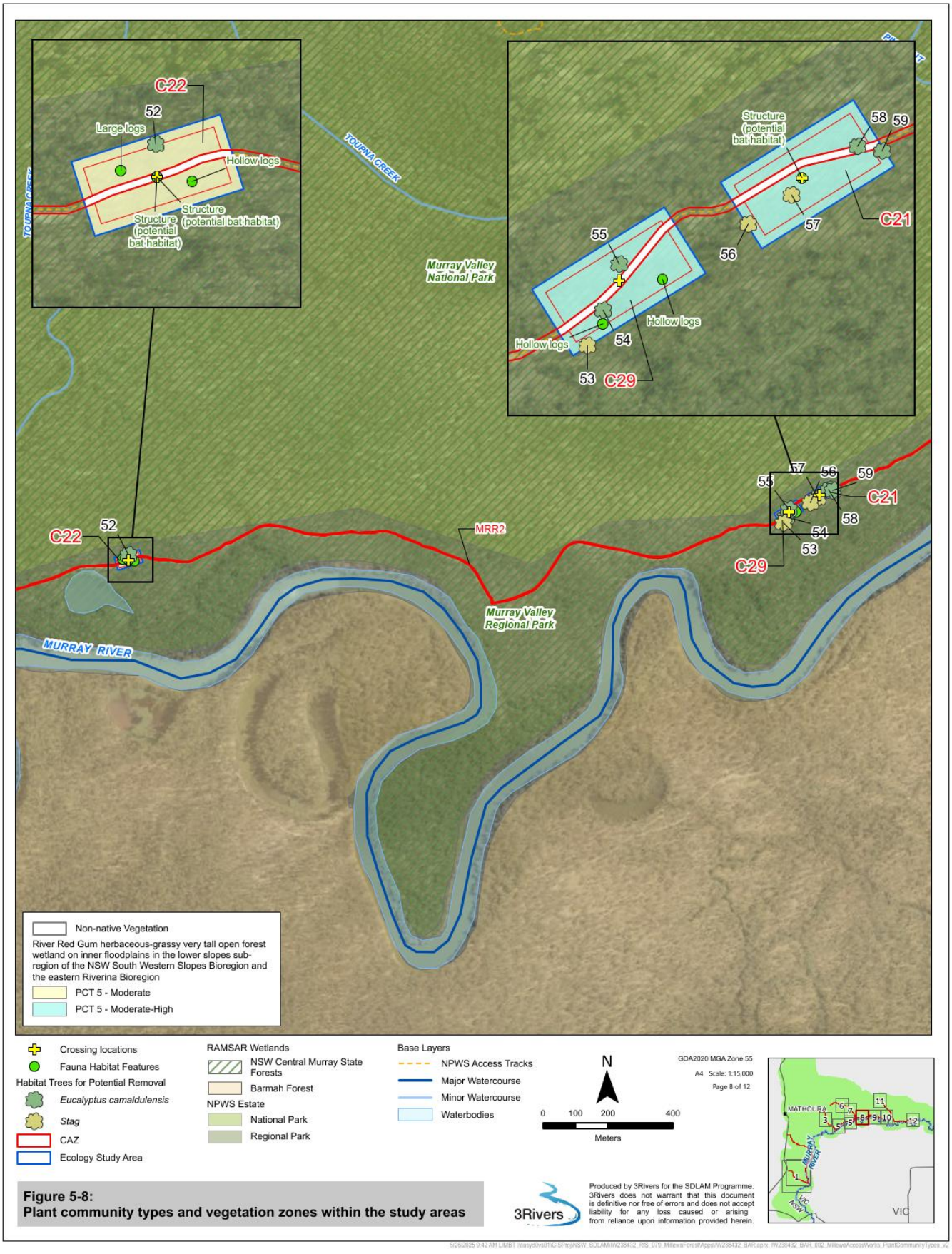



**Figure 5-8:**
**Plant community types and vegetation zones within the study areas**

Figure 6-9 Plant community types and habitat trees within the CAZ and survey area

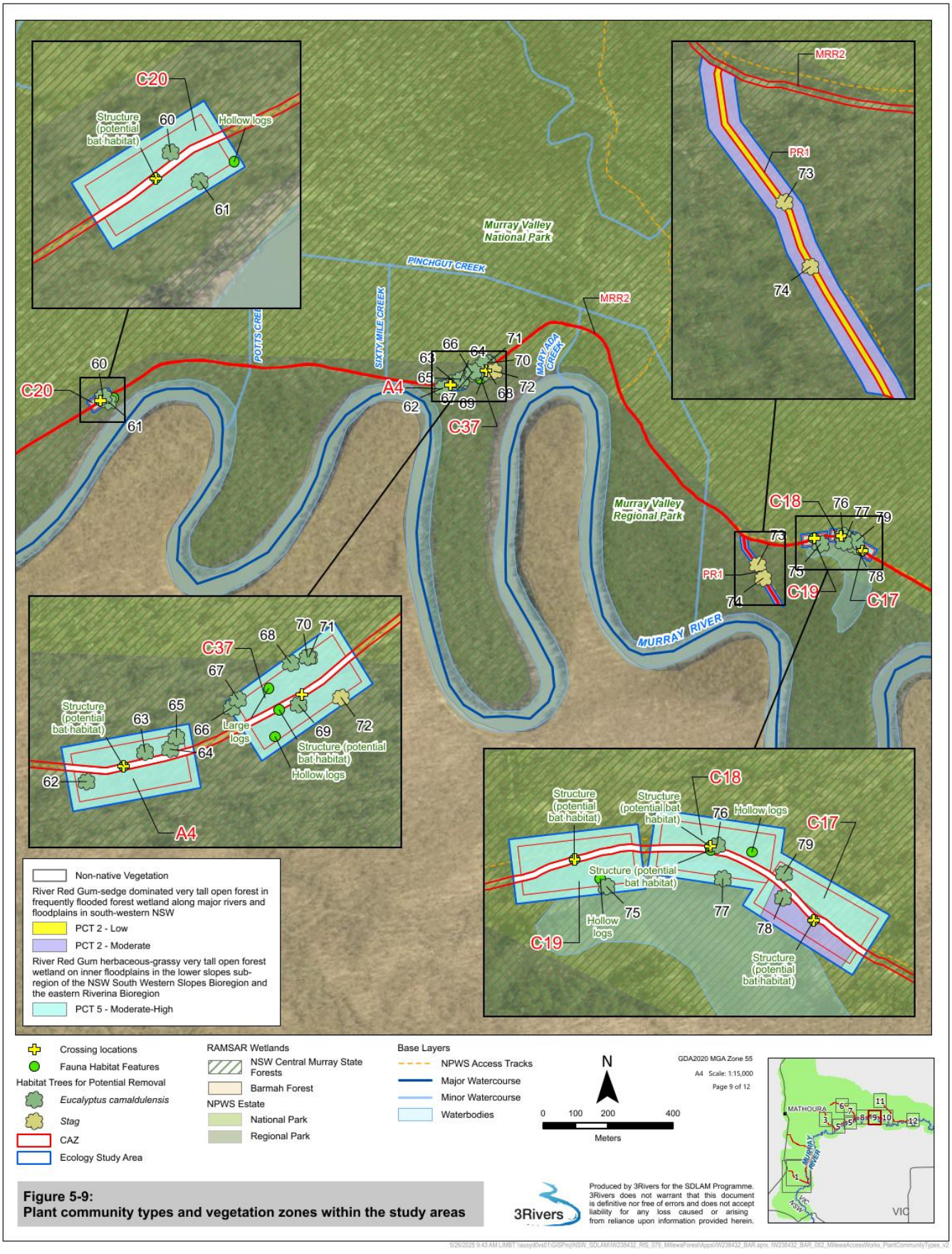



Figure 6-10 Plant community types and habitat trees within the CAZ and survey area

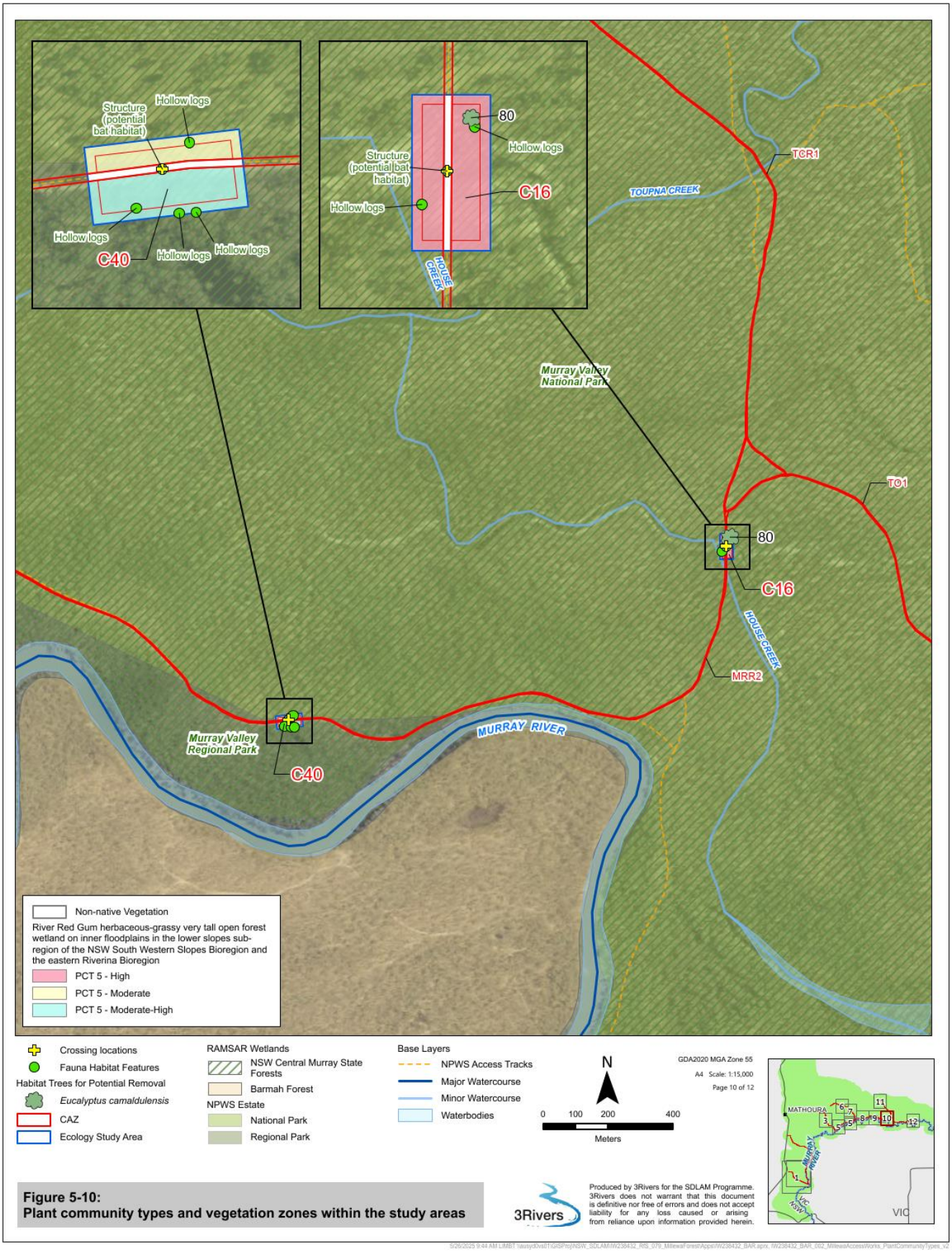



Figure 6-11 Plant community types and habitat trees within the CAZ and survey area

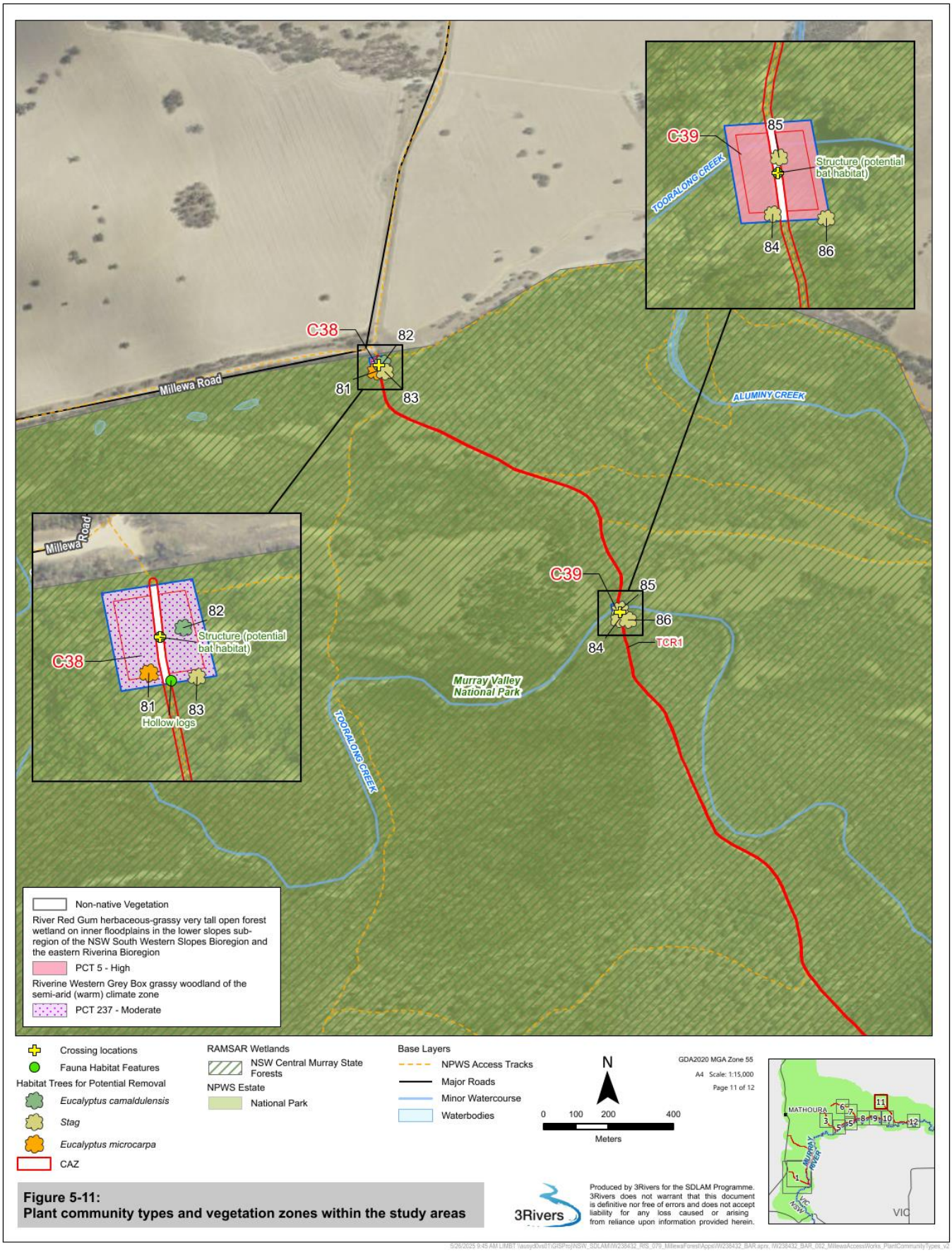



**Figure 5-11:**
**Plant community types and vegetation zones within the study areas**

Figure 6-12 Plant community types and habitat trees within the CAZ and survey area

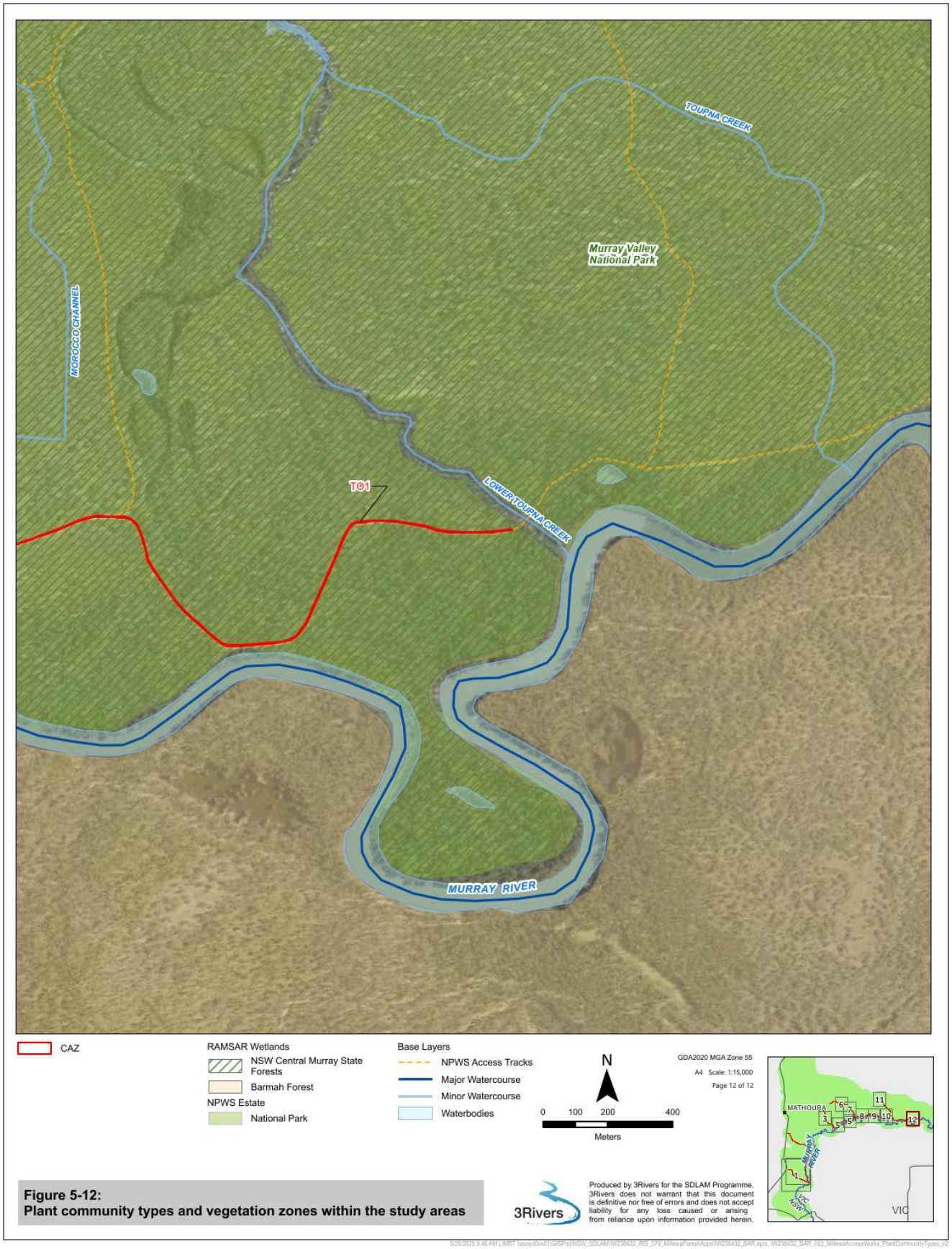



Figure 6-13 Plant community types and habitat trees within the CAZ and survey area

#### 6.4.1.2 Threatened Ecological Communities (TECs)

PCT 237 is associated with the two endangered Threatened Ecological Communities (TECs) including:

- Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia - Listed as Endangered under the EPBC Act
- Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions - Listed as Endangered under BC Act.

Vegetation within site C38 was identified as PCT 237 ( refer to **Figure 6-12**) and was considered to meet the diagnostic criteria the for BC Act listed TEC, but did not meet the criteria for the EPBC Act listed TEC (refer to **Attachment A** for further details).

#### 6.4.1.3 Groundwater Dependant Ecosystems (GDEs)

The majority of Millewa Forest is classified as a floodplain water body with a high potential for GDEs. PCT 2, PCT 5, and PCT 237 are potentially representative of terrestrial obligate GDEs (i.e., not entirely dependent on groundwater). While these PCTs may not be obligate GDEs in the strictest sense, i.e., not entirely reliant on groundwater at all times, they are likely to function as facultative GDEs that depend on groundwater during critical dry periods. In floodplain environments, vegetation often accesses groundwater via the capillary fringe, particularly when surface water or rainfall is insufficient to maintain ecological function. This access becomes essential during extended dry periods or in the absence of regular flooding, when groundwater may serve as the primary water source sustaining vegetation health.

As the plants within these PCTs may at times rely on capillary water in the soil that rises from the water table, any lowering of the water table may result in a reduction in groundwater availability and declining vegetation health during low rainfall periods. However, it is important to note that most of the works are expected to require only shallow excavation and are therefore unlikely to interact with the groundwater table.

#### 6.4.1.4 Wetland of International Importance (Ramsar wetlands)

Ramsar wetlands are rare or unique wetlands that are important for conserving biological diversity and are listed under the Convention on Wetlands of International Importance (Ramsar Convention).

The Proposal is located within the NSW Central Murray Forests Ramsar site, which spans 84,000-hectare. The Ramsar site comprises three geographically discrete but interrelated areas: Millewa Forest (comprising approximately 38,000 ha), Werai Forest, and Koondrook-Perricoota Forest.

An ecological character description of the Central Murray Forests Ramsar site (Harrington and Hale, 2011) was prepared based on the state of the site at the time of its listing in 2003 and it recognised the following important or unique values:

- The NSW Central Murray Forests are the largest complex of tree-dominated floodplain wetlands in southern Australia, making them a good representative of this wetland type in the Murray-Darling Basin bioregion
- There are eight threatened species, listed at the national and / or international scale supported by the wetlands within the Ramsar site, including: Australasian Bittern (*Botaurus poiciloptilus*), Australian Painted Snipe (*Rostratula benghalensis*), Murray Hardyhead (*Craterocephalus*

*fluviatilis*), Superb Parrot (*Polytelis swainsonii*), River Swamp Wallaby-grass (*Amphibromus fluitans*), Trout Cod (*Maccullochella macquariensis*), Silver Perch (*Bidyanus bidyanus*), and Murray Cod (*Maccullochella peelii*)

- The Ramsar site provides habitat for 11 species of wetland bird listed under international migratory agreements (JAMBA, CAMBA and ROKAMBA) and is important for colonial nesting waterbirds, supporting breeding of thousands of birds during times of inundation. It is also important for breeding of native fish. In addition, the permanent rivers and wetlands within the site are recognised as drought refuge for native fauna in the semi-arid region
- The Ramsar site provides migratory routes between habitat in the Murray River, anabranches and floodplains and is considered important for recruitment of native fish (King et al., 2007).

The Proposal is also within 10 km of the Barmah Forest Ramsar site, located in Victoria on the southern side of the Murray River opposite Millewa Forest. Millewa Forest, together with Barmah Forest in Victoria, form Australia's largest area of River Red Gum Forest.

An overview of the proximity of Ramsar wetlands within 500 km radius of Proposal areas is provided in **Table 6-6**.

Table 6-6 Proximity of Ramsar wetlands to Proposal area

| Ramsar wetlands | Proximity within locality |
|---|---|
| **Banrock Station Wetland Complex** | 400 – 500 km upstream from Ramsar site |
| **Barmah Forest** | This Ramsar site is located adjacent from the Proposal to the south of the Murray River |
| **Gunbower Forest** | 20 – 30 km upstream from Ramsar site |
| **Hattah-Kulkyne Lakes** | 200 – 300 km upstream from Ramsar site |
| **NSW Central Murray Forests** | The Proposal is within this Ramsar site |
| **Riverland** | 300 – 400 km upstream from Ramsar site |
| **The Coorong, and Lakes Alexandrina and Albert Wetland** | 400 – 500 km upstream from Ramsar site |

#### 6.4.1.5 Threatened fauna species and habitat

On the basis of regional records, reports and modelled habitat, a total of 53 threatened fauna species have been previously recorded or highlighted as having potential to occur within about 10 km of the Proposal. This includes 40 birds, 8 mammals, 2 frogs, 2 reptiles and one insect. Of these, 19 threatened fauna species are considered as having a moderate to high likelihood of occurring within Proposal area including seven EPBC Act listed species (refer to **Table 6-7**).

No threatened fauna species were recorded during the field surveys undertaken in Millewa Forest between 10 and 13 February 2025. No targeted fauna surveys were undertaken, although opportunistic surveys were conducted over the entirety of the survey area.

All sites within the survey area offer potential habitat features for threatened fauna species. These habitat features include:

- **Eucalyptus riparian woodland** which provides suitable habitat for the identified threatened terrestrial fauna species. Woodland bird species are expected to utilise vegetation for foraging, roosting and nesting.
- **Hollow-bearing trees (HBTs)** which provide important nesting and roosting opportunities for hollow dependent fauna such as the Superb Parrot and forest owls. When hollow-bearing trees collapse or shed limbs they also provide hollow logs that serve as important foraging substrates and shelter sites. Up to 96 trees were recorded within the survey area as HBTs or potential HBTs. A total of 65 of these trees were located with the Proposal CAZ. **Table 6-8** provides further details of each of these trees and recommended protection zones for retainment.
- **Mature trees** which provide abundant food resources such as flowers, nectar, fruit and seeds and a complex substrate that supplies diverse habitats for invertebrate populations.
- **Existing culverts and bridges** which provide potential roosting habitat for microbat species such as the Southern Myotis and the Yellow-bellied Sheathtail-bat. Suitable culverts for the Southern Myotis, include those with a height greater than 1.5m, and contain suitable microhabitats in the form of lift holes and crevices. At time of inspection structures located at A4, C24, C25, C30 and C41 were mostly blocked by accumulation of soil and debris. Therefore, were considered unlikely to provide potential habitat for these species. Existing regulators at site A15 and A16 were also considered unlikely to provide potential habitat.

Other habitat features such as fallen logs, stick nests, aquatic habitats, and low-quality emergent vegetation were also present within Proposal area (refer to **Section 6.5** for more detail).

Table 6-7 Habitat suitability assessment for threatened fauna species

| Species | EPBC Act | BC Act | Likelihood of occurrence |
|---|---|---|---|
| **Woodland birds** | | | |
| Blue-winged Parrot (*Neophema chrysostoma*) | V | V | Moderate likelihood at most sites with the exception of the Moira Cutting Access Track. |
| Bush Stone-curlew (*Burhinus grallarius*) | - | E | Moderate likelihood at most sites with the exception of the Moira Cutting Access Track. |
| Diamond Firetail (*Stagonopleura guttata*) | V | V | Moderate likelihood at most sites with the exception of the Moira Cutting Access Track. |
| Dusky Woodswallow (*Artamus cyanopterus cyanopterus*) | - | V | High likelihood with the opportunity to utilise habitats at all sites. |
| Flame Robin (*Petroica phoenicea*) | - | V | Moderate likelihood at most sites with the exception of the Moira Cutting Access Track. |
| Gilbert's Whistler (*Pachycephala inornata*) | - | V | Moderate likelihood at most sites with the exception of the Moira Cutting Access Track. |
| Grey-crowned Babbler (*Pomatostomus temporalis temporalis* (eastern subspecies)) | - | V | Moderate likelihood at most sites with the exception of the Moira Cutting Access Track. |

| Species | EPBC Act | BC Act | Likelihood of occurrence |
|---|---|---|---|
| Hooded Robin (south-eastern form (*Melanodryas cucullata cucullata*)) | E | V | Moderate likelihood at most sites with the exception of the Moira Cutting Access Track. |
| Scarlet Robin (*Petroica boodang*) | - | V | High likelihood at most sites with the exception of the Moira Cutting Access Track. |
| Southern Whiteface (*Aphelocephala leucopsis*) | V | V | Moderate likelihood at most sites with the exception of the Moira Cutting Access Track. |
| Superb Parrot (*Polytelis swainsonii*) | V | V | High likelihood at most sites with the exception of the Moira Cutting Access Track. |
| Varied Sittella (*Daphoenositta chrysoptera*) | - | V | High likelihood at most sites with the exception of the Moira Cutting Access Track. |
| **Wetland birds** | | | |
| Australasian Bittern (*Botaurus poiciloptilus*) | E | E | Moderate likelihood to occur within the Moira Cutting Access Track. Most other sites comprising of PCT 2 and PCT 5 may provide suitable habitat when water and emergent aquatic vegetation is present. |
| **Raptors** | | | |
| Little Eagle (*Hieraaetus morphnoides*) | - | V | Moderate likelihood to occur within all habitat types present. |
| Square-tailed Kite (*Lophoictinia isura*) | - | V | Moderate likelihood to occur within all habitat types present. |
| White-bellied Sea-Eagle (*Haliaeetus leucogaster*) | - | V | Moderate likelihood to occur within all habitat types present. |
| **Mammals** | | | |
| Koala (*Phascolarctos cinereus* (combined populations of Queensland, New South Wales and the Australian Capital Territory)) | E | E | Moderate likelihood at most sites with the exception of the Moira Cutting Access Track. |
| Southern Myotis (*Myotis macropus*) | - | V | Moderate likelihood to occur within all habitat types present. |
| Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*) | - | V | Moderate likelihood to occur within all habitat types present. |

*E = Endangered, V = Vulnerable*

Table 6-8 Hollow bearing trees located within the survey area and reccomended tree protection zones

| Tree ID | Tree species | Location | Diameter at breast height (DBH)(m) | Number of hollows | Hollow size range (cm) | Approx. height above ground to the nearest hollow (m) | Tree Protection Zone(m) |
|---|---|---|---|---|---|---|---|
| 1 | *Eucalyptus camaldulensis* | Within CAZ | 3.00 | 5 | 10 | 5 | 36.0 |
| 2 | *Eucalyptus camaldulensis* | Within CAZ | 1.80 | 4 | 10 | 5 | 21.6 |
| 3 | Stag | Outside of CAZ | 0.70 | 1 | 20 | 10 | 8.4 |
| 4 | *Eucalyptus camaldulensis* | Within CAZ | 0.80 | 1 | 20 | 18 | 9.6 |
| 5 | *Eucalyptus camaldulensis* | Within CAZ | 1.15 | 2 | 10 - 20 | 9 | 13.8 |
| 6 | *Eucalyptus camaldulensis* | Within CAZ | 0.90 | 2 | 20 | 12 | 10.8 |
| 7 | *Eucalyptus camaldulensis* | Outside of CAZ | 1.10 | 3 | 10 | 7 | 13.2 |
| 8 | *Eucalyptus camaldulensis* | Outside of CAZ | 1.00 | 2 | 10 - 20 | 8 | 12.0 |
| 9 | Stag | Within CAZ | 1.00 | 1 | 30 | 10 | 12.0 |
| 10 | *Eucalyptus camaldulensis* | Within CAZ | 0.70 | 3 | 10 | 12 | 8.4 |
| 11 | Stag | Within CAZ | 0.60 | 1 | 30 | 15 | 7.2 |
| 12 | *Eucalyptus camaldulensis* | Outside of CAZ | 0.70 | 1 | 10 | 20 | 8.4 |
| 13 | *Eucalyptus camaldulensis* | Within CAZ | 2.50 | 4 | 10 - 30 | 10 | 30.0 |
| 14 | Stag | Within CAZ | 0.60 | 3 | 10 - 20 | 8 | 7.2 |
| 15 | *Eucalyptus camaldulensis* | Within CAZ | 1.00 | 4 | 10 - 30 | 20 | 12.0 |
| 16 | *Eucalyptus camaldulensis* | Within CAZ | 2.00 | 6 | 10 - 50 | 8 | 24.0 |
| 17 | Stag | Within CAZ | 0.70 | 2 | 10 - 30 | 15 | 8.4 |

| Tree ID | Tree species | Location | Diameter at breast height (DBH)(m) | Number of hollows | Hollow size range (cm) | Approx. height above ground to the nearest hollow (m) | Tree Protection Zone(m) |
|---|---|---|---|---|---|---|---|
| 18 | Stag | Within CAZ | 1.40 | 4 | 10 - 30 | 15 | 16.8 |
| 19 | Stag | Outside of CAZ | 1.30 | 1 | 30 | 9 | 15.6 |
| 20 | *Eucalyptus camaldulensis* | Within CAZ | 1.85 | 4 | 15 - 35 | 13 | 22.2 |
| 21 | *Eucalyptus camaldulensis* | Within CAZ | 0.95 | 1 | 15 | 17 | 11.4 |
| 22 | Stag | Outside of CAZ | 0.50 | 1 | 15 | 20 | 6.0 |
| 23 | Stag | Within CAZ | 1.65 | 4 | 10 - 50 | 5 | 19.8 |
| 24 | Stag | Within CAZ | 0.50 | 1 | 30 | 6 | 6.0 |
| 25 | Stag | Outside of CAZ | 0.80 | 1 | 10 | 25 | 9.6 |
| 26 | *Eucalyptus camaldulensis* | Within CAZ | 1.00 | 2 | 20 - 30 | 8 | 12.0 |
| 27 | *Eucalyptus camaldulensis* | Within CAZ | 1.20 | 3 | 20 - 40 | 5 | 14.4 |
| 28 | *Eucalyptus camaldulensis* | Within CAZ | 1.60 | 3 | 15 - 30 | 10 | 19.2 |
| 29 | *Eucalyptus camaldulensis* | Within CAZ | 1.90 | 3 | 20 - 40 | 17 | 22.8 |
| 30 | Stag | Within CAZ | 0.70 | 2 | 30 | 6 | 8.4 |
| 31 | *Eucalyptus camaldulensis* | Within CAZ | 1.50 | 2 | 20 - 30 | 10 | 18.0 |
| 32 | *Eucalyptus camaldulensis* | Within CAZ | 0.35 | 2 | 15 - 20 | 6 | 4.2 |
| 33 | Stag | Within CAZ | 0.40 | 1 | 15 | 9 | 4.8 |
| 34 | Stag | Outside of CAZ | 0.60 | 1 | 20 | 10 | 7.2 |

| Tree ID | Tree species | Location | Diameter at breast height (DBH)(m) | Number of hollows | Hollow size range (cm) | Approx. height above ground to the nearest hollow (m) | Tree Protection Zone(m) |
|---|---|---|---|---|---|---|---|
| 35 | Stag | Within CAZ | 0.70 | 2 | 10 - 15 | 12 | 8.4 |
| 36 | Stag | Outside of CAZ | 0.70 | 2 | 20 - 30 | 5 | 8.4 |
| 37 | *Eucalyptus camaldulensis* | Outside of CAZ | 0.85 | 2 | 20 - 40 | 16 | 10.2 |
| 38 | *Eucalyptus camaldulensis* | Within CAZ | 0.70 | 1 | 20 | 15 | 8.4 |
| 39 | Stag | Within CAZ | 0.60 | 3 | 10 - 15 | 4 | 7.2 |
| 40 | *Eucalyptus camaldulensis* | Within CAZ | 0.80 | 3 | 10 - 35 | 15 | 9.6 |
| 41 | *Eucalyptus camaldulensis* | Outside of CAZ | 0.80 | 2 | 20 | 15 | 9.6 |
| 42 | *Eucalyptus camaldulensis* | Within CAZ | 1.40 | 4 | 10 - 30 | 20 | 16.8 |
| 43 | *Eucalyptus camaldulensis* | Outside of CAZ | 1.00 | 1 | 20 | 20 | 12.0 |
| 44 | Stag | Within CAZ | 0.90 | 2 | 30 | 5 | 10.8 |
| 45 | Stag | Outside of CAZ | 0.95 | 2 | 20 - 30 | 20 | 11.4 |
| 46 | *Eucalyptus camaldulensis* | Within CAZ | 1.15 | 1 | 20 | 25 | 13.8 |
| 47 | *Eucalyptus camaldulensis* | Within CAZ | 1.40 | 4 | 10 - 30 | 15 | 16.8 |
| 48 | *Eucalyptus camaldulensis* | Outside of CAZ | 1.10 | 1 | 20 | 10 | 13.2 |
| 49 | *Eucalyptus camaldulensis* | Outside of CAZ | 0.90 | 3 | 10 - 20 | 10 | 10.8 |
| 50 | *Eucalyptus camaldulensis* | Outside of CAZ | 1.20 | 1 | 15 | 14 | 14.4 |
| 51 | *Eucalyptus camaldulensis* | Within CAZ | 0.90 | 1 | 10 | 11 | 10.8 |

| Tree ID | Tree species | Location | Diameter at breast height (DBH)(m) | Number of hollows | Hollow size range (cm) | Approx. height above ground to the nearest hollow (m) | Tree Protection Zone(m) |
|---|---|---|---|---|---|---|---|
| 52 | *Eucalyptus camaldulensis* | Outside of CAZ | 1.25 | 2 | 10 | 18 | 15.0 |
| 53 | Stag | Outside of CAZ | 0.70 | 3 | 20 - 30 | 5 | 8.4 |
| 54 | *Eucalyptus camaldulensis* | Within CAZ | 1.00 | 2 | 10 | 15 | 12.0 |
| 55 | *Eucalyptus camaldulensis* | Within CAZ | 0.70 | 1 | 20 | 13 | 8.4 |
| 56 | Stag | Outside of CAZ | 1.00 | 3 | 30 - 50 | 7 | 12.0 |
| 57 | Stag | Within CAZ | 1.10 | 1 | 50 | 3 | 13.2 |
| 58 | *Eucalyptus camaldulensis* | Within CAZ | 0.60 | 1 | 25 | 12 | 7.2 |
| 59 | *Eucalyptus camaldulensis* | Outside of CAZ | 0.70 | 1 | 20 | 14 | 8.4 |
| 60 | *Eucalyptus camaldulensis* | Within CAZ | 0.60 | 1 | 10 | 15 | 7.2 |
| 61 | *Eucalyptus camaldulensis* | Within CAZ | 0.80 | 1 | 10 | 10 | 9.6 |
| 62 | *Eucalyptus camaldulensis* | Within CAZ | 1.10 | 2 | 10 - 20 | 13 | 13.2 |
| 63 | *Eucalyptus camaldulensis* | Within CAZ | 1.00 | 1 | 10 | 20 | 12.0 |
| 64 | *Eucalyptus camaldulensis* | Within CAZ | 0.70 | 1 | 10 | 17 | 8.4 |
| 65 | *Eucalyptus camaldulensis* | Within CAZ | 0.80 | 1 | 30 | 16 | 9.6 |
| 66 | *Eucalyptus camaldulensis (fissure)* | Outside of CAZ | 0.80 | - | - | 10 | 9.6 |
| 67 | *Eucalyptus camaldulensis* | Outside of CAZ | 0.70 | 1 | 15 | 20 | 8.4 |
| 68 | *Eucalyptus camaldulensis* | Outside of CAZ | 0.45 | 1 | 20 | 4 | 5.4 |

| Tree ID | Tree species | Location | Diameter at breast height (DBH)(m) | Number of hollows | Hollow size range (cm) | Approx. height above ground to the nearest hollow (m) | Tree Protection Zone(m) |
|---|---|---|---|---|---|---|---|
| 69 | *Eucalyptus camaldulensis* | Within CAZ | 0.60 | 1 | 15 | 10 | 7.2 |
| 70 | *Eucalyptus camaldulensis* | Within CAZ | 0.60 | 1 | 10 | 12 | 7.2 |
| 71 | Stag | Within CAZ | 0.50 | 1 | 10 | 12 | 6.0 |
| 72 | Stag | Outside of CAZ | 1.30 | 6 | 15 - 40 | 8 | 15.6 |
| 73 | Stag (fissure) | Within CAZ | 0.70 | - | - | - | 8.4 |
| 74 | Stag (fissure) | Within CAZ | 0.70 | - | - | - | 8.4 |
| 75 | *Eucalyptus camaldulensis* | Outside of CAZ | 2.20 | 8 | 10 - 40 | 10 | 26.4 |
| 76 | *Eucalyptus camaldulensis* | Within CAZ | 1.90 | 3 | 10 - 20 | 9 | 22.8 |
| 77 | *Eucalyptus camaldulensis* | Outside of CAZ | 1.30 | 1 | 15 | 7 | 15.6 |
| 78 | *Eucalyptus camaldulensis* | Within CAZ | 1.00 | 1 | 20 | 7 | 12.0 |
| 79 | *Eucalyptus camaldulensis* | Within CAZ | 1.30 | 2 | 20 | 10 | 15.6 |
| 80 | *Eucalyptus camaldulensis* | Within CAZ | 1.00 | 3 | 20 - 30 | 7 | 12.0 |
| 81 | *Eucalyptus microcarpa* | Within CAZ | 0.85 | 4 | 10 - 30 | 10 | 10.2 |
| 82 | *Eucalyptus camaldulensis* | Within CAZ | 0.90 | 5 | 15 - 30 | 5 | 10.8 |
| 83 | Stag | Outside of CAZ | 0.90 | 1 | 10 | 6 | 10.8 |
| 84 | Stag | Outside of CAZ | 1.00 | 3 | 20 - 35 | 10 | 12.0 |
| 85 | Stag | Within CAZ | 1.00 | 1 | 30 | 20 | 12.0 |

| Tree ID | Tree species | Location | Diameter at breast height (DBH)(m) | Number of hollows | Hollow size range (cm) | Approx. height above ground to the nearest hollow (m) | Tree Protection Zone(m) |
|---|---|---|---|---|---|---|---|
| **86** | Stag | Outside of CAZ | 1.00 | 2 | 20 - 30 | 20 | 12.0 |
| **87** | *Eucalyptus camaldulensis* | Within CAZ | 0.50 | 1 | 10 | 8 | 6.0 |
| **88** | *Eucalyptus camaldulensis* | Within CAZ | 0.60 | 1 | 20 | 25 | 7.2 |
| **89** | *Eucalyptus camaldulensis* | Within CAZ | 1.80 | 3 | 30 - 50 | 20 | 21.6 |
| **90** | Stag (fissure) | Within CAZ | 1.20 | - | - | - | 14.4 |
| **91** | Stag (fissure) | Outside of CAZ | 0.90 | - | - | - | 10.8 |
| **92** | Stag | Within CAZ | 0.60 | 1 | 10 | 8 | 7.2 |
| **93** | *Eucalyptus camaldulensis* | Within CAZ | 1.00 | 1 | 25 | 15 | 12.0 |
| **94** | Stag (fissure) | Within CAZ | 0.70 | - | - | - | 8.4 |
| **95** | Stag (fissure) | Within CAZ | 0.70 | - | - | - | 8.4 |
| **96** | Stag | Outside of CAZ | 1.90 | 3 | 10 - 30 | 13 | 22.8 |

#### 6.4.1.6 Threatened flora species and habitat

On the basis of regional records, reports and modelled habitat, a total of 18 listed threatened flora species have been previously recorded or having potential to occur within about 10 km of the of the Proposal area. The only one of these species considered to have potential to occur within the CAZs is Floating Swamp Wallaby-grass (*Amphibromus fluitans*), which is listed as vulnerable under the EPBC Act and BC Act. Floating Swamp Wallaby-grass is known to occur in swamp margins within the Murray Valley National Park and Regional Park. Only small portions of the CAZs were considered to support suitable habitat for this species. A specimen was observed at a known reference site to confirm its growth activity and life history at time of survey. Dedicated searches were carried out for Floating Swamp Wallaby-grass but no plants were identified.

There was a lack of suitable habitat present within the CAZs for the other threatened flora species previously recorded or having potential to occur in the vicinity of the Proposal, and therefore these species were assigned a low likelihood of occurrence.

#### 6.4.1.7 Migratory species

Twelve migratory bird species are predicted to occur within about 10 km of the Proposal based on the EPBC Act PMST (NSW DCCEEW, 2025a) and NSW BioNet Atlas database (NSW DCCEEW, 2025b). No migratory species were detected during the field surveys carried out for the Proposal.

While some migratory bird species would use the Proposal locality on occasion, the Proposal area is not recognised as 'important habitat' as defined under the EPBC Act *Policy Statement 1.1 Significant Impact Guidelines* (Department of the Environment, 2013), in that the Proposal CAZs 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.

Based on the above considerations, the Proposal is unlikely to impose a significant effect on any of the listed migratory species predicted to occur within or near to the CAZs.

### 6.4.2 Impacts

#### 6.4.2.1 Construction

##### Removal of vegetation and habitat

The Proposal would involve clearing of up to 5.7 ha of native vegetation within the CAZs including:

- 1.18 ha of PCT 2
- 4.36 ha of PCT 5
- 0.14 ha of PCT 237

The proposed vegetation to be impacted would include up to 65 hollow bearing trees and 0.14 ha of a BC act listed TEC.

This loss of vegetation is considered a worst-case scenario, as the contractor would be required to limit the area of vegetation cleared within the CAZ to only that required to carry out the construction of structures. Removal of vegetation would be also minimised through utilising existing cleared access tracks, equating to 26.9 ha of non-native vegetation within the CAZ.

Additionally, work areas and laydown areas would be strategically placed in locations requiring minimal disturbance, primarily within existing cleared areas. Retainment of the TEC, hollow-bearing trees and large mature trees within the CAZ would be prioritised where practicable. Importantly, the natural regeneration of vegetation would be possible during operation.

### Threatened ecological communities

The Proposal would also remove up to 0.14 ha of the BC Act listed TEC present within the C38 CAZ. However, the removal of vegetation within this CAZ would be avoided where possible, and natural regeneration of vegetation would be possible during operation. The Proposal would not impact on this TECs ability to regenerate from the seedbank.

### Threatened species

Impacts to threatened species during construction are primarily related to the removal of habitat.

There were no threatened plant species identified within the CAZ and limited presence of suitable habitat to support threatened species. Due to the currently disturbed habitat condition, and the existing extent of these threatened species regionally, the removal of potential threatened flora species habitat within the CAZs is not likely to adversely affect local populations.

As a conservative worst-case scenario, the Proposal would result in the loss of up to 5.7 ha of habitat and up to 65 hollow bearing trees that provide suitable foraging and nesting habitat for various fauna species, particularly woodland birds.  Additionally, there is the potential to impact breeding and shelter habitat for microbat species where existing wooden bridge/culvert crossings are proposed to be replaced.

Due to the relatively small scale of habitat being removed and the adjacent contiguous riparian vegetation, it is unlikely the vegetation being removed would be important or preferred habitat for local or migratory species.

Any species using the trees and habitat to be removed would be displaced. However, with extensive preferred habitat in the adjacent contiguous riparian vegetation and the broader Murray Valley National Park and Regional Park, the impact of the proposed vegetation removal is considered minor.

Overall, the area of vegetation proposed to be removed is not considered important to the survival or recovery of any identified threatened species and the impacts are expected to be relatively minor in relation to extensive areas of suitable adjacent habitat as

### Ramsar wetlands and nationally important wetlands

The Proposal would not cause a significant impact to the NSW Central Murray Forests and Barmah Ramsar sites.

A limit of acceptable change has been set for the NSW Central Murray Forests Ramsar site based on conditions at the time of listing which was during a long drought (Harrington and Hale, 2011). The

limit of acceptable change for River Red Gum Forests in the Millewa Forest Group is to be no less than 20,000 ha. Given the proposed extent of native vegetation clearing (5.7 ha) is a negligible portion of the River Red Gum Forests in the Millewa Forest Group, it does not trigger the prescribed limit of acceptable change.

### Groundwater dependant ecosystems

As discussed in **Section 6.3**, the Proposal would not impact on groundwater therefore no impacts to groundwater dependant ecosystems are expected.

### Other impacts

Other potential impacts to terrestrial biodiversity include:

- **Wildlife connectivity and habitat fragmentation** — The extent of vegetation clearing is generally minor and isolated to the discrete locations of the existing structures. As this clearing is isolated, it would not separate the existing woodland into two patches or impact existing vegetation connectivity. The extent of the clearing is considered minor and would not impact the mobility of resident or migratory fauna within the patch and into the adjacent riparian vegetation within Murray Valley National Park and Regional Park
- **Edge effects** — Edge effects refer to the impact of increased exposure of vegetation due to the clearing of adjacent vegetation. Impacts can include changes to microclimate, vegetation composition, weed spread and distribution, hydrology, dieback, soils, and fauna. Increased prevalence of weeds is predicted to be the greatest edge effect as a result of the Proposal because invasive weed species are already present within the CAZ.
- **Fauna injury and mortality** — Fauna injury or death could occur during vegetation clearing. Some mobile species, such as birds, would be able to move away from the path of clearing and may not be greatly affected unless they are nesting. However, other species that are less mobile (e.g. ground dwelling reptiles and mammals), or those that are nocturnal and nest or roost in trees during the day (e.g. arboreal mammals and micro bat species), may find it difficult to move rapidly when disturbed. Fauna could also be struck by construction vehicles, plant and equipment performing other tasks or become trapped in equipment and excavations. While this could result in injury and death, the likelihood of this occurring is considered negligible as the CAZs are small and within existing disturbed areas.
- **Proliferation of weeds** — Proliferation of weed species is likely to occur as vegetation is removed, soil is disturbed, and machinery moves about the work sites. During construction there is potential to disperse weed seeds and plant material into adjoining areas of moderate to high quality native vegetation where weed species do not currently occur in high density. Areas of bare soil created at the CAZs would provide opportunities for weed establishment. The impacts from weed invasion would likely commence a few months after construction and gradually increase over months and seasons. Proliferation of weed species has the potential to impact on the quality and integrity of the native vegetation within and surrounding the CAZs including habitat for threatened species.
- **Pests** — The movement of plant and equipment has the potential to transfer pests within Millewa Forest and alter their abundance. The CAZ are likely to provide habitat for a range of pest species including rabbits, foxes and cats. Construction activities have the potential to

disperse pest species across the surrounding landscape due to habitat removal, noise, and human presence during construction and operation. However, the Proposal is unlikely to significantly increase the value of the habitat for pest species in the study areas over the long-term. Rabbits tend to colonise more disturbed and modified open habitats, such as the agricultural landscape surrounding Murray Valley National Park and Regional Park, and the Proposal is unlikely to contribute to increased levels of predation on native fauna from foxes and cats as the CAZs are mostly limited to existing disturbed areas.

- **Pathogens** — The movement of plant and equipment has the potential to transfer pathogens within Millewa Forest. The most likely causes of pathogen dispersal and importation associated with the Proposal include earthworks, movement of soil, and attachment of plant matter to vehicles and machinery. The potential for pathogens to occur will be treated as a risk during construction.
- **Noise** — Construction noise may result in fauna temporarily avoiding habitats adjacent to the CAZs. The impacts from noise emissions would be localised to the CAZs and adjacent areas and are not considered likely to have a significant, long-term impact on wildlife populations. No nightworks are proposed, which would avoid disturbance to fauna at dawn, dusk and at night.
- **Dust** — Dust generated during construction may be deposited onto the foliage of vegetation adjacent to the CAZs. This has the potential to reduce photosynthesis and transpiration and cause abrasion and radioactive heating resulting in reduced growth rates and decreases in overall health of the vegetation. Deposition of dust on foliage is likely to be highly localised.

#### 6.4.2.2 Operation

The Proposal would not prevent the natural regeneration of vegetation and is not anticipated to impact on terrestrial biodiversity during operation with the implementation of safeguards in **Table** 6-9.

### 6.4.3 Safeguards

Measures proposed to avoid, minimise or manage potential terrestrial biodiversity impacts as a result of the Proposal are detailed in **Table 6-9.**

Table 6-9 Safeguards for terrestrial biodiversity impacts

| Ref | Impact | Safeguard | Responsibility | Timing |
|---|---|---|---|---|
| B1 | Direct impacts to vegetation outside of the CAZ | The vegetation clearing boundary at each work site will be accurately and clearly marked out using flagging tape prior to the start of works. The clearing boundaries must not extend outside the approved CAZs. The Biodiversity Management Plan will specify the type of flagging required to delineate the clearing boundaries.<br>The Biodiversity Management Plan will specify the type of flagging and signage required to delineate the approved CAZs. | Contractor | Prior to construction |

| Ref | Impact | Safeguard | Responsibility | Timing |
|---|---|---|---|---|
| B2 | Direct impacts to biodiversity within the CAZ | Where there are opportunities to not clear the entire approved CAZ, preference should be given to avoiding clearing of areas containing established trees (including hollow-bearing trees), vegetation containing large stick nests (if present) and high-quality native vegetation and instead concentrate clearing to areas of the CAZ that have been subject to previous disturbance.<br>To assist in this process, the CEMP will include figures of the approved CAZ showing the locations of hollow-bearing trees, vegetation communities; important flora and fauna habitat areas, and locations where threatened species, populations or ecological communities have been recorded. | Contractor | Prior to construction |
| B3 | Direct impacts to vegetation outside of the CAZ | Materials, plant, equipment, work vehicles and stockpiles will be stored, parked or placed as applicable within the clearing boundaries or on existing access tracks at or leading to the works sites that are temporarily closed to traffic and as a result are available for the sole use of the contractor. | Contractor | Construction |
| B4 | Indirect impacts to retained vegetation | Where feasible, materials, plant, equipment, work vehicles and stockpiles will be stored, parked or placed as applicable away from the driplines of trees that are outside the clearing boundaries or that are within the clearing boundaries but proposed for retention. | Contractor | Construction |
| B5 | Direct impacts to surrounding vegetation | If any damage occurs to vegetation outside the approved CAZs it is to be reported and managed as an environmental incident in accordance with the environmental incident management procedure contained in the CEMP. NSW DCCEEW and NPWS will be notified so that appropriate remediation strategies can be developed and implemented. | Contractor, NSW DCCEEW | Construction |
| B6 | Direct impacts to biodiversity | A pre-clearing inspection will be undertaken 48 hours prior to any native vegetation clearing by a suitably qualified ecologist and | Contractor | Prior to construction |

| Ref | Impact | Safeguard | Responsibility | Timing |
|---|---|---|---|---|
| | | the Contractor's Environmental Manager (or delegate). The pre-clearing inspection at each work site will include, as a minimum:<br>• A check of the physical demarcation of the clearing boundary and CAZ.<br>• Identification of trees that are just outside the marked clearing boundary that require protection to avoid unintended damage during the clearing and subsequent construction works.<br>• Identification of hollow-bearing trees that need to be removed in accordance with the hollow-bearing tree removal procedure (see below, B8).<br>• Identification of other habitat features that may need to be relocated outside the clearing boundary.<br>• Identification and demarcation of any habitat features which will be retained within the CAZ, i.e., hollow-bearing trees, stick nests. Any nests identified during surveys, and any of which have been established post-survey, will be clearly marked out by a surveyor using high visibility flagging tape prior to the start of works and must be avoided or relocated by suitably qualified personnel. Where feasible, construction is to be undertaken outside of nesting periods of threatened bird species to avoid incidental impacts.<br>• Any TECs will be marked using high visibility temporary fencing and signage to ensure avoidance, where possible, during construction. The completion of the pre-clearing inspection will form a hold point requiring sign-off from NSW DCCEEW.<br>• Identification of any threatened flora and fauna. Targeted threatened flora surveys are to be conducted during the pre-clearing survey. Any identified threatened flora species will be marked using high visibility temporary fencing and signage to ensure avoidance, where | | Construction |

| Ref | Impact | Safeguard | Responsibility | Timing |
|---|---|---|---|---|
| | | possible, during construction. The completion of the pre-clearing inspection will form a hold point requiring sign-off from NSW DCCEEW.<br>Implementation of the erosion and sediment control plan for the work site, including erosion control structures. | | |
| B7 | Direct impacts to retained trees | Trees within the clearing boundary that are proposed to be retained will be protected during the construction phase in accordance with Australian Standard 4970-2009 *Protection of Trees on Development Sites.*<br>Trees located just outside the clearing boundary that are identified during the pre-clearing inspection as being at risk of damage during the construction phase will also be protected in accordance with AS 4970-2009. | Contractor | Construction |
| B8 | Impacts to biodiversity associated with Hollow Bearing Trees | The biodiversity management plan will include a procedure for the removal of hollow-bearing trees. The procedure will include the following steps:<br>• Non-hollow bearing trees and vegetation surround a hollow-bearing tree will be removed first. Trees should be felled into the CAZ to avoid damaging adjacent vegetation<br>• Leave the hollow-bearing tree standing for at least one night after other clearing to allow any fauna using the hollows to leave<br>• An NPWS ranger or suitably qualified ecologist is to be present during felling of hollow-bearing trees<br>• Before felling a hollow-bearing tree, tap along the trunk using an excavator or loader to scare fauna from the hollows. Repeat several times<br>• After felling a hollow-bearing tree check its hollows and surrounds to ensure no fauna have become trapped or injured. Any fauna found should be safely | Contractor | Construction |

| Ref | Impact | Safeguard | Responsibility | Timing |
|---|---|---|---|---|
| | | located to nearby habitat by the attending NPWS ranger or ecologist<br>• If a hollow-bearing tree is removed in stages the non-hollow-bearing branches should be removed before the hollow-bearing branches are removed<br>In consultation with NPWS, felled hollow-bearing trees should be cut into sections and the sections with hollows prioritised for placement into the surround forest to provide additional potential habitat for ground dwelling fauna such as reptiles and small mammals. | | |
| B9 | Direct impacts to native fauna | The biodiversity management plan will include a procedure for dealing with the presence of native fauna species within the CAZs during the construction works. The procedure will require construction work at the site of the find to immediately cease and the subject animal allowed to leave the CAZ without being harassed.<br>If an animal needs to be relocated outside a CAZ, the contractor is to notify NSW DCCEEW and they will in turn notify NPWS to agree on appropriate mitigation measures including relocation measures. The contractor will only restart work at the subject site when authorised by NSW DCCEEW. | Contractor | Construction |
| B10 | Direct impacts to native fauna | Construction and worker vehicles and machinery will be checked at the start and end of each workday to ensure fauna are not entrapped. | Contractor | Construction |
| B11 | Impacts to threatened fauna | Construction during the breeding period of threatened species to be avoided where possible for:<br>• Superb Parrot breeding period (September to January)<br>• White-bellied Sea-eagle (June - September)<br>• Southern Myotis (November - March).<br>If this cannot be achieved, this species will be considered during pre-clearing surveys to | Contractor | Construction |

| Ref | Impact | Safeguard | Responsibility | Timing |
|---|---|---|---|---|
| | | ensure that no impacts will occur. The pre-clearing surveys will need to check:<br>• any hollow-bearing trees to be removed or impacted, to ensure these are not being used by nesting parrots.<br>any hollow-bearing trees or structures to be removed or impacted, to ensure these are not being used by roosting and/or breeding bats. | | |
| B12 | Impacts to habitat features | Relocation of habitat features (e.g. fallen timber, hollow logs) outside the CAZs will occur in accordance with an approved project-specific procedure to be included in the biodiversity management plan. | Contractor | Construction |
| B13 | Impacts from introduction and spread of weeds | Weed management will be undertaken in consultation with NPWS in areas affected by construction prior to any clearing works in accordance with the *Biosecurity Act 2015* to minimise the risk of weeds being spread to the surrounding environment; including during transport of waste off-site to a licensed waste disposal facility. | Contractor | Construction |
| B14 | Impacts from introduction and spread of weeds | All weeds, propagules, other plant parts and/or excavated topsoil material that is likely to be infested with weed propagules will be treated on site or bagged, removed from site, and disposed of at a suitably licensed waste facility. If pesticide use is proposed it must occur in accordance with NPWS's requirements including the *Pesticide Use Notification Plan* (NPWS, 2022). | Contractor | Construction |
| B15 | Impacts from introduction and spread of plant pathogens | All vehicles and machinery engaged in earthworks and vegetation clearance activities will follow the Myrtle Rust hygiene protocol for vehicles and heavy machinery in Table 5 of *the Hygiene Guidelines* (Department of Planning, Industry and Environment, 2020). | Contractor | Construction |
| B16 | Wildlife impacts from vehicle strike | Drivers must stay vigilant for fauna during machinery operation and vehicle movements. | Contractor | Construction |

| Ref | Impact | Safeguard | Responsibility | Timing |
|---|---|---|---|---|
| B17 | Impacts to TEC | Avoidance of vegetation clearing and excavation works within or directly adjacent to identified TEC areas, will be avoided, where practicable. Laydown areas will be placed on existing cleared or disturbed non-native areas within the CAZ. Any TECs will be marked using high visibility temporary fencing and signage to ensure avoidance, where possible, during construction. The completion of the pre-clearing inspection will form a hold point requiring sign-off from NSW DCCEEW. | Contractor, NSW DCCEEW | Prior to construction<br><br>Construction |

### 6.4.4 Significance assessment

Assessments of significance have been prepared, to determine if the Proposal would result in significant impact to TECs, Ramsar wetland and to threatened flora and fauna species listed under the EPBC and BC Acts which are considered to have a moderate or higher likelihood of occurring within the CAZs (refer to Appendices B and C of **Attachment A**). The assessments include the following:

- 19 threatened fauna species including 7 EPBC act listed species
- One migratory bird
- One Ramsar wetland
- One TEC listed under the BC Act

Results of the assessments concluded that the Proposal is unlikely to have a significant impact on any of the assessed threatened species, TEC or Ramsar site within the meaning of the EPBC Act and BC Act.

### 6.4.5 Residual impacts

The Proposal would remove up to 5.7 ha of native vegetation and 65 hollow bearing trees that could provide habitat for threatened species. However, impacts to vegetation and species habitat would be minimised and direct harm to fauna species avoided with implementation of safeguards. The Proposal also would not impact the ability for vegetation to natural regenerate. Additionally, impacts to threatened species are not considered to be significant with implementation of safeguards.

Residual impacts to terrestrial biodiversity values would be largely temporary and short term and would support the delivery of works proposed under the Millewa Forest Supply Project that are intended to protect the long-term ecological health of Millewa Forest.

# 6.5 Aquatic biodiversity

The *Millewa Access Works Biodiversity Assessment Report* (refer to **Attachment A**) assesses potential aquatic biodiversity impacts of the Proposal. It details the findings of an aquatic habitat assessment undertaken for waterways present within 32 of Proposal CAZ sites. The key findings of the assessment are summarised in the following sections.

## 6.5.1 Existing environment

### 6.5.1.1 Fish passage

The rivers, anabranches and wetlands of Millewa Forest are important habitats for native fish populations. Despite this, connectivity among habitats has been a long-standing issue in the Barmah-Millewa Forest (Cadwallader, 1977, in Stuart et al., 2020) and ongoing declines in species diversity have been recorded in the forest.

Existing floodplain regulators were not designed with fish passage considerations, or consideration of the need for native fish moving between flowing anabranches, floodplains and the Murray River (Sharpe, 2018). Tracking studies of large bodied native fish identified that during periods of hydrological connection between the river and creek habitats (at Murray River flows greater than 8,000 megalitres per day), large bodied native fish, particularly flow-dependent species such as Murray Cod (*Maccullochella peelii*), Trout Cod (*Maccullochella macquariensis*), Golden Perch (*Macquaria ambigua ambigua*) and Silver Perch (*Bidyanus bidyanus*), move from the main river channel into Millewa Forest creeks (Jones, 2008; Jones and Stuart, 2008; Sharpe, 2018; Jones et al., 2022).

Tracked fish occupied creek habitats until river flows begin to recede, upon which they move back to the Murray River (in unregulated creeks). However, they were stranded in regulated creeks, unable to pass flow regulation structures back to the Murray River, but they persistently attempted to move back to the river, undertaking searching movements up to impassable regulators (Jones et al., 2022). Impassable barriers at creek/river effluent points can strand very high numbers of large and small bodied fish on the floodplain when high river flows recede (Jones and Stuart 2008; Sharpe, 2018). Restoring native fish pathways between the Millewa Forest floodplain and the Murray River is a priority for the recovery of fish populations (Sharpe, 2018; Stuart et al., 2020).

### 6.5.1.2 Aquatic habitat

Aquatic habitat assessments were undertaken for 32 of the Proposal CAZ sites where crossings are located in accordance with criteria outlined in the *Policy and Guidelines for Fish Habitat Conservation and Management* (DPI, 2013) and *Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings* (Fairfull and Witheridge, 2003).

The purpose of the assessment was to determine whether aquatic habitat present could be considered Key Fish Habitat (KFH) – which is habitat that is important to the maintenance of fish populations generally and to the survival and recovery of threatened aquatic species. The assessment involved a desktop review of existing information in addition to a visual inspection of all sites with the exception of C33, C26 and C28 (due to time constraints).

The inspected waterways were generally shadowed by the riparian woodland canopy, where in-stream emergent vegetation was sparse to absent in-stream, depending on water levels.

In total 19 crossing sites are located within an ephemeral flood runner that were dry at time of inspection. These sites would generally only become wet during flood or high flow conditions. Additionally, 9 crossing sites are located within an ephemeral or intermittent waterway, all of which were generally dry or had some localised pooling present when inspected (refer to **Photo 6-1**). These minor creeks and flood runners form anabranches of the main waterways. Generally, these waterways had woody debris, but otherwise minimal habitat features such as rock complexes, undercut banks, trailing vegetation, and aquatic plants. However, they are expected to provide connectivity between major channels and anabranches in the forest during higher flows and flood conditions.

Photo 6-1 Example of localised pooling and instream habitat features at C36

In total 5 crossing sites are located within a permanent waterway all of which were wet during inspection. These permanent waterways such as Cornalla (Wild Dog) Creek and Swifts Creek, exhibited good quality habitat features, including instream vegetation, abundance of large woody debris, and overhanging/trailing vegetation surrounded by a substantial riparian zone that is continuous with the floodplain forest.

The assessment determined 11 of the Proposal sites to be Key Fish Habitat based either on field observations, threatened species mapping, or waterway classification namely A9, A10, A15, A16, C16, C23, C28, C31, C38, C38 and C39.

**Table 6-10** provides more detail of aquatic habitat present at each assessed site.

Table 6-10 Aquatic habitat assessment

| Site Name | Expected dry-weather condition | Predicted threatened species habitat (DPI, 2025) | KFH Type and Sensitivity (DPI, 2013) | Waterway class (Fairfull and Witheridge, 2003) | Aquatic habitat characteristics at the time of inspection |
|---|---|---|---|---|---|
| A4 | Ephemeral floodrunner; water unlikely | None | Not mapped as KFH | Class 3 – Minimal fish habitat | • Dry upstream and downstream of regulator.<br>• Large woody debris present, but no gravel beds or boulders.<br>• Regulator obstructs fish passage when closed |
| A9 | Permanent watercourse; water likely | Silver Perch, Flathead Galaxias | Type 1 – Highly sensitive | Class 1 – Major fish habitat | • Channel full width low flow, distinct under crossing but less distinct upstream and downstream of bridge.<br>• Large woody debris present, but no gravel beds or boulders.<br>• Wild Dog Creek,10th order stream |
| A10 | Ephemeral floodrunner; water unlikely | Silver Perch, Flathead Galaxias | Type 1 – Highly sensitive | Class 1 – Major fish habitat | • Dry upstream and downstream of informal crossing, although narrow channel is distinct upstream and downstream of crossing<br>• Large woody debris present, but no gravel beds or boulders |
| A15 | Permanent watercourse; water likely | None, although site is 50m upstream from Murray River | Not mapped as KFH, although site is 50m upstream from Murray River | Class 1 – Major fish habitat | • Water present on both sides of regulator; low flow.<br>• Gravel beds, woody debris, boulders present.<br>• Mixed native and exotic vegetation on banks.<br>• Regulator obstructs fish passage when closed |

| Site Name | Expected dry-weather condition | Predicted threatened species habitat (DPI, 2025) | KFH Type and Sensitivity (DPI, 2013) | Waterway class (Fairfull and Witheridge, 2003) | Aquatic habitat characteristics at the time of inspection |
|---|---|---|---|---|---|
| A16 | Permanent watercourse; water likely | None, although site is 50m upstream from Murray River | Not mapped as KFH, although site is 50m upstream from Murray River | Class 1 – Major fish habitat | • Stagnant water downstream of the regulator with exposed gravel beds.<br>• Woody debris and boulders present.<br>• Mixed native and exotic vegetation on banks. Regulator obstructs fish passage when closed |
| C16 | Permanent watercourse; water likely | None | Not mapped as KFH | Class 3 – Minimal fish habitat | • Channel flowing but shallow and poorly defined.<br>• Large woody debris present.<br>• Mixed native and exotic riparian vegetation |
| C17 | Ephemeral or intermittent watercourse; water may be temporarily present | None | Not mapped as KFH, although site is 10m upstream from Pinchgut Lagoon which is defined as KFH | Class 4 – Unlikely fish habitat | • Near to Pinchgut Lagoon which contained water but did not extend to the road crossing at the time of sampling.<br>• Dry, unnamed, poorly defined, and shallow channel cut off from lagoon by debris accumulated in culvert |
| C18 | Ephemeral or intermittent watercourse; water may be temporarily present | None | Not mapped as KFH, although site is 30m upstream from Pinchgut Lagoon which is defined as KFH | Class 4 – Unlikely fish habitat | • Near to Pinchgut Lagoon which contained water but did not extend to the road crossing at the time off field visit.<br>• Dry, unnamed, poorly defined, and shallow channel cut off from lagoon by debris accumulated in culvert |

| Site Name | Expected dry-weather condition | Predicted threatened species habitat (DPI, 2025) | KFH Type and Sensitivity (DPI, 2013) | Waterway class (Fairfull and Witheridge, 2003) | Aquatic habitat characteristics at the time of inspection |
|---|---|---|---|---|---|
| C19 | Ephemeral or intermittent watercourse; water may be temporarily present | None | Not mapped as KFH, although site is 30m upstream from Pinchgut Lagoon which is defined as KFH | Class 4 – Unlikely fish habitat | • Well defined, low-flow, and shallow unnamed channel connecting Pinchgut Creek and Pinchgut Lagoon.<br>• Green algae and Arrowhead present, mixed native and exotic riparian vegetation |
| C20 | Ephemeral floodrunner; water unlikely | None | Not mapped as KFH | Class 4 – Unlikely fish habitat | • Poorly defined, dry, shallow channel.<br>• Box culvert clogged with debris, obstructing fish passage |
| C21 | Ephemeral floodrunner; water unlikely | None | Not mapped as KFH | Class 4 – Unlikely fish habitat | • Poorly defined, dry, shallow channel |
| C22 | Ephemeral floodrunner; water unlikely | None | Not mapped as KFH | Class 4 – Unlikely fish habitat | • Poorly defined, dry, shallow channel |
| C23 | Permanent watercourse; water likely | None | Type 2 – Moderately sensitive | Class 2 – Moderate fish habitat | • 3rd order stream. Downstream of Fisherman's Creek Regulator. Low flowing, well-defined channel.<br>• Mixed native and exotic riparian vegetation and emergent macrophytes |
| C24 | Ephemeral floodrunner; water unlikely | None | Not mapped as KFH | Class 4 – Unlikely fish habitat | • Poorly defined, dry, shallow channel.<br>• Box culvert clogged with debris, obstructing fish passage |
| C24a | Ephemeral floodrunner; water unlikely | None | Not mapped as KFH | Class 4 – Unlikely fish habitat | • Poorly defined, dry, shallow channel |

| Site Name | Expected dry-weather condition | Predicted threatened species habitat (DPI, 2025) | KFH Type and Sensitivity (DPI, 2013) | Waterway class (Fairfull and Witheridge, 2003) | Aquatic habitat characteristics at the time of inspection |
|---|---|---|---|---|---|
| C25 | Ephemeral floodrunner; water unlikely | None | Not mapped as KFH | Class 4 – Unlikely fish habitat | • Poorly defined, dry, shallow channel.<br>• Box culvert clogged with debris, obstructing fish passage |
| C25a | Ephemeral floodrunner; water unlikely | None | Not mapped as KFH | Class 4 – Unlikely fish habitat | • Poorly defined, dry, shallow channel.<br>• Box culvert clogged with debris, obstructing fish passage |
| C26 | Ephemeral floodrunner; water unlikely | None | Not mapped as KFH | Class 4 – Unlikely fish habitat | • Visual assessment not undertaken at time of site field visit |
| C28 | Ephemeral or intermittent watercourse; water may be temporarily present | None | Type 2 – Moderately sensitive | Class 2 – Moderate fish habitat | • Visual assessment not undertaken at time of site field visit<br>• Cornalla Creek - 3rd order stream |
| C29 | Ephemeral floodrunner; water unlikely | None | Not mapped as KFH | Class 4 – Unlikely fish habitat | • Poorly defined, dry, shallow channel.<br>• Box culvert clogged with debris, obstructing fish passage |
| C30 | Ephemeral floodrunner; water unlikely | None | Not mapped as KFH | Class 4 – Unlikely fish habitat | • Poorly defined, dry, shallow channel.<br>• Box culvert clogged with debris, obstructing fish passage |
| C31 | Ephemeral or intermittent watercourse; water may be temporarily present | None | Not mapped as KFH | Class 3 – Minimal fish habitat | • Pool that was dry may connect to nearby unnamed oxbow lagoons during wet periods.<br>• Ample woody debris present |

| Site Name | Expected dry-weather condition | Predicted threatened species habitat (DPI, 2025) | KFH Type and Sensitivity (DPI, 2013) | Waterway class (Fairfull and Witheridge, 2003) | Aquatic habitat characteristics at the time of inspection |
|---|---|---|---|---|---|
| C32 | Ephemeral floodrunner; water unlikely | None | Not mapped as KFH | Class 4 – Unlikely fish habitat | • Poorly defined, dry, shallow channel |
| C33 | Ephemeral floodrunner; water unlikely | None | Not mapped as KFH | Class 4 – Unlikely fish habitat | • Visual assessment not undertaken at time of site field visit<br>• Box culvert clogged with debris in historical photo, obstructing fish passage |
| C34 | Ephemeral floodrunner; water unlikely | None | Not mapped as KFH | Class 4 – Unlikely fish habitat | • Poorly defined, dry, shallow channel |
| C35 | Ephemeral floodrunner; water unlikely | None | Not mapped as KFH | Class 4 – Unlikely fish habitat | • Poorly defined, dry, shallow channel |
| C36 | Ephemeral or intermittent watercourse; water may be temporarily present | Southern Pygmy Perch | Type 1 – Highly sensitive | Class 1 – Major fish habitat | • Watercourse mostly dry except for three isolated pools.<br>• Collection of snags caught in bridge damming watercourse.<br>• Mussel shells found in streambed.<br>• Box culvert clogged with debris, obstructing fish passage |
| C37 | Ephemeral floodrunner; water unlikely | None | Not mapped as KFH | Class 3 – Minimal fish habitat | • Shallow, dry channel with evidence of pools on either side of the crossing |
| C38 | Ephemeral or intermittent watercourse; water may be temporarily present | Silver Perch, Flathead Galaxias, Murray Crayfish | Type 1 – Highly sensitive | Classe 1 – Major fish habitat | • Tooralong Creek, 10th order stream. Channel mostly dry except for upstream pool.<br>• Woody debris present.<br>• Mixed native and exotic riparian vegetation present |

| Site Name | Expected dry-weather condition | Predicted threatened species habitat (DPI, 2025) | KFH Type and Sensitivity (DPI, 2013) | Waterway class (Fairfull and Witheridge, 2003) | Aquatic habitat characteristics at the time of inspection |
|---|---|---|---|---|---|
| C39 | Ephemeral or intermittent watercourse; water may be temporarily present | None | Type 1 – Highly sensitive | Class 3 – Minimal fish habitat | • Unnamed 3rd order stream. Dry, broad channel.<br>• Plentiful woody debris.<br>• Riparian and emergent vegetation |
| C40 | Ephemeral floodrunner; water unlikely | None | Not mapped as KFH | Class 4 – Unlikely fish habitat | • Box culvert clogged with debris, obstructing fish passage.<br>• Shallow, dry channel with small pool formation.<br>• Plentiful woody debris |
| C41 | Ephemeral floodrunner; water unlikely | None | Type 2 – Moderately sensitive | Class 3 – Minimal fish habitat | • Thistle Creek, 3rd order stream. Dry, shallow channel.<br>• Plentiful woody debris.<br>• Box culvert clogged with debris, obstructing fish passage |

#### 6.5.1.3 Threatened aquatic species

Eleven Proposal sites (A9, A10, A15, A16, C16, C23, C28, C31, C38, C38, and C39) are located over streams that have been identified as known or potential key habitat for species listed under the EPBC Act or FM Act. A total of eight threatened aquatic species listed under EPBC Act and/or the FM Act, are considered to have the potential to occur within these study areas including seven fish species and one macroinvertebrate species.

Of these species, four are considered to have a moderate likelihood of occurring with the Proposal area including three listed under the EPBC Act (refer to **Table 6-11**). This was based on the presence of suitable habitat, recent records within the locality (DCCEEW, 2025a; NSW DCCEEW, 2025b and ALA, 2025) and the predicted distribution maps for threatened species listed under the FM Act (DPIRD, 2025).

Table 6-11 Threatened aquatic species likely to occur with the Proposal area

| Species | EPBC Act | FM Act | Suitable habitat within the survey area | Likelihood of occurrence |
|---|---|---|---|---|
| Fish | | | | |

| Species | EPBC Act | FM Act | Suitable habitat within the survey area | Likelihood of occurrence |
|---|---|---|---|---|
| *Bidyanus bidyanus* (Silver Perch) | E | V | This species is mapped within Cornalla (Wild Dog) Creek (sites A9, A10, and C28), Tooralong Creek (C38) and in the Murray River, into which all sites ultimately connect. Sites A15 and A16 are within 50 m of the Murray River. There are several records between 2000 and 2008 in the Murray River (ALA, 2025)). However, regulators may limit the ability of Silver Perch to move directly between the Murray River and most of the smaller streams where crossing works are proposed. | Moderate |
| *Maccullochella macquariensis* (Trout Cod) | E | E | This species is mapped within the Murray River which all sites ultimately connect. Sites A15 and A16 are within 50 m of the Murray River. There are 9 records between 2000 and 2008 (ALA, 2025). Regulators may limit the ability of Trout Cod to move directly between the Murray River and most of the smaller streams where crossing works are proposed. | Moderate |
| *Maccullochella peelii* (Murray Cod) | V | - | Large-bodied channel specialist. Prefers deeper waters of main channel of the Murray River and larger tributaries. Numerous records in the Murray River in the vicinity of the Proposal between 2000 and 2017 (ALA, 2025). Regulators may limit the ability of Murray Cod to move directly between the Murray River and most of the smaller streams where crossing works are proposed. | Moderate |
| Invertebrates | | | | |
| *Euastacus armatus* (Murray Crayfish) | - | V | This species is mapped within Tooralong Creek which is also mapped as KFH. May occur within the survey area. However, it prefers deep flowing water habitats proximal to clay banks. No records in ALA (2025), but has been recovered in the Murray River in several locations in Millewa Forest. Regulators may limit the ability of Murray Crayfish to move directly between the Murray River and most of the smaller streams where crossing works are proposed. | Moderate |

#### 6.5.1.4 Endangered Ecology Communities (EEC)

The Proposal is situated wholly within the Lowland Murray River Endangered Ecological Community (EEC) which is listed as endangered under the FM Act.

The Lowland Murray River EEC encompasses all natural creeks, rivers and associated lagoons, billabongs and lakes of the regulated portions of the Murray, Murrumbidgee and Tumut Rivers, as well as their tributaries and branches. The Lowland Murray River EEC occurs in a lowland riverine environment, characterised by meandering channels and wide floodplains. The land is generally flat to gently sloping. In their natural state, these lowland rivers experience extremely variable flows, ranging from floods to droughts.

Lowland rivers provide a wide range of habitats for fish and invertebrate, including pools, runs or riffles, backwaters and billabongs, large woody habitats and aquatic plants. Floodplains also provide a mosaic of habitat types, including permanent and temporary wetland, as well as terrestrial habitats (DPI, 2007). This ECC is made up of 23 native fish species, including threatened species Murray Cod, Silver Perch, and Trout Cod, and 57 representative aquatic or semi-aquatic invertebrate species, including the threatened Murray Crayfish (NSW Fisheries 2001).

In Millewa Forest, diverse habitats are representative of this EEC, including permanent and intermittent river channels, intermittent swamps, and billabongs

### 6.5.2 Impacts

#### 6.5.2.1 Construction

During construction, the level of risk to aquatic biodiversity is largely dependent on the presence of water within each CAZ at the time. Majority of sites are located on ephemeral flood runners that are expected to be dry during construction. Water is anticipated to be present during construction at 5 permanently wet sites (A9, A15, A16, C16 and C23) and may be temporarily present in the form of localised pooling at 8 ephemeral or intermittent watercourses (C17, C18, C19, C28, C31, C36, C38 and C39). Temporary coffering and dewatering may be required at these sites to create dry instream works.

Construction of the Proposal has the potential to impact aquatic ecosystems directly and indirectly if control measures are not implemented, monitored and maintained throughout the construction phase. The key potential risk to aquatic ecology during the construction phase if safeguards are not implemented relate to:

- Instream construction activities that may result in direct harm to aquatic species
- Noise, vibration and light
- Reduced water quality (within the CAZ and the downstream receiving environment)
- Changes to flow and temporary barriers to fish passage
- Loss or degradation of instream, bank and habitat features.

##### Direct harm or mortality of native fauna

Instream works would be required at each work site and may require localised dewatering once upstream and potentially downstream cofferdams are established. During dewatering, species that

are present in water ponded between the cofferdams could be harmed through entrainment into pumps without implementation of appropriate safeguards.

Other semi aquatic species such as turtle are also known to utilise banks and riparian areas for habitat and are therefore at-risk during bank excavations and the clearing of riparian vegetation - particularly if species come into contact with equipment and machinery.

As sites are expected to generally be dry, it is unlikely that aquatic fauna will be present. Where water may be present, it is considered possible for aquatic species to come into contact with equipment or machinery during the works. However, aquatic fauna is likely to elicit an avoidance response before physical damage occurs if they are not constrained (McCauley et al., 2000).

However, direct harm to native aquatic fauna can be avoided and minimised through the implementation of safeguards outlined in Table 6-12.

### Reduced water quality

As discussed in Section 6.2.2, construction of the Proposal has the potential to impact water quality through mobilisation of sediment and other contaminants via stormwater runoff or dewatering discharges.

No impacts associated with erosion and sedimentation are expected at those sites that will be dry when construction works occur. At sites where water is present if poor water quality and sediment are mobilised to downstream receivers this could indirectly result in harm or kill aquatic fauna.

Construction works also have the potential to impact water quality due to accidental spillage or leaks of toxic substances and litter and other pollutants associated with use of vehicles, establishment of construction sites and installation of structures.

However, impacts are unlikely to occur or would be minimal with implementation standard environmental management practices and safeguards (Refer to Table 6-12)

### Noise, vibration and light impacts

During construction noise and vibration would be generated from instream works. This could potentially impact on aquatic fauna. However, any impacts from noise and vibration would be short-term and localised and would not have a significant or long-term impact. Furthermore, aquatic fauna is likely to elicit an avoidance response before physical damage occurs if they are not constrained (McCauley et al., 2000).

Impacts associated with light are considered negligible as construction is expected to be carried out during standard construction hours between 7am to 6pm from Monday to Friday, and between 8am and 1pm on Saturday. Artificial lighting during these periods would be unnecessary.

### Loss or degradation of instream habitat features and aquatic vegetation

Construction of the Proposal would require the excavation of banks and the removal of important aquatic habitat features such as instream and riparian vegetation. These habitat features provide important resources for aquatic species during periods of high flow. Their removal would result in habitat loss for threatened species, reduced reproductivity and/or direct mortality of adults, larvae and young-of-year native species when flows are present.

The proposed structures have been positioned predominantly within disturbed areas at the existing creek crossings, to reduce removal of riparian vegetation. With the implementation of other safeguards impacts to habitat would be avoided and minimised (Refer to Table 6-12)

### Bank erosion and destabilisation

Disturbance of the streambed and banks of the channel would be required within the CAZ for operation of an excavator. As a result, there is potential for soil erosion and sedimentation downstream if a significant flow event or heavy rainfall occurred during construction. Bank excavation and removal of riparian vegetation may increase risk of bank destabilisation, which could lead to increased turbidity, and the loss of habitat features such as root masses and bank undercutting.

However, the majority of sites are already disturbed with existing infrastructure (i.e. access tracks and creek crossing structures) already in place. The proposed replacement structures have been positioned predominantly within these disturbed areas at the existing creek crossings, therefore, minimising the extent of stabilising vegetation required for removal.

The risk of bank erosion from flows is low as the Proposal would be scheduled for dry and/or low flow conditions, with temporary cofferdams to be used to stop flows from entering the in-stream construction area. Additionally, sedimentation and erosion impacts during heavy rain would be minimised through implementation of standard controls in accordance with the Blue Book.

As a result, the potential for bank erosion and a loss of bank stability due to flowing water is considered unlikely to occur during construction.

### Temporary barriers to fish passage

Majority of sites are expected to be dry during works, therefore would not impact fish passage.

At sites where water may be present temporary cofferdams and silt curtains used at in-stream work sites could temporarily block fish passage past each work site when flows are present.

Due to presence of existing regulators at A4, A15 and A16, flows and fish passage downstream are completely obstructed when gates are closed. Likewise, complete obstructions in the form of culverts clogged by sediment and debris are present at sites C17 and C18. Therefore, impacts to fish passage would not occur at these sites.

Sites likely to have impacts to flow and fish passage without mitigation are sites where water is permanent or common and a bridge or functional culvert is to be replaced with a new structure, ie at sites C16, C19, C23, C35, C38 and C39. Of these sites, C16 and C23 are likely to have water during construction and will require diversion. Sites C19, C23, C38 and C39 may also have water if conditions are particularly wet.

Impacts to fish passage at these sites would be temporary and short term. Additionally, with implementation of safeguards these short-term impacts would be further minimised (Refer to Table 6-12).

### Proliferation of pest species and pathogens

Construction is not expected to directly introduce pest aquatic fauna species such as Common Carp, Eastern Gambusia and Redfin Perch – especially given most sites will be dry during construction and

water quality impacts would be negligible with implementation of standard environmental management practices (refer to Section 6.4).

Construction activities have the potential to disperse weeds in association with clearing of vegetation and stockpile of contaminated mulch and topsoil during earthworks, and movement of soil and attachment of seed (and other propagules) to construction vehicles and other plant. Additionally, any in-water construction which uses vehicles or other plant which have come into contact with other waterways where the pathogens are present such as Epizootic Haematopoietic Necrosis Virus (EHNV) prior to entering the CAZs, has the potential to transfer the virus to native fish.

Impacts associated with the proliferation of pest species and pathogens can be effectively managed with implementation of safeguards provided in Table 6-9.

#### 6.5.2.2 Operation

##### Aquatic Habitat

The proposed new structures have been designed to minimise the physical occupation of the channel bed as far as practical. Additionally, areas of riparian and instream vegetation disturbed during construction would be rehabilitated in accordance with a site rehabilitation plan prepared as part of the CEMP.

It is therefore considered unlikely that the instream footprint would reduce the quality of the aquatic habitat such that a negative effect on native aquatic species and habitats would occur during operation. Furthermore, the replacement of non-functional structures would allow flows to pass more naturally, which has the potential to increase instream habitat available for aquatic species and improve water quality.

##### Fish passage

Many of the existing crossing structures in their current condition limit flows and fish passage within the channels they are located due to their narrow openings and/or the accumulation of debris and sediment during high flows. Generally, operation of the replacement structures is expected to reduce flow constraints and would not worsen fish passage. Majority of crossing sites are expected to improve upon existing fish passage conditions.

The following sites will have culverts replaced with channel-width rock crossings: C17, C20, C21, C24, C24a, C28, C31, and C40. Compared to existing conditions the rock crossings would provide a greater cross-sectional area for flows and thereby decreasing water velocities. This would align more closely with the natural velocities of channels and will improve fish passage compared to the existing crossings. As a result, DPIRD Fisheries have indicated their support for the rock crossings.

Sites C38 and C39 will keep the current culvert structures in situ, but a bypass rock crossing will be built at these sites to enable heavy vehicle access. This retains the current level of fish passage at these 2 sites.

The following crossings will be replaced with upgraded box culverts: C16, C18, C19, C22, C23, C25a, C26, C32 and C33. NSW DCCEEW and DPIRD Fisheries determined that the crossings most important for fish passage where sites C16, C19, C38 and C39. As a result, Hydraflow reports were generated using survey data from the existing channels and with the proposed revised box culvert

designs (Advance Survey Design, 2025). The modelling indicated that the flow velocities in the existing channel during bank full conditions were 0.54m/s at C16; 0.51m/s at C19, 0.42m/s at C38 and 0.31m/s at C39. Under the same flow conditions when culverts would be at full capacity flow velocities through the culverts were modelled to be 0.47m/s at C16; 0.19m/s at C19, 0.42m/s at C38 and 0.45m/s at C39. These are considered to be the maximum velocity culverts are likely to experience. On 20 June 2025, DPIRD Fisheries deemed "these designs are suitable from a fish passage perspective".

Revised box culvert designs and associated hydraulics / flow velocities for C25a, C32, C23, C26, C33, C22 and C18 are not available so it is not possible to assess fish passage implications. However, none of the above creeks at the crossing locations are mapped as KFH (except for C23 which is Type 2 Class 2) and hence impacts to fish passage are unlikely. NSW DCCEEW discussed the basis of design of these proposed box culverts with DPIRD Fisheries on 16 May 2025 and DPIRD Fisheries confirmed that for these sites that "impacts to fish passage were not 'deemed a concern practically'.

As discussed in Section 6.2.2.2 sedimentation and build-up of debris in culverts could occur if structures are not maintained. This has the potential to alter or block flows and impeded fish passage with routine maintenance that would be carried out in accordance with standard NPWS operational management procedures.

#### Proliferation of aquatic pest and weed species

According to recent monitoring, there are five non-native species present across the Barmah-Millewa Forest complex: Common Carp, Goldfish, Redfin Perch, Eastern Gambusia, and Oriental Weatherloach. Research effort has been placed on the potential effects of Common Carp due to their confirmed occurrence and high abundance found during aquatic fauna surveys in the forest, and ability to exploit wetlands and other inundated habitats which are available during environmental watering events.

Of the non-native species which are likely to be present, Carp poses the greatest risk to aquatic values. As fish passage is generally expected to be improved throughout the Proposal area, there is potential for non-native species such as Carp to access previously unoccupied areas as well. However, Carp are already likely to spread across waterways during flood events, which are the major source of flows in channels where replacement crossings are proposed. As the Proposal would not alter flooding regimes – no significant changes in the ability for Carp to spread are anticipated.

During operation there is a risk of weeds being spread by vehicles during any maintenance activities. However, this is unlikely to occur with implementation of standard NPWS operational procedures.

### 6.5.3 Safeguards

Measures proposed to avoid, minimise or manage potential aquatic biodiversity impacts as a result of the Proposal are detailed in Table 6-12.

Table 6-12 Safeguards for aquatic biodiversity impacts

| Ref | Impact | Safeguard | Responsibility | Timing |
|---|---|---|---|---|
| AB1 | Interactions with fauna during construction | A pre-construction survey will be undertaken in areas that will be enclosed by cofferdams. | Contractor | Prior to construction |
| AB2 | Impacts to aquatic habitat and species | Only undertake work when flows are low/dry for a suitable duration to complete work | Contractor | Construction |
| AB3 | Impacts to aquatic species | If water is present at the time of construction:<br>• Fauna salvage in enclosed instream areas would be required prior to removal of instream habitat features and dewatering<br>• Install mesh on water pumps to prevent entrainment of fish during dewatering<br>• fish will be released within the same waterways immediately downstream of the proposed work areas.<br>A procedure to prevent the risk of spreading disease and non-target species would be detailed in the Construction Environmental Management Plan (CEMP). | Contractor | Construction |
| AB4 | Direct impacts to aquatic species | The biodiversity management plan will include a procedure for dealing with the presence of native fauna species within the CAZs during the construction works. The procedure will require construction work immediately cease at the site where fauna has been found and the animal allowed to leave the CAZ without being harassed.<br>Where assistance is required to relocate an animal, the contractor is to notify NSW DCCEEW, and they will in turn notify NPWS to agree on appropriate mitigation measures (including relocation measures). The contractor will only restart work at the | Contractor, NSW DCCEEW | Construction |

| Ref | Impact | Safeguard | Responsibility | Timing |
|---|---|---|---|---|
| | | subject site when authorised by NSW DCCEEW. | | |
| AB5 | Removal of aquatic habitat features | Large woody debris, snags and native aquatic vegetation will be relocated (where possible outside the breeding season of spring and summer) from instream work sites (including at cofferdams if required) to suitable locations upstream and/or downstream in consultation with a qualified ecologist and NPWS. Relocation of these aquatic habitat features from dry in-stream work sites will occur after aquatic fauna salvage and dewatering. | NSW DCCEEW, Contractor | Construction |
| AB6 | Degradation of Aquatic habitat | A Construction Soil and Water Management Plan and Erosion and Sediment Management Plan will be prepared as part of the Contractor's CEMP outlining site specific control measures to manage potential erosion, sedimentation and pollution impacts that could impact on water quality or degrade aquatic habitat. Refer to Safeguard SW1, SW2 and SW3. | Contractor | Construction |
| AB7 | Degradation of Aquatic habitat | Rehabilitation of disturbed areas of riparian and instream vegetation will be undertaken as soon as practicable, progressively and in accordance with a site rehabilitation plan prepared as part of the CEMP and in consultation with NPWS.<br>Rehabilitation of the CAZs will involve replacing and stabilising topsoil and re-planting native trees and plants.<br>Where possible, woody debris, snags and native instream vegetation that was removed to make way for instream work sites will be used in the rehabilitation works. | Contractor | Construction |
| AB8 | Wildlife impacts from machinery/ vehicle strike | Drivers must stay vigilant for fauna during machinery operation and vehicle movements | Contractor | Construction |

### 6.5.4 Significance tests for threatened aquatic species and communities

Assessments of significance have been prepared, to determine if the Proposal would result in significant impacts to 4 threatened aquatics species and one BC Act listed EEC listed likely to occur within the Proposal area (refer to Appendix B of **Attachment A**).

While the Proposal is expected to involve key threatening processes, the assessments of significance determined that the Proposal is unlikely to have a significant impact on the threatened aquatic species or endangered ecological community within the meaning of the FM Act.

This is predominantly due to the works occurring at locations that already have existing structures which have previously been disturbed, and that there would be some improvement to connectivity by the installation of culverts at some sites.

### 6.5.5 Residual impacts

With implementation of the safeguards in **Table 6-12**, impacts to aquatic habitat would be minimised and aquatic ecosystem values within the construction and operational footprints would be low. Any residual impacts are not expected to significantly compromise the functionality, long-term connectivity or viability of habitats, or ecological processes within assemblages of biota.

## 6.6 Aboriginal heritage

The *Bunnydigger Creek & Swifts Creek Regulators Upgrades - Aboriginal Due Diligence Assessment* (Austral Archaeology, 2025a) and *Millewa Crossing Upgrades - Aboriginal Due Diligence Assessment* (Austral Archaeology, 2025b) assesses the potential for Aboriginal archaeological material to occur within the CAZ. The assessments are provided in **Attachment B** and are summarised below.

### 6.6.1 Existing environment

#### 6.6.1.1 Ethnographic context

The Proposal is located within the traditional land of the Yorta Yorta people, also referred to as Joti Jota and Bangerang. The Yorta Yorta traditional boundaries extended from Deniliquin in the north, Tocumwal in the east, Moama in the south and Cohuna in the west (Tindale 1974:194).

The Murray River catchment has an extensive history of human habitation with evidence of human occupation in the Central Murray Valley for at least 15,000 to 9,000 years before present (Macumber and Thorne, 1975).

The Murray River was able to support large populations of Aboriginal people due to the river's permanence and provision of multiple resources. With the large variety of food resources available, human groups could be semi-sedentary along the river in addition to pursuing a hunter gatherer lifestyle that resulted in reliance on seasonally available food resources (Craib, 1991; Atkinson and Berryman, 1983; Greenwood, 2003). Resources along the river 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).

For eight to nine months of the year, groups could rely on the resources that the Murray River provided. These resources were collected through a variety of methods including netting, spearing, and trapping with stone weirs along drainage channels. Meat and roots were cooked either on an open fire or in an earthen oven. Over time, repeated use of a location would see the creation of large mounds (Greenwood, 2003).

Before the first explorers arrived in the area, an epidemic of smallpox had already spread throughout the Aboriginal population and caused an estimated 50 per cent decrease in the Aboriginal population about 50 years before the first Europeans arrived in Murray Valley (Atkinson and Berryman, 1983; Curr, 1883). Curr believed that there was an Aboriginal population of about 1200 in the region in 1841. After colonial contact, the Aboriginal population continued to decline and was forcibly relocated to several missions and reserves in Victoria and New South Wales.

#### 6.6.1.2 Landscape context

Prior to European settlement and large-scale water management, the river would have flooded seasonally each year (Coutts 1977). During these periods, inundated areas would have supported many food resources for local Aboriginal people, such as aquatic faunal species and terrestrial fauna seeking water sources (Pardoe 2014).

Since European settlement and the implementation of river regulation, the surrounding environment has undergone intensive disturbances associated with development of water infrastructure and agricultural land use. Such activities would have involved large-scale soil removal, the relocation of materials, and extensive sub-surface disturbance by heavy machinery. These changes would have reduced the availability of natural resources since European settlement and would have likely disturbed any Aboriginal cultural heritage sites that were present.

Despite past disturbances and modification, the current Millewa Forest is representative of the environment and resources that were present in the Proposal area prior to European settlement. The forest supports diverse freshwater and terrestrial ecosystems, with an extensive range of flora and fauna that provides insight into the resources that would have been available to Aboriginal people. While no local geological formations suitable for stone tool production have been recorded, the broader riverine landscape would have offered a range of materials and ecological resources for traditional use (Buchan 1974).

As discussed in **Section 6.1**, the Proposal area is located predominately within the Murray Channels and Floodplains Landscape. The soil landscape, associated with this landscape - fine alluvial and clay sediments, promotes excellent preservation of archaeological materials (Ferring 2017). These soil patterns are often associated with the presence of site types such as Aboriginal burials, hearths and long-term occupation sites due to the availability of permanent water sources.

#### 6.6.1.3 Previous archaeological work

A previous report on an archaeological survey in the Murray Valley recorded Aboriginal sites at 5 locations along the northern bank of the Murray River, between Albury and Mildura (Bucan, 1974). Bucan observed that nearly half of the sites located within the survey were oven mounds associated with water sources. Scarred trees were the second most common site recorded.

The NSW National Estate Grants Program 1987/88 (State Forests of NSW): Murray-Murrumbidgee Aboriginal Survey – Lake Victoria and Koondrook State Forests identified six archaeologically

sensitive landforms which included floodplains, levees/point bars, ephemeral creeks, lagoons, river margins and sand dunes. The study also provides a description of the types of Aboriginal archaeological sites that are located within the Murray River Valley. Surface artefact scatter, shell middens, fish weirs, oven mounds, scarred trees, pathways (native tracks), burials, ceremonial grounds, natural sacred sites, and contact/historical sites were all identified as sites that are found within the Central Murray region. Dates for the Central Murray have been assessed at multiple locations within the region as being between 13,000 years before present at Kow Swamp and 1,100 years before present at Algabohnyah.

Another report which focused on burials associated with sand dunes on the Riverine Plain found that burial grounds are reported more in the west than in the east of the Riverine Plain, with isolated burial being common in the east (Bonhomme, 1990). Burial locations are dependent on the topography of the area, with sand dunes being locations of 'cemeteries' and artificial mounds being constructed in areas where there are no or few sand dunes. Sand dunes become more favoured as burial sites in the western portion of the Riverine Plain than in the east. Burial grounds in sand dunes will also contain multiple burials with isolated individual burials not being overly common throughout the region.

A report by Littleton (1999) compared burial practices between the Lower Murray, Central Murray, Upper Murray and Lower Darling. The Upper Murray, which is the closest region studied to the Proposal, had the highest number of sites with 164 sites that contain 739 burials. The Upper Murray had a lower number of burials per site than the Central Murray and Lower Darling.

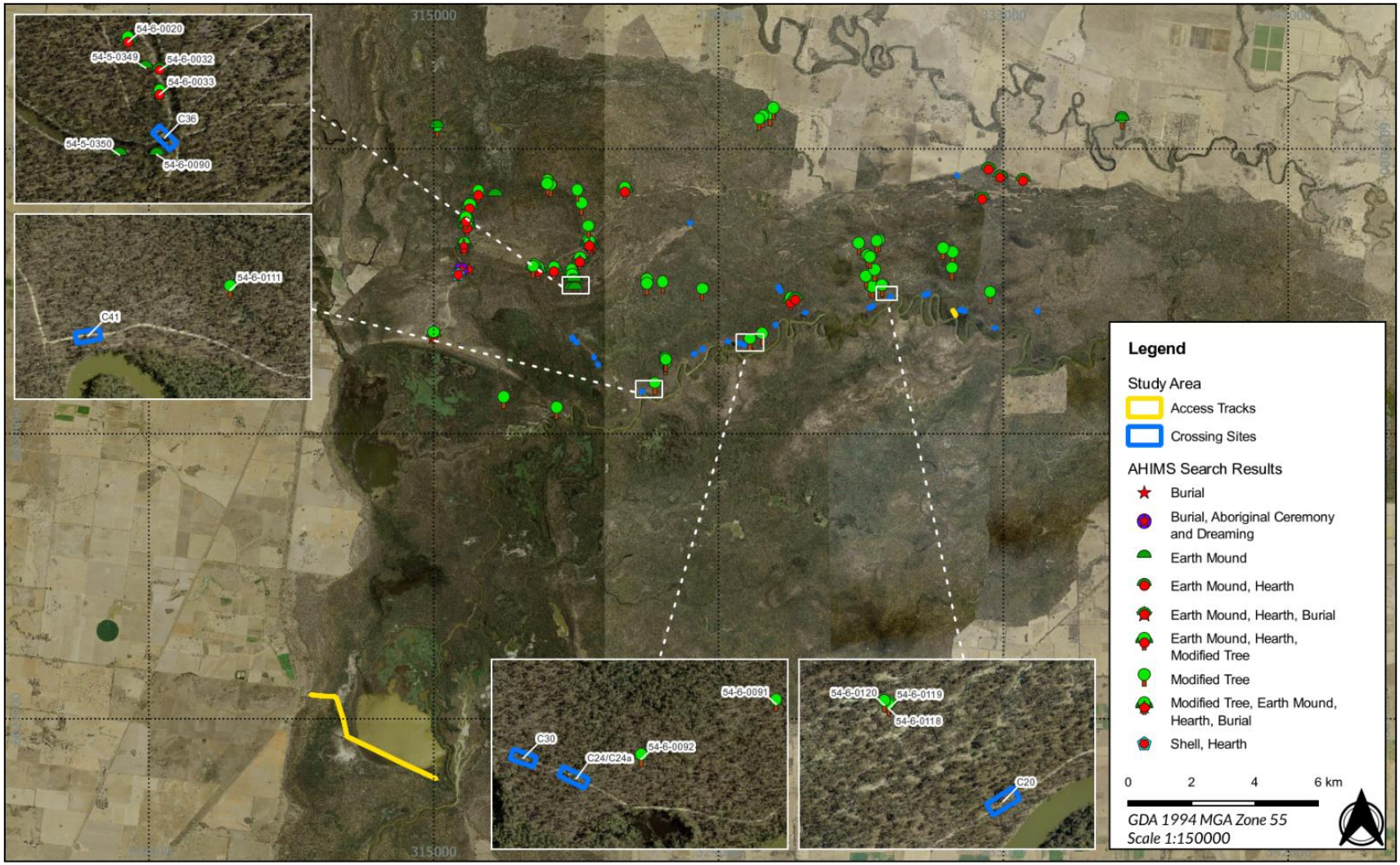
#### 6.6.1.4 Search of heritage registers

A search of the Heritage NSW Aboriginal Heritage Information Management System (AHIMS) database identified up to 166 previously recorded sites within a 10 km radius of the Proposal area. The distribution of these sites is shown in **Figure 6-14** below.

Results identified that Modified trees make up the majority of sites, accounting for 46 per cent of known sites in the southern portion of the Proposal area and 50 per cent of sites in the northern portion. Earth mounds are the next most commonly occurring site, followed by hearths, and burials. In lesser frequencies, but still occurring in the search area, are ochre quarries, Aboriginal Ceremony and Dreaming, shell and stone quarry sites.

The AHIMS search also identified one restricted site which was confirmed by the registrar to not be located within the Proposal area therefore has been excluded from the results.

None of the AHIMS sites were located within the proposed CAZs. The nearest AHIMS sites to the Proposal area include an earth mound about 34 metres southwest of C36, and another earth mound located 34 metres east of C39.




**AHIMS sites within proximity of the study area** 24100 -

Murray Valley Regional Park, Millewa NSW - ACHDDA

*Source: NSW LPI Aerial* *Drawn by: FOT Date: 2025-06-24*

AUSTRAL ARCHAEOLOGY

Figure 6-14 AHIMS sites within proximity to the study area

#### 6.6.1.5 Visual site inspection

Visual site inspections of the proposed CAZs were undertaken to identify and record any Aboriginal archaeological sites visible on the surface or areas of Aboriginal archaeological potential and cultural sensitivity on three separate occasions:

- 14 March 2023
- 15 October 2024
- 14 May 2025

The site inspections were carried out in line with requirements 5 to 8 of the Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW (DECCW 2010) by qualified archaeologists who were accompanied by registered Aboriginal parties and NSW DCCEEW representatives. The site inspections identified no Aboriginal cultural heritage and it was determined that there was low archaeological potential based on the significant ground disturbance that occurred for the development of the existing structures and access tracks. The results of the visual site inspections are shown in **Figure 6-15** to **Figure 6-18** below.

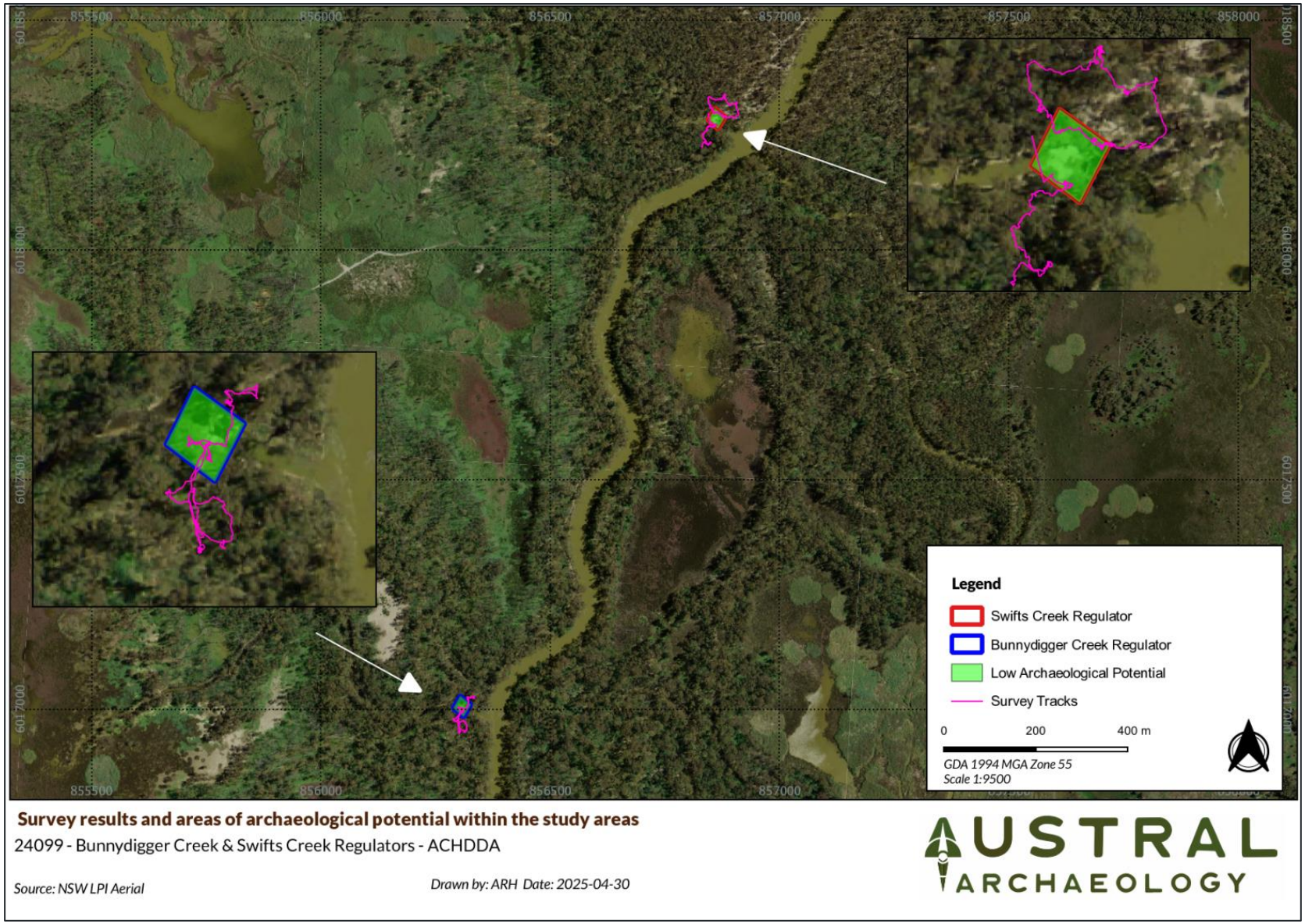



Figure 6-15 Survey results and areas of archaeological potential within the study areas (1 of 4)

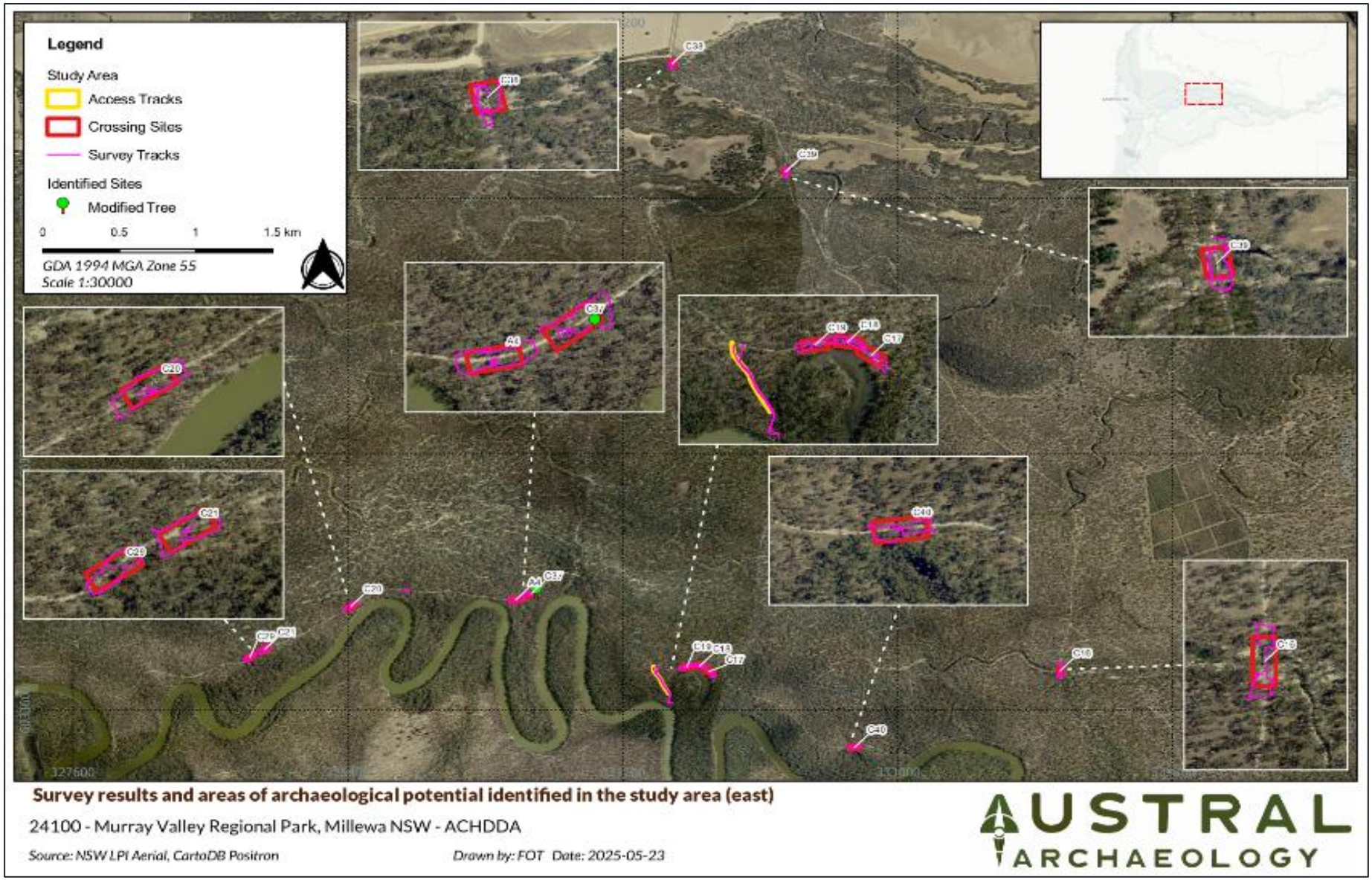



Figure 6-16 Survey results and areas of archaeological potential within the study areas (2 of 4)

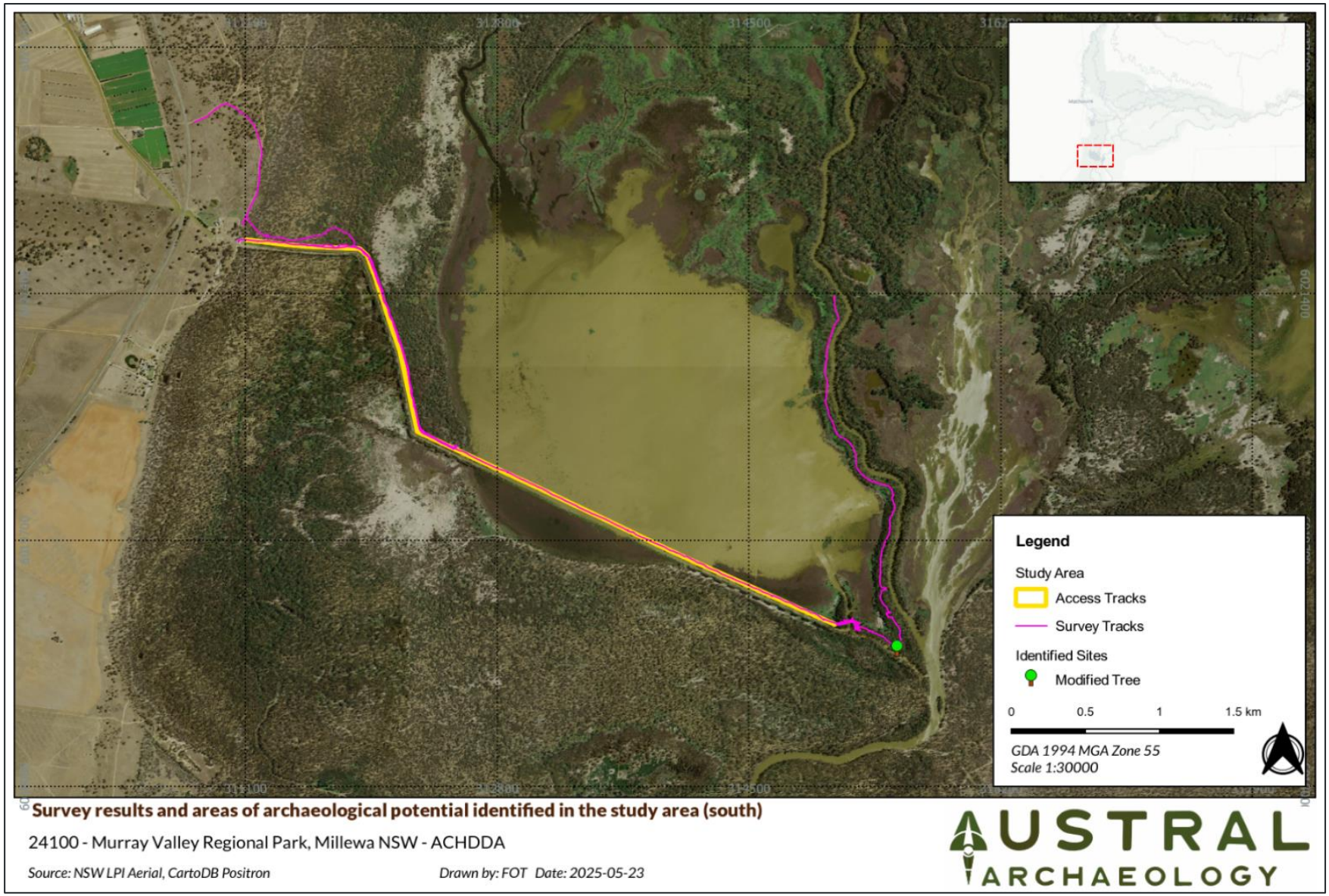



Figure 6-17 Survey results and areas of archaeological potential within the study areas (3 of 4)

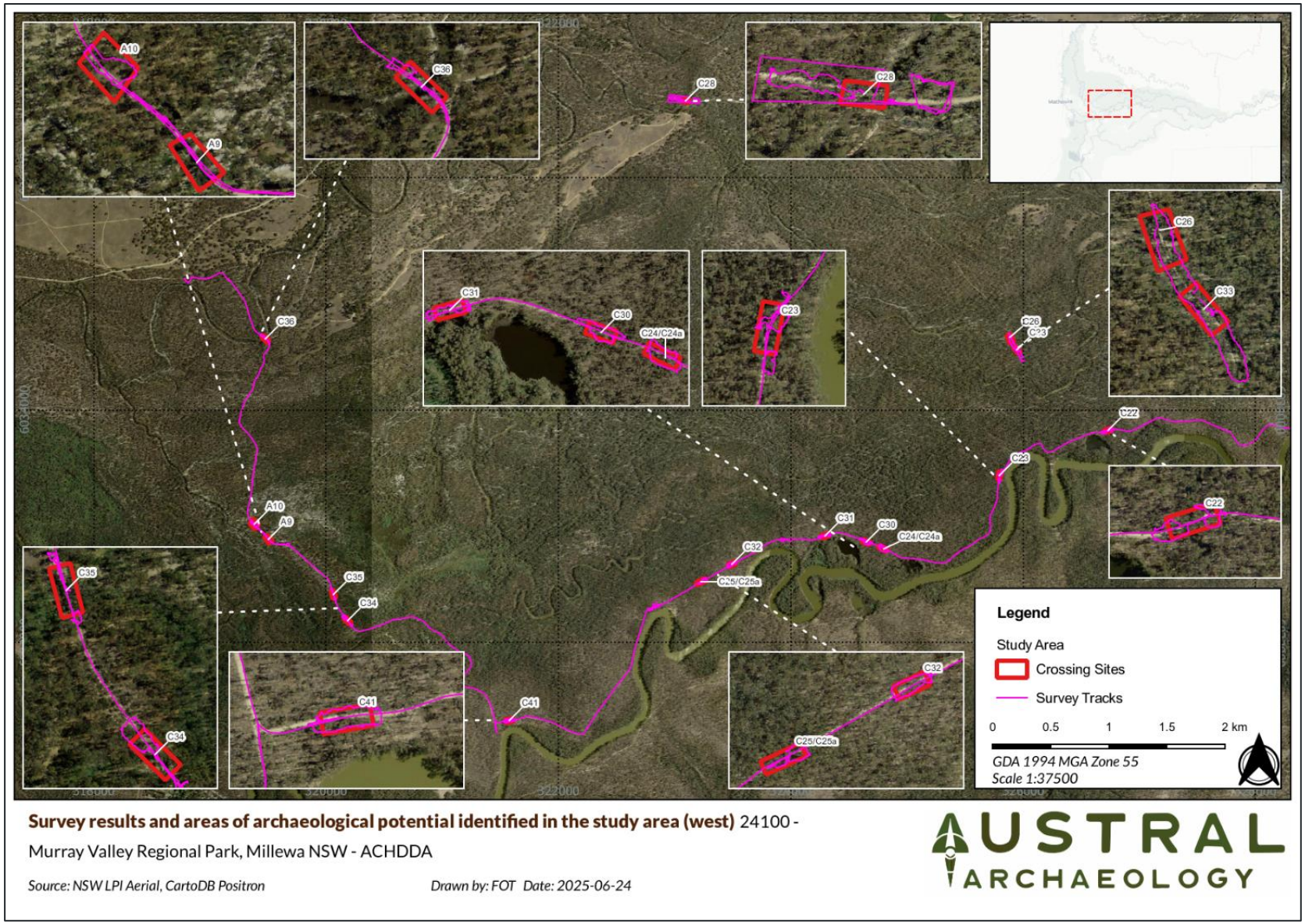



Figure 6-18 Survey results and areas of archaeological potential within the study areas (4 of 4)

#### 6.6.1.6 Assessment

Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW (Department of Environment, Climate Change and Water NSW 2010) sets out the reasonable and practicable steps which individuals and organisations need to take in order to determine whether further assessment or an Aboriginal Heritage Impact Permit (AHIP) application is required for the activity to proceed.

While the Proposal area is generally located in a culturally sensitive landscape, visual inspections did not identify either Aboriginal cultural material or areas of archaeological potential within the proposed CAZs. This is attributed to the highly disturbed nature of the area from past activities.

Based on this outcome, further assessment or an AHIP is not warranted.

### 6.6.2 Impacts

#### 6.6.2.1 Construction

The Proposal would involve earthworks including surface and subsurface disturbance of soils and vegetation removal within the CAZs during construction. While the Proposal area is generally located in a culturally sensitive landscape, visual inspections did not identify either Aboriginal cultural material or areas of archaeological potential within the proposed CAZs. As such, the Proposal would not impact on any known Aboriginal cultural heritage items or sites during construction and would not require an AHIP to proceed.

Unknown Aboriginal heritage items are unlikely to be encountered during construction due to highly disturbed nature and low archaeological potential of the Proposal area. Safeguards to managed potential impacts to unexpected finds are provided in **Table 6-13**.

#### 6.6.2.2 Operation

The Proposal would not impact any known Aboriginal heritage items during operation.

### 6.6.3 Safeguards

Measures proposed to avoid, minimise or manage potential Aboriginal heritage impacts as a result of the Proposal are detailed in **Table 6-13**Table 6-13**.**

Table 6-13 Safeguards for Aboriginal heritage impacts

| Ref | Impact | Safeguard | Responsibility | Timing |
|---|---|---|---|---|
| AH1 | Unexpected Heritage finds | Unexpected Aboriginal cultural heritage finds will be managed in accordance with NSW DCCEEW's Unexpected Heritage Find flowchart, EMF-WG-TOO-04_010) which is provided as an appendix to **Attachment B** and summarised below:<br>• If an Aboriginal object is discovered during construction, all works in this | Contractor, NSW DCCEEW | Construction |

| Ref | Impact | Safeguard | Responsibility | Timing |
|---|---|---|---|---|
| | | location must stop and no further harm must occur to the area.<br>• The find must be left in place and protected from any further harm.<br>• Notify the NSW DCCEEW Project Manager of the find, who in turn will notify NPWS, Heritage NSW, and the Environment Line (13 15 55) and arrange for a qualified archaeologist and representatives of the registered Aboriginal parties to inspect the find.<br>• If they confirm that the find is an Aboriginal object, the item will be recorded on AHIMS, agreement reached on its management, and an application made for an Aboriginal heritage impact permit. | | |
| AH2 | Suspected human remains | Discovery of suspected human remains finds will be managed in accordance with NSW DCCEEW's Suspected human remains Protocol, which is provided as an appendix to **Attachment B** and summarised below<br>Aboriginal ancestral remains may be found in a variety of landscapes in NSW, including middens and sandy or soft sedimentary soils. If any suspected human remains are discovered during any activity, you must:<br>• Immediately cease all works at that location and not further move or disturb the remains.<br>• Notify the NSW DCCEEW Project Manager of the find, who in turn will notify NSW Police if the material is determined to be of human origin and less than 100 years old, or NPWS Aboriginal Partnerships and Heritage Unit, and Heritage NSW if the remains are believed to be Aboriginal.<br>• If in doubt or required by NSW Police, the NSW DCCEEW will obtain specialist advice from a forensic anthropologist or bioarchaeologist to confirm that the | Contractor, NSW DCCEEW | Construction |

| Ref | Impact | Safeguard | Responsibility | Timing |
|---|---|---|---|---|
| | | bones are human, their age and whether they are Aboriginal or not.<br>• The remains must be left in place and protected from further harm or damage or unauthorised access until further advice states otherwise.<br>• If the remains are confirmed to be Aboriginal, the NSW DCCEEW will notify the RAPs.<br>• Aboriginal ancestral remains will be recorded in a culturally appropriate manner in collaboration with Heritage NSW and the registered Aboriginal parties.<br>• Work will not recommence at the location until authorised in writing by Heritage NSW if the remains are considered by the NSW Police and Heritage NSW to be Aboriginal. | | |

### 6.6.4 Residual impacts

Given there are no previously recorded sites located within the proposed CAZ and no Aboriginal cultural heritage was identified during visual site inspection, it is anticipated there would be negligible impacts to Aboriginal heritage as a result of the Proposal. If unexpected finds occur during the Proposal, the processes identified in **Section 6.6.3** would be implemented.

## 6.7 Historic heritage

### 6.7.1 Existing environment

#### 6.7.1.1 Historical context

European settlement of the area surrounding the constructions footprints occurred from the early 1850s, when steamboats began trading along the Murray River. The trade along the Murray supported the establishment and growth of towns along the river and enabled new industries, such as timber-getting, to become more viable (Joss, n.d.; Discover Murray, n.d.).

The quick growth of logging and agriculture in the region lead to the reservation of land under the *Crown Lands Alienation Act of 1861* for water and forestry purposes, which was superseded by the *Lands Acts Amendment Act of 1875*. Where land was reserved for timber, the government was able to sell logging licences to private companies (Joss, n.d.). These licences also came with regulations

on the quantity and type of timber that could be harvested, mainly focusing on the harvesting of red gum.

In 1884, with the implementation of the *Crown Lands Act 1884*, the land surrounding the CAZs was classified as leasehold meaning it was let through leases and could be subject to various forms of 'alienation' (Hanson, 1889). Such alienation started to occur at the CAZs from 1898 as land was declared as forest reserves or amalgamated into existing forest reserves.

The *Water Rights Act 1896* transferred the control of waterways and water flow to the crown, which prevented private landholders from constructing dams and weirs without the prior consent of the government and a licence (Austral Archaeology, 2003).

From 1914, modifications started being made to the Murray River and its tributaries as part of the 1914 River Murray Waters Agreement, which sought to ensure that water levels within the river were maintained so that it was navigable while also providing water for irrigation (Mead, 1915). This agreement came about due to the effects of the Federation Drought that lasted from 1895 to 1902, drastically reducing the water levels within the Murray River. As a part of the plan, locks, reservoirs and dams were built the length of the Murray to ensure large quantities of water could be stored in the river system to maintain suitable water levels (Mead, 1915; Murray Darling Basin Authority, 2022). In NSW, this agreement was enforced by the *River Murray Waters Act 1915*, which established the Murray River Commission to oversee the construction and maintenance of infrastructure that was outlined in the Act. In 1987, this agreement was superseded by the first Murray-Darling Basin Agreement.

In 1917, the Proposal area and surrounds were proclaimed as part of the Millewa State Forest, which was re-dedicated on 4 April 1919.

In 1938, the Forestry Commission applied to the Water Conservation and Irrigation Commission for multiple works along the Murray River including the construction of embankments either side of Pinchgut Creek and the channel connecting Pinchgut Lagoon to the creek (Government Gazette, 16 September 1938).

#### 6.7.1.2 Desktop review

A search of relevant statutory and non-statutory heritage registers including the World Heritage List, Commonwealth Heritage List, National Heritage List, NSW State Heritage Register, Murray Local Environmental Plan 2011, or Murray Development Control Plan 2012 and Historic Heritage Information Management System was carried out on 2 June 2025 to identify listed non-aboriginal heritage within the Proposal area.

Results of the search indicated that the proposed CAZ areas are within the area of the 'Barmah and Millewa Forests' listing on the Register of the National Estate, which is a non-statutory archive. The register entry for Barmah and Millewa Forests notes that the area contains a rich cultural landscape related to historical activities in the area.

Additionally, results from the Historic Heritage Information Management System identified three potential heritage items located within the Proposal area including:

- Item ID 13739 - Millewa Stump 2 with board notches (located within site C33)
- Item ID 13748 - Millewa Toupna Crossing Road survey tree (located within site C38)

- Item ID 13749 - Millewa flood record tree 1992 and 1993 (located within site C38).

These three items are not currently listed on any other heritage register. Further details of their potential heritage values and significance was not available at time of search.

The nearest registered historic heritage items outside of the Proposal is Moira Station, which is listed in Schedule 5 of Murray Local Environmental Plan 2011. This item is located more than one kilometre from the Proposal.

The existing crossing and track infrastructure relevant to the Proposal is not listed on any statutory and non-statutory heritage registers and are considered to be minor ad hoc structures of recent construction and of no heritage significance.

### 6.7.2 Impacts

If works were to occur in close proximity to the items without safeguards in place, the identified heritage items could potentially be impacted by construction activities such as vegetation clearing and ground disturbance within the CAZ.

However, as the items are not located directly within expected design footprints of structures proposed at C33 and C38, potential impacts within the CAZ are considered avoidable with safeguards in place.

An exclusion zone would be established around the items to prevent construction activities occurring near to the items ensuring their protection.

In the event construction activities could not be avoided within close proximity to the items or would otherwise pose a risk to the items despite implementation of safeguards, a further detailed significance and impact assessment would be required.

As the potential heritage items identified can be avoided within the CAZ and the existing crossing and track infrastructure have no identified heritage values, the Proposal is not expected to have any non-Aboriginal heritage impacts.

In the event construction activities could occur within close proximity to the items or could otherwise pose a risk to the items despite implementation of safeguards, a further detailed significance and impact assessment would be required.

### 6.7.3 Safeguards

Measures proposed to avoid, minimise or manage potential historic heritage impacts as a result of the Proposal are detailed in **Table 6-14**.Table 6-14

Table 6-14 Safeguards for non-Aboriginal heritage impacts

| Ref | Impact | Safeguard | Responsibility | Timing |
|---|---|---|---|---|
| NAH1 | Impact identified items | Three recorded potential heritage sites will be protected from potential impacts during construction by establishing and maintaining exclusion zones, using temporary, high visibility fencing.<br>Exclusion zones of at least 5 m will be established around:<br>• Item ID 13739 - Millewa Stump 2 with board notches (located within site C33)<br>• Item ID 13748 - Millewa Toupna Crossing Road survey tree (located within site C38)<br>• Item ID 13749 - Millewa flood record tree 1992 and 1993 (located within site C38)<br>Exclusion zones are to be established by a qualified archaeologist. | Contractor, NSW DCCEEW | Prior to construction/ Construction |
| NAH2 | Unexpected finds | If historical archaeological relics are discovered during construction, all work will cease in the area. The contractor will notify NSW DCCEEW Project Manager, who in turn will notify NPWS. A historical archaeologist will be engaged to assess the item's significance. | Contractor, NSW DCCEEW | Construction |

### 6.7.4 Residual impacts

There are no listed historical heritage items identified within the proposed CAZ areas. Construction and operation of the Proposal is unlikely to affect any historical heritage item. Impacts to potential historic heritage items would be avoid with implementation of the outlined safeguards in **Table 6-14**.

## 6.8 Air quality

### 6.8.1 Existing environment

Air quality at the CAZs is characteristic of a bushland environment. The main contributors to air quality in the environment surrounding the Proposal would include emissions from motor vehicles

and machinery used for park operations. Existing air quality would also be impacted during periods of high wind, surrounding agricultural activities, bushfires, other forms of fires, or dust storm events.

A search of the National Pollutant Inventory in June 2025 did not identify any sources for air polluting substances near the Proposal.

Sensitive receivers located within one kilometre of the Proposal include:

- Homesteads on agricultural properties along the Cobb Highway, the nearest of which is about 0.2 km east of Moira Cutting (MC1)
- Moira Station on the Cobb Highway, a function centre that includes accommodation, about 1 km south-west of Moira Cutting (MC1)
- Swifts Creek Campground, which is about 0.1 km north to Swifts Regulator (A15) off Narrows Road (NR1)
- Barmah Lakes camping and picnic ground, which is located in Barmah National Park, on the Victorian side of the Murray River, about 0.4 km south-east of Narrows Road (NR1)
- Kingfisher Cruises, which is located in Barmah National Park, on the Victorian side of the Murray River, about 0.8 km south-east of Narrows Road (NR1)
- Camo Crew campsite, which is located about 0.5 km south of Millewa River Road (MRR2)
- Great riverside campsite, which is located in Barmah National Park, on the Victorian side of the Murray River about 0.8 km east of Millewa River Road (TO1)

## 6.8.2 Impacts

### 6.8.2.1 Construction

Air quality impacts during construction of the Proposal are expected to be minor. Construction air quality impacts would be limited to localised and temporary indirect impacts from elevated exhaust emissions and dust generation. Dust particles may be generated as a result of a range of activities associated with the Proposal including:

- Vegetation clearing
- Construction traffic on unsealed roads
- Haulage of spoil
- Stockpiling
- Loading and unloading of material
- Rock and concrete crushing
- Earthworks including stripping topsoil, excavations and placement of fill.

Airborne dust or exhaust emissions from vehicles, plant and equipment can cause nuisance, harm or injury to recreational users, nearby residents and contractor staff if not adequately managed. However, dust generation and exhaust emissions during construction are considered to have only temporary, non-continuous and localised impacts on potential receptors. Given the short duration, small area and relatively minor nature of the proposed construction works, any air quality impacts would be temporary, localised and minor.

The Swifts Creek Campground would be temporarily closed while construction works are occurring at this site. The nearest sensitive receive to any of the construction works would therefore be at least 200 metres from the construction works, which is sufficiently distant to make it unlikely that any sensitive receivers would experience adverse air quality impacts during the construction phase. Any adverse impacts will be managed through the preparation and implementation of a CEMP and environmental safeguards listed in **Table 6-15.**

#### 6.8.2.2 Operation

The only air quality impacts during operation of the Proposal would be emissions from vehicles used to access the CAZs to carry out operational and maintenance tasks. The operational and maintenance requirements of the waterway crossings and access tracks would be infrequent and minor and no greater than those of the existing structures and tracks. Therefore, operational air quality impacts are expected to be minor and no greater than those associated with the existing infrastructure.

### 6.8.3 Safeguards

Measures proposed to avoid, minimise or manage potential air quality impacts as a result of the Proposal are detailed in **Table 6-15.**

Table 6-15 Safeguards for air quality impacts

| Ref | Impact | Safeguard | Responsibility | Timing |
|---|---|---|---|---|
| AQ1 | Dust generation during construction | Work methods will be modified during high wind conditions if excessive dust is generated. | Contractor | Construction |
| AQ2 | Dust generation by vehicles | All vehicles on site will be confined to designated routes. | Contractor | Construction |
| AQ3 | Dust generation by vehicles | Reduce vehicle speeds to minimise dust emissions. | Contractor | Construction |
| AQ4 | Dust generation by vehicles | Visual monitoring for dust will be implemented during the works. Where required, a hose or water cart would be used to regularly wet down haulage access tracks, work sites and laydown areas. | Contractor | Construction |

| Ref | Impact | Safeguard | Responsibility | Timing |
|---|---|---|---|---|
| AQ5 | Vehicle emissions | Trips and trip distances will be controlled and reduced where possible, for example by coordinating delivery and removal of materials to avoid unnecessary trips. | Contractor | Construction |
| AQ6 | Vehicle emissions | Minimise engine idling and ensure vehicle engines are switched off when stationary or parked within ancillary facilities or construction zones. | Contractor | Construction |

### 6.8.4 Residual impacts

The Proposal has the potential to cause only minor air quality impacts, and the likelihood of any impacts to air quality would be reduced with implementation of the safeguards identified in **Table 6-15**. The nearest sensitive receivers are about 0.2 km from the Proposal and are unlikely to be adversely affected by adverse air quality.

## 6.9 Noise and vibration

### 6.9.1 Existing environment

The acoustic environment of the Proposal is characterised by the ambient environmental noise of Millewa Forest. Ambient noise levels would be generally consistent with typical day/night patterns in a remote and isolated noise environment. Anthropogenic sources of noise are infrequent and mainly restricted to those vehicles and machinery engaged in park operations and vehicles of recreational visitors.

Noise-sensitive receivers within a 5 km radius of the Proposal include:

- Homesteads on agricultural properties along the Cobb Highway, the nearest of which is about 0.2 km east of Moira Cutting (MC1)
- Moira Station on the Cobb Highway, a function centre that includes accommodation, about 1 km south-west of Moira Cutting (MC1)
- Dwelling and tourist accommodation in Mathoura, the nearest of which is about 4.4 km north of Moira Cutting (MC1)
- Swifts Creek Campground, which is about 0.1 km north to Swifts Regulator (A15) off Narrows Road (NR1)
- Barmah Lakes camping and picnic ground, which is located in Barmah National Park, on the Victorian side of the Murray River, about 0.4 km south-east of Narrows Road (NR1)

- Kingfisher Cruises, which is located in Barmah National Park, on the Victorian side of the Murray River, about 0.8 km south-east of Narrows Road (NR1)
- Dharnya cultural centre, which includes a visitors' centre, bunkhouse, kitchen and mess hall and caretaker's residence, located about 1.5 km south-east of Narrows Road (NR1)
- Murray Valley campgrounds, which is located about 1.3 km north of Millewa River Road (DS1)
- The Timbercutter Redgum Cafe Bar, which is about 1.7 km south-west of Millewa River Road (DS1)
- Murraybank caravan park, which is about 2.8 km south-west of Millewa River Road (DS1)
- Tarragon Lodge Holiday park, which is about 3.2 km south-west of Millewa River Road (DS1)
- Picnic Point caravan park, which is about 2 km south-west of Millewa River Road (DS1)
- Edward River bridge campground, which is located about 2.5 km west of Millewa River Road (DS1)
- Camo Crew campsite, which is located about 0.5 km south of Millewa River Road (MRR2)
- Great riverside campsite, which is located in Barmah National Park, on the Victorian side of the Murray River about 0.8 km east of Millewa River Road (TO1)
- Camo Deets campsite, which is located in Barmah National Park, on the Victorian side of the Murray River about 2.3 km east of Millewa River Road (TO1)
- Lupmans campsite, which is located in Barmah National Park, on the Victorian side of the Murray River about 4 km east of Millewa River Road (TO1)
- Homesteads on agricultural properties on Millewa Road, the nearest of which is about 2 km east of north of Toupna Crossing Road (TCR1)

## 6.9.2 Impacts

### 6.9.2.1 Construction

Sources of noise and vibration during construction of the Proposal would include:

- Plant and equipment generating intermittent noise and vibration e.g. excavators, compressors, trucks etc.
- Key construction activities including demolition works and earthworks
- Traffic noise associated with the movement of construction vehicles to and from the work sites.

Noise and vibration impacts from these activities would be localised, temporary, non-continuous, only experienced for short periods, and in-line with the *Draft Construction Noise Guidelines* (NSW Environment Protection Authority, 2020). No sensitive receivers are expected to be adversely impacted by construction noise due to the distance of the works from sensitive receivers. The large tracts of bushland separating the works from the nearest sensitive receivers would also minimise the potential for noise impacts to the nearest sensitive receivers.

Given the short duration, small area and relatively minor nature of the proposed construction works, any noise and vibration impacts would be temporary, localised and minor. Any adverse impacts will be managed through the preparation and implementation of a CEMP and the environmental safeguards listed in **Table 6-16**Table 6-16.Table 6-16

#### 6.9.2.2 Operation

There is no operational component of the Proposal therefore noise and vibration impacts are not expected.

### 6.9.3 Safeguards

Measures proposed to avoid, minimise or manage potential noise and vibration impacts as a result of the Proposal are detailed in **Table 6-16**Table 6-16.

Table 6-16 Safeguards for noise and vibration impacts

| Ref | Impact | Safeguard | Responsibility | Timing |
|---|---|---|---|---|
| NV1 | Construction noise impacts to residents | Inform the local community of the potential impact of increased heavy vehicle traffic during the construction phase, including potential noise impacts. | NSW DCCEEW | Construction |
| NV2 | Out of hours construction noise and vibration | Unless otherwise approved by NSW DCCEEW through an out of hours application process, construction hours will be limited to:<br>• Monday to Friday: 7 am to 6 pm<br>• Saturday: 8 am to 5 pm<br>• No construction work on Sundays or public holidays. | Contractor | Construction |
| NV3 | Construction noise and vibration | All site personnel will be made aware of noise issues and mitigation measures through induction processes. | Contractor | Construction |
| NV4 | Construction noise and vibration | All machinery will be well maintained and in good working order. All vehicles and equipment will be fitted with silencing devices, where applicable. | Contractor | Construction |

### 6.9.4 Residual impacts

The Proposal has the potential to cause only minor noise and vibration impacts, and the likelihood of any impacts would be reduced with implementation of the safeguards identified in **Table 6-16**Table 6-16. The nearest sensitive receivers to the Proposal are at least 0.2 km away and are unlikely to be impacted by noise and vibration.

# 6.10 Traffic and access

## 6.10.1 Existing environment

The main access to Murray Valley National Park and Regional Park is from Cobb Highway. The highway starts at Echuca and proceeds north through Moama, Mathoura and Deniliquin and continues on to connect with the Barrier Highway near Wilcannia. The Cobb Highway passes along the western boundary of Murray Valley National Park and Regional Park. The Cobb Highway passes along the western boundary of Murray Valley National Park and Regional Park. Access between the highway and the parks is provided via Jones Street in Mathoura, which connects to Picnic Point Road in the Murray Valley National Park.

The most recent traffic volume data available on Transport for NSW's Traffic Volume Viewer for the Cobb Highway in the vicinity of Mathoura is from 2012. Traffic was counted about 770 metres east of the intersection with Nine Mile Road. Average daily traffic of 1,888 vehicles in both directions was recorded, of which 83 per cent of vehicles were light vehicles and 17 per cent heavy vehicles.

Key roads within the Murray Valley National Park and Regional Park include Picnic Point Road, which is a sealed road that intersects with Millewa Road, an unsealed road that proceeds through the park in an easterly direction to connect with agricultural land at Bullatale on the northern boundary of the park. There are several other unsealed roads into the park from Cobb Highway which can provide more direct access to sites in the northern and southern areas of the park. All of the work sites would be accessed from the Cobb Highway and then via the following routes:

- Access to lower Millewa (i.e. Moria Cutting, Narrows Road, A15-A16): Poverty Point Road, Porters Creek Road, Millewa Road, Millewa River Road, Narrows Road or Moira cutting Access Track
- Access to Upper Millewa (i.e. Millewa River Road, Fisherman's Bend Road, A4-A10, C16-C41): Jones Street, Picnic Point Road, Millewa Road to Millewa River Road, Toupna Crossing Road and or Fisherman's Bend Road and Pinchgut Regulator Access Track

The road network within Murray Valley National Park and Regional Park is infrequently travelled, particularly outside the peak summer holiday period. The existing access tracks located within the park proposed to be upgraded are described in Table 2-1.

## 6.10.2 Impacts

### 6.10.2.1 Construction

Construction would generate heavy vehicle movements associated with the transportation of construction machinery and equipment to and from the site, the delivery of materials to the site, and the removal of demolition and construction waste and surplus materials from the site.

The construction access routes to the work sites have been selected in consultation with NPWS. These construction access routes have been inspected by NSW DCCEEW and selected due to their suitability for the expected types, sizes and number of construction vehicles. Factors considered in the route selections included the adequacy of sight lines for turning onto and off the Cobb Highway, road surface conditions, road widths and total distance.

Construction vehicles would cause a negligible increase in heavy vehicle traffic on Cobb Highway and would not represent a substantial increase in traffic on local roads. It is expected that construction traffic movements would be limited to the initial transport of construction plant and materials to the work sites, the removal of construction plant and materials from the work sites following construction completion, and worker movements to and from the work sites at the start and end of each working day. Local roads may see an increase in traffic during the abovementioned activities subject to contractors' schedules performing the works.

Construction vehicles would park within the CAZ at each site, or along the access tracks that pass each site. It is estimated that construction vehicle movements at each work site would peak at ten vehicle movements (including three heavy vehicles) per day primarily associated with haulage and transportation of construction machinery and materials (i.e., crushed rock /gravel, precast culvert structures) to Millewa Forest. Light vehicle movements would be associated with site workers and smaller deliveries. The maximum daily heavy vehicle movements at each work site are considered likely to occur during the demolition works and earthworks associated with haulage of spoil and clean fill material.

No upgrade or maintenance of Transport for NSW or council-owned roads would be required.

The staging and timing of the Proposal would be developed in coordination with NPWS field staff to minimise disruptions to park operations and establish detour routes as needed. The works would not prevent access to any private property and would not impact maritime activities or boating access.

The works are proposed to occur outside the peak summer holiday period, which would minimise the number of users of Millewa River Road inconvenienced by its temporary closure and the need to use a detour.

#### 6.10.2.2 Operation

The Proposal would benefit park management activities through improved vehicle access for NPWS staff and reduced trail maintenance requirements/costs.

### 6.10.3 Safeguards

Measures proposed to avoid, minimise or manage potential traffic and access impacts as a result of the Proposal are detailed in **Table 6-17**Table 6-17.

Table 6-17 Safeguards for traffic and access impacts

| Ref | Impact | Safeguard | Responsibility | Timing |
|---|---|---|---|---|
| **TA1** | Construction traffic | A construction traffic management plan will be prepared as part of the CEMP. The plan will include:<br>• A driver code of conduct<br>• Confirmation of haulage routes and access locations | Contractor | Construction |

| Ref | Impact | Safeguard | Responsibility | Timing |
|---|---|---|---|---|
| | | • Measures to maintain access and capacity to existing roads where possible<br>• Traffic control measures including signage at appropriate locations to notify road users of increased traffic volumes and construction vehicles<br>• Management of oversized vehicles<br>A response plan for any construction-related traffic incidents. | | |
| TA2 | Construction traffic | Consultation with NPWS and Murray River Council will be undertaken to minimise the impacts to the surrounding road network during construction including temporary access tracks or road closures. Any agreed traffic management measures will be incorporated into the construction traffic management plan. | Contractor | Construction |

### 6.10.4 Residual impacts

During the construction phase, there would be localised and short-term increases in traffic on the surrounding road network from construction vehicles.

The traffic and access impacts during construction of the Proposal are considered negligible due to the remote location of the work sites, small number of construction vehicles required, and the safeguards detailed in **Table 6-17**Table 6-17.

During operation, the Proposal would result in improved access into and throughout Millewa Forest.

## 6.11 Visual

### 6.11.1 Existing environment

The existing visual amenity at the CAZs is typical of a natural floodplain and bushland environment.

There is an extensive network of unsealed NPWS managed trails throughout the Murray Valley National Park and Regional Park that provide access for management operations. The road network is infrequently travelled, particularly outside the peak summer holiday period when works would occur.

The existing structures where works are proposed would only be visible when directly at the sites. The construction works would generally be within the existing trail corridor and not within sight of any passing public traffic or sensitive receivers.

## 6.11.2 Impacts

### 6.11.2.1 Construction

There would be negligible public visibility of the construction work sites during the construction phase because track sections would be temporarily closed to the public.

Construction traffic travelling through Murray Valley National Park would be seen by recreational users of the park. This would be minor and short-term impact that would have a negligible impact on their use of the park.

The Proposal is not likely to significantly affect the existing land use or scenic landscape. The majority of works are to be carried out in areas of the National Park where the land use and natural character of the area is already impacted by the existing trails. There are no permanent residents located within or adjoining the proposed CAZ who would experience amenity impacts during construction.

During the construction phase, there will be localised and short-term visual impacts to the scenic landscape in the vicinity of the CAZ due to disturbance by vehicles, stockpiling and machinery. This impact is not considered to be significant since the trails are inaccessible to the public and the majority of construction activities would be screened by surrounding vegetation.

During construction, access to affected trails within Millewa Forest would be restricted. However, given the minor, short-term and temporary nature of this access restriction, impacts to existing land use are anticipated to be negligible.

### 6.11.2.2 Operation

The Proposal would result in some minor visual impacts to users of the park post construction as the absence of mature vegetation within the CAZ after construction would make areas distinguishable from the surrounding vegetation until the site rehabilitation plantings become established. In time the appearance of the area would become similar to the surrounding forest.

Due to the small footprint of the works and the dominance of existing trees at each site, the overall visual impact of the Proposal would be negligible. If any users of the park were walking near the proposed culverts and rock crossings they would observe structures similar in appearance to those found elsewhere in the park.

## 6.11.3 Safeguards

Measures proposed to avoid, minimise or manage potential visual impacts as a result of the Proposal are detailed in **Table 6-18.**

Table 6-18 Safeguards for visual amenity impacts

| Ref | Impact | Safeguard | Responsibility | Timing |
|---|---|---|---|---|
| V1 | Visibility of construction works | During construction, all equipment, materials and temporary facilities, such as site offices and portable toilets, will be located within the designated CAZs for the works. | Contractor | Construction |
| V2 | Visibility of construction works | The construction work sites will be clearly demarcated and maintained in an orderly manner. | Contractor | Construction |
| V3 | Visibility of construction works | All construction equipment will be removed from the park as soon as it is not required, including any material and refuse related to the works. | Contractor | Construction |
| V4 | Revegetation | A site rehabilitation plan will be prepared as part of the CEMP. The site rehabilitation plan will detail how the work sites will be stabilised and revegetated once the new infrastructure is built.<br>A draft site rehabilitation plan will be provided to NPWS for comment and any comments provided will be addressed in the final version of the plan.<br>Rehabilitation of the CAZs including revegetation will be carried out as soon as practicable. | NSW DCCEEW | Construction |

### 6.11.4 Residual impacts

Given the remote location, small scale of the Proposal and safeguards detailed in **Table 6-18**, the Proposal is considered to have a negligible impact on visual amenity or landscape character at Millewa Forest during both construction and operation.

# 6.12 Hazard

## 6.12.1 Existing environment

### 6.12.1.1 Bushfire risk

The Proposal is located on land which has been classed as a designated bush fire prone area. The vegetation category for the CAZs is Vegetation Category 1 which is considered to be the highest risk for bush fire. This vegetation category has the highest combustibility and likelihood of forming fully developed fires including heavy ember production.

As discussed in Section 4.2.2, the Proposal is located in the Mid Murray Zone Bush Fire Management Committee area. The bush fire risk management plan prepared by the committee in 2009 identifies the bush fire season for the area as running from October -November to March-April. Fire weather conditions for the area are described as being usually associated with winds from the west around to the north accompanied by high daytime temperatures and low relative humidity. Dry lightning storms occur frequently during the bush fire season and often start forest and grass fires. The area has on average 250 bush/grass fires per year, of which 6 to 10 on average can be considered to be major fires. The main sources of ignition in the area are lightning strikes, unattended campfires, power lines, machinery and traffic, escaped agricultural burns and the use of cutting and welding equipment. Potential major risk seasons follow significant periods of high growth from high winter rainfall which allow the build-up of fine fuels and create the potential for a major fire season across the whole of the Mid-Murray Zone when this material cures (Mid Murray Zone Bush Fire Management Committee, 2009).

NPWS adopts a strategic approach to managing fires in parks and reserves including research, planning, hazard reduction, rapid response firefighting crews and community alerts. NPWS, in consultation with the community and other organisations, develop fire management strategies outlining plans of action for use in the event of a fire. The plans cover the protection and conservation of wildlife and property and extend across all NSW national parks. The type of strategy developed for each park varies according to the complexity of the park's fire management issues.

The NPWS fire management strategy relevant to the Proposal is the *Murray Valley National and Regional Parks (Millewa, Moira and Gulpa Islands Precincts) Fire Management Strategy* (NPWS, 2012). The strategy identifies two types of fire trail category: essential (category 1) and important (category 2). Of relevance to the Proposal is that Millewa River Road, Poverty Point Road, Porters Creek Road, Narrows Road, Fisherman's Bend Road and Toupna Crossing Road are all essential fire trails. The strategy defines fire thresholds for vegetation communities to conserve biodiversity. Fire thresholds are assigned with consideration of fire history including the time since areas of the park were last burnt and the recent frequency of burning. The strategy recognises four fire management zones at the park, with most of the park including all of the Proposal sites being land management zones. The objectives of this zone are to conserve biodiversity and protect cultural and historic heritage and to manage fire consistent with the applicable fire thresholds.

#### 6.12.1.2 Flooding

The Proposal is within the flood planning area identified in the Murray Local Environmental Plan 2011. Section **4.1.6.1** outlines the provisions of the plan in relation to development within the flood planning area.

#### 6.12.1.3 Safety and security

A number of existing trails and crossings are in poor condition and unsafe for vehicles. Further, high flows and rainfall can cut-off access along and to these trails for extended periods, causing significant damage and preventing access for maintenance and operation of NPWS assets such as flow-regulating structures. The Proposal seeks to improve trail and crossing condition, durability and access throughout the Millewa Forest.

### 6.12.2 Impacts

#### 6.12.2.1 Construction

##### Bushfire risk

Construction activities for the Proposal would pose an increased risk of bush fire due to the potential for sparks from machinery (i.e. jack hammers, rock saws, and angle grinders), vehicles (i.e. vehicle exhaust systems when traversing over dry vegetation) and hot works if not appropriately managed. There is also the potential for increased bushfire risk should waste vegetation from vegetation clearing and pruning be left in-situ and/or stockpiled onsite. Fuel leaks and spills from plant and equipment and temporary storages of small quantities of flammable materials, such as fuel, could also provide a fuel source for bush fires or cause a bush fire if ignited.

##### Flooding

Construction of the Proposal would be scheduled when there are low flows in the Murray River and Edward River and there would be no or minimal flow in local waterways. Temporary cofferdams may be used to create dry in-stream work sites. Therefore, there is low potential for flooding of the work sites. If a flood event were to occur during the construction phase that is sufficiently large to overtop the cofferdams it is expected that the readily available information on flows in the Murray River upstream of the work sites would provide ample time to move plant and equipment to higher ground and clear the work sites so as to minimise the damage that inundation of the site could cause. The construction works would have a negligible impact on local flood patterns.

The Construction Soil and Water Management Plan to be prepared as part of the Contractor's CEMP will include contingencies for unexpected moderate to high flows in the Murray River during instream works.

##### Safety and security

The contractor would be responsible for the safety of their staff and subcontractors working at the construction sites and any visitors to the sites. The contractor would require all people attending the sites to complete a safety induction that informs them of the safety procedures to be implemented during construction works.

#### 6.12.2.2 Operation

##### Bushfire risk

The operation of the Proposal would have no impact to bushfire risk and would not increase the occurrence of bushfires or threat to life in an emergency bushfire event.

##### Flooding

The Proposal would not impact on local flood regimes, given no material changes to inundation depths or extents are anticipated.

### 6.12.3 Safeguards

The proposed construction works are unlikely to occur during summer as this is when the Murray River is typically operated at high flow to deliver water to downstream irrigators. This would decrease the bush fire risks associated with the construction works, because the critical wildfire season generally occurs from October/November to March/April. The risk is further reduced given the Proposal would take place where existing infrastructure is already present and vegetation would be cleared from the CAZs to enable the construction works to occur.

The bush fire hazard associated with construction of the Proposal would be managed through equipment selection, appropriate access arrangements, safety protocols during periods of high fire risk and the implementation of an emergency response plan as detailed in the *Murray Valley National and Regional Parks (Millewa, Moira and Gulpa Islands Precincts) Fire Management Strategy*. As per NPWS policy, the park may be closed to the public during periods of extreme fire danger, wildfire suppression operations or prescribed burning operations, and this closure would extend to the contractor.

Measures proposed to avoid, minimise or manage potential hazard impacts as a result of the Proposal are detailed in Table 6-19.

Table 6-19 Safeguards for hazards

| Ref | Impact | Safeguard | Responsibility | Timing |
|---|---|---|---|---|
| H1 | Bushfire risk during construction | The following controls will be implemented to mitigate potential for fires and increased bush fire risk during construction:<br>• No stockpiling or burning of waste vegetation to occur onsite<br>• Daily weather checks will be undertaken during the pre-start meeting to note for potential fire danger<br>• Any notices erected, displayed or issued by NPWS regulating the use of fire in the park will be complied with | Contractor | Construction |

| Ref | Impact | Safeguard | Responsibility | Timing |
|---|---|---|---|---|
| | | • Hot works and machinery which may result in sparking or ignition must not be used on a Total Fire Ban Day without an exemption from the NSW Rural Fire Service<br>• Fuel and other similar flammable materials, such as gas cylinders and paint, will be stored in appropriate fire-resistant storage containers<br>• Appropriate firefighting equipment (e.g., water pump, extinguisher and hand tools) should be available on site along with trained staff<br>• Stationary plant will be parked in cleared areas<br>No smoking on site in accordance with section 19 of the NPW Regulation. | | |
| H2 | Bushfire risk during construction | All works will be undertaken in accordance with the operational guidelines under the *Murray Valley National and Regional Parks (Millewa, Moira and Gulpa Islands Precincts) Fire Management Strategy* which includes provisions pertaining to operation of earthmoving equipment and visitor management. | Contractor | Construction |
| H3 | Emergency response | Emergency contacts and response procedures will form part of the CEMP and site inductions. | Contractor | Construction |
| H4 | Flooding during construction | Instream construction works are to occur only when flows are low/dry for a suitable duration prior to construction.<br>The Construction Soil and Water Management Plan to be prepared as part of the Contractor's CEMP will include contingencies for unexpected moderate to high flows in the Murray River during instream works. | Contractor | Construction |

### 6.12.4 Residual impacts

Carrying out the construction works outside the critical wildfire season and implementing the safeguards and mitigation measures inTable 6-19 **Table 6-19** would result in the Proposal having minimal bushfire risk during the construction phase. The operation of the Proposal has negligible bushfire risk.

Carrying out the construction works when there is low flow in the Murray River would minimise the potential flooding of the work sites. The operation of the Proposal would have negligible impact.

## 6.13 Socio-economic

### 6.13.1 Existing environment

The Proposal is located within the Murray River Council local government area. As per the 2021 census, 5,834 people were reported as being in the local government area's labour force. Of these, 55.8 per cent were employed full time, 33.5 per cent were employed part-time and 3.1 per cent were unemployed. The most common occupations included managers (22.2 per cent), professionals (14.4 per cent), technicians and trade workers (13.6 per cent) and labourers (12.6 per cent). The population of the surrounding area is sparse, with few towns in the region. The nearest towns within the region include Mathoura with a population of 1,002 people and Tocumwal with a population of 2,862 people.

The Yorta Nation and Bangerang Nation are the traditional custodians of Millewa Forest. Barmah-Millewa Forest has been the heartland of both nations for over 60,000 years providing a rich abundance of food, medicinal and cultural resources and their ongoing connection to the landscape is evident in creation stories and traditional ecological knowledge. The Yorta land use and occupancy map demonstrates an ongoing connection to the forest, with known occupancy and harvest sites for plant, wood, earth, invertebrates, fish, reptile, bird and mammal resources (Murray-Darling Basin Authority, 2012).

Barmah-Millewa Forest is a popular destination for recreation and tourism, with most visitors attracted to the rivers and their surroundings. Barmah-Millewa Forest receives about 100,000 visitor days per year (Abel and O'Connell, 2006). Rivers and lakes are important for boating and fishing, bait collection, picnicking, and canoeing. Scenic driving, 4WD driving, trail bike riding, cycling, bushwalking, orienteering and camping are other popular recreational uses of the forest (Abel and O'Connell, 2006). The strong interest for nature studies, including activities such as birdwatching, highlights the abundance of wildlife in the area and the importance of the environment for recreational users of the forest.

### 6.13.2 Impacts

#### 6.13.2.1 Business, employment and social infrastructure

Construction of the Proposal would provide temporary benefits to local and regional businesses, particularly in industries that provide goods and services to support construction activities.

Businesses in hospitality, accommodation and trades at Moama, Mathoura and Deniliquin and other local towns in the region are the most likely to benefit.

Local businesses could also see a short-term benefit with increased revenue from sourcing of local supplies and construction workforce spending. Although local procurement will be prioritised where possible, it is likely that some of the workforce would need to be sourced from outside the local region, due to the technical requirements of the Proposal and the limited availability of local workers with the necessary skills and experience. This non-resident workforce would contribute to increased spending locally during construction.

Construction of the Proposal is not expected to negatively impact or significantly increase demand on social infrastructure, health services or accommodation in the region due to the low numbers of workers required and relatively short duration. No impact to irrigation water deliveries via the Murray and Edward Rivers are expected to occur during the construction phase.

#### 6.13.2.2 Recreational users

The Proposal is unlikely to significantly affect local tourism or recreational usage within the area. There would be temporary short-term impacts on recreational users due to the closure Millewa River Road and other access tracks such as Fishermen's Bend Road during construction. Local amenity impacts from construction noise and dust are unlikely to impact park visitors due to the temporary closure of Millewa River Road and other access tracks across Millewa Forest and the distance of all of the proposed work sites from key destinations within the park and organised recreational activity locations.

Key stakeholders including NPWS, park visitors and commercial operators within the park would be notified in advance of construction commencing and would be updated on the progress of the works during the construction phase so impacts can be avoided where possible.

### 6.13.3 Safeguards

No specific socio-economic safeguards are proposed as the Proposal would have negligible adverse socio-economic impacts. Ongoing consultation will be carried out with key stakeholders regarding the timing of works and notification to any temporarily disrupted users such as NPWS and WaterNSW operational staff.

### 6.13.4 Residual impacts

Construction of the Proposal would likely provide temporary benefits to local and regional businesses, including businesses that provide hospitality, accommodation, trades, and goods and services to support construction. The Proposal is unlikely to significantly affect local tourism or recreational usage within the area given it is located in a remote area of Millewa Forest that is infrequently accessed by the public.

Operation of the Proposal would have no adverse socio-economic impacts.

# 6.14 Waste, contamination and hazardous materials

## 6.14.1 Existing environment

A review was undertaken on 8 July 2025 of the Environment Protection Authority's contaminated land record of notices under section 58 of the *Contaminated Land Management Act 1997* and the list of NSW contaminated sites notified to the Environment Protection Authority under section 60 of the Act did not reveal any registered contaminated land sites within the Proposal area.

A review of premises currently regulated by an environment protection licence under the POEO Act and premises that are no longer required to be licensed under the POEO Act carried out the same day did not identify any such premises within the Proposal area. Pursuant to section 4.6 of the State Environmental Planning Policy (Resilience and Hazards) 2021 there is no apparent reason to consider that the land proposed to be developed would be contaminated and, as such, no further contamination investigation is required. A search of the National Pollutant Inventory for the 2023/2024 reporting period also carried out the same day did not identify any sources for air polluting substances near the Proposal.

## 6.14.2 Impacts

### 6.14.2.1 Construction

#### Waste and hazardous materials

The construction of the Proposal would generate spoil from earthworks, demolition waste from the removal of existing infrastructure, and construction waste from the proposed construction works. General waste would also be generated by construction personnel. Waste streams would include:

- Green waste from cleared vegetation
- Concrete, timber, metal and rock riprap materials from removal of the existing structure
- Excess spoil material from excavation to accommodate the proposed crossing structures
- Oil, grease, and other liquid waste from the maintenance of construction plant and equipment
- Dried surplus concrete and minor quantities of other surplus construction materials such as scrap metal, paints, glues and other incidental chemicals used in construction
- Minor quantities of general wastes and sewage from ancillary facilities.

#### Contamination

As the construction activities are proposed within waterways there is the potential for contamination impacts to sensitive aquatic environments. However, the works are proposed to occur when there are low flows in the Murray River and no or minimal flow in the creeks where the works would occur. Cofferdams may be installed to isolate the works from upstream and downstream environments, which would minimise the risk of contamination or sedimentation impacts to downstream waterways.

Localised contamination from accidental spills or leaks of fuels, oils and chemicals (such as hydraulic oils) from construction plant and vehicles during construction is considered unlikely but

possible and the risk would be managed with suitable safeguards. Minimal quantities of fuel would be stored at the construction sites, with all refuelling activities to occur in a designated area at least 20 m away from waterways.

#### 6.14.2.2 Operation

Use of the proposed upgrade tracks and crossing structures during operation are unlikely to result in impacts associated with waste and hazardous materials with implementation of standard NPWS operation procedures.

### 6.14.3 Safeguards

Waste management for the Proposal would be based on the waste management hierarchy established by the objectives of the *Waste Avoidance and Resource Recovery Act 2001*. This includes reducing the amount of waste produced as much as possible, maximising waste reuse, and disposing waste as the last option and doing so appropriately. Crushed rock fill material would be required for the construction of the proposed structures. This material would be sourced off site, with some material such as rock riprap from demolition of the existing structures being reused where appropriate. All waste including surplus fill material will be classified in accordance with the *Waste Classification Guidelines* (Environment Protection Authority, 2014a), with appropriate records and disposal dockets retained for audit purposes. The Proposal would further minimise construction waste through:

- Sustainable selection of construction materials
- Detailed estimation and accurate ordering of quantities of materials required
- Prefabricated and precast materials would be preferentially used to minimise onsite construction waste and optimise material usage.

All suitable excavated material will be reused onsite as backfill and/or for the construction of cofferdams where feasible. Any materials that cannot be reused onsite would be removed and recycled or disposed of at a suitably licensed facility.

Measures proposed to avoid, minimise or manage potential waste, contamination and hazardous materials impacts as a result of the Proposal are detailed in **Table 6-20**Table 6-20.

Table 6-20 Safeguards for waste, contamination and hazardous material impacts

| Ref | Impact | Safeguard | Responsibility | Timing |
|---|---|---|---|---|
| W1 | Spoil generation | Where feasible, suitable excavated spoil material will be reused onsite as backfill and/or for construction of cofferdams. | Contractor | Construction |
| W2 | Surplus excavation material | Earth removed that is surplus to the requirements of the site where it was excavated and which can be classified as virgin excavated natural | Contractor | Construction |

| Ref | Impact | Safeguard | Responsibility | Timing |
|---|---|---|---|---|
| | | material or excavated natural material could be used for other works proposed in Millewa Forest as part of the Millewa Forest Supply Project or otherwise disposed off-site at an appropriately licensed waste facility. | | |
| W3 | Green waste generation | Cleared vegetation suitable for use in the rehabilitation works (e.g. fallen logs that could provide habitat) would be retained on site for later reuse in accordance with the site rehabilitation plan. Other cleared vegetation would be mulched and either disposed off-site at a suitably licensed waste facility or, if requested by and agreed with NPWS, made available for NPWS to reuse within Murray Valley National Park and Regional Park. | Contractor | Construction |
| W4 | Hazardous materials | All hazardous materials will be stored in accordance with existing or agreed NPWS procedures. | Contractor | Construction |
| W5 | Accidental spills and leaks | All contractors and staff will be appropriately trained through a site induction and toolbox talks to prevent, minimise and manage accidental spills. | Contractor | Construction |
| W6 | Accidental spills and leaks | Machinery will be inspected daily to ensure no oil, fuel or lubricants are leaking from the machinery. Machines will be maintained as per manufacturers specifications. | Contractor | Construction |
| W7 | Accidental spills and leaks | To avoid release to the environment, all waste hazardous materials (fuels, lubricants, herbicides, etc.) will be disposed off-site in accordance with Environment Protection Authority guidelines. | Contractor | Construction |

| Ref | Impact | Safeguard | Responsibility | Timing |
|---|---|---|---|---|
| W8 | Accidental spills and leaks | Spill response procedures will follow existing or agreed NPWS procedures. | Contractor | Construction |
| W9 | Accidental spills and leaks | Mobile spill kits fully stocked with adequate spill prevention and absorbent materials (including absorbent pads, granular absorbent and disposal bags) will be maintained onsite and on construction vehicles carting hazardous materials. | Contractor | Construction |
| W10 | Accidental spills and leaks | Refuelling of all vehicles and mobile equipment will occur at least 20 m away from any drainage lines or waterways and with suitable bunding/controls. | Contractor | Construction |
| W11 | Soil contamination | If suspected soil contamination is encountered, the suspect materials should be segregated and placed in a designated bunded stockpile covered in plastic sheeting to prevent rainfall infiltration and/or soil migration during windy conditions. | Contractor | Construction |
| W12 | Generation of construction waste | All waste material generated will be handled and disposed of carefully to minimise the risk of pollution. | Contractor | Construction |
| W13 | Generation of construction waste | All construction and demolition materials able to be recycled shall be separated and recycled at approved facilities or reused onsite. | Contractor | Construction |
| W14 | Generation of construction waste | All demolition material and waste materials will be classified in accordance with the *Waste Classification Guidelines* (Environment Protection Authority, 2014a), removed from the site in a timely manner, and disposed of at a suitability-licensed waste disposal facility. | Contractor | Construction |

| Ref | Impact | Safeguard | Responsibility | Timing |
|---|---|---|---|---|
| W15 | Generation of construction waste | Records of waste classification and disposal dockets will be maintained. | Contractor | Construction |
| W16 | Concrete waste | Bunded receptacles for concrete waste including concrete slurries and washout water will be provided at the work sites to capture, contain and appropriately dispose of any concrete waste at a suitably licensed waste facility. These will be located as far from waterways as feasible<br>Preferential use of fabricated and precast materials will be integrated into the detailed design to minimise onsite construction waste and optimise material usage where possible | NSW DCCEEW | Detailed design |

### 6.14.4 Residual impacts

During the construction phase, only small quantities of construction waste (i.e. concrete, timber and metal) primarily from demolition works and green waste from vegetation clearing would be generated. There is the potential for accidental spills or leaks from vehicles, plant and equipment to cause localised soil and water contamination impacts during construction. However, given the works would occur in dry waterways and quantities of hydrocarbon are anticipated to be minimal, the risk is considered to be low.

Implementation of the safeguards identified would significantly reduce the potential for impacts from waste and other contaminants during construction.

No impacts are anticipated for during operation. Residual impacts would be negligible.

## 6.15 Cumulative impacts

### 6.15.1 Existing environment

The Proposal would support works under the broader Millewa Forest Supply Project, which, together with the Yanga National Park Supply Project, forms the Murray and Murrumbidgee Valley National Parks SDL Adjustment Supply Measure Project.

Works under the Millewa Forest Supply Project include replacement or refurbishment of Little Edward River Offtake Regulator, Moira Regulator, Nestrons Regulator, Pinchgut Regulator and

Bullatale Supply Channel inlet regulator. These works are scheduled to occur in late 2025 and finish in late 2026.

Other SDLAM projects near to the Proposal include works under the Mid-Murray Anabranches project along Tuppal Creek, Bullatale Creek and Native Dog Creek on private land north of the Proposal. Works along Tuppal Creek have commenced in September 2024 and are expected to be completed by November 2025. Works along Bullatale and Native Dog Creek are scheduled to occur concurrently with the Proposal (refer to **Section 3.4**).

There are also other projects proposed as part of the broader Reconnecting River Country program across the Murray southern basin communities. These projects are not anticipated to be in the direct vicinity of the Proposal.

Other projects under construction or proposed for the broader area, include EnergyConnect and various renewable energy projects. There are no other known major projects within the Proposal area. As discussed in **Section 1.4**, there are a number of other SDLAM program initiatives occurring within the broader locality (refer to **Section 1.4**).

## 6.15.2 Impacts

### 6.15.2.1 Construction

Given the minor environmental impacts associated with the Proposal, and the remote locations of the Proposal and the other work proposed as part of the Millewa Forest Supply Project, any potential cumulative impacts during construction would be negligible. NSW DCCEEW, as the proponent of the Millewa Forest Supply Project, is able to manage the delivery of the works to avoid or minimise adverse cumulative impacts. Ongoing consultation would be carried out with NPWS and other project stakeholders regarding the timing of works and interface with other projects within the area.

### 6.15.2.2 Operation

The proposed works under the Millewa Forest Supply project, including the Proposal, have been designed as a package to optimise environmental outcomes for Barmah-Millewa Forest. The works would have an overall positive impact on the safety and efficiency of environmental watering of the forest and would create opportunities for the site environmental water managers to achieve some ecological outcomes more easily than with the existing environmental regulators in the forest.

No cumulative impacts are anticipated between the Proposal and other projects during operation.

## 6.15.3 Safeguards

Measures proposed to avoid, minimise or manage potential cumulative impacts as a result of the Proposal are detailed in **Table 6-21**Table 6-21.

Table 6-21 Safeguards for cumulative impacts

| Ref | Impact | Safeguard | Responsibility | Timing |
|---|---|---|---|---|
| C1 | Cumulative impacts | Construction of the various components of the Millewa Forest Supply Project would be coordinated by the NSW DCCEEW to minimise any potential cumulative impacts. | NSW DCCEEW | Construction |

### 6.15.4 Residual impacts

Given the minor environmental impacts associated with the Proposal, and the remote locations of the proposed project elements, any potential cumulative impacts during construction would be negligible.

# 7 Matters of national environmental significance under the EPBC Act

The purpose of the EPBC Act is to ensure that actions likely to cause a significant impact on 'matters of national environmental significance' undergo an assessment and approval process. Under the EPBC Act, an action includes a project, a development, an undertaking, an activity or a series of activities, or an alteration of any of these things. An action that 'has, will have or is likely to have a significant impact on a matter of national environmental significance' is deemed to be a 'controlled action' and may not be undertaken without prior approval from the Commonwealth Minister for the Environment.

Any potential to significantly impact on Matters of National Environmental Significance (MNES) is likely to require a referral to the Commonwealth Department of Climate Change, Energy, the Environment and Water for a decision as to whether it is a controlled action requiring approval under the EPBC Act.

Of the nine MNES, five are potentially relevant to the Proposal and these are considered in **Table 7-1.**

Table 7-1 EPBC factors for consideration

| Environmental Factor | Applicable? | Residual Impact level | Reasons | Safeguards/mitigation measures |
|---|---|---|---|---|
| **Is the Proposal likely to impact on matters of national environmental significance as follows:** | | | | |
| **Listed threatened species or ecological communities** | Yes | Low | There are seven threatened fauna species listed under the EPBC Act with considered moderate to high likelihood of using the habitats in the CAZs and surrounding areas.<br>Assessments of significance for these species have been prepared in accordance with the EPBC Act and are provide in Appendix B of **Attachment A**.<br>The assessments conclude that the Proposal has a low potential for significant impacts to these seven species as the impacts associated with the Proposal are minimal in the context of the available habitat located within Murray Valley National Park and Regional Park and Barmah National Park. | Refer to Section 6.4.3 and Section 6.5.3 for safeguards for potential impacts to listed threatened species or ecological communities. |

| Environmental Factor | Applicable? | Residual Impact level | Reasons | Safeguards/mitigation measures |
|---|---|---|---|---|
| **Listed migratory species** | Yes | Low | While migratory bird species may use the CAZ on occasion, such as the Sharp-tailed Sandpiper (Calidris acuminata), the CAZs would not be classed as an 'important habitat' as defined under the *EPBC Act Policy Statement 1.1 Significant Impact Guidelines* (Department of the Environment, 2013), in that the CAZs do not contain:<br>• Habitat used by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species<br>• Habitat used by a migratory species which is at the limit of the species' range<br>• Habitat within an area where the species is declining.<br>Based on the above considerations, the Proposal is unlikely to have a significant effect on any of the listed migratory species predicted to occur within the locality. | Refer to Section 6.4.3 for safeguards for potential impacts to listed migratory species. |
| **Wetland of international importance (Ramsar wetland)** | Yes | Negligible | The Proposal is located within the NSW Central Murray Forests Ramsar site in NSW, and near the Barmah Forest Ramsar site in Victoria. The Proposal would not have significant impacts on the NSW Central Murray Forests Ramsar site because:<br>• The areas of direct impact are small and previously disturbed<br>• There would be negligible hydrological changes to the broader Ramsar site given inundation of the floodplain under regulated flow conditions is primarily controlled by the operation of the key riverine regulators such as Nestrons Regulator and Mary Ada | Refer to Section 6.4.3 for safeguards for wetlands of international importance. |

| Environmental Factor | Applicable? | Residual Impact level | Reasons | Safeguards/mitigation measures |
|---|---|---|---|---|
| | | | Regulator. As these structures would be operated in a manner consistent with the existing structures minimal hydrological changes are anticipated. The *Barmah-Millewa Forest Environmental Water Management Plan* (Murray-Darling Basin Authority, 2012) and *Murray-Lower Darling Long Term Water Plan* (Department of Planning, Industry and Environment, 2020a) would continue to form the basis for environmental watering of Millewa Forest<br>• Water quality would be protected by carrying out the works when there are low flows in the Murray River and using cofferdams as required to create dry work sites | |
| **World heritage values of world heritage properties** | No | Nil | There are no world heritage areas in proximity to the Proposal. | N/A |
| **The national heritage values of national heritage places** | No | Nil | There are no national heritage places in proximity to the Proposal. | N/A |

# 8 Summary of impacts

In accordance with sections 5.5 and 5.7 of the EP&A Act, a summary of potential impacts for each environmental factor listed in section 171(2) of the EP&A Regulation has been detailed in **Table 8-1** below.

Table 8-1 Compliance with section 171(2) of the EP&A Regulation

| Environmental Factor | Impact | Where addressed |
|---|---|---|
| **(a) the environmental impact on the community** | The Proposal would benefit the site environmental water managers by providing them with more flexibility in how they can achieve environmental watering outcomes for Millewa Forest.<br>The Proposal would have negligible socio-economic impacts. | **Section 6.13** |
| **(b) the transformation of the locality** | The Proposal would not result in the transformation of the locality. The access track upgrades and replacement waterway crossings would be of a similar scale and bulk to the existing structures. As a result, the overall impact of these changes would be minor and would not substantially change the predominant character of these sites. The potential visual impacts of the Proposal have been assessed and were found to be negligible. | **Section 6.11** |
| **(c) the environmental impact on the ecosystems of the locality** | A comprehensive biodiversity assessment considering terrestrial and aquatic biodiversity has been completed and found that the Proposal is unlikely to have a significant impact on threatened species, populations, ecological communities and migratory species, and residual biodiversity impacts are low. | **Section 6.4** and **Section 6.5** |
| **(d) reduction of the aesthetic, recreational, scientific or other environmental quality or value of the locality** | This REF comprehensively assesses potential environmental impacts of the Proposal and has found them to be primarily positive. Potential adverse environmental impacts are minor or insignificant. | **Chapter 6** |

| Environmental Factor | Impact | Where addressed |
|---|---|---|
| (e) the effects on any locality, place or building that has—<br>(i) aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance, or<br>(ii) other special value for present or future generations | Potential impacts to Aboriginal heritage and historic heritage as a result of the Proposal have been assessed and are anticipated to be negligible. | Section 6.6 and Section 6.7 |
| (f) the impact on the habitat of protected animals, within the meaning of the *Biodiversity Conservation Act 2016* | A comprehensive biodiversity assessment considering terrestrial and aquatic biodiversity has been completed and found that the Proposal is unlikely to have a significant impact on threatened species, populations, ecological communities and migratory species, and residual biodiversity impacts are low. | Section 6.4 and Section 6.5 |
| (g) the endangering of a species of animal, plant or other form of life, whether living on land, in water or in the air | | |
| (h) long-term effects on the environment | This REF comprehensively assesses potential environmental impacts of the Proposal and has found them to be primarily positive. Potential adverse environmental impacts are minor or insignificant. | Chapter 6 |
| (i) degradation of the quality of the environment | | |
| (j) risk to the safety of the environment | The Proposal involves upgrading existing access tracks and creek crossings. No risks to the safety of the environment are anticipated. | Section 3.2 |
| (k) reduction in the range of beneficial uses of the environment | An objective of the Proposal is to remove constraints to the movement of water across the floodplain and reopening pathways for native fish.<br>The Proposal is not expected to significantly affect land use in the region as the Proposal is focused on the replacement of existing infrastructure. | Section 2.1 |
| (l) pollution of the environment | There is a low potential for minor impacts to water quality due to erosion and sedimentation during construction. This risk is readily managed by standard construction practices and additional safeguards outlined in Table 6-3. | Section 6.2 and Section 6.14 |

| Environmental Factor | Impact | Where addressed |
|---|---|---|
| **(m) environmental problems associated with the disposal of waste** | Waste management during construction of the Proposal is a minor risk and would be readily controlled by construction practices and safeguards outlined in Table 6-20. | **Section 6.14** |
| **(n) increased demands on natural or other resources that are, or are likely to become, in short supply** | Precast concrete culverts, rock and gravel are widely available in the quantities required for the Proposal. Re-use of materials is discussed in Section 6.14. | **Section 6.14** |
| **(o) the cumulative environmental effect with other existing or likely future activities** | Given the minor environmental impacts associated with the Proposal, and the remote locations of the proposed project elements, any potential cumulative impacts during construction would be negligible. | **Section 6.15** |
| **(p) the impact on coastal processes and coastal hazards, including those under projected climate change conditions** | N/A | N/A |
| **(q) applicable local strategic planning statements, regional strategic plans or district strategic plans made under the Act, Division 3.1** | Clause 2.73(1)(a) of the Transport and Infrastructure SEPP allows development for any purpose to be carried out without consent on land reserved under the NPW Act, or acquired under Part 11 of the NPW Act, if the development is for a use authorised under the NPW Act.<br>The Proposal is to be assessed under Division 5.1 of the EP&A Act with NSW DCCEEW being the determining authority. | **Section 4.1.4.1** |
| **(r) other relevant environmental factors.** | This REF comprehensively assesses potential environmental impacts of the Proposal, including potential socio-economic impacts, and has found them to be primarily positive. Potential adverse environmental impacts are minor or insignificant. | **Chapter 6** |

# 9 Environmental management

## 9.1 Construction environmental management

Safeguards have been proposed in this REF to avoid, minimise or manage potential environmental impacts of the Proposal. Should the Proposal proceed, these safeguards will be incorporated into the detailed design and applied during construction of the Proposal.

The Construction Environmental Management Plan (CEMP) would include the safeguards identified in Chapter 6 of this REF and any additional measures required by licences, permits or approvals that are required to construct the Proposal. The CEMP would provide a framework for establishing how the safeguards would be implemented and who would be responsible for their implementation. It would include a procedure for managing and reporting environmental incidents where there is a breach of the requirements contained in the safeguards. The CEMP would be prepared prior to commencement of construction. The CEMP would include the following subplans:

- Erosion and sediment control plan
- Construction soil and water management plan
- Biodiversity management plan
- Site rehabilitation plan
- Construction traffic management plan.

A draft of the CEMP would be provided to NPWS for comment and any comments provided would be addressed in the final CEMP. The CEMP would be a working document that is subject to ongoing change and updates as necessary during the construction phase. The key objective of the CEMP would be to deliver and implement the environmental commitments made in the REF throughout the construction period, together with conditions imposed by any licences and approvals. The CEMP would include the following information:

- Details of key project personnel and their contact details
- An audit and reporting program to ensure all of the safeguards are implemented
- Training requirements, including site induction requirements to ensure that all personnel understand the principles of environmental management
- Emergency and incident response procedures
- List of approvals to be obtained before construction commences
- Consultation requirements (government and community) and a complaint handling procedure
- Actions for meeting environmental objectives based on the safeguards identified in this REF and any statutory or regulatory obligations
- Details of the personnel responsible for the implementation of each safeguard.

## 9.2 Summary of safeguards

A summary of all measures proposed to avoid, minimise, or manage potential environmental impacts of the Proposal, as identified throughout **Chapter 6**, are detailed in **Table 9-1**.

Table 9-1 Summary of safeguards

| Ref | Impacts | Safeguards | Responsibility | Timing |
|---|---|---|---|---|
| **Topography, Soils and Geology** | | | | |
| **T1** | Erosion and sediment | An erosion and sediment control plan will be prepared as part of the Contractor's CEMP. Site specific erosion and sediment control measures will be designed, implemented and maintained in accordance with relevant sections of *Managing Urban Stormwater: Soil and Construction Volume 1* (Landcom, 2004) (the Blue Book). The erosion and sediment control plan will provide details of the cofferdams to be installed upstream and downstream of instream work sites and the strategies that will be implemented to stabilise soils during the construction phase<br>Erosion and sediment control measures to stabilise ground surfaces disturbed during the construction phase and may include but not be limited to:<br>• Sediment fences, coir logs, catch drains and/or bunds along the perimeter of CAZ<br>• Stockpiling materials on site for the shortest time feasible<br>• Covers on truck loads when transporting loose material<br>• Covers on (or watering of) stockpiles<br>• Managing runoff from the work sites including uncovered stockpiles to ensure there is minimal contamination or sediment entering watercourses.<br>• Additionally, contingencies for extreme weather or flood conditions during construction. | Contractor | Construction |

| Ref | Impacts | Safeguards | Responsibility | Timing |
|---|---|---|---|---|
| | | Where feasible, these control measures will be in place before any vegetation clearing or earthwork starts and will remain in place throughout the construction phase until the site rehabilitation plan has been fully implemented. | | |
| **Surface water and drainage** | | | | |
| SW1 | Mobilisation of sediment into waterways | A comprehensive erosion and sediment management plan would be developed and implemented as part of the CEMP. The erosion and sediment management plan would be prepared for the Proposal with specific control measures outlined for each Proposal feature. Sediment control measures may include diversion drains, sediment fencing, coir logs, catch drains and perimeter bunds.<br>If required, siting of sediment basins should consider management of run-off from construction areas and use of captured water for dust suppression. The CEMP would also account for extreme weather or flood conditions during construction. Refer to safeguard T1 in Table 6-1. | Contractor | Construction |
| SW2 | Sedimentation and pollution from instream work | A Construction Soil and Water Management Plan will be prepared as part of the Contractor's CEMP. Site specific control measures will be designed, implemented and maintained in accordance with relevant sections of *Managing Urban Stormwater: Soil and Construction Volume 1* (Landcom, 2004) (the Blue Book).<br>Control measures to manage potential pollution or sedimentation impacts from instream works will include but not be limited to:<br>• Floating silt fences<br>• Cofferdams to create dry sites for instream works<br>• Undertake work when flows are low/dry for a suitable duration to complete work<br>• Contouring disturbed areas of waterway beds and banks to reinstate natural contours or otherwise in accordance with the design drawings | Contractor | Detailed design<br>Construction |

| Ref | Impacts | Safeguards | Responsibility | Timing |
|---|---|---|---|---|
| | | • Managing runoff from the work sites including uncovered stockpiles to ensure there is minimal contamination or sediment entering watercourses.<br>• Develop contingencies for unexpected moderate to high flows in the Murray River during instream works.<br>Control measures will be in place prior to commencement of any instream works. | | |
| SW3 | Accidental spills and leaks | An emergency spill response procedure will be prepared in accordance with the NSW DCCEEW's incident management protocols to minimise the impact of accidental spillages of fuels, chemicals and fluids during construction<br>Storage of hazardous materials such as oils and chemicals and refuelling activities will occur in bunded areas and as far from waterways as feasible | Contractor | Detailed design<br>Construction |
| SW4 | Dewatering of in-stream work areas | A Construction Soil and Water Management Plan will be prepared as part of the CEMP and will outline procedures and water quality standards (ANZG, 2018) to be achieved prior to dewatering within the cofferdam areas (dry work areas), if required. | Contractor | Detailed design<br>Construction |
| SW5 | Water release from water quality controls during construction | The Construction Soil and Water Management Plan will outline procedures (as per the Blue Book) and water quality standards (ANZG, 2018) to be achieved prior to discharging water to waterways. | Contractor | Detailed design<br>Construction |
| SW6 | Water quality monitoring | Visual monitoring of local water quality (e.g. turbidity, hydrocarbon spills/slicks) will be carried out daily during construction to identify any potential spills or deficient erosion and sediment controls. Should a change in water quality appear evident samples will be collected and analysed. | Contactor | Construction |
| SW7 | Impacts to flows | Instream construction works are to occur only when flows are low/dry for a suitable duration prior to construction. | Contractor | Construction |

| Ref | Impacts | Safeguards | Responsibility | Timing |
|---|---|---|---|---|
| | | The Construction Soil and Water Management Plan to be prepared as part of the Contractor's CEMP will include contingencies for unexpected moderate to high flows in the Murray River during instream works. | | |
| **Groundwater** | | | | |
| GW1 | Unexpected groundwater ingress into the work sites during construction | Any groundwater that enters excavations within the CAZ will be tested and, if suitable, pumped into nearby waterways or otherwise pumped into a treatment pond and treated before being discharged into nearby waterways.<br>If treatment ponds are required, they must be located within the CAZ and their location, size and proposed uses must be documented in the construction soil and water management plan.<br>The CEMP will include water quality criteria for any water to be discharged into nearby waterways. | Contractor | Construction |
| **Terrestrial Biodiversity** | | | | |
| B1 | Direct impacts to vegetation outside of the CAZ | The vegetation clearing boundary at each work site will be accurately and clearly marked out using flagging tape prior to the start of works. The clearing boundaries must not extend outside the approved CAZs. The Biodiversity Management Plan will specify the type of flagging required to delineate the clearing boundaries.<br>The Biodiversity Management Plan will specify the type of flagging and signage required to delineate the approved CAZs. | Contractor | Prior to construction |
| B2 | Direct impacts to biodiversity within the CAZ | Where there are opportunities to not clear the entire approved CAZ, preference should be given to avoiding clearing of areas containing established trees (including hollow-bearing trees), vegetation containing large stick nests (if present) and high-quality native vegetation and instead concentrate clearing to areas of the CAZ that have been subject to previous disturbance. | Contractor | Prior to construction |

| Ref | Impacts | Safeguards | Responsibility | Timing |
|---|---|---|---|---|
| | | To assist in this process, the CEMP will include figures of the approved CAZ showing the locations of hollow-bearing trees, vegetation communities; important flora and fauna habitat areas, and locations where threatened species, populations or ecological communities have been recorded. | | |
| B3 | Direct impacts to vegetation outside of the CAZ | Materials, plant, equipment, work vehicles and stockpiles will be stored, parked or placed as applicable within the clearing boundaries or on existing access tracks at or leading to the works sites that are temporarily closed to traffic and as a result are available for the sole use of the contractor. | Contractor | Construction |
| B4 | Indirect impacts to retained vegetation | Where feasible, materials, plant, equipment, work vehicles and stockpiles will be stored, parked or placed as applicable away from the driplines of trees that are outside the clearing boundaries or that are within the clearing boundaries but proposed for retention. | Contractor | Construction |
| B5 | Direct impacts to surrounding vegetation | If any damage occurs to vegetation outside the approved CAZs it is to be reported and managed as an environmental incident in accordance with the environmental incident management procedure contained in the CEMP. NSW DCCEEW and NPWS will be notified so that appropriate remediation strategies can be developed and implemented. | Contractor, NSW DCCEEW | Construction |
| B6 | Direct impacts to biodiversity | A pre-clearing inspection will be undertaken 48 hours prior to any native vegetation clearing by a suitably qualified ecologist and the Contractor's Environmental Manager (or delegate). The pre-clearing inspection at each work site will include, as a minimum:<br>• A check of the physical demarcation of the clearing boundary and CAZ.<br>• Identification of trees that are just outside the marked clearing boundary that require protection to avoid unintended damage during the clearing and subsequent construction works. | Contractor | Prior to construction<br><br>Construction |

| Ref | Impacts | Safeguards | Responsibility | Timing |
|---|---|---|---|---|
| | | • Identification of hollow-bearing trees that need to be removed in accordance with the hollow-bearing tree removal procedure (see below, B8).<br>• Identification of other habitat features that may need to be relocated outside the clearing boundary.<br>• Identification and demarcation of any habitat features which will be retained within the CAZ, i.e., hollow-bearing trees, stick nests. Any nests identified during surveys, and any of which have been established post-survey, will be clearly marked out by a surveyor using high visibility flagging tape prior to the start of works and must be avoided or relocated by suitably qualified personnel. Where feasible, construction is to be undertaken outside of nesting periods of threatened bird species to avoid incidental impacts.<br>• Any TECs will be marked using high visibility temporary fencing and signage to ensure avoidance, where possible, during construction. The completion of the pre-clearing inspection will form a hold point requiring sign-off from NSW DCCEEW.<br>• Identification of any threatened flora and fauna. Targeted threatened flora surveys are to be conducted during the pre-clearing survey. Any identified threatened flora species will be marked using high visibility temporary fencing and signage to ensure avoidance, where possible, during construction. The completion of the pre-clearing inspection will form a hold point requiring sign-off from NSW DCCEEW.<br>• Implementation of the erosion and sediment control plan for the work site, including erosion control structures. | | |
| **B7** | Direct impacts to retained trees | Trees within the clearing boundary that are proposed to be retained will be protected during the construction phase in accordance with Australian Standard 4970-2009 *Protection of Trees on Development Sites.*<br>Trees located just outside the clearing boundary that are identified during the pre-clearing inspection as being at risk of damage during the | Contractor | Construction |

| Ref | Impacts | Safeguards | Responsibility | Timing |
|---|---|---|---|---|
| | | construction phase will also be protected in accordance with AS 4970-2009. | | |
| B8 | Impacts to biodiversity associated with Hollow Bearing Trees | The biodiversity management plan will include a procedure for the removal of hollow-bearing trees. The procedure will include the following steps:<br>• Non-hollow bearing trees and vegetation surround a hollow-bearing tree will be removed first. Trees should be felled into the CAZ to avoid damaging adjacent vegetation<br>• Leave the hollow-bearing tree standing for at least one night after other clearing to allow any fauna using the hollows to leave<br>• An NPWS ranger or suitably qualified ecologist is to be present during felling of hollow-bearing trees<br>• Before felling a hollow-bearing tree, tap along the trunk using an excavator or loader to scare fauna from the hollows. Repeat several times<br>• After felling a hollow-bearing tree check its hollows and surrounds to ensure no fauna have become trapped or injured. Any fauna found should be safely located to nearby habitat by the attending NPWS ranger or ecologist<br>• If a hollow-bearing tree is removed in stages the non-hollow-bearing branches should be removed before the hollow-bearing branches are removed<br>• In consultation with NPWS, felled hollow-bearing trees should be cut into sections and the sections with hollows prioritised for placement into the surround forest to provide additional potential habitat for ground dwelling fauna such as reptiles and small mammals. | Contractor | Construction |
| B9 | Direct impacts to native fauna | The biodiversity management plan will include a procedure for dealing with the presence of native fauna species within the CAZs during the construction works. The procedure will require construction work at the | Contractor | Construction |

| Ref | Impacts | Safeguards | Responsibility | Timing |
|---|---|---|---|---|
| | | site of the find to immediately cease and the subject animal allowed to leave the CAZ without being harassed.<br>If an animal needs to be relocated outside a CAZ, the contractor is to notify NSW DCCEEW, and they will in turn notify NPWS to agree on appropriate mitigation measures including relocation measures. The contractor will only restart work at the subject site when authorised by NSW DCCEEW. | | |
| B10 | Direct impacts to native fauna | Construction and worker vehicles and machinery will be checked at the start and end of each workday to ensure fauna are not entrapped. | Contractor | Construction |
| B11 | Impacts to threatened fauna | Construction during the breeding period of threatened species to be avoided where possible for:<br>• Superb Parrot breeding period (September to January)<br>• White-bellied Sea-eagle (June - September)<br>• Southern Myotis (November - March).<br>If this cannot be achieved, this species will be considered during pre-clearing surveys to ensure that no impacts will occur. The pre-clearing surveys will need to check:<br>• any hollow-bearing trees to be removed or impacted, to ensure these are not being used by nesting parrots.<br>• any hollow-bearing trees or structures to be removed or impacted, to ensure these are not being used by roosting and/or breeding bats. | Contractor | Construction |
| B12 | Impacts to habitat features | Relocation of habitat features (e.g. fallen timber, hollow logs) outside the CAZs will occur in accordance with an approved project-specific procedure to be included in the biodiversity management plan. | Contractor | Construction |
| B13 | Impacts from introduction and spread of weeds | Weed management will be undertaken in consultation with NPWS in areas affected by construction prior to any clearing works in accordance with the *Biosecurity Act 2015* to minimise the risk of weeds being spread to the | Contractor | Construction |

| Ref | Impacts | Safeguards | Responsibility | Timing |
|---|---|---|---|---|
| | | surrounding environment; including during transport of waste off-site to a licensed waste disposal facility. | | |
| B14 | Impacts from introduction and spread of weeds | All weeds, propagules, other plant parts and/or excavated topsoil material that is likely to be infested with weed propagules will be treated on site or bagged, removed from site, and disposed of at a suitably licensed waste facility. If pesticide use is proposed it must occur in accordance with NPWS's requirements including the *Pesticide Use Notification Plan* (NPWS, 2022). | Contractor | Construction |
| B15 | Impacts from introduction and spread of plant pathogens | All vehicles and machinery engaged in earthworks and vegetation clearance activities will follow the Myrtle Rust hygiene protocol for vehicles and heavy machinery in Table 5 of *the Hygiene Guidelines* (Department of Planning, Industry and Environment, 2020). | Contractor | Construction |
| B16 | Wildlife impacts from vehicle strike | Drivers must stay vigilant for fauna during machinery operation and vehicle movements. | Contractor | Construction |
| B17 | Impacts to TEC | Avoidance of vegetation clearing and excavation works within or directly adjacent to identified TEC areas, will be avoided, where practicable. Laydown areas will be placed on existing cleared or disturbed non-native areas within the CAZ. Any TECs will be marked using high visibility temporary fencing and signage to ensure avoidance, where possible, during construction. The completion of the pre-clearing inspection will form a hold point requiring sign-off from NSW DCCEEW. | Contractor, NSW DCCEEW | Prior to construction<br><br>Construction |
| Aquatic biodiversity | | | | |
| AB1 | Interactions with fauna during construction | A pre-construction survey will be undertaken in areas that will be enclosed by cofferdams. | Contractor | Prior to construction |
| AB2 | Impacts to aquatic habitat and species | Only undertake work when flows are low/dry for a suitable duration to complete work | Contractor | Construction |

| Ref | Impacts | Safeguards | Responsibility | Timing |
|---|---|---|---|---|
| AB3 | Impacts to aquatic species | If water is present at the time of construction:<br>• Fauna salvage in enclosed instream areas would be required prior to removal of instream habitat features and dewatering<br>• Install mesh on water pumps to prevent entrainment of fish during dewatering<br>• fish will be released within the same waterways immediately downstream of the proposed work areas.<br>A procedure to prevent the risk of spreading disease and non-target species would be detailed in the Construction Environmental Management Plan (CEMP). | Contractor | Construction |
| AB4 | Direct impacts to aquatic species | The biodiversity management plan will include a procedure for dealing with the presence of native fauna species within the CAZs during the construction works. The procedure will require construction work immediately cease at the site where fauna has been found and the animal allowed to leave the CAZ without being harassed.<br>Where assistance is required to relocate an animal, the contractor is to notify NSW DCCEEW, and they will in turn notify NPWS to agree on appropriate mitigation measures (including relocation measures). The contractor will only restart work at the subject site when authorised by NSW DCCEEW. | Contractor, NSW DCCEEW | Construction |
| AB5 | Removal of aquatic habitat features | Large woody debris, snags and native aquatic vegetation will be relocated (where possible outside the breeding season of spring and summer) from instream work sites (including at cofferdams if required) to suitable locations upstream and/or downstream in consultation with a qualified ecologist and NPWS. Relocation of these aquatic habitat features from dry in-stream work sites will occur after aquatic fauna salvage and dewatering. | NSW DCCEEW, Contractor | Construction |

| Ref | Impacts | Safeguards | Responsibility | Timing |
|---|---|---|---|---|
| AB6 | Degradation of Aquatic habitat | A Construction Soil and Water Management Plan and Erosion and Sediment Management Plan will be prepared as part of the Contractor's CEMP outlining site specific control measures to manage potential erosion, sedimentation and pollution impacts that could impact on water quality or degrade aquatic habitat. Refer to Safeguard SW1, SW2 and SW3. | Contractor | Construction |
| AB7 | Degradation of Aquatic habitat | Rehabilitation of disturbed areas of riparian and instream vegetation will be undertaken as soon as practicable, progressively and in accordance with a site rehabilitation plan prepared as part of the CEMP and in consultation with NPWS.<br>Rehabilitation of the CAZs will involve replacing and stabilising topsoil and re-planting native trees and plants.<br>Where possible, woody debris, snags and native instream vegetation that was removed to make way for instream work sites will be used in the rehabilitation works. | Contractor | Construction |
| AB8 | Wildlife impacts from machinery/ vehicle strike | Drivers must stay vigilant for fauna during machinery operation and vehicle movements | Contractor | Construction |
| **Aboriginal Heritage** | | | | |
| AH1 | Unexpected Heritage finds | Unexpected Aboriginal cultural heritage finds will be managed in accordance with NSW DCCEEW's Unexpected Heritage Find flowchart, EMF-WG-TOO-04_010) which is provided as an appendix to Attachment B and summarised below:<br>• If an Aboriginal object is discovered during construction, all works in this location must stop and no further harm must occur to the area.<br>• The find must be left in place and protected from any further harm.<br>• Notify the NSW DCCEEW Project Manager of the find, who in turn will notify NPWS, Heritage NSW, and the Environment Line (13 15 55) and | Contractor, NSW DCCEEW | Construction |

| Ref | Impacts | Safeguards | Responsibility | Timing |
|---|---|---|---|---|
| | | arrange for a qualified archaeologist and representatives of the registered Aboriginal parties to inspect the find.<br>• If they confirm that the find is an Aboriginal object, the item will be recorded on AHIMS, agreement reached on its management, and an application made for an Aboriginal heritage impact permit. | | |
| AH2 | Suspected human remains | Discovery of suspected human remains finds will be managed in accordance with NSW DCCEEW's Suspected human remains Protocol, which is provided as an appendix to Attachment B and summarised below<br>Aboriginal ancestral remains may be found in a variety of landscapes in NSW, including middens and sandy or soft sedimentary soils. If any suspected human remains are discovered during any activity, you must:<br>• Immediately cease all works at that location and not further move or disturb the remains.<br>• Notify the NSW DCCEEW Project Manager of the find, who in turn will notify NSW Police if the material is determined to be of human origin and less than 100 years old, or NPWS Aboriginal Partnerships and Heritage Unit, and Heritage NSW if the remains are believed to be Aboriginal.<br>• If in doubt or required by NSW Police, the NSW DCCEEW will obtain specialist advice from a forensic anthropologist or bioarchaeologist to confirm that the bones are human, their age and whether they are Aboriginal or not.<br>• The remains must be left in place and protected from further harm or damage or unauthorised access until further advice states otherwise.<br>• If the remains are confirmed to be Aboriginal, the NSW DCCEEW will notify the RAPs. | Contractor, NSW DCCEEW | Construction |

| Ref | Impacts | Safeguards | Responsibility | Timing |
|---|---|---|---|---|
| | | • Aboriginal ancestral remains will be recorded in a culturally appropriate manner in collaboration with Heritage NSW and the registered Aboriginal parties.<br>• Work will not recommence at the location until authorised in writing by Heritage NSW if the remains are considered by the NSW Police and Heritage NSW to be Aboriginal. | | |
| Historic Heritage | | | | |
| NAH1 | Impact identified items | Three recorded potential heritage sites will be protected from potential impacts during construction by establishing and maintaining exclusion zones, using temporary, high visibility fencing.<br>Exclusion zones of at least 5 m will be established around:<br>• Item ID 13739 - Millewa Stump 2 with board notches (located within site C33)<br>• Item ID 13748 - Millewa Toupna Crossing Road survey tree (located within site C38)<br>• Item ID 13749 - Millewa flood record tree 1992 and 1993 (located within site C38)<br>Exclusion zones are to be established by a qualified archaeologist. | Contractor, NSW DCCEEW | Prior to construction/ Construction |
| NAH2 | Unexpected finds | If historical archaeological relics are discovered during construction, all work will cease in the area. The contractor will notify NSW DCCEEW Project Manager, who in turn will notify NPWS. A historical archaeologist will be engaged to assess the item's significance. | Contractor, NSW DCCEEW | Construction |
| Air quality | | | | |
| AQ1 | Dust generation during construction | Work methods will be modified during high wind conditions if excessive dust is generated. | Contractor | Construction |

| Ref | Impacts | Safeguards | Responsibility | Timing |
|---|---|---|---|---|
| AQ2 | Dust generation by vehicles | All vehicles on site will be confined to designated routes. | Contractor | Construction |
| AQ3 | Dust generation by vehicles | Reduce vehicle speeds to minimise dust emissions. | Contractor | Construction |
| AQ4 | Dust generation by vehicles | Visual monitoring for dust will be implemented during the works. Where required, a hose or water cart would be used to regularly wet down haulage access tracks, work sites and laydown areas. | Contractor | Construction |
| AQ5 | Vehicle emissions | Trips and trip distances will be controlled and reduced where possible, for example by coordinating delivery and removal of materials to avoid unnecessary trips. | Contractor | Construction |
| AQ6 | Vehicle emissions | Minimise engine idling and ensure vehicle engines are switched off when stationary or parked within ancillary facilities or construction zones. | Contractor | Construction |
| Noise and Vibration | | | | |
| NV1 | Construction noise impacts to residents | Inform the local community of the potential impact of increased heavy vehicle traffic during the construction phase, including potential noise impacts. | NSW DCCEEW | Construction |
| NV2 | Out of hours construction noise and vibration | Unless otherwise approved by NSW DCCEEW through an out of hours application process, construction hours will be limited to:<br>Monday to Friday: 7 am to 6 pm<br>Saturday: 8 am to 5 pm<br>No construction work on Sundays or public holidays. | Contractor | Construction |
| NV3 | Construction noise and vibration | All site personnel will be made aware of noise issues and mitigation measures through induction processes. | Contractor | Construction |

| Ref | Impacts | Safeguards | Responsibility | Timing |
|---|---|---|---|---|
| NV4 | Construction noise and vibration | All machinery will be well maintained and in good working order. All vehicles and equipment will be fitted with silencing devices, where applicable. | Contractor | Construction |
| Traffic and access | | | | |
| TA1 | Construction traffic | A construction traffic management plan will be prepared as part of the CEMP. The plan will include:<br>• A driver code of conduct<br>• Confirmation of haulage routes and access locations<br>• Measures to maintain access and capacity to existing roads where possible<br>• Traffic control measures including signage at appropriate locations to notify road users of increased traffic volumes and construction vehicles<br>• Management of oversized vehicles<br>A response plan for any construction-related traffic incidents. | Contractor | Construction |
| TA2 | | Consultation with NPWS and Murray River Council will be undertaken to minimise the impacts to the surrounding road network during construction including temporary access tracks or road closures. Any agreed traffic management measures will be incorporated into the construction traffic management plan. | Contractor | Construction |
| Visual | | | | |
| V1 | Visibility of construction works | During construction, all equipment, materials and temporary facilities, such as site offices and portable toilets, will be located within the designated CAZs for the works. | Contractor | Construction |
| V2 | Visibility of construction works | The construction work sites will be clearly demarcated and maintained in an orderly manner. | Contractor | Construction |

| Ref | Impacts | Safeguards | Responsibility | Timing |
|---|---|---|---|---|
| V3 | Visibility of construction works | All construction equipment will be removed from the park as soon as it is not required, including any material and refuse related to the works. | Contractor | Construction |
| V4 | Revegetation | A site rehabilitation plan will be prepared as part of the CEMP. The site rehabilitation plan will detail how the work sites will be stabilised and revegetated once the new infrastructure is built.<br>A draft site rehabilitation plan will be provided to NPWS for comment and any comments provided will be addressed in the final version of the plan.<br>Rehabilitation of the CAZs including revegetation will be carried out as soon as practicable. | NSW DCCEEW | Construction |
| Hazards | | | | |
| H1 | Bushfire risk during construction | The following controls will be implemented to mitigate potential for fires and increased bush fire risk during construction:<br>• No stockpiling or burning of waste vegetation to occur onsite<br>• Daily weather checks will be undertaken during the pre-start meeting to note for potential fire danger<br>• Any notices erected, displayed or issued by NPWS regulating the use of fire in the park will be complied with<br>• Hot works and machinery which may result in sparking or ignition must not be used on a Total Fire Ban Day without an exemption from the NSW Rural Fire Service<br>• Fuel and other similar flammable materials, such as gas cylinders and paint, will be stored in appropriate fire-resistant storage containers<br>• Appropriate firefighting equipment (e.g., water pump, extinguisher and hand tools) should be available on site along with trained staff<br>• Stationary plant will be parked in cleared areas<br>No smoking on site in accordance with section 19 of the NPW Regulation. | Contractor | Construction |

| Ref | Impacts | Safeguards | Responsibility | Timing |
|---|---|---|---|---|
| H2 | Bushfire risk during construction | All works will be undertaken in accordance with the operational guidelines under the *Murray Valley National and Regional Parks (Millewa, Moira and Gulpa Islands Precincts) Fire Management Strategy* which includes provisions pertaining to operation of earthmoving equipment and visitor management. | Contractor | Construction |
| H3 | Emergency response | Emergency contacts and response procedures will form part of the CEMP and site inductions. | Contractor | Construction |
| H4 | Flooding during construction | Instream construction works are to occur only when flows are low/dry for a suitable duration prior to construction.<br>The Construction Soil and Water Management Plan to be prepared as part of the Contractor's CEMP will include contingencies for unexpected moderate to high flows in the Murray River during instream works. | Contractor | Construction |
| **Waste, contamination and hazardous materials** | | | | |
| W1 | Spoil generation | Where feasible, suitable excavated spoil material will be reused onsite as backfill and/or for construction of cofferdams. | Contractor | Construction |
| W2 | Surplus excavation material | Earth removed that is surplus to the requirements of the site where it was excavated and which can be classified as virgin excavated natural material or excavated natural material could be used for other works proposed in Millewa Forest as part of the Millewa Forest Supply Project, or otherwise disposed off-site at an appropriately licensed waste facility. | Contractor | Construction |
| W3 | Green waste generation | Cleared vegetation suitable for use in the rehabilitation works (e.g. fallen logs that could provide habitat) would be retained on site for later reuse in accordance with the site rehabilitation plan. Other cleared vegetation would be mulched and either disposed off-site at a suitably licensed waste facility or, if requested by and agreed with NPWS, made available for NPWS to reuse within Murray Valley National Park and Regional Park. | Contractor | Construction |

| Ref | Impacts | Safeguards | Responsibility | Timing |
|---|---|---|---|---|
| W4 | Hazardous materials | All hazardous materials will be stored in accordance with existing or agreed NPWS procedures. | Contractor | Construction |
| W5 | Accidental spills and leaks | All contractors and staff will be appropriately trained through a site induction and toolbox talks to prevent, minimise and manage accidental spills. | Contractor | Construction |
| W6 | Accidental spills and leaks | Machinery will be inspected daily to ensure no oil, fuel or lubricants are leaking from the machinery. Machines will be maintained as per manufacturers specifications. | Contractor | Construction |
| W7 | Accidental spills and leaks | To avoid release to the environment, all waste hazardous materials (fuels, lubricants, herbicides, etc.) will be disposed off-site in accordance with Environment Protection Authority guidelines. | Contractor | Construction |
| W8 | Accidental spills and leaks | Spill response procedures will follow existing or agreed NPWS procedures. | Contractor | Construction |
| W9 | Accidental spills and leaks | Mobile spill kits fully stocked with adequate spill prevention and absorbent materials (including absorbent pads, granular absorbent and disposal bags) will be maintained onsite and on construction vehicles carting hazardous materials. | Contractor | Construction |
| W10 | Accidental spills and leaks | Refuelling of all vehicles and mobile equipment will occur at least 20 m away from any drainage lines or waterways and with suitable bunding/controls. | Contractor | Construction |
| W11 | Soil contamination | If suspected soil contamination is encountered, the suspect materials should be segregated and placed in a designated bunded stockpile covered in plastic sheeting to prevent rainfall infiltration and/or soil migration during windy conditions. | Contractor | Construction |
| W12 | Generation of construction waste | All waste material generated will be handled and disposed of carefully to minimise the risk of pollution. | Contractor | Construction |

| Ref | Impacts | Safeguards | Responsibility | Timing |
|---|---|---|---|---|
| W13 | Generation of construction waste | All construction and demolition materials able to be recycled shall be separated and recycled at approved facilities or reused onsite. | Contractor | Construction |
| W14 | Generation of construction waste | All demolition material and waste materials will be classified in accordance with the Waste Classification Guidelines (Environment Protection Authority, 2014a), removed from the site in a timely manner, and disposed of at a suitability-licensed waste disposal facility. | Contractor | Construction |
| W15 | Generation of construction waste | Records of waste classification and disposal dockets will be maintained. | Contractor | Construction |
| W16 | Concrete waste | Bunded receptacles for concrete waste including concrete slurries and washout water will be provided at the work sites to capture, contain and appropriately dispose of any concrete waste at a suitably licensed waste facility. These will be located as far from waterways as feasible<br>Preferential use of fabricated and precast materials will be integrated into the detailed design to minimise onsite construction waste and optimise material usage where possible | NSW DCCEEW | Detailed design |
| Cumulative impacts | | | | |
| C1 | Cumulative impacts | Construction of the various components of the Millewa Forest Supply Project would be coordinated by the NSW DCCEEW to minimise any potential cumulative impacts. | NSW DCCEEW | Construction |

# 10 Conclusion

## 10.1 Justification

From the 1930s, the Millewa Forest water channel network has been manipulated by the installation of many banks and regulators and, in some cases, construction of artificial channels. These management interventions influenced the movement of water on the floodplain largely to optimise floodplain forestry. Further infrastructure was constructed during the 1990s to assist with river operations in the Murray and Edward River systems. Planned works under the as part of the Millewa Forest Supply Project would include the upgrading of a number of regulating structures used for environmental watering of Millewa Forest. These works would result in improved fish passage between the forest and the Murray River and would contribute to the 45 gigalitre per annum water saving targeted by the Acceleration Program.

At present, existing unsealed management trails which incorporate a variety of creek crossing structures are located throughout the Millewa Forest and serve both as primary access routes for existing water management infrastructure and fire trails for NPWS.

A number of these trails and crossing structures have been identified as essential for construction access for works planned as part of the Millewa Forest Supply Project. However, these trails and crossing structures are in poor or degrading condition and would not provide safe construction access. Additionally, a portion of the existing crossing structures currently act as barriers to water movement and native fish passage across the Millewa Forest floodplain when flows are present.

The Proposal would upgrade these access routes and replace a number of crossing structures with fish friendly designs. This would provide more durable access tracks and extend the time until the access tracks are likely to require further maintenance. This would support delivery of the Millewa Forest Supply Project by improving construction access for the project and ongoing access for NPWS and WaterNSW operational and maintenance activities throughout Millewa Forest.

Potential environmental impacts of the Proposal have been identified and assessed in **Chapter 6** and found to be minor or insignificant. Required native vegetation removal would be limited and disturbed areas of the CAZ not occupied by new infrastructure would be revegetated in accordance with a site rehabilitation plan prepared as part of the CEMP. The Proposal is unlikely to significantly impact threatened species, populations, ecological communities or migratory species.

Safeguards specific to the Proposal have been developed to avoid, minimise or manage these potential impacts. The minor potential environmental impacts of the Proposal are outweighed by the broader, long-term benefits of the Proposal and the Proposal is considered to be in the public interest.

## 10.2 Ecological sustainable development

Ecologically sustainable development is development that improves the total quality of life, both now and in the future. Section 193 of the EP&A Regulation identifies four principles of ecologically sustainable development that are presented in **Table 10-1**. The table also identifies how the Proposal aligns with each of the principles.

Section 2A (2) of the NPW Act requires that the objects of the NPW Act are to be achieved by applying the principles of ecologically sustainable development. The consistency of the Proposal with the objects of the NPW Act is presented in Error! Reference source not found.. The alignment of the Proposal with both section 193 of the EP&A Regulation and the objects of the NPW Act means that the requirement of section 2A (2) of the NPW Act is also satisfied.

Table 10-1 Consideration of the EP&A Regulation principles of ecologically sustainable development

| EP&A Regulation principles of ecologically sustainable development | Proposal response |
|---|---|
| **The precautionary principle**<br>This principle states: 'if there are threats of serious or irreversible damage, lack of scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.' | This REF has assessed the potential environmental impacts of the proposal and identified environmental safeguards to control these impacts. The proposal 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 REF. |
| **Intergenerational equity**<br>This principle states: 'the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.' | The proposal is not expected to adversely impact on the health, diversity or productivity of the environment for future generations. The proposal would enable the desired outcomes of the Murray and Murrumbidgee Valley National Parks SDL Supply Project to be achieved and is therefore considered to represent a positive impact on intergenerational equity by maintaining ecosystem health for future generations. |
| **Conservation of biological diversity and ecological integrity**<br>This principle states: '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 the proposal location has been carried out to identify and manage any potential impact of the proposal on local biodiversity and ecological integrity (refer to **Section 6.4** and **Section 6.5** and **Attachment A**). The potential impacts of the proposal on biodiversity would be mostly limited to the construction phase and would involve vegetation and habitat removal. The proposal is not considered to represent a significant impact on any threatened or migratory species listed under the EPBC Act, or any threatened species listed under the BC Act or FM Act. |

| EP&A Regulation principles of ecologically sustainable development | Proposal response |
|---|---|
| **Improved valuation, pricing, and incentive mechanism**<br>This principle is defined as:<br>'Improved valuation, pricing and incentive mechanisms, namely, that environmental factors should be included in the valuation of assets and services, such as:<br>i. polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,<br>ii. the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,<br>iii. environmental goals, having been established, should be pursued in the most cost-effective way, by establishing incentive structures, including market mechanisms that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems'. | The implementation of safeguards to protect environmental resources is considered to represent the internalisation of environmental costs by the NSW DCCEEW as a result of the proposal. |

## 10.3 Conclusion

The Proposal is subject to assessment under Division 5.1 of the EP&A Act. As detailed in Sections 6 and 8 of this REF, all matters affecting or likely to affect the environment due to the construction and operation of the Proposal have been examined and taken into account to the fullest extent possible.

The Proposal would provide safe construction access routes, by creating load rated infrastructure, for planned works as part of the broader Millewa Forest Supply Project and improve flow connectivity and in some instances, native fish movement across the Millewa Forest floodplain. The Proposal would also support access for ongoing management and operational activities within Millewa Forest.

The design development of the Proposal has aimed to minimise environmental impacts whilst ensuring the proposed works meet the Proposal's key objectives. However, the Proposal would still have some minor environmental impacts as identified in this REF, including clearing of up to 5.7 ha of native vegetation and temporary traffic, noise and air quality impacts during the construction phase. Safeguards outlined in this REF will avoid, minimise or manage known or likely impacts, ensuring residual risks and impacts as identified in Section 6 remain low.

Overall, the Proposal is unlikely to cause a significant impact on the environment. Therefore, an environmental impact statement and approval from the NSW Minister for Planning under Division

5.2 of the EP&A Act is not required. As NSW DCCEEW has not opted under section 7.8(3)(b) of the BC Act to prepare a biodiversity development assessment report and the Proposal will not have a significant impact on threatened entities under that Act, or the FM Act, a species impact statement is also not required. As the Proposal is considered unlikely to have a significant impact on matters of national environmental significance or the environment of Commonwealth land within the meaning of the EPBC Act no referral to the Commonwealth Department of Climate Change, Energy, the Environment and Water is required.

# 11 References


3Rivers (2023a), *Millewa Forest: Draft Operational Risk Management Strategy*. Prepared by 3Rivers on behalf for the NSW Department of Climate Change, Energy, the Environment and Water. Version 2.0, 19 July 2023

3Rivers (2023b), *Millewa Forest Supply Project, Review of Environmental Factors,* Prepared by 3Rivers on behalf for the NSW Department of Planning and Environment, Final, 19 October 2023

Abel, N and O'Connell, D (2006), *Barmah Forest: A review of its values, management objectives and knowledge base*. Goulburn Broken Catchment Management Authority, Shepparton, Victoria, May 2006, https://www.gbcma.vic.gov.au/downloads/Wetlands/Barmah_Final_20060522.pdf

ALA (2022), *The Atlas of Living Australia*. Atlas of Living Australia, http://www.ala.org.au

Atkinson, W. and Berryman, A. (1983), *Aboriginal Association with the Murray Valley Study area*. Victorian Land Conservation Council, Victoria

Austral (2025a), Millewa Crossing Upgrades, Murray Valley Regional Park, Millewa, New South Wales, Aboriginal Cultural Heritage Due Diligence Assessment, Final, Prepared for the NSW Department of Climate Change, Energy, the Environment and Water.

Austral (2025b), Bunnydigger and Swifts Creek Regulator Upgrades, Murray Valley National Park, Mathoura, New South Wales, Aboriginal Cultural Heritage Due Diligence Assessment, Final, Prepared for the NSW Department of Climate Change, Energy, the Environment and Water.

Austral Archaeology (2003), *Heritage Assessment of 304 River Structures Southern Region, NSW and 36 River Structures Northern Region, NSW for Section 170 Heritage and Conservation Register, 2003*

Austral Archaeology (2023), *Millewa Forest Supply Project Aboriginal Cultural Heritage Assessment*. Prepared for 3Rivers, on behalf of the Department of Climate Change, Energy, the Environment and Water, Austral Archaeology, Swan Hill, Victoria, May 2023

Bonhomme, T. (1990), *Aboriginal Burials and Sand Mining on the Riverine Plains, NSW*. National Parks and Wildlife Service, 1990

Borrell, A. and Liefting, A. (2017), *Intervention Flow Monitoring, Millewa Forest 2016-17*. Report prepared for National Parks and Wildlife Service, Moama, https://www.mdba.gov.au/sites/default/files/pubs/Millewa-flow-monitoring-2016-17.PDF

Bridge, J.S. 2003 Rivers and Floodplains: Forms, Processes, and Sedimentary Record. Blackwell Publishing.

Bucan, R.A. (1974), *Report on an Archaeological Survey in the Murray Valley, New South Wales, 1973-4*. Report to the National Parks and Wildlife Service, 1974

Cadwallader, P.L. (1977) J.O. Langtry's 1949–50 Murray River investigations. Fisheries and Wildlife Paper No. 13, Fisheries & Wildlife Service, Melbourne

Chesterfield, E.A. (1986), Changes in the vegetation of the river red gum forest at Barmah, Victoria, *Australian Forestry* **49** pp. 4-15.

Colloff, M.J., Ward, K.A. and Roberts, J. (2014), Ecology and conservation of grassy wetlands dominated by spiny mud grass *Pseudoraphis spinescens* in the southern Murray-Darling Basin, Australia. *Aquatic Conservation*: Marine Freshwater Ecosystems, **24** pp 238-255

Craib, J.L. (1991), *Archaeological Survey in the Moira-Millewa State Forests*. Report to the National Parks and Wildlife Service, 1991

CSIRO (2008). Water availability in the Murray. A report to the Australian Government from the CSIRO Murray-Darling Basin Sustainable Yields Project. CSIRO, Australia. 217pp.

Curr, E. (1883), *Recollections of Squatting in Victoria, then called the Port Phillip District (from 1841 to 1851)*. Reproduction, Rich River Printers, Echuca, 1883

DCCEEW( Commonwealth Department of Climate Change, Environment, Energy and Water) (2022), *Protected Matters Search Tool*. Commonwealth Department of Climate Change, Environment, Energy and Water, Canberra, http://www.environment.gov.au/webgis-framework/apps/pmst/pmst.jsf

DoE (Commonwealth Department of the Environment) (2013), *Matters of National Environmental Significance, Significant Impact Guidelines 1.1*. Commonwealth Department of the Environment, Canberra, 2013, https://www.dcceew.gov.au/sites/default/files/documents/nes-guidelines_1.pdf

Ecological Associates and SKM (2011), *Environmental Water Delivery: Yarrawonga to Tocumwal and Barmah-Millewa*. Prepared for Commonwealth Environmental Water, Department of Sustainability, Environment, Water, Population and Communities, Canberra, https://www.dcceew.gov.au/sites/default/files/documents/ewater-delivery-yarrawonga.pdf

Fairfull and Witheridge (2003), *Why do fish Need to Cross the Road? Fish Passage Requirements for Watercourse Crossings*. NSW Department of Primary Industries - Fisheries, January 2003, Cronulla, https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0004/202693/Why-do-fish-need-to-cross-the-road_booklet.pdf

Gippel, C.J. (2003), *Review of Achievements and Outcomes of Environmental Flow Initiatives Undertaken on the Extended River Murray System to August 2002*. Report by Fluvial Systems Pty Ltd, Stockton, to the Murray-Darling Basin Commission, Canberra, ACT, March 2003, https://www.mdba.gov.au/sites/default/files/archived/mdbc-tlm-reports/2106_Review_of_Achievements_Outcomes_of_eflows_2002.pdf

Gower, T., Rutherfurd, I., Sims, A., Vietz, G., and Arrowsmith, C. (2020), *Barmah Choke Sediment Transport Investigation*. Report by Streamology for the Murray Darling Basin Authority, Canberra, 29 November 2020, https://www.mdba.gov.au/sites/default/files/pubs/barmah-millewa-forest-sediment-transport-investigation.pdf

Greenwood, S. (2003), *Barmah Island and Richardson's Lagoon Aboriginal Cultural Heritage Investigations*. A Joint Heritage Investigation Project of Northeast, Regional Cultural Heritage Program and Aboriginal Affairs, Victoria, 2003

Hale, J. and Butcher, R. (2011), *Ecological Character Description for the Barmah Forest Ramsar Site*. Report to the Commonwealth Department of Sustainability, Environment, Water, Population and Communities, Canberra

Harrington, B. and Hale, J., (2011), *Ecological Character Description for the NSW Central Murray Forests Ramsar site*. Report to the Commonwealth Department of Sustainability, Environment, Water, Population and Communities, Canberra, https://www.dcceew.gov.au/sites/default/files/documents/ecd-nsw-central-murray-forests.pdf

Harrington, B. and Hale, J., (2011), E*cological Character Description for the NSW Central Murray Forests Ramsar site*. Report to the Commonwealth Department of Sustainability, Environment, Water, Population and Communities, Canberra, https://www.dcceew.gov.au/sites/default/files/documents/ecd-nsw-central-murray-forests.pdf

Invasive Plants and Animals Committee (2016), *Australian Weeds Strategy 2017 to 2027*. Australian Government Department of Agriculture and Water Resources, Canberra, https://www.agriculture.gov.au/sites/default/files/sitecollectiondocuments/pests-diseases-weeds/consultation/aws-final.pdf

Jacobs (2023) BSM Preliminary Salinity Impact Assessment Procedure, Appendix A - Case study: Yanga and Millewa National Parks, prepared for NSW Department of Planning and Environment

Jones, M. J. and Stuart, I. G. (2008), *Regulated floodplains a trap for unwary fish*. Fisheries Management and Ecology. vol 15, pp 71-79

Jones, M., Stuart, I.G., Sharpe, C., Childs, P., Allen, W., Cronin, B. and Fanson, B. (2022) *Optimising the Millewa Forest regulators to enhance native fish movement.* Unpublished client report for the NSW NPWS. Arthur Rylah Institute for Environmental Research, Victorian Department of Environment, Land, Water and Planning, Heidelberg, Victoria, 2022

King, A. J., Tonkin, Z., & Mahoney, J. (2007), *Assessing the effectiveness of environmental flows on fish recruitment in Barmah-Millewa Forest*. Report to the Murray-Darling Basin Commission. Arthur Rylah Institute for Environmental Research, Victorian Department of Sustainability and Environment

Lauchlan Arrowsmith, C. Vietz, G., Gower, T. Woods, K. (2021). *Options for Managing Sediment in the Barmah-Millewa Reach of the River Murray - Preliminary Investigations*. Report prepared for the Murray-Darling Basin Authority, Canberra, 29 November 2021, https://www.mdba.gov.au/sites/default/files/pubs/barmah-millewa-sediment-management-options-assessment-report.pdf

Leitch, C. (1989), *Towards a strategy for managing the flooding of Barmah Forest*. Victorian Department of Conservation, Forests and Lands: Benalla

Leslie, D.J. (1995), *Moira Lake: A Case Study of the Deterioration of a River Murray Natural Resource*. M. For. Sci. Thesis, University of Melbourne, Parkville

Leslie, D.J. (1995), *Moira Lake: A Case Study of the Deterioration of a River Murray Natural Resource*. M. For. Sci. Thesis, University of Melbourne, Parkville

Leslie, D.J. and Lugg, A. (1994), *Proposed plan for the rehabilitation of the Moira Lake Wetlands*. State Forests of NSW, Department of Water Resources NSW and Murray-Darling Basin Commission

Leslie, D.J. and Lugg, A. (1994), *Proposed plan for the rehabilitation of the Moira Lakes wetlands*. NSW Murray Wetlands Working Group Report. Department of Water Resources, Murray Region.

Littleton, J. (1999), East and west: Burial practices along the Murray River, *Archaeology in Oceania*. **34**(1), pp. 1-14

Lyon, R. H., Lumsden, L. F. & Ward, K.A. (2002), Vertebrate fauna of Barmah Forest, a large forest of river red gum Eucalyptus camaldulensis on the floodplain of the Murray River. *The Victorian Naturalist*, Volume 119: pp. 230-248

Macumber, P.G and Thorne, R. (1975), The Coh–na cranium site - A re-appraisal. *Archaeology in Oceania* **10**(1), pp. 67–72

Maunsell (1992) Barmah-Millewa Forest Water Management Plan. Prepared for the Murray-Darling Basin Commission by Maunsell Pty Ltd, Bewsher Consulting, BHP Engineering, Land Technologies Division, Consulting Environmental Engineers, Dwyer Leslie and Ian Drummond and Associates. Murray Darling Basin Commission, Canberra. January 1992.

McCauley, R.D., Fewtrell, J., Duncan, A.J., Jenner, C., Jenner, M-N., Penrose, J.D., Prince, R.I.T., Adhitya, A., Murdoch, J. and McCabe, K., 2000. Marine seismic surveys – A study of environmental implications. APPEA Journal 692.

McKinnon, L. J. (1997), *Monitoring of Fish Aspects of the Flooding of Barmah Forest*. Marine and Freshwater Resources Institute, Queenscliff

MDBA (Murray-Darling Basin Authority) (2012), *Barmah-Millewa Forest Environmental Water Management Plan*. Murray-Darling Basin Authority, Canberra, February 2012, https://www.mdba.gov.au/sites/default/files/pubs/BMSL_FA_screen.pdf

MDBA (Murray-Darling Basin Authority) (2022), *Central Murray*. https://www.mdba.gov.au/water-management/catchments/central-murray

MDBA (Murray-Darling Basin Authority) (2023), *Who manages the Murray -Darling Basin*. https://www.https://www.mdba.gov.au/water-management/allocations-states-mdba/managing-murray-river

MDBC (2005) The Living Murray Foundation Report on the significant ecological assets targeted in the First Step Decision. MDBC Publication No. 09/05, Canberra, ACT

Mid Murray Zone Bush Fire Management Committee (2009), *Bush Fire Risk Management Plan*. Mid Murray Zone Bush Fire Management Committee, November 2009, https://www.rfs.nsw.gov.au/__data/assets/pdf_file/0014/2381/Mid-Murray-BFRMP.pdf

Mitchell, P (2002), Descriptions for NSW (Mitchell) Landscapes Version 2, Department of Environment and Climate Change.

Murray-Darling Basin Authority (2010), *Assessing Environmental Water Requirements*. Chapter 10: Barmah-Millewa Forest. Murray-Darling Basin Authority, Canberra

Murray-Darling Basin Authority (2012). *Barmah-Millewa Forest Environmental Water Management Plan*, Murray-Darling Basin Authority, February 2012, https://www.mdba.gov.au/sites/default/files/pubs/BMSL_FA_screen.pdf

Murray-Darling Basin Authority (2015), *River Murray from Yarrawonga Weir to Wakool Junction Reach Report: Constraints Management Strategy*. Licensed from the Murray–Darling Basin Authority under a Creative Commons Attribution 3.0 Australia Licence, Murray Darling Basin Authority, July 2015, https://www.mdba.gov.au/sites/default/files/pubs/Yarrawonga-to-Wakool-reach-report.pdf

Murray-Darling Basin Commission (2006), The Barmah-Millewa Forest Icon Site Environmental Management Plan 2006-2007. Murray-Darling Basin Commission, Canberra, https://www.mdba.gov.au/sites/default/files/archived/mdbc-tlm-reports/2083_Env_Man_Plan_Barmah_Millewa_2006-07.pdf

NPWS (2022), *Pesticide Use Notification Plan*. Environment and Heritage Group of the Department of Planning and Environment, Parramatta, April 2022, https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Pests-and-weeds/pesticide-use-notification-plan-220222.pdf

NSW DECCW (Department of Environment, Climate Change and Water) (2010). Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010

NSW Department of Planning, Industry and Environment (DPIE), 2025. eSpade. Available: https://www.environment.nsw.gov.au/eSpade2Webapp.

NSW DPE (Department of Planning and Environment) (2021), *Guidelines for Preparing a Review of Environmental Factors: How to Assess the Environmental Impacts of Activities within NSW National Parks*. Environment, Energy and Science Group of the Department of Planning and Environment, Parramatta, February 2022, https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Parks-reserves-and-protected-areas/Development-guidelines/guidelines-for-preparing-a-review-of-environmental-factors-220069.pdf

NSW DPE (Department of Planning and Environment) (2022a), *Guidelines for Division 5.1 assessments*. NSW Department of Planning and Environment, Sydney, June 2022, https://www.planning.nsw.gov.au/-/media/Files/DPE/Guidelines/Policy-and-legislation/SSI-Guidelines/Guidelines-for-Division-51-assessments.pdf

NSW DPE (Department of Planning and Environment) (2022b), *BioNet Atlas - the Atlas of NSW Wildlife Threatened Species Profile Database*. NSW Department of Planning and Environment, Sydney, https://www.environment.nsw.gov.au/atlaspublicapp/UI_Modules/ATLAS_/AtlasSearch.aspx

NSW DPI (Department of Primary Industries) (2022). Murray Alluvium Water Resource Plan, Groundwater Resource Description, NSW Department of Industries, first published 2019 - updated in 2022

NSW DPI (Department of Primary Industries) (2013), *NSW Fisheries Policy and Guidelines for Fish Habitat Conservation and Management (2013 update)*. NSW Department of Primary Industries,-Fisheries, Wollongbar, NSW, June 2013, https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0005/634694/Policy-and-guidelines-for-fish-habitat.pdf

NSW DPIE (Department of Planning, Industry and Environment) (2020b), *Murray-Lower Darling Long-term Water Plan Part A: Murray-Lower Darling Catchment*. NSW Department of Planning, Industry and Environment, Parramatta, September 2020, https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Water/Water-for-the-environment/long-term-water-plans/murray-lower-darling-long-term-water-plan-part-a-catchment-200080.pdf

NSW DPIE (Department of Planning, Industry and Environment) (2020a), *Hygiene Guidelines*. Environment, Energy and Science Group of the former Department of Planning, Industry and

Environment, Parramatta, April 2020, https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Wildlife-management/saving-our-species-hygiene-guidelines-200164.pdf

NSW EPA (Environment Protection Authority) (2020), *Draft Construction Noise Guidelines 2020*. NSW Environment Protection Authority, Parramatta, November 2020, https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/noise/20p2281-draft-construction-noise-guideline.pdf

NSW Fisheries, 2001. Aquatic Ecological Community in the Natural Drainage System of the Lower Murray River Catchment. Fisheries Scientific Committee Recommendation. Ref. No. FR16(2). File No. FSC 01/01.

NSW Heritage Office, 2001, *NSW Heritage Manual, Assessing Heritage Significance*. NSW Heritage Office, Sydney, July 2001, https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Heritage/assessing-heritage-significance-2001.pdf

NSW NPWS (National Parks and Wildlife Services) (2012), *The Murray Valley National and Regional Parks (Millewa, Moira and Gulpa Islands Precincts) Fire Management Strategy*, Office of Environment and Heritage, 2012

NSW NPWS (National Parks Wildlife Services) (2003). The Bioregions of New South Wales- their biodiversity, conservation and history. NSW National Parks and Wildlife Service, Hurstville

Raymond S, Duncan M, Tonkin Z and Robinson W (2021) Barmah–Millewa fish condition monitoring (2007–2021). Arthur Rylah Institute for Environmental Research Unpublished client report for the Murray–Darling Basin Authority. Department of Environment, Land, Water and Planning, Heidelberg, Victoria.

Raymond, S., Duncan, M., Tonkin, Z., and Robinson, W. (2021), *Barmah-Millewa Fish Condition Monitoring (2007-2021)*. Arthur Rylah Institute for Environmental Research Unpublished client report for the Murray-Darling Basin Authority. Victorian Department of Environment, Land, Water and Planning, Heidelberg, Victoria

Raymond, S., Rourke, M., & Tonkin, Z. (2011) *Barmah-Millewa Fish Condition Monitoring: 2010/11 Annual Report*. New South Wales Department of Primary Industries and Arthur Rylah Institute for Environmental Research. Victorian Department of Sustainability and Environment, Heidelberg, Victoria. Unpublished report submitted to the Murray-Darling Basin Authority

Roberts, J. and Marston, F. (2011), *Water Regime of Wetland and Floodplain Plants. A Source Book for the Murray -Darling Basin*. National Water Commission: Canberra

Sharpe, C. (2018) Moira Lake Fish Surveys 2018. A summary of findings report for NSW National Parks and Wildlife Service by CPS Enviro P/L.

Sharpe, C. (2018) Moira Lake Fish Surveys 2018. A summary of findings report for NSW National Parks and Wildlife Service by CPS Enviro P/L.

Sharpe, C. (2018), Restoring Large bodied fish populations at Millewa Forest. Project status and summary report for NSW National Parks and Wildlife Service by CPS Enviro Pty Limited, 2018

Sharpe, C. and Wilson, E., (2012), *Fish surveys at 39 Sites Throughout Millewa Forest, NSW, with Focus on the Distribution of Southern Pygmy Perch* (Nannoperca australis). May/June 2012. Summary of Findings Report for the NSW Office of Environment and Heritage by CPS Environmental Research

Speight, J.G. 2009 Landform in Australian Soil and Land Survey Field Handbook. Collingwood: National Committee on Soil and Terrain, CSIRO.

Stuart, I., Sharpe, C. and Childs, P. (2020). Recovery of large-bodied fish in Millewa Forest. Unpublished Client Report for the NSW National Parks and Wildlife Service. Arthur Rylah Institute for Environmental Research, Department of Environment, Land, Water and Planning, Heidelberg, Victoria.

Stuart, I., Sharpe, C. and Childs. P. (2020), *Recovery of large-bodied fish in Millewa Forest*. Unpublished client report for the NSW National Parks and Wildlife Service. Arthur Rylah Institute, Heidelberg, Victoria, 2020

Suarez, L., Ward, K. A. and Ryu, D. (2018). Consultant report prepared for the Goulburn-Broken Catchment Management Authority, Shepparton. Dept of Infrastructure, Engineering and Research, University of Melbourne, Parkville. 9 pp.

Tindale, N. B. (1974). *Aboriginal Tribes of Australia - Their Terrain, Environmental Controls, Distribution, Limits, and Proper Names*, Canberra: Australian National University Press

Trueman, W.T. (2007), *Some Recollections of Native Fish in the Murray-Darling System with Special Reference to the Trout Cod* Maccullochella macquariensis, *Summary & Source Material from the Draft Publication* Bluenose: The Lost World of the Trout Cod. Prepared as an interim report for Native Fish Australia (Victoria) Incorporated, Doncaster, Victoria, June 2007, https://www.nativefish.asn.au/userfiles/files/Recollections_compressed.pdf

VIC DELWP (Department of Environment, Land, Water and Planning) (2015), *Business case for operating rule change to the use of the Barmah-Millewa Forest Environmental Water Allocation, A Sustainable Diversion Limit Adjustment Measure*. Prepared by Alluvium Consulting Australia, RM Consulting Group and DG Consulting for the Victorian Department of Environment, Land, Water and Planning, https://www.water.vic.gov.au/__data/assets/pdf_file/0018/325080/23-Barmah-Millewa-Forest-Environmental-Water-Allocation-BMFEWA-Current-notification-Amendment-1-Applied.pdf

Vivian, L. and Godfree, R. (2012), The response of a degraded Murray River floodplain wetland to extreme drought and flood, in Grove, J.R. and Rutherford, I.D. (eds.) *Proceedings of the 6th Australian Stream Management Conference, Managing for Extremes*, 6 to 8 February, 2012, Canberra, Australia, published by the River Basin Management Society, pp1 - 7.

Water Technology (2009) Barmah-Millewa Hydrodynamic Modelling Model Re-calibration, Water technology, Notting Hill, Victoria.

# 12Terms and abbreviations

| | |
|---|---|
| **AHD** | Australian height datum |
| **AHIMS** | Aboriginal Heritage Information Management System |
| **BC Act** | *Biodiversity Conservation Act 2016* |
| **BC Regulation** | Biodiversity Conservation Regulation 2017 |
| **Biodiversity and Conservation SEPP** | State Environmental Planning Policy (Biodiversity and Conservation) 2021 |
| **CEMP** | Construction environmental management plan |
| **DPI** | Department of Primary Industries |
| **EPA** | Environment Protection Authority |
| **EPBC Act** | *Environment Protection and Biodiversity Conservation Act 1999* |
| **EP&A Act** | *Environmental Planning and Assessment Act 1979* |
| **EP&A Regulation** | Environmental Planning and Assessment Regulation 2021 |
| **FM Act** | *Fisheries Management Act 1994* |
| **IBRA** | Interim Biogeographic Regionalisation for Australia |
| **LEP** | Local environmental plan |
| **Murray Valley SoMI** | Statement of Management Intent: Murray Valley National Park and Murray Valley Regional Park (NPWS, 2014) |
| **NPW Act** | *National Parks and Wildlife Act 1974* |
| **NPW Regulation** | National Parks and Wildlife Regulation 2019 |
| **NPWS** | National Parks and Wildlife Service |
| **NSW** | New South Wales |
| **NT Act** | *Native Title Act 1993* |
| **OEH** | Office of Environment and Heritage |
| **PCT** | Plant community type |
| **POEO Act** | *Protection of the Environment Operations Act 1997* (NSW) |
| **Proposal, the** | The Millewa Forest Supply Project |
| **REF** | Review of environmental factors |

| | |
|---|---|
| **AHD** | Australian height datum |
| **SDL** | Sustainable diversion limit |
| **SDLAM** | NSW Sustainable Diversion Limit Adjustment Mechanism Program |
| **SEPP** | State environmental planning policy |
| **Site environmental water managers** | Stakeholders with an interest in and/or responsibility to carry out environmental watering of Millewa Forest are:<br>• NPWS, as the icon site manager for The Living Murray<br>• The Biodiversity and Conservation Division of the Environment and Heritage Group of the Department of Planning and Environment, which manages the Barmah-Millewa water account<br>• The Commonwealth Environmental Water Office and the Murray-Darling Basin Authority, which hold the water entitlement for The Living Murray.<br>While all these stakeholders are involved in the management of environmental watering of Millewa Forest, for practical reasons NPWS has assumed day-to-day responsibility for carrying out environmental watering of the forest. For simplicity, environmental watering of the forest is discussed in this REF as the responsibility of 'the site environmental water manager'. |
| **Transport and Infrastructure SEPP** | State Environmental Planning Policy (Transport and Infrastructure) 2021 |
| **WM Act** | *Water Management Act 2000* (NSW) |

# Attachment A Biodiversity assessment report

# Attachment B Aboriginal due diligence assessment reports

# Attachment C  Section 199 Notification