NSW NATIONAL PARKS & WILDLIFE SERVICE

Yathong Nature Reserve

Review of environmental factors for proposed feral predator–free area

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Introduction

This review of environmental factors (REF) and supporting documents have been prepared by the NSW National Parks and Wildlife Service (NPWS) and consultants to assess and mitigate potential impacts associated with establishing a feral predator–free area in western New South Wales (NSW) within Yathong Nature Reserve (the reserve).

The proposal

The proposal involves the construction and operation of conservation fencing and associated infrastructure at Yathong Nature Reserve, followed by the control of feral predators and herbivores (to the greatest extent practicable) and the reintroduction of locally extinct species at Yathong Nature Reserve in the Central Mallee. The proposal will include:

- construction of conservation fencing approximately 104.15 km in length enclosing a feral predator–free area of 39,230 ha in Yathong Nature Reserve. Two sliding and 8 swing gates will be installed at strategic locations to enable vehicle access
- establishment of a 15 m wide cleared corridor along the conservation fence (7.5 m either side of the conservation fence)
- upgrade to and ongoing maintenance to 75 km of existing management/fire trails and construction of 28.8 km of new management/fire trails around the perimeter of the conservation fence which, contained within a 15 m cleared corridor
- construction of 18.31 km of internal conservation fences alongside the Glenlea Fire Trail and Western Fire Trail
- establishment of ancillary facilities to support the project, such as compounds, staff accommodation and research facilities
- eradication of feral predators and herbivores from the proposed feral predator–free area.

In this REF, the term ‘study area’ generally refers to the 191.61 ha construction footprint area (i.e. the fence alignment and cleared corridor and operation base at Yathong Quarters precinct, as described in Section 7.2.2). The term ‘feral predator–free area’ refers to the area enclosed by the conservation fence. A later stage of the proposal will include the introduction/reintroduction/translocation of locally extinct animal species into the feral predator–free area. However, this is not specifically assessed in this REF as it will be subject to further assessments via future translocation proposals.

Proposal objectives

The objectives of the proposal are to:

- create and maintain a large feral predator–free area by constructing fencing and eradicating feral animal species within the fenced enclosure
- establish and maintain viable populations of reintroduced species in the new feral predator–free area
- maintain and improve the trajectory for extant resident animal species (including threatened species) within the new feral predator–free area
- improve the environmental health and ecosystem function within the feral predator–free area.

In addition, in the longer term, the Yathong Nature Reserve feral predator–free area has an important role in increasing the awareness and understanding of threatened species, ecological communities, threatening processes and their management, through education and research programs.

Options considered

At a statewide scale, the Central West region of NSW has been identified as a priority for the establishment of a feral predator–free area by the National Parks and Wildlife Service (NPWS) to protect and restore extinct and extant populations of threatened fauna.

Consideration has been given to reasonably feasible alternative sites within the Central West of NSW, alternative designs and management options that may also achieve the proposal objectives.

The preferred location of Yathong Nature Reserve was identified through an assessment against broad criteria, requiring judgements based on available science, experience and an overall, holistic assessment.

The Central West was identified as a suitable region using a spatial multi-criteria analysis which aims to maximise conservation outcomes and benefit the greatest diversity of priority species. From here, sites within the region were considered based on:

- the number of species (both reintroduced and extant) that will benefit
- practicality and feasibility of establishing and maintaining infrastructure associated with the feral predator–free area
- environmental, social and cultural impacts associated with site establishment works
- the extent of ecosystem restoration achievable.

These decisions were made in consultation with key stakeholders, both internal and external to the NSW Government.

The proposal outlined in this REF is considered, on balance of ecological, cultural, social, operational and economic factors, to be best located in Yathong Nature Reserve to achieve the objectives of the feral predator–free area program.

Statutory and planning framework

This REF and supporting documents have been prepared in accordance with the requirements of section (s) 5.5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) specifying a ‘duty to consider environmental impact to the fullest’ extent before carrying out or approving works that are not subject to development consent under Part 4 of the EP&A Act.

The REF considers the environmental factors listed in section 171 of the Environmental Planning and Assessment Regulation 2021, including all additional environmental factors that are relevant to this proposal.

The assessment has taken into account the provisions of the NSW *Biodiversity Conservation Act 2016* (BC Act), the Commonwealth *Environmental Protection and Biodiversity Act 1999* (EPBC Act), and other relevant legislation.

Accordingly, this REF:

- undertakes an analysis of the environmental, economic, physical and social implications of the proposal
- predicts and describes the potential environmental impacts associated with the proposal and develops environmental safeguards to avoid, minimise or mitigate those impacts
- assesses the significance of residual impacts.

Community and stakeholder consultation

Consultation with the relevant government agencies and registered Aboriginal parties has been undertaken as detailed in this REF.

The *Central Mallee reserves draft plan of management* (NPWS 2021a), which included aspects of this proposal, was publicly exhibited from 1 April to 5 July 2021 before its finalisation adoption and publication (NPWS 2021b).

This REF will be publicly exhibited to the wider community for a period of 30 days. Members of the public are invited to 'have their say' on the proposal. Issues raised in submissions will be considered and, where appropriate, addressed before determination of this REF.

Once determined, the final version of the REF and the decision statement listing the conditions of determination will be published.

Environmental impacts

The impacts associated with the project have been summarised in Table 1.

Table 1 Summary of impacts associated with the project

Category of impact	Significance of impacts		
	Extent of impact	Nature of impact	Environmentally sensitive features
Physical and chemical	Construction and operation – negligible; negative	Potential minor and negative noise, air, soil, contamination, water (creeks) impacts from project works, however, mitigation measures will be implemented to ensure the impact is negligible.	Keginni Creek and 5 unnamed waterways run through the reserve. Concrete waste stockpile near unnamed creek #1.
Biological	Construction – low; negative Operation – high; positive	A number of threatened species may be impacted in the short term through the direct removal of 137.41 ha of native vegetation and 525 hollow-bearing trees. Impacts will be managed through mitigating measures such as minimising clearing where possible. However, during operation there will be long-term positive benefits resulting in an overall improvement in habitat and ecological processes, removal or reduction in the severity of several key	137.41 ha of native vegetation will be removed for the project, however this represents a small portion (0.12%) of the total area of Yathong Nature Reserve which is 115,604 ha. No plant community types in the study area are considered a threatened ecological community. A number of threatened species which use this vegetation as habitat may be impacted during the construction phase which is further detailed in Section 9 and 10. Every effort to minimise this impact has been made.

Category of impact	Significance of impacts		
	Extent of impact	Nature of impact	Environmentally sensitive features
		threatening processes, reintroduction of locally extinct fauna, and overall a more balanced trophic structure and ecological health and functioning. This is likely to far outweigh the short to medium term impacts. The removal of feral predators, reintroduction of locally extinct species and the associated fire and weed management will have positive effects for up to 28 animal species within the proposed 39,230 ha feral predator–free area.	The proposal is not likely to have a significant impact on threatened species, populations or ecological communities listed under the BC Act. The proposal is not likely to have a significant impact on threatened species, populations or ecological communities, migratory species, or matters of national environmental significance within the meaning of the EPBC Act. A referral to the Australian Government's Department of Climate Change, Energy, the Environment and Water is not required.
Natural resources	Construction – low; negative Operation – high; positive	There will be minor negative impacts on natural resources during construction related to impacts on biodiversity as detailed above, however the long-term positive impacts to biodiversity are significant. The construction of the conservation fence, management/fire trails and operations base at the Yathong Quarters, will require the use of resources including metal for the conservation fence, concrete for footings, materials to construct several accommodation structures and road base/general fill for track construction.	As detailed above, 137.41 ha of native vegetation will be removed for the project, however, no plant communities are considered a threatened ecological community. A number of threatened species which use this vegetation as habitat will be impacted during the construction phase which is further detailed in Sections 9 and 10. In regard to road base/general fill required for management/fire trail construction, the road surface will be locally reshaped to achieve desired grades and finishes where possible. If there is a deficit and additional material is required, it will be imported from appropriately licensed quarries, likely within the Cobar, Carrathool or Lachlan local government areas.

Category of impact	Significance of impacts		
	Extent of impact	Nature of impact	Environmentally sensitive features
Cultural Heritage	**Non-Aboriginal heritage** Construction and operation – negligible; negligible **Aboriginal heritage** Construction – medium; negative Operation – low; negligible	**Non-Aboriginal heritage** There are no impacts to non-Aboriginal heritage associated with the project, pending the additional heritage inspection. **Aboriginal heritage** There may be negative impacts to Aboriginal heritage which will be assessed and managed in accordance with the project's Aboriginal cultural heritage assessment report which is being completed for the project. This involves significant consultation with key stakeholders including registered Aboriginal parties, site inspections and a detailed impact assessment.	**Non-Aboriginal heritage** There are no impacts to non-Aboriginal heritage associated with the project, pending the additional heritage inspection. **Aboriginal heritage** Aboriginal heritage items will be identified during the site inspection which will be completed as part of the assessment process and in consultation with the registered Aboriginal parties and any other relevant stakeholders.

Justification and conclusion

This REF has examined and taken into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity.

This has included consideration of impacts on cultural values (including Aboriginal and non-Aboriginal heritage), socio-economic values (including potential impacts on the community resulting from construction works) and threatened species, populations and ecological communities and their habitats. It has also considered potential impacts to threatened species and matters of national environmental significance listed under the Commonwealth EPBC Act.

A number of potential environmental impacts from the proposal have been identified and amended during the design development and options assessment. The proposal as described in the REF best meets the project objectives. The proposal will result in some impacts on the biological values, such as the removal of 137.41 ha of native vegetation, however, this represents a small portion (0.12%) of the total area of Yathong Nature Reserve which is 115,604 ha. Safeguards and management measures as detailed in this REF will ameliorate or minimise these expected impacts. The proposal will also provide positive environmental, social, cultural and economic benefits.

On balance the proposal is considered justified, and the following conclusions are made:

- Despite environmental impacts associated with the construction of the conservation fence, the proposed activity will result in a net ecological gain due to the prevention of illegal activity, improved habitat, and restored ecological function within the reserve.
- The proposal is not likely to have a significant impact on threatened species, populations or communities within the meaning of the NSW *Biodiversity Conservation Act 2016*. Threatened species tests of significance for species listed under the BC Act can be seen in the ecological assessment (Ecoplanning 2022 at Appendix A).
- The proposal is not likely to have a significant impact on threatened species, populations, ecological communities or migratory species, or any other matters of national environmental significance within the meaning of the *Environment Protection and Biodiversity Conservation Act 1999*. A referral to the Australian Government's Department of Climate Change, Energy, the Environment and Water is not required. Assessments of significance for matters of national environmental significance listed under the EPBC Act can be seen in the ecological assessment (Appendix A).

1. Background

Australia has the worst mammal extinction in the world. At least 34 Australian mammal species have been driven to extinction since European settlement, with feral cats (*Felis catus*) and foxes (*Vulpes vulpes*) the main drivers for at least two-thirds of these losses (Legge et al. 2018; Woinarski et al. 2015; Radford et al. 2018). The range and abundance of surviving mammals continues to decline significantly across Australia.

Feral cats and foxes also impact on bird (Garnett et al. 2011; Woinarski et al. 2017), reptile (Woinarski et al. 2018; Chapple et al. 2019) and amphibian species (Woinarski et al. 2020).

Feral cats are found throughout mainland Australia and are estimated to kill over 2 billion native animals every year (J Woinarski, S Legge pers. comm). In New South Wales (NSW), cats are thought to impact 117 threatened species, more than any other feral animal species (Coutts-Smith et al. 2007).

There is strong scientific consensus that a network of feral predator–free areas is as an essential part of a broader conservation strategy to protect and restore our most vulnerable native species (NESP 2018; Legge et al. 2018).

The NSW Feral predator–free area project represents one of the most significant threatened fauna restoration projects in NSW's history. The project builds on the successful Reintroduction of Locally Extinct Mammals Project which has established 3 feral predator–free areas in western NSW and has reintroduced 8 species that were previously extinct to NSW. The establishment of 4 large feral cat and fox-free areas under the NSW feral predator–free project at various locations across NSW, including a site in western NSW (see Figure 1), will deliver a measurable conservation benefit for at least 50 threatened animal species including:

- the re-establishment of 9 mammal species currently listed as extinct in NSW, including iconic species such as the greater bilby (*Macrotis lagotis*), western quoll (*Dasyurus geoffroii*) and eastern bettong (*Bettongia gaimardi gaimardi*)
- the establishment of new populations of at least 14 threatened species (and 5 protected species) which are locally extinct – priority species will include the critically endangered long-footed potoroo (*Potorous longipes*), the eastern quoll (*Dasyurus viverrinus*) and bushfire-affected species such as the smoky mouse (*Pseudomys fumeus*)
- an improvement in the trajectory, or reduction in extinction risk, for another 21 threatened extant animal species, including bushfire-affected species such as the red-legged pademelon (*Thylogale stigmatica*), and iconic species such as the koala (*Phascolarctos cinereus*) and malleefowl (*Leipoa ocellata*)
- a significant conservation benefit for an additional 10 or more extant threatened animal species.

The NSW Feral predator–free area program will, in turn, improve, enhance and restore essential ecosystem function and processes.

The program is partly funded by the NSW Environmental Trust for $20.3 million with the large majority of these funds to be expended over the program's first 4 years. NPWS will cover other costs, including ongoing costs. The program will be independently evaluated in its 10th year.

Reflecting the central role of national parks in securing our biodiversity, the project will deliver an exceptional ecological return and position NSW as a world-leader in rewilding, restoration ecology and feral predator control.

Figure 1 Map of existing and potential NSW feral predator–free areas in NSW (Source: NPWS 2022)

1.1 Yathong Nature Reserve site

1.1.1 Site selection process

At a statewide scale, the Central West of NSW has been identified as a priority for the establishment of a feral predator-free area by the Department of Planning and Environment (the department) to protect and restore extinct and extant populations of threatened fauna.

NSW National Parks and Wildlife Service (NPWS) conducted detailed assessments across a number of priority sites at a regional scale. Consideration was given to a number of alternative sites including

- Yathong Nature Reserve
- Nombinnie Nature Reserve
- Gundabooka National Park
- Dthinna Dthinnawan Community Conservation Area Zone 1 National Park
- Ledknapper Nature Reserve
- Pilliga West State Conservation Area
- Nocoleche Nature Reserve
- Paroo-Darling National Park and State Conservation Area

- Narran Lake Nature Reserve
- Macquarie Marshes Nature Reserve and State Conservation Area
- Culgoa National Park
- Kaputar National Park
- Goobang National Park
- Oolambeyan National Park
- Goonoo National Park and State Conservation Area.

Consideration was then given to the following factors in selecting the final site:

- the number of native species that will benefit including:
  - the number of locally extinct species to be reintroduced (and the likely population size of each, based on the area and suitability of habitat at each site)
  - extant fauna that will benefit from feral animal removal
- establishment and maintenance costs, including perimeter length, topography, and management risks such as fire, vandalism, drainage/culverts and the timeframe for completion
- the scale and quality of the visitor experience, including the location, natural setting and accessibility, together with the cost of implementing visitor programs
- environmental, cultural and social impacts associated with construction of the conservation fence and supporting ancillary infrastructure, including impacts on plant and animal species, ecological communities, connectivity, Aboriginal and historic heritage values and recreational use
- the anticipated extent of broader ecosystem restoration based on current condition and the benefits associated with the exclusion of feral animals, focussed management and reintroductions.

The views of stakeholders were recognised and considered against these factors. Yathong Nature Reserve (the reserve) was identified as providing, on balance, the best site in Central West NSW for establishing a large feral predator–free area and reintroducing locally extinct native wildlife.

The predicted species outcomes of the activity include:

- The Yathong Nature Reserve site will support the reintroduction of up to 9 locally extinct species, including the burrowing bettong (*Bettongia lesueur*), brush-tailed bettong (*Bettongia penicillata*), western quoll, greater stick-nest rat (*Leporillus conditor*), greater bilby, Mitchell's hopping mouse (*Notomys mitchellii*), bridled nail-tail wallaby (*Onychogalea fraenata*), western barred bandicoot (*Perameles bougainville*) and desert mouse.
- A significant conservation benefit for at least 19 threatened species including the kultarr (*Antechinomys laniger*), southern ningaui (*Ningaui yvonneae*), striped-faced dunnart (*Sminthopsis macroura*), malleefowl, Mukarrthippi grasswren (*Amytornis striatus striatus),* red-lored whistler (*Pachycephala rufogularis*) and southern scrub-robin (*Drymodes brunneopygia*).

Note: all translocations are subject to approval of translocation plans as per the *Translocation operational policy* (DPIE 2019a).

1.1.2 Predicted outcomes of the activity

The predicted ecological processes and function outcomes of the activity include:

- improved ecosystem function over time within the feral predator–free area through the restoration of ecological processes such as seed and spore dispersal, soil engineering and predator–prey relationships
- introduced predators replaced with native predators, reducing total predation pressure on native prey species
- introduced grazers replaced with native grazers, reducing total grazing pressure on native vegetation
- improved habitat conditions for a number of threatened flora species present on site
- Yathong Nature Reserve feral predator–free area will also result in an improvement in the ecological health and functioning of threatened ecological communities.

2. Brief description of the proposed activity

Proposal name	The construction and operation of conservation fencing and associated infrastructure and control of feral predators and herbivores (to the greatest extent practicable) to support the reintroduction of locally extinct species at Yathong Nature Reserve in the Central Mallee.
Name of NPWS park or reserve	Yathong Nature Reserve
NPWS Area	Central West Area, West Branch
Location of activity	Western portion of Yathong Nature Reserve (see Figure 2)
Council	Cobar Shire Council
NSW State electorate	Barwon
Proposed commencement date	August 2022
Proposed completion date	June 2023 establishment, reintroductions and management will be ongoing

3. Proponent's details

Area Manager or Section Manager	Fiona Buchanan Fiona.buchanan@environment.nsw.gov.au
Contact name	Denyell Clark
Position	Senior Project Officer, Central West Area
Street address	74 River Street Dubbo NSW 2830
Postal address	PO Box 580, Dubbo NSW 2830

4. Permissibility and assessment pathway

4.1 Permissibility under NSW legislation

4.1.1 National Parks and Wildlife Act 1974

Objects of the National Parks and Wildlife Act (s 2A)

The activity is consistent with the following objects of the NPW Act *National Parks and Wildlife Act 1974* (NPW Act):

- conservation of habitat, ecosystems and ecosystem processes (s 2A(1)(a)(i))
    - the removal of feral predators and herbivores and the reintroduction of locally extinct species will lead to the restoration of ecosystem processes and function, including predicted increased levels of seed and spore dispersal and soil engineering
- biological diversity at the community, species and genetic levels (s 20A(1)(a)(ii))
    - through reintroduction of locally extinct species, and restoration of threatened ecological communities
- fostering public appreciation, understanding and enjoyment of nature and their conservation (s 2A(1)(c))
    - through increased awareness and understanding of threatened species, communities, threats and their management, including incorporation of scientific research and application of traditional knowledge.

Adverse effects to the values for which the land has been reserved under the NPW Act (consistent with s 2A(3)(b) of the NPW Act) will be minimised through careful design, incorporating best practice methods for construction of conservation fencing and associated infrastructure, removal of feral animals and reintroduction of locally extinct species.

In addition, there has been consideration of the principles of ecologically sustainable development (as required under s 2A(2) of the NPW Act) in the following aspects of the project:

- this REF's careful evaluation of the potential for serious or irreversible damage to the existing environmental values of the reserve and the risk-weighted consequences of various options with the aim of avoiding those impacts (precautionary principle)
- the project's desired outcome is to maintain or enhance the environmental health, diversity and productivity of part of the Cobar Peneplain and the Murray Darling Depression Interim Biogeographic Regionalisation for Australia (IBRA) bioregions for the benefit of future generations (inter-generational equity)
- the fundamental goal of the project is the enhancement of native biodiversity and ecological integrity (conservation of biological diversity).

Reserve management principles (s 30J)

The activity is consistent with the following management principles for nature reserves under s 30J of the NPW Act, particularly:

- the conservation of biodiversity and the maintenance of ecosystem function (s 30J(2)(a))

  - through removal of feral predators and herbivores, reintroduction of locally extinct species, and improved ecosystem health, including seed and spore dispersal and soil engineering
- provision for appropriate research and monitoring (s 30J(2)(d))
  - through the development and implementation of a comprehensive monitoring, evaluation and reporting plan and research strategy.

Consistency with the plan of management

The *Central Mallee reserves plan of management* (NPWS 2021b) was adopted in October 2021. The project will be consistent with policies and actions outlined in Section 1 of the plan – 'Protecting the natural environment'.

Leasing, licensing and easement provisions

Not applicable – NPWS is the proponent and the project is not subject to a lease or licence.

NPWS management powers and responsibilities

The activity is consistent with the functions of the Secretary and NPWS as outlined in the following sections of the NPW Act:

- carrying out of works and scientific research considered by the Secretary to be necessary for the preservation, protection and management of the reserve (s 8(3)(b) and s 8(3)(c))
  - this includes the construction and operation of conservation fencing and associated infrastructure, removal of feral predators and herbivores, reintroduction of locally extinct species and monitoring, evaluation and reporting
- the conservation and protection of reserves and wildlife (s 12(a) and s 12(b))
  - this includes the establishment of the feral predator–free area, control of feral predators and reintroduction of locally extinct species
- the conduct of research or monitoring and public education related to reserves and wildlife (s 12(h) and s 12(i))
  - this includes the proposed research, monitoring, evaluation and reporting of the activity including education and communication.

4.1.2 Wilderness Act 1987

Not relevant – Yathong Nature Reserves is not in a wilderness area.

4.1.3 Biodiversity Conservation Act 2016

The proposal is consistent with the biodiversity conservation objectives of the *Biodiversity Conservation Act 2016* (BC Act).

The activity will:

- contribute to conservation of biodiversity and ecological integrity
- facilitate ecological sustainable development
- improve and share knowledge, including local and Aboriginal knowledge, about the status and values of biodiversity and of ecosystem services and the effectiveness of conservation actions.

A test of significance for threatened species and ecological communities as listed under the BC Act can be seen in the ecological assessment (Ecoplanning 2022 at Appendix A). The proposal is unlikely to significantly impact any threatened species or communities listed under the BC Act.

The proposal identifies key threatening processes relevant to the proposed activity, with methods to mitigate the impacts of these.

4.1.4 Rural Fires Act 1997

The activity is consistent with the objectives of protecting life and property and protection of the environment under the *Rural Fires Act 1997* (RF Act).

The Yathong Nature reserve fire management strategy (NPWS 2014) will be updated to include the appropriate fire advantage zones for the various aspects of the project. Asset protection zones (APZ) and strategic fire advantage zones (SFAZ) will be mapped in consultation with the local bush fire management committee and appropriate management of these zones will mitigate the risk to the conservation fence by incorporating strategic prescribed burns as required.

The proposal will involve a 15 m cleared corridor around the boundary of Yathong's feral predator–free area with the conservation fence situated approximately in the centre of this corridor. A minimum 6 m fuel-free zone will be achieved either side of the conservation fence as per s 76 of the RF Act.

NPWS has put forward an amendment to be included in a current fire access and fire trail plan for the Central Mallee area.

Planning for bushfire protection

The proposal is consistent with the objectives of *Planning for bush fire protection* (RFS 2019). The improved fire trail system will better allow the containment of any fires in and around Yathong Nature Reserve and prevent impacts on neighbouring residential properties. The proposed boundary trails will improve separation between neighbouring private properties and the reserve.

4.2 Assessment pathways

4.2.1 Environmental Planning and Assessment Act 1979

The activity may be undertaken without development consent under the provisions of clause 2.73(1)(a) of *State Environmental Planning Policy (Transport and Infrastructure) 2021* (Transport and Infrastructure SEPP) because:

- it is on land reserved under the NPW Act or acquired under Part 11 of the NPW Act,
- and
- it is for a purpose authorised under the NPW Act.

The activity is not 'designated development' under Schedule 3 of the Environmental Planning and Assessment Regulation 2021.

The activity is not 'state significant infrastructure' under the *SEPP (Planning Systems) 2021*, and is not of a similar kind to such an activity.

The activity is not 'designated development' under the *SEPP (Resilience and Hazards) 2021* as it is not on land mapped as littoral rainforest or coastal wetland

The activity is not declared to be exempt development under an environmental planning instrument or it fails to fully meet the requirements for exempt development.

It is noted that, while conservation fencing may be considered exempt development in some situations, the height of the proposed fencing and the scale of the associated ground disturbance and clearing mean it does not meet the standards of exempt development (under Schedule 10 of the Transport and Infrastructure SEPP) and the definition of 'minor impact' (under s 1.6 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

Further, the project is considered a 'use of land', including a change in existing land use, through restricted public access and the reintroduction of locally extinct species. A 'use of land' is included in the definition of 'activity' under s 5.1 of the EP&A Act, requiring a consideration – to the fullest extent possible – of the environmental impacts of the proposal under s 5.5 of the EP&A Act.

4.2.2 Coal Mine Subsidence Compensation Act 2017

Not applicable – The activity does not involve the erection or alteration of an improvement within a mine subsidence district.

4.2.3 Fisheries Management Act 1994

The activity involves the excavation of or deposition in 'water land', that is, any land submerged by water, either permanently or intermittently.

The *Fisheries Management Act 1994* (FM Act) applies to all waters within the limits of NSW. It aims, amongst other things, to conserve threatened species, populations and ecological communities of fish and marine vegetation; and promote ecologically sustainable development, including the conservation of biological diversity. The FM Act is administered by the NSW Department of Primary Industry (DPI) Fisheries.

Under s 199 of the FM Act, a public authority must, before it carries out or authorises the carrying out of dredging work or reclamation work, give the Minister written notice of the proposed work, and consider any matters raised by the Minister. Dredging includes works that involve excavating water land, moving or removing material on to or from water land. Reclamation works means using materials, for example, sand, soil, gravel, timber or rocks to fill or reclaim water land or depositing such material on water land to construct something over water land.

Some of the construction works in the proposed activity may involve dredging or reclamation work as defined under s 199 of the FM Act in Keginni Creek which is considered an ephemeral creek. Works will include:

- vegetation clearing within the creek and surrounding riparian vegetation (if required)
- installation of conservation fencing and associated footings
- placement of rock/gravel at the base of the conservation fencing, and on the creek bed

In accordance with the Strahler system, Keginni Creek is classified as a 4th order stream due to the large upstream network of minor ephemeral drainage/hydro lines. However, Keginni Creek is not classified as key fish habitat and does not contain any threatened species or key threatening processes listed in the schedules of the FM Act relevant to the proposed activity.

The outcomes of the statutory consultation is summarised in Section 4.2 and Appendix B of this REF.

4.2.4 Heritage Act 1977

Not applicable. The proposal is not on land that contains:

- an item listed on the State Heritage Register (SHR)
- an item not listed on the SHR but identified by NPWS as being of potential state significance
- an item listed on the NPWS Heritage and Conservation Register under s.170 of the Heritage Act (contained in the Historic Heritage Information Management System).

Further, the proposal will not affect a place, building, landscape feature or moveable heritage item older than 25 years, protected under the NPW Regulation.

Refer to the heritage assessment (Unearthed Archaeology and Heritage 2022 at Appendix C) for further details.

4.2.5 Marine Estate Management Act 2014

Not applicable – the activity does not affect or directly adjoin a marine park or aquatic reserve, and works are not likely to affect plants or animals within the marine park or aquatic reserve.

4.2.6 Environment Protection and Biodiversity Conservation Act 1999

The activity is on land that contains the following, or the activity may affect:

- nationally listed threatened species and ecological communities, or listed migratory species.

Matters of national environmental significance which may be impacted by the proposal and have therefore been assessed in this REF include:

- the Mallee Bird Community of the Murray Darling Depression Bioregion which is listed as an endangered ecological community
- threatened flora and fauna species listed under the EPBC Act
- key threatening processes (KTP).

These matters are described in Sections 9 and 10 and in Appendix A of this REF. An assessment of the significance of impacts on matters of national environmental significance is included in Appendix A as per significant impact guidelines (DoE 2013) and summarised in Appendix A which confirms that there will be no significant impact to any species, populations or communities listed under the EPBC Act and therefore, as stated in Section 12, referral to the Australian Government is not required.

4.3 Consistency with National Parks and Wildlife Service policy

Table 2 indicates whether the activity is consistent with policies of the National Parks and Wildlife Service (NPWS) or other parts of the department's Environment and Heritage Group, including an explanation where necessary.

Table 2 The project in relation to Environment and Heritage policies, strategies and procedures

Policy name	How proposal is consistent
Translocation operational policy	Single species and multi-species translocation plans will be prepared for each species proposed to be introduced or reintroduced in accordance with the NPW Act, BC Act and the *Translocation operational policy* (DPIE 2019a). All translocation proposals will be prepared in consultation with species experts. This includes consultation with relevant recovery teams to advise on likely requirements for founder individuals for translocations. Translocation proposals will be subject to peer review by a minimum of 2 scientists, including one department scientist and one external independent scientist. Relevant animal ethics committee approvals will be required under the *Animal Research Act 1985*. The translocation proposals will include an assessment of the risks associated with genetic diversity and how this will be estimated and increased/maintained, as well as impacts of proposed introductions/reintroductions on extant fauna, flora and ecosystem functions.
Boundary fencing policy	Boundary fencing is fencing that is constructed along, or close to, the legal boundary of a reserve managed by NPWS. NPWS recognises the importance of working with adjoining landowners to manage common boundaries. In some locations the conservation fence will be aligned parallel to a common boundary. The proposal is not consistent with the policy in terms of the level of clearing (which provides for clearing only up to 6 m on from the fence line – see paragraph 14) but is consistent with policy in terms of the environmental assessment required for fence construction and clearing (paragraphs 16–18). Due to the special needs of the project, the proposal is not consistent with the requirement for boundary fencing to be of a type that would typically be suitable for installation on a park boundary. As such, NPWS would be fully responsible for the fence's installation and maintenance costs.
Regional pest management strategy 2012–17: Western Rivers region	This NPWS regional pest management strategy for the Western Rivers region (NPWS 2013) identifies significant pest animal and weed species in the region and the native species and communities that they threaten. It recognises that pest management programs must take account of the complex land-use histories of the region, including agricultural and forestry production, remnant vegetation of an 'island' reserve system and significant Aboriginal and cultural heritage. Key animal pest management programs focus on the control of foxes, feral pigs (*Sus scofra*), feral goats (*Capra hircus*) and rabbits (*Oryctolagus cuniculus*). The strategy prioritises the protection of the river red gum forests and wetlands and recommends balancing conservation values with developing tourism opportunities and recreational amenities. The installation of conservation fencing is consistent with the objectives of this strategy.
NPWS Firearms management manual (NPWS 2022)	Control of feral animals will be conducted in line with the feral animal control plans and will use a range of conventional techniques including trapping, shooting and baiting, in accordance with relevant codes of practice (including animal welfare requirements) and the Environment Protection Authority (EPA) / Australian Pesticides and Veterinary Medicines Authority (APVMA) permits. Use of firearms will be consistent with the NPWS Firearms management manual and individual shoot plans.
Operational policy: protecting Aboriginal cultural heritage (DECC 2009)	Aboriginal cultural heritage is present on the site. Any potential impacts to these heritage items will be assessed through an **Aboriginal cultural heritage assessment report which is currently underway**. This report will identify these potential impacts, mitigating measures and allow for consultation with the Aboriginal community on the project.

Policy name	How proposal is consistent
Cultural heritage strategic policy conserving heritage – connecting cultures (DEC 2007)	The Aboriginal cultural heritage assessment (currently underway) will identify Aboriginal heritage values present on site. A desktop assessment of non-Aboriginal heritage has also been completed which concluded that there will be no impacts to non-Aboriginal heritage items. Further details are provided in Appendix C.

4.4 Strategic plans

The relevant strategic plans prepared under Division 3.1 of the EP&A Act are:

- *Cobar Local Strategic Planning Statement* (Cobar Shire 2020)

The proposal is consistent with this statement in that it aims to protect and management the environmental asset of a major stand of remnant mallee vegetation that has been widely cleared in the surrounding agricultural lands. A future stage of the proposal may include a unique tourist attraction, diversifying the local tourism market.

- *Far West Regional Plan 2036* (DPE 2022b)

The proposal is consistent with this plan as it incorporates a major conservation measure to protect and manage environmental assets.

4.5 Type of approval sought

Internal NPWS approval or authorisation, including expenditure, is required for the proposed activity.

Pending the completion of the Aboriginal cultural heritage assessment report and consultation with the registered Aboriginal parties, an Aboriginal heritage impact permit under s 90 may need to be sought.

5. Consultation – general

5.1 Consultation required under Transport and Infrastructure SEPP

Where consultation with relevant government agencies has been completed, this has been included in Appendix B.

5.1.1 Local Council (s 2.10, 2.11, 2.12 and 2.14)

The activity is on land that contains:

- local council infrastructure or services (such as stormwater, sewer, roads).

Discussion has been held with Cobar City Council (council) in regard to the broader proposal and the conservation fence alignment. It is noted that the road reserves traversing and surrounding Yathong Nature Reserve are categorised as unclassified roads under the *Roads Act 1993* and are therefore managed by council.

In consultation with council and Crown Lands – Far West Area, the conservation fence alignment along Yathong Road (DP1188538) is in the process of being adjusted and will be located outside the road reserve. NPWS are seeking council's concurrence under the NPW Act for an adjustment of the nature reserve's boundary under s 188C of the NPW Act to realign the Western Division Road no. 43 to the existing Yathong Road formation. Further details are provided in Appendix B.

5.1.2 National park or other C1-zoned land (s 2.15(2)(a) and 2.15(2)(b))

The activity is:

- a development on land zoned C1 (formerly E1) or is on or adjacent to land reserved or acquired under the NPW Act.

The activity is supported by the NPWS Central West Area and the regional advisory committee. It is subject to the outcomes of this REF.

5.1.3 Marine park or aquatic reserve (s 2.15(2)(b))

Not applicable – the proposal is not on or adjacent to a marine park or aquatic reserve.

5.1.4 Roads or maritime (s 2.15(2)(c) and s 2.110)

The activity is:

- a traffic-generating development on main roads.

Discussion has been held with Transport for NSW (TfNSW, formerly RMS) in regard to the broader proposal and the conservation fence alignment. However, it is noted that the roads surrounding Yathong Nature Reserve are categorised as unclassified roads under the Roads Act and are therefore managed by Cobar City Council, not TfNSW. Consultation with TfNSW will be ongoing throughout the project as required, if the proposal includes any development listed as a traffic generating development in Schedule 3 of the Transport and Infrastructure SEPP.

5.1.5 Siding Spring Observatory (s 2.15(2)(d))

Not applicable – the proposal will not increase the amount of artificial light in the dark night sky within 200 km of the Siding Spring Observatory.

5.1.6 Defence communications facility buffer (s 2.15(e))

Not applicable – the proposal is not located in the buffer area surrounding the facility near Morundah.

5.1.7 Mine subsidence area (s 2.15(2)(f))

Not applicable – the proposal is not on land in a mine subsidence district within the meaning of the *Coal Mine Subsidence Compensation Act 2017*.

5.2 Consultation required under other legislation

5.2.1 Fisheries Management Act

On 7 March 2022, DPI Fisheries was provided formal notification of works under s 199 of the FM Act as detailed in Appendix B. DPI Fisheries advised they had no concerns with the proposed dredging or reclamation works in Keginni Creek as this waterway is not mapped as a key fish habitat. No further comments were received from DPI Fisheries.

5.3 Consultation requirements under NPW Act for leases and licences

Not applicable – the proposal does not require a lease or licence under s 151.

5.4 Targeted consultation

5.4.1 Adjacent landowners

Consultation is ongoing between adjacent landowners and NPWS.

The *Central Mallee reserves draft plan of management* (NPWS 2021a), which outlined the feral predator–free area proposal was posted to all direct neighbours on 1 April 2021. Opportunity to comment was provided. Direct contact with individual neighbours will be carried out by project staff during the project.

5.4.2 Wider community consultation and/or notification of works

In December 2020, the establishment of a feral predator–free area was announced to take place at Yathong Nature Reserve, in the Central West NSW. This was followed by the release of the *Central Mallee reserves draft plan of management: incorporating Yathong Nature Reserve, Nombinnie Nature Reserve, Nombinnie State Conservation Area and Round Hill Nature Reserve* (NPWS 2021a). This draft plan of management, proposed to replace the existing plan of management for Yathong and Round Hill nature reserves, facilitated the establishment of a feral predator–free area. Following the exhibition of the draft replacement plan from 1 April to 5 July 2021, submissions were considered by the 2 relevant statutory advisory groups before adoption by the Hon Matthew Kean, Minister for Energy and the Environment, in October 2021 (NPWS 2021b).

A draft communication and engagement plan has been prepared and is being implemented to guide community engagement and consultation throughout the project, and in particular timely and accurate information to the community during site preparation and construction.

This REF will be publicly exhibited to the wider community and interest groups. Any comments received will be considered when finalising the REF where appropriate.

Consultation with registered Aboriginal parties is detailed in Section 6.

The communication and engagement plan provides for continued consultation at identified stages of the project. All residential properties and other key stakeholders (e.g. local councils) affected by the activity will be notified at least 5 days prior to commencement of the activity.

5.4.3 Interest groups and/or notification

This REF will be publicly exhibited to the wider community and interest groups. Any comments received will be considered when finalising the REF where appropriate. NPWS is currently working to identify other groups with interest in the project. Consultation with these groups and individuals is and will remain ongoing.

6. Consultation – Aboriginal communities

6.1 Native title consultation requirements

The land is not subject to an Indigenous land use agreement.

The Ngemba, Ngiyampaa, Wangaaypuwan and Wayilwan People have submitted a native title claim which covers Yathong Nature Reserve. It has not yet been determined.

In the planning for the proposal, it is assumed that native title has not been extinguished and it is recognised the proposal may affect the ability of the claimants to carry out certain native title rights through restrictions on access.

Consultation with the claimants is occurring, the outcomes of which will be detailed in the Aboriginal cultural heritage assessment report.

This consultation follows earlier consultation that also involved the claimants' legal representative during the preparation of the reserve's current plan of management, as required under section 24JB (Subdivision J) of the *Native Title Act 1993* (Cth).

6.2 Other consultation with Aboriginal communities

Yathong Nature Reserve is not under a joint management arrangement. In accordance with the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010a), the Aboriginal community will be consulted as part of the Aboriginal cultural heritage assessment report for the proposed activity. Consultation will include notification to interested parties, providing information on the proposal and seeking cultural advice. The cultural heritage assessment is being prepared.

7. Proposed activity (or activities)

7.1 Location of activity

Location information for Yathong Nature Reserve is provided in Table 3 and also shown in Figure 2 and Figure 3 below.

Table 3 Location information for Yathong Nature Reserve

Park name	Yathong Nature Reserve
Description of location	Yathong Nature Reserve is part of the Central Mallee west of Cobar Road, located in the suburb of Irymple in Central West NSW. The reserve is 2 hours from Cobar and 3 hours from Griffith.
Site commonly known as	N/A
Lot/DP	Lot 3/ DP 754676, Lot 1/ DP 754747, Lot 4573/ DP 767707, Lot 2923/ DP 765083
Street address	Cobar Road, Irymple, NSW, 2835
Site reference	Easting: 354226 Northing: 6388446 MGA zone: 56

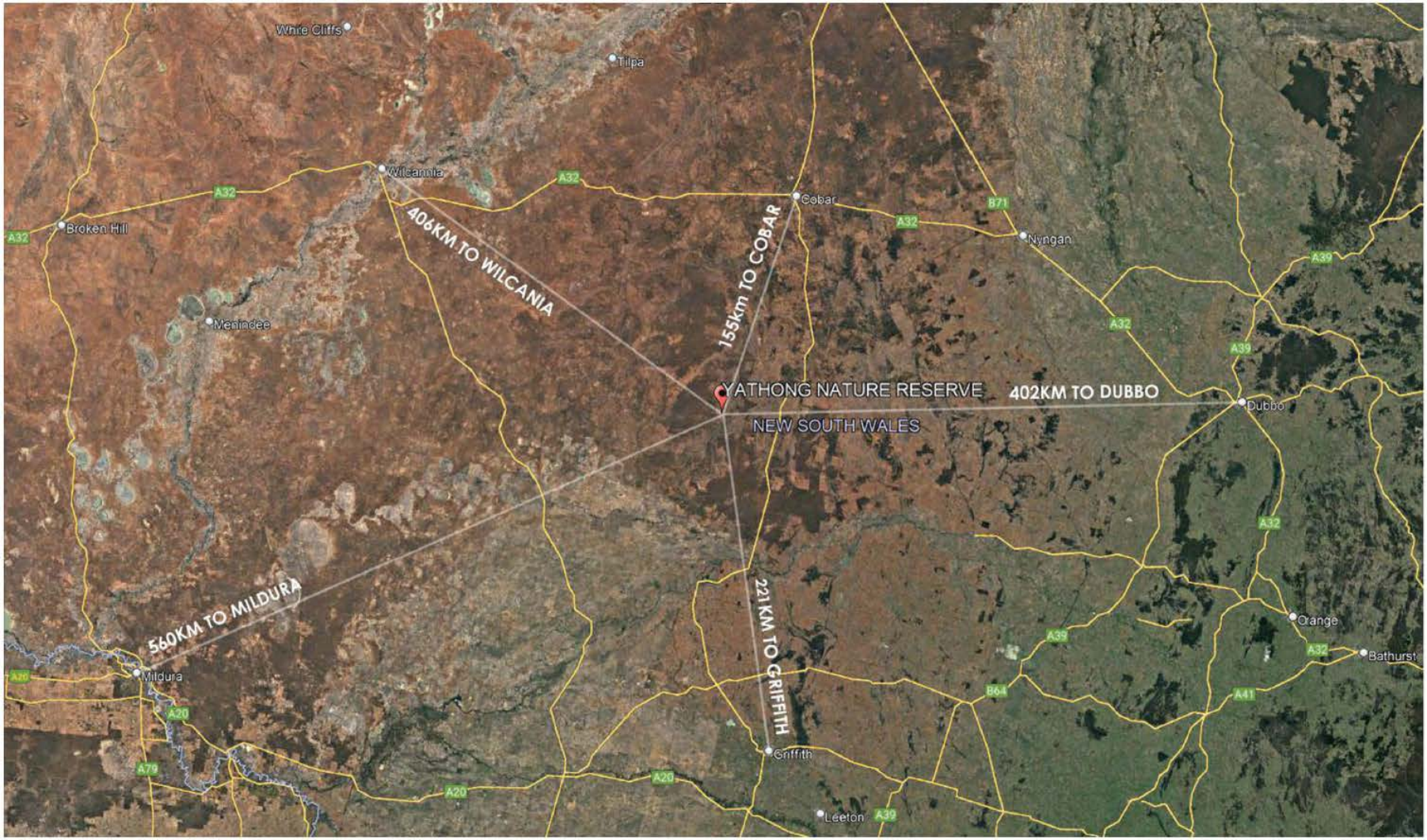

Figure 2 Location of Yathong Nature Reserve on a regional scale

Figure 3 Location of Yathong Nature Reserve on a local scale

7.2 Description of the proposed activity

A summary of the proposal is provided below and is further detailed in subsequent sections.

- The major activity associated with the proposal will be the construction of approximately 104.15 km conservation fencing to enclose a feral predator–free area of 39,230 ha in Yathong Nature Reserve. The style and standard of fence (see illustrations by Pritchard Francis 2022 in Appendix D) will prevent ingress by feral predators including foxes, cats and wild dogs (*Canis lupus* subspp.).
- The 104.15 km long conservation fence will require a 15 m wide cleared corridor (up to 7.5 m wide on each side of the conservation fence) for access and maintenance purposes. This will result in the removal of up to 129.22 ha native vegetation. See Figure 4 and Figure 5.
- Inside the feral predator-free area, on the Glenlea Fire Trail and Western Fire Trail, 18.31 km of internal conservation fences will be constructed. The internal conservation fences will facilitate the effective release of individual species, which would be specified in the species' approved translocation proposal. The internal fencing will be the same design as the conservation fence (Appendix D). The internal fences will also require a 15 m wide clear area (up to 7.5 m either side of the internal fence). However, as the internal fence will be located on existing roads it will not require the removal of any additional vegetation.
- Two sliding and 8 swing gates will be installed at strategic locations on the conservation fence perimeter to enable vehicle access as shown in Figure 4. In a later stage, an additional 2 swing gates will be installed along the internal fence at the future Stage 1 area, however this has not been assessed in this REF.
- Temporary onsite storage, connection to electrical and communication services, installation of surveillance, and monitoring equipment in the reserve and outside the feral predator–free area. If any of these works require vegetation clearing, it will be within areas already cleared for the project, or within the existing cleared areas in the reserve. See Section 7.2.4 for further details.
- The construction of new fire/access trails running parallel to Yathong Road with a 28.8 km distance and a width of 15 m. These will fall within the same 129.22 ha native vegetation clearing footprint that aligns with the conservation fence.
- The maintenance and upgrade of 75 km of existing park roads and management/fire trails to enable access for the construction and maintenance of the conservation fencing. These works will fall within the same 129.22 ha native vegetation clearing footprint that aligns with the conservation fence.
- Construction of additional accommodation facilities, at a site approximately 500 m west of Yathong Quarters, including the access roads, service installation and other miscellaneous ancillary facilities. This additional accommodation is required to support the project during both the construction and operational phases. This will result in the removal of up to 8.19 ha of native vegetation.
- Upgrades to the operational base at Yathong Quarters precinct including the establishment of the additional accommodation facilities, a new ecology/research building, new amenity blocks, rainwater tanks, upgraded wastewater system, services/utilities installation/upgrades, laydown/storage areas and any other related works. This will not result in any additional vegetation clearing, that is, the works are located in areas which have previously been disturbed.
- Management of this feral predator–free area, including the control and eradication of feral animals and other interventions such as dedicated fire management, habitat restoration and weed control.

This stage of the proposal will have conservation benefit for a range of species known to occur in the reserve, including at least 19 threatened species such as the kultarr, southern ningaui, striped-faced dunnart, malleefowl, mukarrthippi grasswren, red-lored whistler and southern scrub-robin.

A later stage of the proposal (not covered by this REF) will involve reintroduction of 9 species that are locally extinct, 8 of which are currently considered extinct in NSW, namely the burrowing bettong, brush-tailed bettong, western quoll, greater stick-nest rat, greater bilby, Mitchell's hopping mouse, bridled nail-tail wallaby and western barred bandicoot.

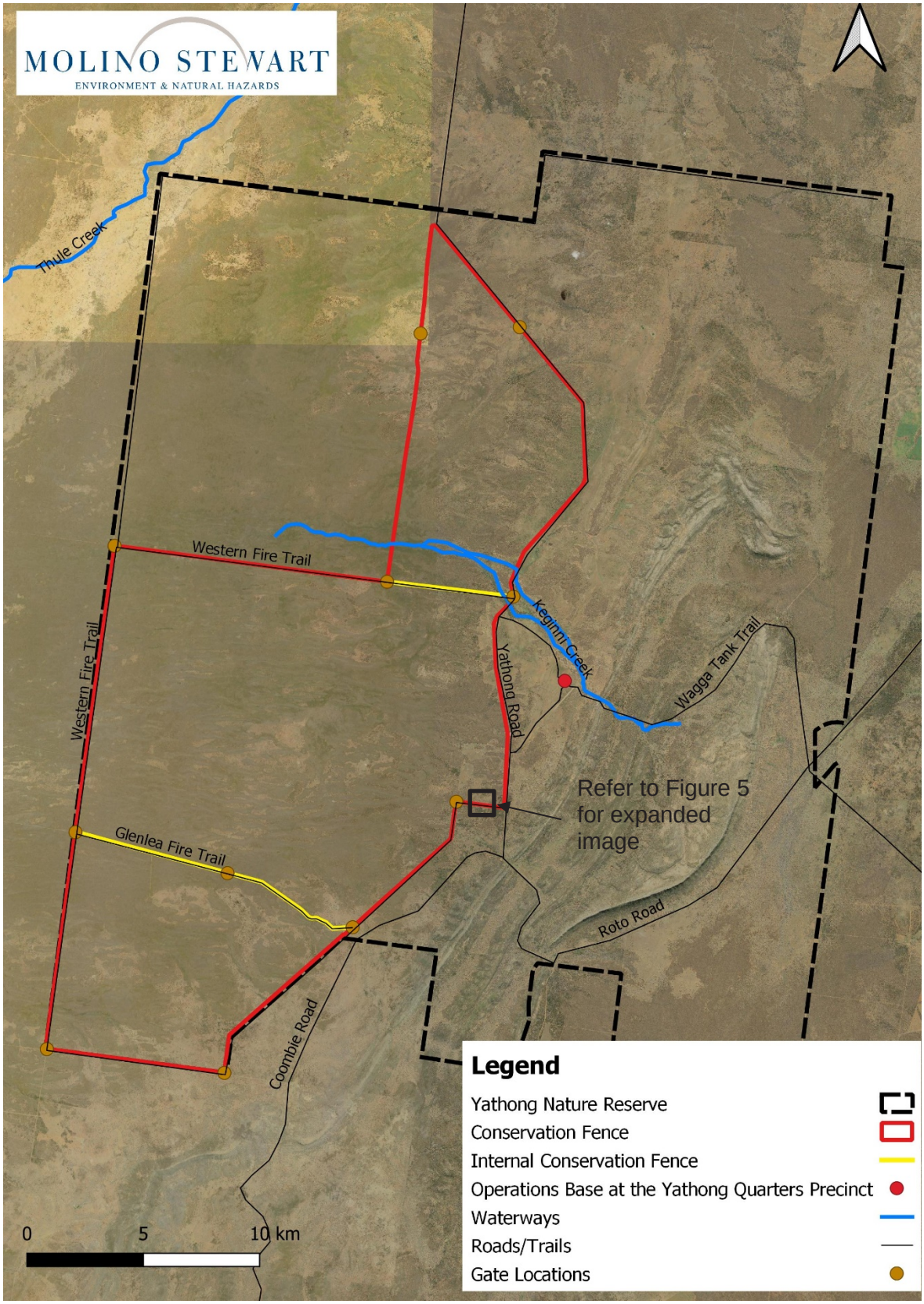

Figure 4 Location of the proposed conservation fence within Yathong Nature Reserve

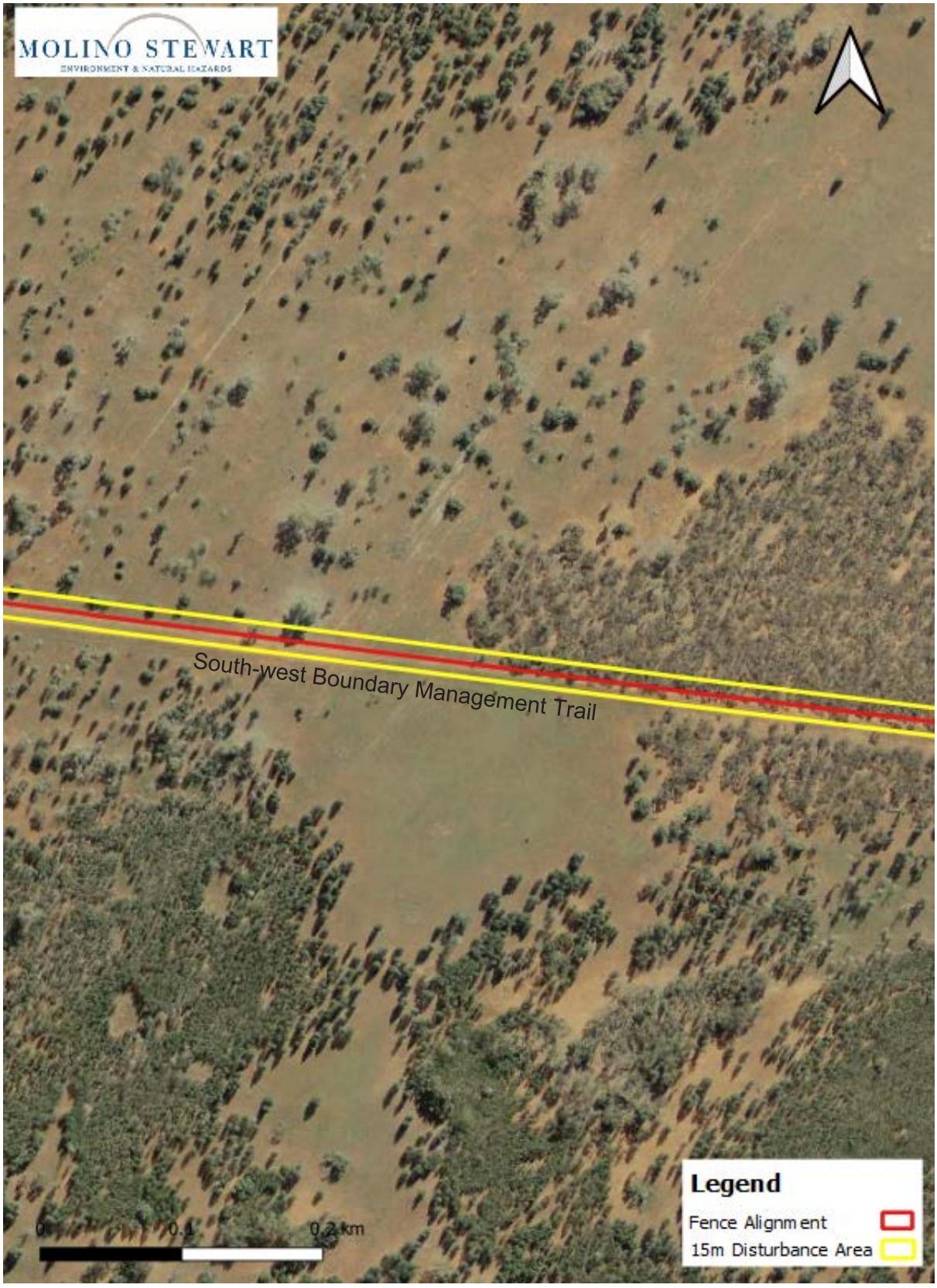

Figure 5 **An example of the 7.5 m cleared corridor either side of the proposed conservation fence line (15 m total). The location of this specific area is shown in Figure 4**

7.2.1 The proposed activity: pre-construction, construction and post-construction

The proposed activity involves a number of stages, listed below.

Pre-construction:

- Detailed planning and identification of suitable sites.
- Consultation with internal and external stakeholders such as neighbours, community groups, local environmental groups and the Aboriginal community has been ongoing and will continue throughout.
- Planning and approvals including amendment to the reserve plan of management and environmental and cultural assessments.
- On-ground assessment of the fence alignment to minimise impacts to threatened flora and fauna.
- Completion of Aboriginal cultural heritage assessment report and non-Aboriginal heritage assessment to accurately assess and address impacts on cultural heritage values.
- Detailed marking of the proposed fence line including proposed centreline, boundaries of the cleared corridor and easement.
- Installation of works and road closure signs to inform neighbours and stakeholders of planned works and closures.
- Collection of baseline ecological health and monitoring data as per the ecological health and monitoring framework (DPE 2022a).
- Completion of detailed engineering drawings illustrating the conservation fencing specifications.

Construction:

- Vegetation management including the removal of vegetation, and mulching of removed vegetation.
- Establishment/construction of any ancillary facilities, for example, site compounds, accommodation facilities, upgrades to the operations base at Yathong Quarters.
- Construction of access trails to allow long-term maintenance for conservation fence, fire, feral animal and weed control, and program management. This will include the implementation of an erosion and sediment control plan and the standards identified in the Rural Fire Service's *Fire trail design, construction and maintenance manual* (SCS 2017).
- Construction of feral predator–free area fences, connection to solar array, vehicle gates etc.

Post-construction/operation:

- Removal of feral predators, and feral herbivores to the greatest extent practicable, and to ensure no significant ecological impact.
- Reintroduction of locally extinct, threatened and declining animal species (note this is not specifically assessed in this REF as it will be subject to further assessments via future translocation proposals).
- Monitoring, evaluation and reporting on species, threats and ecosystem health.
- Ongoing maintenance of the conservation fence and park management activities.

7.2.2 The activity footprint (size of the area of impact)

The total footprint of the proposal is 191.61 ha which is split into several activities as discussed below and shown in Table 4.

- The perimeter of the feral predator–free area fence will be approximately 104.15 km in length and include a 15 m cleared corridor around the conservation fence line (7.5 m either side). The gives a total footprint of approximately 155.73 ha, which includes the removal of 129.22 ha of native vegetation. This proposal also includes some ancillary works associated with the construction and operation of the fence line including access tracks around the perimeter, temporary construction compounds and laydown areas, cleared asset protection (cleared corridor) to ensure tree falls do not damage the conservation fence. If works occur outside the activity footprint identified here, additional assessments and approvals will be required.
- Construction of the internal conservation fences within the feral predator–free area, on the Glenlea Fire Trail and Western Fire Trail, will be approximately 18.31 km long and include a 15 m easement giving a construction footprint of 27.47 ha. However, it is noted that this internal conservation fence will be located on the existing management trails and no further vegetation clearing (native or non-native) will be required.
- The construction of the additional accommodation facilities and upgrades to the operational base at the Yathong Quarters as shown in Figures 6 and 7 will have a construction footprint of approximately 8.41 ha, which includes the removal of 8.19 ha of native vegetation for the additional accommodation facilities. Upgrades to the Yathong Quarters will be located in previously disturbed/cleared areas and therefore no vegetation clearing will be required.

Table 4 Summary of calculated construction activity footprint

Activity	Native vegetation clearing (ha)	Non-native and other areas (including roads) (ha)	Total footprint area (ha)
Conservation fence including 15 m corridor (which includes management trails)	129.22	26.51	155.73
Internal fence along existing management trail	0	27.47 (along access roads only)	27.47
Upgrade to operations base at the Yathong Quarters	8.19	0.22	8.41
Total	**137.41**	**54.2**	**191.61**

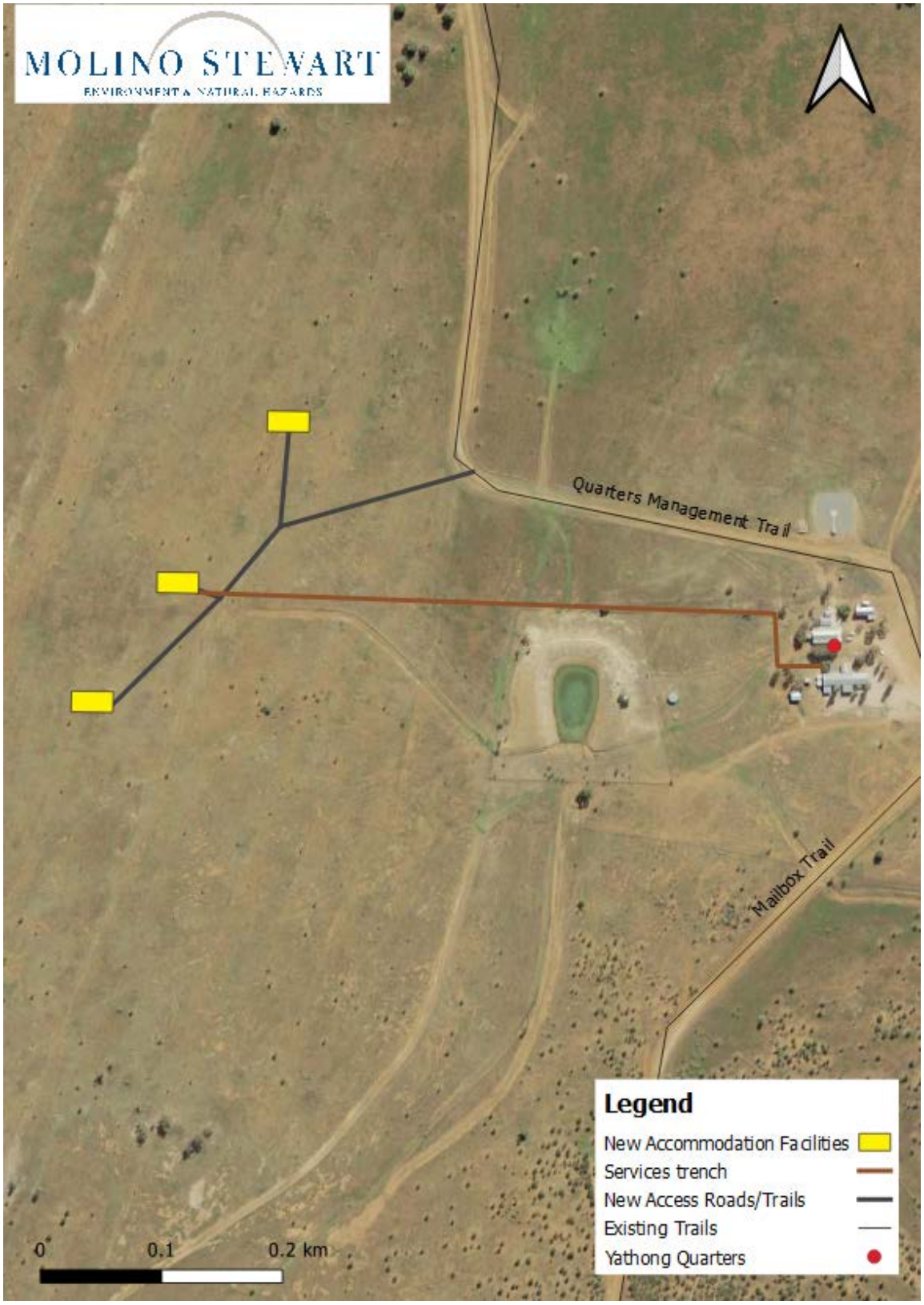

Figure 6 Location of the proposed additional accommodation facilities located at the operations base at the Yathong Quarters precinct within Yathong Nature Reserve

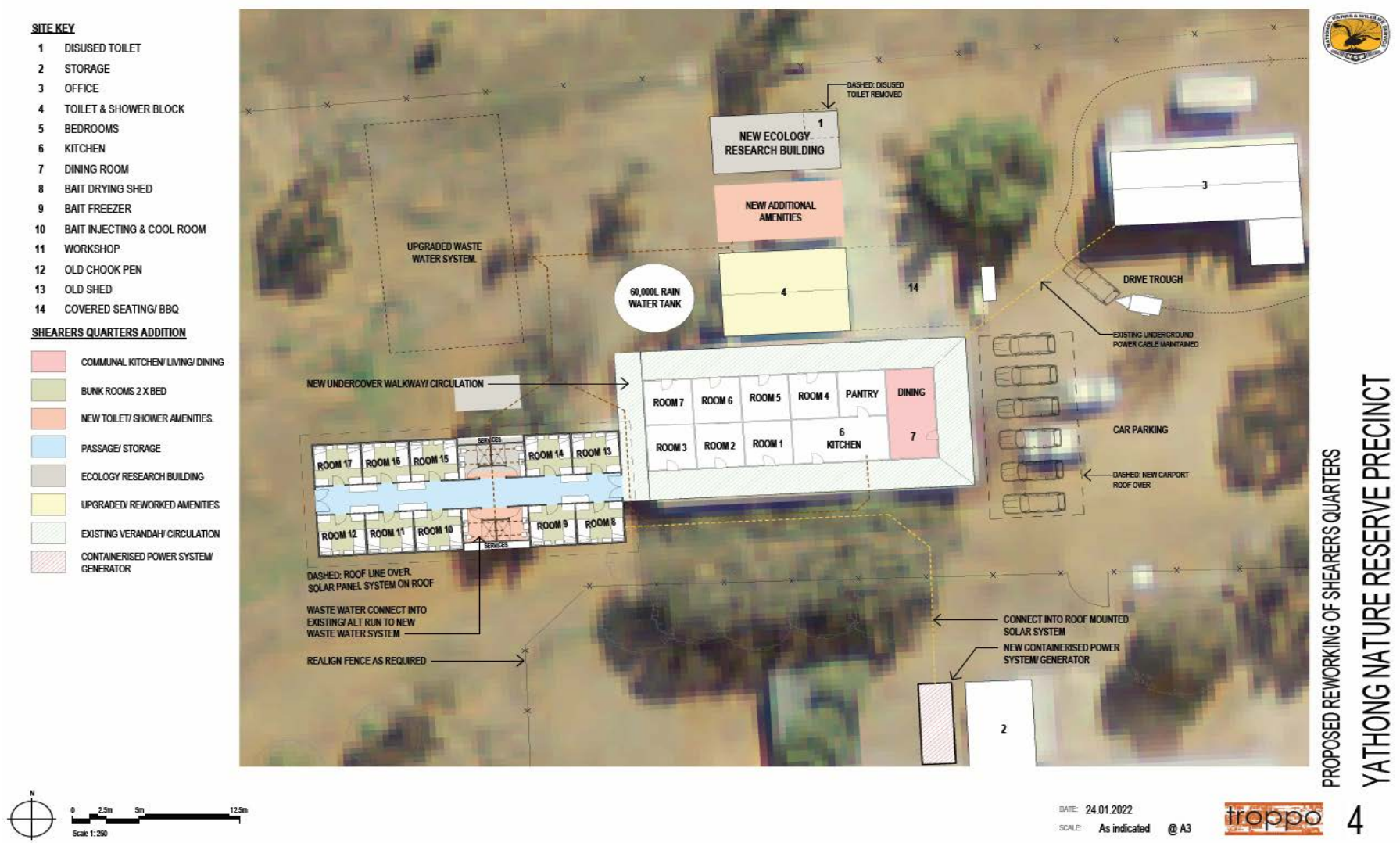

Figure 7 Proposed upgrades to the operations base at Yathong Quarters precinct

7.2.3 Proposed construction methods, materials and equipment

This section details the construction methodologies, materials and equipment which will be utilised for the project.

Vegetation management/clearing methodologies

The vegetation management will occur in accordance with the following specifications:

- A conservation fence line disturbance corridor of 15 m (7.5 m outside and inside the conservation fence) will be cleared of all vegetation using linear strips along the edge of existing roads and trails.
- A pre-clearing inspection should be completed by a suitably experienced and qualified ecologist prior to any clearing. Any identified fauna should be relocated. Proposed clearing limits and areas should be verified prior to clearing.
- Vegetation removal will use a combination of D6 bulldozers and forestry and finishing mulchers, to remove trees with a diameter at breast height (DBH) of less than 20 cm.
- **Hollow-bearing trees** will be removed under the following guidelines.
    - Hollow-bearing trees to be removed will be clearly marked.
    - Fauna should be removed passively (i.e. ushering) from the zone of disturbance prior to the entering of machinery.
    - When removing hollow-bearing trees, surrounding areas should be cleared, before inspecting the hollow with a camera if possible. If fauna is present, the tree will be left for one night to allow the fauna to move on before being felled.
    - Following felling, hollows and the surrounding area are to be checked again to ensure no trapped or injured fauna are present.
    - Trees should be shaken by being tapped by an excavator or similar prior to felling in an attempt to scare fauna from hollows.
    - If the tree is being removed in stages, the hollow-bearing branch should be the last to be removed.
    - Trees should be felled in a manner that avoids disturbance to surrounding vegetation.
    - The removal of hollow-bearing trees will be avoided altogether where possible.
    - An ecologist will be on site during the removal of hollow-bearing trees.
- Dangerous or overhanging trees or branches within 20 m of the conservation fence will be assessed, and potentially trimmed to avoid potential future impacts on conservation fence integrity.
- All remaining vegetation within the conservation fence corridor clearing footprint is to be mulched and spread across the corridor to reduce soil erosion potential. However, this should be avoided in or directly adjacent to waterways/drainage lines to avoid the mulch from being washed away, or any tannin leachate related water quality issues. Areas with weed infestations are not to be used for mulch generation and reuse.
- Where possible, stumps will be mulched to ground level rather than being ripped and removed.
- Mallee roots will be removed and mulched, with the material used to backfill the hole caused from the stump removal. Herbicides may be used as part of the ongoing vegetation maintenance works.
- There will be no windrows left along the conservation fence line corridor.

Conservation/internal fence construction methodologies and design

As shown in Appendix D, the proposed conservation fence would be 1.8 m high, with a floppy top and 2 hot (electric) wires. In addition, the conservation fence has 2 'skirts' that lay flat on the ground on the inside and outside of the conservation fence, extending 450 mm and 300 mm respectively. The bulk of the conservation fence is constructed from netting, with 30 mm aperture on the lower section and 40 mm on the upper section. The smaller holes on the lower section are designed to prevent juvenile rabbits entering the feral predator–free area (see diagram in Appendix D). The top 2 sections of netting that would be installed on the conservation fence will overlap (as opposed to being 'butt-joined') to improve the strength across the join (see diagram in Appendix D). There would be a second overlapping section extending up from the base (the area most subject to macropod impact).

Upon completion of vegetation clearing for the conservation fence, strainer assemblies will be installed at corners. Strainers will consist of posts and rails and be designed as bases for wire tensioning.

A single plain wire will be installed at ground level to provide a sight line for the installation of pickets and intermediate posts.

Intermediate posts (posts 1.8 m above ground level, 80 mm nominal bore) will be spaced every 400 m, or where extra strength or support is required. Intermediate posts will be concreted into the ground.

Pickets (1.8 m above ground level) will be spaced every 5 m. Pickets will be installed mechanically, using a post knocker that will ram them to a depth of 600 mm. Following installation of posts and pickets, 6 horizontal plain support wires (2.5 mm diameter) will be strung, spanning the height of the conservation fence (making a total of 7 horizontal plain wires, including the sighter wire). The plain wires will be tensioned back to the strainers, and tied off to the pickets using tie-wire. Hot wire 'stand-offs' will then be installed. The stand-offs are 160 mm long rods that support the electric wires and keep them clear from the body of the conservation fence to prevent shorting out. The stand-offs will be bolted to the pickets at 1,000 mm and 1,300 mm above ground level. Insulators will be fitted later in the construction process. Netting will then be installed.

Three rolls of netting (all 1.4 mm gauge) are used:

- 1,800 mm wide roll for the upper vertical section, including the 600 mm floppy top (40 mm aperture)
- 1,200 mm wide roll for the lower vertical section and external skirt (30 mm aperture)
- 900 mm wide roll for the lower section and internal skirt (30 mm aperture).

Netting is connected to the plain support wires using 'c-clips' that are installed using pneumatic guns. At this point, lengths of 3.15 mm plain wire will be threaded in the netting that forms the floppy top to help hold its shape so that it is effective in excluding any feral animals that climb the conservation fence. These will be installed at every picket, and 2 between pickets.

Electric wires will then be installed, threaded through insulators on the stand-offs, and connected to a solar-powered electric conservation fence energiser. Two energisers will be installed at diagonally opposite sections of the conservation fence to ensure consistent voltage is maintained around the perimeter.

Two sliding gates and 8 swing gates will be installed at strategic locations on the conservation fence perimeter to enable vehicle access as shown in Figure 4. The proposed gates are a combination of sliding and swing gates that will have the capacity to open 180 degrees and have a metal post running along the base of the gate frame or roll-on tracks set into a concrete plinth (Appendix D). The gates will have a fixed-angle top to prevent feral incursions. All gates will be padlocked (keyed alike). The gates will mostly be located at the

intersection of roads, trails, corner points or other suitable areas. Two additional gates will be installed to the Stage 1 area, however, this has not been assessed in this REF.

There will be minor variations in the conservation fence design through construction to accommodate local variances in terrain (such as distance between posts and pickets) or where the fence crosses ephemeral watercourses.

A diagrams illustrating the design for the conservation fence and gates is provided in Appendix D.

Management/fire trail construction methodologies and design

Management/fire trails will be constructed and upgraded to enable access for the construction and ongoing management of the conservation fence. The conservation fence will be in the centre of the 15 m cleared corridor, allowing 7.5 m on the inside and outside of the conservation fence.

A network of fire trails will be constructed on the inside of the conservation fence, within the 7.5 m cleared corridor. The trails will be constructed in accordance with the Rural Fire Service (RFS) *Fire trail design, construction and maintenance manual* (SCS 2017) and the RFS *Fire trail standards* (RFS 2016). Most trails will be constructed to a Category 1 standard, however some trails may be constructed to a lesser standard to be determined by additional risk assessments and during detailed design. Design standards for Category 1 trails are detailed below and also detailed in Section 7.2.5:

- minimum of 4 m in width, with 4 m in vertical clearance
- minimum inner radius of 6 m at curves
- grade of less than 15 degrees
- crossfall of less than 6 degrees
- passing bays every 250 m, that can be either:
  - widened section of 6 m width and 20 m length
  - turnaround, as below
- turnarounds, consisting of a turning circle of a 22 m diameter.

Passing bays and turnarounds will accommodate existing trail intersections where possible.

Where the fire trails cross any waterways or drainage/hydro lines, appropriately designed creek crossings will be installed, such as box culverts. The general construction methodology for a culvert is as follows:

- The exposed creek will allow for the lead project officer to determine the natural flow regime and determine the most appropriate location of the culvert.
- Test the streambed to determine the proximity to bedrock and the amount and size of sterile imported quarry rock necessary to sit the culvert piping on.
- Install a coffer dam to prevent inundation of the worksite.
- Excavate the stream bed (minimal required to achieve 10% submersion of culvert pipes below streambed) to make space for the fill in which the culvert will sit.
- Excavation should follow the existing stream bed gradient to ensure that excess build-up of sediment and debris do not occur inside of the culvert.
- Spread crushed rock over the bottom of the streambed and compact.
- Place culvert pipe with 10% of diameter below streambed (to allow for any potential fish movement).
- Install pre-cast concrete headwalls in streambed to protect the upstream and downstream fill batters surrounding the culvert pipe.

- Backfill and compact around the culvert with ~20 mm crushed rock.
- Pipe outlets should discharge onto stable surfaces. Scouring at the pipe outlet should not undermine the crossing structure or initiate gully erosion.
    - Install rock ~500 mm and geotextile at inlet and outlet of culvert for scour protection.
    - Install ~500 mm rock or aggregate where necessary to armour unstable areas and mitigate for potential batter collapse.
- Remove coffer dam and install temporary sedimentation and erosion control measures.

7.2.4 Ancillary facilities to support construction and operation

The proposal involves the establishment of ancillary facilities to support the construction which is detailed below and also shown in Figures 6 to 7.

- Construction of additional staff accommodation approximately 500 m west of Yathong Quarters, including the access roads, carparking, rainwater tanks, wastewater management systems and other miscellaneous ancillary facilities as shown in Figure 6. Subject to final design, there will be 3 separate accommodation blocks, each consisting of approximately 3–5 bedrooms, amenities, kitchen and laundry facilities. Electricity will be provided to the additional accommodation facilities via an underground service which will be trenched and installed from the Yathong Quarters. The additional accommodation facilities will support the project during both the construction and operational phases. The construction of the additional accommodation facilities and the installation of services will require up to 8.19 ha of native vegetation (grassland) clearing which is further detailed in Section 9.1.7.
- Upgrades to the operations base at the Yathong Quarters precinct will be required and will include the establishment of the additional accommodation facilities, a new ecology/research building, new amenity blocks, rainwater tanks, upgraded wastewater system, services/utilities installation/upgrades, laydown/storage/stockpile areas and any other minor ancillary works as shown in Figure 7. Where possible and safe to do so, the existing structures will be utilised in preference to the construction of new structures. If new structures are required, they will primarily be modular construction (containerised) and transported in and installed upon footings. The operations base at the Yathong Quarters precinct will also be used to store plant, equipment and materials required for the project. The upgrades to the operations base at the Yathong Quarters will support the project during both the construction and operational phase. This will not result in any additional vegetation clearing, that is, the works are located in areas which have previously been disturbed.
- During the construction phase of the project, smaller ancillary compound/laydown/stockpile areas may be established along the conservation fence alignment. These areas will be located within the 15 m cleared corridor along the conservation fence line which will already be disturbed for construction of the conservation fence. Additional locations for ancillary facilities may be utilised pending further assessment and approval from NPWS. These additional locations should be located in areas which do not have any native vegetation and have minimal/negligible environmental impact, as determined by NPWS.
- Surveillance and monitoring equipment will also be installed within the fenced area and in other parts of Yathong Nature Reserve.

Any of the above structures will be constructed in accordance with the department's *Construction assessment procedures* and NPWS *Park facilities manual* (NPWS 2016) and associated policies, and be a colour which is sympathetic to the natural setting.

Some of these ancillary facilities may also be required during the operational phase to complete maintenance/repairs, however it is expected to be on a smaller scale compared to the construction phase.

7.2.5 Construction and maintenance of management/fire trails

There are several management trails within the proposed feral predator–free area which will typically be used during construction and operation of the project. These are outlined below and also shown in Figure 3.

- Glenlea Fire Trail and the Western Management Trail which are Category 1 strategic trails which is the standard required by the Rural Fire Service (RFS) to support response to fires
- Red Tank West Fire Trail, Glenlea Homestead Fire Trail and 10 Mile Tank Management Trail which are Category 7 tactical trails
- Burglars Dam Management Trail and another unnamed management trail which runs north approximately 7 km off the Gleanlea Fire Trail about 5 km west from the south-west boundary – these fire trails are dormant
- There are also various additional tracks, which vary in condition, located throughout Yathong Nature Reserve as shown in Figure 3.

In addition to the existing trail network as detailed above, the project will require 28.8 km of new trails to be constructed, and 75 km of existing trails to be upgraded to facilitate the construction and maintenance of the conservation fencing, land management (particularly feral animal eradication and ongoing control), fire management and science activities within the feral predator–free fenced area as shown in Figure 8. This includes:

- the construction of a new trail which runs parallel to Yathong Road with a 28.8 km distance and a width of 15 m – this will fall within the same 129.22 ha native vegetation clearing footprint that aligns with the conservation fence
- maintenance and upgrade of 75 km of existing fire/access trails including the Northern Boundary Fire Trail, Western Boundary Fire Trail and South-West Boundary Fire Trail – these will fall within the same 129.22 ha native vegetation clearing footprint that aligns with the conservation fence.

All proposed new track locations have been selected to minimise impacts to environmental and cultural values, and specifically to threatened plants, and to make as much use of existing cleared areas and previously existing tracks as possible. As detailed in Section 10.2, minor adjustments to the conservation fence alignment to avoid areas of native vegetation, large native trees or any other environmental constraints should be undertaken wherever practicable.

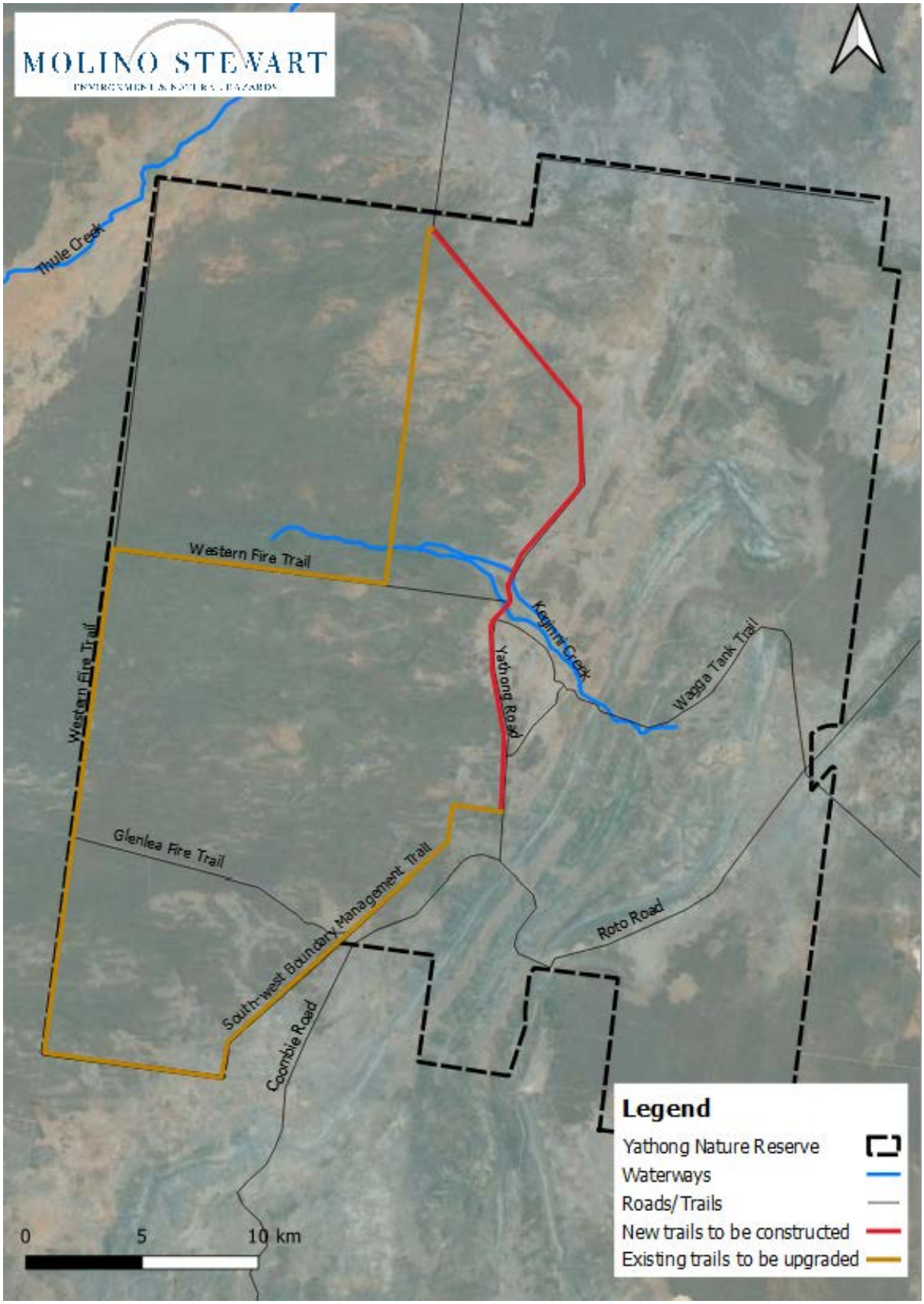

Figure 8 Location of the new management/fire trails to be constructed, and the existing management/fire trails to be upgraded within Yathong Nature Reserve

7.2.6 Eradication of feral predators and feral herbivores from proposed feral predator–free area

The eradication of feral predators and feral herbivores (to the greatest extent practicable) within the proposed feral predator–free area will be delivered through intensive feral animal control programs informed by a comprehensive monitoring program. The feral animals known to be in the area are cats, foxes, wild dogs (*Canis lupus* subspp.), goats, pigs, rabbits and hares (*Lepus capensis*).

These works will be documented in a future feral animal management plan. All feral animal control programs will be consistent with the NSW *Codes of practice and standard operating procedures for the effective and humane management of pest animals* (DPI 2022), Invasive Animal CRC standard operating procedures and NPWS standard operating procedures (including those for pesticide use) and the NPWS Firearms management manual.

Feral animal control plans will use a range of conventional techniques including trapping, shooting and baiting, in accordance with relevant codes of practice (including animal welfare requirements) and the EPA / APVMA permits. Experimental and emerging techniques will be considered and deployed if appropriate. As detailed below, the eradication of feral predators and herbivores will be completed in 2 phases progressively across each of the compartments commencing with the Stage 1 release area, then associated compartments – south, north and central.

Phase 1

A monitoring program will be implemented, consisting of remote camera traps deployed in an array throughout the feral predator–free area, and sand plots on tracks. Eradication effort and impact will be recorded and, together with the data from the monitoring program, the results will be used to refine the eradication program. Monitoring will be carried out prior to and ongoing throughout the Phase 2 control program.

Before the gates of the feral predator–free area are closed, fodder may be provided in strategic locations outside the conservation fence to attract as many animals away from the conservation fence as possible. Consultation with the relevant landowners will be conducted where fodder is placed on, or within the vicinity of private properties. The initial program to be implemented will be the control of rabbits. Rabbits are a food source for cats and foxes. Removal of this food source will ensure that feral predators are more likely to be interested in baits and attractants. NPWS will use a variety of best practice techniques to control rabbits (and eradicate where possible). Immediately prior to the conservation fence being closed, rabbit baiting will commence – using Pindone and/or 1080 treated oats and carrots. Rabbit haemorrhagic disease (and subsequent variations of rabbit biological control agents) will be used where conditions at the time of eradication permit.

Control of rabbits will be conducted until the rabbit numbers are at ecologically insignificant numbers, where their impacts are unlikely to be significant. NPWS has developed a draft ecological health monitoring framework for this site (DPE 2022a) which will provide an ongoing means of assessing rabbit activity (number of records per monitoring site) and occupancy (proportion of sites with records) which are indicators of rabbit density.

Phase 2

Once the conservation fence is at ‘lock-up’ stage, intensive control of feral predators and feral herbivores will be conducted. The tactical deployment of eradication effort and tools will be modified in response to the information generated by the monitoring program. Typically, the eradication tools will include:

- ongoing regular spotlighting patrols – these patrols will be used for opportunistic shooting of feral herbivores and predators
- deployment of soft-jaw traps for feral cats, foxes and rabbits
- deployment of cage traps, using a variety of attractants to bring feral animals into the traps
- deployment of canid pest ejectors throughout the feral predator–free area, using a variety of attractants
- deployment of 1080 baiting through aerial and ground baiting programs
- pending activity records of feral herbivores, water and fodder points may be established inside the feral predator–free area to attract feral herbivores to allow more efficient removal
- traps – using 1080 treated grains or manufactured baits – will be deployed for feral pigs, pending numbers recorded through the activity monitoring
- use of cat-detection dogs
- use of cat trackers
- deployment of Eradicat (subject to permit approval).

Shooting (opportunistic or planned) will be conducted under shoot plans approved by NPWS and carried out by authorised personnel. Additional separate risk management documents are required for some techniques, including an authorised control officer risk assessment for poison baiting.

Verification of feral predator-free status

The proposed feral predator–free area will be monitored using remote camera arrays, sand plots, scat sampling, scent-detection dogs and spotlighting. Verification of feral predator–free status will be determined through assessing activity of feral animals over time. Where there has been no activity detected on camera or on sand plots for 2–3 months, an 'interim feral-free status' will be declared. To ensure all feral predators have been removed, intensive monitoring will continue for a further 2–3 months post 'interim feral-free status', after which the area will be declared 'feral predator–free'. Subject to the results of the monitoring, initial reintroductions may be conducted (possibly within holding pens) before the conclusion of the 4–6 month monitoring period, with released animals monitored intensively for survival. Once declared feral-free, regular monitoring for the presence of feral predators and herbivores will continue inside the conservation fence (using remote camera traps and sand plots on tracks) to ensure any incursions are detected. Patrols of the conservation fence line will identify any damages to the conservation fence allowing incursions, resulting in prompt repair. Any incursions will be responded to as per the feral animal management plan.

7.2.7 Removal of large macropods, and emu from feral predator–free area

Large macropods such as eastern grey kangaroo (*Macropus giganteus*), and possibly swamp wallaby (*Wallabia bicolour*) and emus (*Dromaius novaehollandiae*) within the feral predator–free area are a potential risk to the integrity and ecological function of the conservation fence. Released from predation pressure, macropods and emus inside the conservation fence are likely to increase unsustainably. Large numbers of macropods could also reduce the prospect of success for the reintroductions by impacting on vegetation (i.e. removing cover and/or food for reintroduced mammals). NPWS will monitor this macropod and emu pressure as per the draft overarching ecological health monitoring framework (DPE 2022a) and adopt an adaptive management approach within the feral predator–free area. If macropod control or relocation is required, NPWS will develop a macropod management

plan with welfare consideration in mind to assess options and inform preferred options to manage populations inside the feral predator–free area with best practices for animal welfare and relevant approvals.

7.2.8 Reintroduction / introduction / translocation of locally extinct animal species

The Yathong Nature Reserve site will support the reintroduction of up to 9 locally extinct species, including:

- burrowing bettong
- brush-tailed bettong
- western quoll
- greater stick-nest rat
- greater bilby
- Mitchell's hopping mouse
- bridled nail-tail wallaby
- western barred bandicoot / Shark Bay bandicoot
- desert mouse.

Detailed assessment and planning for these translocations will occur as part of a separate translocation proposal, as required under the *Translocation operational policy* (DPIE 2019a). The translocation proposal will require approval by the department and would include the details of any licensing required for the reintroduction. As such, the reintroduction of species has not been assessed in this REF.

7.2.9 Asset protection and strategic fire management to protect infrastructure

The protection of life and property, including community assets, from the adverse impacts of fire is a legislative requirement and the primary fire management objective of the NPWS.

Relevant bush fire risk management plans and reserve fire management strategies will be reviewed in order to ensure they adequately identify built and natural assets and prioritise strategies for their protection.

NPWS proposes the establishment of a strategic fire advantage zone (SFAZ) around the outside perimeter of the conservation fence. Fuel reduction within the SFAZ will aim to reduce the overall fuel hazard to below the rating of 'high' (the target for an SFAZ) with the intention of reducing the risk of fire within the zone and to assist with suppression of fires in this zone. This will be largely achieved by regular and ongoing mechanical works. The finalisation of these SFAZs is subject to the amendment of the Yathong Nature Reserve fire management strategy.

Reduction of fuels within the SFAZs can be achieved using both prescribed burning and the mechanical removal of ground debris, shrubs and sub-canopy trees. Further, the construction of access tracks and general removal of vegetation 7.5 m either side of the conservation fence will further reduce fuel load within the SFAZ.

The bush fire risk management plans and reserve fire management strategies will also be reviewed and used to establish asset protection zones (APZ) around the proposed additional accommodation facilities and the operations base at the Yathong Quarters. The APZs will be determined in consultation with the local bush fire management committee. For the purpose of this REF and determining vegetation clearing quantities, it is assumed that a 75 m radius APZ will be implemented around the additional accommodation facilities.

Reduction of fuels within the APZs can be achieved using both prescribed burning and the mechanical removal of ground debris, shrubs and sub-canopy trees.

A program of ecological and cultural burns will be carried out within the feral predator–free area prior to, during and following reintroductions. These burns will be planned to optimise outcomes from an ecological, cultural and safety perspective. Where possible, these will be designed to achieve mutual outcomes for community safety and biodiversity. The strategy will be based on tolerable fire intervals for species and ecological communities, with a number of overarching principles to ensure that a diversity of age classes / life stages of vegetation communities are present across the reserve.

7.2.10 Monitoring, evaluation and reporting

NPWS has developed a detailed draft overarching ecological health monitoring framework (DPE 2022a) which includes Yathong Nature Reserve (Appendix E). The draft framework will be used to guide how the NPWS will monitor, evaluate and report performance against the project objectives, outputs and outcomes identified for the Yathong feral predator–free area, over the short, medium and long term. The framework will also provide for continuous improvement and adaptive management to ensure that the best available evidence (including lessons learned from successes and failures) continues to inform the program.

Indicators are selected to monitor trends in:

- biodiversity indicators (including reintroduced species, extant species and habitat use)
- threat indicators (including feral predator and herbivore activity and abundance, macropods and rabbits)
- indicators related to ecological function and processes.

8. Reasons for the activity and consideration of alternatives

8.1 Objectives and reasons for the proposal

The primary objectives of the program are to:

- establish and maintain viable new populations of locally extinct species within the feral predator–free area
- maintain or improve the trajectory (as measured by population size, abundance, occupancy, or extent) of extant resident fauna (including threatened species) within the feral predator–free area
- improve ecological health / ecosystem function within the feral predator–free area
- eliminate (or reduce to ecologically insignificant levels) threats to reintroduced and extant resident fauna and their habitat.

In addition, Yathong Nature Reserve has an important role in increasing the awareness and understanding of threatened species, communities, threating processes and their management. This will be achieved through the development of visitor experiences but this is outside of the scope of this REF.

The value of the feral predator–free areas include that they will operate as anchors (foundations) supporting site-based and broader landscape-scale conservation by:

- preventing the extinction of highly threatened species which will not survive in the presence of feral cats and/or foxes
- providing secure long-term protection, and increasing the wild population, of species which are suppressed by cats and/or foxes
- restoring ecological processes through the return of digging mammals etc.
- enabling targeted interventions beyond feral animal control, as required
- through research and innovation, generating knowledge which can be applied to mitigate the impact of feral predators and other threats across the landscape (i.e. improve conservation outcomes ‘beyond the fence’)
- establishing insurance populations of threatened species until effective landscape control of cats and foxes is developed, without the risk of ongoing reinvasion. This will provide source populations to allow the restoration of populations, when feasible, across a landscape. Furthermore, this will allow an insurance population in the case of stochastic events.
- promoting public awareness of, and appreciation for, the value of native wildlife and conservation.

8.1.1 Reasons for the feral predator–free program

Scientific publications have established:

- Australia has the highest number of mammal extinctions in the world (Burbidge and McKenzie 1989; McKenzie et al. 2007).
- Over 30 mammal species are now extinct (>13% of all terrestrial Australian mammals) and another 60 listed as threatened (Woinarski et al. 2015; Legge et al. 2018).

- In NSW, 26 mammal species have become extinct since European settlement, and around 50–60% of surviving mammals are threatened with extinction.
- Predation by the introduced red fox and feral cat is the key driver in almost all of these extinctions, and in the ongoing decline of many extant species (Short and Smith 1994; Abbott 2011; Woinarski et al. 2015; Radford et al. 2018). Feral cats and/or foxes have been shown to have a significant impact on some bird (Garnett et al. 2011; Woinarski et al. 2017), reptile (Woinarski et al. 2018; Chapple et al. 2019) and amphibian species (Woinarski et al. 2020).
- The number of species considered at risk of extinction continues to rise (EPA 2018).
- Some monitoring programs indicating population reductions of >90% in multiple species over the last 2 decades, even in large conservation reserves (Woinarski et al. 2015). Most conservation reserves under current management will fail to conserve and recover such predator-susceptible species (Woinarski et al. 2018).
- The effective control of feral predators is essential for the recovery of many of our most threatened species, especially mammals and ground-dwelling birds.
- Despite current conservation efforts, there is no effective strategy for landscape-scale control of feral cats and landscape-scale fox control has mixed results (Radford et al. 2018).
- A number of species with a high to extreme susceptibility to predation are dependent on permanent and intensive predator control, and in some cases entirely dependent on feral predator–free safe havens (Legge et al. 2018; Radford et al. 2018).

There is strong scientific support for the establishment of feral predator–free areas using conservation fencing as an essential component of any overall strategy to prevent further extinctions and promote the recovery of our most susceptible species (Ringma et al. 2017; Legge et al. 2018; Legge et al. 2019). A network of these enclosures is necessary to complement the conventional reserve system and is required in the short to medium term to prevent extinction of predator-susceptible threatened mammal species (Legge et al. 2019).

Australian small to medium-sized terrestrial mammals have been in significant decline since European settlement some 200 years ago (Woinarski et al. 2015) and Central West NSW is no exception. The ecological importance of these mammals and the function they provide cannot be understated (Haouchar et al. 2016).

Feral predator–free areas have been identified as a key component in the conservation of mammals in Australia (Ringma et al. 2018). With pressures from feral predators increasing (Woinarski et al. 2017), creating a network of predator-free safe areas is the most effective and achievable tactic in the medium term (NESP 2018).

The establishment of a large feral predator–free site in the Central Mallee presents an opportunity to study the outcomes of such a project on a much larger scale. Such a location enables research that could prove critical in the long-term conservation of mallee vegetation, by providing opportunities to study this ecosystem in the absence of feral predators, providing a ‘reference site’.

8.2 Consideration of alternatives

8.2.1 Alternative sites

At a statewide scale, Central West NSW has been identified as a priority for the establishment of a feral predator–free area by the department to protect and restore extinct and extant populations of threatened mammals.

The assessment of potential sites has taken into account a range of factors including:

- land tenure, permissibility and reserve size
- topography (including drainage lines)
- access, management operations, facilities and constraints
- risk of stochastic events such as fire and flooding
- environmental, cultural and social values and impacts
- habitat suitability and condition for selected species proposed for reintroduction
- presence of easements, roads, and utilities
- level of support from adjacent landholders and the broader community.

A large number of reserves were considered and assessed under these criteria, including:

- Yathong Nature Reserve
- Nombinnie Nature Reserve
- Gundabooka National Park
- Dthinna Dthinnawan Community Conservation Area Zone 1 National Park
- Ledknapper Nature Reserve
- Pilliga West State Conservation Area
- Nocoleche Nature Reserve
- Paroo-Darling National Park and State Conservation Area
- Narran Lake Nature Reserve
- Macquarie Marshes Nature Reserve and State Conservation Area
- Culgoa National Park
- Kaputar National Park
- Goobang National Park
- Oolambeyan National Park
- Goonoo National Park and State Conservation Area.

An initial assessment identified Yathong Nature Reserve as a preferred site in the Central West. Consideration was then given to a range of factors (listed below) in selecting the final site:

- the number of native species that will benefit including:
    - the number of locally extinct species to be reintroduced (and the likely population size of each, based on the area and suitability of habitat at each site)
    - extant fauna that will benefit from feral animal removal
- establishment and maintenance costs (including perimeter length, topography, and management risks such as fire, vandalism, drainage / culverts and the timeframe for completion)
- the scale and quality of the visitor experience, including the location, natural setting and accessibility, together with the cost of implementing visitor programs
- environmental, cultural and social impacts associated with construction of the conservation fence and supporting ancillary infrastructure, including impacts on plant and animal species, ecological communities, connectivity, Aboriginal and historic heritage values and recreational use
- the anticipated extent of broader ecosystem restoration based on current condition and the benefits associated with the exclusion of feral animals, focussed management and reintroductions
- The view of stakeholders will be recognised and considered against these factors.

A draft new plan for the reserve, to replace the *Yathong Nature Reserve, Nombinnie Nature Reserve and Round Hill Nature Reserve plan of management* (NPWS 1996) was released for public comment in April 2021. This replacement plan would facilitate the establishment of a feral predator–free area and subsequent fauna reintroductions. It also incorporated Nombinnie State Conservation Area (a new park reserved since 1996). The replacement plan of management – the *Central Mallee reserves plan of management* (NPWS 2021b) – was adopted on 27 October 2021.

8.2.2 Alternative alignments and designs

The feral predator–free area is located to the west of Yathong Road and excludes the north-west section of the reserve which is currently being utilised for a cat research project. However, this area may be considered for future expansion of the feral predator–free area once the cat research project is complete.

Further to the above, consideration has been given to multiple alternative conservation fence alignments within Yathong Nature Reserve to avoid and minimise potential environmental, cultural and social impacts. The alignment within Yathong Nature Reserve was selected to maximise the size of the feral predator–free area while minimising environmental impacts and road constraints. In most locations, the alignment has been selected along an existing road/management trail to reduce vegetation clearing and overall environmental impact, with the exception of Yathong Road due to road reserve constraints. Alternative alignments would have resulted in a higher ratio of vegetation impacted to vegetation retained within the feral predator–free area.

8.2.3 Alternative construction and management options

Consideration has been given to options for reducing the overall impact of the construction of the conservation fencing, including reduced setbacks where possible and agreements with neighbouring landholders for ongoing access for maintenance. The proposed design involves an impacted corridor of 15 m in width. This allows for a Category 1 trail on both the internal and external sides of the conservation fence. This footprint cannot be reduced without significant sacrifices to access and park management activities, including fire management and to manage the risk of tree fall damage to the conservation fence.

The impact on the positioning of the conservation fence on the management trails was also considered. Regardless of whether the conservation fence is located in the centre of the trail, or on the side of the trail, a 15 m vegetation clearance area will be required. To maintain the formation of existing trails, it is preferred that the conservation fence is generally located on the side of management trails.

8.2.4 Taking no action

Yathong Nature Reserve was previously subject to significant levels of over-grazing from feral animals. This included impacts from goats, pigs and rabbits resulting in moderate to poor vegetation condition and minimal opportunities for seed germination and growth. The high abundance of feral predators, such as cats and foxes and prolonged drought cycles have impacted on the natural restoration of these ecosystems (Lunney 2001).

Since 2015, NPWS has put in considerable effort into the control of feral animals which has resulted in a positive vegetation response and an improved ecological function within Yathong Nature Reserve.

In addition to providing a platform for improved community engagement, education and compliance, the proposed activity will result in a conservation outcome that cannot otherwise be achieved.

8.2.5 Justification for preferred site

Yathong Nature Reserve was identified as providing, on balance, the best site for establishing a large feral predator–free area and reintroducing locally extinct native wildlife.

In selecting Yathong Nature Reserve, NPWS has taken into account a range of factors including size, habitat suitability, the number of species that will benefit, including the expected carrying capacity of the site for priority species, opportunities for public engagement, the cost and practicality of establishing, maintaining and operating a feral predator–free area, and other environmental and cultural impacts and benefits.

Yathong's feral predator–free area will deliver major benefits, including:

- return of locally extinct species
- an increase in populations of extant fauna threatened by cats and/or foxes
- improvement in ecological health through:
- removal of feral herbivores
- restoration of ecosystem processes such as digging and predation.

Other benefits of establishing feral predator–free fenced areas include:

- research opportunities to increase knowledge in long-term management of threatened species and populations
- unique opportunities to enhance the community's awareness and understanding of our threatened species, the factors impacting on them and the benefits of healthy native ecosystems
- exchange of animals between sites, to strengthen genetic diversity and contribute to threatened species conservation at a national scale
- opportunities to work collaboratively with Aboriginal traditional owners and communities on restoring Country.

9. Description of the existing environment

Yathong Nature Reserve is located within the Cobar Shire Local Government Area (LGA) in Central Western NSW. Yathong Nature Reserve was established in 1971 and with subsequent additions now covers an area of 115,604 ha and is managed by NPWS. The reserve is renowned for extensive areas of red dune plains, mallee, box woodlands, cypress and belah. Yathong also supports unique and in some cases threatened flora and fauna species, including ningaui (*Ningaui yvonneae)*, kultarr, malleefowl, mukarrthippi grass wren (*Amytornis striatus striatus*), wild lemon, sour bush *(Choretrum glomeratum),* wedding bush *(Ricinocarpos bowanii)* and yellow darling pea *(Swainsona pyrophila).*

The land use in the areas surrounding Yathong Nature Reserve consist of:

- Nombinnie Nature Reserve and Round Hill Nature Reserve immediately to the south-east
- native uncleared vegetation to the west and north (not part of Yathong Nature Reserve)
- lands which have been previously cleared and are now used for agriculture and rural residential purposes.

Access into Yathong Nature Reserve is via Yathong Road which is off Merri Road, Roto. There are number access tracks and management/fire trails throughout the reserve, some of which are not regularly maintained. Vehicular access is typically restricted to four-wheel drive (4WD) only, particularly during and immediately after periods of heavy rainfall.

9.1 Natural values

9.1.1 Geology, geomorphology and topography

Yathong Nature Reserve straddles the boundary of 2 major biogeographic regions: the Cobar Peneplain and the Murray Darling Depression (NPWS 2003).

The eastern section of Yathong Nature Reserve is located on the southern edge of the Cobar Peneplain. The Cobar Peneplain is a prominent topographical landscape based on Palaeozoic rocks, formed on the north-westerly extension of the Lachlan Fold Belt. It is easily distinguished from most of the surrounding bioregions, which are relatively flatter landscapes. During the Tertiary and Quaternary (50–60 million years ago), and possibly as recently as 5 million years ago, marine sediments were deposited in the Murray (Geological) Basin with the coastline being the south-western edge of the Cobar Peneplain. In the Quaternary, after these shallow seas receded, sands were mobilised by wind to form dunes and sandplains that advanced onto the peneplain.

The rolling downs and flat plains punctuated by stony ridges of the reserve are characteristic of the Cobar Peneplain landform. Bedrock is mainly of resistant Devonian rocks of quartzite, conglomerate and sandstone. Yathong Nature Reserve contains most of the Merrimerriwa Range which rises to 425 m above sea level at Mount Merri and is a major landscape feature in the area. The Keginni Range in the central southern area of Yathong is less prominent. Soils are sandy lithosols on the ridges and red earths and gravel on the lowlands.

The western part of Yathong consist of level to gently undulating plains of the Darling Depression within the Murray Darling Depression Bioregion (NPWS 2003). The landscape reflects the movement of shallow seas back and forth, which reworked the sandy surface sediments into the characteristic dunes and sandplains. Rock outcrops are absent in the Murray Darling Depression. The soils consist of brown calcareous soils, with Quaternary alluvial and aeolian (wind-blown) material forming flat plains of calcareous red earths and solonized brown soils overlain by dunes of silicious and sandy red earths. East–west dune fields to 10 m relief occur in the central western part of Yathong Nature Reserve. The dune fields were formed in previous, more arid climates and the lakes and depressions also indicate climatic change during the Quaternary with both pluvial and arid conditions.

9.1.2 Soil types and properties (including contamination)

The study area is defined by 7 NSW (Mitchell) landscapes which have been summarised below as also shown in Figure 9:

- **Ivanhoe – Nangara Sandplains** (Isp) – Located on the western boundary of Yathong Nature Reserve, with 2 isolated pockets towards the north-east. Soils in this landscape are described as solonized brown soils and texture-contrast soils on the plains. Deep calcareous red earths, red clayey sands, sandy earths, and red and brown sands on dunes. Swales with deep calcareous red earths and red texture-contrast soils. Non-cracking brown and grey clays in depressions.
- **Ivanhoe – Nangara Linear Dunes** (Ild) – Located in multiple pockets on the western side of Yathong Nature Reserve. Soils in this landscape are described as dunes of Quaternary sands with narrow to broad swales and sandplain, small depressions and channels. Deep calcareous red earths, loamy sand to red siliceous sand. Deep clayey sands, sandy earths, reddish-brown clay soils, red texture-contrast soils in swales and on sandplains. Solonized brown clay soils in sinks and channels.
- **Nymagee Downs** (Ngd) – Located towards the northern section of Yathong Nature Reserve. Soils in this landscape are described as shallow, stony, loamy and sandy soils on crests, deep, calcareous red earths and solonized brown soils with gilgai on plateau, grading to deeper acid, neutral or calcareous red earths and red texture contrast soils with hardpan down slope.
- **Waranary – Yathong Ranges** (Wyr) – This landscape stretches from the southern section of Yathong Nature Reserve to the north-east section and is comprised of strike ridges, rocky cliffs, and associated slopes. Soil in this landscape is described as sandy lithosols becoming deeper and better developed down slope, narrow valleys of red earths, incised drainage tracts with bare rock or sandy beds and levees.
- **Hillston Sandplains** (Hsp) – This landscape is limited to the south-east corner of Yathong Nature Reserve. Soil in this landscape is described as level to undulating sandplain of Quaternary aeolian sands and limited alluvium. Calcareous red earth and solonized brown soils with deep siliceous sands on hummocks.
- **Nymagee Sandplains** (Ngs) – This landscape is located in the south-eastern section of Yathong Nature Reserve. Soil in this landscape is described as level sandplains of Quaternary alluvium with low hummocky rises, isolated low rises of Silurian siltstone and sandstone. Calcareous red earths and solonized brown soils with hummocks of deep, red siliceous sands.
- **Buckambool – Jackermaroo Hills** (Bjh) – This landscape is located in a small section of Yathong Nature Reserve to the north-east comprised of strike ridges and rocky cliffs. Soil in this landscape is described as sandy and loamy lithosols on ridges grading to deep red earths down slope and in valleys. Incised drainage tracts with bare rock or sandy creek beds and levees.

Based on the above landscapes present within Yathong Nature Reserve, the following soil properties have been investigated:

- **Salinity** – Salinity maps (DPIE 2021e) detail that the overall salinity hazard within Yathong Nature Reserve is considered very low. This is shown in Figure 10.
- **Acid sulfate soils** – Acid sulfate soil maps (DPIE 2021b; DPIE 2021c) were reviewed and there are no known areas within Yathong Nature Reserve.
- **Erodibility hazard** – Modelled hillslope erosion risk maps (DPIE 2021f) identify that the Nangara Sandplains landscape in the western section of the Yathong Nature Reserve has a relatively high K-factor (0.06–0.08), meaning that soil properties have high potential for rill and gully erosion. However, the overall soil erosion risk (based on the revised universal soil loss equation), which takes into consideration annual rainfall, slope

steepness/length, ground cover etc. has determined that soil erosion within Yathong Nature Reserve is relatively low to moderate risk (between 0 and 500 t/ha/yr). This is shown in Figure 11. Soil erosion and sedimentation issues should be considered during design, construction and operation phases of the project.

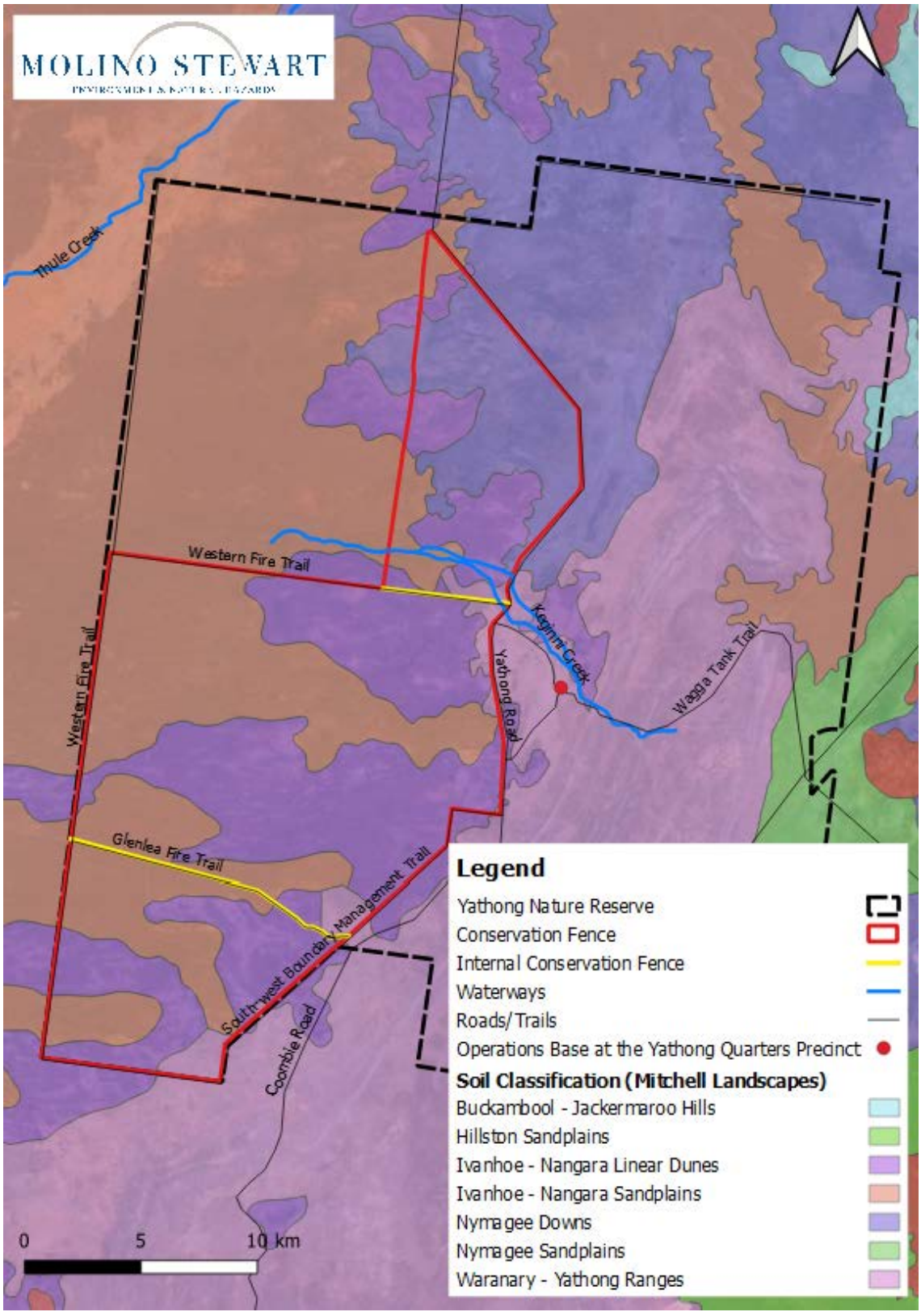

Figure 9 NSW (Mitchell) landscapes soil classifications within the Yathong Nature Reserve and surrounding areas (Source: SEED data portal)

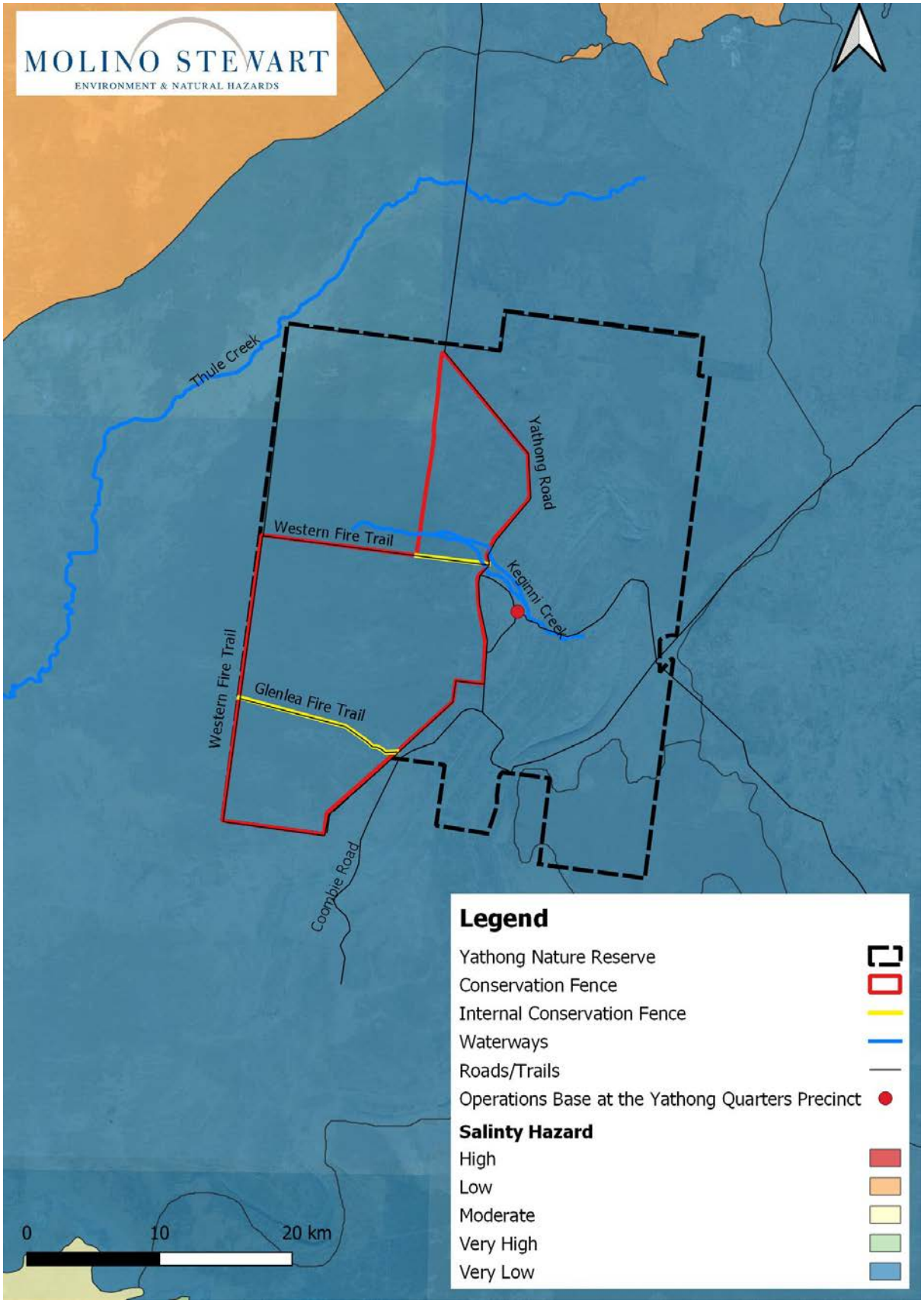

Figure 10 Salinity hazard within the Yathong Nature Reserve and surrounding areas (Source: SEED data portal)

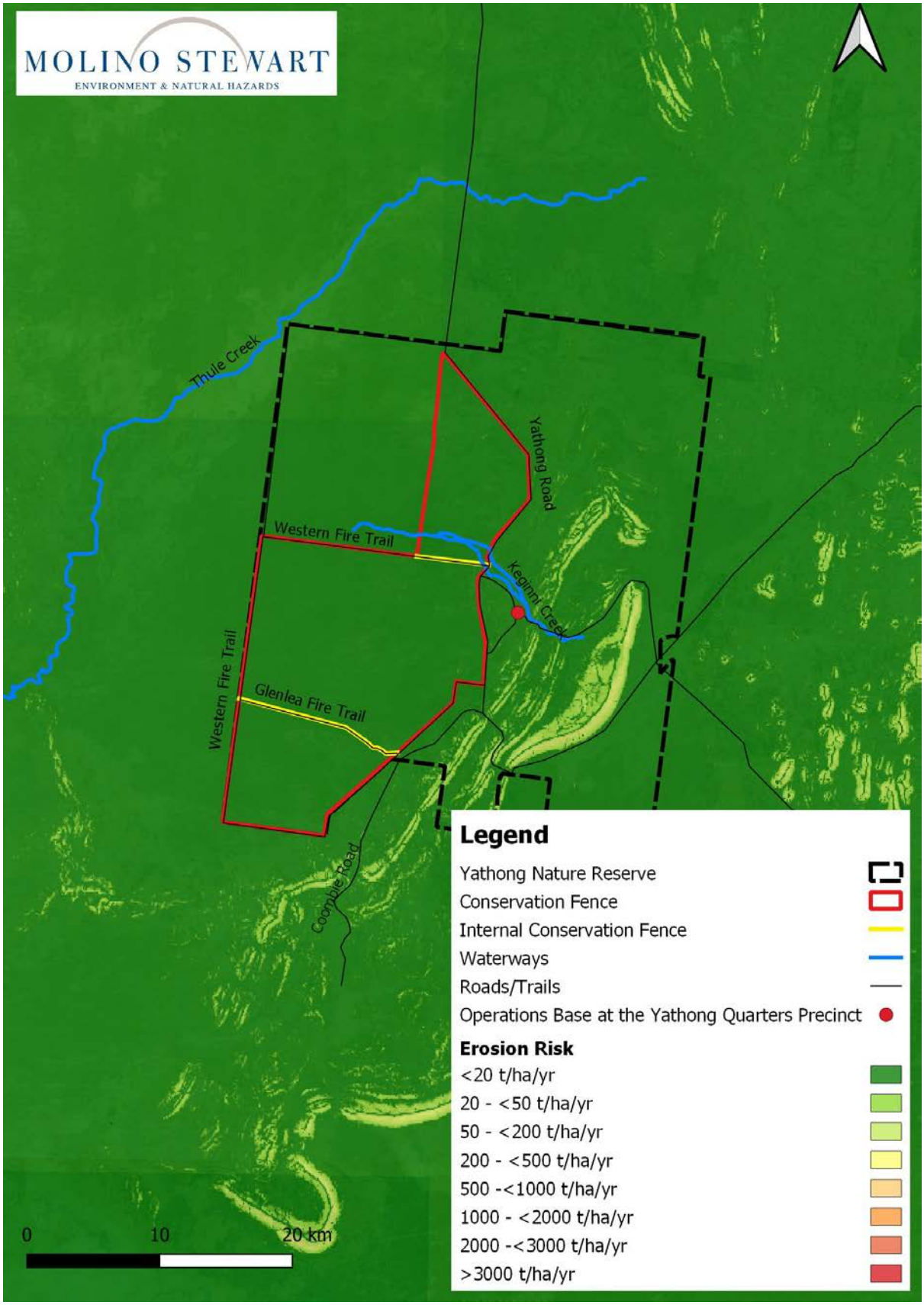

Figure 11 Modelled soil erosion risk within the Yathong Nature Reserve and surrounding areas (Source: SEED data portal)

A review of potential contamination sources within Yathong Nature Reserve was completed and has been detailed below.

- NSW EPA Contamination Land Record of Notices (EPA 2021) – There are no contaminated lands records within Cobar Shire or Carrathool LGAs.
- NSW Historical Imagery Database (NSW Department of Customer Service – Spatial Services 2021) – A review of historical imagery available from 1966 was reviewed which indicates that there has been no significant developments, land clearing or any other activities which may result in significant contamination.
- Sharing and Enabling Environmental Data in NSW (SEED) mapping for naturally occurring asbestos (see links to SEED data portal in the 'More information' section) – There is no known naturally occurring asbestos located within, or in the vicinity of Yathong Nature Reserve.
- A site inspection was completed on 21 February 2022 by Ryan Maxwell (Molino Stewart – Senior Environmental Consultant) (see Appendix E for Ryan's experience and qualifications) which identified a pile of crushed and broken up concrete was observed along Yathong Road as shown in Figure 12 and Figure 13. This appeared to be along or in the immediate vicinity of the fence alignment. The concrete pile was located on the western side of Yathong Road, immediately to the south of unnamed creek #1. While the source of the concrete is unknown, it may have originated from a previous causeway which crossed the Yathong Road. A visual inspection of the concrete pile did not uncover any indication of contamination (including asbestos), however this will need to be verified when/if the concrete pile is disturbed or removed during construction.

Figure 12 Concrete waste stockpile along Yathong Road near unnamed creek #1

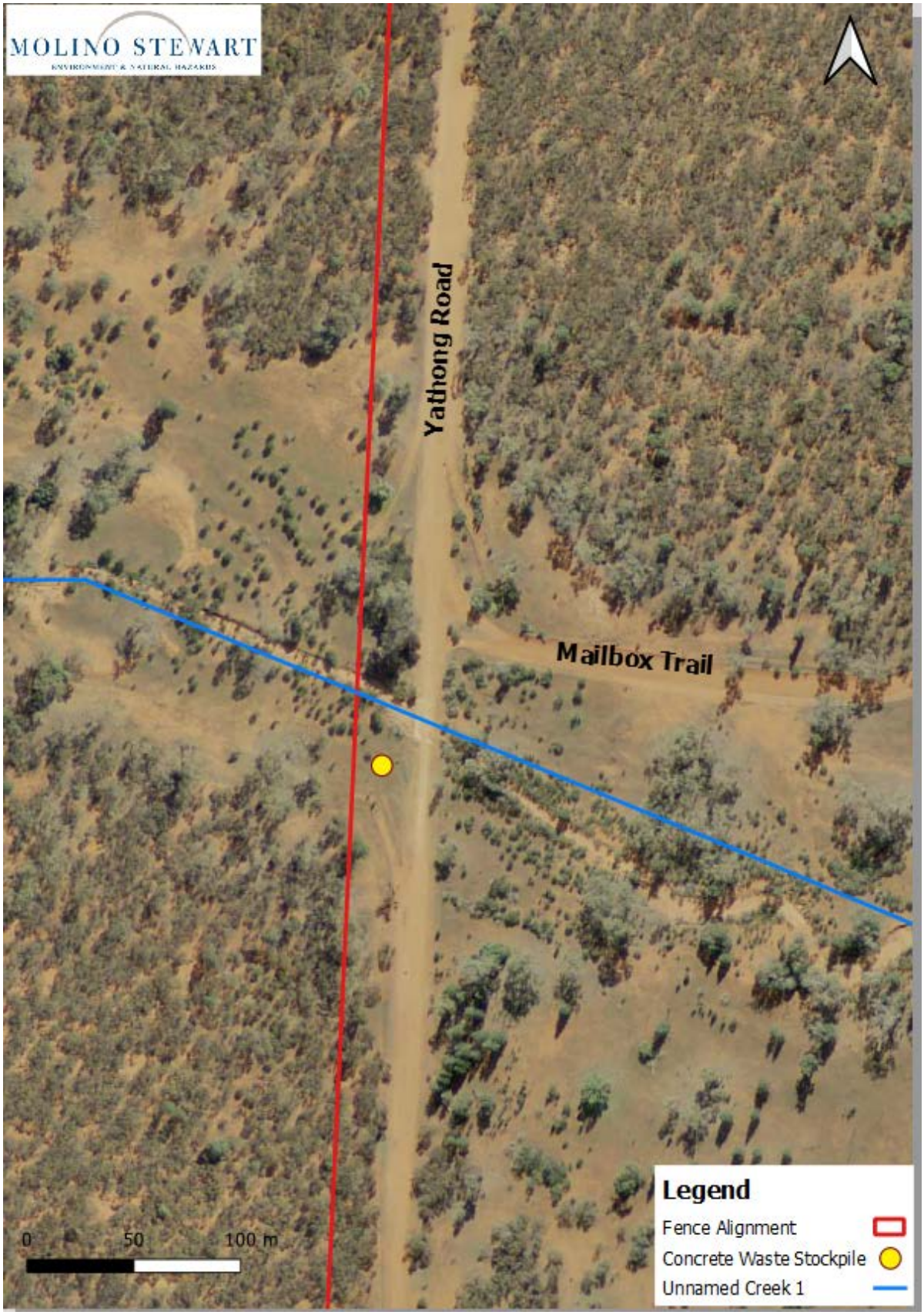

Figure 13 Location of the concrete waste stockpile along Yathong Road near unnamed creek #1

9.1.3 Watercourses, waterbodies and wetlands (including their catchment values)

There is a network of waterways located within the Yathong Nature Reserve which are described below. Relevant images are included in Figures 14 to 22 and Figure 23 shows significant waterways in the reserve.

- **Keginni Creek** – This creek is approximately 25 km in length and runs through the central region of Yathong Nature Reserve. It is considered an ephemeral waterway. There are a number of unnamed tributaries along its reach which are also considered to be ephemeral. Keginni Creek intersects the conservation fence and internal conservation fence in several locations. At all of these locations there is no defined bank profile, however there is a small but observable flow path which forms part of the larger floodplain/depression. During the site inspection on 21 February 2022, there was a small soak observed within the creek in proximity to the proposed conservation fence line. The location of Keginni Creek is shown in Figure 23, and an image in Figure 14. In accordance with the Strahler system, Keginni Creek is classified as a 4th order stream due to the large upstream network of minor ephemeral drainage/hydro lines. However, it is not mapped as key fish habitat on the DPI *Fisheries Spatial Data Portal*.

Figure 14 Location where the proposed conservation fence line intersects Keginni Creek

- **Unnamed creek #1** – This unnamed creek is located on the eastern side of the study area as shown in Figure 23. During the site inspection on 21 February 2022, there was no water observed 50 m either side of where the creek intersects with the conservation fence line, however, erosion and incised creek banks indicate that the creek flows during significant rainfall events (Figure 15). In accordance with the Strahler system, this unnamed creek is classified as a 3rd order stream due to a large upstream network of minor ephemeral drainage/hydro lines. However, it is not mapped as key fish habitat on the DPI *Fisheries Spatial Data Portal*.

Figure 15 Looking downstream (west) to where the proposed conservation fence line intersects with unnamed creek #1

- **Unnamed creek #2** – This unnamed creek is located on the southern side of the study area as shown in Figure 23. During the site inspection on 21 February 2022, there was no water observed 50 m either side of where the creek intersects the conservation fence line, however erosion and incised creek banks indicate that the creek flows during significant rainfall events (Figures 16 and 17). In accordance with the Strahler system, this unnamed creek is classified as a 2nd order stream. However, it is not mapped as key fish habitat on the DPI *Fisheries Spatial Data Portal*.

Figure 16 Looking upstream (east) to where the proposed conservation fence line intersects with unnamed creek #2 – significant erosion/deposition across the road and within the creek can be seen

Figure 17 Looking downstream (west) to where the proposed conservation fence line intersects with unnamed creek #2 – significant erosion/deposition within the creek can be seen

- **Unnamed creek #3** – This small unnamed creek is located on the southern side of the study area as shown in Figure 23. During the site inspection on 21 February 2022, there was no water observed 50 m either side of where the creek intersects the conservation fence line, however minor erosion and deposition was evident, indicating that flows are present during significant rainfall events (Figure 18). In accordance with the Strahler system, this unnamed creek is a 1st order stream. However, it is not mapped as key fish habitat on the DPI *Fisheries Spatial Data Portal*.

Figure 18 Looking downstream (north) to where the proposed conservation fence line intersects unnamed creek #3

- **Unnamed creek #4** – This unnamed creek is located on the southern side of the study area as shown in Figure 23. During the site inspection on 21 February 2022, there was no water observed 50 m either side of where the creek intersects the conservation fence line, however geomorphological features were observed including significant erosion/deposition, defined creek banks (incised in sections), sediment size variations and ripples as shown in Figures 19 and 20. Large woody debris was also observed which appears to have been snagged by existing vegetation during flows. Existing fence structures were present although significantly damaged from flood/flow events. In accordance with the Strahler system, this unnamed creek is classified as a 3rd order stream due to a large upstream network of minor ephemeral drainage/hydro lines. However, it is not mapped as key fish habitat on the DPI *Fisheries Spatial Data Portal*.

Figure 19 Looking downstream (north) near where the proposed conservation fence line intersects unnamed creek #4

Figure 20 Approximately 80 m downstream (north) from where the proposed conservation fence line intersects unnamed creek #4

- **Unnamed creek #5** – This unnamed creek is located on the eastern side of the study area, approximately 1 km north of unnamed creek #1, as shown in Figure 23. During the site inspection on 21 February 2022, there was no water observed 50 m either side of where the creek intersects the conservation fence line, however erosion and defined creek banks indicate that the creek flows during significant rainfall events (Figure 21 and 22). A twin pipe culvert has previously been installed under the road at this location. In accordance with the Strahler system, this unnamed creek is classified as a 1st order stream. However, it is not mapped as key fish habitat on the DPI *Fisheries Spatial Data Portal*. Note – The conservation fence will be located to the right of the twin culverts shown in Figure 21 and therefore will not provide fauna access into the feral predator–free area.

Figure 21 Looking upstream (east) to where the proposed conservation fence line intersects with unnamed creek #5

Figure 22 Looking downstream (west) to where the proposed conservation fence line intersects with unnamed creek #5.

- **Drainage/hydro-lines** – In addition to named and unnamed creeks detailed above, there is a network of unnamed surface water drainage/hydro-lines located throughout Yathong Nature Reserve. These are considered ephemeral and likely only flow during significant rain events. In many cases, these drainage lines flow into Keginni Creek. Some of these drainage/hydro-lines intersect the conservation fence alignment at various locations. During the site inspection on 21 February 2022, none of these drainage/hydro-lines (except for those detailed in Figure 23) had any observable geomorphological features (bank profiles, erosion, deposition, ripples etc.) suggesting the absence of any significant flows. In accordance with the Strahler system, these additional unnamed drainage/hydro-lines are generally classified as 1st or 2nd order streams, none of which are mapped as key fish habitat on the DPI *Fisheries Spatial Data Portal*.
- **Dams** – There are a number of man-made dams located throughout Yathong Nature Reserve which are likely remnant dams constructed prior to the establishment of the reserve. The conservation fence alignment does not intersect any of these dams.

As detailed above, there are a number of locations where the conservation fence alignment crosses a waterway, particularly Keginni Creek and unnamed creeks #1 to #5. The below considerations must be made to minimise impacts on these waterways.

- While the waterways are not classified as key fish habitat, the management/fire trails and conservation fence locations which pass through Keginni Creek and unnamed creeks #1 to #5 should be designed in accordance with the *Why do fish need to cross the road? – fish passage requirements for waterway crossings* (Fairfull and Witheridge 2003) to minimise overall disturbance to the waterway and to not block fish passage.
- The conservation fence and associated infrastructure should be designed to allow water to freely flow through and therefore not cause any flood related issues.
- Appropriate construction methodologies should be selected to minimise impacts on water quality, erosion and sediment control in accordance with *Managing urban stormwater: soils and construction* (Landcom 2004, also known as the ‘blue book’).

Yathong Nature Reserve is not located within a drinking water supply catchment area. There are no wetlands located within Yathong Nature Reserve.

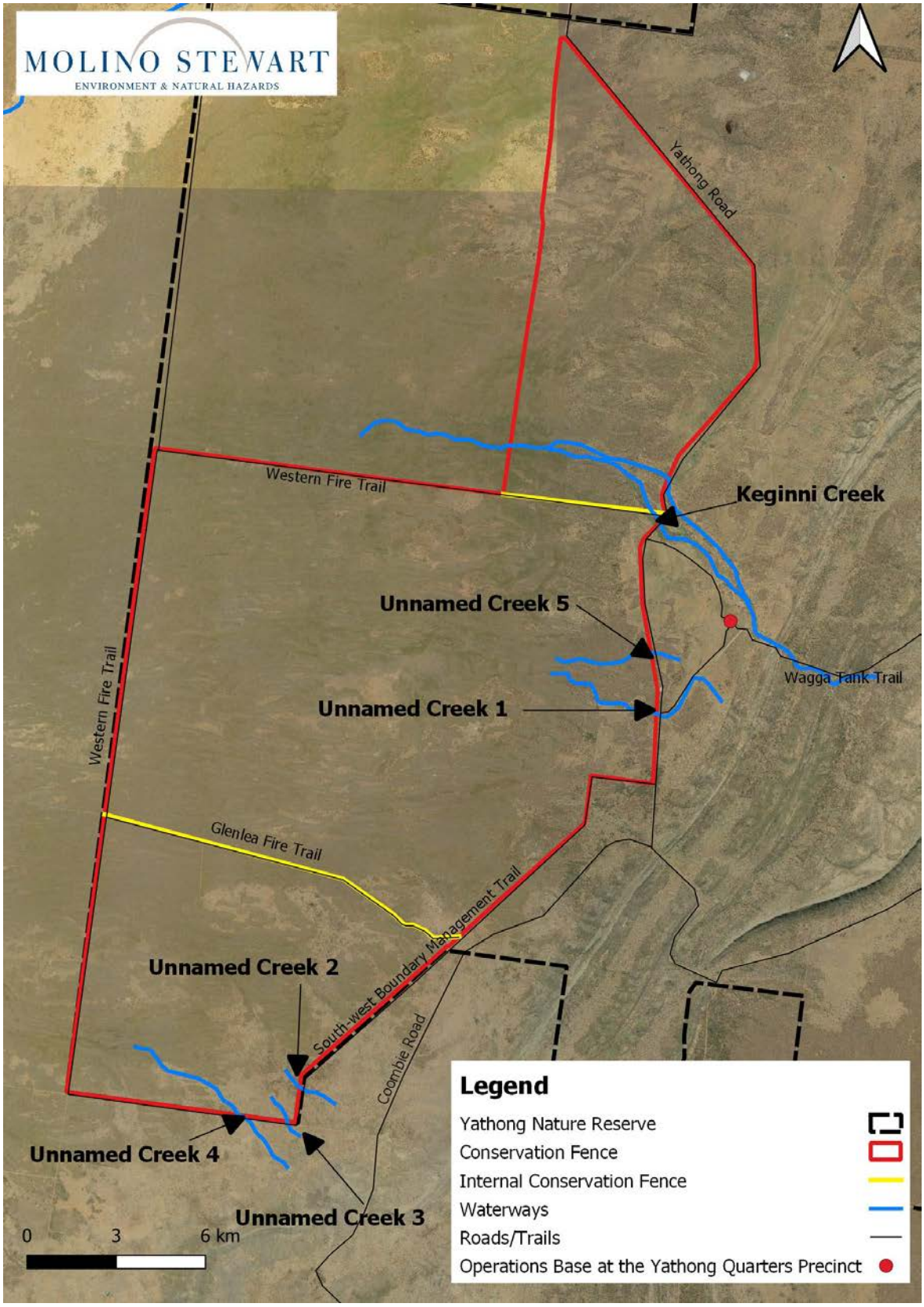

Figure 23 Waterways of significance within the Yathong Nature Reserve and surrounding areas

9.1.4 Climate

Yathong Nature Reserve has hot summers and cool winters. Based on the nearest reputable weather station at Cobar Airport (station number 048237), the mean maximum temperatures range between about 36°C in summer and 16°C in winter (Figure 24) (BOM 2021). The mean minimum temperatures range between about 21°C in summer and 3°C in winter (Figure 25) (BOM 2021).

Mean annual rainfall is 335 mm (BOM 2021). Rainfall, on average, is distributed throughout the year with a peak in the January and February, however, heavy rainfall events may occur at any time of the year (Figure 26). Wind is predominantly from the east to north-east in the mornings, and west to south-west in the afternoons as shown in Figure 27.

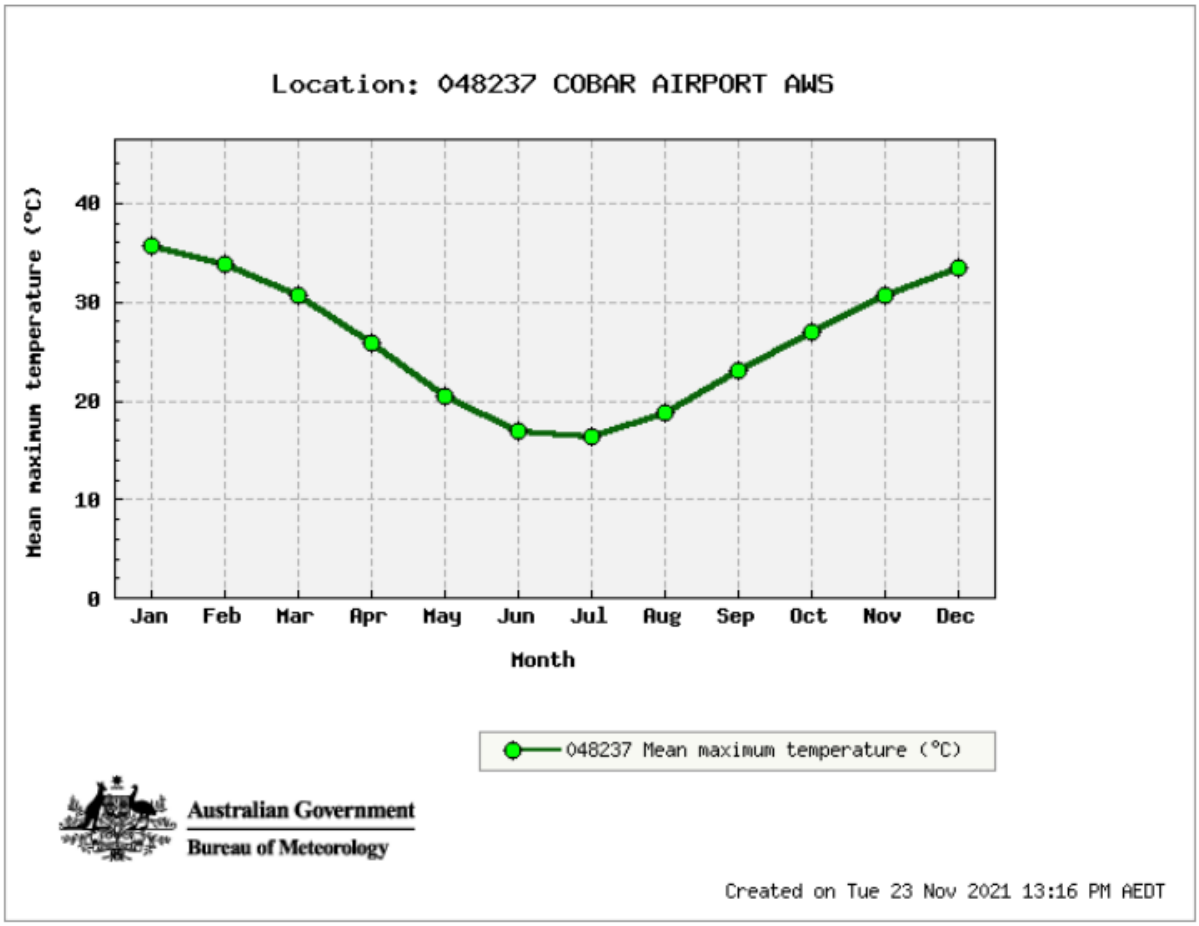

Figure 24 Monthly mean maximum temperature at Cobar (Source: BOM 2021)

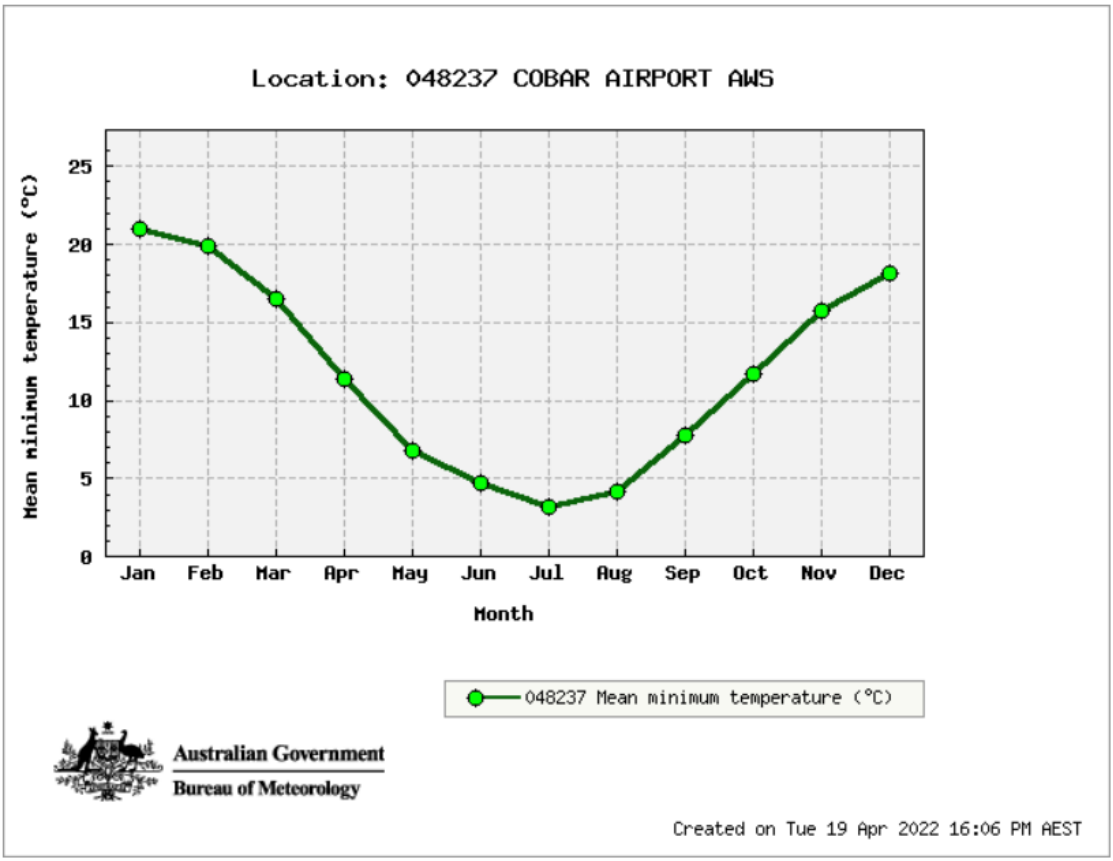

Figure 25 Monthly minimum temperature at Cobar (Source: BOM 2021)

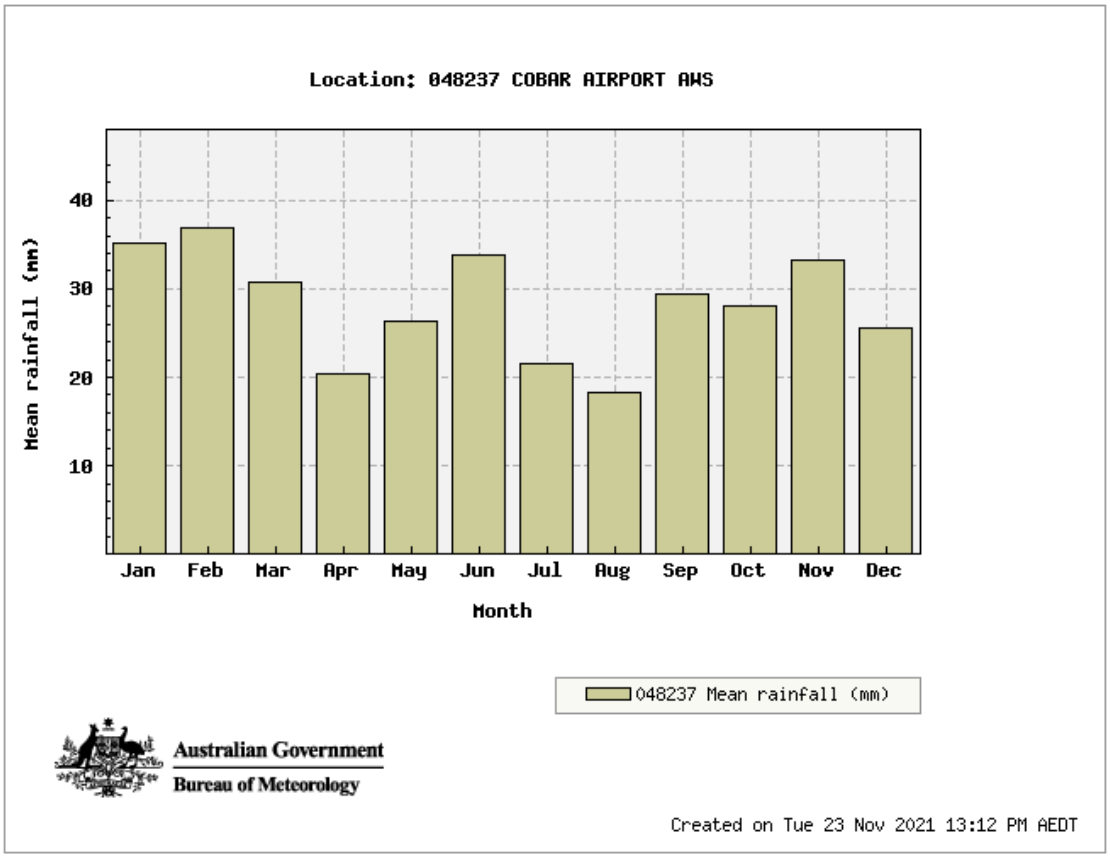

Figure 26 Monthly mean rainfall at Cobar (Source: BOM 2021)

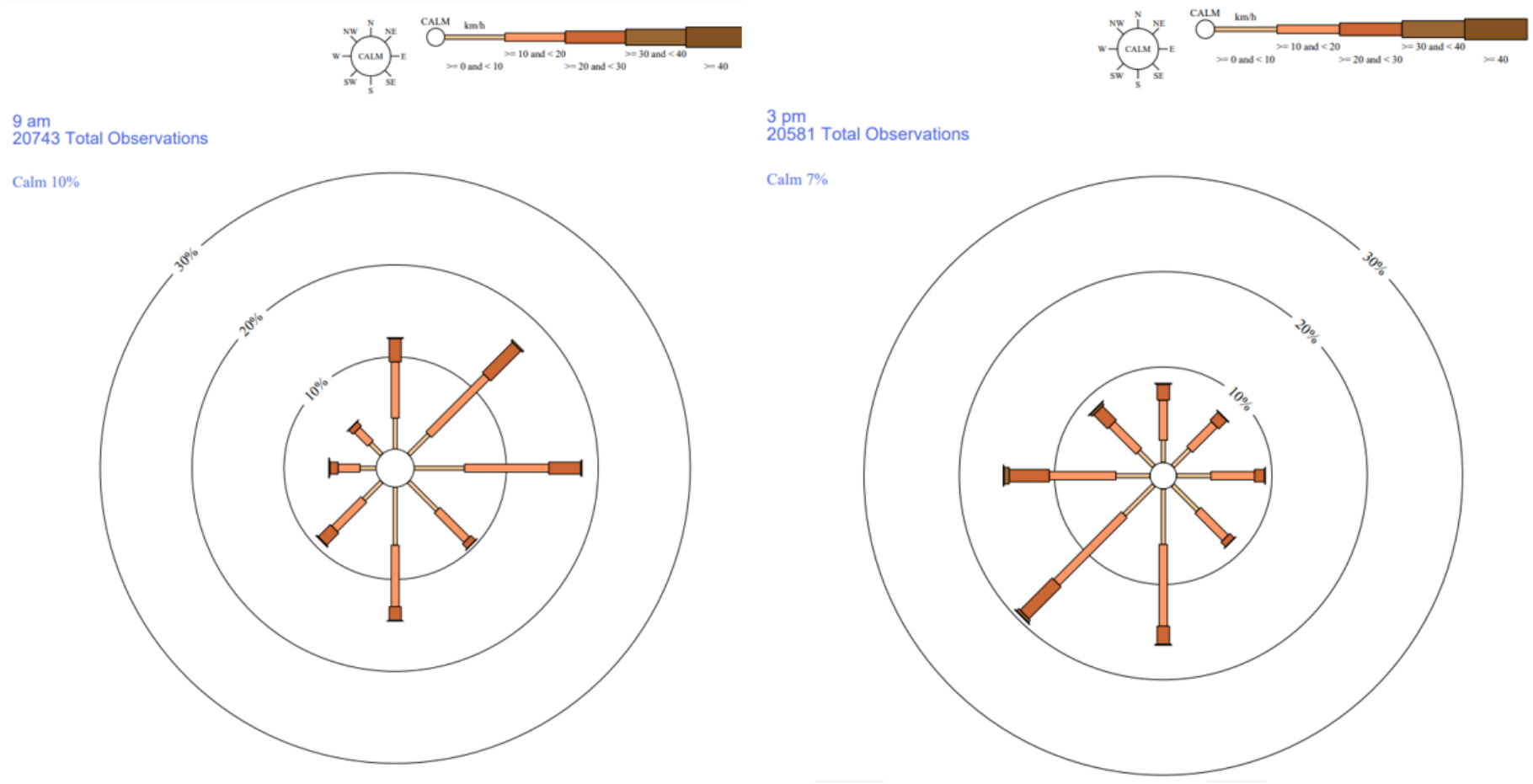

Figure 27 Annual mean wind strength and direction at 9 am (on left) and 3 pm (on right) at Cobar (Source: BOM 2021)

9.1.5 Coasts and estuaries

Not applicable as Yathong Nature Reserve is not a coastal area or in proximity to any estuaries.

9.1.6 Areas of outstanding biodiversity value or critical habitat

As detailed in ecological assessment report prepared by EcoPlanning for this REF (Appendix A), there are no areas of outstanding biodiversity value declared under the BC Act or critical habitat declared under the FM Act.

An asset of intergenerational significance (site AIS_E0_285) has been declared for the mukarrthippi grasswren which protects approximately 40 ha of sandhill complex in the central western part of the proposed feral predator free area (Figure 28). The fence alignment and disturbance area will not enter the asset area and therefore no impacts are anticipated.

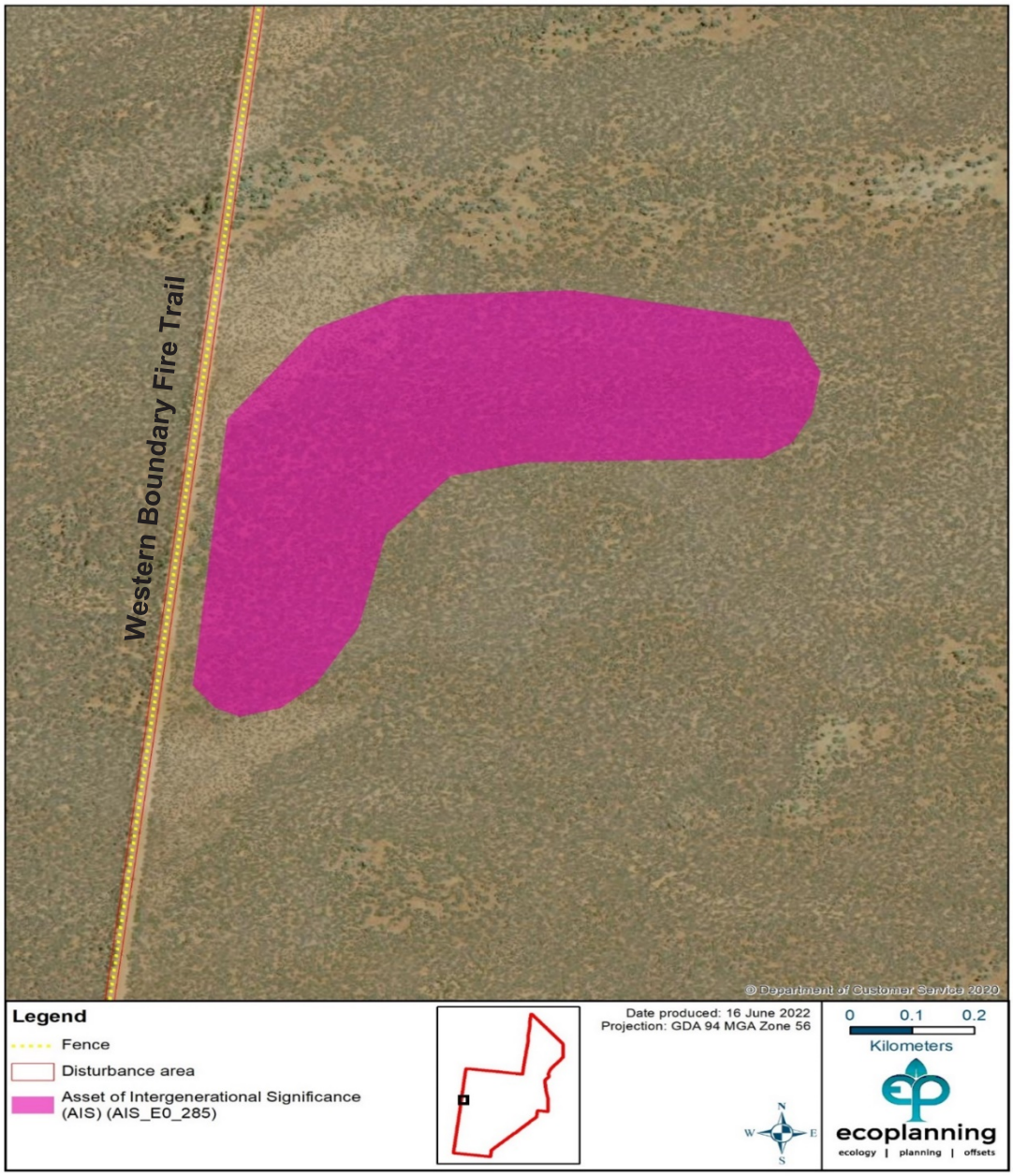

Figure 28 Asset of intergenerational significance for the mukarrthippi grasswren

9.1.7 Vegetation

Desktop assessment

The State vegetation type map for Central West / Lachlan Region Version 1.4 VIS_ID4468 (SEED data portal) was used to stratify the study area and for site selection. The proposed works intersects 13 plant community types (PCTs) identified on the vegetation map (Table 5 and Figure 29). No threatened ecological communities were recorded within the study area.

Table 5 Plant community types (PCTs) in the study area

Plant community type	Area (ha)
PCT 10 River Red Gum – Black Box woodland wetland of the semi-arid (warm) climatic zone	0.80
PCT 23 Yarran tall open shrubland of the sandplains and plains of the semi-arid (warm) and arid climatic zones	0.19
PCT 57 Belah/Black Oak – Western Rosewood – Wilga woodland of central NSW including the Cobar Peneplain Bioregion	6.75
PCT 72 White Cypress Pine – Poplar Box woodland on foot slopes and peneplains mainly in the Cobar Peneplain Bioregion	2.43
PCT 104 Gum Coolabah woodland on sedimentary substrates mainly in the Cobar Peneplain Bioregion	30.49
PCT 105 Poplar Box grassy woodland on flats mainly in the Cobar Peneplain Bioregion and Murray Darling Depression Bioregion	2.86
PCT 143 Narrow-leaved Hopbush – Scrub Turpentine – Senna shrubland on semi-arid and arid sandplains and dunes.	0.81
PCT 171 Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion	22.78
PCT 173 Sandplain mallee of central NSW	30.80
PCT 174 Mallee – Gum Coolabah woodland on red earths flats of the eastern Cobar Peneplain Bioregion	15.88
PCT 49 Partly derived Windmill Grass – copperburr alluvial plains shrubby grassland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	9.75
PCT 165 Derived corkscrew grass grassland/forbland on sandplains and plains in the semi-arid (warm) climate zone	2.45
PCT 250 Derived tussock grassland of the central western plains and lower slopes of NSW	8.19

Some PCTs typically have an equivalent, in part, to threatened ecological communities (TEC) listed under the BC Act. However, none of the PCTs in the study area matched the equivalent TEC (Table 6) under the BC Act and EPBC Act.

Table 6 Plant community types (PCTs) mapped in the Central West / Lachlan region vegetation map, their equivalent threatened ecological community (TEC) and whether they were present in the study area

PCT	TEC name	Presence in study area
PCT 23	*Acacia melvillei* Shrubland in the Riverina and Murray-Darling Depression bioregions	No. *Acacia melvillei* not recorded by DPIE (2019b) or Ecoplanning (Appendix A)
PCT 57	*Acacia loderi* shrublands (part)	No. *Acacia loderi* not recorded by DPIE (2019b) or Ecoplanning
PCT 143	*Acacia loderi* shrublands (part)	No. *Acacia loderi* not recorded by DPIE (2019b) or Ecoplanning
PCT 173	*Acacia loderi* shrublands (part) *Acacia melvillei* Shrubland in the Riverina and Murray-Darling Depression bioregion (part)	No. *Acacia loderi* and *A. melvillei* not recorded by DPIE (2019b) or Ecoplanning
PCT 174	*Acacia loderi* shrublands (part)	No. *Acacia loderi* not recorded by DPIE (2019b) or Ecoplanning

DPIE (2019b) noted that vegetation mapping for Yathong Nature Reserve had some inaccuracies but did not include a validated version of the map.

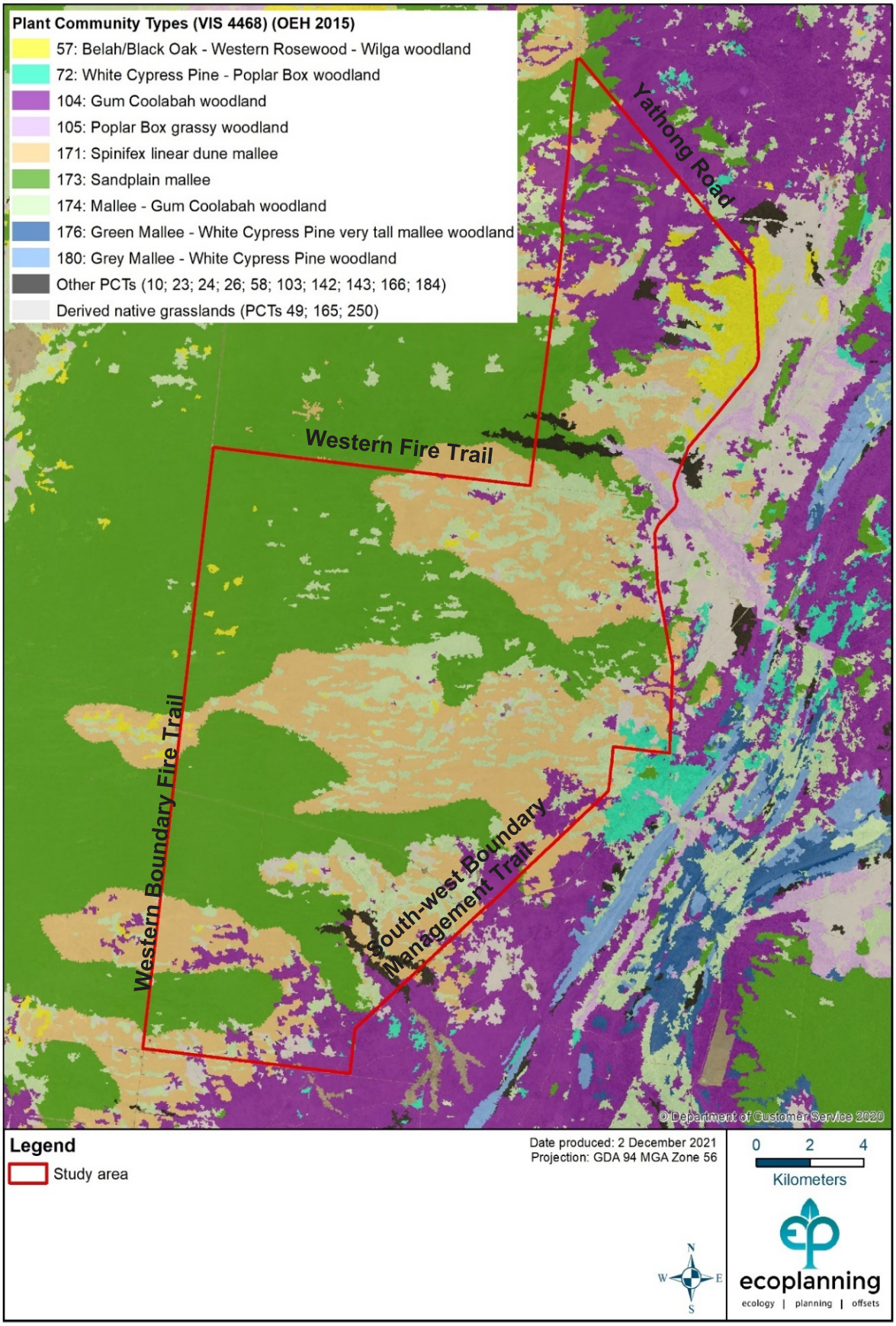

Figure 29 Plant community types within the study area (Source: SEED data portal State vegetation type map for Central West / Lachlan Region Version 1.4 VIS_ID4468).

Fieldwork methodology

A site survey of the conservation fence alignment was conducted on 15 to 24 September 2021 by Elizabeth Norris (Senior Ecologist), Bruce Mullins (Principal Ecologist), Ross Wellington (Principal Ecologist, Australian Environmental Surveys) and Rebecca O'Rourke (Ecologist, Molino Stewart). Each of these person's experience and qualifications are provided in Appendix E. Weather conditions during this period were typically cold to warm with 6 mm of rainfall recorded during the field survey. In the 3 months leading up to the survey, Mount Hope recorded above average rainfall, including 90.0 mm in June, 43.2 mm in July and 17.0 mm in August.

The field survey commenced with a vehicle-based reconnaissance of the study area. During the reconnaissance, traverses of areas of interest and changes in vegetation and soil types were inspected by the survey team.

A summary of survey methodologies is provided below, however further details (including survey effort) are detailed in Appendix A.

- vegetation plot, composition, structure and function surveys conducted in accordance with overarching ecological health monitoring framework (DPE 2022a)
- rapid vegetation assessments
- incidental sightings of flora species.

The flora survey aimed to record as many species as possible. A definitive list of the flora within the study area cannot be gathered without systematic traverses and survey across several seasons, and previous ecological studies undertaken in the area as detailed in Appendix A. However, the techniques used in this investigation are considered adequate to gather the data necessary to validate the vegetation communities and vegetation condition in the study area and assess the likelihood of occurrence of any threatened flora species.

The impacts assessment is based on a desktop assessment of the proposed fence alignment, as the proposed conservation fence line had not been surveyed and marked in the field when the surveys were undertaken. Therefore, there is likely to be a degree of error in the location of the conservation fence line alignment that was assessed, the calculations of area for each PCT affected and estimates of impact.

Subsequent to the original desktop assessment, the alignment of the conservation fence was changed along the 30 km section of Yathong Road. In this location, the conservation fence would be located approximately 37.5 m from the centreline of Yathong Road, with a 15 m disturbance corridor (7.5 m either side). The new alignment and disturbance corridor was not assessed by Ecoplanning (Appendix A), therefore, an additional survey was completed by Dave Sturman from AREA Environmental & Heritage Consultants between 22 March and 25 March 2022 (see attachment to Appendix A). This additional survey along the new conservation fence alignment and disturbance area:

- verified PCTs along the new alignment
- recorded incidental sightings of flora species not previously identified (if any), including any threatened species.

Results from the additional survey have been incorporated into this REF.

The scope of the original assessment was amended to include ancillary infrastructure, including additional site accommodation, roads and service trenching works in the operations base at Yathong Quarters precinct. The area has been heavily disturbed and the vegetation, while not formally surveyed is mostly likely to be PCT 250 (Derived tussock grassland of the central western plains and lower slopes of NSW). There is 8.19 ha of PCT 250 in the study area.

An additional 18.31 km of internal conservation fencing within the feral predator–free area is required along existing trails. This part of the fence line alignment was not inspected and assessed as part of the ecological assessment (Appendix A). However, no vegetation removal would be required for the additional conservation fencing and therefore no further assessment was undertaken.

Fieldwork results

The field surveys identified 202 flora species, which included 177 native species, 22 exotic species, and 3 indeterminate species (Appendix A).

None of the species recorded are listed as threatened species under the BC Act or EPBC Act. DPIE (2019b) noted the presence of significant species and species of taxonomic interest. Of the species described, the survey recorded forms of *Chrysocephalum apiculatum*, *Bulbine semibarbata*, *Enchylaena tomentosa* that were of interest and mallee forms of *Eucalyptus intertexta*.

The field survey also identified an orchid from the *Pterostylis biseta* group. However, it is understood that this species is possibly an undescribed species and under revision (L Copeland pers. comm.). This species occurred in spinifex linear dune mallee where up to 15 individuals were found within the 0.1 ha plot.

Regarding PCTs, field reconnaissance, plot-based surveys and rapid assessments were used to validate PCTs within the study area described in the desktop assessment (Table 5 and Figure 29). It was identified that a number of errors, in regards to PCT classifications, were observed including:

- no evidence for PCT 10 within the subject site
- no evidence for PCT 23 within the subject site
- no evidence for PCT 143 within the subject site.

In some instances, PCTs 49 and 165 were retained in the validated vegetation map due to a lack of data to more accurately assign an alternative PCT due to the extent of clearing. PCTs 49 and 165 are likely to be derived from PCTs 57, 72 and 104 within the subject site.

The areas of validated PCTs within the study area is detailed in Table 7 and shown in Figure 30 to Figure 35.

Table 7 Impacts to validated plant community types (PCTs) along the proposed conservation fence line

PCT number	PCT name	Impact area (ha)
49	Partly derived Windmill Grass – copperburr alluvial plains shrubby grassland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	5.54
57	Belah/Black Oak – Western Rosewood – Wilga woodland of central NSW including the Cobar Peneplain Bioregion	11.87
72	White Cypress Pine – Poplar Box woodland on foot slopes and peneplains mainly in the Cobar Peneplain Bioregion	2.26
104	Gum Coolabah woodland on sedimentary substrates mainly in the Cobar Peneplain Bioregion	33.86
105	Poplar Box grassy woodland on flats mainly in the Cobar Peneplain Bioregion and Murray Darling Depression Bioregion	2.86

PCT number	PCT name	Impact area (ha)
165	Derived corkscrew grass grassland/forbland on sandplains and plains in the semi-arid (warm) climate zone	2.45
171	Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion	24.12
173	Sandplain mallee of central NSW	30.52
174	Mallee – Gum Coolabah woodland on red earth flats of the eastern Cobar Peneplain Bioregion	15.73
250	Derived tussock grassland of the central western plains and lower slopes of NSW	8.19
Total native vegetation clearing		**137.41**
Total non-native vegetation clearing and roads		54.20
Total area impacted		**191.61**

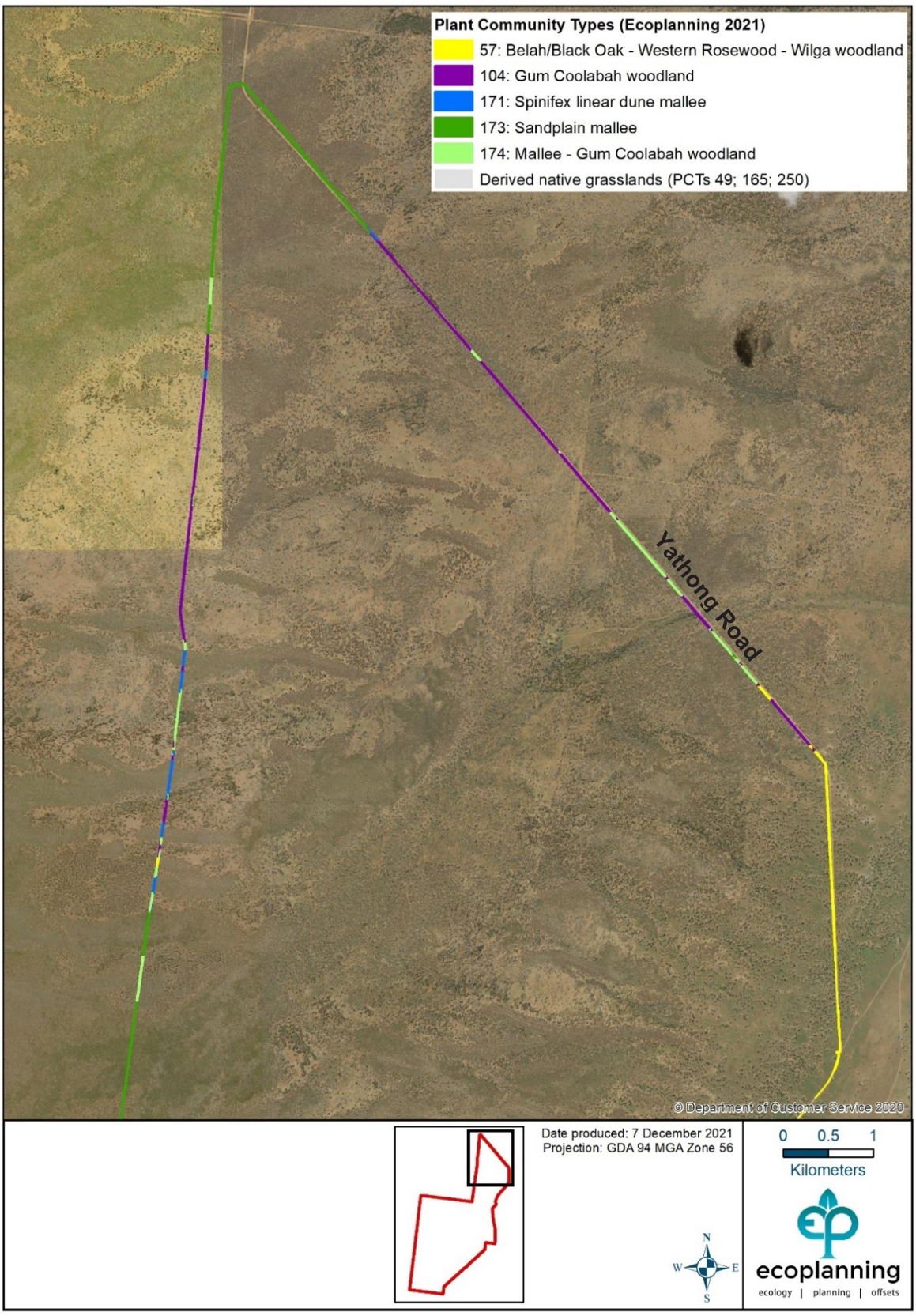

Figure 30 Validated plant community types (PCTs) within the subject site in the northern part of the study area

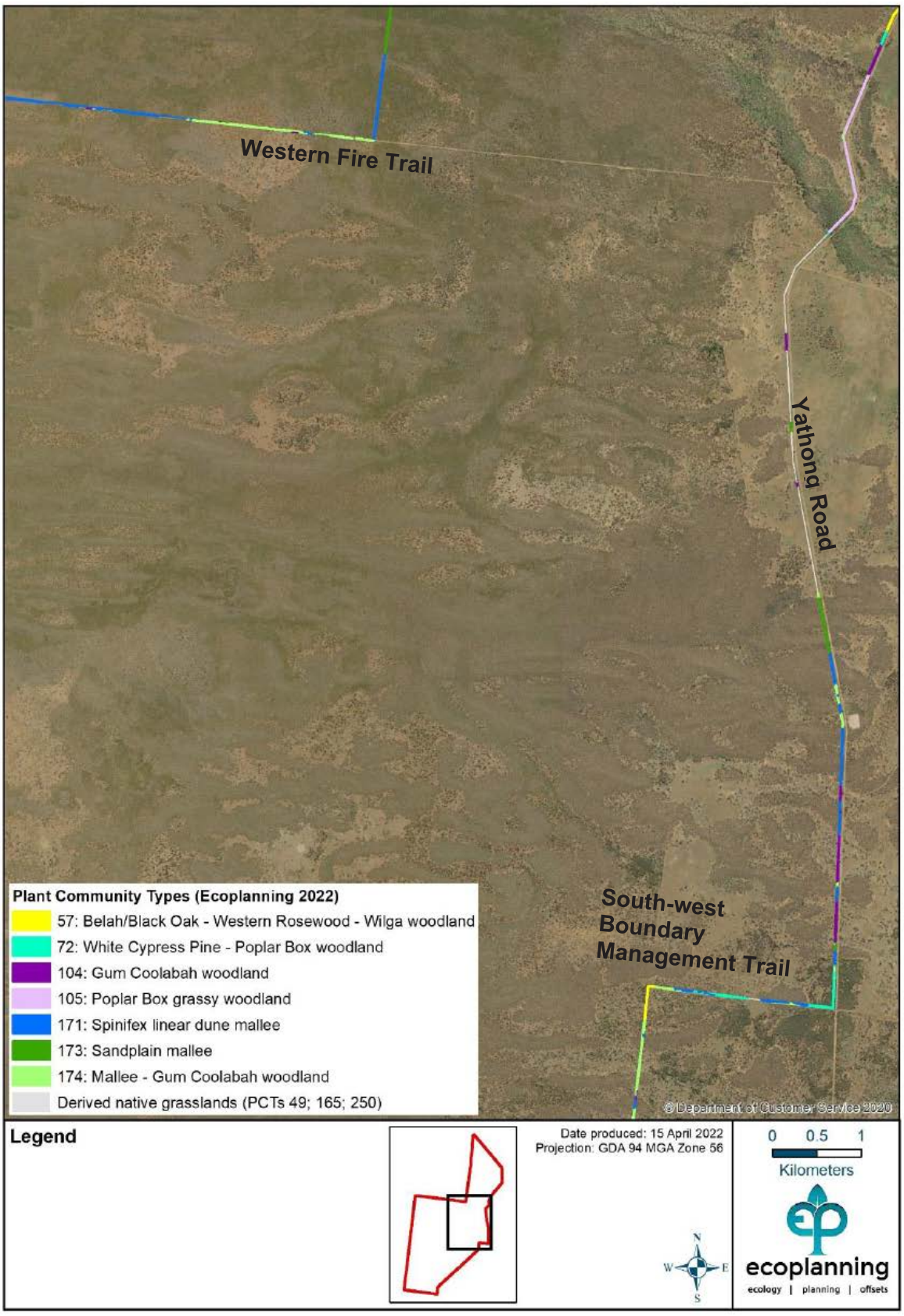

Figure 31 **Validated plant community types (PCTs) within the subject site in the central eastern part of the study area**

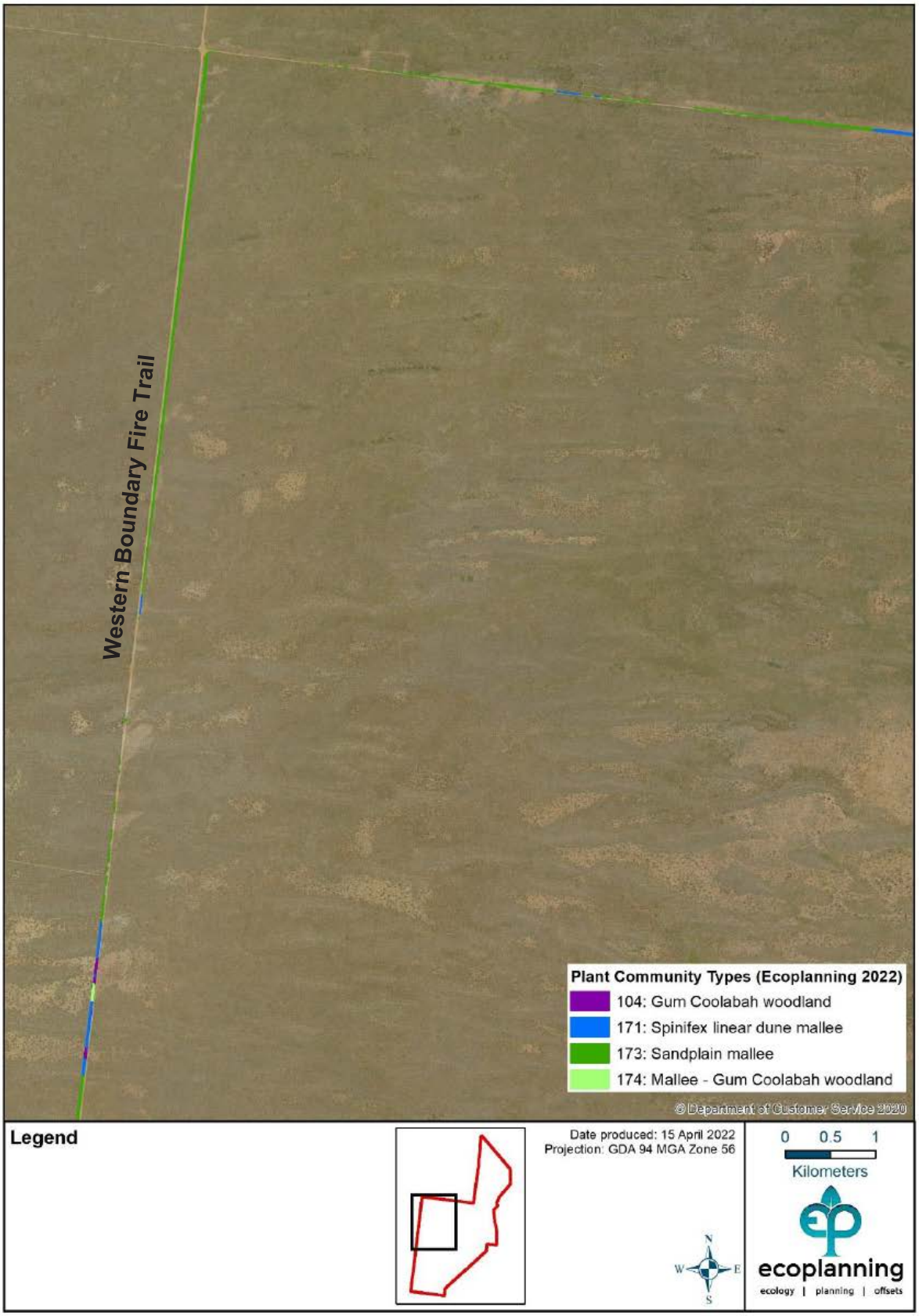

Figure 32 Validated PCTs within the subject site in the central-western part of the study area

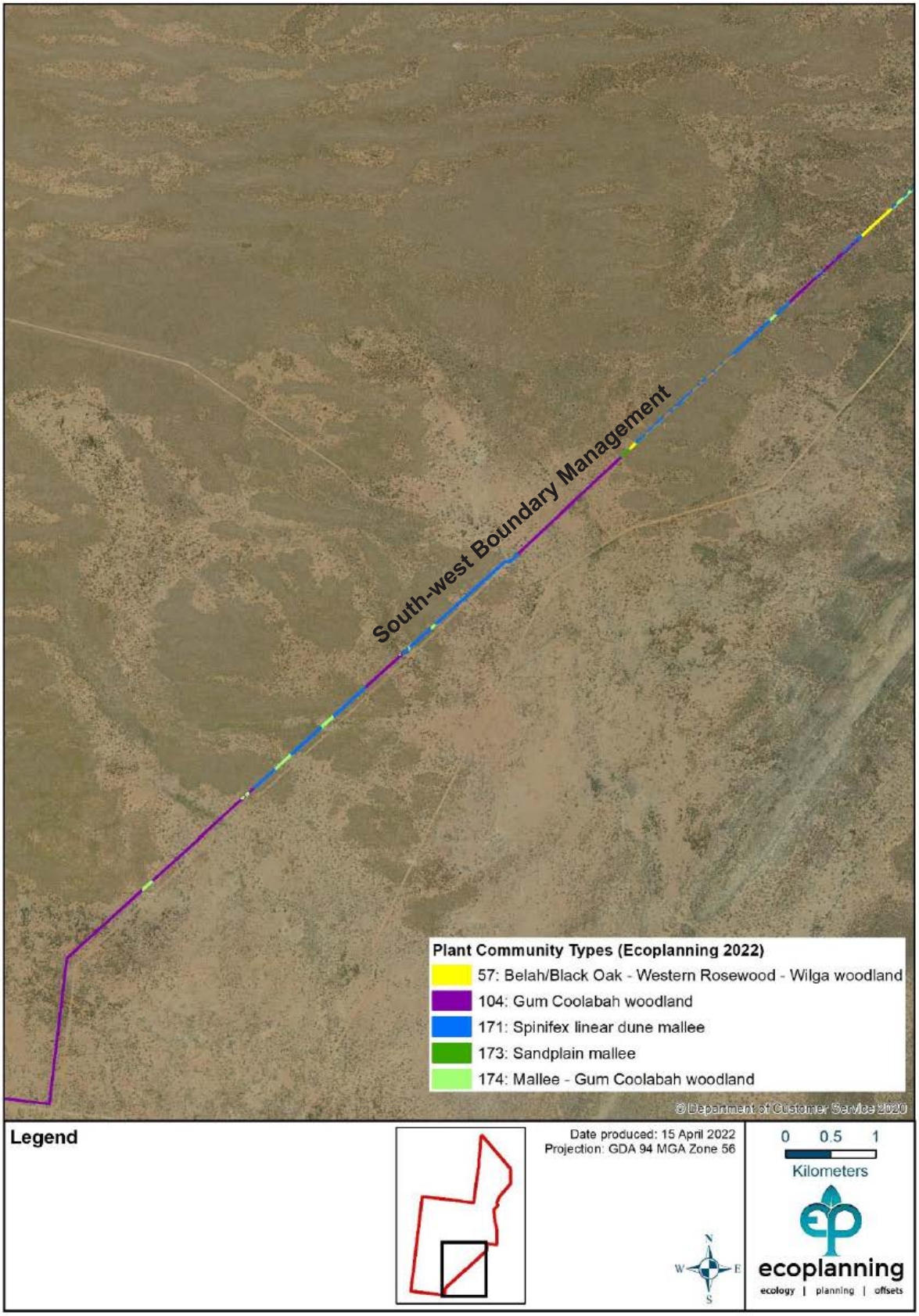

Figure 33 Validated plant community types (PCTs) within the subject site in the south-eastern part of the study area

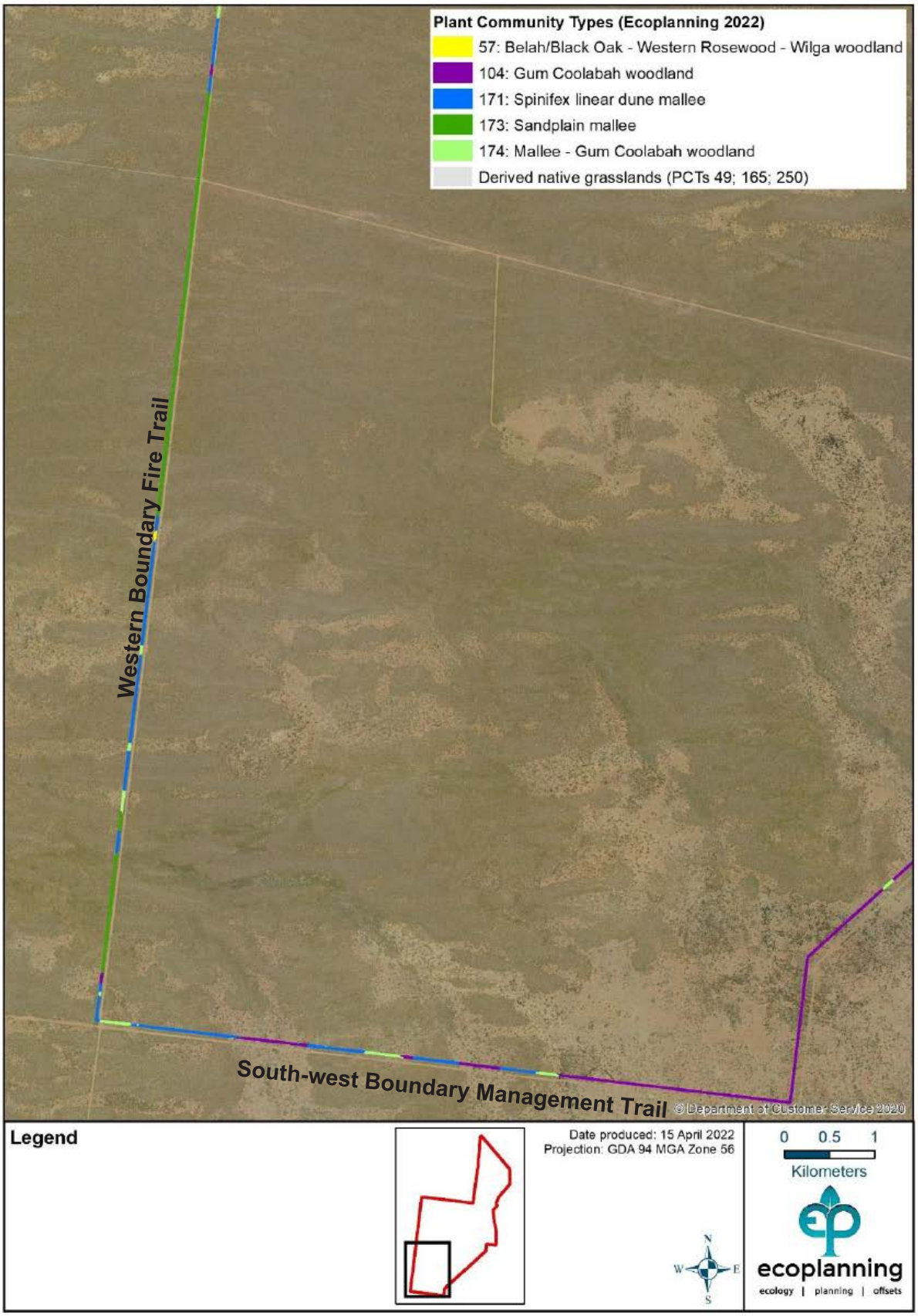

Figure 34 Validated plant community types (PCTs) within the subject site in the south-western part of the study area

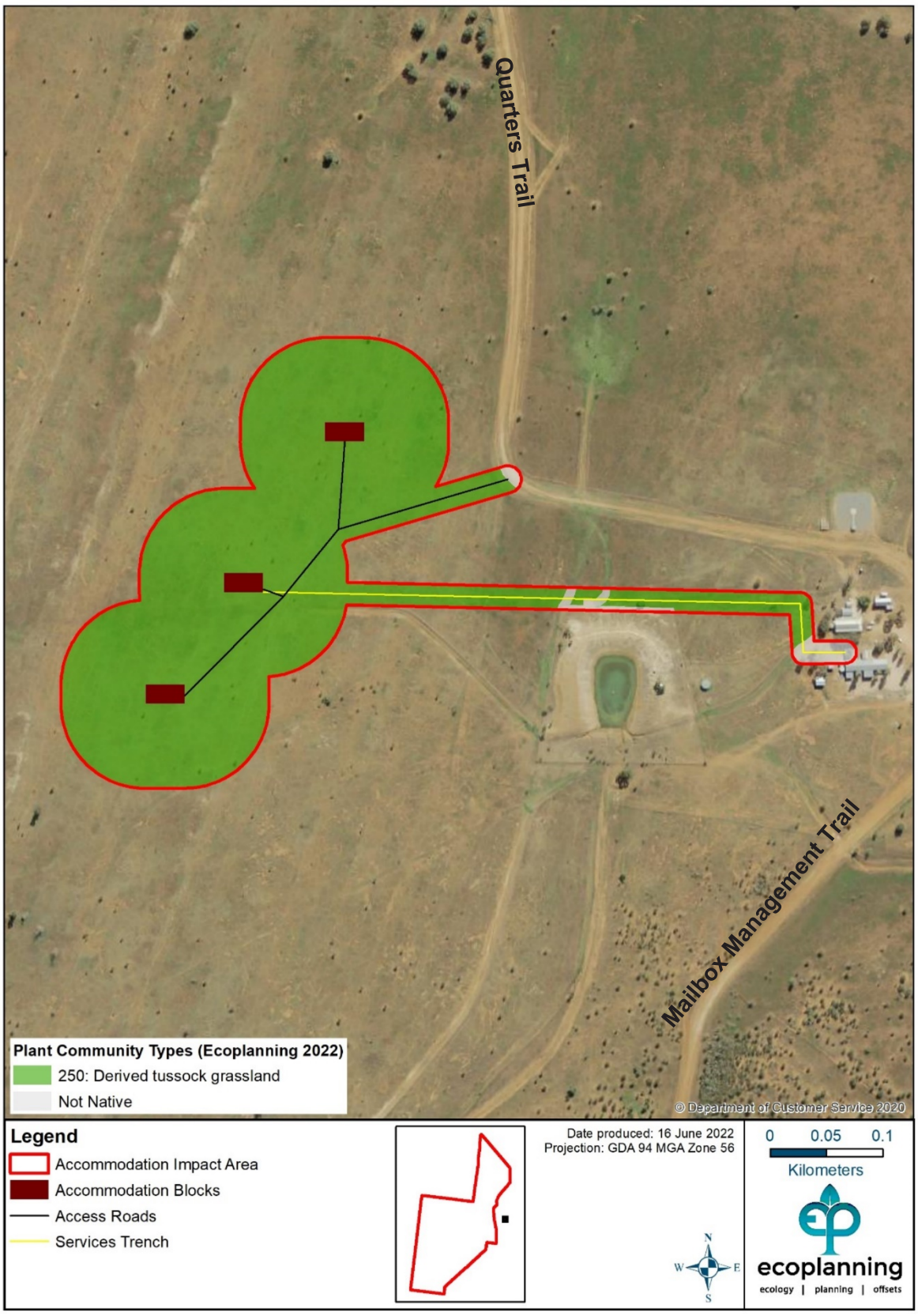

Figure 35 Plant community types (PCTs) within the operations base at Yathong Quarters (Source: SEED data portal State vegetation type map for Central West / Lachlan Region Version 1.4 VIS_ID4468)

A description of the validated PCTs detailed in Table 7 is provided below (with the exception of PCTs 49 and 165 which are likely to be derived from PCTs 57, 72 and 104).

NOTE: The location of the sites referenced in this section (e.g. Yathong 1, New2) are detailed in Appendix A.

PCT 57 Belah/Black Oak – Western Rosewood – Wilga woodland of central NSW including the Cobar Peneplain Bioregion

This PCT occurs across both IBRA subregions of the Cobar Peneplain with site Yathong 1 occurring within the Barnato Downs IBRA subregion. Scattered occurrences occur within the Darling Depression IBRA subregion. Several previously unmapped patches were also observed, for example, north of site New2 adjacent to the access track. Yathong 1 is located within the largest mapped area of this PCT.

This open woodland is dominated by *Casuarina cristata* (belah) and *Callitris glaucophylla* (white cypress pine), 12–14 m in height and with a cover of 5%. Photographs of this community are provided in Appendix 4.The mid-layer was dominated by scattered *Alectryon oleifolius* subsp. *canescens* (western rosewood), *Geijera parviflora* (wilga), *Eremophila longifolia* (berrigan) and *Eremophila mitchellii* (budda) to a height of 4–5 m and a variable cover of up to 10%.

The extensive ground layer was dominated by *Sclerolaena birchii* (galvanized burr), *Austrostipa scabra* (speargrass), *Erodium crinitum* (blue storksbill), *Rhodanthe floribunda* (common white sunray). Other species included the forbs *Calotis cuneifolia* (purple burr-daisy), *Crassula sieberiana* (Australian stonecrop), *Cuphonotus humistratus* and *Wahlenbergia gracilenta*, and the chenopods *Salsola australis* and *Sclerolaena diacantha* (grey copperburr).

Several weed species were recorded including *Medicago laciniata* (cut-leaved medic), *Echium plantagineum* (Paterson's curse), *Sonchus oleraceus* (common sowthistle), *Sisymbrium erysimoides* (smooth mustard) and *Carrichtera annua* (wards weed).

This PCT is equivalent, in part, to the TEC *Acacia loderi* shrublands where *Acacia loderi* dominates. *Acacia loderi* was not recorded on site, therefore, the TEC does not occur in the subject site.

PCT 104 Gum Coolabah woodland on sedimentary substrates mainly in the Cobar Peneplain

The 6 sites in this PCT are spread across 2 IBRA subregions of the Cobar Peneplain Bioregion with sites New1, New4 and New5 occurring within the Barnato Downs subregion; and sites New2, New3 and YNR040 occurring within the Darling Depression subregion.

This woodland to open woodland community is generally dominated by a canopy of *Eucalyptus intertexta* (gum coolabah) (New1, New2) or *Callitris glaucophylla* (white cypress pine) or in combination (New3, New4) up to 18 m in height and cover of up to 5%. Other canopy species included *Brachychiton populneus* subsp*. trilobus* (YNR040) and *Eucalyptus socialis* in association with *E. intertexta* (red mallee) (New5). Photographs of this community are provided in Appendix 4.

The mid-layer was generally sparse across sites New1, New2 and YNR040 where more open grassy and herbaceous vegetation was present in comparison to sites New3, New4 and New5 where shrubs were more common (Appendix 4). The height of the mid-layer ranged from 1 to 6 m with a cover of 5% at most sites. Common species recorded included *Eremophila mitchellii* (budda), *Eremophila glabra* (tarbush), *Dodonaea viscosa* subsp. *angustissima* (narrow-leaved hopbush) and *Geijera parviflora* (wilga). Other species

occurring less frequently included *Eremophila deserti* (turkeybush) and *Eremophila longifolia* (berrigan).

The ground layer was diverse across all sites, up to 0.8 m in height and with a cover of 15% at most sites, with the exception of New1 where *Austrostipa scabra* predominated. Smaller shrubs and ground layer species were dominated by *Austrostipa scabra* subsp. *scabra* (speargrass), *Hyalosperma semisterile, Calotis lappulacea* (yellow burr-daisy), *Rhodanthe floribunda* (common white sunray)*, Rhodanthe corymbiflora* (small white sunray) and the chenopods *Sclerolaena diacantha* (grey copperburr), *Chenopodium desertorum* and *Einadia nutans* (climbing saltbush)*.* Other commonly occurring ground layer species included *Goodenia cycloptera, Goodenia fascicularis* and *Calotis cuneifolia* (purple burr-daisy).

Species richness was high across all sites ranging between 53 species (New2, New3, New5), 66 species (New1) and 79 species (YNR040) recorded.

Weed species commonly encountered included the forbs *Medicago minima* (woolly burr medic), *M. polymorpha* (burr medic), *M. laciniata* (cut-leaved medic), *Silene apetala* (mallee catchfly), and the grasses *Rostraria pumila* (rooughtail), *Bromus rubens* (red brome), *Vulpia muralis* and *Monachather paradoxus* (bandicoot grass). Weed species were generally more common where historic clearing appears to have been undertaken such as at sites New1, New2 and YNR040 located towards the southern end of the study area.

PCT 171 Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion

Note – All 6 sites occur within the Darling Depression IBRA subregion.

This mallee shrubland to open shrubland community is dominated by a number of canopy species, including *Eucalyptus socialis* (red mallee), *E. gracilis* (yorrell), *E. dumosa* (white mallee) and *E. viridis* (green mallee) up to 7 m in height and having a projective foliage cover of up to 15%. The dominance of each mallee species was variable across all sites surveyed and not all 4 species were present at each site. Photographs of this community are provided in Appendix 4.

The mid-layer was generally sparse across all sites, ranging from 1 to 4 m in height with a cover of up to 5% (Appendix 4). Dominant species recorded included *Eremophila glabra* (tarbush) and *Geijera parviflora* (wilga) with *Acacia colletioides* (wait-a-while), *Acacia wilhelmiana* (Wilhelmi's wattle), *Senna artemisioides, Pimelea microphylla* and *Bossiaea walkeri* (cactus bossiaea) occurring less frequently. Most shrub species were found to be growing in proximity to mallee species.

The ground layer was also sparse across all sites, up to 0.6 m in height and a variable cover between sites up to 30% depending on the abundance of *Triodia* patches. *Triodia scariosa* subsp. *scariosa* (porcupine grass) and *Austrostipa scabra* subsp. *scabra* (speargrass) predominated at most sites. Oher common species included the shrubs *Olearia pimeleoides,* the forbs *Goodenia willisiana, Halgania cyanea* (rough halgania), *Vittadinia cervicularis* var. *cervicularis,* and the chenopods *Sclerolaena parviflora* and *Maireana enchylaenoides* (wingless bluebush). Other forbs recorded included several species of *Ptilotus* including *P. sessilifolius* (silver-tails), *P. modestus, P. spathulatus* (pussytails) and *P. erubescens* (hairy heads). *Lomandra collina* (pale mat-rush) and *L. effusa* (scented mat-rush) were present at some sites.

One undescribed species belonging to the *Pterostylis biseta* group (L Copeland pers. comm.) was recorded within site CWPT6745 where up to 15 individuals were found.

Several climbing species were also recorded including *Rhyncharrhena linearis* (purple pentatrope), *Parsonsia eucalyptophylla* (gargaloo), *Marsdenia australis* (doubah) and *Comesperma integerrimum.*

Species richness was variable ranging from 27 to 33 species (YNR080, CWPT6732, YNR038, YNR061), 43 species (CWPT6745) and 48 species (YNR048) recorded.

Weed species were not recorded within any of the sites surveyed in this PCT.

PCT 173 Sandplain mallee of central NSW

This mallee shrubland to open shrubland community is dominated by a number of canopy species including *Eucalyptus socialis* (red mallee), *E. dumosa* (white mallee) and *E. gracilis* (yorrell) predominating with *E. viridis* (green mallee) occurring less frequently. The canopy extended up to 6 m in height with cover of up to 20%. Of all 4 mallee species, *E. gracilis* was recorded at every site. Photographs of this community are provided in Appendix 4.

The mid-layer was generally sparse to almost absent at one site (YNR079), but across other sites it ranged from 1 to 3 m in height with a cover of 5% (Appendix 4). Dominant shrub species varied between sites and included *Acacia colletioides* (wait-a-while), *Acacia senna artemisioides* subsp. *x petiolaris* (woody cassia)*, Melaleuca uncinata* (broombush), *Dodonaea viscosa* subsp. *angustissima* (narrow-leaved hopbush), *Eremophila glabra* and *Bossiaea walkeri* (cactus bossiaea) occurring less frequently. Most shrub species were found to be growing in proximity to mallee species. At site YNR074 the shrub *Melaleuca uncinata* formed dense thickets.

The ground layer was also sparse, generally up to 0.5 m in height with a cover of 5% at most sites with the exception of site YNR079 where a cover of 17% was recorded with *Triodia scariosa* subsp. *scariosa* (porcupine grass) and *Westringia rigida* (stiff westringia) predominating. *Triodia scariosa* subsp. *scariosa, Halgania cyanea* (rough halgania) and *Austrostipa scabra* subsp. *scabra* (speargrass) predominated at most sites. Oher common species included the shrub *Olearia pimeleoides,* the forbs *Vittadinia dissecta* var. *hirta* (dissected New Holland daisy), *Goodenia glabra, Calotis cuneifolia* (mountain burr-daisy), the chenopods *Sclerolaena parviflora, Sclerolaena diacantha* and *Maireana enchylaenoides* (wingless bluebush), and the grass *Paspalidium constrictum*. *Lomandra collina* (pale mat-rush) and *L. leucocephala* subsp. *robusta* (woolly mat-rush) were present at some sites.

The climbing species *Rhyncharrhena linearis* (purple pentatrope) was recorded at several sites.

Species richness was variable ranging from 19 species (YNR079) to 42 species (YNR074) with the remaining sites recording 29 species (YNR011), 33 species (YNR054) and 23 species (YNR055).

Weed species were not recorded within any of the sites surveyed in this PCT.

PCT 174 Mallee – Gum Coolabah woodland on red earth flats of the eastern Cobar Peneplain Bioregion

Veg class: Sand Plain Mallee Woodlands

Veg formation: Semi-arid Woodlands (Shrubby sub-formation)

IBRA: Cobar Peneplain; Murray Darling Depression; NSW South Western Slopes;Riverina

IBRA subregion: Nymagee;Barnato Downs;Canbelego Downs;Boorindal Plains;Lachlan Plains;Darling Depression;Lower Slopes;Lachlan

County: COBAR; BOGAN;

PCT 72 White Cypress Pine – Poplar Box woodland on foot slopes and peneplains mainly in the Cobar Peneplain Bioregion

PCT 72 is located along the south-eastern boundary of the reserve, adjacent to the southern entrance. Another much smaller patch is located further to the south along the south-eastern

boundary between sites YNR040 and New1. Photographs of this community are provided in Appendix 4.

Within the study area this woodland PCT is characterised by a canopy of dense *Callitris glaucophylla* (white cypress pine) with younger regrowth present. Other canopy species included *Eucalyptus populnea* subsp. *bimbil* and scattered *Eucalyptus intertexta* (gum coolabah).

The mid-layer may contain a shorter stratum of *Callitris glaucophylla* and shrub species including *Eremophila mitchellii* (budda), *Senna artemisioides* group and *Dodonaea viscosa.*

The ground layer may range from mid-dense to sparse and be dominated by *Austrostipa scabra* subsp. *scabra,* the forbs *Calotis cuneifolia* (purple burr-daisy), *Sida cunninghamii* (rigid sida), *Chrysocephalum apiculatum* (common everlasting), and the chenopods *Sclerolaena birchii* (galvanised burr), *Sclerolaena diacantha* (grey copperburr) and *Enchylaena tomentosa* (ruby saltbush).

PCT 105 Poplar Box grassy woodland on flats mainly in the Cobar Peneplain Bioregion and Murray Darling Depression Bioregion

PCT 105 is located along the central eastern boundary adjacent to the intersection with the Western Fire Trail / access track.

Within the study area, this woodland PCT is characterised by a canopy of *Eucalyptus populnea* subsp. *bimbil* (poplar box) in association with an ephemeral low-lying drainage area. The shrub layer is very sparse and the ground layer is dominated by weedy species including *Echium plantagineum* (Paterson's curse) (Appendix 4).

The mid layer may include *Geijera parviflora* (wilga), *Eremophila mitchellii* (budda), *Eremophila glabra* and *Senna artemisioides* group*.*

The ground layer may include the grasses *Austrostipa scabra* subsp. *scabra, Aristida behriana,* the forbs *Calotis cuneifolia* (purple burr-daisy), *Stackhousia muricata* (western stackhousia)*, Stackhousia monogyna* (creamy candles), *Plantago turrifera, Erodium crinitum* (blue storksbill), and the chenopods *Sclerolaena convexula* (tall copperburr) and *Sclerolaena birchii* (galvanised burr)*.*

PCT 250 Derived tussock grassland of the central western plains and lower slopes of NSW

The proposed accommodation and site facilities will be constructed on disturbed land identified as either PCT 49, 165 or 250. Surveys were not conducted where this infrastructure will be located, however, based on casual observations and photos provided by NPWS of the vegetation in the area, PCT 250 seems to be the more likely community in this area.

The tree layer had largely been removed, and there was a scant shrub layer. Native and exotic grasses and forbs dominated the ground layer.

DPIE (2019b) recorded the presence of PCT 229 (Derived mixed shrubland on loamy-clay soils in the Cobar Peneplain Bioregion). However, PCT 229 is not located near the former homestead where there was more intensive land use. Therefore, it seems unlikely that it would be located near Yathong Quarters.

Only 2 priority weeds and one weed of national environmental significance (WoNS) was identified in the BioNet Atlas search for Yathong Nature Reserve. During the site survey,2 WoNS were recorded within the study area (Table 8).

Table 8 Priority weeds and weeds of national environmental significance (WoNS)

Species	WoNS	Duty
Lycium ferocissimum African boxthorn	Y	**Prohibition on certain dealings** Must not be imported into the state, sold, bartered, exchanged or offered for sale **Regional recommended measure** Land managers mitigate the risk of the plant spreading from their land. Land managers reduce impact of plant on priority assets (riparian areas and floodplains).
Opuntia stricta Prickly pear	Y	**Prohibition on certain dealings** Must not be imported into the state, sold, bartered, exchanged or offered for sale **Regional recommended measure** Land managers mitigate the risk of the plant spreading from their land. Land managers mitigate the risk of the plant being introduced to their land. The plant or parts of the plant are not traded, carried, grown or released into the environment. Land managers reduced impact of the plant on priority assets (grazing, conservation and urban areas).

9.1.8 Plants and animals

Desktop assessment

BioNet Atlas records for flora within Yathong Nature Reserve list 642 species, which includes 545 native species and 97 exotic species. DPIE (2019b) noted the presence of other significant flora and flora of taxonomic interest in the reserve.

BioNet Atlas records for fauna within Yathong Nature Reserve list 260 species, which includes 6 amphibians, 53 reptiles, 169 birds and 32 mammals (Table 9 and Appendix A). Two birds and 8 mammals are listed as introduced. Threatened fauna are discussed in Section 4.1.4 of Appendix A.

Table 9 BioNet Atlas records of fauna in Yathong Nature Reserve

Fauna class	Number of species	Introduced
Amphibians	6	0
Reptiles	53	0
Birds	169	2
Mammals	32	8
Total	**260**	**10**

The BioNet Atlas identified 21 threatened or migratory species listed under the BC Act and/or EBPC Act within 5 km of the feral predator–free area and an additional 13 species that had been previously recorded in Yathong Nature Reserve. Of these 34 species, 2 are threatened plants and 31 are threatened fauna, including 2 reptiles, 7 mammals and 23 birds, and one migratory species. Table 10 indicates the number species in each class listed under the BC Act and the EPBC Act, by different conservation status. No species listed under the FM Act were recorded in BioNet.

Table 10 Number of threatened species groups in Yathong Nature Reserve and the surrounding area

Class	Conservation status (BC Act / EPBC Act)			
	Migratory	Vulnerable	Endangered	Critical
Flora	–	1 / 1	–	1 / 0
Amphibians	–	–	–	–
Reptiles	–	1 / 0	1 / 0	–
Birds	0 / 1	20 / 2	2 / 0	1 / 0
Mammals	–	5 / 2	2 / 0	–

Many threatened species in Yathong Nature Reserve prefer habitat associated with mallee communities and sandy soils. Therefore, Yathong Nature Reserve is likely to play an important role in the conservation and preservation of these species. Details are provided in Appendix A, but below are some of the relevant species and their conservation status under the BC Act:

- western blue-tongued lizard (*Tiliqua occipitalis*) – vulnerable
- malleefowl– endangered
- shy heathwren (*Hylacola cautus*) – vulnerable
- chestnut quail-thrush (*Cinclosoma castanotum*) – vulnerable
- red-lored whistler– critically endangered
- southern scrub-robin (*Drymodes brunneopygia*) – vulnerable
- southern ningaui – vulnerable
- striated grasswren (*Amytornis striatus*) – vulnerable.

An asset of intergenerational significance (Site AIS_E0_285) has been declared for the mukarrthippi grasswren, protecting approximately 40 ha of sand dune complex in the central western part of the proposed feral predator–free area. The fence alignment and disturbance area will not enter this asset area and therefore no impacts are anticipated.

A likelihood of occurrence analysis was undertaken following field survey to reduce the primary list to those species known or likely to use the study area, and thus may be impacted by the proposed works. This reduced the list to 11 species known to occur and 5 species that were previously recorded and deemed a ‘high’ likelihood of occurrence (see Appendix A).

The 11 species known to occur in the study area are:

- western blue-tongued lizard
- malleefowl
- pink cockatoo (also known as Major Mitchell’s cockatoo) (*Lophochroa leadbeateri*) – vulnerable
- shy heathwren
- chestnut quail-thrush
- southern scrub-robin
- grey-crowned babbler (*Pomatostomus temporalis temoralis)* – vulnerable
- Gilbert’s whistler (*Pachycephala inornata)* – vulnerable
- pied honeyeater (*Certhionyx variegatus*) – vulnerable
- little pied bat (*Chalinolobus picatus*) – vulnerable
- inland forest bat (*Vespadelus baverstocki*) – vulnerable.

The 5 species with a high likelihood of occurrence are:

- striated grasswren, including the subspecies mukarrthippi grasswren
- red-lored whistler
- dusky woodswallow (*Artamus cyanopterus cyanopterus*) – vulnerable
- hooded robin (Melanodryas cucullata cucullata) – vulnerable
- kultarr which is known to occur within 5 km of the study area – endangered.

Of the species listed above that are known or highly likely to occur in the study area, malleefowl and red-lored whistler are listed under the EPBC Act. Only impacts to these 2 species are considered further in this REF. An assessment of impacts to all species listed above is included in Appendix A.

In addition to the above fauna species, the Mallee Bird Community of the Murray Darling Depression Bioregion is listed under the EPBC Act as endangered. Further assessment of any impacts are detailed in Section 9.4 and Appendix A.

Figure 36 shows the location of threatened fauna within the reserve and surrounding area.

Five of the introduced feral animals previously recorded at Yathong Nature Reserve are recognised as contributing to key threatening processes (KTPs) under the BC Act. These KTPs are:

- Competition and grazing by the feral European rabbit (*Oryctolagus cuniculus*)
- Competition and habitat degradation by Feral goats (*Capra hircus*)
- Predation by the European red fox (*Vulpes vulpes*)
- Predation by the feral cat (*Felis catus*)
- Predation, habitat degradation, competition and disease transmission by feral pigs (*Sus scrofa*).

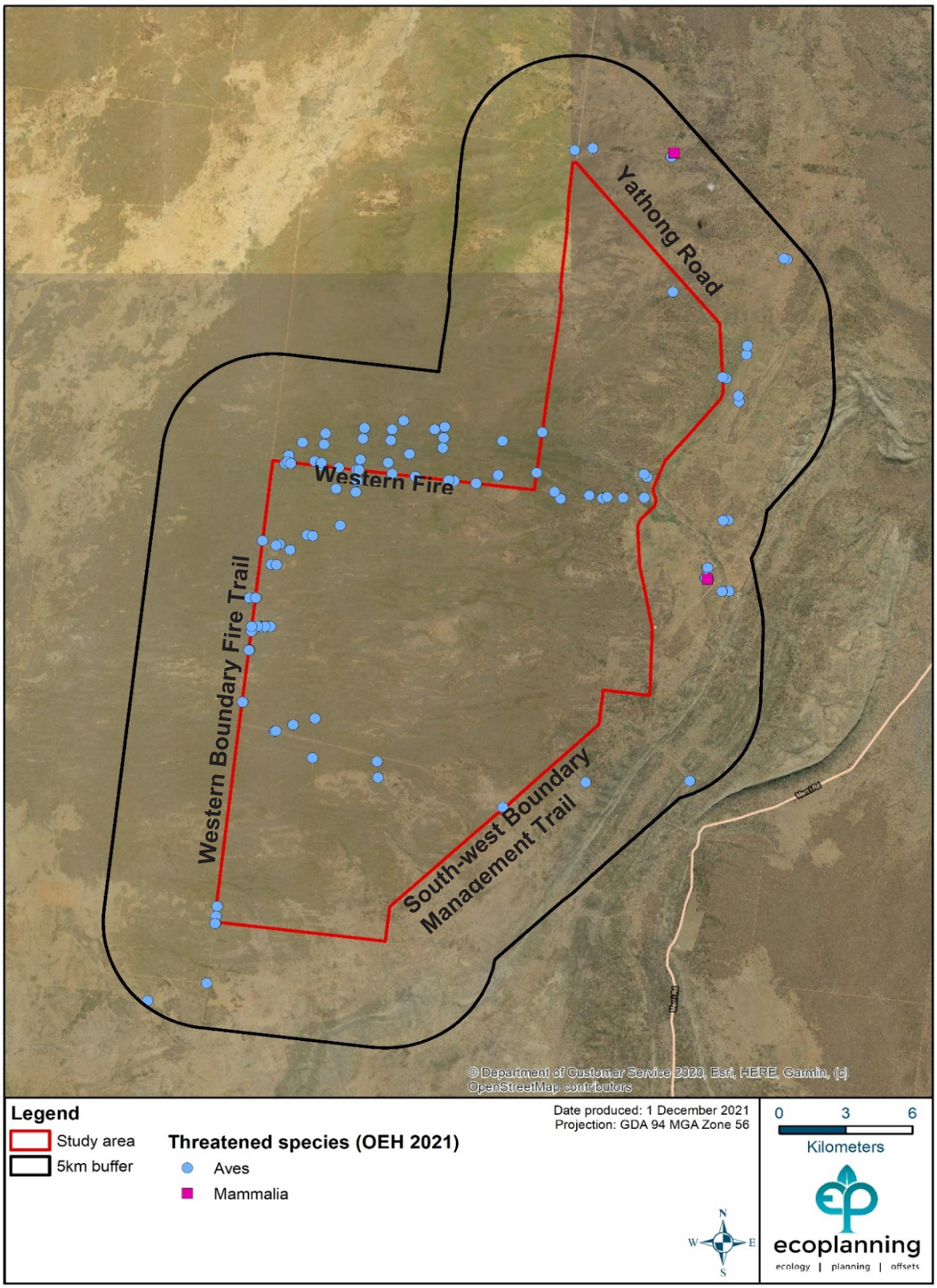

Figure 36 Threatened bird and mammals species recorded within Yathong Nature Reserve and the surrounding area (i.e. within 5 km of the study area) – sensitive species records are denatured (Source: NSW BioNet search, 2021).

Fieldwork methodologies

The site survey of the conservation fence alignment was conducted on 15 to 24 September 2021 by Elizabeth Norris (Senior Ecologist, EcoPlanning), Bruce Mullins (Principal Ecologist, EcoPlanning), Ross Wellington (Principal Ecologist, Australian Environmental Surveys) and Rebecca O'Rourke (Ecologist, Molino Stewart). Each of these person's experience and qualifications are provided in Appendix E. Weather conditions throughout the site survey were cold to warm with 6 mm of rainfall recorded. In the 3 months leading up to the survey, Mount Hope recorded above average rainfall, including 90.0 mm in June, 43.2 mm in July and 17.0 mm in August.

The field survey commenced with a vehicle-based reconnaissance of the study area. During the reconnaissance, traverses of areas of interest and changes in vegetation and soil types were inspected by the survey team.

Survey methodologies used included the following (see Appendix A for further details, including survey effort:

- diurnal bird census surveys
- bird songmeter recordings
- reptile surveys
- microbat monitoring using anabat detectors
- mammal monitoring using motion-activated cameras
- incidental sightings of flora and fauna species
- fauna habitat feature surveys such as hollow-bearing trees, bird nests and rock outcrops.

The fauna survey was limited to a single period of survey in a single season. While the survey applied a stratified approach, and a range of passive and active techniques to record fauna, they were limited by time and resources. Nevertheless, they provide a snapshot of the fauna residing within the surveyed areas. These surveys, coupled with historic data for the area, are deemed sufficient for the purpose of the REF.

The impacts assessment is based on a desktop assessment of the proposed fence alignment,, and the proposed conservation fence line had not been surveyed and marked in the field when the surveys were undertaken. Therefore, there is likely to be a degree of error in the location of the conservation fence line alignment that was assessed, the calculations of area for each PCT affected, numbers of hollow-bearing trees to be impacted and estimates of impact.

After the above fieldwork was completed, NPWS advised that there was a change to the conservation fence alignment along the 30 km section of Yathong Road. In this location, the conservation fence would be located approximately 37.5 m from the centreline of Yathong Road, with a 15 m disturbance corridor (7.5 m either side). The new alignment and disturbance corridor was not assessed by Ecoplanning (Appendix A), therefore, an additional survey was completed by Dave Sturman from AREA Environmental & Heritage Consultants between 22 March and 25 March 2022 (see attachment to Appendix A). This additional survey along the new conservation fence alignment and disturbance area included:

- fauna habitat feature surveys such as hollow-bearing trees, bird nests and rock outcrops
- incidental sightings of fauna species, including any threatened species.

Results from the additional survey have been incorporated into this REF and Appendix A.

An operations base at Yathong Quarters precinct will be established for the project, including accommodation, storage and maintenance facilities. The area has been heavily disturbed and the vegetation, while not formally surveyed is mostly likely to be PCT 250 (Derived tussock grassland of the central western plains and lower slopes of NSW). There is 8.19 ha of PCT 250 in the study area.

A total of 18.31 km of internal conservation fencing within the feral predator–free area is required along existing trails. This part of the fence line alignment was not inspected and assessed as part of the ecological assessment (Appendix A). However, no vegetation removal would be required for the additional conservation fencing and therefore no further assessment was undertaken.

Fieldwork results

Field surveys recorded 22 reptiles, 87 birds, 18 mammals and no frogs. A list of fauna is included in Appendix A which shows the species detected by different survey techniques, with a detailed breakdown of species recorded per site during the survey. This included one threatened reptile, 8 threatened birds and 2 threatened mammals. A list of these species, their conservation status and the sites at which they were recorded is provided in Table 11 and shown in Figure 37.

Table 11 Threatened species recorded during the survey, their conservation status and the sites where they were identified

Species	Conservation Status (BC Act / EPBC Act)	Sites recorded (refer to Appendix A)
Western blue-tongued lizard (*Tiliqua occipitalis*)	Vulnerable	Incidental (intersection of Green Trail and Western Fire Trail)
Malleefowl (*Leipoa ocellata*)	Endangered / Vulnerable	Incidental (CWPT6732, YNR061, approx. 1.5 km east of YNR074)
Grey-crowned babbler (*Pomatostomus temporalis temporalis*)	Vulnerable	New1, New3, Yathong1, New4, New5, CWPT6732, YNR011, YNR038, YNR061, YNR080, incidental (several locations)
Shy heathwren (*Hylacola cautus*)	Vulnerable	YNR074
Chestnut quail-thrush (*Cinclosoma castanotum*)	Vulnerable	CWPT6732, CWPT6745, YNR054, YNR079
Gilbert's whistler (*Pachycephala inornata*)	Vulnerable	Incidental (near YNR079)
Southern scrub-robin (*Drymodes brunneopygia*)	Vulnerable	YNR074
Pied honeyeater (*Certhionyx variegatus*)	Vulnerable	YNR074, incidental (near Yathong1, northern boundary)
Pink cockatoo (*Lophochroa leadbeateri*)	Vulnerable	YNR038, New5, New2, incidental (New3, Yathong Rd near South West Boundary Trail)
Little pied bat (*Chalinolobus picatus*)	Vulnerable	YNR038, YNR011
Inland forest bat (*Vespadelus baverstocki*)	Vulnerable	YNR011, YNR048, YNR054, YNR038, New2

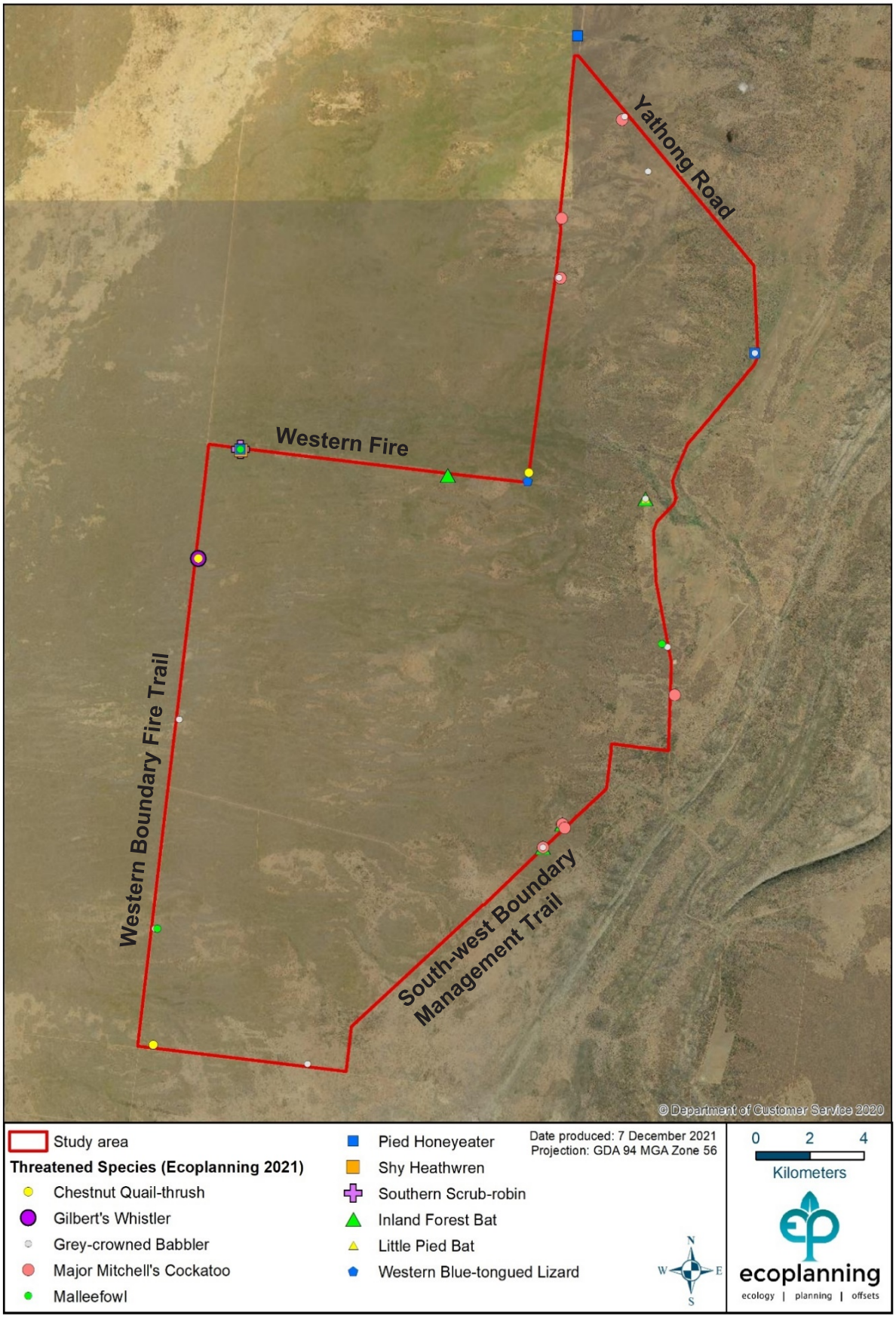

Figure 37 The location of threatened species recorded during the survey

Fauna habitat values identified within the study area that may provide refuge for native fauna are listed in Table 12.

Table 12 Key fauna habitat features present across the study area and the species that may use them

Habitat features	Fauna species
Mallee woodland	Birds, small to medium mammals, reptiles, mammals
Open woodland	Birds, small to large mammals, micro-chiropteran bats, reptiles, mammals
Open grassland	Birds, small to large mammals, reptiles and frogs
Coarse woody debris and litter beds	Birds, small mammals, reptiles and frogs
Sandy soils	Burrowing mammals, reptiles, frogs
Hollow-bearing trees	Arboreal mammals, micro-chiropteran bats, reptiles and frogs
Ephemeral watercourses	Birds, micro-chiropteran bats, reptiles and frogs

Based on the habitat values within the study area, a suite of fauna species are likely to use the study area for foraging, refuge and breeding purposes. Mallee woodlands offer habitat to a unique suite of fauna. Many species that occur in mallee community rely on this vegetation type throughout their life cycle due to the assemblage of species, vegetation structure and sandy soils.

Coarse woody debris provides a critical habitat feature for many ground-dwelling fauna. The benefit of coarse woody debris for fauna is well researched and is positively correlated with species diversity, including for many threatened fauna. Coarse woody debris was low in sand plain and linear dune mallee woodland, with total lengths in plots less than 1 m and several plots recording 0 m. Often in these communities there was high amounts of fine debris. In gum coolabah woodlands, woody debris varied from 7.5 m to 30 m within the plot.

Hollow-bearing trees were mapped 7.5 m to 10 m either side of the proposed conservation fence line. Hollow-bearing trees are a valuable resource in the landscape as they take many years to form in older growth trees and provide a limiting resource for fauna. The survey counted 525 hollow-bearing trees in the search area. Hollows were most common in *Eucalyptus intertexta* with 230 trees being hollow-bearing. Hollows were present in limbs and trunks, with several hollows in the trees with a 30–50 cm diameter at breast height. Tree hollows were also found in *E. populnea* (bimble box), *Allocasuarina cristata* (belah), *E. socialis* (red mallee), *Callitris glaucophylla* (white cypress pine) and standing dead trees, most of which were likely to be *E. intertexta*. The highest concentration of hollow-bearing trees were in the northern and eastern parts of the study area as shown in Figure 38**.**

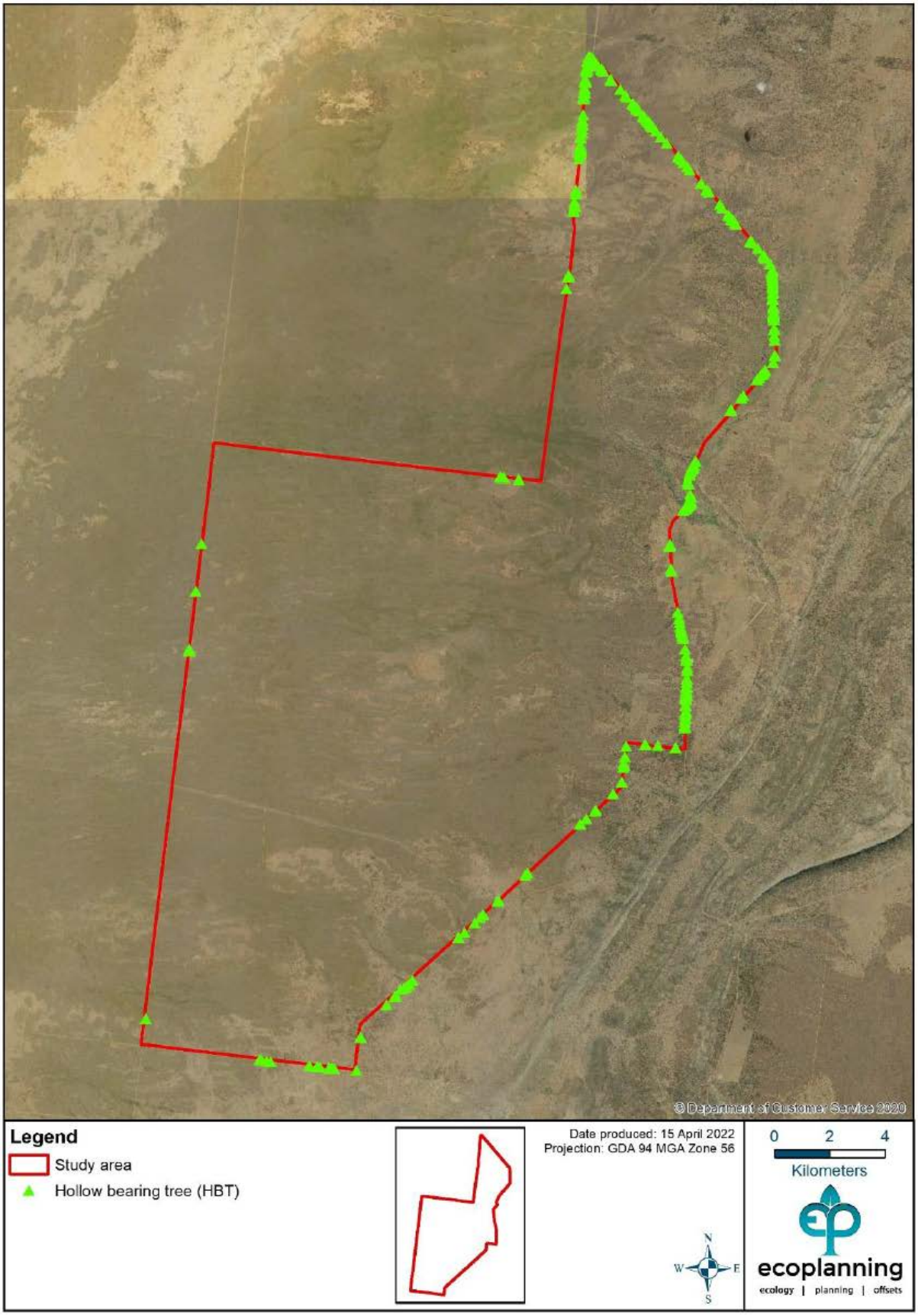

Figure 38 Hollow-bearing trees identified 7.5 m to 10 m each side of the conservation fence alignment

9.2 Cultural values

9.2.1 Aboriginal cultural heritage

An Aboriginal cultural heritage assessment report is currently being prepared for the project in accordance with the Part 6 of the NPW Act and the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010). This includes an extensive consultation process with the registered Aboriginal parties, and any other relevant stakeholders.

9.2.2 Historic heritage values

A heritage desktop assessment was undertaken by Tory Stening (Unearthed Archaeology and Heritage 2022 at Appendix C). Tory's experience and qualifications are provided in Appendix E.

The assessment included a search of the NSW State Heritage Register and the Cobar Local Environment Plan which identified that there are no listed heritage items located within the vicinity of the proposal.

There are 3 homesteads located within the general Yathong Nature Reserve locality which include Yathong Homestead, Glenlea Homestead and Irymple Homestead. While these homesteads are not listed heritage items, they potentially have heritage significance. The Irymple Homestead has been previously modified and the Glenlea Homestead is in ruins. However, the proposed works are not located in the immediate vicinity of these 2 homesteads and will not be impacted by the project, therefore no further investigation is required.

Yathong Homestead has been previously modified, however the operations base at the Yathong Quarters precinct (which includes the Shearers Quarters), will be upgraded for this project to include the establishment of the additional accommodation facilities, a new ecology/research building, new amenity blocks, rainwater tanks, upgraded wastewater system, services/utilities installation/upgrades, laydown/storage areas and any other related works. Based on concept design drawings (Figure 7), the upgrades appear to be outside the curtilage of the historic Yathong Homestead and therefore no impacts are anticipated. However, this will be confirmed during an additional site inspection being conducted by Unearthed Archaeology.

Therefore, it is recommended that:

- The proposed work will not adversely impact on the heritage significance of the study area or vicinity.
- It is not expected that any archaeological deposits or relics will be disturbed by the proposed works.
- There is no objection to the proposed works on a heritage or non-Aboriginal archaeological basis.
- Confirmation is required that the proposed upgrades to the operations base at the Yathong Quarters precinct are outside the curtilage of the historic Yathong Homestead.
- No further heritage or non-Aboriginal archaeological investigation is required in respect of the proposed works as outlined in this report.

9.3 Social values

9.3.1 Recreation values

Yathong Nature Reserve currently experiences very low levels of recreational activity, generally limited to birdwatching. Visitor facilities in the reserve are limited to trail signage and one information bay at the intersection of Bruce Cullenward Drive and Merri Road.

The reserve is exposed to some illegal activity, such as pig hunting and goat mustering.

Once established, the feral predator–free area will provide a unique visitor opportunity to learn about and observe a variety of small native mammals inhabiting a healthy ecosystem. It is important that people have such environmental education opportunities and the experience of seeing iconic animals such as bilbies, bettongs and other species in the wild. The siting and installation of low-key visitor facilities and interpretive signage will be considered after the feral predator–free area has been established.

9.3.2 Scenic and visually significant areas

Given the reserve's relatively flat topography, there is a lack of lookouts or high points. The conservation fence will be offset from roads, including Yathong Road, therefore it is not anticipated to have any significant scenic or visual impact

9.3.3 Education and scientific values

The site is frequently used by NSW Government and tertiary education organisations for a variety or research projects including the existing cat research project in the north-western part of the reserve. Monitoring of threatened species is proposed under the assets of intergenerational significance program and in Saving our Species strategies, for example strategies for the malleefowl, and these will be able to continue following the construction of the conservation fence.

The proposed activity provides an opportunity for community engagement, enhancing community awareness and understanding of our threatened species, the factors impacting on them and the benefits of a healthy native ecosystems. It also provides an opportunity for ground-breaking research in reintroduction biology and landscape / ecosystem management.

9.3.4 Interests of external stakeholders

In December 2020, the establishment of a feral predator–free area was announced to take place at Yathong Nature Reserve, in Central West NSW. This was followed by the release of a draft plan of management amendment which included Yathong Nature Reserve, Nombinnie Nature Reserve and State Conservation Area and Round Hill Nature Reserve. This amendment facilitated the establishment of a feral predator–free area. The *Central Mallee reserves draft plan of management* (NPWS 2021a) was prepared and publicly exhibited from 1 April to 5 July 2021. Following this, a finalised plan of management was adopted in October 2021 and made available publicly (NPWS 2021b).

A draft communication and engagement plan has been prepared and implemented to guide community engagement and consultation throughout the project, and in particular timely and accurate information to the community during site preparation and construction.

The communication and engagement plan includes:

- details and timing of proposed activities to affected residents and key interest groups, including changed traffic and access conditions
- contact name and number for enquiries.

All residential properties and other key stakeholders (e.g. local councils) affected by the activity will be notified at least 5 days prior to commencement of the activity.

The plan provides for continued consultation at identified stages of the project.

This REF will also be publicly exhibited to the wider community and interest groups. Any comments received will be considered when finalising the REF where appropriate.

Registered Aboriginal parties have been consulted via the Aboriginal cultural heritage assessment process as detailed in Section 9.2.1.

9.4 Matters of national environmental significance

In accordance with the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act), an action will require approval from the Minister if the action will have, or is likely to have, a significant impact on a matter of national environmental significance. These matters include:

- World Heritage properties
- National Heritage places
- wetlands of international importance (listed under the Ramsar Convention)
- listed threatened species and ecological communities
- migratory species protected under international agreements
- Commonwealth marine areas
- Great Barrier Reef Marine Park
- nuclear actions (including uranium mines)
- a water resource, in relation to coal seam gas development and large coal mining development.

As detailed in the ecological assessment report in Appendix A, matters of national environmental significance applicable to the project relate to threatened species and communities which were assessed as having a ‘high’ likelihood or were ‘present’ within the study area. These include 2 vulnerable species (the malleefowl and red-lored whistler) and one endangered ecological community (the Mallee Bird Community of the Murray Darling Depression Bioregion).

As summarised in the significant impact criteria Appendix F, the proposed action is unlikely to have a significant impact on a matters of national environmental significance and subsequent need for referral.

The Mallee Bird Community of the Murray Darling Depression Bioregion is an assemblage of birds that are dependent on the mallee vegetation that occurs in the bioregion. The Mallee Bird Community is composed of 20 bird species that includes 8 mallee specialist species and 12 mallee-dependent species, some of which are listed individually as threatened species. The loss of habitat for mallee specialists could lead to local or regional-scale extinctions, and the loss of mallee habitat for mallee-dependent species could lead to substantial declines.

The mallee specialist species are:

- black-eared miner (*Manorina melanotis*)
- chestnut quail-thrush (*Conclosoma castanotum*)
- mallee emu-wren (*Stipiturus mallee*)
- malleefowl (Leipoa ocellata)
- red-lored whistler (Pachycephala rufogularis)

- scarlet-chested parrot (*Neophema splendida*)
- striated grasswren (*Amytonis striatus*) (note now mukarrthippi grasswren [*A. striatus striatus*])
- mallee western whipbird (*Psophodes nigrogularis*).

The mallee-dependent species are:

- crested bellbird (*Oreoica gutturalis*)
- grey-fronted honeyeater (*Ptilotula plumula*)
- jacky winter (Microeca fascinans)
- purple-gaped honeyeater (*Lichenostomus cratitius*)
- regent parrot (Polytelis anthopeplus)
- shy heathwren (Calamanthus cautus)
- southern scrub-robin (*Drymodes brunneopygia*)
- splendid fairy-wren (*Malurus splendens*)
- spotted pardalote (*Pardalotus punctatus*)
- white-eared honeyeater (*Nesoptilotis leucotis*)
- white-fronted honeyeater (*Purnella albifrons*)
- yellow-plumed honeyeater (*Ptilotula ornata*).

10. Impact assessment

10.1 Physical and chemical impacts during construction and operation

Is the proposed activity likely to…	Applicable?*	Impact level (negligible, low, medium or high; negative or positive; or NA)	Reasons (describe the type, nature and extent of impact, taking into account the receiving environment & proposed safeguards which will limit the impact)	Safeguards/mitigation measures
1. Impact on soil quality or land stability?	☒	Construction – low to medium; negative Construction – low; negative	Approximately 137.41 ha of native vegetation would be removed, and 54.20 ha of non-native vegetation which also includes roads/disturbed areas. This represents a small portion (0.12%) of the total area of Yathong Nature Reserve being 115,604 ha, and even a smaller portion across the entire Central Mallee Reserves. During construction, there is potential for loss of soil quality and stability through the removal of vegetation and ground cover along the conservation fence line and additional accommodation facility site. Once these areas have been disturbed, and the soil is exposed, the risk of erosion and sedimentation -related issues is increased, although the soil landscape is still considered to have relatively low erosivity. This includes the generation of sediment -laden water and transportation of sediments into drainage/hydro-lines and/or creeks. Access track construction, realignment and maintenance of the conservation fence easement may also compact ground surfaces, increasing runoff potential. These impacts will be limited to the 15 m disturbance corridor around the conservation fence line.	• A construction environmental management plan (CEMP) will be prepared to address: o any requirements associated with statutory approvals o details of how the project will implement the identified safeguards outlined in the REF o issue-specific environmental management plans. • Works will be undertaken in accordance with the following (where applicable): o NPWS Erosion and sediment control on unsealed roads – a field guide for erosion and sediment control maintenance practices on unsealed roads (OEH 2012) o *Managing urban stormwater: soils and construction,* volume 1, 4th edition (Landcom 2004, also known as the ‘blue book’) • Erosion and sediment control plans (ESCP) are to be developed for high risk areas e.g. waterways. ESCPs must detail erosion and sediment controls which are required to be installed, timings, inspection details etc.

Is the proposed activity likely to…	Applicable?*	Impact level (negligible, low, medium or high; negative or positive; or NA)	Reasons (describe the type, nature and extent of impact, taking into account the receiving environment & proposed safeguards which will limit the impact)	Safeguards/mitigation measures
		Operation – negligible; negative	During the site inspection on 21 February 2011, a pile of crushed and broken up concrete was observed along Yathong Road as shown in Figure 12and Figure 13. This appeared to be along or in the immediate vicinity of the alignment. The concrete pile was located on the western side of Yathong Road, immediately to the south of unnamed creek #1. While the source of the concrete is unknown, it may have originated from a previous causeway which crossed Yathong Road. A visual inspection of the concrete pile did not uncover any indication of contamination (including asbestos), however this will need to be verified when/if the concrete pile is disturbed or removed during construction. This is also detailed in Section 9.	• Any temporary soil/spoil stockpiles are to be adequately stabilised/covered and not located in or adjacent to waterways and drainage/hydro-lines. • Works should not take place during or following heavy rain events (other than work necessary to ensure that soil erosion is minimised). Works should not be scheduled when heavy rainfall is forecast. • Erosion and sediment controls will be left in situ until the excavated surfaces are stable. • Where possible, all foot traffic and light vehicle movements will be confined to existing management trails or the clearing corridor constructed for the conservation fence line. • The site supervisor, through site inductions, will make all personnel aware of risks and responsibilities related to spills of fuel, oil and other chemicals that may be required onsite. Machinery and vehicles will be inspected on a daily basis giving particular attention to the condition of hoses and connections. • An emergency spill kit must be kept on site at all times. Staff and contractors using machinery must be made aware of the location of the spill kit and trained in its use. • Hay bales will only be used as an erosion control method if they are certified weed-free. • In the long term, the control of feral herbivores and restoration of ecological processes should reduce soil erosion across the proposal area.
		Operation – medium; positive	The access tracks will be designed to include controls which minimise erosion and sediment related issues in accordance with the NPWS *Erosion and sediment control on unsealed roads – a field guide for erosion and sediment control maintenance practices on unsealed roads* (OEH 2012) and *Managing urban stormwater: soils and construction* (Landcom 2004, also known as the 'blue book'). This may include table drains, mitre drains, rollovers etc. Ongoing maintenance of access tracks will be required. The removal of predators and other herbivores fauna species will likely provide an improvement to soil conditions throughout the site due to reduced pressure from grazing and burrowing from rabbits.	

Is the proposed activity likely to…	**Applicable?***	**Impact level** (negligible, low, medium or high; negative or positive; or NA)	**Reasons** (describe the type, nature and extent of impact, taking into account the receiving environment & proposed safeguards which will limit the impact)	**Safeguards/mitigation measures**
			With safeguards, these potential impacts are expected to be minimised and managed to an appropriate level (i.e. not significant).	• Where possible, ground vegetation will be retained to minimise soil disturbance. • Erosion and sediment controls are to be periodically inspected during both construction and operation to ensure they are functioning as designed. • Imported fill/soil must not be contaminated and must be suitable for use on site. Imported rock/gravel is to be free from contamination, natural quarry material (not recycled aggregate) and where possible, sourced locally. • If the concrete stockpile (Figures 12 and 13) is to be disturbed or removed during construction, it should be inspected for contamination, classified in accordance with the EPA *Waste classification guidelines* (EPA 2014), and disposed of at an appropriately licensed waste facility. • An unexpected contamination finds procedure is to be developed and implemented throughout construction. This should include immediate actions and reporting requirements.
2. Affect a waterbody, watercourse, wetland or natural drainage system – either physically or chemically (e.g. due to runoff or pollution)?	☒	Construction – low to medium; negative	Construction works for the conservation fence installation will be required within Keginni Creek and several unnamed drainage/hydro-lines. Works which have the potential to generate sediment --laden water runoff include vegetation clearing (along alignment), post hole excavation, access track upgrade (where required) and rock installation at the base of the conservation fence line/creek bed. If the works are not designed or constructed properly, there is potential for scouring and erosion to occur within the creek/drainage lines around the conservation fence structure.	• As previously stated, a specific ESCP should be developed for works within waterways shown in Figure 23, i.e. Keginni Creek and unnamed creeks #1 to #5. • Ground disturbance works are not to occur within Keginni Creek and unnamed creeks #1 to #5 immediately prior to, during or immediately after significant rainfall. If water is observed within the waterway, which would result in significant sediment-laden water generation, works are not to proceed.

Is the proposed activity likely to…	Applicable?*	Impact level (negligible, low, medium or high; negative or positive; or NA)	Reasons (describe the type, nature and extent of impact, taking into account the receiving environment & proposed safeguards which will limit the impact)	Safeguards/mitigation measures
		Operation – low; negative	There is also very low risk for oil/hydrocarbon spills resulting in water and or soil contamination. During operation, if maintenance of access tracks is not completed, there is potential for ongoing erosion and sediment-laden water generation to occur. Flood events may also cause road washouts. With safeguards, these potential impacts are expected to be minimised and managed to an appropriate level (i.e. not significant).	• A spill kit is to be on site at all times and ready for deployment in the event of a spill. This is particularly important when working in or adjacent to waterways. • Fuels and chemicals must be stored in an impervious bunded area a minimum of 50 m away from: o rivers, creeks or any areas of concentrated water flows o flooded or poorly drained areas o slopes above 10%. • There must be no release of dirty water into drainage/hydro-lines and/or waterways. • Visual monitoring of local water quality (i.e. turbidity, hydrocarbon spills/slicks) must be carried out on a regular basis to identify any potential spills or deficient erosion and sediment controls. • Concreting for conservation fence footings is not to occur in areas where there is free-standing water, or when significant rainfall is imminent. Concrete washouts to occur in contained receptacles and not within, or immediately adjacent to waterways. • The design of roads/trails within waterways is to consider controls to minimise the risk of a washout during flood events in accordance with relevant standards including RFS *Fire trail design, construction and maintenance manual* (SCS 2017), and the blue book (Landcom 2004).

Is the proposed activity likely to…	Applicable?*	Impact level (negligible, low, medium or high; negative or positive; or NA)	Reasons (describe the type, nature and extent of impact, taking into account the receiving environment & proposed safeguards which will limit the impact)	Safeguards/mitigation measures
3. Change flood or tidal regimes, or be affected by flooding?	☒	Construction – low; negative Operation – low to medium; negative	During construction, there is potential for flood events to inundate work areas, plant/equipment and material storage areas. This may result in release of chemicals/fuels, materials being swept downstream and damage to plant, equipment and materials. Due to the conservation fence alignment being located within Keginni Creek (4 order creek) and various drainage/hydro-lines (typically 1st and 2nd order creeks), there is potential for negative flooding impacts if not managed correctly. However as detailed in Section 9.1.3, many of these waterways, including Keginni Creek, are ephemeral and have no defined bank profile and only flow during significant rainfall events. Impacts include: • poor design resulting in flow restrictions e.g. inappropriate chain wire sizing, excessive installation of rock causing a dam effect etc. • debris build-up along the conservation fence line causing blockages, deposition of sediment, redirection of flows etc. • damage to conservation fence from floating debris. With safeguards, these potential impacts are expected to be minimised and managed to an appropriate level (i.e. not significant).	• Weather forecasts to be checked regularly to best plan for rainfall events during construction. • If flooding is likely, plant, equipment and materials are to be demobilised or moved to a location away from potential flood waters. • Inspections of site following rain events to determine suitability for construction works. If deemed unsafe, no work to be undertaken in wet conditions. • The conservation fence and other infrastructure located within waterways (Keginni Creek and unnamed creeks #1 to #5) will be designed to allow water flows to freely pass through without causing any flooding impacts. • Investigate the feasibility of snag posts, which are located in waterways, and could potentially be installed directly upstream of the conservation fences. This may minimise the risk of the conservation fence being damaged by floating woody debris during flood events. • Operational procedures are to be developed which include provisions for inspecting the conservation fences after heavy rainfall to ensure there are no blockages, debris build-up or other maintenance requirements.
4. Affect coastal processes and coastal hazards, including those under climate change	☐	N/A	N/A	N/A

Is the proposed activity likely to…	Applicable?*	Impact level (negligible, low, medium or high; negative or positive; or NA)	Reasons (describe the type, nature and extent of impact, taking into account the receiving environment & proposed safeguards which will limit the impact)	Safeguards/mitigation measures
projections (e.g. sea level rise)?				
5. Involve the use, storage or transport of hazardous substances, or use or generate chemicals which may build up residues in the environment?	☒	Construction – low; negative	During construction, bulk chemicals would not be stored on site. The CEMP will address correct storage and handling of hazardous materials. Minor storage of essential chemicals and fuels, such as fuel for minor machinery and equipment will be carried out, however, will be temporary during construction. Therefore, the potential for spills from chemicals and fuels within the subject site would be minimal.	• Liquids and chemicals would be stored within the designated bunded areas and not located within or in the immediate vicinity of waterways. • Minor refuelling in the field may be undertaken, at least 40 m from waterways. Drip trays/pads are to be used to capture any minor fuel drips. • Bunded areas would be at a 120% capacity of liquids within the area. • Spill kits will be located in each vehicle as well as at each site compound and managed by the contractor. • Vehicles, plant, equipment and machinery would be regularly checked/maintained in accordance with manufacturer specifications. Daily visual checks should also be undertaken to identify any leaks/spills. • Poison, herbicide and insecticides are to be managed and stored, applied and overall managed in accordance with the applicable NPWS guidelines.
		Operation – low; negative AND	During operation, poisons used in the control of vertebrate pests (e.g. 1080 for control of foxes and wild dogs) will be used in line with the strict NPWS regulations on storage, administration and disposal. Some selective herbicides may be used for the control of noxious weeds, should infestations occur. If not stored or applied correctly, there is potential for spillage into the environment or non-target species impact. However, if managed correctly, these activities will have a positive impact by reducing weeds and pest species populations.	
		Operation – medium; positive	These practices are consistent with those already used at this site by NPWS and adherence to mitigation measures will ensure negligible impact.	
6. Involve the generation or disposal of gaseous, liquid or solid wastes or emissions?	☒	Construction – low; negative	During construction, the below emissions and waste streams will likely be generated: • Vegetation/green waste – this will either be reused on site (erosion and sediment control, windrows, mulch) or disposed off site.	• The waste hierarchy will be applied, giving preference to avoidance and beneficial reuse of waste where possible.

Is the proposed activity likely to…	Applicable?*	Impact level (negligible, low, medium or high; negative or positive; or NA)	Reasons (describe the type, nature and extent of impact, taking into account the receiving environment & proposed safeguards which will limit the impact)	Safeguards/mitigation measures
		Operation – low; negative	• General construction waste, including conservation fencing offcuts, concrete washout waste, packaging waste, spent tool waste, pallets, general rubbish from workers etc. This waste will be disposed of off site. • Spoil/soil waste from civil works – this will be classified and disposed of at a suitably licensed facility. • A small amount of liquid waste may be generated if servicing/maintenance of plant and equipment is required. This waste will be disposed of off site. • Emissions will be generated from vehicles, plant/equipment, generators etc., however this is anticipated to be minimal. As shown in Section 9.1.2, a pile of broken up/crushed concrete is present adjacent to unnamed creek #1 which may need to be disposed of or relocated during the construction of the conservation fence. During operation, the following waste streams are anticipated: • waste associated with any repairs/maintenance required along the conservation fence line • general household waste generated at the operations base at the Yathong Quarters precinct (including the additional accommodation facilities) • animal carcasses associated with pest management works. With safeguards, these potential impacts are expected to be minimised and managed to an appropriate level (i.e. not significant).	• Shrubs and small trees to be mulched if suitable and reused on site. Tannin-producing species will do not be used as mulch near waterbodies. • All waste is to be classified and managed in accordance with the NSW *Protection of the Environment Operations Act 1997* and Regulations. This includes classification in accordance with the EPA *Waste classification guidelines* (EPA 2014). In particular, spoil waste requires testing and classification prior to removing from site e.g. virgin excavated natural minerals, excavated natural material general solid waste. • Waste is to only be disposed of at suitably licensed waste disposal facilities. • Waste tracking records will be maintained. • Waste will be stored in suitable receptacles at designated waste storage areas. This includes cigarette butts (however, it is noted that under NPWS policy, smoking is not allowed in any national park or reserve). • Work sites are to be generally kept clean and will be free of litter. • The project and contractors will use new vehicles with modern low-emission standards. • Contract requirements will enforce fencing contractors to collect and remove all construction waste (offcuts, cutting wheels, etc.) from site and disposal at a licensed facility. • The conservation fence material order has specified that all netting for conservation fence lines is to be

Is the proposed activity likely to…	Applicable?*	Impact level (negligible, low, medium or high; negative or positive; or NA)	Reasons (describe the type, nature and extent of impact, taking into account the receiving environment & proposed safeguards which will limit the impact)	Safeguards/mitigation measures
				packaged without plastic wrapping, to avoid breakdown and disposal of this material on site. • Oil, paints and other liquid wastes will be stored at appropriate facilities near the operations base at the Yathong Quarters precinct and transported to a licensed liquid waste facility. • If the concrete stockpile (Figures 12 and 13) is to be disturbed or removed during construction, it should be inspected for contamination, classified in accordance with the EPA *Waste classification guidelines*, and disposed of at an appropriately licensed waste facility.
7. Involve the emission of dust, odours, noise, vibration or radiation?	☒	Construction – low, negative	During construction, the following will be generated: • **Dust** – ground disturbance works such as vegetation clearing, access track construction, post footing excavation, transported soil/spoil, gate pad construction andupgrades at the Yathong Quarters will likely generate dust emissions. However, the disturbance area is relatively small and there are no 'sensitive receivers' (DECC 2009) located in the vicinity of the project. Therefore, impacts associated with dust are anticipated to be minimal. Dust deposition of vegetation may also occur. • **Odour** – Odour emissions may be generated from waste storage areas and amenities, however these are anticipated to have negligible impacts. • **Noise** – Noise will be generated from plant and equipment being used for vegetation clearing, access track construction, conservation fence	• Ground disturbance works are to be minimised and limited to the conservation fence alignment, management trails and the operations base at the Yathong Quarters precinct. This will minimise exposed areas that have the potential to generate dust. • If significant dust is being generated from works, and is causing impacts, dust suppression techniques may be employed e.g. water carts, polymer application, stabilisation of exposed areas with mulch. • Vehicles transporting waste or other materials that may produce dust shall be covered during transportation. • Should wind and climatic conditions be such that dust cannot be controlled, and control strategies are not possible, then dust-generating work would cease.

Is the proposed activity likely to…	Applicable?*	Impact level (negligible, low, medium or high; negative or positive; or NA)	Reasons (describe the type, nature and extent of impact, taking into account the receiving environment & proposed safeguards which will limit the impact)	Safeguards/mitigation measures
			installation etc. Plant and equipment which may be used include excavators, tippers, trucks, light vehicles/4WDs, piling (auger), concrete trucks, compounds etc. No night works are anticipated. There are no sensitive receivers located in the vicinity of the works therefore noise impacts are anticipated to be negligible. • **Vibration** – no vibration-intensive activities are anticipated for the works therefore no impacts are anticipated. • **Radiation** – no radiation impacts are anticipated for the works. During operation, small quantities of dust may be generated from previously disturbed areas such as access tracks. However, this is expected to be minimal. With safeguards, these potential impacts are expected to be minimised and managed to an appropriate level (i.e. not significant).	• Construction activities to be restricted to the period 7 am to 6 pm Monday to Friday and Saturdays 8 am to 1 pm. No works would occur on Sundays or public holidays. • All vehicles and machinery will comply with industry noise guidelines.
		Operation – negligible, negative		

10.2 Biodiversity impacts during construction and operation

Is the proposed activity likely to…	Applicable?*	Likely impact (negligible, low, medium or high; negative or positive; or NA)	Reasons (describe the type, nature and extent of the impact, the nature of the receiving environment and any proposed safeguards which will limit the impact)	Safeguards/mitigation measures
1. Affect any declared area of outstanding biodiversity value or critical habitat?	☐	N/A	An asset of intergenerational significance (Site AIS_E0_285) has been declared for the Mukarrthippi grasswren protecting approximately 40 ha of sand dune complex in the central western part of the proposed feral predator–free area. The fence alignment and disturbance area will not enter the asset area and therefore no impacts are anticipated. The project will not impact any other declared areas of outstanding biodiversity value or critical habitat.	The fence alignment and disturbance area will not enter or otherwise impact the asset of intergenerational significance (AIS_E0_285) which has been declared for the mukarrthippi grasswren.
2. Result in the clearing or modification of vegetation, including ecological communities and plant community types of conservation significance?	☒	Construction – low; negative	During construction, up to 137.41 ha of native vegetation would be removed, and 54.20 ha of non-native vegetation which also includes roads/disturbed areas, allowing for the protection of approximately 39,230 ha of vegetation. The conservation fence line has been purposely designed taking into consideration the local conditions including vegetation. The conservation fence line easement will be approximately 15 m wide allowing for a 7.5 m wide access track on each side of the conservation fence. This maximum width will allow for safe vehicle access on each side of the conservation fence, provides a buffer from any potential tree and branch falls, and acts as a fire break in the event of a wildfire incident. A list of each plant community type and the amount of clearing for each is listed below (see Table 7): • PCT 49 – 5.54 ha • PCT 57 – 11.87 ha	The following safeguards and mitigation measures have already been or are to be implemented. Where they are yet to be implemented, they should be incorporated into the projects CEMP. • The conservation fence alignment has been located adjacent to existing access tracks to minimise vegetation clearing and subsequent ecological impacts wherever possible. This includes utilisation of existing cleared tracks and conservation fence lines in preference to disturbing new areas. • Prior to vegetation clearing works, a survey of the proposed fence alignment should be undertaken to identify where any minor adjustments to the conservation fence alignment can be made to avoid areas of native vegetation, or large native trees, wherever practicable. • The vegetation clearing protocol detailed in Section 7.2.3 is to be implemented.

Is the proposed activity likely to…	Applicable?*	Likely impact (negligible, low, medium or high; negative or positive; or NA)	Reasons (describe the type, nature and extent of the impact, the nature of the receiving environment and any proposed safeguards which will limit the impact)	Safeguards/mitigation measures
		Operation – high; positive	• PCT 72 – 2.26 ha • PCT 104 – 33.86 ha • PCT 105 – 2.86 ha • PCT 165 – 2.45 ha • PCT 171 – 24.12 ha • PCT 173 – 30.52 ha • PCT 174 – 15.73 ha • PCT 250 – 8.19 ha • Non-native vegetation and roads/disturbed areas – 54.20ha. None of the above PCTs are considered threatened ecological communities (TECs) under the BC Act or EPBC Act. Some indirect minor impacts on vegetation are also likely including edge effects, traffic, soil erosion and weed establishment. Proposed safeguards are likely to adequately manage these risks. During operation, significant positive impacts on vegetation will arise as a result of the removal of feral animals, and the restoration of ecological processes as a result of reintroduced small mammals. The area/vegetation within the feral predator free–area will be passively rehabilitated by removing feral animals (particularly feral herbivores) which degrade the land (see Section 7.2.6). Further, active rehabilitation works, such as weed management, will be undertaken at various stages when required during operation which will further rehabilitate land and vegetation within the feral predator free–area.	• Vegetation clearing limits, no-go zones and/or trees for retention/removal should be clearly delineated to ensure unapproved vegetation clearing does not occur. This should be incorporated into the project's CEMP. • A pre-clearing inspection should be completed by a suitably experienced and qualified ecologist prior to clearing. Any identified fauna should be relocated. • A detailed ecological monitoring regime has been outlined in the draft overarching ecological health monitoring framework (DPE 2022a), which sets out annual monitoring methods which will be used to document and describe changes to threatened species abundance and populations, plus detect new species that may visit or establish. Note – Hollow-bearing tree controls are detailed in row 3 of this table.

Is the proposed activity likely to…	Applicable?*	Likely impact (negligible, low, medium or high; negative or positive; or NA)	Reasons (describe the type, nature and extent of the impact, the nature of the receiving environment and any proposed safeguards which will limit the impact)	Safeguards/mitigation measures
3. Endanger, displace or disturb terrestrial or aquatic fauna, including fauna of conservation significance, or create a barrier to their movement?	☒	Construction – low; negative	During construction, approximately 137.41 ha of native vegetation will be removed for the project which will potentially impact on fauna species as detailed below: • Direct impacts as a result of clearing the conservation fence line and works at the operations base at Yathong Quarters, with the potential to affect less-mobile fauna occupying soil and vegetation such as reptiles, invertebrates, frogs and small terrestrial mammals. • Habitat loss by the removal of vegetation and up to 525 hollow-bearing trees and woody debris. Note – the survey area for hollow-bearing trees was 7.5 m to 10 m either side of the conservation fence alignment (to account for any future conservation fence alignment changes), therefore the number of hollow-bearing trees to be removed is expected to be lower. The loss of habitat trees and woody debris is not significant in the context of availability of habitats in the feral predator–free area and with implementation of the safeguards/mitigation measures. • Short-term disturbance during the works to any noise-sensitive species. Impact assessments (Appendix A) were completed for all threatened fauna species and communities listed under the BC Act or EPBC Act known to occur, or likely to occur in the feral predator–free	The following safeguards and mitigation measures have already been or are to be implemented. Where they are yet to be implemented, they should be incorporated into the projects CEMP. • Where possible, the conservation fence alignment has been located adjacent to existing access tracks to minimise further vegetation clearing and subsequent ecological impacts. This includes utilisation of existing cleared tracks and conservation fence lines in preference to disturbing new areas. • An assessment of significance was completed for relevant threatened species (Appendix A) which confirmed that no significant impact is anticipated. • Any large trees which are felled during the project, are to be placed within the Yathong Nature Reserve to provide potential future habitat for fauna species (large woody debris). This is further detailed in Sections 7.2.3 and 9. • Any woody debris which will be impacted by the works are to be relocated within the Yathong Nature Reserve to provide potential future habitat for fauna species. This is further detailed in Sections 7.2.3 and 9. • Where possible, minor adjustments to the conservation fence alignment to avoid hollow-bearing trees (shown in Figure 38) should be undertaken wherever practicable. • An ecologist is to be present when habitat trees (as shown in Figure 38) or other fauna habitat are

Is the proposed activity likely to…	Applicable?*	Likely impact (negligible, low, medium or high; negative or positive; or NA)	Reasons (describe the type, nature and extent of the impact, the nature of the receiving environment and any proposed safeguards which will limit the impact)	Safeguards/mitigation measures
		Operation – high; positive	area. These assessments suggest that there will be no significant impact to any of these threatened species. Any impacts can be adequately managed with implementation by the safeguards/mitigation measures listed in this section. During operation, the project's explicit aims are to remove feral predators and reintroduce extinct animals, thus improving their plight and restoring ecosystem processes which are also of benefit to other threatened species found in the area which provides a positive impact. This project is closely aligned with many of the NSW Government management actions for key threatened species such as providing safe havens from feral predators, and thus are expected to benefit most, if not all threatened animal species which have been identified from the feral predator–free area.	relocated or destroyed to ensure that any encountered fauna is appropriately handled/managed. This is further detailed in Sections 7.2.3 and 9. • The removal of hollow-bearing trees is to be completed in accordance with procedures outlined in Section 7.2.3. • A pre-clearing inspection should be completed by a suitably experienced and qualified ecologist prior to clearing. Any identified fauna should be relocated. Proposed clearing limits and areas should be verified prior to clearing. This is further detailed in Sections 7.2.3 and 9. • A detailed ecological monitoring regime has been outlined in the draft overarching ecological health monitoring framework (DPE 2022a), which sets out annual monitoring methods which will be used to document and describe changes to threatened species abundance and populations, plus detect new species that may visit or establish.
		Operation – low; negative	However, the conservation fence line would also create a barrier to movement for a small number of fauna species that cannot pass through the conservation fence. These potential negative impacts would not be significant, particularly when the proposed safeguards are taken into account. The positive impacts of the proposed project are significant. The conservation fence alignment crosses a number of ephemeral waterways as shown in Figure 23 which likely only flow during significant rainfall and flood events. No significant ponds or wet sections were observed during the site survey.	• Care has been taken in conservation fence design and layout to mitigate the potential impacts on macropods and emus from conservation fenced barriers. One-way exit gates, conservation fence intersections and angles and other infrastructure has been designed with these welfare considerations in mind. • The design of the conservation fence through waterways (Keginni Creek and unnamed creeks #1 to #5) will be designed to allow the water to freely flow through the conservation fence meshing.

Is the proposed activity likely to…	Applicable?*	Likely impact (negligible, low, medium or high; negative or positive; or NA)	Reasons (describe the type, nature and extent of the impact, the nature of the receiving environment and any proposed safeguards which will limit the impact)	Safeguards/mitigation measures
			Therefore, the presence of resident aquatic fauna (such as fish) in these waterways and drainage/hydro-lines is unlikely. If there is any aquatic fauna present, they are likely to be small enough to freely pass through the conservation fence e.g. crustaceans, polychaetes etc. As detailed in Section 9.1.3, many of the waterways are 1st or 2nd order streams, however Keginni Creek is classified as a 4th order stream due to the large upstream network of minor ephemeral drainage/hydro lines.	Meshing will be appropriately sized to allow the movement of any small aquatic fauna, whilst still preventing access of larger feral species.
4. Result in the removal of protected flora or plants or fungi of conservation significance?	☐	N/A	While 2 protected flora species were identified in the NSW BioNet Atlas search (see Section 9 and Appendix A), they were not observed during the ecological survey and are unlikely to occur within the study area and therefore no impacts are anticipated.	N/A
5. Contribute to a key threatening process to biodiversity or ecological integrity?	☒	Construction – low; negative	During construction, up to 137.41 ha of native vegetation and up to 525 hollow-bearing trees will be removed for the project contributing to the following key threatening processes listed under the BC Act. • Clearing of native vegetation • Loss of hollow-bearing trees Note – the survey area for hollow-bearing trees was 7.5 m to 10 m either side of the conservation fence alignment (to account for any future conservation fence alignment changes), therefore the number of hollow-bearing trees to be removed is expected to be lower.	As detailed in earlier sections of this table and also in Section 9.

Is the proposed activity likely to…	Applicable?*	Likely impact (negligible, low, medium or high; negative or positive; or NA)	Reasons (describe the type, nature and extent of the impact, the nature of the receiving environment and any proposed safeguards which will limit the impact)	Safeguards/mitigation measures
		Operation – high; positive	However, these impacts are considered to be minor due to the significant amount of vegetation (115,604 ha) and hollow-bearing trees still available within Yathong Nature Reserve. The removal of native vegetation and those hollow-bearing trees allows for construction of a conservation fence which has significant positive impacts as detailed below. During operation, the project's explicit aims are to remove cats, foxes, rabbits, goats and pigs and reintroduce locally extinct animals, thus improving their plight and restoring ecosystem processes which are also of benefit to other threatened species found in the area, which provides a positive impact. This also has a positive contribution to minimising the effects of the following key threatening processes listed under the BC Act. • Competition and grazing by the feral European rabbit (*Oryctolagus cuniculus*) • Competition and habitat degradation by feral goats (*Capra hircus*) • Predation by the European red fox (*Vulpes vulpes*) • Predation by the feral cat (*Felis catus*) • Predation, habitat degradation, competition and disease transmission by feral pigs (*Sus scrofa*).	
6. Introduce weeds, pathogens, pest animals or genetically	☒	Construction – low, negative	During construction, the introduction and/or spread of weeds and pathogens species could occur via the below activities:	The following safeguards and mitigation measures have already been or are to be implemented. Where they are yet to be implemented, they should be incorporated into the projects CEMP.

Is the proposed activity likely to…	Applicable?*	Likely impact (negligible, low, medium or high; negative or positive; or NA)	Reasons (describe the type, nature and extent of the impact, the nature of the receiving environment and any proposed safeguards which will limit the impact)	Safeguards/mitigation measures
modified organisms into an area?		Operation – High; positive	• Plant/equipment being used to construct the conservation fence has weed seed contained within it which is spread to other areas of Yathong Nature Reserve. • Vegetation clearing in areas with existing weed infestations allowing for the dispersal and spread of weed seeds. Weeds of National Significance (WoNS) located within the feral predator–free area include African Boxthorn (*Lycium ferocissimum*) and Prickly Pear (*Opuntia stricta)*. • Ground disturbance and vegetation clearing will potentially create sites/areas for weed invasion. With the implementation of the listed mitigation measures, weed and pathogen impacts are anticipated to be minimal. During operation, the objective of the conservation fence is to eradicate pest species including rabbits, pigs, goats, cats and foxes therefore there will be a significant positive impact associated with the project. No genetically modified organisms are to be used at any stage of the project.	• All vehicles, machinery and equipment entering the site (prior to arrival) are to be thoroughly cleaned inside and out to reduce potential for weed seed spread. • Prior to commencing work on the site, all vehicles and equipment will be delivered to and inspected as cleaned in a common inspection area. Any additional cleaning prior to commencement of works will be undertaken in the common inspection area. • Vehicles and equipment working within the construction zone will be inspected daily with any identified weed seeds or segments removed and disposed of appropriately. • The area of disturbance and immediate surrounds will be continually monitored during and after construction activities to identify and control any weed populations that have established as a result of works. Particular focus will be on eradication of any establishment of WoNS in the area of disturbance. • All weed incursions will be monitored and controlled by a person experienced in weed management. • Vegetation clearing in areas which have weed infestations, are not to be reused as mulch. This vegetation waste is to be adequately disposed/managed to ensure weeds are not spread. If being removed offsite, it is to be disposed of at an appropriately licensed waste facility.

Is the proposed activity likely to…	Applicable?*	Likely impact (negligible, low, medium or high; negative or positive; or NA)	Reasons (describe the type, nature and extent of the impact, the nature of the receiving environment and any proposed safeguards which will limit the impact)	Safeguards/mitigation measures
				• Imported rocks, soil or other relevant material are to be free of weed and seeds as much as practicable. • Prepare and/or implement weed management strategy aimed at suppressing and eradicating existing weed populations and preventing establishment of new weeds along conservation fence alignments. Contractors will be provided with inductions to assist them to identify high threat weeds.

10.3 Community impacts during construction and operation

Is the proposed activity likely to…	Applicable?*	Likely impact (negligible, low, medium or high; negative or positive; or N/A)	Reasons (describe the type, nature and extent of the impact, the nature of the receiving environment and any proposed safeguards which will limit the impact)	Safeguards/mitigation measures
1. Affect community services or infrastructure?	☒	Construction – negligible; negative	During construction, works will be occurring adjacent to the road reserve, however impacts to road users are considered unlikely/negligible. Yathong Road will be used to transport materials to the project site, however due to the minimal number of people that use Yathong Road, impacts are again considered to be unlikely and negligible. Road closures are not anticipated for the project.	N/A
2. Affect sites important to the local or broader community	☒	Construction – low; negative	During construction, the feral predator–free area in Yathong Nature Reserve will be closed to the public. As the reserve's primary purpose is to	• During construction, signage around the reserve should indicate why it is closed, a brief summary of

Is the proposed activity likely to…	Applicable?*	Likely impact (negligible, low, medium or high; negative or positive; or N/A)	Reasons (describe the type, nature and extent of the impact, the nature of the receiving environment and any proposed safeguards which will limit the impact)	Safeguards/mitigation measures
for their recreational or other values or access to these sites?		Operation – low; positive and negative Operation – medium; positive	conserve ecosystems, species, communities or natural phenomena the impact on recreational use by the public is minimal. Yathong Nature Reserve currently experiences very low levels of recreational activity, generally limited to birdwatching. Visitor facilities in the reserve are limited to trail signage and one information bay at the intersection of Bruce Cullenward Drive and Merri Road. The reserve is exposed to some illegal activity, such as pig hunting and goat mustering. Therefore, during construction, recreational, social and community impacts related to the closure of the feral predator–free area within Yathong Nature Reserve are anticipated to be low. Once construction of the conservation fence is completed, the enclosed feral predator–free area in Yathong Nature Reserve will generally not be accessible by the general public, however there is potential for a unique visitor opportunity to learn about and observe a variety of small native mammals. However due to the previously stated low levels of current recreational use, recreational, social and community impacts related to the closure of the feral predator–free area within Yathong Nature Reserve are anticipated to be low. The reserve's remote location provides potential as a western NSW tourist destination, which would allow for improved awareness and understanding of threatened species, ecological communities, threatening processes and their management.	the project, and that future access will be possible in some form. • A draft communication and engagement plan has been prepared and implemented to guide community engagement and consultation throughout the project, and in particular timely and accurate information to the community during site preparation and construction. The communication and engagement plan will include (as a minimum): o details and timing of proposed activities to affected residents and key interest groups, including changed traffic and access conditions o contact name and number for enquiries. • All residential properties and other key stakeholders (e.g. local councils) affected by the activity will be notified at least 5 days prior to commencement of the activity. • The plan provides for continued consultation at identified stages of the project. • Following establishment of the feral predator–free area, the area may be open to the public in some capacity. Options to enable public access to and interpretation of the feral predator–free area within Yathong Nature Reserve are to be investigated. • NPWS is to continue to undertake and promote scientific and education use of the Yathong Nature Reserve.

Is the proposed activity likely to…	Applicable?*	Likely impact (negligible, low, medium or high; negative or positive; or N/A)	Reasons (describe the type, nature and extent of the impact, the nature of the receiving environment and any proposed safeguards which will limit the impact)	Safeguards/mitigation measures
			Options to enable public access to and interpretation of the feral predator–free area within Yathong Nature Reserve are to be investigated. With regard to scientific and educational value, the reserve is frequently used by tertiary education organisations for a variety or research projects. Some monitoring of threatened species is proposed under the assets of intergenerational significance program and Saving our Species strategies, e.g. for the malleefowl. These programs will be able to continue following the construction of the conservation fence. The proposed activity provides an opportunity for community engagement, enhancing community awareness and understanding of our threatened species, the factors impacting on them and he benefits of a healthy native ecosystems; and an opportunity for ground-breaking research in reintroduction biology and landscape / ecosystem management.	
3. Affect economic factors, including employment, industry and property value?	☒	Construction and operation – medium; positive	The Yathong Nature Reserve feral predator–free area project involves the creation of 4 roles with 2 based at Dubbo and 2 based at Cobar. Increases in visitation to the sites will likely result in economic benefit to the local communities of Mount Hope, Hillston, Cobar and Lake Cargelligo.	N/A
4. Have an impact on the safety of the community?	☐	N/A	N/A	N/A

Is the proposed activity likely to…	**Applicable?***	**Likely impact** (negligible, low, medium or high; negative or positive; or N/A)	**Reasons** (describe the type, nature and extent of the impact, the nature of the receiving environment and any proposed safeguards which will limit the impact)	**Safeguards/mitigation measures**
5. Cause a bushfire risk?	☒	High, positive	Bushfire risk will be managed in the reserve with regular hazard reduction burning, together with ecological and cultural burns, to allow movement of fauna within the reserve.	• The program will include the review of the reserve fire management strategy (NPWS 2014) to include the appropriate fire advantage zones for the various aspects of the project. Asset protection zones (APZ) and strategic fire advantage zones (SFAZ) will be mapped in consultation with the local bush fire management committee and appropriate management of these zones will mitigate the risk to the conservation fence by incorporating strategic prescribed burns as required.
6. Affect the visual or scenic landscape?	☒	Operation – medium; negative medium, negative	Given the reserve's relatively flat topography, there is a lack of lookouts or high points. Further, the conservation fence is offset from Yathong Road and therefore unlikely to be visible or within sight lines for any road users and neighbours. Therefore during construction and operation, the conservation fence will have minimal/negligible visual impact on the neighbours adjacent to the proposed feral predator–free area or community members driving down the public road.	N/A

10.4 Natural resource impacts during construction and operation

Is the proposed activity likely to…	Applicable?*	Likely impact (negligible, low, medium or high; negative or positive; or N/A)	Reasons (describe the type, nature and extent of the impact, the nature of the receiving environment and any proposed safeguards which will limit the impact)	Safeguards/mitigation measures
1. Result in the degradation of the park or any other area reserved for conservation purposes?	☒	Construction – low; negative Operation – high; positive	Vegetation management is addressed in Section 9. The project will require soil and vegetation disturbance to a relatively narrow linear disturbance corridor which will be no wider than 15 m and a total area of 191.61 ha, 137.41 ha of which is native vegetation. The impact has been reduced by constructing the conservation fence adjacent to existing access tracks which have previously been cleared. In total, this disturbance corridor will protect approximately 39,230 ha within Yathong Nature Reserve, where vegetation impacts from feral and over-abundant herbivores will be reduced and predation from feral predators eliminated. There will be no other use or degradation of natural resources (water, air or extractive materials) as part of the activity. Overall, the project activities are specifically aimed at improving the conservation value, ecological function and status of threatened species in a large area of Yathong Nature Reserve.	In addition to those safeguards detailed in previous sections, the following safeguards and mitigation measures have already been or will be implemented. • Great effort was made in site selection to minimise habitat disturbance for threatened species; this included utilisation of existing cleared tracks and conservation fence lines in preference to disturbing new areas. • Impact assessments using relevant BC Act guidelines and the matters of national environmental significance criteria were performed for all identified species, suggesting no significant impacts (Appendix A). • A detailed ecological monitoring regime has been outlined in the draft overarching ecological health monitoring framework (DPE 2022a), which sets out annual monitoring methods which will be used to document and describe changes to threatened species abundance and populations, plus detect new species that may visit or establish.
2. Affect the use of, or the community's ability to use, natural resources?	☐	N/A	The activity does not impact on the use of, or the community's ability to use, natural resources, including water, air and minerals.	N/A

Is the proposed activity likely to…	**Applicable?***	**Likely impact** (negligible, low, medium or high; negative or positive; or N/A)	**Reasons** (describe the type, nature and extent of the impact, the nature of the receiving environment and any proposed safeguards which will limit the impact)	**Safeguards/mitigation measures**
3. Involve the use, wastage, destruction or depletion of natural resources including water, fuels, timber or extractive materials?	☒	Construction – low; negative Operation – high; positive	As previously described, a combined total area of up to 137.41 ha of native vegetation will be removed within the disturbance corridor for this project, however this is considered relatively minor in the context of the extant area of native vegetation of similar composition across Yathong Nature Reserve. There are limited opportunities to reuse/recycle vegetation waste. During construction, resources will be used to construct the conservation fence including fuel, water, concrete, soil/fill materials, however these are considered minimal and will not significantly deplete local natural resources. Regarding the materials required for the project, the construction of the conservation fence, management/fire trails and operations base at the Yathong Quarters precinct, will require the use of resources including metal for the conservation fence, concrete for footings, materials to construct several accommodation structures and road base/general fill for track construction. There are limited opportunities to use recycled materials or accredited alternatives (e.g. timber from certified sustainable sources). Conservation fence materials have been selected based on their effectiveness, durability and maintenance requirements. In regard to road base/general fill required for management/fire trail construction, the road surface will be locally reshaped to achieve desired grades and finishes where possible. If there is a deficit and additional material is required, it will be imported from appropriately licensed quarries, likely within the Cobar, Carrathool or Lachlan LGAs.	• Construction materials will be sourced from Australian suppliers where possible to ensure stringent environmental standards. • Opportunities for reducing resource consumption are to investigated. • Where possible, the road surface will be locally reshaped to achieve desired grades and finishes. If there is a deficit and additional fill/road base is required, it will be imported from an appropriately licensed quarries, likely within the Cobar, Carrathool or Lachlan LGAs.

Is the proposed activity likely to…	Applicable?*	Likely impact (negligible, low, medium or high; negative or positive; or N/A)	Reasons (describe the type, nature and extent of the impact, the nature of the receiving environment and any proposed safeguards which will limit the impact)	Safeguards/mitigation measures
			The project is specifically designed to conserve and protect natural resources, through increased opportunities for recruitment of long-lived perennial plants, improved soil physical and chemical properties, and improved ecological function through the restoration of mammals beneficial to soil processes in arid environments.	
4. Provide for the sustainable and efficient use of water and energy?	☒	Construction – low, negative Operation – negligible; negative	The project will largely be run out of the operations base at the Yathong Quarters precinct which is connected to mains electricity, has a rainfall harvesting system and tanks for potable water importation. An additional unit with 3 rooms will be added behind the existing Shearers Quarters with independent energy supply that can be turned off when not in use. Electricity will be provided between Yathong Quarters and the additional accommodation facilities via an underground trenched electrical cable. However, for field work operations along the conservation fence line, including any temporary ancillary facilities (compounds/laydown etc.), water and electricity are not readily available. Therefore, diesel generators will likely be used to generate electricity required for the works. Potable drinking water will be sourced from the operations base at the Yathong Quarters precinct each day. Non-potable water, which may be required for dust suppression, civil compactions works etc. may be sourced from potable water supplies at the operations base (if small quantities are required), or from nearby dams located adjacent to the operations base at the Yathong Quarters precinct. Impacts during the operational phase are anticipated to be negligible.	• Strategies to minimise water consumption will include: o for non-potable water requirements, water to be sourced from dams adjacent to the Shearers Quarters instead of potable water from tanks (where appropriate and possible) o contractor/employee education/awareness around reducing water consumption wherever possible.

10.5 Aboriginal cultural heritage impacts during construction and operation

Is the proposed activity likely to…	Applicable?*	Likely impact (negligible, low, medium or high; negative or positive; or N/A)	Reasons (describe the type, nature and extent of the impact, the nature of the receiving environment and any proposed safeguards which will limit the impact)	Safeguards/mitigation measures
1. Disturb the ground surface or any culturally modified trees?	☐	TBC	The results of the survey of the entire fence line will determine the likelihood of any sites being impacted. It is understood that the alignment of the fence could be adjusted to avoid impacts to any Aboriginal sites. • This section will be updated following completion of the Aboriginal cultural heritage assessment report.	TBC
2. Affect or occur in close proximity to known Aboriginal objects or Aboriginal places? If so, can impacts be avoided? How?	☐	TBC	The predictive model indicates that Aboriginal sites within the present study area are most likely to occur around creeks and ephemeral drainage channels. The results of the survey will identify if the proposed fence line will directly or indirectly impact on any Aboriginal sites or places. • This section will be updated following completion of the Aboriginal cultural heritage assessment report.	TBC
3. Affect areas: a. within 200 m of waters b. within a sand dune system c. on a ridge top, ridge line or headland d. within 200 m below or above a cliff face e. within 20 m of or in a cave, rock shelter or a cave mouth? f. If so, can impacts be avoided? How?	☐	TBC	The topographic mapping and predictive model indicate that within the proposed alignment of the feral predator–proof fence, that the most likely location for Aboriginal sites is where the fence crosses creeks or ephemeral drainage lines. It is not anticipated that any ridges, cliffs, caves or sand dunes are expected within the fence alignment. • This section will be updated following completion of the Aboriginal cultural heritage assessment report.	TBC

Is the proposed activity likely to…	Applicable?*	Likely impact (negligible, low, medium or high; negative or positive; or N/A)	Reasons (describe the type, nature and extent of the impact, the nature of the receiving environment and any proposed safeguards which will limit the impact)	Safeguards/mitigation measures
4. Affect wild resources which are used or valued by the Aboriginal community or affect access to these resources?	☐	TBC	• This section will be updated following completion of the Aboriginal cultural heritage assessment report.	TBC
5. Affect access to culturally important locations?	☐	TBC	• This section will be updated following completion of the Aboriginal cultural heritage assessment report.	TBC

10.6 Other cultural heritage impacts during construction or operation

Is the proposed activity likely to…	Applicable?*	Likely impact (negligible, maintenance, minor, major, contentious; or NA)	Reasons (describe the type, nature and extent of impact, taking into account the receiving environment & proposed safeguards which will limit the impact)	Safeguards/mitigation measures
1. Impact on places, buildings, landscapes or moveable heritage items?	☒	Construction & operation – negligible; negligible	A heritage desktop assessment was undertaken by Unearthed Archaeology and Heritage in February 2022 (Appendix C). The assessment included searches of the NSW State Heritage Register and the Cobar Local Environment Plan which identified that there are no listed heritage items located within the vicinity of the proposal. While Yathong Homestead is not a listed heritage item, it has potential heritage significance. Yathong Homestead has been previously modified, however the operations base at the Yathong Quarters precinct, will be upgraded for this project to include the establishment of the additional accommodation facilities, a new ecology/research building, new amenity blocks, rainwater tanks, upgraded	

Is the proposed activity likely to…	Applicable?*	**Likely impact** (negligible, maintenance, minor, major, contentious; or NA)	**Reasons** (describe the type, nature and extent of impact, taking into account the receiving environment & proposed safeguards which will limit the impact)	Safeguards/mitigation measures
			wastewater system, services/utilities installation/upgrades, laydown/storage areas and any other related works. Based on concept design drawings (Figure 7), the upgrades appear to be outside the curtilage of the historic Yathong Homestead and therefore no impacts are anticipated. However, this will be confirmed during an additional site inspection being conducted by Unearthed Archaeology. Therefore, it is concluded that: • The proposed work will not adversely impact on the heritage significance of the study area or vicinity. • It is not expected that any archaeological deposits or relics will be disturbed by the proposed works. • There is no objection to the proposed works on a heritage or non-Aboriginal archaeological basis. Confirmation is required that the proposed upgrades to the operations base at the Yathong Quarters precinct is outside the curtilage of the historic Yathong Homestead.	
2. Impact on vegetation of cultural landscape value (e.g. gardens and settings, introduced exotic species, or evidence of broader remnant land uses)?	☒	Construction & operation – negligible; negative	It is considered that the setting of the 3 homesteads and the landscape of the Yathong Nature Reserve (as detailed in Section 9.2.1) as a whole is representative of the mallee scrublands of western NSW. However, the homesteads are not anticipated to be impacted by the project (pending the additional heritage inspection), and vegetation removal has been minimised as detailed in this REF to reduce impacts as much as possible.	N/A

10.7 Matters of national environmental significance under the EPBC Act

Is the proposal likely to impact on matters of national environmental significance, including:	**Applicable?***	**Impact level** (negligible, low, medium or high; negative or positive; or NA)	**Reasons** (describe the type, nature and extent of impact, taking into account the receiving environment & proposed safeguards which will limit the impact)	**Safeguards/mitigation measures**
1. Listed threatened species or ecological communities)?	☒	Construction – low; negative Operation – High; positive	During construction, up to 191.61 ha (137.41 ha being native vegetation) of the total 115,604 ha within Yathong Nature Reserve will be disturbed. Of this, approximately 54.64 ha is mallee woodland (PCTs 171 and 173, see Table 7) which is considered habitat for the malleefowl, red-lored whistler and also consists of the Mallee Bird Community of the Murray Darling Depression Bioregion, an endangered ecological community. Therefore, it is possible (but unlikely) that some localised negative impact may occur for these threatened species, however it is anticipated to be minimal due to the 39,230 ha of available habitat with increased level of protection and management within the fenced area, and the removal of feral animals which are considered predators of these protected species. This is further explained in Section 9. During operation, the project's explicit aims are to reintroduce extinct animals, thus improving their plight and restoring ecosystem processes which are also of benefit to other threatened species found in the area. The project's proposed actions are closely aligned with the measures to reduce the impacts of key threatening processes listed under the EPBC Act. These include providing safe havens from feral predators and reducing total grazing pressure, and thus are expected to benefit most, if not all, threatened species which have been identified from the feral predator–free area.	In addition to those safeguards detailed in Section 9, the following safeguards and mitigation measures have already been implemented. • Great effort was made in site selection to minimise habitat disturbance for threatened species; this included utilisation of existing cleared tracks and conservation fence lines in preference to disturbing new areas • The Protected Matters Search Tool, literature sources and government databases were used in combination with on-ground survey data to determine the species occurring or potentially occurring at the study area. • Impact assessments using the matters of national environmental significance criteria were performed for all identified species and communities, suggesting no significant impacts (Section 9 and Appendix A). • A detailed ecological monitoring regime has been outlined in the draft overarching ecological health monitoring framework (DPE 2022a), which sets out annual monitoring methods which will be used to document and describe changes to threatened species abundance and populations, plus detect new species that may visit or establish.

Is the proposal likely to impact on matters of national environmental significance, including:	**Applicable?***	**Impact level** (negligible, low, medium or high; negative or positive; or NA)	**Reasons** (describe the type, nature and extent of impact, taking into account the receiving environment & proposed safeguards which will limit the impact)	**Safeguards/mitigation measures**
		Operation – Low; negative	However, the conservation fence may also have some minor negative impacts, particularly to the malleefowl which is a ground-dwelling species, by limiting home range, dispersal capability, gene transfer and resources associated with the construction of the conservation fence. The conservation fence has the potential to constrain movements of malleefowl. Malleefowl are not noted flyers, and are more likely to take flight when startled; however, it is understood that malleefowl (adults at least) are capable of flying over conservation fences. Therefore, the conservation fence may create a barrier that restricts, but does not necessarily preclude, movement of individuals between the fenced area and surrounding habitat. The extent of the direct impact of this is difficult to predict at this point, and the drivers of impact may differ to other situations. However, observations from similar projects in similar environments may help to reduce the potential for negative impacts. Overall, the project will have low short-term negative impact to some threatened species, countered by the high long-term positive effects.	
2. Listed migratory species?	☐	N/A	While one migratory species, the fork-tailed swift was identified in the NSW BioNet Atlas search (see Section 9 and Appendix A), it is unlikely to occur within the study area and therefore no impacts are anticipated.	N/A
3. The ecology of Ramsar wetlands?	☐	NA	N/A	N/A

Is the proposal likely to impact on matters of national environmental significance, including:	**Applicable?***	**Impact level** (negligible, low, medium or high; negative or positive; or NA)	**Reasons** (describe the type, nature and extent of impact, taking into account the receiving environment & proposed safeguards which will limit the impact)	**Safeguards/mitigation measures**
4. World heritage values of world heritage properties?	☐	NA	N/A	N/A
5. The national heritage values of national heritage places?	☐	NA	N/A	N/A

11. Proposals requiring additional information

Under the *Guidelines for preparing a review of environmental factors*, no additional information is required.

12. Summary of impacts and conclusions

The impacts associated with the project have been summarised in Table 13 below.

Table 133 Summary of impacts associated with the project

Category of impact	Significance of impacts		
	Extent of impact	**Nature of impact**	**Environmentally sensitive features**
Physical and chemical	Construction and operation – negligible; negative	Potential minor and negative noise, air, soil, contamination, water (creeks) impacts from project works, however, mitigation measures will be implemented to ensure the impact is negligible.	Keginni Creek and 5 unnamed waterways run through the reserve. Concrete waste stockpile near unnamed creek #1.
Biological	Construction – low; negative Operation – high; positive	A number of threatened species may be impacted in the short term through the direct removal of 137.41 ha of native vegetation and 525 hollow-bearing trees. Impacts will be managed through mitigating measures such as minimising clearing where possible. However, during operation there will be long-term positive benefits resulting in an overall improvement in habitat and ecological processes, removal or reduction in the severity of several key threatening processes, reintroduction of locally extinct fauna, and overall a more balanced trophic structure and ecological health and functioning. This is likely to far outweigh the short to medium term impacts. The removal of feral predators, reintroduction of locally extinct species and the associated fire and weed management will have positive effects for up to 28	137.41 ha of native vegetation will be removed for the project; however, this represents a small portion (0.12%) of the total area of Yathong Nature Reserve which is 115,604 ha. No plant community types in the study area are considered a threatened ecological community. A number of threatened species which use this vegetation as habitat may be impacted during the construction phase which is further detailed in Section 9 and 10. Every effort to minimise this impact has been made. The proposal is not likely to have a significant impact on threatened species, populations or ecological communities listed under the BC Act. The proposal is not likely to have a significant impact on threatened species, populations or ecological communities, migratory species, or matters of national environmental

Category of impact	Significance of impacts		
	Extent of impact	**Nature of impact**	**Environmentally sensitive features**
		animal species within the proposed 39,230 ha feral predator–free area.	significance within the meaning of the EPBC Act. A referral to the Australian Government's Department of Climate Change, Energy, the Environment and Water is not required.
Natural resources	Construction – low; negative Operation – high; positive	There will be minor negative impacts on natural resources during construction related to impacts on biodiversity as detailed above, however the long-term positive impacts to biodiversity are significant. The construction of the conservation fence, management/fire trails and operations base at the Yathong Quarters, will require the use of resources including metal for the conservation fence, concrete for footings, materials to construct several accommodation structures and road base/general fill for track construction.	As detailed above, 137.41 ha of native vegetation will be removed for the project, however, no plant communities are considered a threatened ecological community. A number of threatened species which use this vegetation as habitat will be impacted during the construction phase which is further detailed in Sections 9 and 10. In regard to road base/general fill required for management/fire trail construction, the road surface will be locally reshaped to achieve desired grades and finishes where possible. If there is a deficit and additional material is required, it will be imported from appropriately licensed quarries, likely within the Cobar, Carrathool or Lachlan local government areas.
Cultural Heritage	**Non-Aboriginal heritage** Construction and operation – negligible; negligible **Aboriginal heritage** Construction – medium; negative Operation – low; negligible	**Non-Aboriginal heritage** There are no impacts to non-Aboriginal heritage associated with the project, pending the additional heritage inspection. **Aboriginal heritage** There may be negative impacts to Aboriginal heritage which will be assessed and managed in accordance with the project's Aboriginal cultural heritage assessment report which is being completed for the project. This involves significant consultation with key stakeholders including registered Aboriginal parties, site inspections and a detailed impact assessment.	**Non-Aboriginal heritage** There are no impacts to non-Aboriginal heritage associated with the project, pending the additional heritage inspection. **Aboriginal heritage** Aboriginal heritage items will be identified during the site inspection which will be completed as part of the assessment process and in consultation with the registered Aboriginal parties and any other relevant stakeholders.

In conclusion there is not likely to be a significant effect on the **environment** and an environmental impact statement is not required.

This REF has examined and taken into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the proposed activity.

This has included consideration of impacts on cultural values (including Aboriginal and non-Aboriginal heritage), socio-economic values (including potential impacts on the community resulting from construction works) and threatened species, populations and ecological communities and their habitats. It has also considered potential impacts to threatened species and matters of national environmental significance listed under the Commonwealth EPBC Act.

A number of potential environmental impacts from the proposal have been identified and amended during the design development and options assessment. The proposal as described in the REF best meets the project objectives and will result in some impacts on the biological values. These will be short-term in nature. Safeguards and management measures as detailed in this REF will ameliorate or minimise these expected impacts. The proposal will also provide positive environmental, social, cultural and economic benefits. On balance the proposal is considered justified. The project will significantly improve the ecological condition of the site through the removal of invasive species, the return of up to 9 species of locally extinct wildlife, the restoration of ecological processes and remnant vegetation, and management of weeds and fire.

The proposal is not likely to have a significant impact on **threatened species, populations or communities** within the meaning of the NSW BC Act, and a species impact statement is not required.

The activity is not likely to have a significant impact on **matters of national environmental significance** listed under EPBC Act.

The proposal is not likely to have a significant impact on threatened species, populations or ecological communities or migratory species, within the meaning of the EPBC Act. A referral to the Australian Government's Climate Change, Energy, the Environment and Water is not required. Threatened species tests of significance for species listed under the BC Act and assessments of significance for species listed under the EPBC Act can be seen in Appendix A.

The activity will not require **certification** to the *Building Code of Australia*, *Disability (Access to Premises – Buildings) Standards 2010* or Australian Standards in accordance with the NPWS *Construction Assessment Procedure*.

13. Supporting documentation

Documentation supporting this application is detailed below, including appendix number.

Appendix	Document title	Author	Date
Appendix A	*Ecological assessment report: Yathong Nature Reserve* The ecological assessment report also includes the below: • likelihood of occurrence tables • flora and fauna species (including those which are threatened) observed during the ecological surveys • impact assessments under the BC Act and EPBC Act • Protected Matters Search Tool results • Additional ecological survey completed by AREA.	Ecoplanning	June 2022 (Version 2.1 – Final)
Appendix B	NSW Government agency consultation	DPE	NPWS, DPE
Appendix C	*Heritage desktop assessment: Yathong rewilding program, Yathong Nature Reserve, Irymple NSW*	Unearthed Archaeology and Heritage	February 2022 (Version A.2022.1047)
Appendix D	Design drawings of the proposed conservation fence and gates	Prichard Francis Civil	September 2021
Appendix E	Experience and qualifications of personnel involved in the preparation of this REF	Various	2022
Appendix F	Matters of national environmental significance significant impact criteria assessment for Malleefowl and red-lored whistler and Mallee Bird Community	DPE	2022

14. Signature of proponent

By signing the REF, the proponent confirms that the information in the REF is accurate and adequate to ensure that all potential impacts of the activity can be identified.

Signature		Signature	
Name (printed)	Denyell Clark	Name (printed)	Fiona Buchanan
Position	Senior Project Officer, Central West Branch	Position	Area Manager, Central West Branch
Date		Date	

Seal (if signing under seal):

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More information

- EPBC Act Protected Matters Search Tool, Australian Government website
- Indigenous land use agreements

NPWS park policies and procedures:

- Boundary fencing policy

Acts, regulations and environmental planning instruments:

- Biodiversity Conservation Act 2016
- Biosecurity Act 2015
- Environmental Planning and Assessment Regulation 2021, Schedule 3
- Fisheries Management Act 1994 No 38
- National Parks and Wildlife Act 1974
- State Environmental Planning Policy (Biodiversity and Conservation) 2021 (Chap 8)
- State Environmental Planning Policy (Resilience and Hazards) 2021
- State Environmental Planning Policy (Transport and Infrastructure) 2021, section 2.73

Sharing and Enabling Environmental Data in NSW – SEED web portal datasets:

- Acid sulfate soils risk
- Environmental Planning Instrument - Acid Sulfate Soils
- Environmental Planning Instrument - Drinking Water Catchment
- Hydrogeological Landscapes of New South Wales and the Australian Capital Territory
- Modelled Hillslope Erosion over New South Wales
- Naturally occurring asbestos
- NSW (Mitchell) Landscapes - version 3.1
- NSW Hydrography
- NSW Wetlands
- State vegetation type map for Central West / Lachlan Region Version 1.4 VIS_ID4468

Database and search webpages:

- NSW BioNet, NSW Government website, accessed 2021
- NSW National Parks and Wildlife – Assets of intergenerational significance interactive map
- Historical imagery – database search at Yathong Nature Reserve 2021, NSW Department of Customer Service – Spatial Services webpage
- Fisheries Spatial Data Portal, NSW Department of Primary Industries webpage, accessed 2021
- *Contaminated land record of notices,* NSW Environmental Protection Authority webpage, accessed 2021

Appendices

Appendices A, C, D and E are supplied as separate PDFs accessed via the webpage for this REF.

Appendix B and F are below.

Appendix B NSW Government agency consultation

From: Denyell Clark
To: Ryan Maxwell
Subject: FW: Yathong Feral-Predator-Free Area Draft REF
Date: Monday, 7 March 2022 10:10:02 AM
Attachments: image001.png

Good morning Ryan,

David Ward the Fisheries Manager has responded to the Draft REF review with one comment for section 3.2.3 Fisheries Management Act 1994 "If Keginni Creek is not mapped as Key Fish Habitat then there is no need to consult under s.199 of the FM Act".
I am still awaiting to see if Evan Knoll has any comments. I gave them until the 19.03.2022 to respond.

To streamline the process and gain back some time, could we have the REF for public exhibition with holding statements for the ACHAR and provide the ACHAR as a targeted exhibition to the RAP's allowing for 2 weeks to comment?

Kind Regards,

Denyell Clark
Senior Project Officer
NPWS Central West Area
NSW National Parks and Wildlife Service
74 River St, Dubbo 2830
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W nationalparks.nsw.gov.au

From: David Ward <david.ward@dpi.nsw.gov.au>
Sent: Thursday, 3 March 2022 2:49 PM
To: Denyell Clark <denyell.clark@environment.nsw.gov.au>; Evan Knoll <evan.knoll@dpi.nsw.gov.au>
Cc: Dave Kelly <Dave.Kelly@environment.nsw.gov.au>
Subject: RE: Yathong Feral-Predator-Free Area Draft REF

Hi Denyell,

Thank you for the opportunity to review the REF. I have reviewed the REF and made notes on Page 6.

Cheers
David

David Ward | Fisheries Manager
DPI Fisheries - Freshwater Environment
Department of Primary Industries
4 Marsden Park Road | Calala NSW 2340
T: +61 2 6763 1255 | M: +61 (0) 0429 908 856
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Yathong Nature Reserve: review of environmental factors for feral predator–free area

From: Denyell Clark <denyell.clark@environment.nsw.gov.au>
Sent: Thursday, 3 March 2022 11:30 AM
To: David Ward <david.ward@dpi.nsw.gov.au>; Evan Knoll <evan.knoll@dpi.nsw.gov.au>
Cc: Dave Kelly <Dave.Kelly@environment.nsw.gov.au>
Subject: Yathong Feral-Predator-Free Area Draft REF

Good morning,

Further to our consultation on 15 December I have attached a draft REF for Yathong's proposed Feral-Predator-Free Area construction.

Would you mind reviewing the draft REF and providing feedback either with comments or track changes.
If possible, could I have a response before COB 19 March 2022. If this time frame is not manageable please let me know.

Regards,

Denyell

Denyell Clark
Senior Project Officer
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The Department of Planning, Industry and Environment 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

The Department of Planning, Industry and Environment 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 throughtful and collaborative approaches to out work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.

This email is intended for the addressee(s) named and may contain confidential and/or privileged information.
If you are not the intended recipient, please notify the sender and then delete it immediately.
Any views expressed in this email are those of the individual sender except where the sender expressly and with authority states them to be the views of the NSW Office of Environment, Energy and Science.

PLEASE CONSIDER THE ENVIRONMENT BEFORE PRINTING THIS EMAIL

Appendix F Matters of national environmental significance significant impact criteria assessment

Malleefowl (*Leipoa ocellata*) – vulnerable species

Criteria **An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:**	Response
a. lead to a long-term decrease in the size of an important population of a species	The proposal will remove up to 54.64 ha of mallee woodland (PCTs 171 and 173, see Table 7) to construct a conservation fence for the feral predator–free project. Any negative impact arising from the removal of this vegetation will likely be offset by the removal of feral predators which are a key threat to malleefowl, from within the fenced area. Therefore, the proposal should not lead to a long-term decrease in the population.
b. reduce the area of occupancy of an important population	The proposal will clear up to 54.64 ha of mallee woodland, most of which is located along the edge of roads. Within the feral predator–free area there is approximately 25,000 ha of mallee woodland, which is suitable habitat for malleefowl.
c. fragment an existing important population into two or more populations	The conservation fence line has the potential to constrain movements of malleefowl. Malleefowl are not noted flyers, and are more likely to take flight when startled, however, malleefowl (adults at least) are capable of flying over conservation fences. The conservation fence may create a barrier that restricts, but does not necessarily preclude, movement of individuals between the fenced area and surrounding habitat.
d. adversely affect habitat critical to the survival of a species	The study area has not been declared critical habitat for the species. However, the species is restricted to mallee woodlands and the central mallee reserves are a large, consolidated area that includes mallee woodland. The proposal will remove 137.41 ha of native vegetation, including 54.64 ha of mallee woodland, which is a small area compared to the area of mallee woodland retained within the feral predator–free area (i.e. 25,000 ha).
e. disrupt the breeding cycle of an important population	The proposal is likely to benefit the breeding cycle of the species by removing key threats (i.e. feral predators, pigs, goats etc.) from within the fenced area. Foxes and cats will predate on malleefowl chicks, and pigs and goats are known to disturb malleefowl nests. It is anticipated that malleefowl within the feral predator–free area will be more likely to complete their life cycle
f. modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will remove up to 54.64 ha of mallee woodland, however, it is not likely that this will cause the species to decline.
g. result in invasive species that are harmful to a vulnerable species	The proposal will remove feral animal species from the feral predator–free area. Many of these species are considered

Criteria **An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:**	Response
becoming established in the vulnerable species habitat	the greatest threat to malleefowl, either because they predate on them or they disturb malleefowl nests. Therefore, the proposal will not result in invasive species becoming established in malleefowl habitat.
h. introduce disease that may cause the species to decline, or	The proposal will construct a conservation fence around a 39,230 ha area that includes malleefowl habitat. It is not likely that the proposal will introduce a disease that may cause the species to decline.
i. interfere substantially with the recovery of the species.	The proposal will not interfere with the recovery of the species. Rather the proposal is likely to be an opportunity to benefit the species.
Conclusion of EPBC act significant impact guidelines (DoE 2013) for malleefowl	A referral is not recommended for malleefowl. The conservation fence line has the potential to constrain movements of malleefowl, however does not necessarily preclude movement of individuals between the feral predator–free area and surrounding habitat. Further, feral animals that threaten the species will be removed which should increase the likelihood that they will be a viable and productive population. The proposal will also remove up to 54.64 ha of mallee woodland. However, the feral predator–free area will retain and improve 25,000 ha of mallee woodland for the species.

Red-lored whistler (*Pachycephala rufogularis*) – vulnerable species

Criteria **An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:**	Response
• lead to a long-term decrease in the size of an important population of a species	The proposal will remove up to 54.64 ha of mallee woodland (PCTs 171 and 173, see Table 7) to construct a conservation fence for the feral predator–free area project. The red-lored whistler is a mobile species and the conservation fence will not inhibit the species nor lead to a long-term decrease in the population.
• reduce the area of occupancy of an important population	The proposal will clear up to 54.64 ha of mallee woodland, most of which is located along the edge of roads. Within the feral predator–free area there will be approximately 25,000 ha of mallee woodland, which is suitable habitat for red-lored whistler.
• fragment an existing important population into two or more populations	The conservation fence line is not likely to fragment a population of red-lored whistler. Red-lored whistler is a mobile species and will be able to move freely across the conservation fence line.

Criteria **An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:**	Response
• adversely affect habitat critical to the survival of a species	The study area has not been declared critical habitat for the species. However, the species is restricted to mallee woodlands and the central mallee reserves are a large, consolidated area that includes mallee woodland. The proposal will remove 54.64 ha of mallee woodland, which is a small area compared to the area of mallee woodland retained within the feral predator–free area (i.e. 25,000 ha).
• disrupt the breeding cycle of an important population	The proposal is not likely to disrupt the breeding cycle of red-lored whistler. Within the conservation fence, feral animals will be removed, which will eliminate some threats to the breeding success of the species. Predation of the red-lored whistler by foxes and cats will likely reduce and therefore have a positive impact.
• modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will remove up to 54.64 ha of mallee woodland, however, it is not likely that this will cause the species to decline.
• result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species habitat	The proposal will remove feral species from the feral predator–free area. Many of these species are considered a threat to red-lored whistler because they predate on them (i.e. cats and foxes) or they degrade habitat (i.e. goats). Therefore, the proposal will not result in invasive species becoming establish in red-lored whistler habitat.
• introduce disease that may cause the species to decline, or	The proposal will construct a conservation fence around a 39,230 ha area that includes red-lored whistler habitat. It is not likely that the proposal will introduce a disease that may cause the species to decline.
• interfere substantially with the recovery of the species	The proposal will not interfere with the recovery of the species. Rather the proposal is likely to be an opportunity to benefit the species.
• Conclusion of EPBC act significant impact guidelines (DoE 2013) for red-lored whistler	A referral is not recommended for red-lored whistler, as: • The proposal will affect a relatively small area of habitat primarily located along the edge of roads. • The species is mobile and the conservation fence will not fragment the population. • Feral animals that pose a threat to the species will be removed from within the feral predator–free area.

Mallee Bird Community of the Murray Darling Depression Bioregion

Criteria **An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:**	Response
a. reduce the area of occupancy of an important population	The proposal will clear up to 54.64 ha of mallee woodland (PCTs 171 and 173, see Table 7), most of which is located along the edge of roads. Within the feral predator–free area will be approximately 25,000 ha of mallee woodland, which is suitable habitat for the Mallee Bird Community.
b. fragment an existing important population into two or more populations	The proposal is located along existing roads within the reserve, with the exception of small areas where new gaps will be created. While the roads along which the fence will be created already fragment mallee woodland, the width of some gaps will be wider than they current are to allow for the ongoing management of the fence.
c. adversely affect habitat critical to the survival of a species	Critical habitat has not been identified for the Mallee Bird Community. However, critical habitat for the black-eared miner has been registered under the EPBC Act. None of this habitat will be affected by the project. While not formally recognised, long unburnt patches of mallee are considered important for many mallee species. Mallee woodland adjacent to roads in Yathong are subject to periodic hazard reduction burning. Therefore, these areas along the feral predator–free area boundary takes place to protect the majority of habitat in the reserve are likely to be less important for the Mallee Bird Community.
d. modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposed fence will cross drainage lines on site. Mechanisms will be put in place to allow water to flow through fenced areas to avoid the potential for the fences to create a barrier to free flow. Therefore, the proposal is not likely to destroy abiotic factors.
e. cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example, through regular burning or flora or fauna harvesting	Field survey identified 9 of the 20 species characteristic of the Mallee Bird Community. The project is not likely to negatively affect the community, but should increase the abundance of species threatened by the feral predators and herbivores that will be removed as part of the project. The project will be monitored closely to detect change over time and will apply adaptive management principles to deliver a positive outcome, including to the Mallee Bird Community.
f. cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but limited to • assisting invasive species, that are harmful to the listed ecological community, to become established, or	The project is intended to improve the quality and integrity of vegetation and ecological communities present. It will do this by removing feral predators and herbivores from the area that are harmful and considered a key threat to the Mallee Bird Community, amongst others. Vegetation management of the area may require weed management, but the objective of weed control will be to improve the condition of the native vegetation on site. It

Criteria **An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:**	Response
• causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community	is not likely that herbicide application will have a detrimental effect on the ecological community.
g. interfere substantially with the recovery of an ecological community	A recovery has not yet been prepared for the Mallee Bird Community.
Conclusion of EPBC act significant impact guidelines (DoE 2013) for Mallee Bird Community	A referral is not recommended for Mallee Bird Community, as: • the proposal will affect a relatively small area of habitat for the ecological community primarily located along the edge of roads some of which has been burnt as a hazard reduction measure, • habitat is currently fragmented, • the program should not reduce the composition of the Mallee Bird Community, • the program will remove threats to birds that are characteristic of the Mallee Bird Community.