Wyangala Dam Wall Raising Project

Scoping Report

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Prepared by

Christopher Holloway
Associate Director
16 March 2020

Approved by

Alexandra Frolich
Associate Environmental Scientist
16 March 2020

Executive Summary

ES1 Overview

New South Wales (NSW) is currently facing critical water supply issues and the government response is to fast track a portfolio of drought relief and water security projects. This includes the raising of Wyangala Dam, near Cowra in the Lachlan Valley region of NSW (the project).

The NSW *Water Supply (Critical Needs) Act 2019* has declared the project to be critical State significant infrastructure (CSSI) under Division 5.2 of Part 5 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). A CSSI declaration acknowledges that the project is critical to NSW for environmental, economic or social reasons.

Critical State significant infrastructure require approval from the NSW Minister for Planning and Public Spaces. Applications for CSSI must be accompanied by an environmental impact statement (EIS). The purpose of this Scoping Report is to inform the content of the environmental assessment requirements to be issued by the Secretary of the NSW Department of Planning, Industry and Environment. The Secretary's environmental assessment requirements will specify what needs to be addressed within the EIS.

WaterNSW is responsible for dam operations, water security and managing water stored in 42 water storages across the State. WaterNSW is the proponent for the project.

ES2 What is the project?

The raising of Wyangala Dam would provide an additional 650 gigalitres (GL) of storage capacity and General Security equivalent yield improvements of around 21 GL per annum. The raised dam would contribute to a step improvement in water security, drought security and flood management capacity for the Lachlan Valley region.

Key project elements include:

- an embankment dam wall nominally raised by up to 10 metres (m);
- intake towers nominally raised by up to 10 m;
- reuse of two existing access bridges at the dam crest;
- a wider spillway towards the south;
- a new 'saddle' embankment northeast of the existing embankment; and
- relocation of services and structures affected by the raised FSL.

While the key components of the project are largely fixed, the final design solution and operation will be based on an iterative design and assessment process that will be carried out during the development of the EIS.

ES3 Why is the project needed?

Drought security and flood management have been dual challenges for the Lachlan Valley. In the last twenty years for example, the Lachlan Valley has suffered through the Millennium Drought of the 2000s and significant flooding in 2016 causing economic, social and environmental damage. The inability of the regulated water system to mitigate these weather events impacts the local water dependent agricultural and mining industries, as well as critical town

water supplies. Stakeholder engagement has continually highlighted community views in requiring the project to deliver better management of flood and drought events.

The inadequacy of current water infrastructure in the Lachlan Valley, coupled with the risk of increasing likelihood of droughts and floods and the lead time for the development of the scale of infrastructure response required, means that delivery of solutions should be commenced as soon as possible.

The NSW Government identified the Lachlan Valley in its *State Infrastructure Strategy* as the first of four 'priority catchments' for the investment and delivery of critical water infrastructure projects. Investigations into possible solutions concluded that raising Wyangala Dam was key to providing the greatest improvement in drought security, flood management and water reliability.

ES4 What are the key issues and likely impacts?

Preliminary environmental investigations have been carried out to identify the relevant matters to be addressed in the EIS for the project and the required level of assessment. This process was guided by the government, community and stakeholder views obtained during previous consultation for the project and informed by desktop assessment and some limited field survey in areas potentially impacted.

Key issues to be assessed within the proposed EIS would include:

- Water – the project is likely to impact on surface water hydrology, water quality, cold water pollution, and flooding. Consequently, considerations of water users (which includes surface and ground water), downstream infrastructure and properties adjacent to the downstream watercourse will be required.

- Biodiversity – the project would impact native vegetation, including threatened species habitat and waterways due the need to clear vegetation during construction and from the inundation of the environment upstream of the dam. Indirect impacts are also possible to the downstream aquatic habitat and species due to potential changes to the flow regime.

- Heritage – there are many known sites of Aboriginal significance in the area and it is likely there are more sites to be discovered. Some of these may be impacted due to the expected inundation or from construction works.

- Land – erosion and sedimentation is a key consideration for the project's construction and operation. Partial or complete inundation of agricultural land may impact the viability of some properties which is also a key social and economic consideration.

- Social and economic – Wyangala township is near to the dam and two holiday parks are located on the foreshore of Wyangala Dam. Further assessment is needed to better understand the social and economic impacts and benefits of the project on the local and regional community.

- Hazard and risks – dam safety management is paramount to protect life, property and the environment from dam failure. A detailed assessment of the design against dam safety requirements would be undertaken.

Other issues such as potential impacts on public infrastructure, transport and access, air quality, amenity (including noise and visual impacts) and hazards and risks (such as bushfire, contamination and waste) will also be assessed in the EIS. However, likely impacts are not expected to be significant and detailed assessments are not anticipated to be required.

ES5 How will the project be assessed?

The project is subject to Division 5.2 of Part 5 of the EP&A Act that requires preparation of an EIS and approval from the NSW Minister for Planning and Public Spaces.

With respect to the provisions of the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act), further detailed survey work is needed to determine potential impacts of the project on matters of national environmental significance. Therefore, WaterNSW will submit a referral under the EPBC Act nominating that the project would potentially result in a significant impact. The Commonwealth Minister for the Environment will need to consider whether the project is likely to be a controlled action under the EPBC Act and require Commonwealth approval.

WaterNSW will seek an accredited process, where the Commonwealth accredits the NSW assessment process under Division 5.2 of the EP&A Act and enable the NSW Department of Planning, Industry and Environment to manage the assessment process, including the identification of environmental assessment requirements and the assessment of the EIS.

Accordingly, the EIS will consider the requirements of both State and Commonwealth agencies. The EIS will be supported by comprehensive technical reports appended to the main report and prepared in accordance with relevant NSW and Commonwealth legislation and guidelines.

The community and stakeholders will have the opportunity to review the EIS and provide a submission. WaterNSW will continue to engage with government agencies, local Councils, key stakeholder groups and the community throughout the development of the project.

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Appendices

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Figures

1 Introduction

1.1 Critical water infrastructure

New South Wales (NSW) is currently facing critical water supply issues and the government response is to fast track a portfolio of drought relief and water security projects. A fundamental part of the solution is the planning and development of three new or augmented dams in NSW. This includes the raising of Wyangala Dam (the project), near Cowra in the Lachlan Valley region of NSW (Figure 1.1).

The Lachlan regulated river system supplies water for irrigation, stock and domestic, town water supply and industrial purposes in the valley. The Lachlan Valley is believed to have some of the poorest levels of water security and reliability in NSW in terms of regulated irrigation and urban water supply. The region was severely impacted by the Millennium Drought and is equally affected by the current drought. The existing dam is situated on the Lachlan River, downstream of the confluence with the Abercrombie River (Figure 1.2).

Key benefits of the project include:

- provision of an additional 650 gigalitres (GL) storage, to the existing 1,218 GL of capacity;
- an additional 21 GL per annum estimated general security equivalent yield;
- significant improvement in drought security, flood management and water reliability; and
- increased capability to manage high inflow/flood events.

The NSW *Water Supply (Critical Needs) Act 2019* (WSCN Act) declared the Wyangala Dam wall raising (the project) as critical State significant infrastructure (CSSI) under the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). The CSSI declaration states that the dam is critical to NSW for environmental, economic or social reasons.

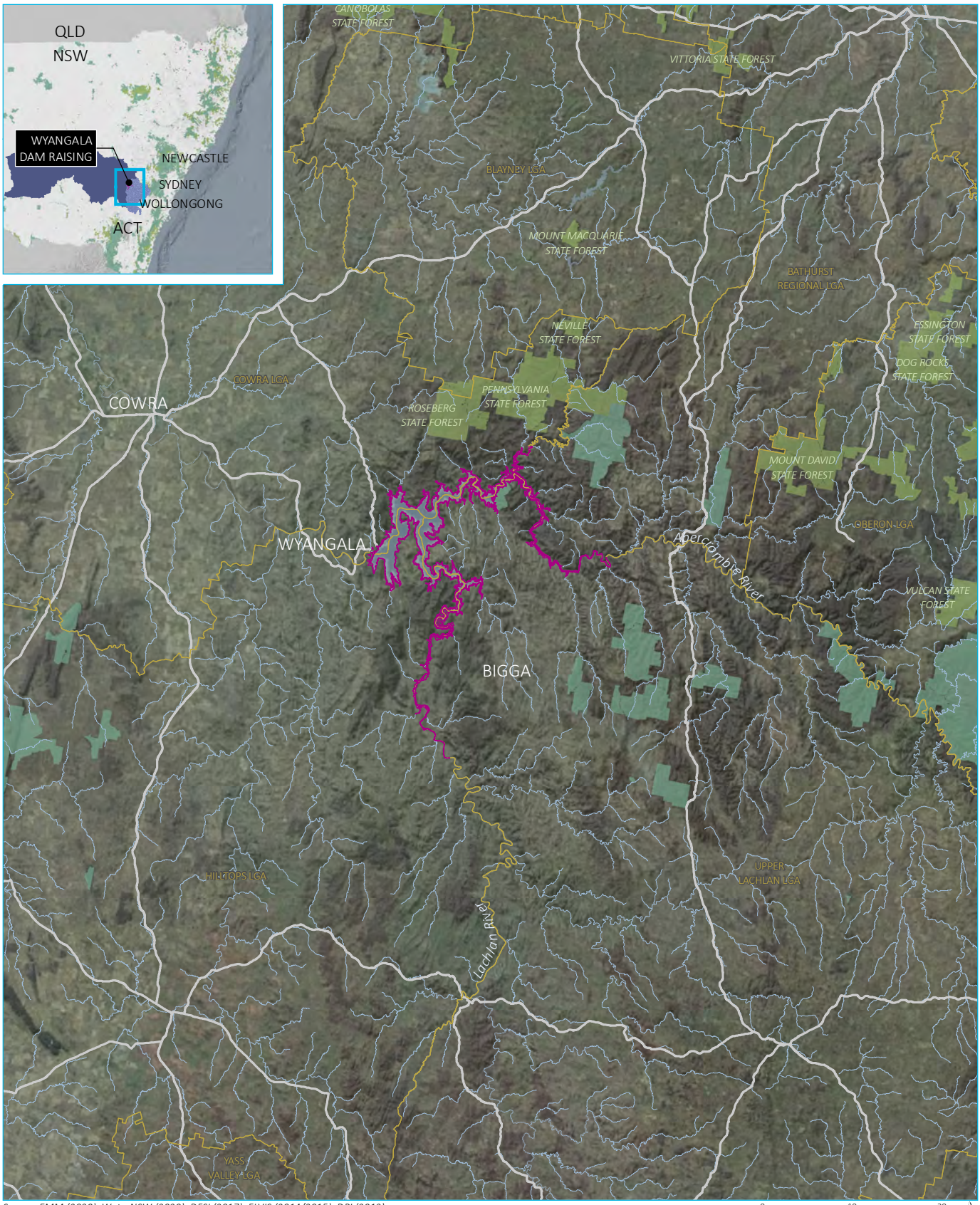
As CSSI, the project is subject to Division 5.2 of Part 5 of the EP&A Act, which requires the preparation of an environmental impact statement (EIS) and the approval of the NSW Minister for Planning and Public Spaces.

1.2 Purpose of this scoping report

This scoping report has been prepared by EMM Consulting Pty Limited (EMM) on behalf of WaterNSW (the proponent) to provide an overview of the project, to consider the potential environmental issues associated with its construction and operation and to identify likely impacts for further investigation and assessment.

The report accompanies the application of the project to the Planning Secretary under section 5.15 of the EP&A Act to carry out State significant infrastructure.

An EIS for State significant infrastructure must be prepared in accordance with the Secretary's environmental assessment requirements (SEARs). The Scoping Report is to inform the content of the SEARs for the project. The SEARs will specify the requirements for the EIS that will be prepared to accompany the application for the project.



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Source: EMM (2020); WaterNSW (2020); DFSI (2017); ELVIS (2014/2015); DPI (2013)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

KEY

- Project footprint
- Major road
- Named watercourse
- Named waterbody
- Local government area
- NPWS reserve
- State forest
- Lachlan River catchment (inset)

Regional context

Wyangala Dam Wall Raising Project
Scoping report
Figure 1.1

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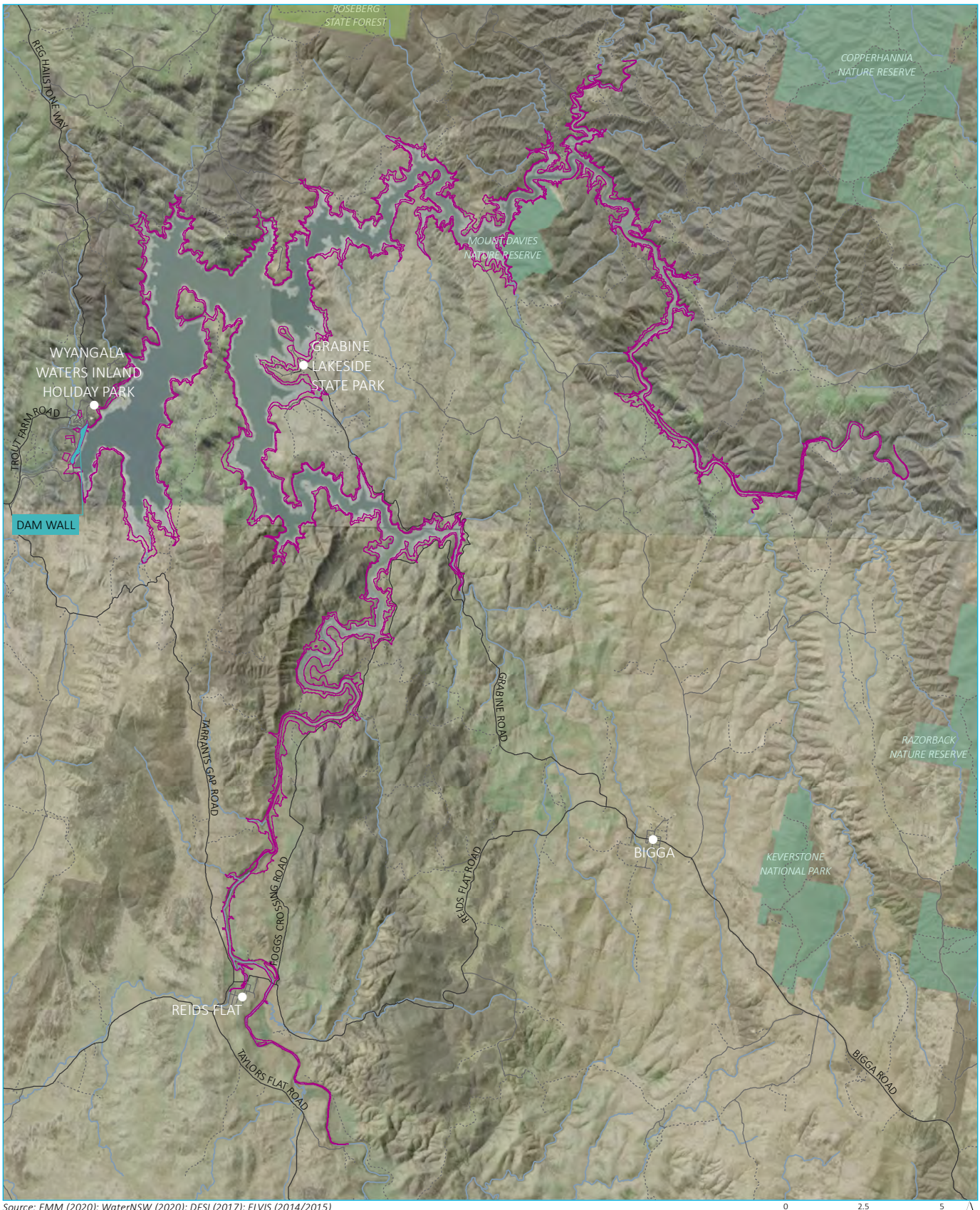

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Source: EMM (2020); WaterNSW (2020); DFSI (2017); ELVIS (2014/2015)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 2.5 5 km

GDA 1994 NSW Lambert

N

KEY

- Project footprint
- Dam wall
- Main road
- Local road
- Track
- Named watercourse
- Waterbody
- NPWS reserve
- State forest

Local context

Wyangala Dam Wall Raising Project
Scoping report
Figure 1.2

EMM creating opportunities

2 The project

2.1 Overview

Wyangala Dam is in the Lachlan River catchment around 30 kilometres (km) south east of Cowra in NSW and has a current storage capacity of 1,218 GL. The raising of Wyangala Dam (the project) would provide an additional 650 GL of storage capacity and General Security equivalent yield improvements of 21.05 GL per annum. The raised dam would contribute to a step improvement in water security, drought security and flood management capacity.

An outline of the key phases of the project has been developed with the key milestones and indicative timing shown in Figure 2.1.

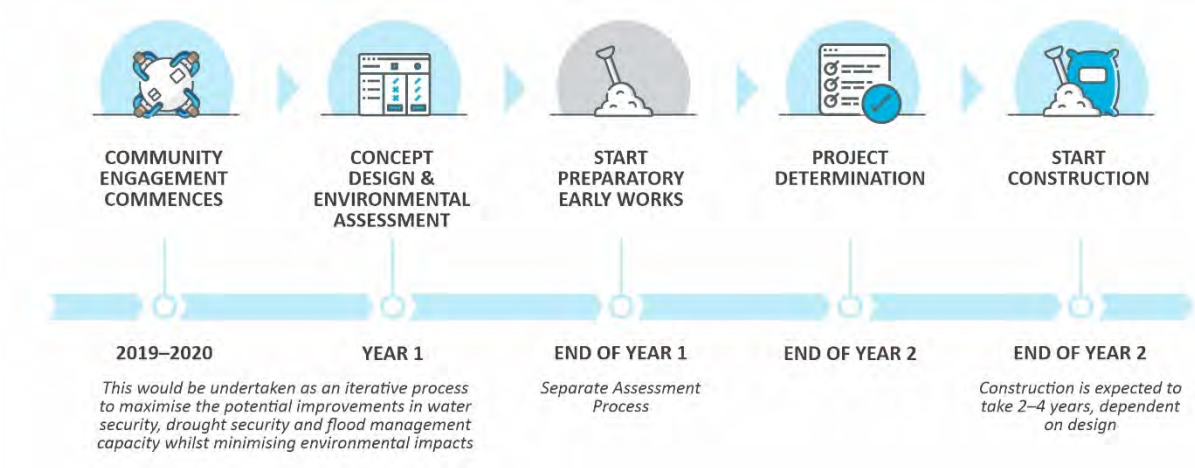


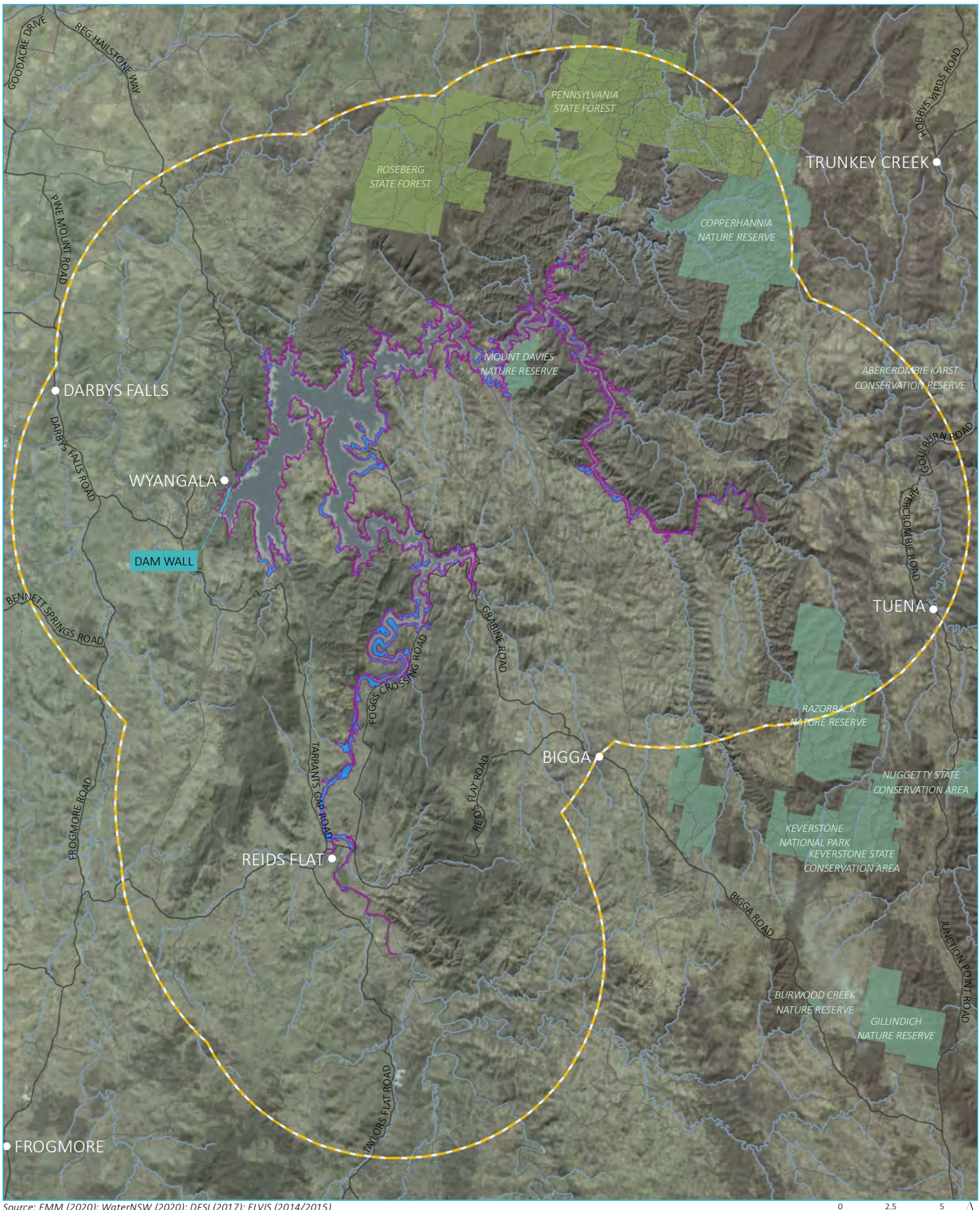
Figure 2.1 Indicative project timing

2.2 Project areas

In outlining the project, three key areas have been described to facilitate the assessment of both direct and indirect impacts during construction and operation. The project areas to be considered include:

- Inundation area: This is the area between the existing FSL and the proposed FSL for the project. This area would be inundated at full supply and as such forms the key area of impact during operation of the project.
- Project footprint: In addition to the area of inundation, direct impacts may be experienced within the footprint of both construction and operational areas.
- Project area: A broader project area has also been defined to allow for assessment of potential indirect impacts. This has been defined as a 10 km area around the project footprint.

Figure 2.2 shows the key project areas, including the inundation area, project footprint and project area.



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Source: EMM (2020); WaterNSW (2020); DFSI (2017); ELVIS (2014/2015)

** Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 2.5 5 km

GDA 1994 NSW Lambert

N

KEY

- Project area
- Project footprint
- Inundation area*
- Dam wall
- Main road
- Local road
- Track
- Named watercourse
- Waterbody
- NPWS reserve
- State forest

Project areas

Wyangala Dam Wall Raising Project
Scoping report
Figure 2.2

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2.3 Project design and layout

The project design provided in this section is an indicative preliminary design. The project design will be further developed to take into consideration environmental and technical investigations.

While the key components of the project are largely fixed, the final design solution and operation will be based on:

- the outcomes of further community engagement;
- results of geotechnical and other structural analysis and design investigations;
- flood and dam break modelling;
- ability for the design to meet dam safety requirements; and
- outcomes of environmental impact studies to ensure the design balances water storage benefits with potential social and environmental impacts.

2.3.1 Key components of the project

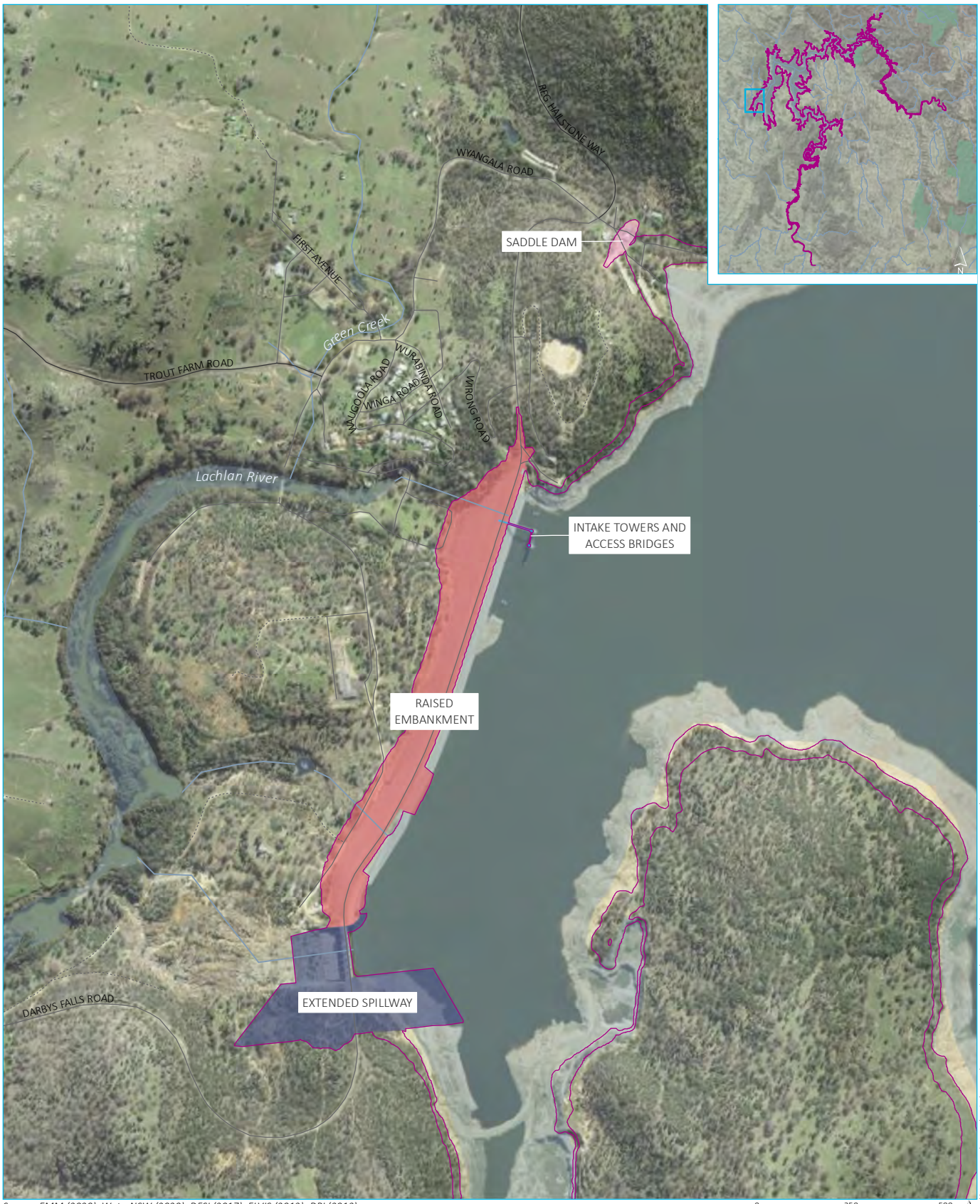
Table 2.1 provides a summary of the key components of the project identified by the preliminary design. An indicative layout for the project is shown in Figure 2.3.

Table 2.1 Summary of key components of project

Component	Description
Raised embankment	The raising of the rockfill embankment would be undertaken on the downstream side of the existing embankment, leaving the upstream face of the existing dam mostly undisturbed. The current embankment has a centrally located clay core. By adopting a downstream raising of the embankment, the new section of clay core would be inclined to match the profile of the new dam. As the wall approaches the spillway, the clay core would transition to a central core to maintain the alignment of the existing road of the spillway. Some upstream rockfill would be required adjacent to the central core on the raised section.
Spillway	The project would require raising of the existing spillway by around 10 m and a widening of the spillway towards the south by around 110 m to provide sufficient flood discharge capacity to cater for the peak PMF discharge. The crest level of the existing ogee weir would be increased through a combination of mass and reinforced concrete over the existing crest. Widening of the spillway would require significant excavation of rock to the south of the existing spillway. To direct flow to the new spillway, a raised curved training wall would also be constructed.
Intake towers	The existing intake towers of the dam would be raised by around 10 m. It has been assumed that the current tower and concrete wall provide sufficient structural integrity to support the raised towers. The raised towers would also consider incorporation of multi-level offtakes within the intake tower design to manage thermal impacts of water released downstream. Existing steel structure on top of the intake towers would be removed and reused on the raised towers.
Access bridges	Existing access bridges would be removed and reinstalled at the raised dam crest level. As the raised embankment crest would be downstream of the existing crest, an around 16 m extension to the access bridge would be required.
Saddle dam	To retain peak water levels at the FSL, an additional embankment would be constructed across a saddle around 600 m north east of the existing embankment. The saddle would be around 6 m tall and 150 m long, although this would be confirmed through further design work.
Construction compounds	The project would require one or more main construction compounds areas to facilitate the raising of Wyangala Dam. Smaller construction laydown areas may also be required to allow for construction of specific elements of

Table 2.1 Summary of key components of project

Component	Description
	the project. These would be in close proximity to the elements to be constructed and would be confirmed during the EIS assessment. Some existing work areas within the WaterNSW operational compound at the base of the existing dam wall may be suitable for use during construction. Adoption of these areas would assist in minimising the impacts of construction traffic and noise on local roads and receivers. Siting criteria for the selection of a preferred compound location are provided in Section 2.5.1.
Construction camp	A construction camp would be established within the existing Wyangala Waters Holiday Park to provide accommodation and associated services during the construction phase of the project.
Services and structures	Relocation of a number of services and structures would be required as a result of the increased inundation extent and project footprint.



Source: EMM (2020); WaterNSW (2020); DFSI (2017); ELVIS (2013); DPI (2013)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 250 500 m

GDA 1994 NSW Lambert

N

KEY

- Project footprint
- Main road
- Local road
- Track
- Watercourse
- Waterbody

Indicative infrastructure

- Extended spillway
- Intake towers and access bridges
- Raised embankment
- Saddle dam

Indicative project layout

Wyangala Dam Wall Raising Project
Scoping report
Figure 2.3

EMM creating opportunities

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2.3.2 Design integration and assessment approach

The preliminary design considered in this scoping report was developed in accordance with WaterNSW's objectives as part of the preliminary business case. Further design work is underway to develop the concept design to inform environmental assessment and feed into the detailed design. The process of design development during the EIS will involve an iterative design integration and assessment process where findings of environmental investigation of the concept will input to ongoing design refinement and solutions. This process, known as the design integration and assessment (DIAA) process will allow the design to avoid or minimise environmental and social impacts where possible without compromising dam safety requirements.

2.4 Construction

The key steps in raising the dam include:

- raising of the embankment dam and full supply level (FSL) by up to 10 metres (m);
- raising the height of the intake towers by up to 10 m;
- taking down and reinstalling the two access bridges at the raised dam crest level;
- widening of the spillway towards the south by about 110 m to provide sufficient flood discharge capacity to cater for the peak probable maximum flood (PMF) discharge;
- constructing a 6 m tall 150 m long embankment across a saddle at approximately 600 m north-east of the existing embankment; and
- relocating services and structures affected by the raised FSL.

Following completion of construction work, the dam would undergo a period of commissioning and filling before commencing routine operation. This stage of the project will be guided by development and implementation of an operational strategy. The Wyangala Dam operating strategy will be developed in consideration of potential impacts on existing water users, environmental outcomes and flood mitigation.

Construction activities for the project would generally be undertaken within the project footprint (Figure 2.2). Some components of construction of the project may be delivered as separate but coordinated construction contract packages. A more detailed staging and construction coordination plan will be presented in the EIS.

There may be additional preliminary works that may be required, which would be further refined during the design process for the project, and be considered either exempt development or subject to the relevant separate environmental impact assessment requirements under the EP&A Act.

2.5 Alternatives being considered

WaterNSW developed options through a series of workshops and through meetings with community and customer representatives. To determine which of the options to shortlist, an assessment was undertaken to identify the options that best met the following objectives:

- foster economic growth through improving water security in the Lachlan Valley;
- deliver a significant "step-change" improvement in drought security;
- improve flood management capability within the regulated portions of the Lachlan Valley area;

- avoid or minimise environmental impacts where possible, and
- provide value for money for users and government funds.

Several options were considered to improve water security for the region, with the raising of Wyangala Dam identified as a preferred option. A preliminary design for the project was prepared as part of the options investigations (GHD 2017).

The preliminary design is based on a 10 m raising of Wyangala Dam to provide an additional 650 GL of storage. An iterative process of environmental investigation, impact assessment and concept design (DIAA process) will be undertaken to refine the preliminary design and in particular confirm the optimal height of the dam. The design will be optimised to maximise the potential improvements in water security, drought security and flood management capacity whilst minimising environmental impacts.

The following would be considered during development of the concept design:

- Flood risks during construction: Refinement of the construction methodology to minimise the risk of flooding impacts downstream during construction. The existing capping materials on the crest would require excavation (around the top three to four metres) to expose the core materials prior to raising of the embankment.
- Spillway energy impacts: Raising of the ogee weir would increase the flow energy, which has potential to result in scour and erosion along the spillway channel and the immediate areas of the Lachlan River. The concept design will need to consider the need for energy dissipation structures.
- Intake towers: The preliminary design (GHD 2017) proposed raising of the existing intake towers however has not made provision for the management of thermal pollution. WaterNSW are committed to assessing and managing the risks associated with thermal pollution, and as such the concept design will need to consider inclusion of multi-level intake capacity in the raised intake towers.
- Saddle Dam: The proposed location of the saddle dam, around 600 m north of the existing embankment, is close to the petrol station at the entrance to the existing Wyangala Waters Holiday Park. Consideration would be given to ensuring the saddle dam siting and construction allows for the protection and maintenance of this facility.

2.5.1 Criteria for determination of construction compound site locality

As the iterative process of concept design and environmental assessment progresses, preferred locations for construction compounds and work sites would be confirmed. The following provides a summary of key criteria that will be considered when selecting a preferred location:

- land ownership/lease arrangements;
- site topography, drainage and soil conditions. The preference for large open areas with a reasonably flat site. A slight slope is permissible for stormwater runoff;
- proximity to the construction site of the dam wall and preferably downstream of the dam to be constructed;
- a site that avoids or minimises potential impacts to vegetation and Aboriginal cultural heritage;
- potential impacts on sensitive receivers including noise and air quality impacts;

- a site that is large enough to accommodate key facilities, including concrete batch plants, heavy construction machinery, construction site offices, storage and laydown areas;
- access and availability of potable water and electricity;
- access and availability of communications;
- accessibility by emergency services;
- accessibility by road for delivery of construction materials and removal of waste;
- potential impact from flooding; and
- safety and security including safety for pedestrian and vehicular movements.

3 Strategic context

3.1 Water security for the future

WaterNSW is responsible for dam operations, water security and managing water stored in all its 42 water storages in NSW. Each valley has different water storage and supply issues. In the coming decades, the most important environmental change with significant implications for infrastructure is a reduction in water availability.

3.1.1 Drought and climate trends

Natural rainfall variability in NSW is large and the State has a history of drought and flooding events. The most severe drought events include the Federation Drought (1896 to 1902) and the more recent Millennium Drought (1996 to mid-2010). Severe flooding events across NSW followed during 2010 and 2011, which provided the wettest two-year period on record and broke the long-term drought across the State (BoM 2012).

While natural variability is expected to provide rainfall during cooler months and in the short-medium term, in the longer term, large year to year rainfall variability is expected against a background state which is expected to further change through time. Longer, drier periods and less frequent but more intense rainfall events are expected.

NSW is currently experiencing one of the most severe droughts on record, with the Central West, Far West and North West regions the worst affected to date. WaterNSW is already delivering a range of emergency drought relief projects to extend water supplies for critical human needs in towns and valleys where rainfall, inflows and storage levels are low. The current experience further highlights the critical need for planning for future droughts and ensuring water security during these periods.

3.1.2 Government support, plans and policy

The State Infrastructure Strategy (SIS) was first delivered in October 2012 and is a 20-year infrastructure investment plan for the NSW Government that places strategic fit and economic merit at the centre of investment decisions. The strategy assesses infrastructure problems and solutions, and provides recommendations to best grow the State's economy, enhance productivity and improve living standards for NSW community. The SIS was reviewed in 2014 and updated in 2018 to the current *Building Momentum State Infrastructure Strategy 2018-2038*.

The NSW Government identified the Lachlan Valley in its *State Infrastructure Strategy 2014 Review* (SIS Review) as the first of four 'priority catchments' for the investment and delivery of critical water infrastructure projects over the next decade. The SIS Review also recommended Water NSW should develop a best practice 20 year capital plan to provide the evidence base required for pricing applications going forward.

In support of the SIS:

- WaterNSW developed a *20 year Infrastructure Options Study* (2018). This Options Study details the State's existing rural bulk water supply systems and provides a strategic level assessment of infrastructure solutions to mitigate or improve long-term level of service issues in the regulated valleys. The Wyangala Dam wall raising was one of many options considered to improve water availability in the Lachlan Valley;
- WaterNSW completed water security investigations for the Lachlan Valley priority catchment. The investigations identified a number of water security options and the Wyangala Dam wall raising was carried forward as the preferred option; and
- a regional water security and supply fund was committed to by the NSW and Commonwealth governments.

The $1 billion water infrastructure package for rural and regional communities in NSW was announced in October 2019 by the NSW Premier and Commonwealth governments. Part of this funding is committed to the planning and development of the project.

3.2 Lachlan Valley catchment

In NSW, 82.5 per cent of the land area and 11.6 per cent of the population is located west of the Great Dividing Range. The main water demands in this area are agriculture and mining and supporting regional towns.

Within the Lachlan Valley catchment, land use is primarily agricultural including 15 per cent for dryland cropping and 75 per cent livestock grazing. Major water users include local councils and water utilities, mining and agriculture including dairy, wool, beef and lamb, as well as irrigated crops such as cereals, lucerne and cotton. Major towns drawing supply in this catchment include Cowra, Parkes, Forbes and Young.

3.2.1 Current challenges and opportunities

The Lachlan Valley catchment has low water security due to high distribution losses from long rivers, anabranches and effluent streams. High evaporation losses also occur from large, shallow lakes and there is insufficient storage capacity for multi-year droughts.

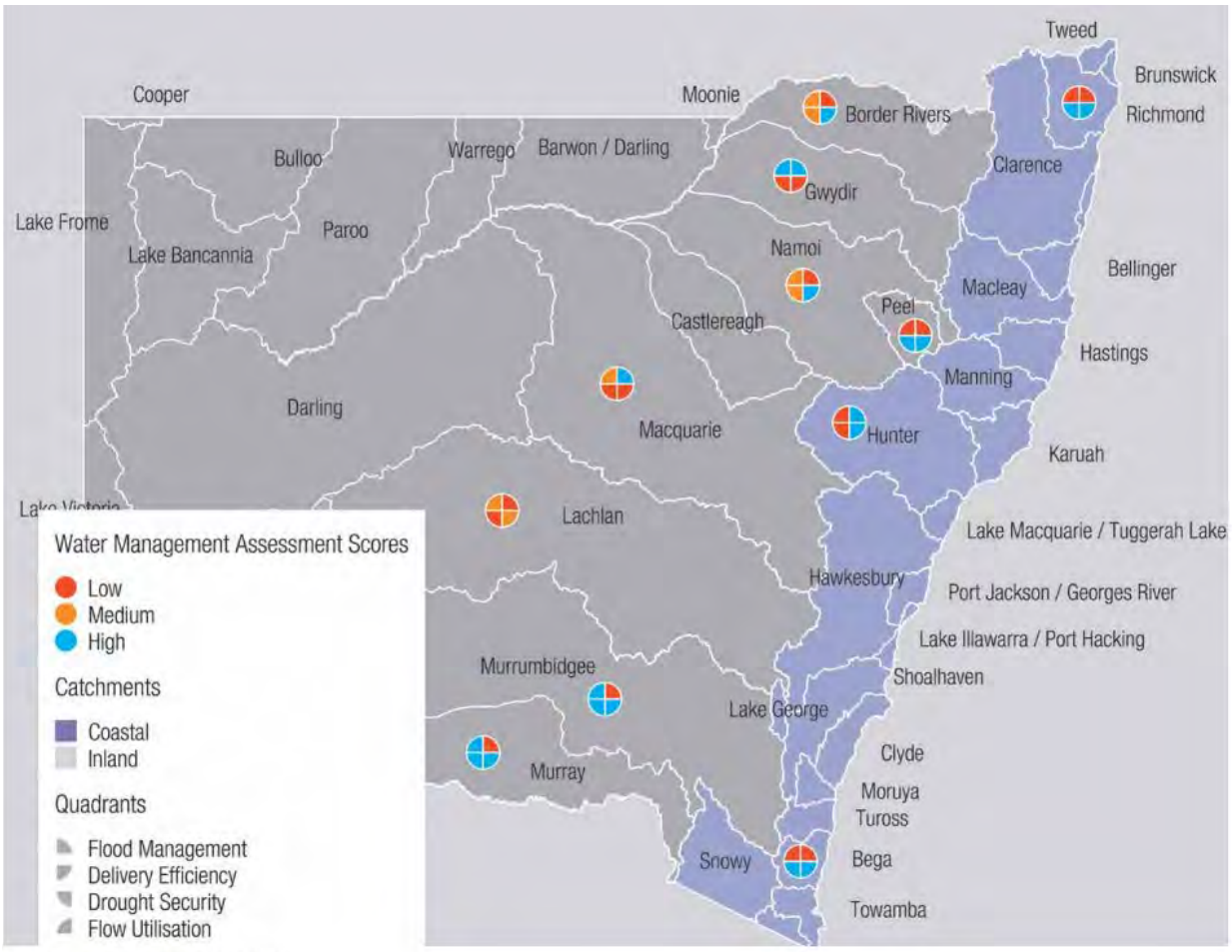
The relative capability of the Lachlan Valley's water system is reflected in the SIS Review, which rated regional valleys according to four attributes (Figure 3.1). The Lachlan Valley scored the worst of all valleys, with low and medium scores across all four key areas.

Compared with similar valleys of largely similar agricultural use, soil and other characteristics, the Lachlan Valley has experienced a markedly lower average water availability over the last 20 years.

In considering potential solutions, WaterNSW developed and assessed a long list of build and non-build options and carried out a strategic assessment to identify a shortlist for feasibility analysis. The shortlist included the following options:

- construction of a new water transfer pipeline between Lake Rowlands and Carcoar Dam;
- delivery of a package of Lower Lachlan water efficiency options;
- raising Wyangala Dam by 10 m; and
- construction of a new 700 GL dam at Cranky Rock.

The raising of Wyangala Dam was the preferred option as it provided the greatest net benefit to improve water security, and balancing cost, community and environmental impacts.



Source: Infrastructure NSW (2014)

Figure 3.1 Water management assessment scores for NSW catchments

3.2.2 Natural and built features that could be impacted by the project

Wyangala Dam is an existing water storage and provides recreational values with two holiday parks along its shores. The surrounding land uses are primarily agricultural however some properties are identified for conservation. Key features identified within the catchment that could be impacted by the project are:

- biodiversity values including terrestrial and aquatic threatened ecological communities and species;
- Aboriginal cultural heritage sites and intrinsic values of the area;
- properties requiring full or partial acquisition as they would be inundated by the new full supply level. Some properties may also be impacted by maximum flood levels and may necessitate relocation of structures;
- utilities and infrastructure requiring relocation as they would be inundated by the new FSL or within future PMF levels; and
- social and recreational infrastructure associated with the two holiday parks: Wyangala Waters Holiday Park and Grabine Lakeside Holiday Park.

These features and further consideration on how they may be impacted by the project is described in Chapter 6. The community includes people living in the Wyangala township downstream of the dam, as well as residences on the rural properties that surround it. Previous consultation carried out for the Lachlan Valley investigations suggests the community are generally supportive of a solution involving Wyangala Dam. Further information on community consultation on the project is provided in Chapter 5 and Chapter 7 of this report.

3.3 Critical need for the project

Drought security and flood management have been dual challenges for the Lachlan Valley. In the last twenty years for example, the Lachlan Valley has suffered through the Millennium Drought of the 2000s and significant flooding in 2016 causing economic, social and environmental damage. The inability of the regulated water system to mitigate these weather events impacts the local water dependent agricultural and mining industries, as well as critical town water supplies.

Lachlan Valley needs better water infrastructure to address two critical issues:

- irrigation drought security; and
- flood management capability.

For decades, residents and businesses in the Lachlan Valley have faced significant challenges due to a lack of irrigation drought security and flood management capability, typically resulting in low, highly variable water availability. In turn, this has impacted the economic potential of the region.

The region's susceptibility to climatic events has been clearly demonstrated in the last 15 years. The Millennium Drought caused profound hardship for many residents, with consecutive years of zero to little general security water allocation and water restrictions in dependent areas.

Since the break of the Millennium drought, floods have destroyed crops, damaged infrastructure, created safety risks, and resulted in significant financial and economic loss. It is estimated that during 2016, flood damage caused around $500 million of economic losses to the area in crop damage alone.

The inadequacy of current water infrastructure in the Lachlan Valley, coupled with the risk of increasing likelihood of droughts and floods and the lead time for the development of the scale of infrastructure response required, means that delivery of solutions should be commenced as soon as possible.

Through investigation of several water security options in the Lachlan Valley it was concluded that raising Wyangala Dam forms part of a recommended scheme that provides the greatest improvement in drought security, flood management and water reliability. The project would reduce the risk and impact of climatic events on water security and mitigate associated social and economic impacts.

Reflecting the relative urgency, the project is critical water infrastructure needed in the next decade to achieve greater water security, reliability and availability. The project is wholly consistent with the State's infrastructure priorities in ensuring water security for regional communities.

4 Statutory context

4.1 Critical State significant infrastructure

Section 5.12 of the EP&A Act provides for the declaration of SSI, and section 5.13 enables the NSW Minister for Planning and Public Spaces to declare SSI to be CSSI if 'it is of a category that, in the opinion of the Minister, is essential for the State for economic, environmental or social reasons'.

On 21 November 2019 the WSCN Act was enacted. The object of the act is to facilitate the delivery of water supplies to certain towns and localities to meet critical human water needs, and to declare certain activities to be CSSI for the purposes of Part 5 of the EP&A Act.

Schedule 3 of the WSCN Act provides that certain activities described in the schedule is taken to be CSSI. It currently includes four activities, including the project. Accordingly, the project is declared to be SSI and CSSI. As such, the project requires assessment and approval from the NSW Minister for Planning and Public Spaces under Division 5.2 of Part 5 of the EP&A Act.

4.2 Planning and assessment process

Division 5.2 of Part 5 of the EP&A Act sets out the assessment and approval framework for SSI and CSSI. This process is shown in Figure 4.1.

As previously stated, applications for SSI and CSSI must be accompanied by an EIS. The requirements of an EIS are stipulated in Schedule 2 of the EP&A Regulation 2000. This states, among other things, that an EIS must address the SEARs and include:

(a) a summary of the EIS,

(b) a statement of the objectives of the development, activity or infrastructure,

(c) an analysis of feasible alternatives to the carrying out the development, activity or infrastructure, having regard to its objectives, including the consequences of not carrying out the development, activity or infrastructure,

(d) an analysis of the development, activity or infrastructure, including:

  (i) a full description of the development, activity or infrastructure, and

  (ii) a general description of the environment likely to be affected by the development, activity or infrastructure, and

  (iii) the likely impact on the environment of the development, activity or infrastructure, and

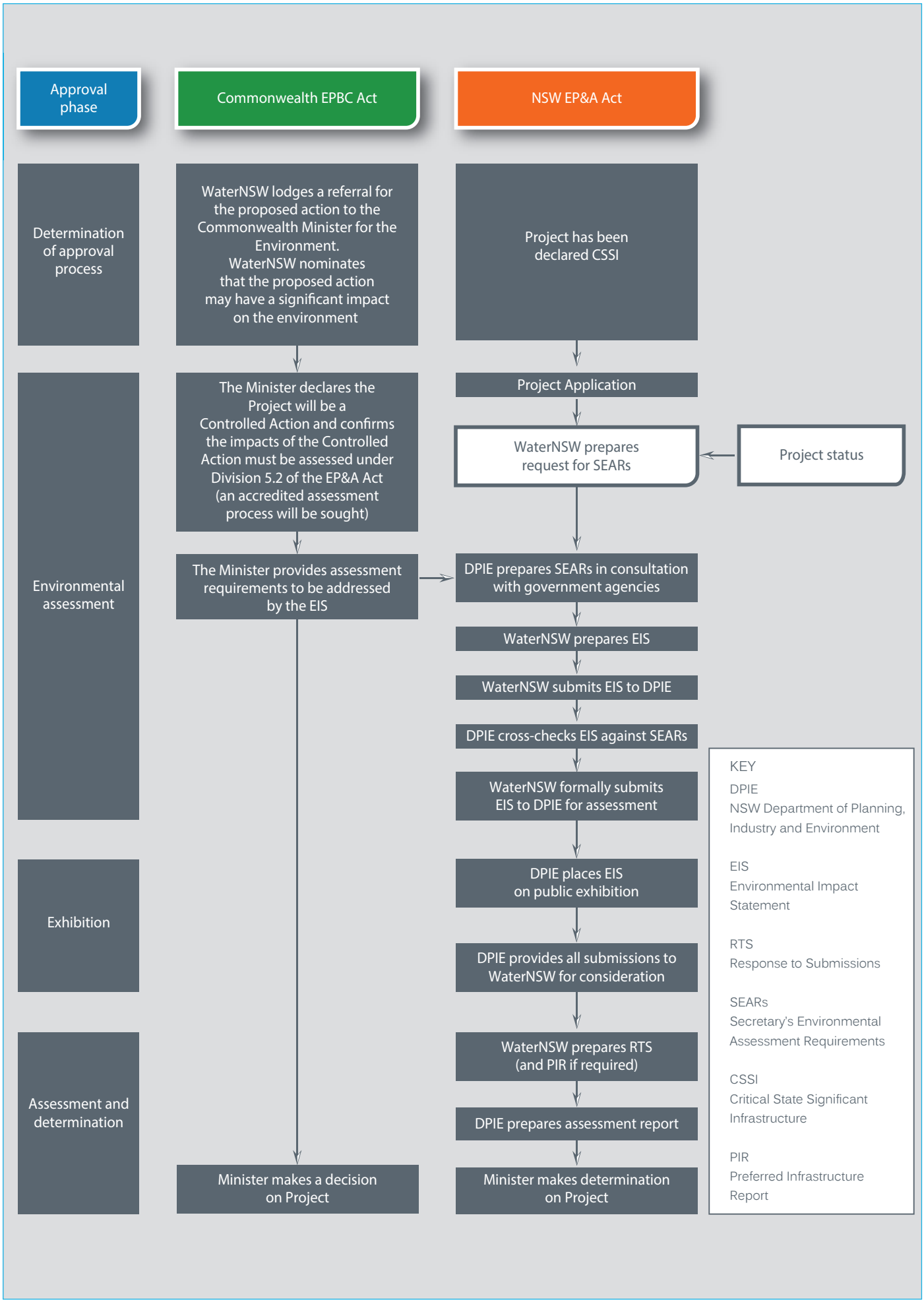
  (iv) a full description of the measures proposed to mitigate any adverse effects of the development, activity or infrastructure, and

  (v) a list of any approvals that must be obtained under any other Act or law before the development, activity or infrastructure may lawfully be carried out,

(e) a compilation (in a single section of the EIS) of the measures referred to in item (d)(iv),

(f) the reasons justifying the carrying out of the development, activity or infrastructure in the manner proposed, having regard to biophysical, economic and social considerations, including the principles of ecologically sustainable development.

The EIS for the project would be undertaken to address the SEARs and include the above requirements.



WaterNSW EMM creating opportunities

Approvals process
Wyangala Dam Wall Raising Project
Scoping Report
Figure 4.1

4.2.1 Application of other provisions of EP&A Act

By virtue of section 5.22 of the EP&A Act, a number of parts and divisions of parts of the EP&A Act do not apply to SSI and CSSI. This includes local environmental plans (LEPs) and state environmental planning policies (SEPPs) (except where they apply to the declaration of infrastructure as SSI and CSSI) and Part 4 of the EP&A Act.

4.2.2 Other State approvals and licences

Under sections 5.23 and 5.24 of the EP&A Act, certain separate environmental approvals under other NSW legislation would not be required for the project or would be required to be issued consistent with an approval (if granted) for the project. Each of these separate environmental approvals is considered in Table 4.1.

Further environmental and other approvals may be required in addition to those referred to under section 5.23 and 5.24 of the EP&A Act, and these would be considered and outlined where relevant to the assessment of the project as part of the EIS.

Table 4.1 Other State approvals and licenses

Approval	Relevance to project	Comment
Approvals not required under section 5.23		
A permit under section 201, 205 or 219 of the NSW *Fisheries Management Act 1994* (FM Act)	Relevant but not required	Consistent with clause 5.23 of the EP&A Act, these approvals are not required for SSI and CSSI or any investigative or other activities that are required to be carried out for the purpose of complying with any environmental assessment requirements in connection with an application for approval.
An approval under Part 4 or an excavation permit under section 139 of the NSW *Heritage Act 1977*	Relevant but not required	
An Aboriginal heritage impact permit under section 90 of the NSW *National Parks and Wildlife Act 1974*	Relevant but not required	
A bushfire safety authority under section 100B of the NSW *Rural Fires Act 1997*	Relevant but not required	
A water use approval under section 89, a water management work approval under section 90 or an activity approval (other than a groundwater interference approval) under section 91 of the NSW *Water Management Act 2000*	Relevant but not required	
Approvals required to be issued consistently under section 5.24		
An aquaculture permit under section 114 of the NSW *Fisheries Management Act 1994*	No	The project does not involve aquaculture.
Approval under section 15 of the NSW *Mine Subsidence Compensation Act 1961*	No	The project is not within a mine subsidence district.
A mining lease under the NSW *Mining Act 1992*	No	The project does not involve mining.
A production lease under the NSW *Petroleum (Onshore) Act 1991*	No	The project does not involve petroleum production.

Table 4.1 Other State approvals and licenses

Approval	Relevance to project	Comment
An environment protection licence (EPL) under Chapter 3 of the NSW *Protection of the Environment Operations Act 1997*	Yes	It is likely that an EPL will be required for the applicable scheduled activities. Under section 5.24(1) of the EP&A Act, an EPL cannot be refused if it is necessary for carrying out approved SSI and CSSI and is to be substantially consistent with the EP&A Act approval.
A consent under section 138 of the NSW *Roads Act 1993* (Roads Act)	Yes	The project involves interaction and works within public road reserves. Under section 5.24(1) of the EP&A Act, consent under section 130 of the Roads Act cannot be refused if it is necessary for carrying out approved SSI and CSSI and is to be substantially consistent with the EP&A Act approval.
A licence under the NSW *Pipelines Act 1967* (Pipelines Act)	No	The project does not involve the construction and operation of water pipelines.

4.3 Commonwealth approval framework

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) aims to protect matters of national environmental significance (MNES) including:

- world heritage properties;
- national heritage places;
- Ramsar wetlands of international importance;
- nationally threatened species and ecological communities;
- migratory species;
- Commonwealth marine areas;
- the Great Barrier Reef Marine Park;
- nuclear actions (including uranium mining); and
- a water resource, in relation to coal seam gas development and large coal mining development.

If an action will, or is likely to, have a significant impact on any MNES, it is deemed to be a 'controlled action' and requires approval from the Commonwealth Minister for the Environment or the Minister's delegate. To determine whether a proposed action will or is likely to be a controlled action, a Referral of Proposed Action is submitted to the Commonwealth Department of the Agriculture, Water and the Environment (DAWE) for assessment.

As stated in 6.2.1, regional vegetation mapping and preliminary field surveys identified that the much of the native vegetation within the study area is likely to be part threatened ecological community, commonly known as Box Gum Woodland which is listed as critically endangered under the EPBC Act. This community is also known to provide habitat for threatened flora and fauna species listed under the EPBC Act.

Accordingly, WaterNSW, on a precautionary basis, will refer the project to DAWE and nominate that it has potential to have a significant impact on MNES and would therefore be a controlled action. This will allow potential impacts to relevant MNES to be considered in the EIS to be prepared on the project.

The approval process under the EPBC Act will be determined with DAWE. A proposed action can be assessed using one of the following assessment approaches:

- accredited assessment (where there is no bilateral agreement in place the Commonwealth Minister for the Environment can accredit use of state legislation, such as the EP&A Act, for the assessment);
- assessment on referral information;
- assessment on preliminary documentation;
- assessment by EIS or public environment report; or
- assessment by public inquiry.

It is the preference of WaterNSW that the project be assessed using an accredited process under section 87(4) of the EPBC Act, where the Commonwealth accredits the assessment process under Division 5.2 of Part 5 of the EP&A Act.

The approval process under the EPBC Act using an accredited process can be seen in Figure 4.1.

The use of an accredited assessment process does not alleviate the approval requirements of the Commonwealth Minister for the Environment under the EPBC Act. While the NSW Minister for Planning and Public Spaces is the determining authority for the project under the EP&A Act, the Commonwealth Minister for the Environment remains the person who must decide whether or not to approve the controlled action under the EPBC Act.

5 Considerations during scoping

5.1 Engagement with community and stakeholders

The project is one of the first major dam projects in NSW in four decades and comes in response to the effects of a severe drought, which has highlighted the importance and priority of water security for communities and users of river systems and water storages.

WaterNSW commenced introductory discussions for the project in late 2019 and early 2020 with local councils and key stakeholder groups, including members of the reference groups formerly established in 2017 (see below). Introductory communication with the broader community has also commenced through:

- media releases including the public announcement by the NSW Minister for Water, Property and Housing;
- updates via the WaterNSW website including a dedicated project page providing a description of the project and access to the supporting feasibility and investigative studies;
- meetings and communications with Reflections Holiday Parks; and
- initial identification and engagement of Aboriginal community members.

Early engagement was guided by WaterNSW's Wyangala Dam Wall Raising Engagement and Communications Plan. This plan was specific to the current scoping phase of the project to ascertain views of targeted stakeholders through to March 2020. In addition to this plan, WaterNSW is currently preparing an Aboriginal engagement communication strategy that will provide a foundation for close engagement with the Aboriginal community. Further community engagement activities will be undertaken to support the EIS..

The following sections outline the activities and feedback received to date and considered during the scoping of the EIS. The proposed engagement strategy for the EIS is provided at Chapter 7.

5.1.1 Previous consultation for Lachlan Valley water security investigations

WaterNSW commenced community and stakeholder engagement with the broader community in 2016 through the development and assessment of build and non-build options within the Lachlan Valley. This engagement informed the Lachlan Valley Priority Catchment Water Security preliminary business case for the project and established relationships for the current project.

The engagement program included a series of meetings with community and customer representatives, update letters, phone and email discussions with landholders, project bulletins and the establishment of a Community Reference Group and a Customer Reference Group. The Community Reference Group included indigenous representation through the Cowra Local Aboriginal Land Council (LALC). The outcomes were documented in the *Lachlan Valley Priority Catchment Water Security Investigations* (GHD 2017).

5.1.2 Consultation outcomes and issues identified

Overall, consultation to date has indicated that stakeholders broadly agree with the critical issues identified in the need for change and the critical water security issue in the region.

The flooding of the Lachlan Valley in 2016 brought a significant community focus on the desire for additional flood mitigation or flood management capabilities in the region. More recently, the current drought has brought significant community attention on the need for better water security and management.

While the concerns have primarily focused on water use and flood management, environmental concerns have also been raised regarding how an infrastructure solution might impact already established environmental controls.

WaterNSW initiated further discussion on the project in late 2019 with local government and key stakeholder groups. These preliminary meetings provided initial views on issues and concerns, perceived benefits and preferred methods of interaction and communication and discussed the principles and practices around WaterNSW future engagement.

The primary concerns highlighted by this consultation were:

- the extent and impacts of inundation;
- the impact of the project on the local tourism economy;
- the future frequency of flooding of communities once the project is completed;
- maximising local community benefits and opportunities;
- the impacts on public infrastructure such as roads, bridges, boat ramps and drainage;
- the impacts on the holiday parks and recreation during the project and following the project completion;
- the impacts on property and the need for land acquisitions;
- concern the project may not proceed;
- how the project will impact/benefit customers and the community and the need to consider other measures for drought proofing;
- the risks for water quality and catchment health;
- issues relating to water security for existing licence holders;
- the affect the project may have on the existing Murray Darling Basin Plan arrangements; and
- opportunities for local business participation in the project.

WaterNSW has committed to guiding principles for engagement on the project and will implement a comprehensive consultation and engagement strategy to inform the project throughout subsequent stages, as detailed in Chapter 7. This will include an Aboriginal engagement communication strategy that will provide a foundation for close engagement with the Aboriginal community.

5.2 Identification of key issues

5.2.1 Scoping process

Preliminary environmental investigations have been carried out to identify the relevant matters to be addressed in the EIS for the project and the required level of assessment. This process was informed by desktop assessment and limited field survey undertaken by WaterNSW and the project team. This process included:

- consultation with DPIE and key stakeholders (including holiday park operators);

- undertaking a process of identifying and characterising relevant matters for assessment, involving an appraisal of likely environmental and social impacts; and
- reporting the outcomes of that assessment in this Scoping Report.

A checklist of matters was provided (DPIE 2019) and a preliminary impact and mitigation assessment was carried out. The full list of matters considered in the scoping assessment is provided in the Scoping Worksheet provided at Appendix A. Those matters relevant to the construction and operation of the project have been identified and allocated to one of the following categories:

- Key matters or issues – these have been defined as requiring detailed assessment, ie will require detailed field surveys and/or quantified modelling techniques to fully understand the impacts and identify project-specific mitigation and/or alternatives. It is assumed at this stage of assessment that each of the listed key issues will require separate technical responses and will be separately attached to the EIS.
- Other matters or issues – characterised as matters where the assessment approach and measures to manage impacts are well understood and routinely used on similar projects and will be subject to a standard assessment. Each of these issues will need to be addressed through the EIS process and require investigation, but which may or may not require a technical study.
- Scoping only issues or matters that require no further assessment in the EIS – matters in this group have been considered in this initial scoping assessment and justification provided as to why it is proposed that they not be investigated further.

The outcomes of the scoping investigations are provided in this report and the completed Scoping Worksheet at Appendix A.

5.2.2 Issues requiring assessment

Based on the findings of the scoping assessment (Appendix A), the environmental investigations that have been carried out to date and feedback received on the project, key assessment issues for the project have been identified as:

- biodiversity;
- hazards & risks (dam and flood; contamination);
- heritage;
- land;
- social; and
- water.

Table 5.1 presents key issues or matters to be considered for the EIS and are detailed further in Chapter 6.

Table 5.1 Identification of key and other issues requiring assessment

Issue	Scoping assessment	Key or other issue
Access	Standard – inundation as a result of the raising of the dam has potential to impact access to property and some local roads.	Other issue (Section 6.7.2)
Air	Standard – impacts to air is likely to be limited during construction and operation, however, should be considered further as the design develops.	Other issue (Section 6.7.3)
Amenity (inc Noise)	Standard – noise and vibration impacts may be experienced during construction. Visual impacts as a result of the raised dam wall and inundation will also require assessment.	Other issue (Section 6.7.4)
Biodiversity	Detailed - the project will have direct impacts arising from the construction of the project and inundation. Potential direct impacts include impact on native vegetation, impact on threatened species habitat; and disturbance/inundation of aquatic habitat.	Key issue (Section 6.2)
Built environment	Standard - inundation as a result of the raising of the dam has potential to impact private property and public infrastructure.	Other issue (Section 6.7.1)
Economic	Standard – partial or complete inundation of land and infrastructure may impact the livelihood of some community members and may also impact access to natural resources.	Key issue (Section 6.5)
Hazards and risks (dam and flood)	Detailed – raising of the dam wall and increase in the capacity of the dam requires detailed consideration of dam safety and flood risks.	Key issue (Section 6.6)
Hazards and risks (other)	Standard – other hazards and risks such as bushfire, contamination and waste will require consideration but are considered unlikely to present a significant risk.	Other issue (Section 6.7.5)
Heritage	Detailed - the project has the potential to impact Aboriginal heritage arising from the construction of the project and inundation.	Key issue (Section 6.3)
Land	Detailed - partial or complete inundation of land and infrastructure may impact land capability and should be considered in conjunction with social and economic impacts. Consideration of soils within the construction and inundation areas also require assessment.	Key issue (Section 6.4)
Social	Detailed – there are a range of potential direct and indirect impacts (positive and negative) of the project. Consideration of the social consequences resulting from the findings of other technical investigations such as investigations into noise, air quality, surface water and access will also be required.	Key issue (Section 6.5)
Water	Detailed – a range of issues including water quality, cold water pollution, changes to flow regimes and flooding require detailed consideration.	Key issue (Section 6.1)

5.2.3 Matters requiring no further assessment in the EIS

As part of the scoping process a range of issue were identified that are considered to not require further investigation. Table 5.2 identifies these issues and provides a brief justification for no further consideration in the project EIS.

Table 5.2 Matters requiring no further assessment

Issue	Justification
Access (port/airport facilities)	No ports or airports are located in proximity to the project and as such there will not be any direct or indirect impacts.
Hazards and risks (coastal hazards)	Wyangala Dam is in the Lachlan River catchment, around 30 km south east of Cowra in NSW and as such does not require assessment of coastal hazards.
Hazards and risks (hazardous/offensive development)	Raising of Wyangala Dam and associated ancillary development is not considered to be hazardous or offensive development.

6 Proposed assessment

Preliminary environmental investigations have been carried out to identify the relevant matters to be addressed in the EIS for the project and the required level of assessment. Based on these findings, issues have been defined as either key or other issues requiring a detailed or standard level of assessment. The proposed assessment for key issues are outlined in Section 6.1 to Section 6.6, and for other issues in Section 6.7.

6.1 Water

6.1.1 Existing environment

i Surface water resources and users

The Lachlan River is a highly regulated river system which supplies water for irrigation, stock and domestic, town water supply and industrial/mining purposes in the valley. Water allocations from the storage are subject to the provisions of the Murray Darling Basin Plan (MDBP), including the Sustainable Diversion Limits (SDLs) and the *Water Sharing Plan for the Lachlan Regulated River Water Source 2016* (Lachlan Regulated WSP).

Wyangala Dam is a major reservoir situated in the upper reaches of the Lachlan Valley, below the confluence of the Lachlan and Abercrombie rivers (Figure 1.1). The dam was built to supply water for irrigation, flood mitigation and potable water for the towns of Cowra, Forbes, Parkes, Condobolin, Lake Cargelligo, Euabalong and Euabalong West and also provides water to lower Lachlan Valley customers.

Each of these users have different requirements in terms of the security of supply, demand profile and tolerance to changes, which require consideration in identifying potential risks and impacts. Potentially sensitive aquatic species and habitat located downstream of the proposed dam have been identified as part of the biodiversity assessment (Appendix B).

ii Hydrogeological setting

The local flow system is a fractured rock groundwater aquifer contained within the Wyangala Granite. The fractured rock is a limited groundwater resource due to the very low primary porosity with groundwater flow occurring within secondary porosity features such as fractures or along contact boundaries between different rock lithologies. The hydraulic conductivity and groundwater storage within these secondary porosity features is typically very low, making it an ideal surrounding rock for water impoundment.

Recharge areas to the fractured rock and upper reaches of the valley alluvial aquifers are generally considered to be via rainfall on the upper slopes, ridgelines and hilltops of the landscapes were the rock sub-crops or outcrops. Discharge points are likely to comprise of natural locations such as springs, spring fed dams, lower slopes and the relatively lower lying areas.

iii Groundwater management and users

Wyangala Dam is within the Lachlan Fold Belt groundwater source managed by the *Water Sharing Plan for the NSW Murray Darling Basin Fractured Rock Groundwater Sources 2020* (MDB Groundwater WSP). Groundwater downstream of the dam is a part of the Upper Lachlan Alluvial groundwater source managed by the *Water Sharing Plan for the Lachlan Unregulated and Alluvial Water Sources 2012* (Lachlan Unregulated WSP).

6.1.2 Issues for consideration

i Surface water

The project may have potential impacts on surface water hydrology, water quality, cold water pollution, and flooding. These impacts could extend beyond the project boundary and may, without appropriate mitigation measures, be significant. The project could adversely impact water users, aquatic and terrestrial ecology, downstream infrastructure and properties adjacent to the downstream watercourse. Improved flow reliability may also provide benefits to downstream water users and environmental flow benefits. The potential impacts of the project with reference to the above matters of consideration will need to be assessed in the EIS. Additional baseline data (flow and water quality) will need to be compiled and detailed flood modelling will be required to quantify and assess the potential impacts.

ii Groundwater

The main issues for consideration of groundwater impacts is a potential reduction of frequency of flooding and reduction in the volume of surface water runoff into the valley alluvium aquifer. This could impact downstream groundwater users that abstract groundwater and dependent environments. These potential impacts could be managed by controlling environmental flows from the dam to the downstream river environment and should be considered during the EIS and development of management plans. Impacts to groundwater due to raising of the dam wall are considered minor and could be managed by dam operating rules.

6.1.3 Approach to assessment in EIS

i Surface water

Operating rules are a key driver in understanding potential water related impacts. The EIS will identify interim operating rules prepared as part of the iterative design and assessment process.

A water assessment will be completed for the EIS. The assessment will characterise baseline conditions through review of available water quality data, supplemented with the collection of additional field data during the EIS. The assessment will identify and provide management measures for:

- potential impacts on ambient water quality parameters, as defined by the baseline data;
- potential geomorphological impacts including potential erosion and sedimentation within the storage, banks of the storage, and downstream impacts to the receiving environment; and
- cold water pollution relative to the downstream ambient water temperature.

Detailed flood modelling will be conducted to identify potentially impacted properties and to quantify any potential environmental impacts associated with the project, and to develop suitable mitigation strategies if required. Dam break modelling will be required as part of the spillway design and this will also be reported in the EIS as it pertains to downstream impacts and public safety.

Water balance modelling will be conducted to confirm yield and security of supply and will consider any requirements of the water sharing plans and SDLs (such as cumulative impacts associated with water extraction/allocation), which have been developed in accordance with the MDBP.

ii Groundwater

A groundwater assessment will be undertaken to assess the incremental impact to the groundwater regime from the project. The key NSW policy the project will need to address is the *NSW Aquifer Interference Policy* (AIP). The AIP sets out the minimal impact considerations that are essentially a series of threshold levels for groundwater level drawdown and quality changes. The study will need to directly address the potential for the project to impact upon these thresholds.

6.2 Biodiversity

A preliminary assessment of terrestrial and aquatic ecology has been prepared. The assessment is provided in Appendix B and can be referred to for further detail on existing biodiversity values and considerations for detailed assessments to be carried out for the EIS.

6.2.1 Existing environment

i Terrestrial ecology

Wyangala Dam is in the *NSW South Western Slopes Interim Biogeographic Regionalisation of Australia (IBRA) region* and *Inland Slopes IBRA subregion*. The project area includes landscape and biodiversity features including slopes, channels and floodplains providing various habitat for different flora and fauna.

Vegetation within the project area is impacted by previous land use, including agriculture and the construction of the existing Wyangala Dam. Areas of denser vegetation including some hollow-bearing trees also occur within the project footprint. Feral sheep and goats were sighted during preliminary field surveys and current native vegetation is frequently already disturbed. The area is under severe drought stress which was evident of vegetation during preliminary survey.

Known and expected native plant community types (PCTs) within the project footprint are shown in Figure 6.1. Desktop assessment and preliminary surveys have identified the following threatened ecological communities (TECs) likely to occur within the project footprint:

- *White Box Yellow Box Blakely's Red Gum Woodland*, listed as endangered under the NSW *Biodiversity Conservation Act 2016* (BC Act);
- *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland*, listed as critically endangered under the EPBC Act (Box Gum Woodland); and
- Grey Box Grassy Woodlands.

Two other TECs, *Mallee and Mallee-Broombush dominated woodland and shrubland, lacking Triodia, in the NSW South Western Slopes Bioregion* and *Natural Temperate Grassland of the South Eastern Highlands*, were identified as potentially occurring. However, these communities are considered unlikely to occur at this stage. Field survey will be required to confirm this.

No important wetlands, coastal wetlands, Ramsar wetlands or local wetlands are located within or immediately adjacent to the project footprint.

Of threatened species recorded in the project area, 26 threatened flora species and 28 threatened fauna species are identified as likely to occur and require further assessment.

A total of 11 migratory species listed under the EPBC Act have potential to occur within the project area, with eight assessed as moderate to high likelihood of occurrence. An assessment of whether the project area supports important habitat for these species will be provided with the EPBC Act referral.

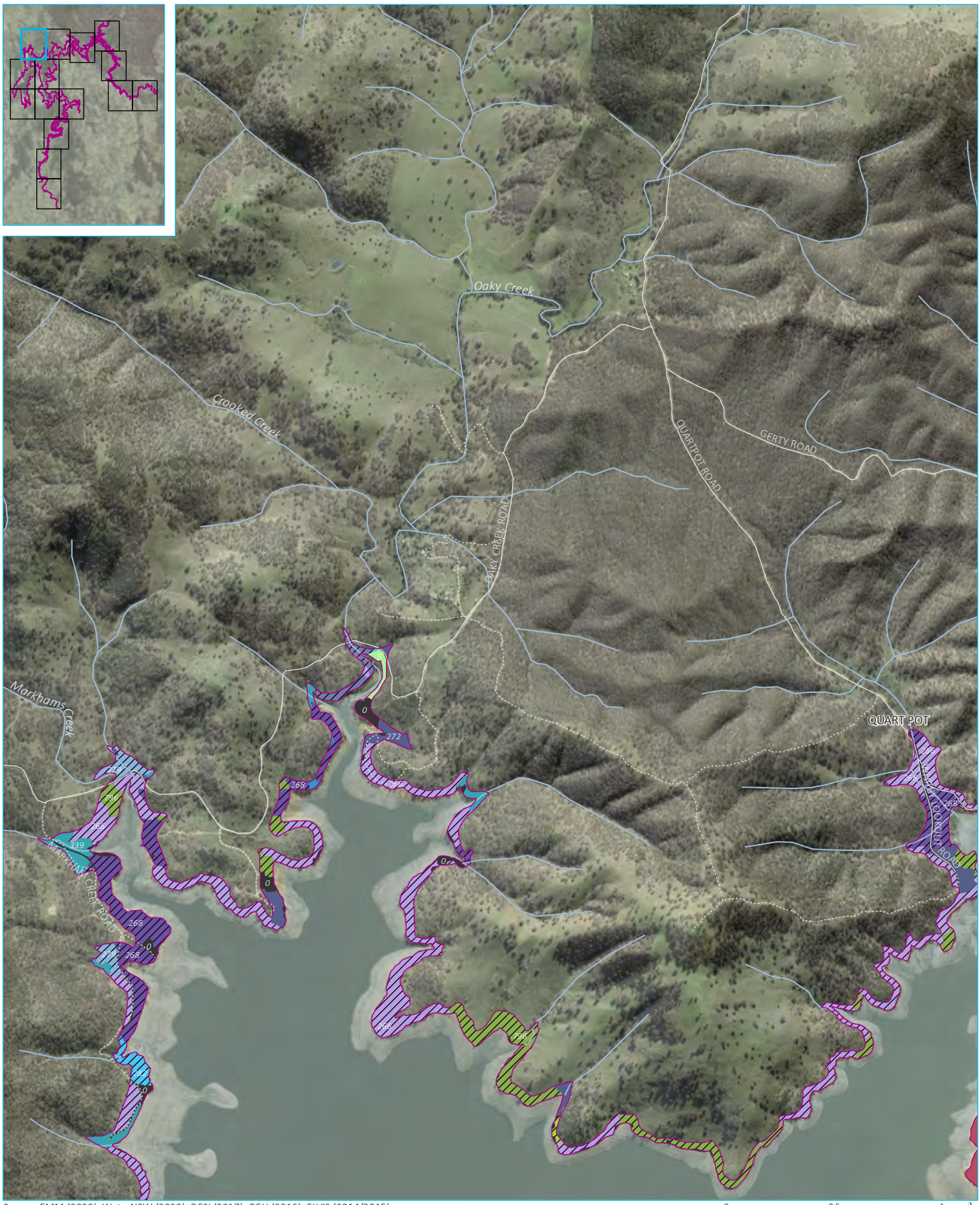
ii Aquatic species and habitats

One threatened ecological aquatic community, *Aquatic Ecological Community in the Natural Drainage System of the Lowland Catchment of the Lachlan River*, occurs downstream of Wyangala Dam. The community is listed as an endangered ecological community (EEC) under the FM Act. This EEC occurs downstream from the Wyangala Dam to the confluence with the Murrumbidgee River where it culminates in the Great Cumbung Swamp.

A total of seven threatened aquatic species listed under the FM Act and/or the EPBC Act were identified through background research, with six considered to be moderate to high potential to occur (Figure 6.2).

iii Groundwater-dependent ecosystems

The *Groundwater Dependent Ecosystems Atlas* predicted that five PCTs may be present in the downstream aquatic study area that could represent terrestrial groundwater-dependent ecosystems (GDEs). Of the predicted terrestrial GDEs, PCT 268 may represent Box Gum Woodland. One aquatic GDE was predicted, *Aquatic Ecological Community in the Natural Drainage System of the Lowland Catchment of the Lachlan River,* and is downstream of Wyangala Dam.



Source: EMM (2020); WaterNSW (2020); DFSI (2017); OEH (2016); ELVIS (2014/2015)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 0.5 1 km

GDA 1994 NSW Lambert

N

KEY

- Project footprint
- Local road
- Vehicular track
- Watercourse/drainage line
- Waterbody
- Potential threatened ecological community
- PCT | Not Native
- PCT1177 | Slaty Gum woodland of the slopes of the southern Brigalow Belt South Bioregion
- PCT217 | Mugga Ironbark - Western Grey Box - cypress pine tall woodland on footslopes of low hills in the NSW South Western Slopes Bioregion
- PCT266 | White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
- PCT268 | White Box - Blakelys Red Gum - Long-leaved Box - Nortons Box - Red Stringybark grass-shrub woodland on shallow soils on hills in the NSW South Western Slopes Bioregion
- PCT272 | White Box - Black Cypress Pine - red gum +/- Mugga Ironbark shrubby woodland in hills of the NSW central western slopes
- PCT277 | Blakelys Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion
- PCT279 | Blakelys Red Gum - White Cypress Pine woodland on footslopes of hills in central part of the NSW South Western Slopes Bioregion
- PCT282 | Blakelys Red Gum - White Box - Yellow Box - Black Cypress Pine box grass/shrub woodland on clay loam soils on undulating hills of central NSW South Western Slopes Bioregion
- PCT289 | Mugga Ironbark - Inland Scribbly Gum - Red Box shrub/grass open forest on hills in the upper slopes sub-region of the NSW South Western Slopes Bioregion
- PCT339 | Tumbledown Red Gum - Black Cypress Pine - Red Stringybark - Currawang shrubby low woodland on Wyangala granite and metasediments of the Wyangala Dam region, NSW South Western Slopes Bioregion
- PCT5 | River Red Gum herbaceous-grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW South Western Slopes Bioregion and the eastern Riverina Bioregion.
- PCT76 | Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions
- PCT796 | Derived grassland of the NSW South Western Slopes

Plant community type mapping

Wyangala Dam Wall Raising Project
Scoping report
Figure 6.1a

EMM creating opportunities

Source: EMM (2020); WaterNSW (2020); DFSI (2017); OEH (2016); ELVIS (2014/2015)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

KEY

- Project footprint
- Local road
- Vehicular track
- Watercourse/drainage line
- Waterbody
- Potential threatened ecological community
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- PCT266 | White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
- PCT268 | White Box - Blakelys Red Gum - Long-leaved Box - Nortons Box - Red Stringybark grass-shrub woodland on shallow soils on hills in the NSW South Western Slopes Bioregion
- PCT272 | White Box - Black Cypress Pine - red gum +/- Mugga Ironbark shrubby woodland in hills of the NSW central western slopes
- PCT282 | Blakelys Red Gum - White Box - Yellow Box - Black Cypress Pine box grass/shrub woodland on clay loam soils on undulating hills of central NSW South Western Slopes Bioregion
- PCT339 | Tumbledown Red Gum - Black Cypress Pine - Red Stringybark - Currawang shrubby low woodland on Wyangala granite and metasediments of the Wyangala Dam region, NSW South Western Slopes Bioregion
- PCT342 | Mugga Ironbark - mixed box woodland on hills in the Cowra - Boorowa - Young region of the NSW South Western Slopes Bioregion
- PCT796 | Derived grassland of the NSW South Western Slopes

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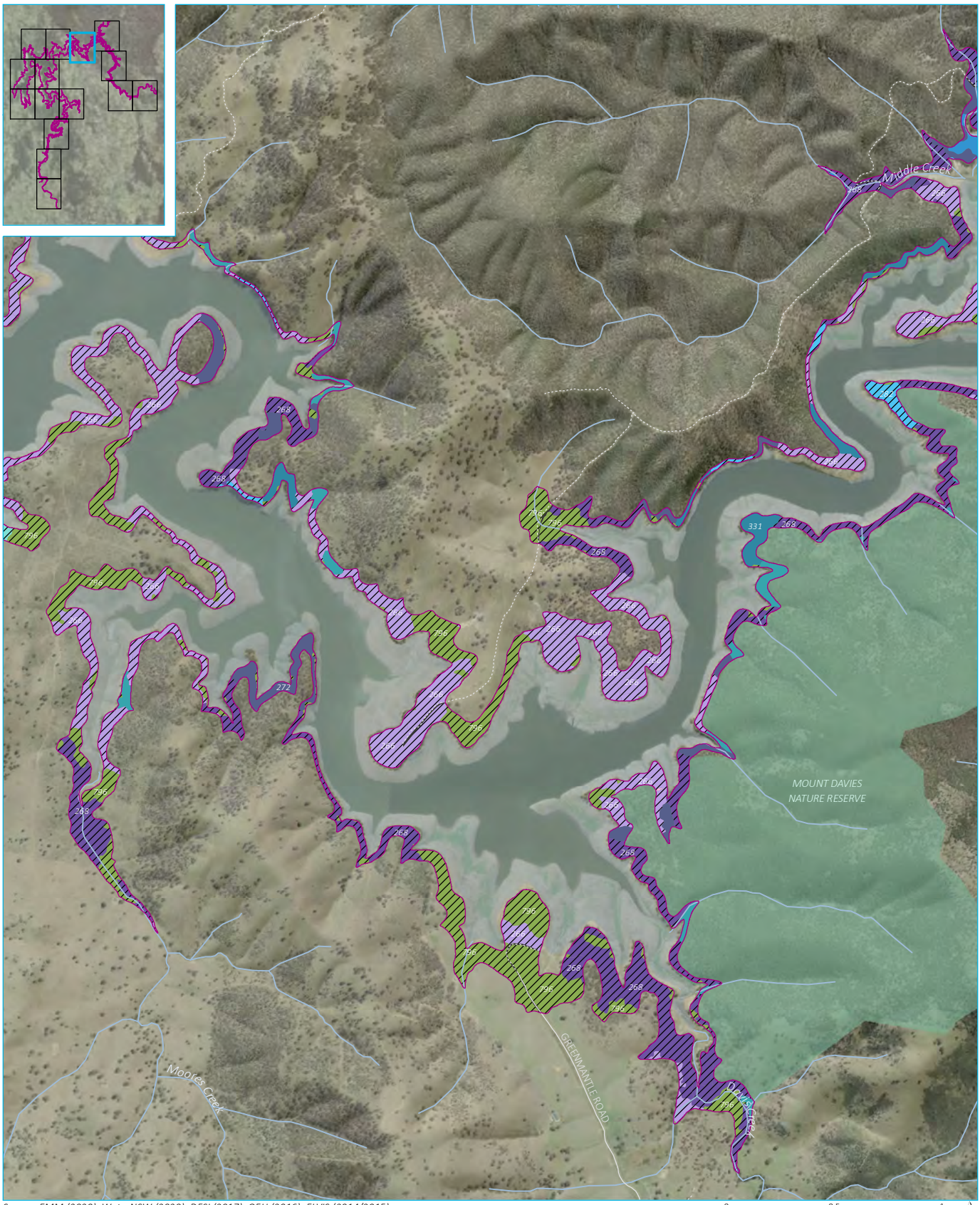
Plant community type mapping

Wyangala Dam Wall Raising Project
Scoping report
Figure 6.1b

EMM
creating opportunities



Source: EMM (2020); WaterNSW (2020); DFSI (2017); OEH (2016); ELVIS (2014/2015)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 0.5 1 km

GDA 1994 NSW Lambert

N

KEY

- Project footprint
- Local road
- Vehicular track
- NPWS reserve
- Watercourse/drainage line
- Waterbody
- Potential threatened ecological community
- PCT | Not Native
- PCT217 | Mugga Ironbark - Western Grey Box - cypress pine tall woodland on footslopes of low hills in the NSW South Western Slopes Bioregion
- PCT266 | White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
- PCT268 | White Box - Blakelys Red Gum - Long-leaved Box - Nortons Box - Red Stringybark grass-shrub woodland on shallow soils on hills in the NSW South Western Slopes Bioregion
- PCT272 | White Box - Black Cypress Pine - red gum +/- Mugga Ironbark shrubby woodland in hills of the NSW central western slopes
- PCT282 | Blakelys Red Gum - White Box - Yellow Box - Black Cypress Pine box grass/shrub woodland on clay loam soils on undulating hills of central NSW South Western Slopes Bioregion
- PCT289 | Mugga Ironbark - Inland Scribbly Gum - Red Box shrub/grass open forest on hills in the upper slopes sub-region of the NSW South Western Slopes Bioregion
- PCT331 | Red Stringybark woodland on hillslopes, northern NSW South Western Slopes Bioregion
- PCT339 | Tumbledown Red Gum - Black Cypress Pine - Red Stringybark - Currawang shrubby low woodland on Wyangala granite and metasediments of the Wyangala Dam region, NSW South Western Slopes Bioregion
- PCT342 | Mugga Ironbark - mixed box woodland on hills in the Cowra - Boorowa - Young region of the NSW South Western Slopes Bioregion
- PCT796 | Derived grassland of the NSW South Western Slopes

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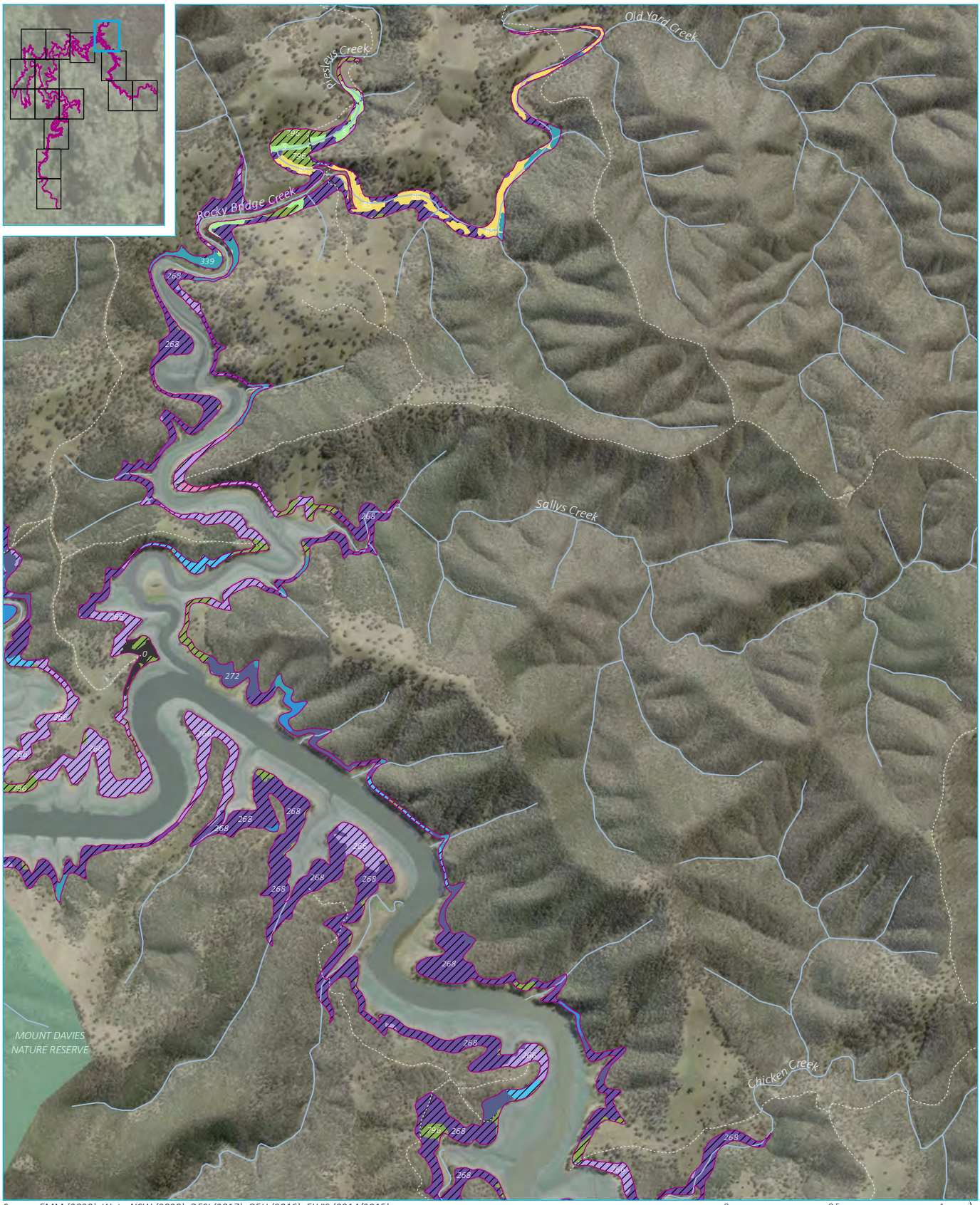
Plant community type mapping

Wyangala Dam Wall Raising Project
Scoping report
Figure 6.1c

EMM creating opportunities



Source: EMM (2020); WaterNSW (2020); DFSI (2017); OEH (2016); ELVIS (2014/2015)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 0.5 1 km

GDA 1994 NSW Lambert

N

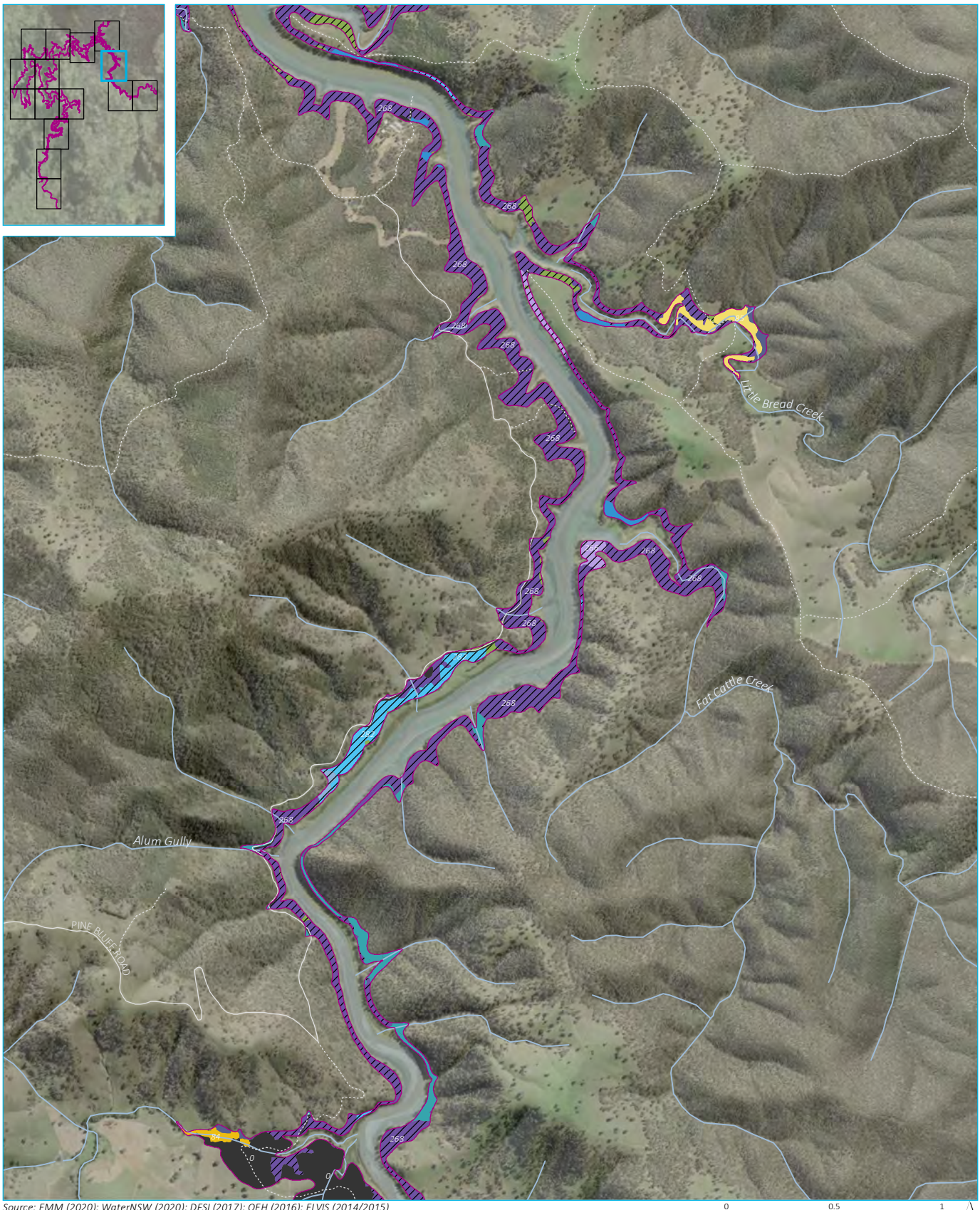
KEY

- Project footprint
- Local road
- Vehicular track
- NPWS reserve
- Watercourse/drainage line
- Waterbody
- Potential threatened ecological community
- PCT | Not Native
- PCT186 | Dwyers Red Gum - Black Cypress Pine - Currawang shrubby low woodland on rocky hills mainly in the NSW South Western Slopes Bioregion
- PCT266 | White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
- PCT268 | White Box - Blakelys Red Gum - Long-leaved Box - Nortons Box - Red Stringybark grass-shrub woodland on shallow soils on hills in the NSW South Western Slopes Bioregion
- PCT272 | White Box - Black Cypress Pine - red gum +/- Mugga Ironbark shrubby woodland in hills of the NSW central western slopes
- PCT279 | Blakelys Red Gum - White Cypress Pine woodland on footslopes of hills in central part of the NSW South Western Slopes Bioregion
- PCT282 | Blakelys Red Gum - White Box - Yellow Box - Black Cypress Pine box grass/shrub woodland on clay loam soils on undulating hills of central NSW South Western Slopes Bioregion
- PCT289 | Mugga Ironbark - Inland Scribbly Gum - Red Box shrub/grass open forest on hills in the upper slopes sub-region of the NSW South Western Slopes Bioregion
- PCT339 | Tumbledown Red Gum - Black Cypress Pine - Red Stringybark - Currawang shrubby low woodland on Wyangala granite and metasediments of the Wyangala Dam region, NSW South Western Slopes Bioregion
- PCT5 | River Red Gum herbaceous-grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW South Western Slopes Bioregion and the eastern Riverina Bioregion.
- PCT796 | Derived grassland of the NSW South Western Slopes
- PCT85 | River Oak forest and woodland wetland of the NSW South Western Slopes and South Eastern Highlands Bioregion

Plant community type mapping

Wyangala Dam Wall Raising Project
Scoping report
Figure 6.1d

EMM
creating opportunities



Source: EMM (2020); WaterNSW (2020); DFSI (2017); OEH (2016); ELVIS (2014/2015)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 0.5 1 km

GDA 1994 NSW Lambert

N

KEY

- Project footprint
- Local road
- Vehicular track
- Watercourse/drainage line
- Waterbody
- Potential threatened ecological community
- PCT | Not Native
- PCT266 | White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
- PCT268 | White Box - Blakelys Red Gum - Long-leaved Box - Nortons Box - Red Stringybark grass-shrub woodland on shallow soils on hills in the NSW South Western Slopes Bioregion
- PCT272 | White Box - Black Cypress Pine - red gum +/- Mugga Ironbark shrubby woodland in hills of the NSW central western slopes
- PCT279 | Blakelys Red Gum - White Cypress Pine woodland on footslopes of hills in central part of the NSW South Western Slopes Bioregion
- PCT282 | Blakelys Red Gum - White Box - Yellow Box - Black Cypress Pine box grass/shrub woodland on clay loam soils on undulating hills of central NSW South Western Slopes Bioregion
- PCT289 | Mugga Ironbark - Inland Scribbly Gum - Red Box shrub/grass open forest on hills in the upper slopes sub-region of the NSW South Western Slopes Bioregion
- PCT339 | Tumbledown Red Gum - Black Cypress Pine - Red Stringybark - Currawang shrubby low woodland on Wyangala granite and metasediments of the Wyangala Dam region, NSW South Western Slopes Bioregion
- PCT796 | Derived grassland of the NSW South Western Slopes
- PCT84 | River Oak - Rough-barked Apple - red gum - box riparian tall woodland (wetland) of the Brigalow Belt South Bioregion and Nandewar Bioregion
- PCT85 | River Oak forest and woodland wetland of the NSW South Western Slopes and South Eastern Highlands Bioregion

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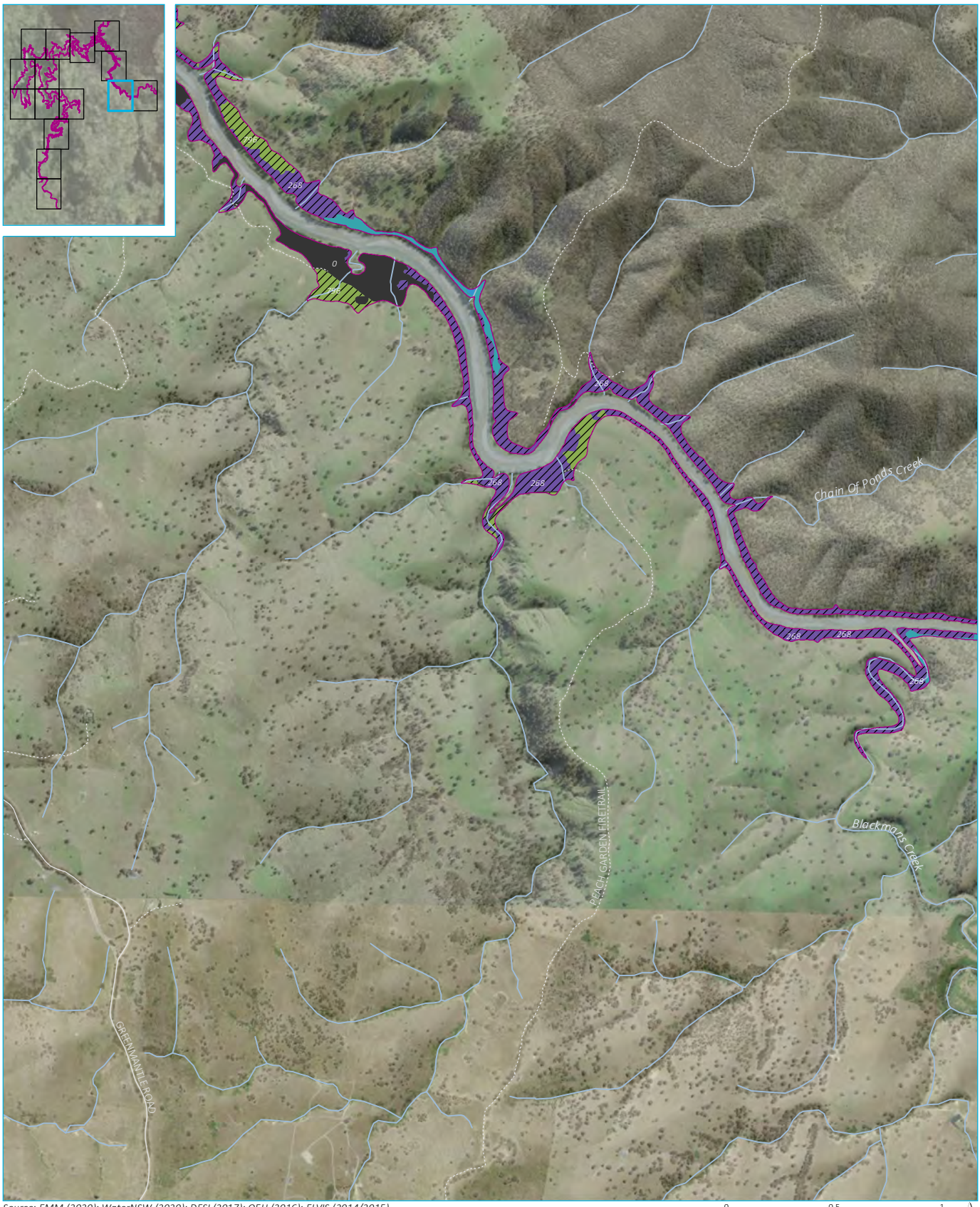
Plant community type mapping

Wyangala Dam Wall Raising Project
Scoping report
Figure 6.1e

EMM
creating opportunities



Source: EMM (2020); WaterNSW (2020); DFSI (2017); OEH (2016); ELVIS (2014/2015)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 0.5 1 km

GDA 1994 NSW Lambert

N

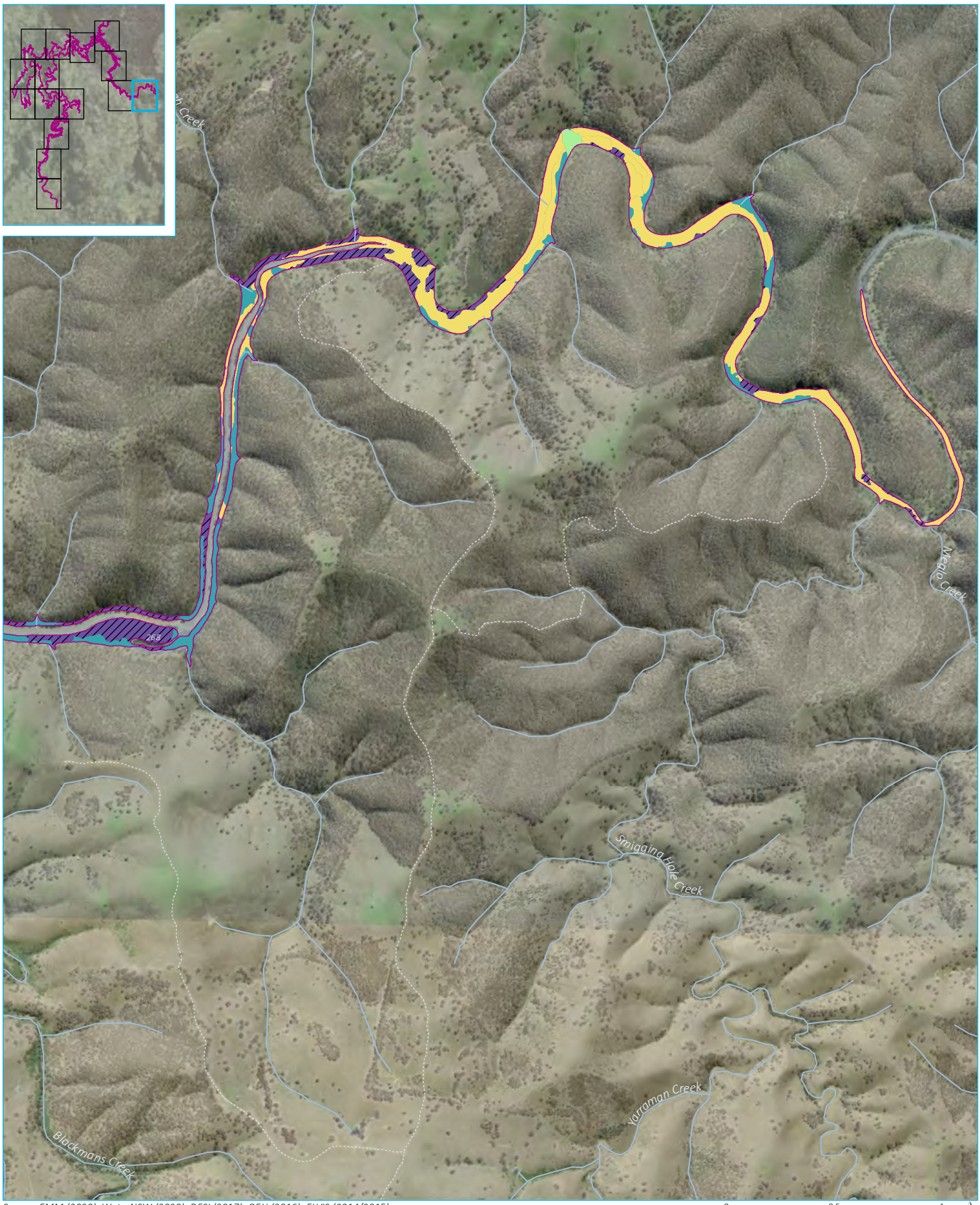
KEY

- Project footprint
- Local road
- Vehicular track
- Watercourse/drainage line
- Waterbody
- Potential threatened ecological community
- PCT | Not Native
- PCT268 | White Box - Blakelys Red Gum - Long-leaved Box - Nortons Box - Red Stringybark grass-shrub woodland on shallow soils on hills in the NSW South Western Slopes Bioregion
- PCT289 | Mugga Ironbark - Inland Scribbly Gum - Red Box shrub/grass open forest on hills in the upper slopes sub-region of the NSW South Western Slopes Bioregion
- PCT339 | Tumbledown Red Gum - Black Cypress Pine - Red Stringybark - Currawang shrubby low woodland on Wyangala granite and metasediments of the Wyangala Dam region, NSW South Western Slopes Bioregion
- PCT796 | Derived grassland of the NSW South Western Slopes

Plant community type mapping

Wyangala Dam Wall Raising Project
Scoping report
Figure 6.1f

EMM creating opportunities



Source: EMM (2020); WaterNSW (2020); DFSI (2017); OEH (2016); ELVIS (2014/2015)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 0.5 1 km

GDA 1994 NSW Lambert

N

KEY

- Project footprint
- Vehicular track
- Watercourse/drainage line
- Waterbody
- Potential threatened ecological community
- PCT | Not Native
- PCT268 | White Box - Blakelys Red Gum - Long-leaved Box - Nortons Box - Red Stringybark grass-shrub woodland on shallow soils on hills in the NSW South Western Slopes Bioregion
- PCT339 | Tumbledown Red Gum - Black Cypress Pine - Red Stringybark - Currawang shrubby low woodland on Wyangala granite and metasediments of the Wyangala Dam region, NSW South Western Slopes Bioregion
- PCT5 | River Red Gum herbaceous-grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW South Western Slopes Bioregion and the eastern Riverina Bioregion.
- PCT796 | Derived grassland of the NSW South Western Slopes
- PCT85 | River Oak forest and woodland wetland of the NSW South Western Slopes and South Eastern Highlands Bioregion

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Plant community type mapping

Wyangala Dam Wall Raising Project
Scoping report
Figure 6.1g

EMM
creating opportunities

Source: EMM (2020); WaterNSW (2020); DFSI (2017); OEH (2016); ELVIS (2014/2015)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 0.5 1 km

GDA 1994 NSW Lambert

N

KEY

- Project footprint
- Main road
- Local road
- Vehicular track
- Watercourse/drainage line
- Waterbody
- Potential threatened ecological community
- PCT | Not Native
- PCT1177 | Slaty Gum woodland of the slopes of the southern Brigalow Belt South Bioregion
- PCT185 | Dwyers Red Gum - White Cypress Pine - Currawang shrubby woodland mainly in the NSW South Western Slopes Bioregion
- PCT266 | White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
- PCT268 | White Box - Blakelys Red Gum - Long-leaved Box - Nortons Box - Red Stringybark grass-shrub woodland on shallow soils on hills in the NSW South Western Slopes Bioregion
- PCT279 | Blakelys Red Gum - White Cypress Pine woodland on footslopes of hills in central part of the NSW South Western Slopes Bioregion
- PCT282 | Blakelys Red Gum - White Box - Yellow Box - Black Cypress Pine box grass/shrub woodland on clay loam soils on undulating hills of central NSW South Western Slopes Bioregion
- PCT339 | Tumbledown Red Gum - Black Cypress Pine - Red Stringybark - Currawang shrubby low woodland on Wyangala granite and metasediments of the Wyangala Dam region, NSW South Western Slopes Bioregion
- PCT5 | River Red Gum herbaceous-grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW South Western Slopes Bioregion and the eastern Riverina Bioregion.
- PCT796 | Derived grassland of the NSW South Western Slopes
- PCT80 | Western Grey Box - White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion

Plant community type mapping

Wyangala Dam Wall Raising Project
Scoping report
Figure 6.1h

EMM creating opportunities

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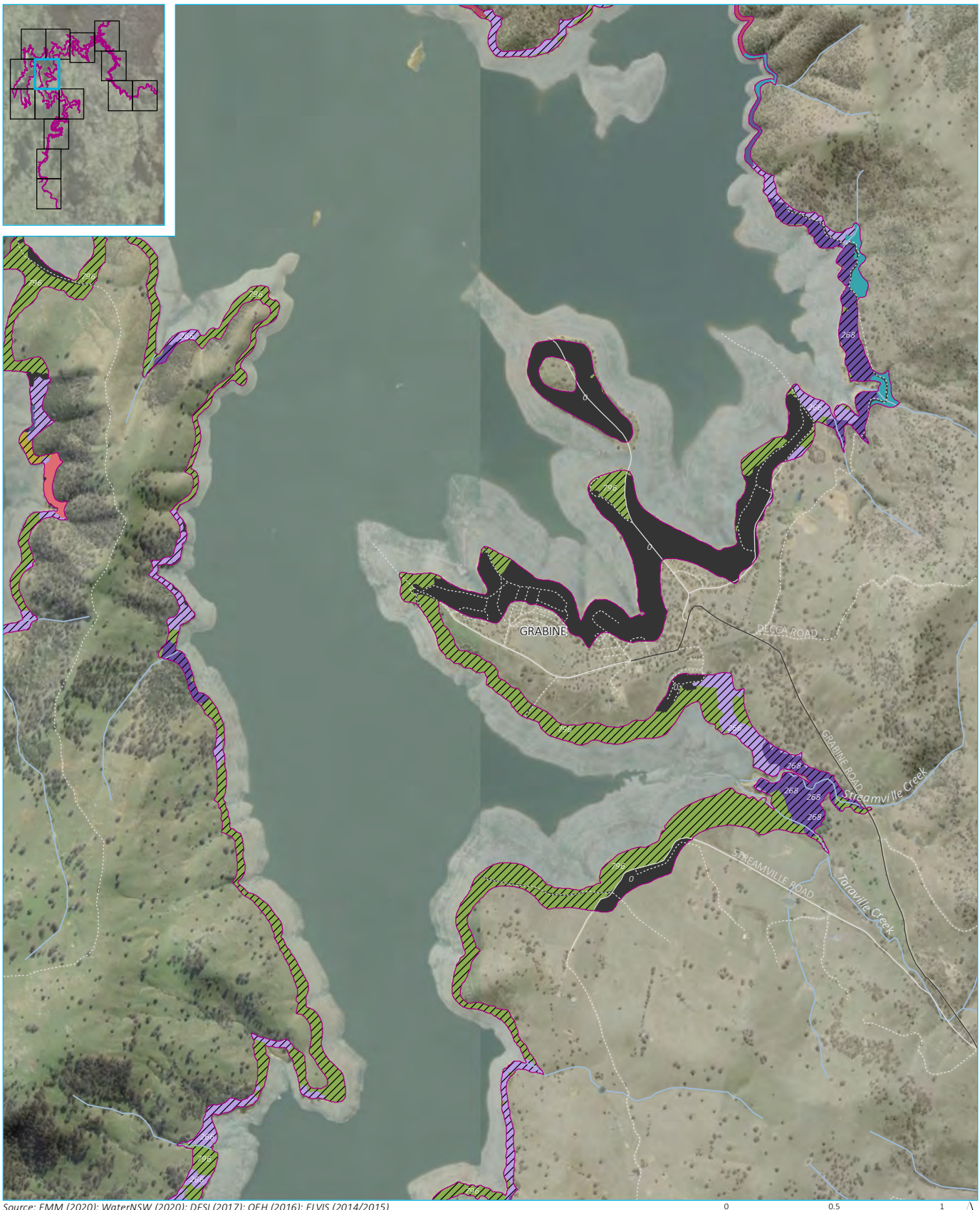


Source: EMM (2020); WaterNSW (2020); DFSI (2017); OEH (2016); ELVIS (2014/2015)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 0.5 1 km

GDA 1994 NSW Lambert

N

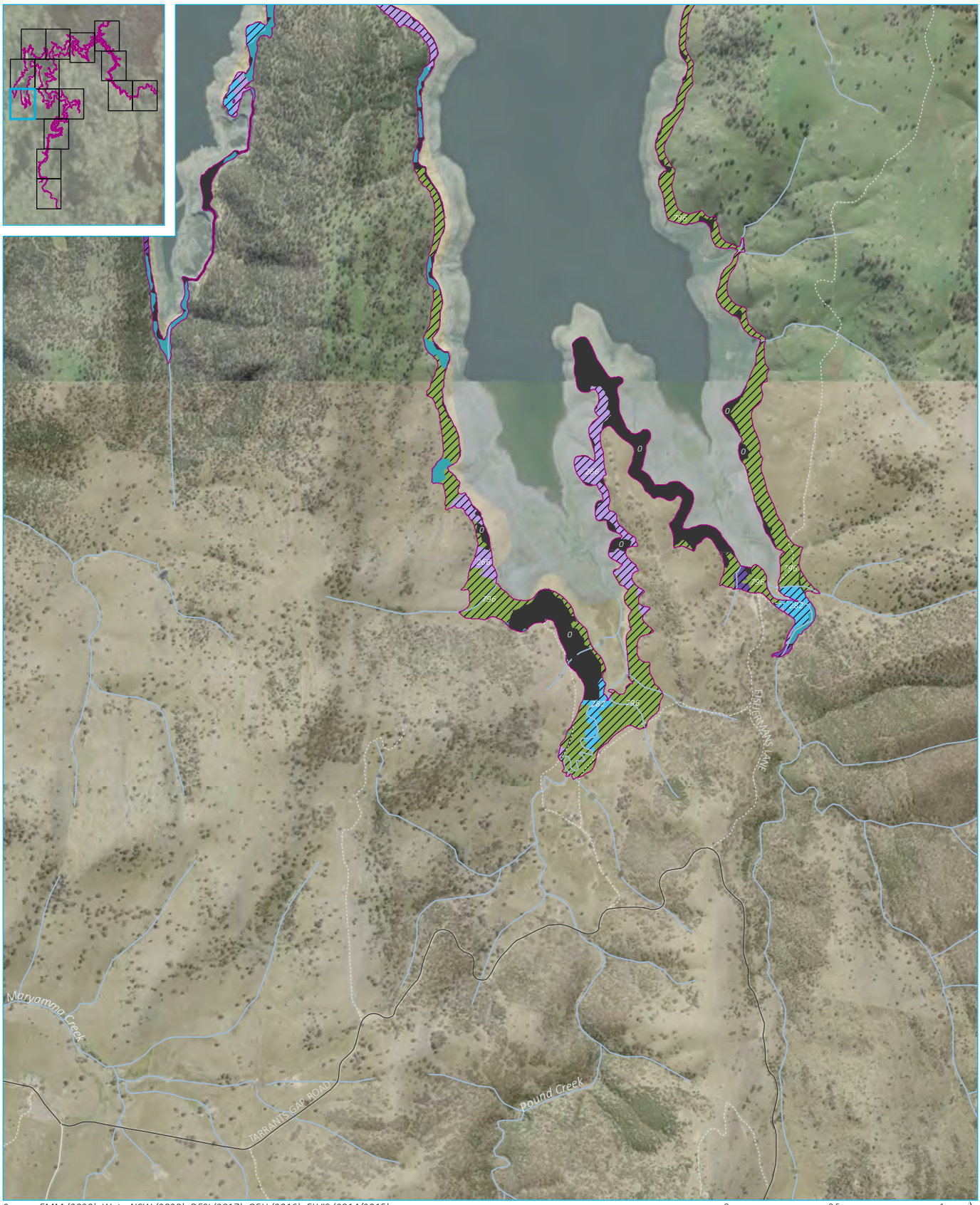
KEY

- Project footprint
- Main road
- Local road
- Vehicular track
- Watercourse/drainage line
- Waterbody
- Potential threatened ecological community
- PCT | Not Native
- PCT1177 | Slaty Gum woodland of the slopes of the southern Brigalow Belt South Bioregion
- PCT185 | Dwyers Red Gum - White Cypress Pine - Currawang shrubby woodland mainly in the NSW South Western Slopes Bioregion
- PCT266 | White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
- PCT268 | White Box - Blakelys Red Gum - Long-leaved Box - Nortons Box - Red Stringybark grass-shrub woodland on shallow soils on hills in the NSW South Western Slopes Bioregion
- PCT272 | White Box - Black Cypress Pine - red gum +/- Mugga Ironbark shrubby woodland in hills of the NSW central western slopes
- PCT339 | Tumbledown Red Gum - Black Cypress Pine - Red Stringybark - Currawang shrubby low woodland on Wyangala granite and metasediments of the Wyangala Dam region, NSW South Western Slopes Bioregion
- PCT796 | Derived grassland of the NSW South Western Slopes
- PCT80 | Western Grey Box - White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina

Plant community type mapping

Wyangala Dam Wall Raising Project
Scoping report
Figure 6.1i

EMM creating opportunities



Source: EMM (2020); WaterNSW (2020); DFSI (2017); OEH (2016); ELVIS (2014/2015)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 0.5 1 km

GDA 1994 NSW Lambert

N

KEY

- Project footprint
- Main road
- Local road
- Vehicular track
- Watercourse/drainage line
- Waterbody
- Potential threatened ecological community
- PCT | Not Native
- PCT185 | Dwyers Red Gum - White Cypress Pine - Currawang shrubby woodland mainly in the NSW South Western Slopes Bioregion
- PCT186 | Dwyers Red Gum - Black Cypress Pine - Currawang shrubby low woodland on rocky hills mainly in the NSW South Western Slopes Bioregion
- PCT266 | White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
- PCT268 | White Box - Blakelys Red Gum - Long-leaved Box - Nortons Box - Red Stringybark grass-shrub woodland on shallow soils on hills in the NSW South Western Slopes Bioregion
- PCT282 | Blakelys Red Gum - White Box - Yellow Box - Black Cypress Pine box grass/shrub woodland on clay loam soils on undulating hills of central NSW South Western Slopes Bioregion
- PCT339 | Tumbledown Red Gum - Black Cypress Pine - Red Stringybark - Currawang shrubby low woodland on Wyangala granite and metasediments of the Wyangala Dam region, NSW South Western Slopes Bioregion
- PCT342 | Mugga Ironbark - mixed box woodland on hills in the Cowra - Boorowa - Young region of the NSW South Western Slopes Bioregion
- PCT796 | Derived grassland of the NSW South Western Slopes

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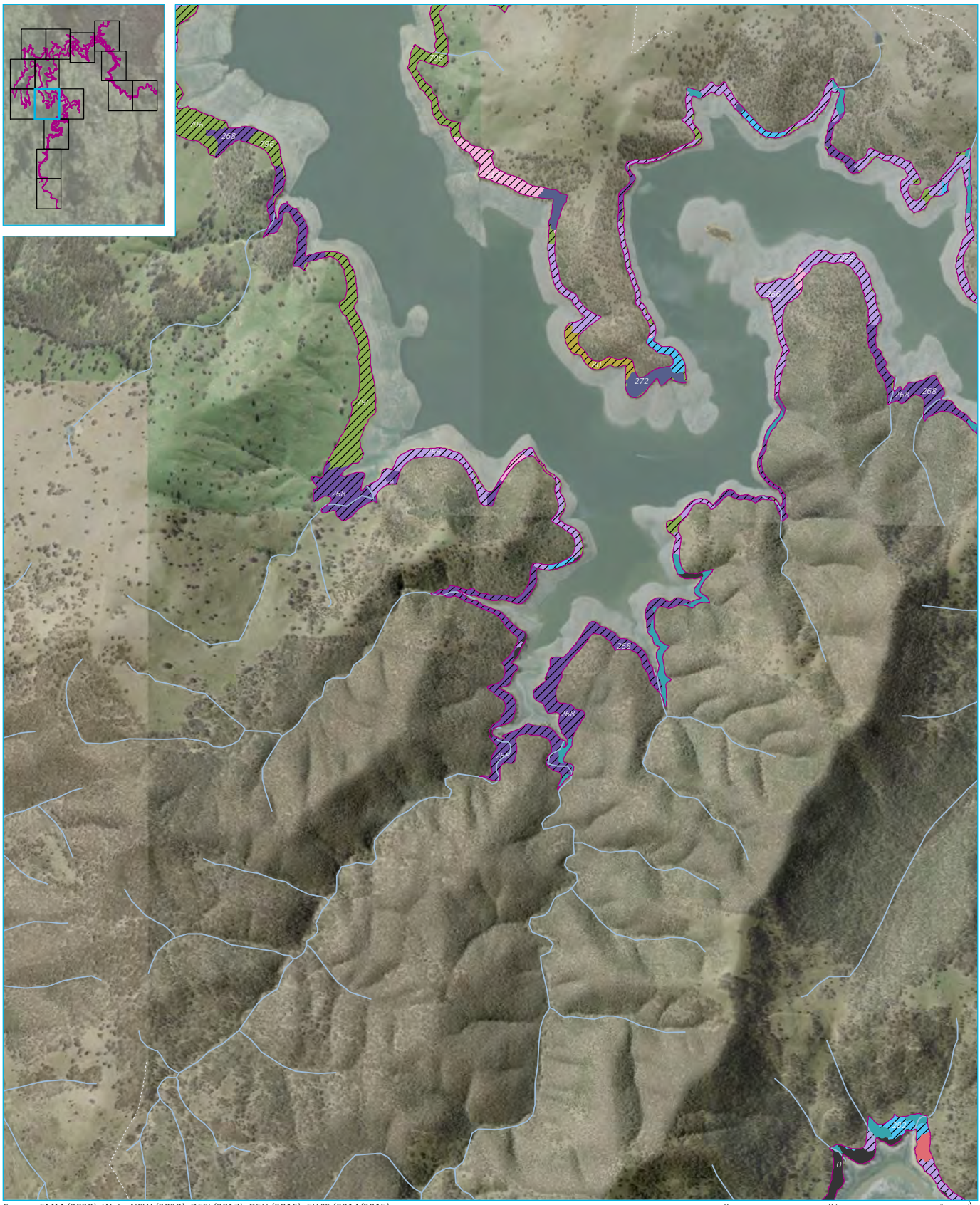
Plant community type mapping

Wyangala Dam Wall Raising Project
Scoping report
Figure 6.1j

EMM
creating opportunities



Source: EMM (2020); WaterNSW (2020); DFSI (2017); OEH (2016); ELVIS (2014/2015)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 0.5 1 km

GDA 1994 NSW Lambert

N

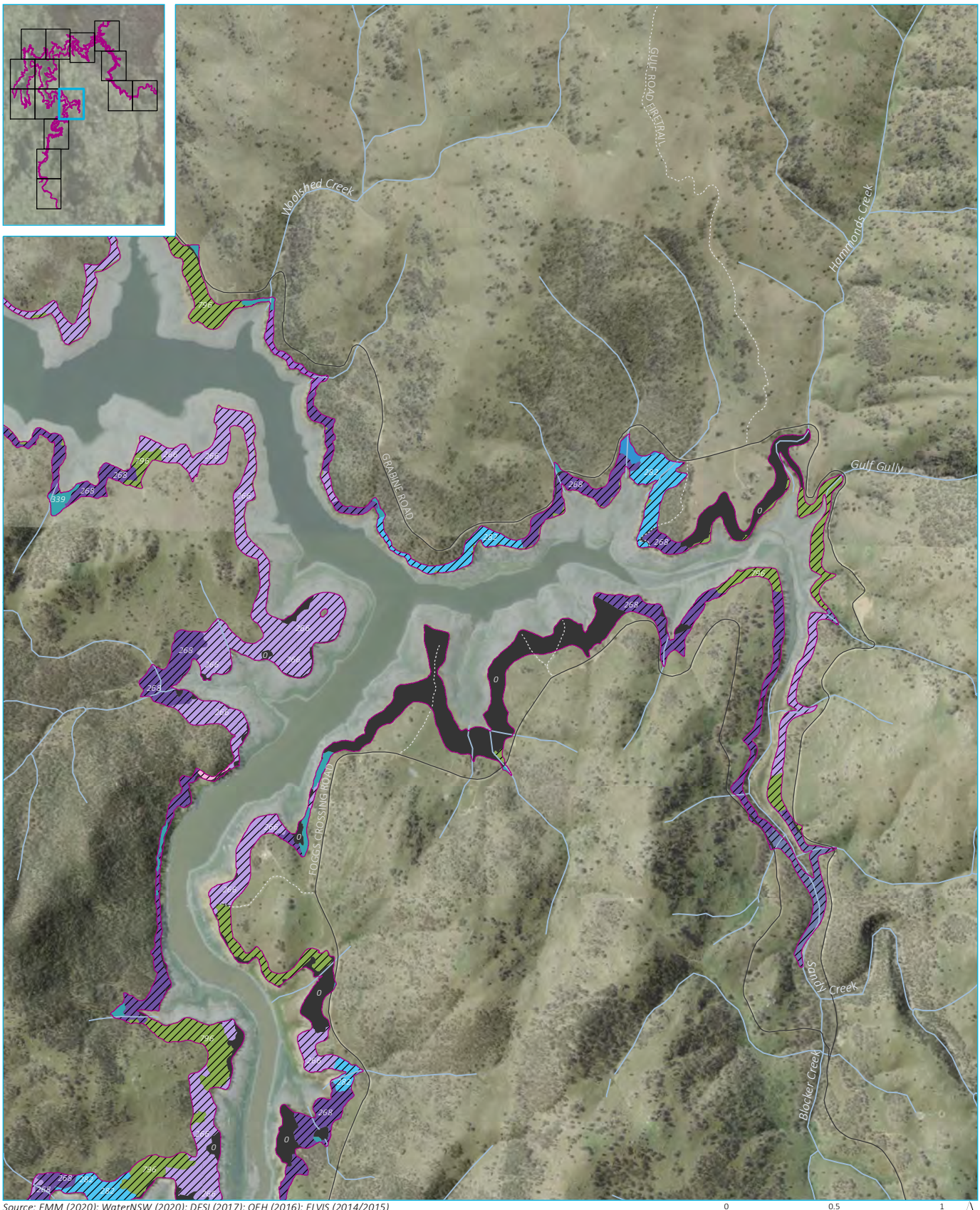
KEY

- Project footprint
- Vehicular track
- Watercourse/drainage line
- Waterbody
- Potential threatened ecological community
- PCT | Not Native
- PCT185 | Dwyers Red Gum - White Cypress Pine - Currawang shrubby woodland mainly in the NSW South Western Slopes Bioregion
- PCT217 | Mugga Ironbark - Western Grey Box - cypress pine tall woodland on footslopes of low hills in the NSW South Western Slopes Bioregion
- PCT266 | White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
- PCT268 | White Box - Blakelys Red Gum - Long-leaved Box - Nortons Box - Red Stringybark grass-shrub woodland on shallow soils on hills in the NSW South Western Slopes Bioregion
- PCT272 | White Box - Black Cypress Pine - red gum +/- Mugga Ironbark shrubby woodland in hills of the NSW central western slopes
- PCT282 | Blakelys Red Gum - White Box - Yellow Box - Black Cypress Pine box grass/shrub woodland on clay loam soils on undulating hills of central NSW South Western Slopes Bioregion
- PCT339 | Tumbledown Red Gum - Black Cypress Pine - Red Stringybark - Currawang shrubby low woodland on Wyangala granite and metasediments of the Wyangala Dam region, NSW South Western Slopes Bioregion
- PCT796 | Derived grassland of the NSW South Western Slopes
- PCT80 | Western Grey Box - White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina

Plant community type mapping

Wyangala Dam Wall Raising Project
Scoping report
Figure 6.1k

EMM creating opportunities



Source: EMM (2020); WaterNSW (2020); DFSI (2017); OEH (2016); ELVIS (2014/2015)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

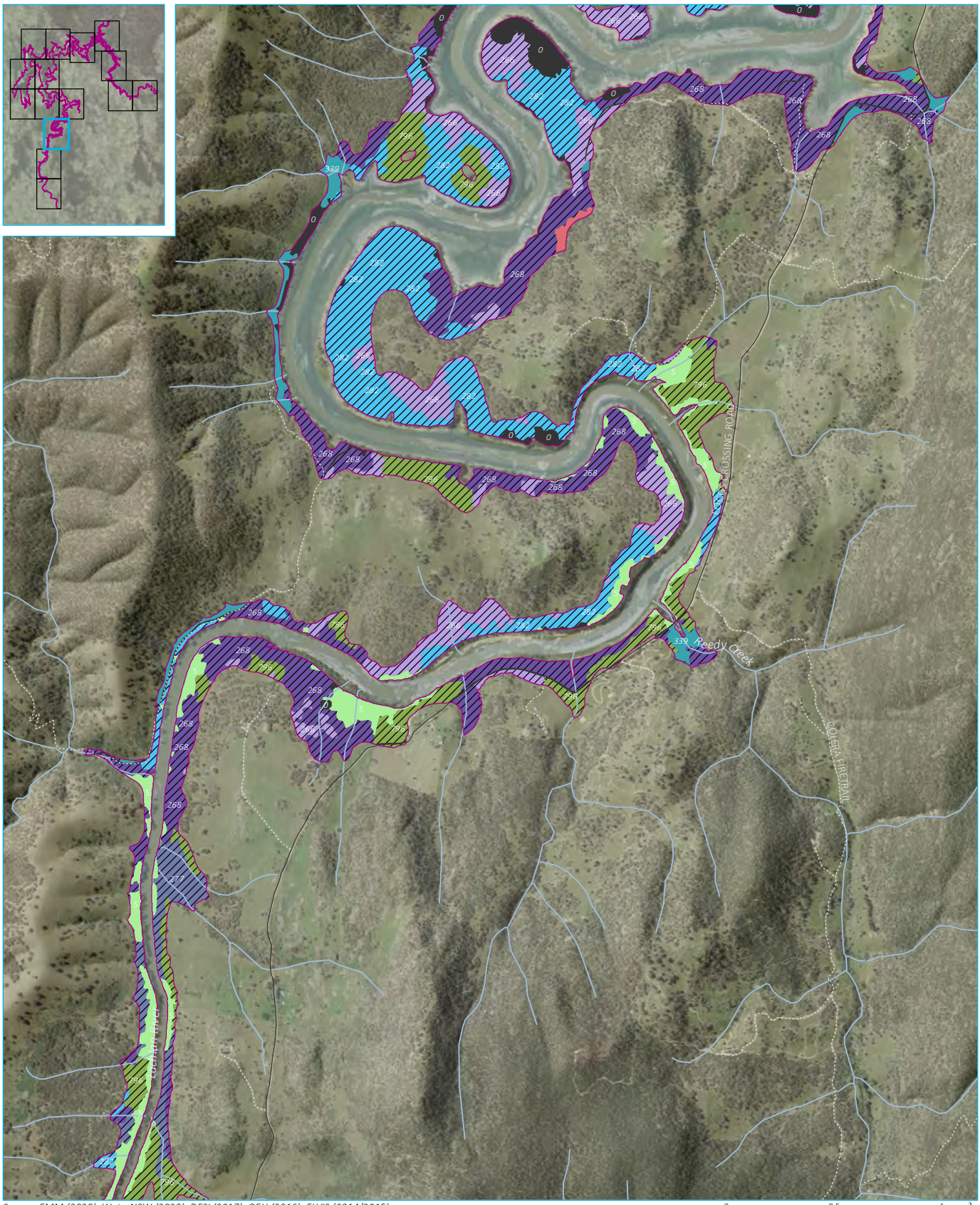
KEY

- Project footprint
- Main road
- Vehicular track
- Watercourse/drainage line
- Waterbody
- Potential threatened ecological community
- PCT | Not Native
- PCT217 | Mugga Ironbark - Western Grey Box - cypress pine tall woodland on footslopes of low hills in the NSW South Western Slopes Bioregion
- PCT266 | White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
- PCT267 | White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion
- PCT268 | White Box - Blakelys Red Gum - Long-leaved Box - Nortons Box - Red Stringybark grass-shrub woodland on shallow soils on hills in the NSW South Western Slopes Bioregion
- PCT277 | Blakelys Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion
- PCT282 | Blakelys Red Gum - White Box - Yellow Box - Black Cypress Pine box grass/shrub woodland on clay loam soils on undulating hills of central NSW South Western Slopes Bioregion
- PCT289 | Mugga Ironbark - Inland Scribbly Gum - Red Box shrub/grass open forest on hills in the upper slopes sub-region of the NSW South Western Slopes Bioregion
- PCT331 | Red Stringybark woodland on hillslopes, northern NSW South Western Slopes Bioregion
- PCT339 | Tumbledown Red Gum - Black Cypress Pine - Red Stringybark - Currawang shrubby low woodland on Wyangala granite and metasediments of the Wyangala Dam region, NSW South Western Slopes Bioregion
- PCT796 | Derived grassland of the NSW South Western Slopes

Plant community type mapping

Wyangala Dam Wall Raising Project
Scoping report
Figure 6.1l

EMM creating opportunities



Source: EMM (2020); WaterNSW (2020); DFSI (2017); OEH (2016); ELVIS (2014/2015)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 0.5 1 km

GDA 1994 NSW Lambert

N

KEY

- Project footprint
- Main road
- Vehicular track
- Watercourse/drainage line
- Waterbody
- Potential threatened ecological community
- PCT | Not Native
- PCT185 | Dwyers Red Gum - White Cypress Pine - Currawang shrubby woodland mainly in the NSW South Western Slopes Bioregion
- PCT266 | White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
- PCT268 | White Box - Blakelys Red Gum - Long-leaved Box - Nortons Box - Red Stringybark grass-shrub woodland on shallow soils on hills in the NSW South Western Slopes Bioregion
- PCT272 | White Box - Black Cypress Pine - red gum +/- Mugga Ironbark shrubby woodland in hills of the NSW central western slopes
- PCT277 | Blakelys Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion
- PCT282 | Blakelys Red Gum - White Box - Yellow Box - Black Cypress Pine box grass/shrub woodland on clay loam soils on undulating hills of central NSW South Western Slopes Bioregion
- PCT339 | Tumbledown Red Gum - Black Cypress Pine - Red Stringybark - Currawang shrubby low woodland on Wyangala granite and metasediments of the Wyangala Dam region, NSW South Western Slopes Bioregion
- PCT5 | River Red Gum herbaceous-grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW South Western Slopes Bioregion and the eastern Riverina Bioregion.
- PCT796 | Derived grassland of the NSW South Western Slopes

Plant community type mapping

Wyangala Dam Wall Raising Project
Scoping report
Figure 6.1m

EMM creating opportunities

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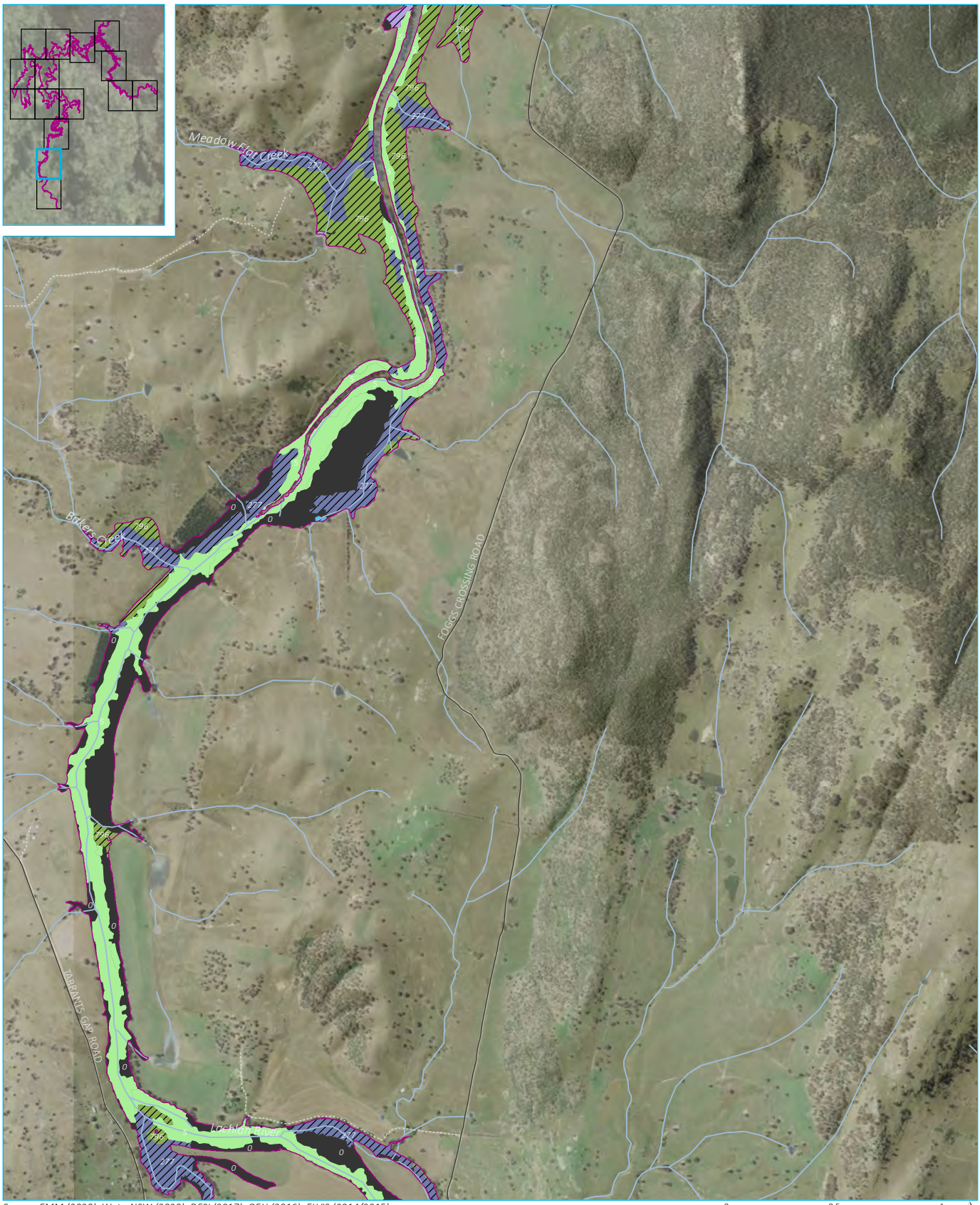

Source: EMM (2020); WaterNSW (2020); DFSI (2017); OEH (2016); ELVIS (2014/2015)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 0.5 1 km

GDA 1994 NSW Lambert

KEY

- Project footprint
- Main road
- Vehicular track
- Watercourse/drainage line
- Waterbody
- Potential threatened ecological community
- PCT | Not Native
- PCT266 | White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
- PCT268 | White Box - Blakelys Red Gum - Long-leaved Box - Nortons Box - Red Stringybark grass-shrub woodland on shallow soils on hills in the NSW South Western Slopes Bioregion
- PCT272 | White Box - Black Cypress Pine - red gum +/- Mugga Ironbark shrubby woodland in hills of the NSW central western slopes
- PCT277 | Blakelys Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion
- PCT282 | Blakelys Red Gum - White Box - Yellow Box - Black Cypress Pine box grass/shrub woodland on clay loam soils on undulating hills of central NSW South Western Slopes Bioregion
- PCT5 | River Red Gum herbaceous-grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW South Western Slopes Bioregion and the eastern Riverina Bioregion.
- PCT796 | Derived grassland of the NSW South Western Slopes

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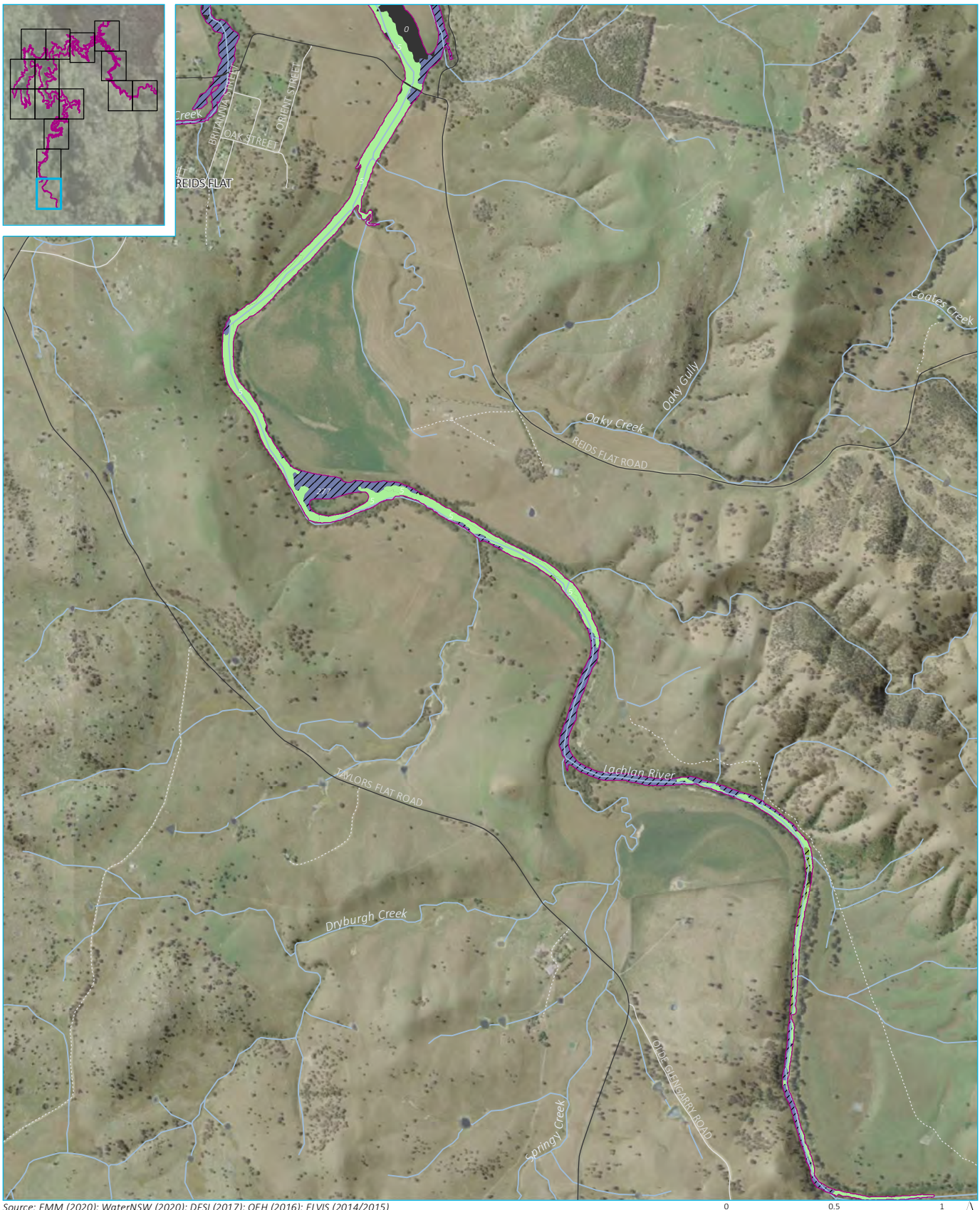
Plant community type mapping

Wyangala Dam Wall Raising Project
Scoping report
Figure 6.1n

EMM creating opportunities



Source: EMM (2020); WaterNSW (2020); DFSI (2017); OEH (2016); ELVIS (2014/2015)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 0.5 1 km

GDA 1994 NSW Lambert

N

KEY

- Project footprint
- Main road
- Local road
- Vehicular track
- Watercourse/drainage line
- Waterbody
- Potential threatened ecological community
- PCT | Not Native
- PCT266 | White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
- PCT277 | Blakelys Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion
- PCT5 | River Red Gum herbaceous-grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW South Western Slopes Bioregion and the eastern Riverina Bioregion.
- PCT796 | Derived grassland of the NSW South Western Slopes

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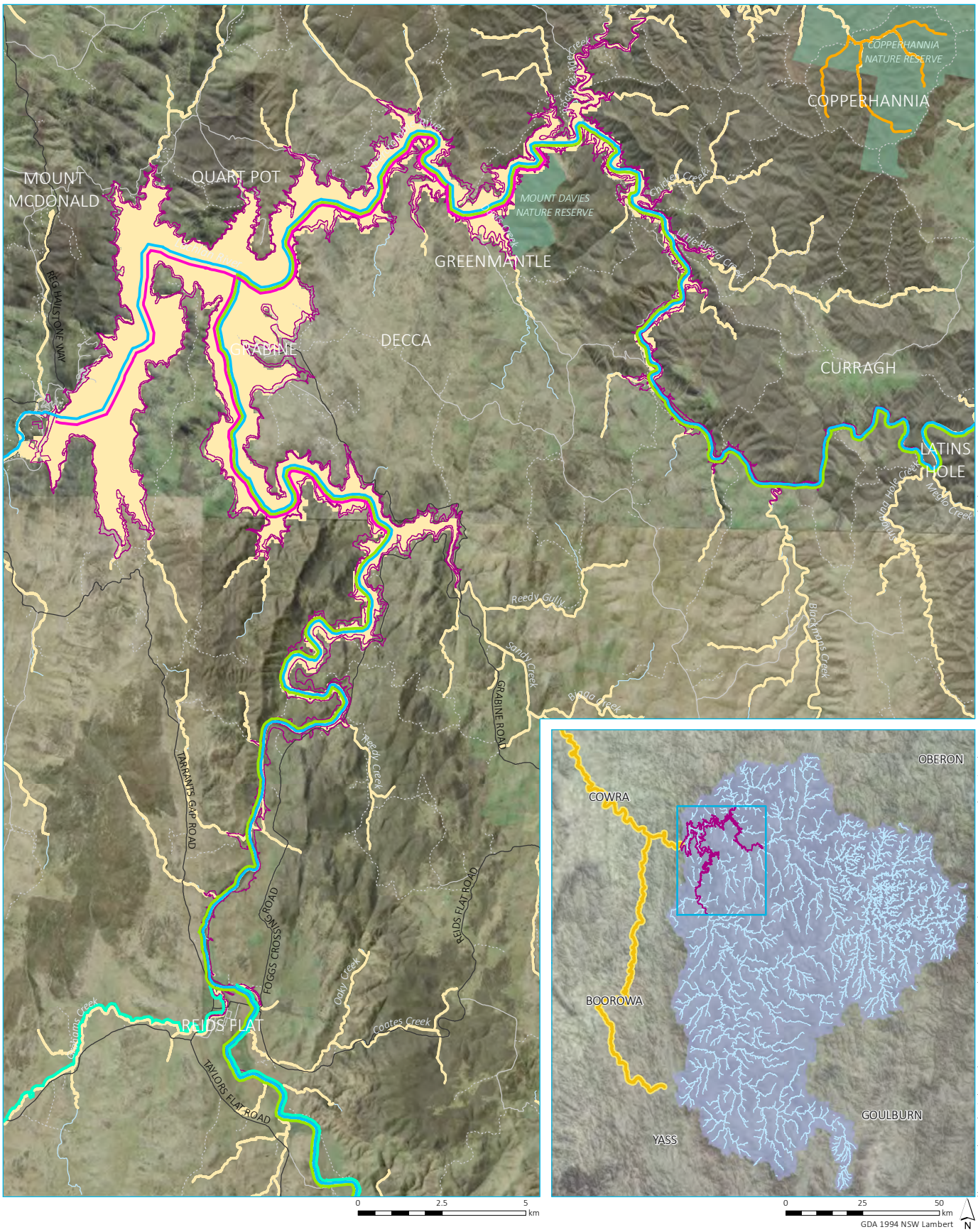
Plant community type mapping

Wyangala Dam Wall Raising Project
Scoping report
Figure 6.1o

EMM creating opportunities



Source: EMM (2020); WaterNSW (2020); DFSI (2017); ELVIS (2014/2015); DPI (2009, 2013); BoM (2011)
*Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.

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KEY

- Project footprint
- Main road
- Local road
- Vehicular track
- Watercourse (Strahler stream order 3 and above)
- NPWS reserve
- Wyangala Dam catchment (refer to inset)
- Key fish habitat
- Aquatic EECs (refer to inset)

Aquatic species

- Eel Tailed Catfish
- Macquarie Perch
- Purple Spotted Gudgeon
- Silver Perch
- Southern Pygmy Perch

Aquatic habitat and species

Wyangala Dam Wall Raising Project
Scoping report
Figure 6.2

EMM
creating opportunities

6.2.2 Issues for consideration

The main impacts of the Wyangala Dam wall raising project would be associated with direct impacts arising from the clearing works for construction of the project, including inundation of upstream environments between the existing FSL and the new FSL. Potential direct impacts rising from the project include:

- impact on native vegetation, including TECs;
- impact on threatened species habitat; and
- disturbance/inundation of waterways.

In addition to the direct impacts arising from the project, a number of indirect, prescribed and uncertain impacts, as described in the biodiversity assessment method (BAM) (OEH 2017), may also result. Indirect impacts include disturbance of fauna species due to increased noise, vibration and dust, lighting impacts, increase in weeds, pathogens and pest and predatory animals, impediments to fish passage and changes in downstream flow regimes that may impact aquatic ecosystems, species and habitats.

Measures to avoid, minimise and mitigate impacts will need to be considered during design and further environmental assessment undertaken as a part of the EIS. Any residual impacts would need to be offset.

6.2.3 Approach to assessment in EIS

An assessment of the biodiversity values and the likely biodiversity impacts of the project will be undertaken in accordance with the BC Act, FM Act and EPBC Act. Terrestrial ecology will be assessed in accordance with the BAM and will be documented in a biodiversity development assessment report (BDAR). Aquatic ecology will be assessed in accordance with the FM Act and documented in an aquatic ecology assessment.

Further assessment of groundwater availability and changes to groundwater following construction will need to be undertaken to inform a more detailed GDE assessment. Further assessment of whether the aquatic study area that supports aquatic and/or subterranean GDEs will also be required as part of the EIS stage.

The assessment of biodiversity would be undertaken in accordance with relevant NSW and Commonwealth legislation and guidelines, including:

- *Commonwealth EPBC 1.1 Significant Impact Guidelines – Matters of National Environmental Significance* (Commonwealth of Australia 2013);
- *Commonwealth Department of the Environment – survey guidelines for nationally threatened species* (various);
- BAM (OEH 2017);
- *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* (DEC 2004);
- *Threatened species survey and assessment guidelines: field survey methods for fauna – Amphibians* (DECC 2009);
- *Policy and guidelines for fish habitat conservation and management* (DPI 2013);
- *NSW Biodiversity Offsets Policy for Major Projects. Fact Sheet: Aquatic biodiversity* (DPI 2014);
- *Survey guidelines for Australia's threatened fish* (DSEWPC 2011); and

- *NSW Guide to Surveying Threatened Plants* (OEH 2016).

The BAM stipulates when surveys are required for native species. Surveys for the project would be undertaken within seasonal timeframes where possible and presence will be assumed for species where surveys cannot be undertaken.

6.3 Heritage

A preliminary assessment of Aboriginal cultural heritage and historic heritage has been prepared. The assessment is provided in Appendix C and can be referred to for further detail on existing heritage values and considerations for detailed assessments to be carried out for the EIS.

6.3.1 Existing environment

The Lachlan River formed the focus of early European investigations and was likely extensively used by Aboriginal people in the past. Wyangala Dam is situated on its confluence with the Abercrombie River, another significant river system of the region. The establishment of the Wyangala Dam between 1928-1935 and modified in the 1960s dammed the Lachlan and inundated an area of some 54 square kilometres (km^2). With the exception of the dam activities, remaining development in the region has been fairly limited, and constrained to farming, pastoralism and/or low-density residential activities.

i Aboriginal cultural heritage

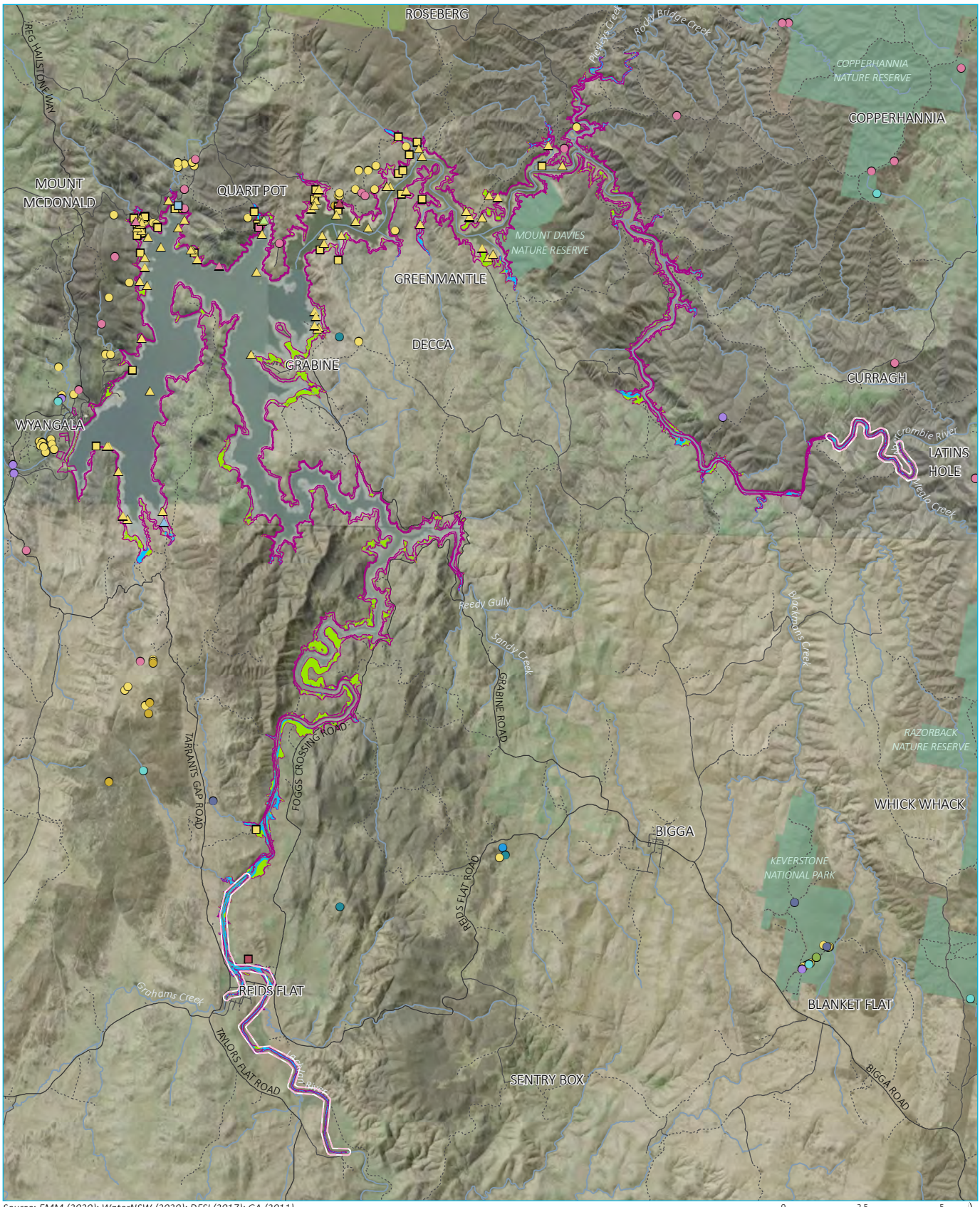
Previous studies of the region are relatively sparse, and primarily constrained to cultural resource management studies as part of various residential or infrastructure related activity around the dam or Cowra itself. The most relevant is work by Kelton (University of Canberra 1991) in relation to survey around the Lachlan River and Wyangala area which highlighted the importance of granite tors and outcroppings for containing past occupation activities in this area. Evidence of past occupation may be more likely to occur on elevated areas (perhaps ridgelines) above water courses, despite their riverbanks likely heavily used in the past.

The *Commonwealth Heritage List* (CHL), *National Heritage List* (NHL) and LEP databases identified no Aboriginal objects, sites or places in the vicinity of the project. Multiple searches of the NSW Aboriginal Heritage Information Management System (AHIMS) database identified 329 previously documented Aboriginal sites in an approximate 3,300 km^2 area centred on the dam.

Registered sites are shown on Figure 6.3, with the majority located on the northern fringe of the Wyangala Dam itself, and lesser aggregations at Copperhannia Nature Reserve and surrounds, and near Reids Flat. Generally, sites appear to be found close to water and/or on crest and ridgeline features. The previous sites are dominated by stone artefactual sites, followed by culturally modified trees, with lesser occurrences of rarer site types such as rock shelters, burials, hearths, grinding grooves, stone arrangement and quarries.

ii Historic heritage

Minimal historical archaeological investigations have been conducted in the region around Cowra. An extensive search of national, state and local heritage registers was conducted. Two heritage listed sites are within a 5 km radius of the Wyangala Dam, the first being the Mount McDonald Cemetery (*Cowra Local Environmental Plan 2012*, item I69), which is located around 2 km north west of the dam. The dam itself is listed on the *State Water Section 170 Register*.



Source: EMM (2020); WaterNSW (2020); DFSI (2017); GA (2011)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 2.5 5 km

GDA 1994 NSW Lambert

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KEY

- Project footprint
- Main road
- Local road
- Track
- Named watercourse
- Upper reaches of Lachlan and Abercrombie Rivers
- Waterbody
- State forest
- NPWS reserve

Area of archaeological potential (between FSL and study area boundary)

- Level to gently inclined terrain
- Level to gently inclined landforms within 100 m of primary watercourse
- Very steep to precipitous terrain

AHIMS site type

- Within existing full supply level
- Within study area
- Outside study area

- Burial/s
- Culturally modified tree
- Grinding groove
- Isolated Aboriginal object
- Isolated Aboriginal object; potential archaeological deposit
- Moderate artefact scatter (20-50)
- Quarry
- Rockshelter (with art)
- Rockshelter (with deposit)
- Small artefact scatter (<10)
- Small artefact scatter (<10); hearth
- Small artefact scatter (<10); potential archaeological deposit
- Stone arrangement
- Undefined artefactual site

AHIMS sites and areas of archaeological sensitivity

Wyangala Dam Wall Raising Project
Scoping report
Figure 6.3

EMM creating opportunities

6.3.2 Issues for consideration

The project has the potential to impact Aboriginal heritage during construction as a result of clearing and earthworks as well as during operation as a result of inundation. The proposed inundation along the Lachlan River may result in a known burial site, #51-2-0006, being affected by the project. While nearer Wyangala Dam, a further known 28 sites would be within the inundation zone of the proposed FSL, with an additional 21 in proximity to the modified lake edge. These include a number of stone artefactual sites, culturally modified trees, an ochre quarry, a stone arrangement, a rock shelter with a deposit, and the previously mentioned burial.

The number of properties to be impacted by the project through inundation and construction require further research to determine if there are any historically significant sites located around the dam. It is likely the land around Wyangala was historically used for pastoralism. Considering the history of the project area and sites identified during the database searches, a range of associated historic features may also be present.

6.3.3 Approach to assessment in EIS

i Aboriginal cultural heritage

An aboriginal cultural heritage assessment (ACHA) would be conducted for the EIS. The ACHA will investigate, characterise, and assess the significance of cultural material and values within the project footprint, and provide guidance on its management and mitigation prior to, during and following construction. The ACHA will be developed in consultation with DPIE and Aboriginal stakeholders, with consideration to:

- consultation requirements set out in the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW 2010); and
- assessment, survey and reporting requirements set out in the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH 2011) and *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010).

ii Historic heritage

A heritage assessment and statement of heritage impact (SoHI) will be prepared as part of the EIS and will investigate significance and assess impacts arising from the project. The assessment would include a review and synthesis of the historical context of the area based on primary and secondary sources, including historical maps and various published and unpublished sources (eg academic theses and consultant reports).

The SoHI would be undertaken in accordance with the principles of the A*ustralia ICOMOS Burra Charter* (Australia ICOMOS 2013a) and its relevant Practice Notes (Australia ICOMOS 2013b, 2013c, 2017). It would also comply with the *NSW Heritage Manual* (1996) and its various updates and other guidelines published by the NSW Heritage Office (1996, 2001, 2009).

6.4 Land

6.4.1 Existing environment

The project area is located in the *Upper Slopes Granites subregion* of the *NSW South West Slopes Bioregion* (NSS). The terrain of the northern portion of the project area consists of narrow ridges, steep slopes and gullies which flatten out into undulating plains towards the southern portion of the project area near the Lachlan River.

The project area traverses a range of soil landscapes, including the Copperhannia and Trunkey in the eastern portion of the project area, and the Wyangala, Pine Mountain and Garland in the west and south portions of the project

area. Soil mapping of the project area indicates that the soil types consist of mostly earthy sands and yellow podzolic soils, with smaller amounts of lithosols and solodic sands. These soil types are related to the quartz rich sandstone and siliceous igneous rocks located across the project area. eSPADE (DPIe 2018) shows Wyangala Dam to be located in the Wyangala soil landscape.

There are a range of existing land uses in and around the project inundation area including:

- Wyangala Dam and associated infrastructure;
- residential areas of Wyangala, including Wyangala Dam Public School and Wyangala Country Club;
- residential areas of Reids Flat, including Reids Flat Landfill Facility and Reids Flat cemetery;
- recreational and tourism related areas, including Wyangla Waters Holiday Park, Grabine Lakeside Holiday Park, and Mount Davies Nature Reserve;
- pastureland currently or previously used for livestock grazing; and
- Aboriginal cultural practices downstream and upstream of the project area.

Land that would be impacted within the project footprint is a mix of crown, freehold, State and local government owned land.

6.4.2 Issues for consideration

The project footprint is located in the Wyangala soil landscape, which is characteristic of siliceous soils on the mid to lower slopes, red podzolic soils and non calcic brown soils on upper slopes west of Wyangala Dam, yellow podzolic soils on mid slopes and yellow soloths along drainage lines.

The erosion hazard varies across each soil type in the Wyangala soil landscape. During or after rainfall events, minor to moderate rill, gully or sheet erosion may occur. Considering the soil may be disturbed due to construction works and during operation due to the increased inundation area, this may result in sediment contaminating surface water and ultimately nearby waterways.

A search of the *Australian Soils Resource Information System* (CSIRO 2014) indicated a low to moderate risk of implications associated with acid sulfate soils occurring during construction and operation of the project.

The project also has the potential to impact on existing land uses. Partial or complete inundation of agricultural land may impact the viability of some land holdings and there is potential for a significant impact to infrastructure associated with recreation and tourism. Changes to land uses and potential full or partial acquisition of property necessitated due to inundation is a key consideration for these impacts, as well as associated impacts to the social and built environment.

6.4.3 Approach to assessment in EIS

Field investigations will be undertaken as part of the EIS to inform the assessment of potential risk to the environment. A soil and water management plan would be prepared in accordance with *Managing Urban Stormwater: Soils and construction, 4th Edition* (Landcom, 2004) (The Blue Book).

Partial or complete inundation of agricultural land may impact the viability of some land holdings and as such the assessment of impacts to land use will be undertaken in combination with the social impact assessment and include consideration of potential economic impacts. As key recreational areas for the local and regional community are to be inundated, impacts will also be considered in combination with impacts to social and community dynamic.

6.5 Social and economic

6.5.1 Existing environment

The project encompasses land within the Cowra, Hilltops, Upper Lachlan and Bathurst local government areas (LGAs). The majority of project infrastructure and potential for impacts to private landholdings and existing structures and services are within the Cowra and Hilltops LGAs.

The largest town nearby to the project is Cowra, about 30 km northwest of the dam wall, with smaller townships of Darbys Falls, Wyangala, Reids Flat and Hovells Creek also within the project's social area of influence.

A large number of businesses in the surrounding area are associated with agriculture, which provides the largest contribution of gross regional product and employment for the region. Other important contributors to the region are manufacturing, health care, education and training, and retail. The region experiences greater than average unemployment rates.

Wyangala Dam provides for a number of recreational activities which are largely enjoyed via the two holiday parks located along the shores of Wyangala Dam, primarily for fishing and boating. The dam is stocked with Murray Cod, Golden Perch and Brown and Rainbow Trout, with a number of other species also caught (WaterNSW 2020).

Wyangala Waters Holiday Park is located on the western side of the dam and Grabine Lakeside Holiday Park on the eastern side. The holiday parks provide camping (powered and unpowered sites) and cabin accommodation, with peak visitation aligning to holiday periods.

6.5.2 Issues for consideration

An influx of workers to the region and locality would be expected during construction which would increase demand for accommodation, community services and other social infrastructure and facilities. These potential impacts could be both positive and negative. With positive impacts associated with economic benefits provided by local and regional business opportunities and contribution and negative impacts associated with local disruption to some parts of the community.

Construction activities at the dam wall and surrounds would result in amenity (noise and visual) impacts. These impacts, while temporary, could occur over several years. This prolonged period may affect health and wellbeing of residents in the Wyangala township and social cohesion more broadly.

The holiday parks are reliant on sufficient water levels to allow for boating and fishing activities accessed from their boat ramps. Drought levels have already impacted visitation to the parks and water security is needed to maintain recreational values and business security.

6.5.3 Approach to assessment in EIS

An economic assessment will be undertaken to demonstrate the regional and local economic benefits of the project during construction. The assessment will also consider changes to the regional economy during operation due to the permanent loss of property uses upstream as a result of inundation as well as the benefits of improved water security for users.

A social impact assessment (SIA) will be undertaken to define the project's area of social influence and identify the potential social impacts (which includes recreational). The SIA will recommend mitigation, management and monitoring measures where required. The assessment will be undertaken generally in accordance with the principles of the New South Wales State Government's *Social impact assessment guideline For State significant mining, petroleum production and extractive industry development September 2017*.

The key objectives of the SIA will be to:

- understand the area of social influence through development of a social profile and collection of qualitative and quantitative data;
- predict and analyse the potential direct and indirect impacts (positive and negative) of the projects including impacts on access to, and demand for, local social services and infrastructure including onsite and offsite housing requirements for construction and operational staff;
- consider the social consequences resulting from the findings of other technical investigations such as investigations into noise, air quality, surface water and traffic to identify potential amenity impacts as well as the outcomes of the economic assessment; and
- develop appropriate mitigation and enhancement strategies.

The establishment of the area of social influence will be undertaken as the first phase of the SIA.

6.6 Hazards and risks

6.6.1 Dam safety

i Existing environment

Construction of Wyangala Dam was completed in 1935 and was a mass concrete gravity dam. Enlargement of the dam with a rock-fill embankment with a clay core downstream of the original dam wall was completed in 1971 (WaterNSW 2020). Upgrades were completed in 2009 to ensure the dam met modern dam safety standards and increased dam safety in the event of extreme flooding. Dam safety is a key risk and all WaterNSW dams are required to meet the requirements of the Dams Safety NSW regulatory requirements. WaterNSW ensures dam safety and manages the risks of dam failure throughout the life of each dam by implementing an effective dam safety management system.

The township of Wyangala was established during the initial construction of the dam. The town is located immediately downstream of the dam wall. Other downstream infrastructure includes other private properties and residences as well as public infrastructure such as roads and bridges.

ii Issues for consideration

Dam safety management is paramount to protect life, property and the environment from dam failure. Dam failure can cause extensive damage to properties and loss of life. Dam failure can occur during probable maximum flood events due to overtopping or inadequate spillway design, as the function of the spillway is to prevent the dam from failure due to overtopping. For the project, protection of Wyangala township and other downstream properties and infrastructure is a key consideration. Environmental considerations are also a factor as the downstream environment include an aquatic EEC.

The project would raise the existing dam wall by up to 10 m, placing pressure on the existing embankment structure from the enlarged storage capacity. The design and construction of the dam raising and spillway extension will need to ensure it continues to meet regulatory requirements for dam safety and will need to demonstrate:

- raising of the wall would not lead to instability of the original concrete dam in the upstream shell of the dam;
- raising of the wall and spillway design would not lead to dam failure;
- that flood risks during construction and operation would not be increased; and

- that public safety risks downstream of the dam have been identified and mitigated through design and dam management.

In addition, the raising of the dam would necessitate changes to water sharing rules and operating licences once completed, as well as modification to the Dam Safety Management System, plans and flood operational rules.

iii Approach to assessment in EIS

The EIS will assess dam safety to ensure public safety risks have been identified and mitigated through design and dam management. The assessment will be undertaken with reference to ANCOLD (2003) *Guidelines on Risk Assessment* and Dams Safety NSW regulations and guidelines and be informed by:

- development of operation rules to cover normal operation, flood operation and environmental flows;
- confirmation of probable maximum flood events through flood modelling;
- dam break modelling – to simulate and predict dam break scenarios; and
- failure mode analysis – to consider all potential failure modes so all contingencies can be accounted for in the design.

While the EIS will describe the outcomes of the above assessments, there will also be a separate dam design and management process that will be carried out by WaterNSW, Dams Safety NSW and other regulators.

6.7 Other issues

6.7.1 Built environment

i Existing environment

Wyangala is a small settlement of around 180 people located less than 300 m north west of the project on the other side of Darby Falls Road (ABS 2016a). Darby Falls Road is the main access point to the Wyangala Dam wall, running along the dam wall to the north and the south. The nearest receiver to the dam wall is a residence on Waugoola Road about 200 m west of the northern extent of the Wyangala Dam embankment. The nearest school to Wyangala Dam is Wyangala Dam Public School located about 500 m north west of Wyangala Dam wall.

Reids Flat is another small village relevant to the project. It is located around 40 km south east of Wyangala on the banks of the Lachlan River. Reids Flat has a population of about 85 people (ABS 2016b). The only major facilities are the Reids Flat Landfill and the Reids Flat cemetery (Hilltops Council 2019).

Other notable features surrounding or partially within the project footprint include:

- Wyangala Waters Holiday Park located around 700 m north of the Wyangala Dam wall;
- Wyangala Waters State Park around 11 km south east from the Wyangala Dam wall;
- Grabine Lakeside Holiday Park located around 7 km north east of the Wyangala Dam wall; and
- Grabine Lakeside State Park located around much of the Wyangala Dam reservoir.

Based on a review of available aerial imagery and a site visit undertaken by EMM, it is evident that the majority of the project footprint has been modified by the existing Wyangala Dam wall and reservoir. The area surrounding the reservoir is characterised by State parks and cleared rural areas associated with pastoralism and grazing.

ii Issues for consideration

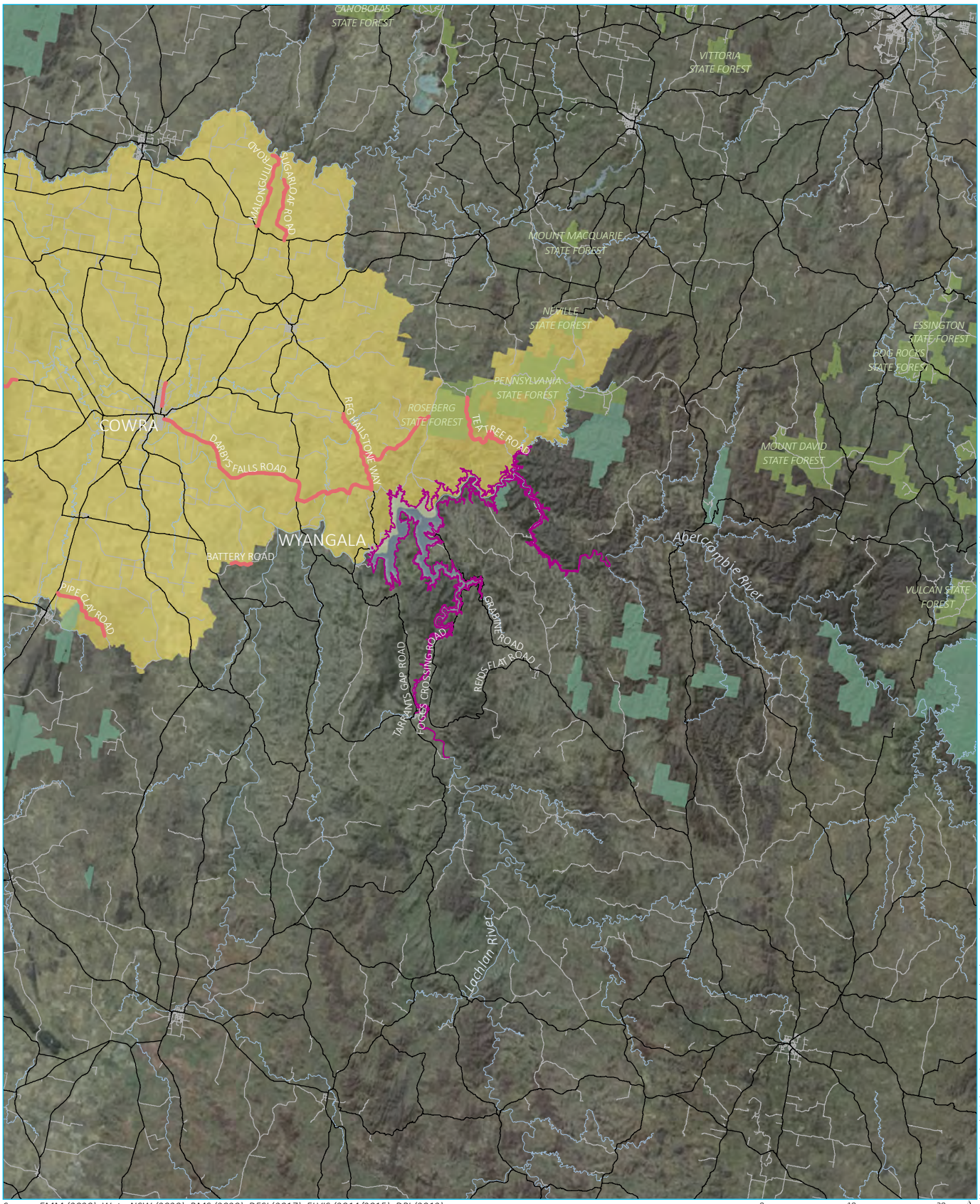
A number of land holdings, including associated houses, shed and other private infrastructure, fall within the inundation area and would therefore be impacted as a result of the project. Additional areas may be impacted periodically through flooding. There are also a number of local roads that fall within the project footprint (Figure 6.4). The Reids Flat Landfill Facility and cemetery both fall outside the project inundation area, however consideration of potential flood impacts is required.

A significant portion of the infrastructure within Wyangala Waters Holiday Park and Grabine Lakeside Holiday Park would be impacted via inundation during operation of the project.

iii Approach to assessment in EIS

An initial assessment of impacts to private property and public infrastructure has been undertaken, however further refinement of the design and associated flood modelling is required to inform this during the EIS. Consultation with local councils will be required to determine any relocation or upgrade requirements to local roads as a result of inundation.

The assessment of impacts to the built environment will be undertaken as part of the SIA and include consideration of potential economic impacts.



Source: EMM (2020); WaterNSW (2020); RMS (2020); DFSI (2017); ELVIS (2014/2015); DPI (2013)

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KEY

- Project footprint
- Main road
- Local road
- Named watercourse
- Routes with potential restrictions
- Approved areas with travel conditions
- Named waterbody
- NPWS reserve
- State forest

Local road network

Wyangala Dam Wall Raising Project
Scoping report
Figure 6.4

EMM
creating opportunities

6.7.2 Transport and access

i Existing environment

The local and regional road network is shown on Figure 6.4. There are no state roads within the vicinity of the inundation area. Abercrombie Road is the closest state road situated about 5.5 km east, Lachlan Valley Way is around 26 km west and Mid-Western Highway is around 27 km north. Hume highway is located over 70 km to the south.

Abercrombie Road is the only State road that falls within the project area. All other local roads are council owned, with a number of these roads expected to be impacted by the project. There are a number of other small local roads within the inundation area including within Grabine Lakeside State Park that do not have a name. Some of these roads may also be impacted by the inundation area.

Given the low population density within the project area, existing traffic levels in the area are low and generally limited to local residents and tourists.

Future operation of the dam is expected to be consistent with current activities and navigational rules for the waterway would not change.

ii Issues for consideration

Major transportation routes during construction may include Darby Falls Road from the south and Reg Hallstone Way from the north. The final project routes will be confirmed once the source of construction materials has been determined.

The project is likely to result in an increase in light and heavy vehicle traffic surrounding the inundation area extent, mostly within the vicinity of the Wyangala Dam wall. The heavy vehicle traffic would serve to transport construction materials to the site, and to take waste materials away from the site. The increase in traffic resulting from the direct impacts of the project would be temporary during the construction phase of the project. It is expected operational traffic would be consistent with current dam activities and therefore no long-term changes to traffic and transport are expected.

iii Approach to assessment in EIS

Direct impacts within the project area would be due to partial inundation of some local roads. Consultation with local Councils will be required to determine any relocation or upgrade requirements. Inundation would also impact on roads within the Wyangala and Grabine State Parks, holiday parks and some rural land holders. An assessment of impacts on these facilities and determination of access requirements during construction and operations will be undertaken as part of the EIS.

6.7.3 Air

i Existing environment

Apart from the villages of Wyangala and Reids Flat, the area surrounding the inundation area is sparsely populated. The nearest receiver to the dam wall is a residence on Waugoola Road about 200 m west of the northern extent of the embankment. Other sensitive receivers exist surrounding the inundation area.

The project is located in areas typical of a rural environment and air quality is generally considered to be good. A few air pollutants would be emitted from the Reids Flat Landfill Facility, residential areas at Wyangala, Reids Flat, surrounding rural and tourism related land holdings. Recent bushfires along the eastern coast of Australia have caused poor air quality in many parts of NSW.

ii Issues for consideration

Temporary air quality impacts are expected within and surrounding the inundation area. Site establishment and construction of the project would result in disturbance of soil and generation of dust due to vehicle driving on unsealed roads and directly from construction activities. Dust, or particular matter, is expected to be the primary air quality impact. Construction plant and equipment, including vehicles required to transport staff and materials to the site would contribute to combustion related pollutants.

Air quality impacts during operation of the project are expected to be minimal and would include minor and occasional vehicle and potential plant emissions associated with maintenance and inspection of project infrastructure.

iii Approach to assessment in EIS

An air quality impact assessment will be undertaken as part of the preparation of the EIS and will assess the potential impacts of dust emissions during construction on sensitive receivers. The assessment will identify potential air quality impacts associated with the project in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (EPA 2016) which lists the statutory methods for modelling and assessing emissions of air pollutants from stationary sources in NSW.

No operational modelling is proposed.

While likely to be minor, annual greenhouse gas emissions will be considered using the *National Greenhouse Accounts Factors* (July 2017).

6.7.4 Amenity

i Existing environment

The project area is located within the *NSW South West Slopes Bioregion* (NSS) within the *Upper Slopes Granites subregion* and is characterised by foothills and isolated pockets of steeper ranges. The project footprint falls predominantly within a terrain of narrow ridges, steep slopes and gullies transitioning to undulating plains further south along the Lachlan River.

Although a human built structure the existing dam wall provides some scenic value, with a number of lookouts present in proximity to the dam wall to provide key vantage points. During high storage levels, the Wyangala foreshore and lake are enjoyed for their natural appearance and aesthetic and offer a range of water-based recreational activities.

The ambient noise environment in the vicinity of the project is likely to be predominantly characterised by natural elements with human influences greater during peak holiday periods associated with boating on the dam as well as general agricultural activities.

A number of residences have been identified in the landscape surrounding the project footprint. The closest residence to the existing embankment is around 200 m west of the northern extent of the embankment. The closest residence to the proposed spillway extension is around 680 m west of the southern extent of the spillway. Other sensitive receptors include transient visitors to the Wyangala Waters and Grabine Holiday Parks.

ii Issues for consideration

The increase in the height of the dam rockfill embankment is likely to increase the number of Wyangala residents who are visually impacted by the rockfill embankment.

The existing rockfill embankment is visible from some areas of the township, it is expected that with the additional height of the dam rockfill embankment would bring greater visibility of the infrastructure. Based on the location of the township in relation to the rockfill embankment overshadowing is not considered a potential impact.

The saddle dam located to the north-east would be constructed in an existing valley between two peaks of the Lachlan Valley. Wyangala is located behind the southern peak and it is not considered this new saddle dam would be visible from the township.

The topography of the local area heavily influences the potential impacts to visual amenity as a result of the raising of the dam wall and associated increase in the area of inundation. However, while the dam height and size would increase, the visual impact would be consistent with the existing dam and views from populated areas within the dam valley is not expected to substantially change.

The primary noise impacts would occur during construction as a result of construction plant and equipment, construction activities and increased vehicle movements. Noise impacts may also be experienced during the relocation of services and structures likely to be affected by the FSL. Noise impacts may also be experienced in relation to quarry activities, however locations for these are yet to be defined.

iii Approach to assessment in EIS

A landscape and visual impact assessment will be prepared as part of the EIS. The assessment will consider potential changes to the landscape character and visual impacts (including lighting impacts) resulting from raising of the dam wall and associated infrastructure, in relation to identified sensitive receptors.

All construction activities are proposed during standard daytime construction hours in accordance with the *Interim Construction Noise Guideline* (ICNG) (DECC 2009). There are not likely to be noise impacts associated with the ongoing operation of the project. As such, a construction only quantitative noise assessment will be carried out in accordance with the ICNG. Operational impacts will be considered qualitatively in the EIS.

6.7.5 Hazards and risks

i Bushfire

The project is located across four bush fire management zones: Canobolas, South West Slopes, Chifley and Southern Tablelands. Mapping provided in the relevant bush fire risk management plans (BFRMPs) for these zones indicates Wyangala is within a very high threat area (Canobolas BFRMP 2017).

The bush fire season in Wyangala runs from October to April each year with the main danger period occurring between December and February. The main sources of ignition reported in these fire management zones are lightning strikes, illegal burning, arson, and machinery and farming activities.

Construction of the project has the potential to result in unplanned fires, creating a risk to project staff as well as to members of the public. Key considerations include potential sources of ignition (eg machinery and equipment) and ensuring adequate construction standards and asset protection zones.

The potential for bushfire hazard and risk impacts will be investigated further through the EIS with consideration of the relevant guidelines and standards, including the NSW Rural Fire Service's (RFS) *Planning for Bush Fire Protection. A guide for Councils, planners, fire authorities and developers* (2006) and relevant BFRMPs.

ii Waste

It is anticipated that the project would produce a number of waste streams during construction. Minor quantities of waste would also continue to be generated by the day-to-day operation of the project.

Waste would also be generated as part of decommissioning at the end of the project's operational life and the relocation of services and structures affected by the FSL.

Waste streams likely to be generated during the construction and ongoing operation of the project would include:

- rock or clay core material removed from the existing embankment as part of the wall raising;
- rock excavated as part of the spillway widening that can't be beneficially reused;
- cardboard packaging, plastic wrapping, plastic ties, wood pallets and other timber offcuts for project infrastructure components;
- general waste from the construction compound, operations and management buildings;
- comingled recycling;
- oily rags, filters and drums (primarily during construction);
- waste batteries; and
- confidential documents.

In addition, consideration of the temporary and/or permanent storage of excavated material generated during construction of the additional embankment is required. Potential impacts from poor management of waste include contamination of land and water, and human and animal health impacts.

iii Contamination

There are no known contaminated land issues within the project footprint. However, agricultural activities have occurred on cleared areas with, and in the vicinity of, the project footprint. A number of landholdings would be inundated as a result of the project including agricultural properties. Further investigations will be required to assess potential for contamination as a result of inundation on these agricultural properties as well inundation of private and public infrastructure, such as roads, bridges and tourism-related facilities.

A contamination assessment of the project footprint would be completed as part of the EIS. The preliminary site investigation will include consideration of the existing environment and a review of the site history, identification of current or historical contaminating activities and potential receptors (including landholdings likely to be inundated as a result of the project). The assessment will provide key measures for managing soils during construction, operations and decommissioning.

The following government guidelines will be considered where relevant during the preparation of the EIS:

- *Acid Sulfate Soils Assessment Guidelines* (Department of Planning 2008);
- *Managing Land Contamination Planning Guidelines: SEPP 55 – Remediation of Land* (Department of Urban Affairs and Planning 1998);
- *Guidelines for Consultants Reporting on Contaminated Sites* (Office of Environment and Heritage 2000);
- *Managing Urban Stormwater: Soils and Construction Volume 1* (Landcom 2004);
- *Managing Urban Stormwater: Soils and Construction Volume 2* (Department of Environment and Climate Change 2009);

- *Guidelines on the Duty to Report Contamination under the CLM Act* (Department of Environment and Climate Change 2008); and
- *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC/ARMCANZ 2000).

7 Proposed community engagement during the EIS

7.1 Overview of approach

WaterNSW is implementing a tailored framework for stakeholder engagement and communication for the project. A broad engagement framework and schedule has been mapped to support delivery of the project as shown in Figure 7.1.

A staged approach was developed by WaterNSW as part of the early consultation program (Phase 1 and 2) to allow response to initial community interest to the project following the government announcements made earlier in October 2019. The focus of EIS engagement will be during Phase 3 and Phase 4, with ongoing community engagement anticipated throughout the project's construction.

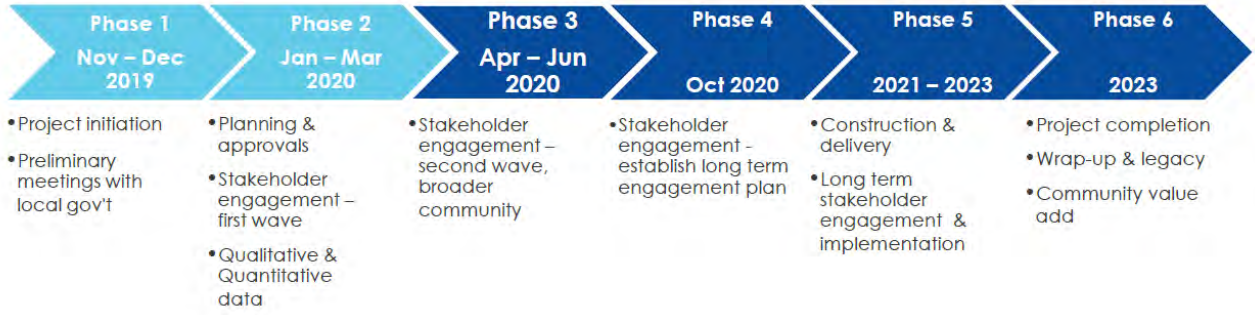

Figure 7.1 WaterNSW's phased community and stakeholder approach

The proposed approach is designed to progressively build the quality and depth of WaterNSW's conversation with stakeholders, set a basis for future engagement and support the project program. WaterNSW principles around stakeholder engagement are that it should be two-way, genuine communication and interaction with clear and accurate information, be timely, accessible, inclusive and sustainable, with stakeholders encouraged to become long-term partners.

7.1.1 Identified stakeholder groups

Early consultation has identified a number of key stakeholder groups. The broad stakeholder groups identified are:

- land holders, including large agricultural/pastoral holdings;
- tourism land holders namely Reflections Holidays Parks;
- Aboriginal groups, including Cowra Local Aboriginal Land Council and other Wiradjuri traditional owners;
- industry and interest groups, including business, tourism, recreation, utilities and other interests;
- government, including local, state and Commonwealth Members of Parliament and regulatory authorities;
- general public; and

- media.

Future consultation and engagement activities will further identify and map individual community and stakeholders with an interest in or likely to be impacted by the project.

7.1.2 WaterNSW guiding principles

As part of initial planning, WaterNSW has developed a series of guiding principles to deliver the project. Given the projects are critical in ensuring water security, the project timeframes are aggressive and require a tailored approach for specific stakeholder groups to ensure a depth of engagement is achieved to support the overall delivery of the project. The guiding principles are described below.

The WaterNSW Way guiding principles

- Stakeholder and community engagement must, above all, be genuine and respectful, and tailored to the specific needs of stakeholders to avoid generic low-value activity
- Local community benefits will be maximised with capabilities in local regions identified and utilised where possible
- A 'no surprises' approach will be undertaken to ensure key stakeholders are briefed according to a set of agreed engagement, communication and media protocols
- Issues will be considered not just from WaterNSW perspective but also from a stakeholder view – a 'walk in their shoes' approach
- WaterNSW will listen, will be fact based in its communication and engagement, and will aim to have a comprehensive understanding of stakeholder issues
- WaterNSW will ensure internal conversations are held regularly and coordination achieved to avoid stakeholders being exposed to siloed thinking and 'corporate speak'
- Baseline community (quantitative) and stakeholder (qualitative) sentiment will be established, followed up with ongoing regular research and monitoring to ensure the performance of the WaterNSW engagement, and to provide the ability to continue to tailor the engagement plan to meet emerging issues
- WaterNSW will be committed to the requirements of the plan, to stay the course for the long term and to be an active partner with stakeholders.

7.2 Engagement during the EIS

WaterNSW has developed a specific engagement action plan for Wyangala Dam that will outline the specific methods and timing for its implementation.

Engagement targeted specifically for the Wyangala Dam Wall Raising project leading up to the EIS exhibition will comprise:

- community briefings to be held in key local communities;
- discussions with affected and potentially affected land holders;

- engagement with Aboriginal stakeholders, groups, and organisations around mobilisation for opportunities associated with the project EIS (in line with the Aboriginal engagement communication strategy, see below);
- intergovernmental meetings with key representatives from DAWE, DPIE and other government agencies; and
- media briefings.

A broader Aboriginal engagement communication strategy is currently being implemented and aims to ensure early and close engagement with the Aboriginal community and provide a framework for ongoing consultation. The strategy involves:

- identifying key Aboriginal stakeholder for each region and establish points of contact;
- documenting any key issues or areas of concern raised during initial discussions;
- identifying key community areas or projects that may provide opportunity for integration into the project; and
- identifying interests and ideas raised by stakeholders about future involvement in the assessment process, and subsequent stages of the project (such as construction).

A comprehensive schedule of community participation and engagement has been developed. The following opportunities for when and how the community can be involved in the planning, design and environmental assessment phases of the project are likely to include:

- attendance at community information sessions – to be announced;
- participation in community sentiment analysis via qualitative and quantitative research;
- Community Reference Group meetings;
- Aboriginal Reference Group meetings;
- cohort of key opinion leader meetings;
- interest group round table meetings;
- location engagement such as site tours / walkthrough Q&A opportunities, event tie-ins;
- Environmental Impact Statement (EIS) consultation during the exhibition of the documentation; and
- via DPIE through making a submission on the project during the EIS public exhibition.

Project information will be provided to the local community and targeted stakeholders via the following:

- directly with the local community through face-to-face meetings or community events;
- directly with Aboriginal groups (identified through Aboriginal engagement communication strategy) through face-to-face meetings;
- mail and/or email to local community and key stakeholders registering an interest;

- mail and/or email to WaterNSW customers;
- Wyangala Dam Wall Raising pages on the WaterNSW website (www.waternsw.com.au);
- social media including WaterNSW Facebook page; and
- a project email address to directly respond to concerns and enquiries (WyangalaDam@waternsw.com.au as well as projects@waternsw.com.au).

8 References

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Appendix A

Scoping worksheet

Project : J190822 **Scoping Report Wyangala Dam Raising: Appendix A Scoping worksheet**

MATTERS		IMPACTS		ASSESSMENT LEVEL	CUMULATIVE IMPACTS	COMMUNITY ISSUES	ASSESSMENT APPROACH	SCOPING REPORT
Potential matters that could be affected by the project		Is the project (without mitigation) likely to cause an impact?	Are the impacts (without mitigation) likely to be significant based on the magnitude of the impacts and/or sensitivity of receivers?	What level of assessment is required to assess impacts and determine mitigation measures?	Will cumulative assessment be required?	Did the community raise any concerns about the impacts?	Indicative approach to assessment in EIS	Where was this addressed in the Scoping Report?
Group	**Specific**	**Impact?**	**Significant Impact?**	**Assessment Level**	**Cumulative**	**Concerns?**	**Category**	**Section**
ACCESS	access to property	Yes	Unknown	Standard	No	Yes	Standard Assessment with focussed engagement	Section 2.3, Section 6.7.2
	parking	Yes	Unlikely			No	Scoping Report	N/A
	port / airport facilities	No				No	None (include short explanation in Scoping Report)	Section 5.2.3
	road / rail network	Yes	Unknown	Standard	No	Yes	Standard Assessment with focussed engagement	Section 6.7.2
	other - please specify	N/A					None (include short explanation in Scoping Report)	
AIR	atmospheric emissions	Unknown	Unlikely			No	Scoping Report	Section 6.7.3
	gases	Unknown	Unlikely			No	Scoping Report	Section 6.7.3
	particulate matter	Unknown	Unknown	Standard	No	No	Standard Assessment	Section 6.7.3
	other - please specify	N/A					None (include short explanation in Scoping Report)	
AMENITY	noise	Yes	Unknown	Standard	No	Yes	Standard Assessment with focussed engagement	Section 6.7.4
	odour	Unknown	Unknown	Standard	No	No	Standard Assessment	N/A
	vibration	Yes	Unknown	Standard	No	Yes	Standard Assessment with focussed engagement	Section 6.7.4
	visual	Yes	Unknown	Standard	No	Yes	Standard Assessment with focussed engagement	Section 6.7.4
	other - please specify	N/A					None (include short explanation in Scoping Report)	
BIODIVERSITY	conservation areas	Yes	Likely	Detailed	No	Yes	Detailed Assessment with focussed engagement	Section 3.2, Section 6.2.1
	native vegetation	Yes	Likely	Detailed	No	Yes	Detailed Assessment with focussed engagement	Section 6.2
	native fauna	Yes	Likely	Detailed	No	Yes	Detailed Assessment with focussed engagement	Section 6.2
	other - please specify	N/A					None (include short explanation in Scoping Report)	
BUILT ENVIRONMENT	private property	Yes	Likely	Standard	No	Yes	Standard Assessment with focussed engagement	Section 3.2.2, Section 6.4
	public domain	Yes	Unknown	Standard	No	Yes	Standard Assessment with focussed engagement	Section 3.2.2, Section 6.4
	public infrastructure	Yes	Likely	Standard	No	Yes	Standard Assessment with focussed engagement	Section 3.2.2, Section 6.4
	other - please specify	N/A					None (include short explanation in Scoping Report)	
ECONOMIC	livelihood	Yes	Likely	Standard	No	Yes	Standard Assessment with focussed engagement	Section 6.5
	natural resource use	Yes	Likely	Standard	No	Yes	Standard Assessment with focussed engagement	Section 6.5
	opportunity cost	Yes	Unknown	Standard	No	No	Standard Assessment	Section 6.5
	other - please specify	N/A					None (include short explanation in Scoping Report)	
HAZARDS & RISKS	biosecurity	Unknown	Unlikely			No	Scoping Report	N/A
	bush fire	Yes	Unknown	Standard	No	No	Standard Assessment	Section 6.7.5
	coastal hazards	N/A					None (include short explanation in Scoping Report)	Section 5.2.3
	dams	Yes	Likely	Detailed	No	Yes	Detailed Assessment with focussed engagement	Section 6.6.1
	dangerous goods	Unknown	Unlikely			No	Scoping Report	Section 4.1.6
	environmental hazards	Unknown	Unknown	Standard	No	No	Standard Assessment	Section 6.7.5
	floods	Yes	Likely	Detailed	No	Yes	Detailed Assessment with focussed engagement	Section 6.1
	groundwater contamination	Unknown	Unknown	Standard	No	No	Standard Assessment	Section 6.7.5
	hazardous / offensive development	No				No	None (include short explanation in Scoping Report)	Section 5.2.3
	land contamination	Unknown	Unknown	Standard	No	No	Standard Assessment	Section 6.7.5
	land movement	Unknown	Unknown	Standard	No	No	Standard Assessment	Section 6.4
	waste	Yes	Unknown	Standard	No	No	Standard Assessment	Section 6.7.5
	other - please specify	N/A					None (include short explanation in Scoping Report)	
HERITAGE	Aboriginal cultural	Yes	Likely	Detailed	No	Yes	Detailed Assessment with focussed engagement	Section 6.3
	historic	Yes	Unknown	Detailed	No	Yes	Detailed Assessment with focussed engagement	Section 6.3
	natural	Yes	Likely	Detailed	No	Yes	Detailed Assessment with focussed engagement	Section 6.3
	other - please specify	N/A					None (include short explanation in Scoping Report)	
LAND	land capability	Yes	Likely	Detailed	No	Yes	Detailed Assessment with focussed engagement	Section 6.4
	soil chemistry	Unknown	Unknown	Standard	No	No	Standard Assessment	Section 6.4
	stability / structure	Yes	Unknown	Standard	No	No	Standard Assessment	Section 6.4
	topography	Unknown	Unknown	Standard	No	No	Standard Assessment	Section 6.4
	other - please specify	N/A					None (include short explanation in Scoping Report)	
SOCIAL	community services / facilities	Yes	Likely	Detailed	No	No	Detailed Assessment	Section 6.5
	health	Unknown	Unknown	Standard	No	No	Standard Assessment	Section 6.5
	housing availability	Unknown	Unknown	Standard	No	Yes	Standard Assessment with focussed engagement	Section 6.5
	safety	Yes	Unknown	Standard	No	No	Standard Assessment	Section 6.5
	social cohesion	Yes	Unknown	Standard	No	Yes	Standard Assessment with focussed engagement	Section 6.5
	other - please specify	N/A					None (include short explanation in Scoping Report)	
WATER	ground water quality	Yes	Unknown	Standard	No	No	Standard Assessment	Section 6.1
	hydrological flows (including flooding)	Yes	Likely	Detailed	No	Yes	Detailed Assessment with focussed engagement	Section 6.1
	surface water quality	Yes	Likely	Detailed	No	Yes	Detailed Assessment with focussed engagement	Section 6.1
	water availability	Yes	Likely	Detailed	No	Yes	Detailed Assessment with focussed engagement	Section 6.1
	other - please specify	N/A					None (include short explanation in Scoping Report)	

Appendix B

Preliminary biodiversity assessment

Appendix C

Preliminary heritage assessment