



Mount Piper to Wallerawang Transmission Line Upgrade





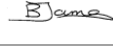

Technical Report 3 – Aquatic Ecology Assessment

Transgrid

August 2025

→ **The Power of Commitment**



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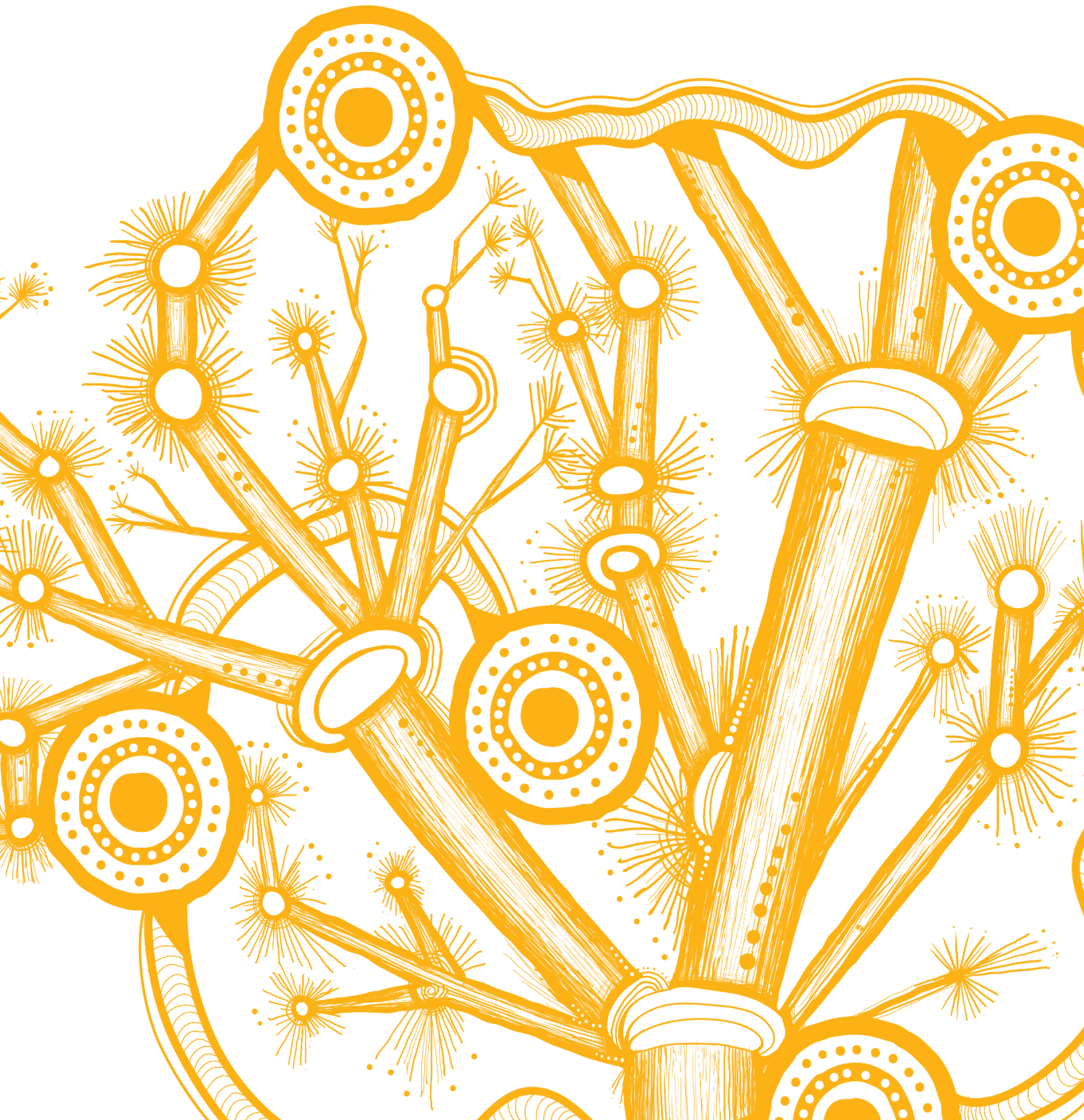
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Acknowledgement of Country

Transgrid and GHD acknowledges Aboriginal and Torres Strait Islander peoples as the Traditional Custodians of the land, water and sky throughout Australia on which we do business. We recognise their strength, diversity, resilience and deep connections to Country. We pay our respects to Elders of the past, present and future, as they hold the memories, knowledges and spirit of Australia. Transgrid and GHD is committed to learning from Aboriginal and Torres Strait Islander peoples in the work we do.



Executive summary

The project

Transgrid proposes to deliver approximately eight kilometres (km) of new 330 kilovolt (kV) transmission line and double circuit transmission structures located between the Mount Piper and Wallerawang 330 kV substations (the project). The project would incorporate sections of an existing, single-circuit 132 kV transmission line, where the two transmission lines would share a widened easement and transmission structures. The project is located within the Central West region of NSW within the Lithgow Local Government Area (Lithgow LGA).

The project is identified in the NSW Network Infrastructure Strategy (EnergyCo, 2023) and also supports the key tenets of the NSW Electricity Infrastructure Roadmap (DPIE, 2020). The Roadmap identifies that the expansion of renewable generation must be accompanied by increased transmission capacity to transfer power from Renewable Energy Zones (REZ) in inland NSW to key demand centres. The Mount Piper to Wallerawang Transmission Line Upgrade Project would provide the additional capacity required to reliably transmit power from the Central West Orana REZ to the Greater Sydney region.

Purpose of this report

This aquatic ecology impact assessment report has been prepared to address the Secretary's Environmental Assessment Requirements for the Project's Environmental Impact Statement (EIS), relating to aquatic ecosystems. This includes consideration of potential project impacts on fish and aquatic invertebrates (e.g. aquatic insects and crustaceans), including threatened species, or key fish habitat, as required under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and under the *NSW Fisheries Management Act 1994* (FM Act).

Existing environment

The project footprint is located within the upper reaches of the Coxs River catchment, upstream of Lake Wallace and crosses varying terrain, topography and waterways. The project footprint traverses a portion of the Gardens of Stone State Conservation Area and land, which has been subject to varying development, including for existing transmission infrastructure, mining and agriculture.

Hydrologic features vary across the waterways within the project footprint. The Coxs River is the waterway in the project footprint providing the greatest ecological value as habitat for fish and aquatic invertebrates. Except for the Coxs River, the waterways intersecting the project footprint are small (first to third) order waterways with low water levels. All waterways in the project footprint, including the Coxs River, have been highly disturbed from adjacent land uses. In accordance with the *Policy and guidelines for fish habitat conservation and management* (DPI, 2013) definitions, the waterways in and adjacent to the project footprint identified as providing key fish habitat (third order or higher) are:

- The Coxs River: *Class 1 – Major fish habitat, Type 2 – Moderately sensitive key fish habitat*
- 'Unnamed tributary of Wangcol Creek (a)'¹: *Class 3 – Minimal fish habitat, Type 3 – Minimally sensitive key fish habitat*
- 'Unnamed tributary of Wangcol Creek (c)': *Class 3 – Minimal fish habitat, Type 3 – Minimally sensitive key fish habitat*.

The other waterways that intersect the project footprint are not identified in DPIRD mapping as key fish habitat or have been determined through this assessment to be *Class 4 - Unlikely key fish habitat*, due to water scarcity, the lack of defined banks, limited potential for water pooling, restricted fish passage and/ or a lack of sensitive fish habitats such as aquatic plants.

¹ The study area includes three unnamed tributaries of Wangcol Creek, which interact with the project footprint. For the purposes of this assessment, they are annotated as tributaries (a), (b) and (c). These tributaries are illustrated in Figure 4.4.

The project footprint is largely within an existing transmission line easement. The waterway crossings along the easement have existing vehicular crossings. The riparian zone has been disturbed in proximity to these waterway crossings from clearing for the existing transmission line easement and vehicular tracks. There are erosion control structures or diversion channels present in 'Unnamed tributary of Wangcol Creek (a) and (c)', which intersect the project footprint.

No threatened fish or threatened aquatic invertebrates are expected to be present in the waterways associated with the project footprint.

Assessment methodology

A desktop-based study was undertaken to identify the waterways potentially providing 'key fish habitat', the potential impacts on such habitats and the potential occurrence of threatened species of fish or aquatic invertebrates listed under the FM Act or the EPBC Act.

A site visit was undertaken in December 2024 to ground-truth the DPIRD key fish habitat mapping and characterise the waterways intersected by the project footprint according to the framework in the *Policy and guidelines for fish habitat conservation and management* (DPI, 2013). This framework considers the fish passage and flow regime of the waterways and the presence of any sensitive fish habitats such as aquatic plants.

The impact assessment considered the risks from the project to the waterways providing key fish habitat during construction and operation. The assessment is based on the proposed ground disturbance and vegetation removal within the project footprint, including riparian vegetation. The project risks that have been considered include:

- Instream works, including direct disturbance of key fish habitat and potential risks aquatic biota.
- Soil disturbance and increased risk of sediment transport and turbidity in waterways, particularly those located within the riparian zone or in waterfront land.
- Construction activities resulting in alteration of bed or banks, changes to surface runoff to waterways, with potential risks to fish passage. This includes new and upgraded culvert crossings for access tracks and associated instream works
- Removal of riparian vegetation with potential risks of reduced aquatic habitat quality and reduced bank stability. Vegetation removal is needed for clearance requirements for the transmission lines, building transmission structures, new access tracks and widening existing access tracks and a temporary construction compound near to the Mount Piper power station adjacent to Unnamed tributary of Wangcol Creek (c).
- Operational and maintenance activities such as the infrequent use of the access tracks and areas of the transmission line easement for maintenance and inspections.
- Cumulative construction and operational impacts from other nearby developments.

The aquatic ecology impact assessment has considered the potential impact on key fish habitat or aquatic biota from the direct and indirect impacts to waterways identified in Technical Report 1 – Water Impact Assessment and the Technical Report 2 –Biodiversity Development Assessment Report.

Impacts from the project

The project is expected to have localised and minor impacts to key fish habitat, and minor or negligible impacts to aquatic biota, including in the Coxs River, which provides higher value habitat. This is based on the following assessment findings:

- Findings in Technical Report 1 – Water Impact Assessment identify that the project is expected to result in temporary, minor impacts to surface water quality and hydrology during construction and negligible impacts during operation, with the adoption of recommended mitigations measures. This includes the development of construction soil and water management plan (SWMP) and the design and management of access tracks and trackside drainage in accordance with *Managing Urban Stormwater: Soils and Construction – Volume 2C, Unsealed Roads* (DECC, 2008).
- There is limited key fish habitat within or adjacent to the project footprint. Construction of the project will result in a loss or alteration a maximum of 60 square metres (m²) in each of the Unnamed tributaries of Wangcol Creek (a) and (c), which provide *Type 3: minimally sensitive habitat*. This loss is attributed to instream works and removal of riparian vegetation. It is expected to have a negligible influence on aquatic biota. Due to the limited habitat value and low water availability, there is limited potential for direct harm (i.e. mortality or injury) to aquatic biota.

- Fish passage is highly constrained in ‘Unnamed tributary of Wangcol Creek (a) and (c)’, due to the existing access track crossings and there is insufficient water to support fish passage. As such, negligible impacts to fish passage are expected during the project construction and operation, from instream works or alteration of instream structures.
- A new culvert crossing is proposed to be constructed across a minor waterway crossing identified as ‘Unnamed tributary (oxbow) of Coxs River’, which may require dewatering for construction. The disconnected oxbow of the Coxs River is a small waterbody formed on a first order tributary of the Coxs River, which is not key fish habitat. The existing Main Western Rail Line is a barrier to fish passage between this waterbody and the Coxs River, however, the waterbody has the potential to contain aquatic biota. Dewatering activities have the potential for direct impacts to individual fish, including stress, injury or death, through entrainment (i.e. extraction into the pipe). Mitigation measures are recommended to minimise potential impacts.
- Existing riparian vegetation has been previously disturbed and is substantially modified in areas around ‘Unnamed tributary of Wangcol Creek (c)’. Riparian vegetation removal during project construction would be associated with construction activities for preferred transmission structures (TS) TS2C, TS4C and TS8C, and construction benches 2C, 3C, 4C, 6C, 7C, 8C and 10D, which are located within 40 metres (m) of the Coxs River, and the Mount Piper construction compound located within 10 m of ‘Unnamed tributary of Wangcol Creek (c)’. The proposed removal of riparian vegetation along the Coxs River during construction would have a minor impact on aquatic biota through reduced shading and habitat material, and the potential of minor changes in bank stability. Mitigation measures are recommended to minimise potential impacts. Negligible impacts to aquatic biota are expected in ‘Unnamed tributary of Wangcol Creek (a) and (c)’ due to removal of riparian vegetation as there is limited ponded water (i.e. limited potential for aquatic fauna to inhabit these areas).
- No impacts are expected to threatened aquatic biota as there are no threatened fish or aquatic invertebrate species, populations or communities expected to occur in the waterways in and adjacent to the project footprint.

Cumulative impacts

Nearby major projects were reviewed with reference to potential cumulative impacts on aquatic biota and habitat that may arise from the proposed project interacting with other projects listed on the NSW Major Projects portal. The potential for cumulative impacts on aquatic biota and habitat were considered from three adjacent projects: Wallerawang Battery Energy Storage System, Mount Piper Battery Energy Storage System and Great Western Battery Energy Storage System. Based on available information, the three projects in combination with the Mount Piper to Wallerawang Transmission Line project, would not likely result in increased cumulative impacts to waterways, aquatic biota and key fish habitats. Each project would implement their respective mitigation and management measures.

Consultation is recommended with the proponent and the contractor for the Mount Piper Battery Energy Storage System to seek further information and identify effective measures to minimise cumulative impacts on minimal key fish habitat of ‘Unnamed tributary of Wangcol Creek (c)’.

Recommended mitigation measures

Technical Report 1 – Water Impact Assessment identifies mitigation measures to manage potential impacts to water quality, erosion and sedimentation and groundwater. The following additional key mitigation measures are recommended to mitigate and minimise potential impacts on aquatic biota and key fish habitat. Other measures are provided in section 6.

- Retain riparian vegetation (particularly native trees) along the Coxs River, by retaining trunk bases and root balls where full removal is not necessary to provide clearance for transmission line infrastructure.
- Construction methods are to minimise any additional restriction to fish passage from current conditions in waterways identified as Class 1 (major) to Class 3 (minimal) fish habitat.
- Consultation with DPIRD will be undertaken for any proposed dewatering and discharge of water to/ from waterways.

Conclusion

- Overall, the project is expected to have only localised, minor impacts to key fish habitat and minor or negligible impacts to aquatic biota, including in the Coxs River, which provides higher value habitat. There is limited key fish habitat in the project footprint, and the condition of existing waterways are already impacted by previous disturbance.
- The project is unlikely to impact on threatened fish or aquatic invertebrates, as threatened aquatic biota are not expected to be present in waterways in or adjacent to the project footprint. Furthermore, during construction, there is only potential for temporary, minor and localised water quality impacts (i.e. limited potential for impacts to downstream waterways) and hydrology, including associated changes with flow regime and fish passage. During operation, impacts are expected to be negligible.

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Appendices

Appendix A	Protected Matter Search Tool Results
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Key terms, acronyms and abbreviations

Term	Description
Alluvial	Deposition from running waters.
Aquatic biota	For the purposes of this assessment, aquatic biota refers to finned fish and aquatic invertebrates, including insects and crustaceans.
Aquifer	A groundwater bearing formation sufficiently permeable to transmit and yield groundwater.
Australian Height Datum or AHD	A common national surface level datum approximately corresponding to mean sea level.
BC Act	<i>Biodiversity Conservation Act 2016</i> (NSW)
BDAR	Biodiversity Development Assessment Report
BESS	Battery Energy Storage System
Biodiversity offsets	Specific measures that are put in place to compensate for impacts on biodiversity values.
BoM	Bureau of Meteorology
Catchment	The land area draining through the mainstream, as well as tributary streams, to a particular site.
Clean Water	Water that has not come into physical contact with ore material and does not have an elevated sediment load.
CSSI	Critical State Significant Infrastructure
CSWMP	Construction Soil and Water Management Plan
CWO REZ	Central-West Orana Renewable Energy Zone
DCCEEW	Department of Climate Change, Energy, Environment and Water. Used to reference both the NSW and Commonwealth departments.
Dewatering	The removal or pumping of water from an above or below ground storage.
DPE	Department of Planning and the Environment
DPIE	Department of Planning, Industry and Environment
DPIRD	NSW Department of Primary Industries and Regional Development
Drawdown	A reduction in piezometric head within an aquifer.
Easement	A legal property right attached to a parcel of land that enables the use of an identified part of the land by a third party other than the owner. For transmission lines, an easement defines the corridor area where the lines are located and that allows access, construction and maintenance work to take place. The easements for the 330 kV transmission lines would typically be 60 metres wide. The easement grants a right of access and for construction, maintenance and operation of the transmission line and other operational assets.
EIS	Environmental Impact Statement
Entrainment	Fish entrainment refers to the unwanted passage of fish through a water intake, where they can be injured, stranded, or killed.
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cwlth)
Ephemeral	Stream that is usually dry, but may contain water for rare and irregular periods, usually after rainfall.
FM Act	<i>Fisheries Management Act 1994</i> (NSW)
GHD	GHD Pty Ltd
GIS	geographic information system
Groundwater	Subsurface water that occurs in soils and geological formations.
Groundwater dependent ecosystems	Ecosystems that need access to groundwater to meet all or some of their water requirements to maintain their communities of plants and animals.
Hydrological regime	The long-term pattern of water flow in a waterway, encompassing its natural variations in magnitude, frequency, and timing of high and low flows.
Hydrology	Relating to rainfall and surface water runoff processes.

Term	Description
Key fish habitat	As per the Policy and Guidelines for Fish Habitat Conservation and Management (DPI, 2013), key fish habitat is defined to include most permanent and semipermanent freshwater habitats including rivers, creeks, lakes, lagoons, billabongs, weir pools and impoundments up to the top of the bank. Farm dams and ephemeral gullies are generally excluded from the definition.
kL	kilolitre
Km	kilometre
kV	kilovolt
Large woody debris / habitat	Large woody debris or habitat refers to branches, logs or fallen trees that are within the channel of a waterway providing key fish habitat, feeding and refuge habitat for some fish and aquatic invertebrates. Woody debris can determine the local hydraulics in a waterway, creating greater hydrological variability.
LGA	Local Government Area
M	metres
Macrophyte	In-channel aquatic plants such as reeds, rushes or lilies. Macrophyte can be submerged (growing on the substrate), floating (with leaf structures floating on the water surface) or emergent (with roots in the substrate but with leaf structures extending out of the water).
Minor waterways	Waterways of the first or second stream order, or those identified through site observations to not provide key fish habitat (i.e. minor drainage lines).
Mm	millimetre
MNES	Matters of National Environmental Significance
NTU	nephelometric turbidity unit
Oxbow	A crescent-shaped waterbody formed when a river abandons a meander, creating a U-shaped bend or a separate body of water. Alternatively, a loop-shaped waterbody formed by a horseshoe bend in a river.
Perenniality	The frequency of flow in a waterway. Whether perennial (flowing year-round), intermittent (flowing periodically most years) or ephemeral (mostly dry, flowing for a short time after rainfall events).
PMST	Protected Matters Search Tool
Project	The CSSI project "Mount Piper to Wallerawang Transmission Line Upgrade Project", which is the subject of the Environmental Impact Statement. The project involves the construction and operation of high voltage transmission lines between the Mount Piper and Wallerawang 330 kV substations.
Project footprint	The area that would be directly affected by construction and the location of operational infrastructure. This includes all areas covered by the transmission line easement and structures, roads, waterway crossings and buildings as shown in Figure 1.1.
REZ	Renewable Energy Zone
Riparian	Pertaining to, or situated on, the bank of a waterway or other water body.
Riparian vegetative zone	The riparian vegetative zone is the trees and other vegetation growing along the bank of a waterway or other water body.
Runoff	The amount of rainfall which actually ends up as streamflow, also known as rainfall excess.
SCA	State Conservation Area
SEARs	Secretary's Environmental Assessment Requirements
Sediment	Soil or other particles that settle to the bottom of lakes, rivers, oceans and other waters.
Sedimentation	Sedimentation is the process where sediment settles out of water and accumulates on the bed of a waterway.
Soil structure	The combination or spatial arrangement of primary soil particles (clay, silt, sand, gravel) into aggregates such as peds or clods, and their stability to deformation.
Strahler Stream Order	Stream classification system where order one is for headwater (new) streams at the top of a catchment (Strahler, 1952). Order number increases downstream using a defined methodology related to the branching of streams.

Term	Description
Surface water	Water that is derived from precipitation or pumped from underground and may be stored in dams, rivers, creeks and drainage lines.
Swale	A low or hollow place, especially a marshy depression between hills or ridges.
Topography	The arrangement of the natural and artificial physical features of an area.
Tributary	A stream or river that flows into a main river or lake.
TS	Specific transmission structures.
Turbidity	A measure of clarity (turbidity) of water. Turbidity in excess of 5 NTU is just noticeable to the average person.
Waterway	A natural or artificial channel through which water flows.

1. Introduction

1.1 Background

The Commonwealth and NSW governments have both established targets to achieve net-zero emissions by 2050. Achieving these targets requires low emissions technologies to be deployed at scale across all sectors of the economy, including the electricity generation sector, currently Australia's largest source of greenhouse gas emissions.

The NSW Transmission Infrastructure Strategy (DPE, 2018) aims to engage the private sector to invest in priority energy infrastructure projects, which can deliver low-cost, clean and reliable energy to consumers.

As part of the Transmission Infrastructure Strategy, the NSW Government has developed a plan to establish five Renewable Energy Zones (REZs) to increase renewable energy generation, reduce carbon emissions, and help deliver lower wholesale electricity costs to consumers. The Central-West Orana REZ (CWO REZ), being the first REZ established, is planned to generate at least 4.5 gigawatt by the late-2020s.

The NSW Government's Electricity Infrastructure Roadmap (DPIE, 2020) identifies that the expansion of renewable generation must be accompanied by increased transmission capacity to transfer power from REZs in inland NSW to key demand centres. Interest in new energy generation projects in the CWO REZ is forecasted to exceed the existing transmission network capacity in several locations. The existing infrastructure located between the Mount Piper 550/330 kilovolt (kV) substation (Mount Piper 330 kV substation) and the Wallerawang 330/132 kV substation (Wallerawang 330 kV substation) has been identified in the NSW Network Infrastructure Strategy (EnergyCo, 2023) as requiring upgrades. The Mount Piper to Wallerawang Transmission Line Upgrade Project (the project) would provide the additional capacity required to reliably transmit power from the CWO REZ to the Greater Sydney region.

1.2 Location

The project is located within the Central West region of NSW within the Lithgow City Council Local Government Area (LGA). It is located approximately 14 kilometres (km) north-west of Lithgow situated on the western fringes of the Blue Mountains (Figure 1.1).

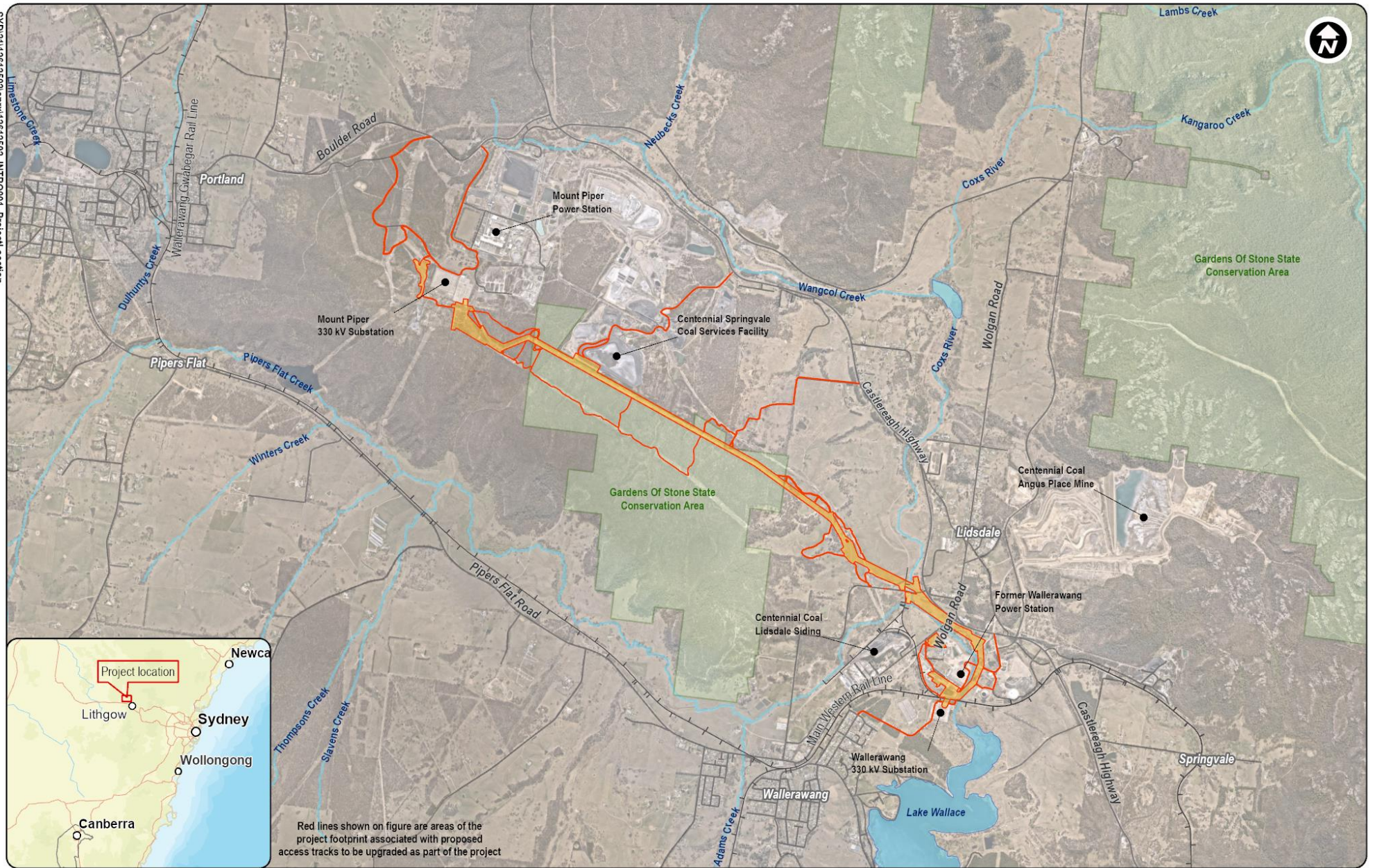
The area that is to be directly affected by the construction and operation of the project, is referred to as the project footprint and is shown in Figure 1.1. The project footprint is approximately 86.5 hectares in size and is generally bounded by the following:

- Castlereagh Highway to the north
- Former Wallerawang Power Station site to the east
- Gardens of Stone State Conservation Area (SCA) to the south
- Mount Piper Power Station to the north-west.

Land uses within and adjacent to the project footprint include:

- electricity generation at Mount Piper Power Station
- electricity transmission, including the Mount Piper and Wallerawang 330 kV substations, and associated transmission lines
- mining activities, with several Centennial Coal operations including the former Ivanhoe Coal Mine and Springvale Coal Services overlapping the project footprint
- agriculture, primarily livestock grazing
- conservation, notably the Gardens of Stone SCA
- state and local road reserves including the Castlereagh Highway, Boulder Road and Brays Lane
- rail corridors including the Main Western Rail Line and a disused railway line near Brays Lane.

A mixture of land uses is proposed at the former Wallerawang Power Station site including predominately commercial land uses in the vicinity of the project. This may include redevelopment of the land for commercial and industrial land use and also the development of a Battery Energy Storage System (BESS).



Red lines shown on figure are areas of the project footprint associated with proposed access tracks to be upgraded as part of the project

- | | | |
|---------------------------|-----------------------------|----------------|
| Project components | Existing environment | Railway |
| Project footprint | Gardens of Stone SCA | Watercourse |
| | Roads | |

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 Metres
 Grid: GDA2020 MGA Zone 56

Figure 1.1 Project location and regional context

1.3 The project

The project would involve construction and operation of approximately 8 km of new 330 kV transmission line between the Mount Piper and Wallerawang 330 kV substations as shown in Figure 1.2. The project would also include the replacement of transmission structures, partial adjustment of existing transmission lines, permanent and temporary access tracks, construction compounds and laydown areas.

Table 1.1 outlines the key features of the project. The description of the project in Table 1.1 is based on the current concept design. Further detail is provided in Chapter 3 of the Environmental Impact Statement (EIS). The project will continue to be refined as part of detailed design.

Table 1.1 The project

Feature	Description
Design	
Transmission line and easement	<p>Approximately 8 km of new 330 kV transmission line between the existing Mount Piper 330 kV and Wallerawang 330 kV substations that would include (from north-west to south-east):</p> <ul style="list-style-type: none"> widening of approximately 0.5 km of existing easements in the vicinity of the Mount Piper 330 kV substation by up to 40 metres (m) to accommodate the new 330 kV transmission line and adjustments to existing 132 kV and 330 kV transmission lines widening of the existing 132 kV easement from 45 m to 60 m for 4.8 km to accommodate double circuit transmission structures for the existing 132 kV transmission line and the new 330 kV transmission line installation of two 132 kV pole structures where the existing 132 kV transmission line is restrung onto the new double circuit transmission structures construction of 1.2 km of new 330 kV transmission line from the existing 132 kV transmission line south-east to the intersection of Main Street and the Castlereagh Highway on a 60 m easement construction of 1.5 km of new 330 kV transmission line on a 40 m easement running parallel to existing 330 kV transmission lines for approximately 1.1 km and then diverging and widening to 60 m for the remaining 0.4 km to the Wallerawang 330 kV substation. <p>The standard easement widths for 132 kV and 330 kV transmission lines are 45 m and 60 m respectively. However, easements may vary in width where multiple transmission lines converge/diverge or where they overlap with an existing easement.</p>
Transmission structures	<p>Transmission structures for the project include approximately 28 new steel lattice towers and four steel and/or concrete pole structures. Transmission structures would range in height from approximately 14 to up to 60 m, however these heights would be subject to detailed design. The image below presents an indicative illustration of the types of structures proposed for the project and their maximum heights.</p> <p>Figure not to scale.</p> <p>The steel transmission structures would generally be spaced between 100 m to 550 m apart and the pole structures about 30 m to 50 m apart.</p> <p>New conductors, earth wires and optical ground wires (OPGW) would be installed on the new transmission structures for the new 330 kV and existing 132 kV lines.</p>

Feature	Description																																																																																																																														
	<p>Local adjustment of existing transmission structures would be required in the vicinity of the Mount Piper 330 kV substation to minimise crossover of transmission lines.</p> <p>Redundant transmission structures, including the gantry immediately north of the Main Western Rail Line, would be removed and recycled, where possible.</p>																																																																																																																														
Construction																																																																																																																															
Program	<p>Construction of the project would commence once all necessary approvals are obtained. It is anticipated that construction would commence in late 2026.</p> <p>Construction would be undertaken in stages over a period of approximately 20 months. The key activities and their indicative durations shown in the below table.</p> <table border="1"> <thead> <tr> <th>Activity</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> <th>7</th> <th>8</th> <th>9</th> <th>10</th> <th>11</th> <th>12</th> <th>13</th> <th>14</th> <th>15</th> <th>16</th> <th>17</th> <th>18</th> <th>19</th> <th>20</th> </tr> </thead> <tbody> <tr> <td>Site establishment</td> <td>█</td> <td>█</td> <td>█</td> <td>█</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Civil works</td> <td></td> <td></td> <td>█</td> <td>█</td> <td>█</td> <td>█</td> <td>█</td> <td>█</td> <td>█</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Assembly of structures</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>█</td> <td>█</td> <td>█</td> <td>█</td> <td>█</td> <td>█</td> <td>█</td> <td>█</td> <td>█</td> <td>█</td> <td>█</td> </tr> <tr> <td>Testing and commissioning</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>De-mobilisation</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>█</td> </tr> </tbody> </table>	Activity	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Site establishment	█	█	█	█																	Civil works			█	█	█	█	█	█	█												Assembly of structures										█	█	█	█	█	█	█	█	█	█	█	Testing and commissioning																					De-mobilisation																				█
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Construction methodology	<p>Construction of the project would include:</p> <ul style="list-style-type: none"> – site establishment including removal of vegetation, construction compound establishment, access track construction and upgrade – removal of existing transmission structures where required – civil works involving earthworks and establishment of construction benches for each transmission structure, and establishment of brake and winch sites – construction of footings and foundation work for the new transmission structures – assembly and erection of new transmission structures – stringing of conductors. 																																																																																																																														
Construction hours	<p>The proposed construction working hours for the project are 7am to 7pm Monday to Sunday.</p> <p>Out-of-hours construction work will likely be required between 7pm to 7am Monday to Sunday and public holidays, to align with scheduled outages.</p> <p>Justification for the out-of-hours works includes:</p> <ul style="list-style-type: none"> – proximity to live transmission lines requiring the work to be completed under a scheduled outage for network and personnel and contractor safety – the need to complete works within a limited time window to meet a timeframe to re-energise the transmission line to avoid disruption to customers – minimising disruptions to the use of the Main Western Rail Line during stringing. 																																																																																																																														
Construction workforce	Expected to peak at about 150 personnel and contractor, with an average workforce of about 60 personnel and contractors.																																																																																																																														
Construction compounds and laydown areas	<p>A total of three construction compounds would support the construction of the project. One would be located at the western-end of the project near the Mount Piper 330 kV substation and two located at the eastern-end of the project within the former Wallerawang Power Station site. The locations of these compounds are shown in Figure 1.2.</p> <p>Laydown of materials (e.g. poles, cable drums, other large equipment, etc.) would also occur at specified locations along the easement within the project footprint, particularly at transmission structure locations.</p>																																																																																																																														
Access	<p>To facilitate efficient construction access, the following is required:</p> <ul style="list-style-type: none"> – upgrading and widening of approximately 25 km of existing access tracks to at least 6 m, with some sections widened up to 10 m due to local topography – construction of approximately 2 km of new 6 m wide access tracks. <p>In addition to those tracks, approximately 4 km of existing track would be used only by light vehicles. The light vehicle tracks may require minor repairs (for example, filling potholes), but would not be graded or widened.</p> <p>The project footprint would be accessed from public roads at 13 access points, with the majority of these being existing property access points.</p>																																																																																																																														

Feature	Description
	<p>Existing access tracks would be used in preference to new tracks wherever possible. Access track upgrades and widening would include required drainage.</p> <p>Access points and access tracks established for the construction of the project that are not required for future operation and maintenance activities would be returned to pre-project conditions, subject to agreement with landowners.</p>
<p>Utility adjustments and infrastructure crossings</p>	<p>The new transmission line would need to cross the following utilities and infrastructure:</p> <ul style="list-style-type: none"> – water pipeline operated by WaterNSW – distribution lines operated by Endeavour Energy – rail signal power supply – council drainage and other assets – public roads at Brays Lane and Main Street – rail lines at the Main Western Rail Line and the disused rail line travelling north of Brays Lane. <p>It is not currently anticipated that the project would require the adjustment of any nearby utilities. Further investigations and consultation with asset owners would be undertaken during detailed design.</p>
<p>Vegetation clearing</p>	<p>The project would require the removal of vegetation for a number of activities including but not limited to building new access tracks and widening existing ones, establishment of construction compounds, laydown areas, and brake and winch sites, construction of the transmission structures, and establishing and maintaining the vegetation clearance requirement for the transmission lines.</p> <p>Vegetation clearing would be undertaken either with the use of machinery or manually, where it is unsafe to operate machinery, or when access is limited. Root balls would be retained where possible. Clearing methods would be determined with consideration to vegetation type or structure, slope and terrain, and environmental and ecological constraints. Removed vegetation, which is weed free, would be mulched for beneficial reuse, where appropriate.</p> <p>Areas cleared for construction, that are not needed for operation of the project, would be rehabilitated to a stable and weed free condition.</p>
<p>Testing and commissioning</p>	<p>Testing and structure checks would form part of the final construction and installation work. These activities would ensure the project has been installed in accordance with the design and statutory standards and is safe to proceed to commissioning which would include, but not be limited to:</p> <ul style="list-style-type: none"> – transmission line cut-in and connection to the electrical network – protection, control and metering checks – high voltage equipment operation and energisation – post commissioning testing and verification.
<p>Demobilisation and rehabilitation</p>	<p>Upon completion of the construction works, all construction equipment, temporary fencing and waste would be removed.</p> <p>All disturbed areas would be rehabilitated to a stable, weed-free condition, unless designated as a permanent access track. This would include spreading topsoil, cleared and stockpiled at the beginning of construction, across the disturbed area to stabilise it to a state where natural regrowth can occur.</p>
<p>Operation</p>	
<p>Design life</p>	<p>About 50 years.</p>
<p>Maintenance</p>	<p>All project infrastructure would require regular maintenance to maintain serviceability and maximise its operational life. Maintenance activities would include:</p> <ul style="list-style-type: none"> – transmission structure monitoring – annual aerial inspection – routine vegetation management on the easement and in the hazard tree zone – access tracks would be maintained in a trafficable condition. <p>Should any irregularities be identified following routine inspections, a work crew would be dispatched from existing Transgrid maintenance depots to rectify any defects found.</p> <p>Periodic inspection and maintenance work would be managed by Transgrid as part of existing operations, with no additional personnel or contractor requirements.</p>



Project components ▭ Project footprint — New and adjusted transmission line ● Proposed transmission structure ○ Existing transmission structure to be reused ▣ Access point		Construction compounds ▭ Access tracks - new — Access tracks - minor upgrades as required (light vehicles only) — Access tracks - upgrade and widen — Access tracks - existing (no change) ▣ Access point		Existing environment ▭ Gardens of Stone SCA — Roads — Railway — Watercourse	
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Figure 1.2 Key features of the project

1.4 Environmental assessment requirements

This aquatic ecology impact assessment has been prepared to address the Secretary’s Environmental Assessment Requirements (SEARs), which were issued on 22 May 2025. Table 1.2 outlines the requirements relevant to this assessment.

Table 1.2 Relevant Secretary’s Environmental Assessment Requirements

Requirements	Where addressed in this report
Biodiversity	
An assessment of the likely direct and indirect impacts on listed aquatic threatened species, populations or ecological communities, scheduled under the <i>Fisheries Management Act 1994</i> , and a description of the measures to minimise and rehabilitate impacts	Section 5 – Impact assessment Section 6 – Mitigation measures

1.5 Purpose and structure of this report

This report has been prepared by GHD Pty Ltd (GHD) as part of the Environmental Impact Statement (EIS) for the project. The assessment has been informed by Technical Report 1 – Water Impact Assessment and Technical Report 2 –Biodiversity Development Assessment Report and should be read in conjunction with these reports.

The purpose of this report is to assess potential impacts to aquatic biota from the construction and operation of the project, and where required, identify feasible and reasonable mitigation and management measures.

This report assesses aquatic biota to meet the requirements of the *Fisheries Management Act 1994* (section 2.2) and the *Biodiversity Conservation Act 2016* (section 2.2.1). Threatened species, communities and populations listed under the BC Act are considered by Technical Report 2 – Biodiversity Development Assessment Report, including frogs.

The report is structured as follows:

- Section 1 – provides an introduction to the project and the assessment
- Section 2 – described the legislative context of the project with regards to aquatic ecology
- Section 3 – describes the assessment methodology
- Section 4 – describes the existing conditions of waterways and key fish habitat
- Section 5 – assesses the impacts of the construction and operation of the project on aquatic biota and key fish habitat
- Section 6 – provides mitigation measures for the impacts identified
- Section 7 – concludes and summarises the assessment.

2. Legislative and policy context

2.1 Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides a regulatory framework to protect and manage matters of national environmental significance (MNES). Under the EPBC Act, an action that has, will have, or is likely to have a significant impact on MNES is deemed to be a 'controlled action' and may not be undertaken without prior approval from the Commonwealth Minister for the Environment and Water.

The EPBC Act identifies MNES as:

- World heritage properties
- National heritage places
- Wetlands of international importance (Ramsar wetlands)
- Threatened species and ecological communities
- Migratory species
- Commonwealth marine areas
- The Great Barrier Reef Marine Park
- Nuclear actions (including uranium mining)
- A water resource, in relation to coal seam gas development and large coal mining development.

The MNES relevant to this report include threatened fish and aquatic invertebrate species. Turtles, frogs, and other semi-aquatic biota listed as threatened under the EPBC Act are considered in the Technical Report 2 – Biodiversity Development Assessment Report. Marine MNES are not relevant to the project and have not been considered in this report.

The project was referred to the Commonwealth Minister for the Environment and Water and determined a controlled action on 2 August 2024.

Threatened fish and aquatic matters protected by the EPBC Act have been addressed in this assessment through:

- desktop review to determine any listed aquatic threatened species (fish and aquatic invertebrates) that are predicted to occur within the locality of the project using the protected matters search tool (see section 3.3)
- likelihood of occurrence assessment for any aquatic MNES identified as potentially occurring (see section 3.3) with consideration of suitable habitat types within the study area.

No EPBC listed threatened aquatic species (fish and aquatic invertebrates) are expected to occur in the study area, as discussed in section 4.4.1.

The closest Ramsar wetlands are 300 km upstream and, therefore, would not be influenced by the project. These wetlands are not discussed further.

Potential impacts to groundwater dependent ecosystems are assessed in Technical Report 1 – Water Impact Assessment.

2.2 Fisheries Management Act 1994

The objectives of the NSW *Fisheries Management Act 1994* (FM Act) are to conserve, develop and share the fishery resources of the State for the benefit of present and future generations. The FM Act is administered by the NSW Department of Primary Industries and regional Development (DPIRD). It lists threatened aquatic species and marine vegetation, including endangered populations, ecological communities and key threatening processes. One of the objectives of the FM Act is to 'conserve key fish habitats', which includes aquatic habitats that are important to the maintenance of fish populations generally and the survival and recovery of threatened aquatic species.

The definition of fish under the FM Act includes finned fish (referred to as fish in this assessment) and aquatic invertebrates at any stage of their life cycle, including oysters and other molluscs, crustaceans, echinoderms and beachworms (but not including whales, seals, turtles, frogs) (DPI, 2013).

Marine vegetation (salt marsh, sea grass, mangroves), which are also legislated under the FM Act, are not relevant to the project and have not been assessed.

Section 220ZZ of the FM Act lists the factors to be considered to determine the significance of impacts of an activity on threatened species, populations, ecological communities of fish and invertebrates and marine vegetation. Threatened species, populations or communities listed under the FM Act are discussed further in section 4.4

2.2.1 Policy and guidelines for fish habitat conservation and management

The *Policy and Guidelines for Fish Habitat Conservation and Management* (DPI, 2013) (the DPI Policy) includes important definitions for key fish habitat and guidance on the assessment of impacts and protection of aquatic environments. The DPI Policy has been developed to facilitate compliance with the FM Act and other legislation relating to fish habitat conservation and management.

The FM Act and assessment requirements as outlined in the DPI Policy have been addressed in this assessment through:

- desktop review to determine the threatened species, populations or ecological communities previously recorded within local waterways, or that are mapped as likely to occur within the study area (see section 4.4)
- waterways classification in accordance with the DPI Policy and identification of sensitive habitats in the project footprint (see section 3.2.3)
- consideration of whether the project would align with key threatening processes for aquatic ecosystems as outlined in the FM Act, *Biodiversity Conservation Act 2016* (BC Act) or EPBC Act (see section 5.4).

Aquatic offsets are not expected to be required for the project given the limited key fish habitat intersecting the project footprint and the minor and temporary nature of instream works.

3. Assessment methodology

3.1 Study area

For the purposes of the assessment, the study area includes waterways that were identified as key fish habitat in DPIRD's key fish habitat mapping (see section 3.2) and the waterways that have the potential to be impacted by the project. The study area includes tributaries in the catchments of Wangcol Creek, Pipers Flat Creek, and sections of the Coxs River, as shown in Figure 3.1.

3.2 Key fish habitat in the study area

One of the main aims of the FM Act is ensuring “no net loss” of key fish habitat. As defined by the *Policy and guidelines for fish habitat conservation and management*, key fish habitat includes third order streams and higher (up to eighth order), while ephemeral waterways (those which flow for only short periods after rainfall) are not considered to be key fish habitat (DPI, 2013).

The key fish habitat in the study area was determined through:

- review of key fish habitat mapping by DPIRD (see Figure 4.4)
- field observations collected during an aquatic habitat survey undertaken in December 2024 (see section 3.2.2)
- waterways classification using the Class and Type framework (see section 3.2.3).

3.2.1 Desktop review of key fish habitat

The key fish habitat layer for the Hawkesbury Nepean catchment in the DPIRD Data Portal (DPIRD, 2025) was reviewed prior to the habitat survey. This was used to identify the areas requiring ground-truthing during the aquatic habitat survey.

3.2.2 Aquatic habitat survey

A survey of aquatic habitat was undertaken on 10 December 2024 in waterways in or adjacent to the project footprint that were identified as key fish habitat in DPIRD's mapping. The survey was conducted by GHD's senior aquatic ecologist and senior geomorphologist. Aquatic habitat, geomorphology and waterway condition were visually assessed to ground-truth the key fish habitat mapping and to inform the impact assessment.

The habitat assessment focused on identifying the features used to classify waterways, as described in section 3.2.3 and the *Policy and guidelines for fish habitat conservation and management* (DPI, 2013).

3.2.3 Waterway classification and key fish habitat sensitivity

Based on the method outlined in the *Policy and guidelines for fish habitat conservation and management* (DPI 2013), the waterway Class and Type of key fish habitat have been assessed. The Class and Type assessment was undertaken with consideration of:

- the frequency of stream flows (perennial, intermittent or ephemeral)
- the stream order identified based on the Strahler stream order classification system (Strahler, 1952) in GIS layers (WaterNSW, 2025) (see Figure 4.1 for waterway stream orders)
- threatened species, populations or ecological communities that are mapped as likely to occur within the study area (see section 3.3)
- outcomes of the aquatic habitat survey, including the observed water levels or watermarks on banks, habitat complexity and the presence or absence of sensitive habitats (see Table 3.2 for details on sensitive habitats).

The criteria for waterway classification are shown in Table 3.1.

As detailed in Table 3.2, minor waterways (first or second order streams) are generally not considered key fish habitat. Therefore, potential impacts to minor waterways have not been considered in detail in this report.

Table 3.1 Classification of waterways for fish passage (adapted from Table 2, DPI, 2013)

Classification	Characteristics or waterway type	Minimum recommended crossing type ¹	Comments
Class 1 Major fish habitat	Major permanently or intermittently flowing waterway (e.g. river, major creek), habitat of a threatened fish species.	Bridge, arch structure or tunnel	Bridges are preferred
Class 2 Moderate fish habitat	Named permanent or intermittent stream, creek or waterway with clearly defined bed and banks with semi-permanent or permanent waters in pools or in connected wetland areas. Marine or freshwater aquatic vegetation is present. Known fish habitat and/or fish observed inhabiting the area.	Bridge, arch structure, culvert ² or ford	Order of preference is bridges, arch structures, box culverts and fords
Class 3 Minimal fish habitat	Named or unnamed waterway with intermittent flow and potential refuge, breeding or feeding areas for some aquatic fauna (e.g. fish, yabbies). Semi-permanent pools form within the waterway or adjacent wetlands after a rain event. Otherwise, any minor waterway that interconnects with wetlands or recognised aquatic habitats.	Culvert ³ or ford	Box culverts are preferred, followed by fords and pipe culverts
Class 4 Unlikely fish habitat	Named or unnamed waterway with intermittent flow following rain events only, little or no defined drainage channel, little or no flow or free-standing water or pools after rain events (e.g. dry gullies or shallow floodplain depressions with no permanent aquatic flora present).	Culvert ⁴ , causeway or ford	Culverts and fords are preferred, followed by causeways

- Notes: 1. In all cases, bridges are preferred to arch structures, followed by arch structures, culverts, fords and lastly causeways.
 2. High priority given to “high flow design” procedures presented for the design of these culverts – refer to design considerations in Witheridge 2002 ‘Fish Passage Requirements of Waterway Crossings – Engineering Guidelines. Institute of Public Works Engineering, Brisbane.
 3. Minimum culvert design using “low flow design” procedures, however, “high” and “medium flow design” should be given priority where affordable (refer Witheridge, 2002).
 4. Fish passage requirements to be confirmed with DPIRD. Fish friendly waterway crossing designs possibly unwarranted.

Table 3.2 Key fish habitat type (sensitivity) (adapted from Table 1, DPI, 2013)

Classification	Characteristics of waterway type
Type 1 – Highly sensitive key fish habitat	Wetlands recognised under international agreements (e.g. Ramsar, JAMBA, CAMBA, ROKAMBA wetlands), wetlands listed in the Directory of Important Wetlands of Australia. Freshwater habitats that contain instream gravel beds, rocks greater than 500 mm in two dimensions, snags greater than 300 mm in diameter or 3 m in length, or native aquatic plants. Any known or expected protected or threatened species habitat or area of declared ‘critical habitat’ under the FM Act. Mound springs.
Type 2 – Moderately sensitive key fish habitat	Freshwater habitats and brackish wetlands, lakes and lagoons other than those defined in Type 1. Weir pools and dams up to full supply level where the weir or dam is across a natural waterway.
Type 3 – Minimally sensitive key fish habitat	Freshwater habitats not included in types 1 or 2 Ephemeral aquatic habitat not supporting native aquatic or wetland vegetation
Not considered key fish habitat	The following are generally not considered to be key fish habitat: <ul style="list-style-type: none"> – first and second order streams on gaining streams (based on the Strahler method of stream ordering) – farm dams on first and second order streams or unmapped gullies – agricultural and urban drains – urban or other artificial ponds (e.g. evaporation basins, aquaculture ponds) – sections of stream that have been concrete-lined or piped (not including a waterway crossing).

3.3 Threatened aquatic species, populations and communities

A desktop assessment was undertaken to identify aquatic threatened flora and fauna species, populations and ecological communities listed under the FM Act and EPBC Act that may be present in the study area and impacted by the project. Databases and other information reviewed included:

- DPIRD’s spatial data portal, showing threatened species distributions listed under the FM Act. Spatial data portal accessed 18 February 2025
- Commonwealth Department of Climate Change, Energy, Environment and Water (DCCEEW Protected Matters Search Tool (PMST), for MNES known or predicted to occur in the locality of the project (Cth DCCEEW, 2025). PMST search conducted on 18 February 2025 (see Appendix A)
- review of observations from the aquatic habitat survey to determine habitat suitability for likelihood of occurrence assessment (e.g. microhabitats present and suitability for threatened species, existing barriers to fish passage, water availability / persistence in smaller waterways).

The outcomes of these searches are discussed in section 4.4.

3.4 Key threatening processes

A key threatening process is defined as an action, activity or proposal that:

- adversely affects threatened species or ecological communities
- could cause species or ecological communities that are not threatened to become threatened.

There are currently 39 key threatening processes listed under the BC Act, eight listed under the FM Act and 22 listed under the EPBC Act. Some key threatening processes are listed under more than one Act. Those potentially relevant to the aquatic ecology assessment are assessed in section 5.4.

3.5 Results of other assessments

The aquatic ecology assessment is informed by the outcomes of other project-specific assessments as described in Table 3.3. These assessments describe key mechanisms of potential impact on aquatic ecology, such as impacts to water quality and waterway stability that have implications for aquatic biota. This report draws on impact assessment information from Technical Report 1 – Water Impact Assessment and Technical Report 2 – Biodiversity Development Assessment Report to assess impacts on aquatic biota.

Table 3.3 Project specific assessments relied upon in the aquatic ecology impact assessment

Project specific assessment	Relevance to aquatic ecology impact assessment
Technical Report 1 – Water Impact Assessment	<p>Technical Report 1 – Water Impact Assessment assessed the following elements and potential impacts for project construction and operation:</p> <ul style="list-style-type: none"> – hydrology and management of overland flows, including flooding – disturbance of riparian zones (particularly vegetation removal for establishing and maintaining vegetation clearance requirements for the transmission lines which would cross waterways, and installation of transmission structures in proximity to waterways) – surface water quality, particularly from sediment transport due to soil disturbance from earthworks, vegetation removal or periodic use of vehicular tracks for maintenance and inspections – instream works and waterway crossings, including vegetation removal, waterway crossings (culvert) where access tracks cross a waterway and adjustment of erosion controls – groundwater interaction from earthworks and piling activities in low lying areas (dewatering discharges, potential drawdown or contamination). <p>Changes to hydrology or flood behaviour can influence aquatic biota by changing water depth or velocity in waterways. This can influence the behaviour of fish, fish passage or the suitability of habitat conditions for certain fish or aquatic invertebrate species.</p>

Project specific assessment	Relevance to aquatic ecology impact assessment
	<p>Water quality is a key component of aquatic ecosystem health. Water quality impairment can impact on aquatic biota through physical processes, or by reducing habitat suitability.</p> <p>The interaction between groundwater and surface water can influence water levels and permanency in waterways, as well as water quality.</p>
<p>Technical Report 2 – Biodiversity Development Assessment Report</p>	<p>The native woody vegetation within the riparian zone is considered to be key fish habitat. Impacts to terrestrial vegetation upstream (through removal) have been considered in the assessment of impacts to aquatic ecology.</p>

3.6 Agency consultation

A meeting was held on 8 January 2025 between DPIRD (Fisheries) and the project team. Various aspects of the project were discussed, including existing condition and classification of waterways, waterway crossing design and general erosion and sediment controls.

Key outcomes of the consultation include:

- fish friendly waterway crossings are not required as there is no key fish habitat in the proposed crossing locations
- no threatened fish species, listed under the FM Act, are recorded to occur within the waterways in the study area (refer to section 4.4.2)
- riparian vegetation near the Coxs River should be preserved where possible, although, it is acknowledged that the riparian zone of this waterway is already disturbed (see section 4).

4. Existing environment

4.1 Topography and hydrology

Topographic and waterway spatial datasets, including the *NSW digital elevation model* (NSW Spatial Services, 2011) and the *NSW hydro line spatial dataset*, were reviewed with respect to the locations of the proposed project elements. The topography, hydrology and project features described in this section are shown on Figure 4.1 and discussed in more detail in Technical Report 1 – Water Impact Assessment. Waterways expected to provide habitat for fish and aquatic invertebrates are discussed in further detail in section 4.3.

Mount Piper 300 kV substation

The eastern portion of the Mount Piper 300 kV substation site (see Figure 4.1), slopes to the north from approximately 960 m Australian Height Datum (AHD) to 950 m AHD, while the western portion slopes to the west from an elevation of 960 m AHD to 950 m AHD. A first order drainage line flows to a small dam, located on the southern side of the Mount Piper 300 kV substation. The downstream extents of this drainage line were decommissioned through filling and construction of the Mount Piper Power Station; however, overland flows are diverted around the western side of the power station site to Wangcol Creek. A third order tributary of Wangcol Creek (named '*Unnamed tributary of Wangcol Creek (c)*' in Figure 3.1, has been diverted around the western side of the Mount Piper 300 kV substation (see photographs in Table 4.1) as part of the clean water diversion for the Mount Piper Power Station (see Figure 4.2).

Wangcol Creek, while outside the project footprint, is downstream of the Mount Piper 300 kV substation and the proposed widened easement and, therefore may be subject to indirect project impacts (e.g. water quality impacts) if there is connectivity to waterways intersected by the project activities. Wangcol Creek transitions from a third to fourth stream order waterway downstream of the project. It has been affected by diversions and instream impacts (such as mining) and is in varying condition, including areas being partly vegetated, fully cleared and degraded.

Transmission line easement and access tracks

Along the project footprint, the site topography is characterised by broken ridgelines, gulleys and spurs. Existing transmission structures are typically located along the highpoints of ridgelines and spurs. The land to the north of the proposed new 330 kV transmission line slopes towards Wangcol Creek and Coxs River. The topography of the transmission line alignment undulates around 950 m AHD.

Between preferred TS26D and TS17D (see Figure 3.1), the existing transmission line easement crosses several first to third stream order unnamed waterways. Government mapping indicates that these waterways flow to the north-east and connect with Wangcol Creek, however, connectivity of these tributaries to Wangcol Creek is thought to have been disrupted or reduced by creek diversions associated with mining and power station infrastructure. The upper portion of one tributary, named Huon Gully, is diverted through the Springvale Coal Services Site to Lamberts Gully. Huon Gully discharges to Wangcol Creek. Third order waterways (i.e. those that may potentially provide key fish habitat) crossed by the transmission line are discussed further in section 4.3.

To the south-east of preferred transmission structure 13D (see Figure 3.1), the project footprint transitions to the drainage flats of Pipers Flat Creek. The topography in this area falls to approximately 876 m AHD at transmission structure 11D. To access transmission structure 11D during construction and operation, a box culvert is proposed to form a new waterway crossing on a first order tributary (an oxbow) of the Coxs River (see Figure 5.1). Based on site observations, this waterway was identified as having limited hydraulic connectivity to the Coxs River due to a Main Western Rail Line embankment. This waterway is not identified as key fish habitat in the DPIRD mapping (see section 4.3).

In the area around transmission structure 12D (see Figure 3.1), the project footprint crosses a third order tributary of Pipers Flat Creek, which flows to the south-east, to meet the main (sixth order) channel of Pipers Flat Creek. Site observations from the December 2024 site visit indicate this waterway does not have features consistent with a third order stream (i.e. key fish habitat), as discussed in section 4.3.

Between preferred TS11D and TS2C, the project footprint follows the Coxs River downstream, falling from 880 m AHD to 875 m AHD over approximately 1.6 km. The Coxs River transitions to a sixth order stream at the confluence of Pipers Flat Creek, approximately 170 m south of preferred transmission structure 11D.

Wallerawang 330 kV substation

The topography at the final preferred transmission structure at the Wallerawang 330 kV substation is approximately 875 m AHD. The site topography at the Wallerawang 330 kV substation slopes downhill to the north from 880 m AHD to 875 m AHD. The western boundary of the Wallerawang 330 kV substation is located approximately 50 m from the banks of the sixth order Coxs River. Immediately downstream of the Wallerawang 330 kV substation, Lake Wallace regulates downstream flows in the Coxs River.

4.2 Geology and soils

The information in this section is provided as background information to support the assessment of existing geomorphology conducted as part of the aquatic habitat assessment. More detailed information on soils and geology is provided in Technical Report 1 – Water Impact Assessment. The soil landscapes in the project footprint are shown in Figure 4.2 and the soil geological units are shown in Figure 4.3.

4.2.1 Geology

The majority of the project footprint is underlain by Permian Illawarra Coal Measures, with remnant Triassic Narrabeen Group sedimentary sequences on higher elevation ridges (MinView NSW seamless geological mapping v 2.4, [MinView | Regional NSW | Mining, Exploration and Geoscience](#), accessed February 2025). The Illawarra Coal Measures are characterised by sedimentary stratigraphic units ranging from mudstone to conglomerate. A thin band of coarse Marangaroo Formation sandstone, underlain by Berry Siltstone have been exposed within the Coxs River valley, in the eastern section of the project footprint. In the west of the project footprint, faulting and subsequent fluvial erosion have exposed claystones and conglomerates of the lower Illawarra Coal Measures and Marangaroo Formation, and underlying Berry Siltstone.

Quaternary alluvium has accumulated on the floor of the Coxs River, within the southeastern section of the project footprint.

4.2.2 Soils

A review of published soil mapping within the vicinity of the project footprint has been undertaken based on soil landscape mapping (NSW DCCEE, 2024) and Australian Soil Classification mapping (eSpade v2.2, NSW Environment and Heritage, 2023).

The project footprint traverses the soil landscapes of Lithgow, Cullen Bullen, Pipers Flat, Wollangambe and areas of disturbed terrain. In the vicinity of the Mount Piper 330 kV substation and the ridgeline of the Gardens of Stone State Conservation Area, Cullen Bullen and Wollangambe soils may be present, comprising yellow earths on crests; moderately deep earthy sands, yellow earths / yellow leached earths and red earths on side slopes.

To the south-east along the flats of Pipers Flat Creek and the Coxs River, the project footprint traverses the soil landscapes of Pipers Flat Creek, Cullen Bullen, Lithgow and areas of disturbed terrain. Pipers Flat soil landscape is comprised of erodible alluvial soils including, leached loams, soloths, and gleyed podzolic soils, which may be high in nutrient content.

In the vicinity of the Coxs River and the Wallerawang 330 kV substation, in areas mapped as the Lithgow and Cullen Bullen soil landscapes, moderately deep to deep, solods or yellow solodic/podzolic soils high in organic matter may be present. these soils are hard setting with high run on potential. The potential for high aluminium toxicity is also noted.

Soils within the project footprint are typically deeply weathered and leached and are susceptible to sheetwash erosion. When disturbed, severe sheet erosion and rilling can occur. Drainage lines can become incised and prone to gully and bank erosion.

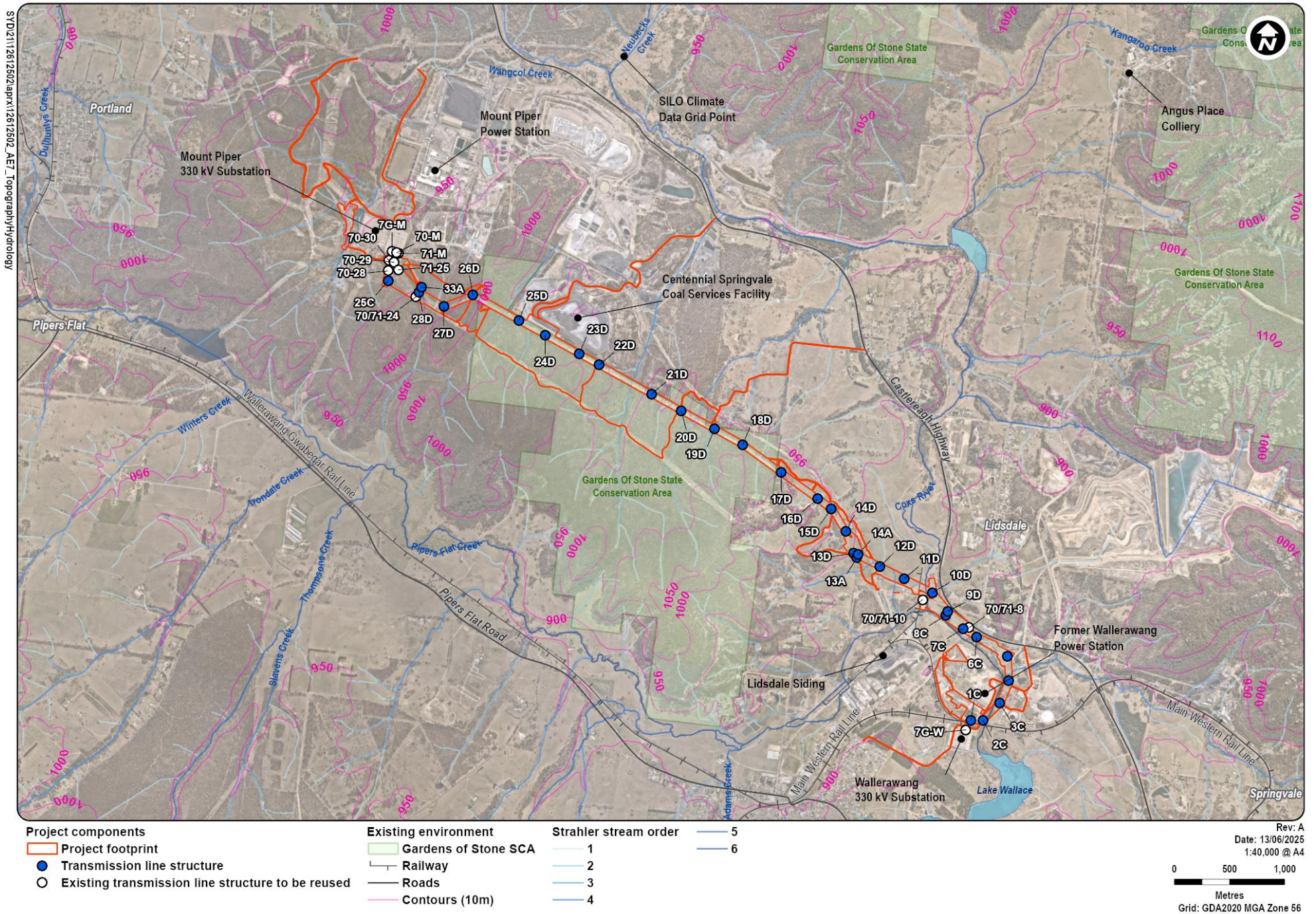


Figure 4.1 Topography and hydrology

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- | | | | |
|---------------------------|-----------------------------|---|-------------------|
| Project components | Existing environment | Soil landscapes of central and eastern NSW | Long Swamp |
| Project footprint | Roads | Cullen Bullen | Medlow Bath |
| | Railway | Disturbed Terrain | |
| | Watercourse | Hassans Walls | |
| | | Lithgow | |

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Figure 4.2 Soils

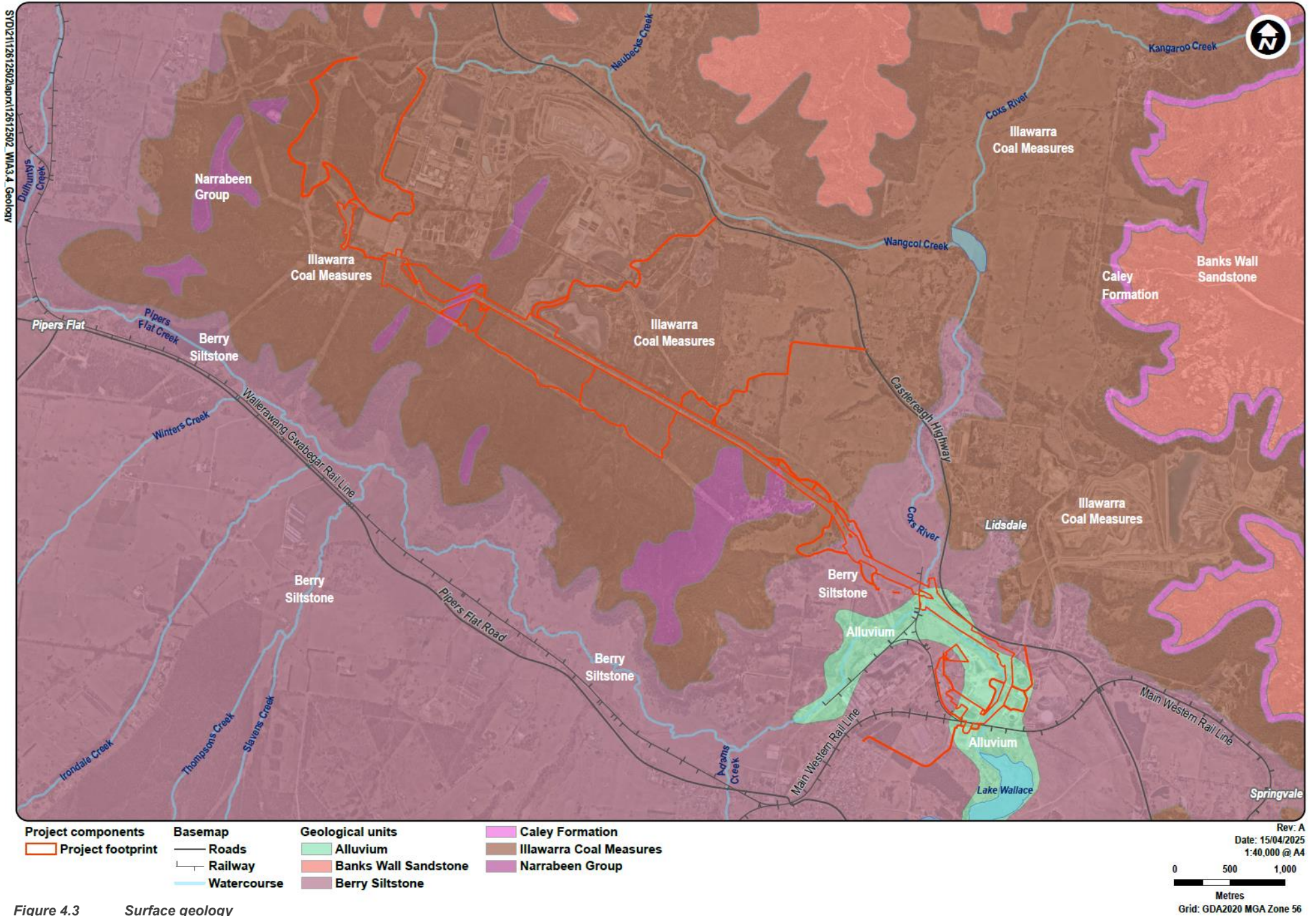


Figure 4.3 Surface geology

4.3 Key fish habitat

Waterways in the study area identified in the DPIRD Spatial Data Portal (DPIRD, 2025) Hawkesbury-Nepean key fish habitat layer, are shown in Figure 4.4. The mapped key fish habitat classification of these waterways has been reviewed and confirmed or amended as part of the habitat assessment and review of aerial imagery. Each waterway has been assigned a classification of waterway class and type. Details are outlined in Table 4.1, Figure 4.4 and Figure 4.5 indicating the:

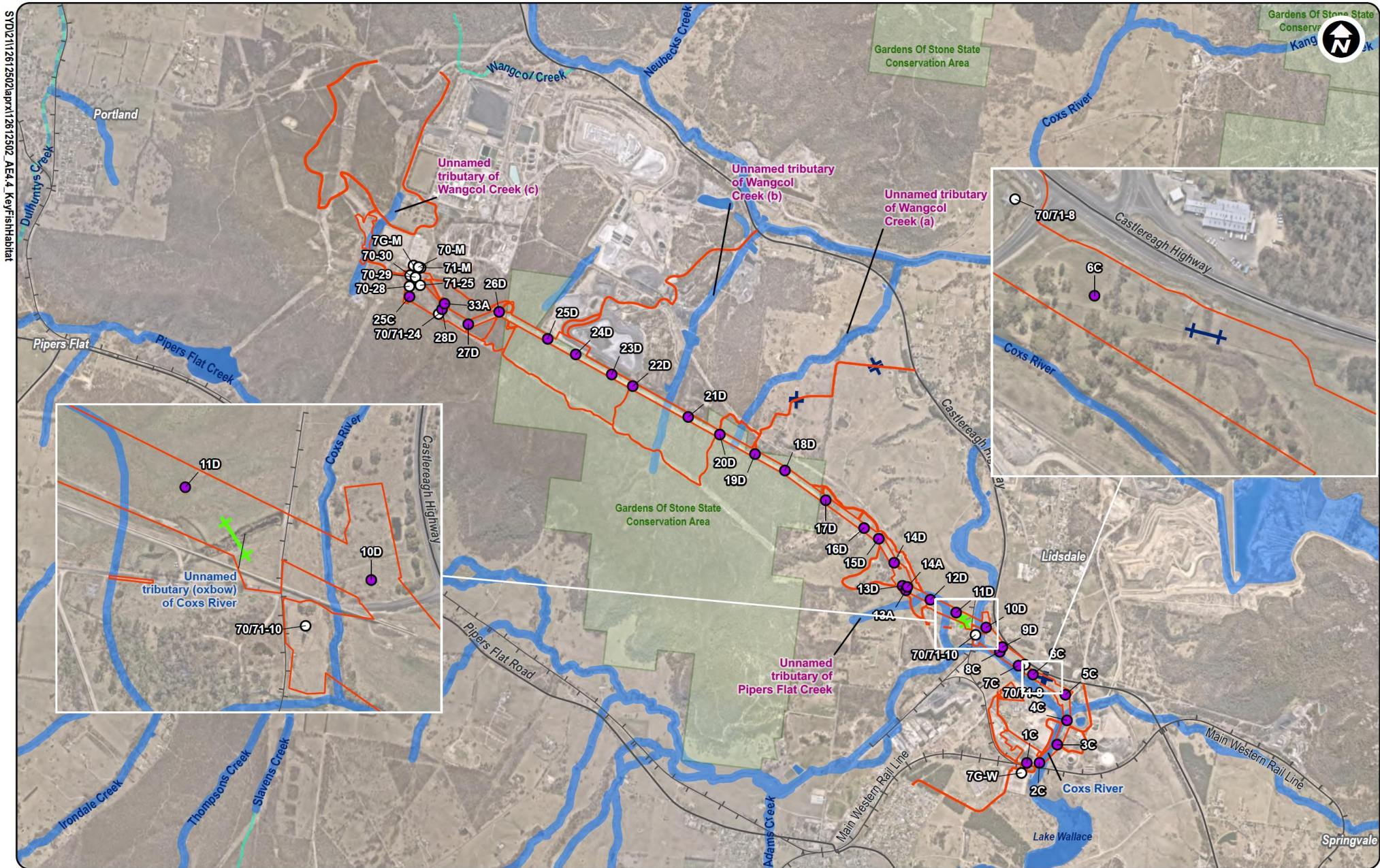
- existing classification in accordance with DPIRD mapping information
- revised classification based on habitat assessment outcomes
- site photos illustrating waterway features.

Some waterways were reclassified as *Class 4 – Unlikely key fish habitat* due to the lack of waterway features or instream habitat. The outcome of the habitat assessment and waterway classification identified the following waterways as providing key fish habitat:

- The Coxs River: *Class 1 – Major fish habitat, Type 2 – Moderately sensitive key fish habitat*
- ‘Unnamed tributary of Wangcol Creek (a)’: *Class 3 – Minimal fish habitat, Type 3 – Minimally sensitive key fish habitat*
- The section of the ‘Unnamed tributary of Wangcol Creek (c)’ downstream of the track and pipe culvert: *Class 3 – Minimal fish habitat, Type 3 – Minimally sensitive key fish habitat.*

These waterways and their revised classifications are shown on Figure 4.5. As detailed in section 3.2.3 and the *Policy and guidelines for fish habitat conservation and management* (DPI, 2013), first and second order streams are not considered to be key fish habitat. Waterway classification has not been undertaken for first and second order streams. The exception to this is the ‘Unnamed tributary (oxbow) of Coxs River’ where a waterway crossing is proposed, as ponded water and aquatic plants were observed during the habitat assessment (see Table 4.1).

Sections of streams that have been concrete-lined or piped are also not considered to be key fish habitat and for this reason, the previously diverted sections of Unnamed tributary of Wangcol Creek (c) (i.e. the sections of the unnamed tributary of Wangcol (c) that are upstream of the existing track and pipe culvert) have been reclassified as *Class 4 – Unlikely key fish habitat*, as described in Table 4.1 and Figure 4.4.



SYD2112612502\prr112612502_AE4.4_KeyFishHabitat

- Project components**
- ▬ Project footprint
 - Transmission line structure
 - Existing transmission line structure to be reused

- Existing environment**
- ▬ Gardens of Stone SCA
 - Railway
 - Roads

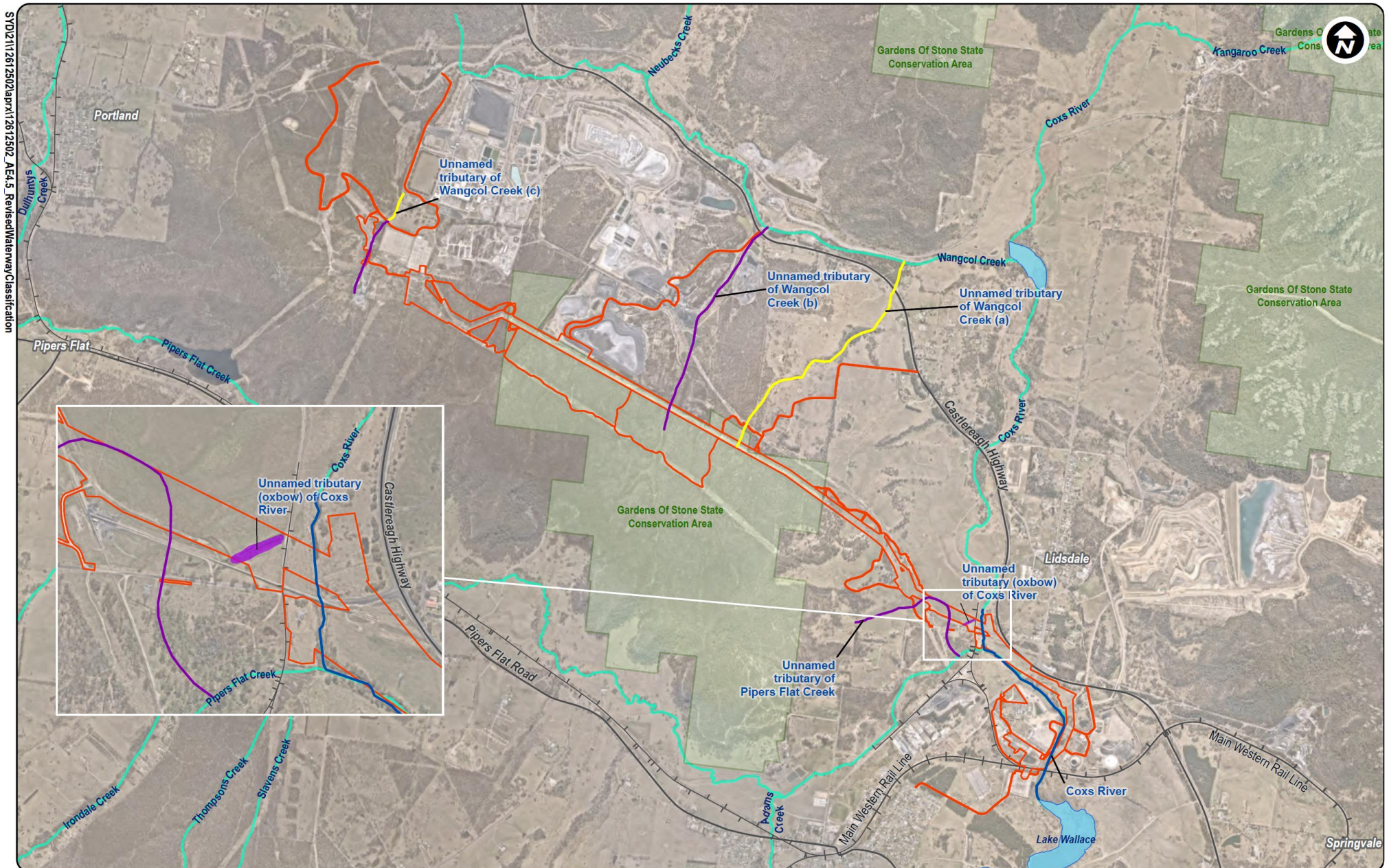
- Watercourse**
- ▬ Key fish habitat mapped in the Hawkesbury Nepean catchment (DPI 2025)
 - + New culvert crossing for access (oxbow)
 - + Upgraded culvert crossing

Figure 4.4 Mapped key fish habitat – desktop classification (DPI, 2025)

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Project components	Existing environment	Watercourse
▬ Project footprint	▬ Gardens of Stone SCA	▬ Class 1: Major fish habitat / Type 2: Moderately sensitive key fish habitat
▬ Railway	▬ Roads	▬ Class 3: Minimal fish habitat / Type 3: minimally sensitive key fish habitat
		▬ Class 4: Unlikely key fish habitat

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Figure 4.5 Revised waterway classifications for waterways in the study area

Table 4.1 Revised waterway classification

Waterway	Desktop (DPIRD) key fish habitat mapping	Ground-truthed waterway classification		Comments
		Waterway Class	Waterway Type	
Unnamed tributary (oxbow) of Coxs River	Not mapped as key fish habitat (see Figure 4.4)	Class 4: Unlikely key fish habitat (see Figure 4.5).	Not applicable (not key fish habitat)	<p>This waterway is <u>not</u> mapped as key fish habitat in DPI (2025) (Figure 4.4). The proposed access track to transmission structure 11D requires traversing across this first order waterway (oxbow) of the Coxs River. This would be achieved by installing a box culvert across the body of water and ground improvements to establish a trafficable and stable surface for light and heavy vehicles. This body of water was formed when the Coxs River was artificially straightened, abandoning the former meander. The water body is now disconnected from Cox River by the Main Western Rail Line.</p> <p>Water within the oxbow was observed as turbid, indicating inputs of fine sediment, either naturally or due to influence from surrounding infrastructure and cleared land. The base of the oxbow is likely to have accumulated thick, soft sediment.</p> <p>Despite some aquatic habitat values, including the presence of ponded water and aquatic plants, connectivity to the Coxs River would be rare due to the railway crossing. Therefore, the observations from the habitat assessment confirm that this waterway is not key fish habitat (see Figure 4.5).</p> <p>Photographs representing the habitat of the Unnamed tributary (oxbow) of Coxs River where the waterway crossing is proposed is shown below.</p>
				
Disconnected oxbow, facing north		Main Western Rail Line restricting connectivity between the oxbow and Coxs River		

Waterway	Desktop (DPIRD) key fish habitat mapping	Ground-truthed waterway classification		Comments
		Waterway Class	Waterway Type	
Unnamed tributary of Pipers Flat Creek	Key fish habitat (see Figure 4.4).	Class 4: Unlikely key fish habitat (see Figure 4.5).	Not applicable (not key fish habitat)	<p>Despite being mapped as a third order waterway and key fish habitat in DPI (2025) (Figure 4.4), no key fish habitat features were observed in the site visit. Based on the visual geomorphology assessment this unnamed tributary is characterised as a swale (i.e. a shallow, broad, and gently sloping channel or depression). The ephemeral swale is fed by an offline dam upstream of the project footprint, and no visible evidence of frequent flow was observed. Due to the lack of a defined channel and lack of ponded water, the waterway was reclassified as Class 4: Unlikely key fish habitat (Figure 4.5).</p> <p>Photographs representing the habitat and waterway condition of Unnamed tributary of Pipers Flat Creek at the existing track crossing near transmission structure 12D are shown below.</p>



Unnamed tributary of Pipers Flat Creek, facing downstream



Unnamed tributary of Pipers Flat Creek, facing upstream

Waterway	Desktop (DPIRD) key fish habitat mapping	Ground-truthed waterway classification		Comments
		Waterway Class	Waterway Type	
'Unnamed Tributary of Wangcol Creek (a)'	Key fish habitat (see Figure 4.4).	Class 3 – Minimal fish habitat (see Figure 4.5).	Type 3 – Minimally sensitive key fish habitat	<p>This is a third order waterway mapped as key fish habitat in DPI (2025) (Figure 4.4).</p> <p>Observations indicate that the waterway in this location is poorly defined upstream of the existing transmission line easement and vehicular track. The track was rutted, with water flowing from the ruts.</p> <p>There is an existing concrete drop control structure on the downstream (north-eastern) side of the track. The downstream margins of this structure are eroding. Downstream of the track, the creek is incised over 2 m with minor bank erosion. This incised channel (approximately 10 m wide from bank to bank) had minor flow fed by the pond at the base of the drop structure, with no observed aquatic vegetation or other sensitive habitat.</p> <p>Based on the waterway features described above and illustrated in the photographs, the waterway has been classified as <i>Class 3 – Minimal fish habitat</i> and <i>Type 3 – Minimally sensitive key fish habitat</i> (see Figure 4.5).</p> <p>Photographs representing the habitat and waterway condition of Unnamed tributary of Wangcol Creek (a) at the existing track crossing between TS19D and TS20D are shown below.</p>




'Unnamed Tributary of Wangcol Creek (a)', upstream of existing transmission line easement



Concrete drop structure downstream of existing transmission line easement, facing north-east (downstream)

Waterway	Desktop (DPIRD) key fish habitat mapping	Ground-truthed waterway classification		Comments
		Waterway Class	Waterway Type	
'Unnamed Tributary of Wangcol Creek (a)' continued				
	'Unnamed tributary of Wangcol Creek (a)', downstream of existing transmission line easement			Concrete drop structure downstream of existing transmission line easement, facing south-west (upstream)


Waterway	Desktop (DPIRD) key fish habitat mapping	Ground-truthed waterway classification		Comments
		Waterway Class	Waterway Type	
'Unnamed tributary of Wangcol Creek (b)'	Key fish habitat (see Figure 4.4).	Class 4: Unlikely key fish habitat (see Figure 4.5).	Not applicable (not key fish habitat)	<p>Although mapped as a third order waterway and key fish habitat in DPI (2025) (Figure 4.4), there was no defined channel at the transmission line easement. Water had ponded upstream of the track, forming a broad, swampy area, with partial track inundation. Water ponded on the track was turbid, with some track erosion visible.</p> <p>Due to the lack of a defined channel and no fish passage, the waterway was classified as Class 4: Unlikely key fish habitat (see Figure 4.5).</p> <p>Aquatic habitat values may improve downstream of the transmission line easement, although, the aerial imagery indicates numerous restrictions to fish passage, including the Western Coal Services haul road and other mine infrastructure (see section 4.1).</p> <p>Photographs representing the habitat and waterway condition of 'Unnamed tributary of Wangcol Creek (b)' at the existing track crossing between preferred TS21D and TS22D are shown below.</p>
				

Waterway	Desktop (DPIRD) key fish habitat mapping	Ground-truthed waterway classification		Comments
		Waterway Class	Waterway Type	
'Unnamed Tributary of Wangcol Creek (c)' – upstream of the existing track and pipe culvert	Key fish habitat (see Figure 4.4)	Class 4: Unlikely key fish habitat (see Figure 4.5).	Not applicable (not key fish habitat)	<p>'Unnamed tributary of Wangcol Creek (c)' is a third order waterway that runs to the west of the Mount Piper 330 kV substation and is mapped in DPI (2025) as key fish habitat (Figure 4.4), however, this mapping does not consider modifications to the waterway. As discussed in section 4.1 (in relation to the Mount Piper 330 kV substation), this unnamed tributary forms part of the clean water diversion for the Mount Piper Power Station.</p> <p>Upstream of the track and pipe culvert (on the north-eastern side of the Mount Piper 330 kV substation), the diversion was observed to be in poor geomorphological condition, with few natural features. Most sections of the diversion channel were concrete lined with sand sheets accumulated in the channel. Other sections showed a lack of defined channel or banks, indicating limited potential for water to pool. Weed ingress was observed to be widespread.</p> <p>The fish passage within the diverted sections upstream of the pipe culvert provided no fish passage due to the channel modification, poor waterway condition and the dam upstream which restricts flow through the channel.</p> <p>As identified in Table 3.1 and the <i>Policy and guidelines for fish habitat conservation and management</i> (DPI, 2013), waterways that have been concrete-lined are not considered to be key fish habitat and for this reason, and the lack of a defined channel or pooled water, the previously diverted sections of 'Unnamed Tributary of Wangcol Creek (c)' upstream of the existing pipe culvert have been reclassified as <i>Class 4: Unlikely key fish habitat</i> (see Figure 4.5).</p> <p>Photographs representing the habitat and waterway condition of 'Unnamed tributary of Wangcol Creek (c)' upstream of the track and pipe culvert are shown below.</p>

Waterway	Desktop (DPIRD) key fish habitat mapping	Ground-truthed waterway classification		Comments
		Waterway Class	Waterway Type	
'Unnamed Tributary of Wangcol Creek (c)' – upstream of the existing track continued				<p>Diverted sections of 'Unnamed tributary of Wangcol Creek (c)', including areas intersected by the existing tracks which are proposed to be modified and widened</p>

Waterway	Desktop (DPIRD) key fish habitat mapping	Ground-truthed waterway classification		Comments
		Waterway Class	Waterway Type	
'Unnamed Tributary of Wangcol Creek (c)' – downstream of the existing track and pipe culvert	Key fish habitat (see Figure 4.4).	Class 3 – Minimal fish habitat (see Figure 4.5).	Type 3 – Minimally sensitive key fish habitat	<p>Downstream of the existing track and pipe culvert waterway crossing (on the north-eastern side of the Mount Piper 330 kV substation), the following aquatic habitat values and site conditions were observed in the 'Unnamed Tributary of Wangcol Creek (c)'.</p> <p>The track is eroding, with a minor headcut upstream of the pipe culvert track crossing indicating some bed scour. There is associated sediment deposition downstream of the crossing.</p> <p>There was no or 'very restricted' fish passage observed during the habitat assessment due to the channel modification, poor waterway condition, existing access tracks and pipe culvert and low water availability. It is estimated that fish passage may improve to 'moderately restricted' in this section of the waterway if the channel was full of water to the top of the bank, however, connectivity to the higher stream order waterway Wangcol Creek is expected to be limited by other infrastructure and diversion related to the Mount Piper power station.</p> <p>The aquatic habitat was observed to be in poor condition, with limited water in December 2024, and given the waterway is diverted appropriately 35 m downstream of the pipe culvert (as part of the Mount Piper power station clean water diversion), this waterway has been classified as <i>Class 3 – Minimal fish habitat and Type 3 – Minimally sensitive key fish habitat</i> (see Figure 4.4).</p> <p>Photographs representing the habitat and waterway condition of Unnamed tributary of Wangcol Creek (c) downstream of the track and pipe culvert are shown below.</p>

Waterway	Desktop (DPIRD) key fish habitat mapping	Ground-truthed waterway classification		Comments
		Waterway Class	Waterway Type	
				
		<p>Aquatic habitat values in Unnamed tributary of Wangcol Creek (c) downstream of the track and pipe culvert (north of the Mount Piper 330 kV substation)</p>		

Waterway	Desktop (DPIRD) key fish habitat mapping	Ground-truthed waterway classification		Comments
		Waterway Class	Waterway Type	
Coxs River	Key fish habitat (see Figure 4.4).	Class 1: Major fish habitat (see Figure 4.5).	Type 2: Moderately sensitive key fish habitat	<p>The Coxs River in the areas where proposed construction activities are within waterfront land (i.e. TS2C, TS4C and TS8C, as outlined in Table 5.1), is a sixth order waterway and is mapped as key fish habitat (Figure 4.4).</p> <p>Observations from site assessments indicate that this waterway provides major <i>Class 1: Major fish habitat key fish habitat</i> due to the permanent water and good fish passage (see Figure 4.5).</p> <p>Although the Coxs River is in reasonable geomorphological condition, the riparian corridor is largely cleared, with only remnant stands of mature vegetation. Minor erosion around meander bends has been observed but is not considered excessive given the minimal riparian vegetation.</p> <p>Highly sensitive habitats were observed, including aquatic vegetation (largely <i>Typha</i> sp.). However, due to the high degree of disturbance, including historical diversion / straightening of the waterway, and substantial riparian vegetation clearing, the waterway has been identified as <i>Type 2: Moderately sensitive key fish habitat</i> (Figure 4.5).</p> <p>Photographs representing the habitat and waterway condition near preferred TS2C, TS4C and TS8C are shown below.</p>
				
		<p>Coxs River near transmission structure 2C</p> <p>Coxs River near transmission structure 4C</p>		

Waterway	Desktop (DPIRD) key fish habitat mapping	Ground-truthed waterway classification		Comments
		Waterway Class	Waterway Type	
Coxs River				
	Coxs River near transmission structure 8C			

4.4 Threatened aquatic species, populations and communities

4.4.1 Threatened aquatic species listed under the EPBC Act

Two EPBC Act listed fish species were identified as having indicative habitat distributions within the study area:

- Macquarie Perch (*Macquaria australasica*), listed as endangered
- Australian Grayling (*Prototroctes maraena*) listed as vulnerable.

Although Macquarie Perch (*Macquaria australasica*) and Australian Grayling (*Prototroctes maraena*) were identified in the PMST as potentially occurring within the study area (Cth DCCEEW, 2025), the DPIRD indicative distribution maps, accessed through the DPIRD Spatial Data Portal (DPIRD, 2025) indicate that these species are not expected to occur in these waterways (see section 4.4.2).

The DPIRD mapping provides finer-scale predictions of occurrence based on historical records or predictive modelling based on waterway features. The dam wall at Lake Wallace, located approximately 2.5 km downstream of the project footprint, is a major fish barrier preventing fish travelling from the mapped distribution of Macquarie Perch (i.e. in the lower Cox River, approximately 70 km downstream of Lake Wallace) into the waterways in the study area.

A 'likelihood of occurrence' assessment for these species is provided in Table 4.2. The outcomes of the assessment are that Macquarie Perch (*Macquaria australasica*) and Australian Grayling (*Prototroctes maraena*) are considered highly unlikely to occur in the study area and, therefore, unlikely to be impacted by the project. These species have therefore not been assessed further in this aquatic ecology assessment. As such, assessments of significance have not been undertaken.

4.4.2 Threatened aquatic species, populations and communities listed under the FM Act

Review of the information in the DPIRD spatial data portal identified that there are no aquatic species, populations or communities listed as threatened under the FM Act mapped to occur within the study area (see section 3.3 for methods used for determining threatening species).

While Macquarie Perch and Australian Grayling are listed as threatened under the FM Act (see Table 4.2), as identified in Table 4.2, the DPIRD mapping of FM Act listed species does not identify these species as potentially occurring in the study area (see Table 4.2 for more detail). As a result, these species have not been assessed further in this aquatic ecology assessment.

Table 4.2 Likelihood of occurrence for threatened aquatic species or populations that may occur within the project footprint or associated waterways

Common name	Scientific name	FM Act Status	EPBC Act status	Indicative distribution in study area	Comments on likelihood of occurrence in Wangcol Creek, Pipers Flat Creek, Coxs River to Lake Wallace, or their tributaries
Macquarie Perch	<i>Macquaria australasica</i>	E	E	PMST: Species or species habitat may occur (Cth DCCEEW, 2025) DPI: No indicative distribution (DPI, 2016a)	Highly unlikely to occur DPIRD mapping doesn't indicate the waterways in the study area as potential habitat for this species (DPI, 2016a). Macquarie Perch are found in high altitude waterways with fast flowing water and boulder / cobble substrates. The DPIRD spatial data portal identifies that the indicative distribution of this species is for eastern flowing waterways in mountainous areas to the east (i.e. the Main Western Rail Line) and Campbells River to the west, near Bathurst. These waterways are not hydrologically connected to the Coxs River upstream of Lake Wallace. Although Macquarie Perch are present in the lower Coxs River, approximately 70 km downstream of Lake Wallace, the dam wall at Lake Wallace is a major fish barrier preventing fish passage in the Coxs River between downstream and upstream sections of the Lake Wallace dam wall. Therefore, this species is highly unlikely to occur.
Australian Grayling	<i>Prototroctes maraena</i>	E	V	PMST: Species or species habitat may occur (Cth DCCEEW, 2025) DPI: No indicative distribution mapped (DPI, 2016b)	Highly unlikely to occur DPIRD mapping doesn't indicate the waterways in the study area as potential habitat for this species (DPI, 2016b). This species is present in eastern draining coastal waterways, to the east and south of the Great Diving Range. Lake Wallace is a major fish barrier preventing fish passage between coastal waterways and the Coxs River. Therefore, this species is highly unlikely to occur.

E – endangered, V – vulnerable.

5. Impact assessment

This section describes the potential impacts to aquatic biota from the construction (section 5.2) and operation of the project (section 5.3), without mitigation. A summary of potential impacts on aquatic biota and key fish habitat is provided in section 5.5. Mitigation measures are outlined in section 6.

5.1 Overview of outcomes from related studies

To enable an impact assessment on aquatic biota and aquatic habitats, an understanding of project impacts on water quality and biodiversity must be understood. This purpose of this section is to provide context and a summary on potential impacts that can then lead to (indirect) impacts on aquatic biota and habitats.

Potential project impacts to waterways providing key fish habitat, as described in Technical Report 1 – Water Impact Assessment and Technical Report 2 – Biodiversity Development Assessment Report, are summarised in Table 5.1. The findings of Technical Report 1 – Water Impact Assessment determined water quality impacts from soil disturbance to be negligible based on the implementation of mitigation measures, including development of an Erosion and Sediment Control Plan (ESCP) in accordance with managing Urban Stormwater: Soils and Construction – Volume 2C, Unsealed Roads (DECC, 2008). Similarly, the water impact assessment concluded that impacts on hydrology are not expected with the implementation of measures included in the *Controlled activities - Guidelines for instream works on waterfront land* (DPE, 2022c).

Based on the above findings, the potential implications for aquatic biota and key fish habitat from these potential waterway impacts are discussed below in sections 5.2, 5.3 and 5.4.

Table 5.1 Summary of potential project impacts to watercourses providing key fish habitat

Waterway and project aspect	Potential project impact to waterways (Technical Reports 1 and 2)	
	Construction	Operation
<p>‘Unnamed tributary of Wangcol Creek (a)’</p> <p>Activities directly impacting on the waterway:</p> <ul style="list-style-type: none"> – Access tracks crossing the waterway may be upgraded and widened – Maintenance of existing access tracks – Vegetation removal for establishing and maintaining vegetation clearance requirements for the transmission lines – Potential installation of new or modification of existing instream erosion control structures <p>Activities indirectly impacting on the waterway:</p> <ul style="list-style-type: none"> – Transmission structure installation upslope (20D) 	<ul style="list-style-type: none"> – Disturbance to bed and banks during vegetation removal or upgrade of access tracks, where they cross the ‘Unnamed tributary of Wangcol Creek (a)’, or amendment of the existing instream erosion control structure (see Table 4.1). – Ground disturbance activities during vegetation removal or upgrade of access tracks, which may result in the transport of soil to the waterway. – Potential water quality impairment (e.g. increased turbidity) and/ or sedimentation if the above activities result in disturbed soils being washed into waterways. – Installation of transmission structure 20D, located upgradient of ‘Unnamed tributary of Wangcol Creek (a)’, which may result in the transport of soil to the waterway. – Removal of riparian vegetation for establishing vegetation clearance requirements for the transmission lines and for the upgrade of the access track, which crosses ‘Unnamed tributary of Wangcol Creek (a)’. – Changes to hydrology due to disturbance of bed or banks, including amendment of the existing erosion control structure, if required. – No direct impacts to the hydrological regime of the waterway are anticipated to occur due to construction compounds and construction benches. 	<ul style="list-style-type: none"> – Reduced riparian vegetation due to ongoing vegetation removal and/ or management of vegetation clearance requirements for the transmission lines or maintenance of the access track, which crosses ‘Unnamed tributary of Wangcol Creek (a)’. – Minor water quality and sedimentation risk due to occasional use of vehicular tracks for maintenance and inspections. – Changes to hydrology due to installation or amendment of instream structures (including the existing erosion control structure), if required or maintenance of access tracks.

Waterway and project aspect	Potential project impact to waterways (Technical Reports 1 and 2)	
	Construction	Operation
<p>‘Unnamed Tributary of Wangcol Creek (c)’</p> <p>Activities directly impacting on the waterway:</p> <ul style="list-style-type: none"> – Access tracks crossing the waterway may be upgraded and widened – Maintenance of existing access tracks <p>Activities indirectly impacting on the waterway:</p> <ul style="list-style-type: none"> – Construction compound C1 adjacent to (within 10 m of) diverted section identified as <i>Class 4 - unlikely key fish habitat</i> 	<ul style="list-style-type: none"> – Disturbance to bed and banks during vegetation removal or upgrade of access tracks, where they cross the ‘Unnamed tributary of Wangcol Creek (c)’. – Ground disturbance activities from vegetation removal for establishing and maintaining vegetation clearance requirements for the transmission lines or from upgrade of existing access tracks, which may result in the transport of soil to the waterway during periods of rainfall. – Potential water quality impairment (e.g. increased turbidity) and/ or sedimentation if the above activities result in disturbed soils being washed into waterways. – No direct impacts to the hydrological regime of the waterway are anticipated due to construction compounds and construction benches. 	<ul style="list-style-type: none"> – Reduced riparian vegetation due to ongoing vegetation removal and/ or management of vegetation clearance requirements for the transmission lines or maintenance of the access tracks, which cross ‘Unnamed tributary of Wangcol Creek (c)’. – Minor water quality and sedimentation risk due to occasional use of vehicular tracks for maintenance and inspections. – Changes to hydrology due to installation or amendment of instream structures (including culverts), if required or maintenance of access tracks.
<p>Coxs River</p> <p>Activities directly impacting on the waterway (potential impact to bank stability):</p> <ul style="list-style-type: none"> – Installation of transmission structures in riparian zone (TS2C, TS4C and TS8C) – Construction benches in the riparian zone (2C, 3C, 4C, 6C, 7C, 8C, 10D) – Riparian vegetation removal for establishing and maintaining vegetation clearance requirements for the transmission lines <p>Activities indirectly impacting on the waterway (potential changes to habitat quality):</p> <ul style="list-style-type: none"> – Riparian vegetation removal and ground disturbance for establishing and maintaining vegetation clearance requirements for the transmission lines, in areas upslope of Coxs River – Access track upgrades adjacent to the waterway – Construction compound C2, nearby to Coxs River (approximately 70 m to the Northern Wallerawang compound) 	<ul style="list-style-type: none"> – Ground disturbance in riparian zone during installation of transmission structures (TS2C, TS4C and TS8C) and construction benches (2C, 3C, 4C, 6C, 7C, 8C, 10D). – Removal of riparian vegetation for clearance for TS2C, TS4C and TS8C. – Potential water quality impairment (e.g. increased turbidity) and/ or sedimentation if the above activities result in disturbed soils being washed into waterways. – Direct instream construction work within the Coxs River would not be required. – Diversion of Coxs River would not be required. – No direct impacts to the hydrological regime of the waterway are due to construction compounds and construction benches. 	<ul style="list-style-type: none"> – Reduced riparian vegetation due to ongoing vegetation removal and/ or management of vegetation clearance requirements for the transmission lines. – Minor water quality and sedimentation risk due to occasional use of vehicular tracks for maintenance and inspections. – Ongoing impacts to the hydrological flow regime are not expected.

5.2 Construction

5.2.1 Direct disturbance of key fish habitat or aquatic biota

Transmission line easement and access tracks

Establishing the extent of vegetation clearing for the transmission lines and upgrade of access tracks by up to 6 m is likely to cause direct disturbance to (refer to Figure 4.5):

- ‘Unnamed Tributary of Wangcol Creek (a)’, classified as *Class 3 – Minimal fish habitat / Type 3 – Minimally sensitive key fish habitat*.
- ‘Unnamed Tributary of Wangcol Creek (c)’, classified as *Class 3 – Minimal fish habitat* and *Type 3 – Minimally sensitive key fish habitat*.

No instream works are proposed to be undertaken in the Coxs River. Therefore, direct disturbance of key fish habitat and aquatic biota in the Coxs River, which provides *Class 1 – Major key fish habitat*, and *Type 2 – Moderately sensitive key fish habitat*, is not expected.

For the two unnamed tributaries on Wangcol Creek, construction activities may cause disturbance of the creek bed substrate, removal of instream habitat such as aquatic plants, leaf litter, or alteration of the bank shape; all of which may remove or alter key fish habitat. Potential impact on aquatic plants is relevant to ‘Unnamed Tributary of Wangcol Creek (c)’ only, as the creek was observed to support a very low coverage of aquatic plants. Most sections of ‘Unnamed Tributary of Wangcol Creek (c)’ are unsuitable for fish, due to the modified nature or lack of water or a defined channel.

There is an existing concrete erosion control structure in place instream on ‘Unnamed Tributary of Wangcol Creek (a)’ (see photographs in Table 4.1). This structure may need to be modified or extended to accommodate the widening of the easement and track, which would further alter the substrate and change the nature of the habitat for fish and aquatic invertebrates in the immediate area.

The width (bank to bank) of each of the two unnamed tributaries of Wangcol Creek is approximately 10 m. Based on the project footprint, there is the potential for disturbance, alteration or removal of up to 60 m² of minimally sensitive key fish habitat. Due to the limited habitat value and low water availability, there is limited potential for direct harm (i.e. mortality or injury) to aquatic biota. The loss of a small area of low value habitat is expected to have a negligible influence on aquatic biota, particularly given the low water levels.

There was no large woody debris observed during the aquatic habitat assessment in the unnamed tributaries of Wangcol Creek crossed by the transmission line easement (i.e. ‘Unnamed tributary of Wangcol Creek (a)’) or the tributary near the Mount Piper 330 kV substation (i.e. ‘Unnamed tributary of Wangcol Creek (c)’) where the tracks may need to be modified. However, new large woody debris can be created over time by tree limbs falling off, trees falling over, or by branches or logs being transported downstream during periods of flow.

Based on the low water levels observed in the two unnamed tributaries of Wangcol Creek, dewatering of these creeks is not expected to be required.

5.2.2 New and upgraded culvert crossings

Four culvert crossings, two new and two existing, are proposed to facilitate construction of the project, as shown on Figure 5.1. These culvert crossings are located in first and second order tributaries that do not provide key fish habitat and impacts to key fish habitat and fish passage are not expected from these instream structures. The potential impacts from these structures to aquatic biota are discussed below.

The new and upgraded culvert crossings include:

- a new box culvert in a marshy area approximately 100 m from the Coxs River, to allow access to TS5C and TS6C
- a new box culvert waterway crossing on the artificially disconnected oxbow of the Coxs River, to allow access to TS10D and TS11D
- the replacement of two existing box culverts (like-for-like replacement) along the private unsealed access track extending from Karawatha Drive within first and second order tributaries of Wangcol Creek to facilitate use for heavy vehicles required to use this access track.

The assessment for each culvert is provided below.

A new box culvert crossing is proposed to facilitate access to TS5C and TS6C. This culvert would be located in a saturated low-lying marshy area located between the Coxs River and the Castlereagh Highway. This area is not mapped as a waterway on the NSW Hydrography hydroline spatial dataset (Spatial Services (DCS), 2025) or as key fish habitat in DPIRD mapping (see Figure 4.4). The aerial imagery supports the mapping as there is no water ponding, although, marshland vegetation is indicated. Therefore, direct disturbance of aquatic biota and key fish habitat are not expected due to the proposed box culvert.

The disconnected oxbow of the Coxs River is a small waterbody formed on a first order tributary of the Coxs River, which is not key fish habitat (see Figure 4.4 and Figure 4.5). This waterbody has limited connectivity to the Coxs River and no fish passage due to the existing Main Western Rail Line. As such, potential impacts to fish passage from the proposed culvert installation are not expected. Despite limited connectivity to the Coxs River, the waterbody has the potential to contain aquatic biota. Construction of the new waterway crossing in this location may involve dewatering to create a dry work area to enable construction. Dewatering activities have the potential for direct impacts to individual fish, including stress, injury or death, through entrainment (i.e. extraction into the pipe). Recommended mitigation measures for reducing potential direct impacts to aquatic biota from proposed dewatering activities are identified in section 6.

The proposed culvert replacements along the private unsealed access track extending from Karawatha Drive are located within first and second order tributaries of Wangcol Creek that do not provide key fish habitat (see Figure 4.5). Therefore, impacts to aquatic biota or key fish habitat from the replacement of these culverts are not expected (see Figure 5.1).

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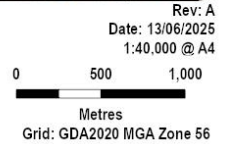
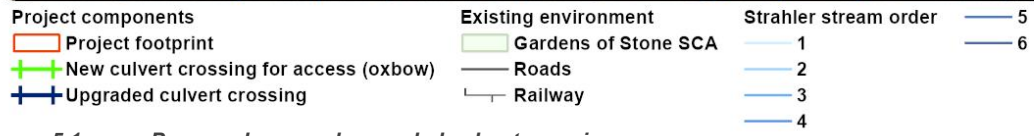
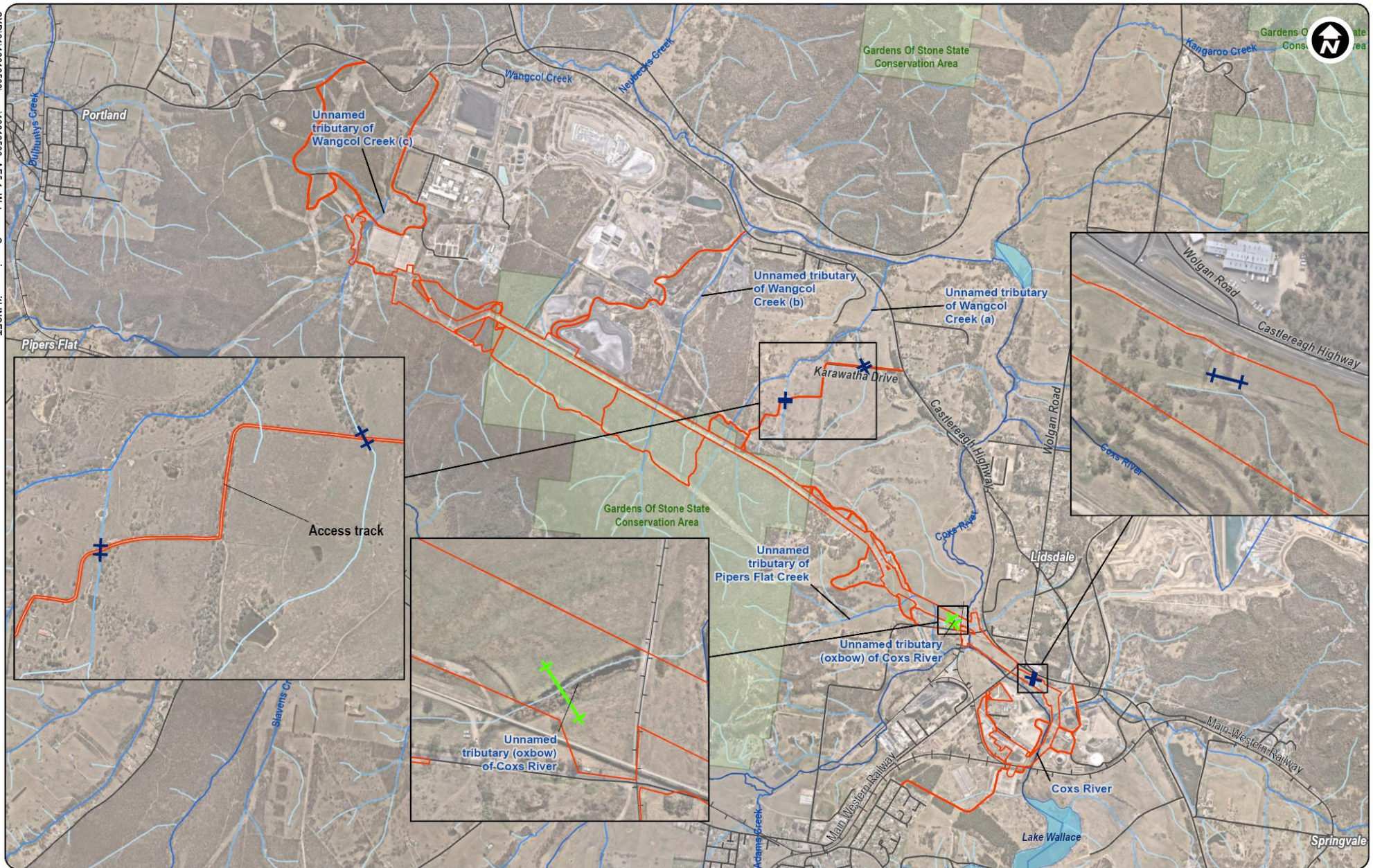


Figure 5.1 Proposed new and upgraded culvert crossings

5.2.3 Removal of riparian vegetation

Construction activities will result in ground disturbance across the full project footprint of about 86.9 hectares. Some construction activities would be required in the riparian zone of waterways (refer to Table 5.1 of Technical Report 1 – Water Impact Assessment), which provide key fish habitat. For example, this includes transmission structure construction, construction benches and construction vehicle access.

Riparian vegetation is important for aquatic species as it provides shade and regulates water temperature and through these mechanisms, controls algal growth. Riparian vegetation is a source of woody debris and detritus (dropped branches, leaves and sticks and fallen trees). These are important structural habitats for fish and aquatic invertebrates. Overhanging tree roots along waterway banks can stabilise the banks (reducing the potential for erosion and sedimentation) and provide refuge to fish and aquatic invertebrates from predators and rapid flows. For these reasons, the removal of riparian vegetation has been identified as a key threatening process under the FM Act, as discussed in Table 5.2.

For the majority of transmission structure locations, construction activities would be located outside of the riparian zone. TS2C, TS4C and TS8C are proposed to be located within the riparian zone of the Coxs River. Additionally, construction benches for TS2C, TS3C, TS4C, TS6C, TS7C, TS8C and TS10D are located within the riparian zone of the Coxs River (see Figure 3.1 for transmission structure locations). The removal of riparian vegetation along the Coxs River may have a minor, localised impact on aquatic biota through reduced shading and habitat material, and the potential of minor, localised changes in bank stability. Where possible riparian vegetation would be retained where it does not encroach on the vegetation clearing area of the project infrastructure.

The two proposed compounds located within the former Wallerawang Power Station site are located in close proximity to the Coxs River which runs through the site and are shown on Figure 3.1. Construction compound 2 located near the existing site entrance off Main Street, is approximately 70 m from the Coxs River, while construction compound 3 located in the centre of the site is approximately 200 m from the Coxs River. Both compounds occur in areas that have been previously disturbed and are already cleared of native vegetation. Therefore, impacts to riparian vegetation in the Coxs River riparian zone are not expected from the two compounds located on the former Wallerawang Power Station site.

Riparian vegetation would be removed for establishing the extent of vegetation clearing for the transmission lines and to upgrade access tracks up to 6 m wide across 'Unnamed tributary of Wangcol Creek (a)' and 'Unnamed tributary of Wangcol Creek (c)'. The two unnamed waterways have been classified as Type 3 - minimally sensitive key fish habitat. The alignment of the transmission line route and proposed access tracks where it crosses the two unnamed waterways is near the headwaters with limited water availability (see photographs in Table 4.1). These sections of the waterways are not likely to support aquatic fauna. The reduction of riparian vegetation in these areas would therefore have a likely negligible impact to aquatic biota.

The Mount Piper construction compound is located within 10 m of the 'Unnamed tributary of Wangcol Creek (c)', however, as identified in Table 4.1 and Figure 4.5, this section of the waterway has been diverted and concrete lined and the riparian vegetation has already been substantially modified. Therefore, the removal of riparian vegetation associated with the construction of the Mount Piper construction compound is not expected to impact aquatic biota or key fish habitat.

Where riparian vegetation removal cannot be avoided, root balls would be retained where possible, in accordance with proposed measures outlined in section 6, particularly in proximity to Coxs River. This will minimise the potential impact to bank stability of the Coxs River and other waterways.

Technical Report 1 – Water Impact Assessment provides more detail on these construction activities in proximity to minor waterways (i.e. those not providing key fish habitat). Technical Report 2 – Biodiversity Development Assessment Report provides more detail on the proposed vegetation removal. Mitigation and management measures for reducing potential impacts on riparian vegetation, aquatic biota and key fish habitat are outlined in section 6.

5.2.4 Potential spread of invasive fish species

Invasive fish, when introduced to waterways outside of their natural range, have the potential to impact on native fish through competition for resources, predation (including eggs), aggressive behaviour or degradation of habitat.

As identified in section 5.2.1, dewatering may be required in the disconnected oxbow of Coxs River, to allow for construction of the culvert crossing (see Figure 5.1). If invasive fish are present in this waterbody and the extracted water is allowed to enter the Coxs River, or its tributaries, there is the potential for invasive fish or aquatic invertebrates (e.g. crayfish) to be transported to the Coxs River. While this is considered unlikely, mitigation measures have been outlined in section 6 to minimise the potential for invasive species to be transported to the Coxs River. This is further discussed in section 5.4 as '*The introduction of fish to freshwaters in a river catchment outside their natural range*' is identified as a key threatening process under the FM Act.

5.2.5 Water quality and sedimentation

Vegetation removal, access track upgrades and construction of transmission structures will involve machinery and vehicles directly disturbing soils. Without suitable mitigation and management measures, soil disturbance in the riparian zones, banks and instream of waterways can result in a temporary minor risk of sediment transport, impacting on water quality and causing sedimentation.

Where sediment is transported to waterways, increased suspended sediment (turbidity) loads can typically result in a range of potential impacts. This could include:

- inhibiting biological functions (e.g. clog gills)
- reducing visibility for foraging of fish and invertebrates
- reducing primary productivity such as algal growth, which is a food source for many aquatic species
- sedimentation, as the sediment settles out of water and accumulates on the bed of a waterway.

Sedimentation can impact aquatic fauna by altering aquatic habitat, including:

- accumulation of sediment on the substrate, altering the substrate texture
- infilling the channel and reducing water depth, which may also reduce habitat connectivity and fish passage.

The Coxs River provides valuable habitat for fish and aquatic invertebrates. The proposed location of TS2C, TS4C and TS8C and the construction benches for TS2C, TS3C, TS4C, 6C, 7C, 8C and 10D (see Figure 3.1) are proposed to be located in the riparian zone of the Coxs River. Due to their proximity (i.e. within 40 m of the bank) to the Coxs River, soil disturbance during construction may result in sediment transport to the Coxs River, which may result in water quality impacts and sedimentation. Management measures outlined in section 6 would be implemented to minimise the impact on downstream water quality from these activities.

Transmission structure 20D is located upgradient of 'Unnamed tributary of Wangcol Creek (a)' and, therefore without mitigation, disturbed soils may potentially be transported downhill to this waterway during rainfall events. The water quality impacts from ground disturbance during construction are expected to be minor and localised (refer to the Technical Report 1 – Water Impact Assessment), therefore, resulting in negligible impacts to aquatic biota.

While no transmission structures are located within the riparian zone of '*Unnamed tributary of Wangcol Creeks (a) and (c)*', the disturbance of the bed and bank of these waterways (see sections 5.2.1) and additional vegetation clearing (see section 5.2.3) required for widening of the transmission line easement and upgrading of the access tracks has the potential to impact water quality. However, given the low water levels and the poor-quality fish habitat in '*Unnamed tributary of Wangcol Creeks (a) and (c)*', temporary and minor impacts to water quality from instream works would result in a negligible impact on aquatic biota.

Once construction is complete, all areas will be stabilised to prevent erosion and sedimentation.

Overall, there is potential for minor and localised impacts to water quality in waterways providing key fish habitat. Negligible impacts to aquatic biota are expected to occur from these water quality impacts. Measures to mitigate impacts on aquatic biota and key fish habitat are provided in section 6. Further measures to mitigate water quality impacts are outlined in Technical Report 1 – Water Impact Assessment.

5.2.6 Hydrology and fish passage

The hydrological regime and streamflow to the 'Unnamed tributaries of Wangcol Creek (a) and (c)' and the Coxs River would not change as a result of the project. Overland flows intercepted by construction work areas, such as construction compound sites, access tracks and construction benches would be directed around and along the edge of the work area and returned to the waterway. This is further described in Technical Report 1 – Water Impact Assessment.

As identified in section 4.3, fish passage is already highly constrained in the '*Unnamed tributary of Wangcol Creek (a)*' and '*Unnamed tributary of Wangcol Creek (c)*'. These constraints include low water levels, insufficient water to support fish, physical constraints of existing pipe culverts and creek diversions upstream and downstream. Fish passage is not expected to change as hydrology and streamflow of waterways would not be impacted by construction activities. Any instream works and any potential instream barriers installed in these waterways during construction would not impact on fish passage, as it is already highly constrained. Therefore, negligible impacts on fish passage are expected.

In conditions of flood and inundation of the Coxs River floodplain, there is the potential for construction areas on the floodplain (including equipment and plant) to obstruct the passage of floodwater and overland flow. This may influence fish passage if there is a change in velocity, water depth and/or the wetted width of the channel. If construction is affected by floods, these temporary, localised changes to conditions would be expected to have only minor impacts on aquatic biota. However, to minimise the potential for changes to flood behavior around the Coxs River, the layout of construction areas would be prepared with consideration of overland flow paths, avoiding any known flood liable land where practicable and minimising the construction period required in flood vulnerable areas. Further details on mitigation measures relating to flood behaviour and hydrology are outlined in Technical Report 1 – Water Impact Assessment.

5.3 Operation

5.3.1 Waterway condition

At TS2C, TS4C and TS8C, which are proposed to be located in the riparian zone of the Coxs River, a 20 m radius surrounding each transmission structure footing would be maintained free of shrub and tree regrowth. Any other vegetation with the potential to not encroach on the vegetation clearing area for the project infrastructure in the riparian zone of the Coxs River would be considered for retention. As discussed in section 5.2.3, tree trunk bases and root balls of riparian trees and vegetation would be retained where possible, to minimise the potential for bank instability of the Coxs River during project operation. As there is expected to be a negligible impact to waterway stability from this ongoing management of riparian vegetation, impacts to aquatic biota would also be negligible.

No disturbance of instream habitat is expected in waterways providing key fish habitat during project operation, other than for maintaining the condition of access tracks where they cross '*Unnamed tributary of Wangcol Creek (a)*' and '*Unnamed tributary of Wangcol Creek (c)*'. As discussed in section 4.3, these waterways have limited water and have been determined to be *Type 3 - minimally sensitive key fish habitat*. Given this, impacts to waterway condition or aquatic biota from works required to maintain the access tracks during project operation are expected to be negligible.

5.3.2 Water quality and sedimentation

During project operation, the proposed culvert crossings of minor waterways, as shown in Figure 5.1, and the access tracks crossing the unnamed tributaries of Wangcol Creek, would likely be trafficked infrequently during maintenance works. Technical Report 1 – Water Impact Assessment has identified that the overall impact on water quality due to ongoing use of access tracks is considered to be negligible. Maintenance of access tracks and culvert crossings would be undertaken as necessary to prevent rutting and erosion of materials into adjacent waterway. Inspections of the transmission structures and any associated infrastructure would be undertaken in accordance with Transgrid's existing processes and procedures.

Riparian vegetation removal has the potential to impact water quality through the disturbance of soils and subsequently, transport of this disturbed material to the Coxs River during rainfall events. As detailed in section 5.3.1, riparian vegetation management during project operation would be restricted to maintaining a 20 m radius free from shrubs surrounding TS2C, TS4C and TS8C, and to maintain clearance in the transmission line easement and access tracks. Soil disturbance associated with this small area of riparian vegetation removal is expected to result in negligible water quality impacts in the Coxs River, or *Unnamed tributary of Wangcol Creek (a)* and *Unnamed tributary of Wangcol Creek (c)* during project operation.

No disturbance of instream habitat is expected on the Coxs River during project operation. The extensive stands of aquatic vegetation (*Typha* sp.) present in the Coxs River, are outside the extent of vegetation clearing for the project's infrastructure and would be retained. These densely growing aquatic plants, would likely trap entrained sediment, reducing the potential water quality and sedimentation influences on downstream environments. Therefore, water quality and sedimentation impact on the Coxs River, and associated aquatic biota, downstream of the project footprint are expected to be negligible during project operation.

5.3.3 Hydrology and fish passage

The operation of the project would not involve any ongoing works that would divert, intercept or impact flows in waterways directly or indirectly. There are unlikely to be any changes to flood behaviour during the operation phase of the project.

Maintenance of vegetation in the transmission line easement and maintenance of the access tracks would be undertaken periodically. These maintenance activities would be minor and infrequent. Such activities would not result in hydrological impacts to waterways or impacts to fish passage. As the proposed culvert crossings (Figure 5.1) are in waterways that don't provide key fish habitat, there are not expected to be any impacts to fish passage from these crossings during project operation.

5.4 Key threatening processes

The potential construction and operational impacts of the project relating to key threatening processes identified under the FM Act are outlined in Table 5.2.

Table 5.2 Assessment of the project against key threatening processes (construction and operation) identified in the FM Act

Key threatening process	Assessment
Instream structures and other mechanisms that alter natural flow	<p>Minor or negligible impacts to natural flow regimes are expected from the project (see Technical Report 1 – Water Impact Assessment). The only instream structures required will be culverts. These would be installed on minor waterways that do not provide key fish habitat. There is potential for minor expansion of erosion and sediment controls in waterways in the headwaters of waterways along the transmission line easement. Based on these minor impacts to natural flow regimes, impacts to aquatic biota are not expected to occur due to changes to flows (see sections 5.2.6 and 5.3.3 for further detail).</p> <p>Should construction occur in periods of flooding and riverine inundation around the Coxs River, the construction area, plant and equipment may obstruct the passage of floodwater and overland flow. This may exacerbate local flood conditions in proximity to Coxs River and may impeded fish passage in the floodplain. These temporary, localised changes to flood conditions (should they occur), would be expected to have only minor impacts to fish passage (see sections 5.2.6 and 5.3.3 for further detail).</p> <p>Mitigation measures are recommended as outlined in section 6 of Technical Report 1 – Water Impact Assessment.</p>
The degradation of native riparian vegetation along NSW water courses	<p>Riparian vegetation would be removed and managed within the easement in proximity to the Coxs River, to provide clearance for TS2C, TS4C and TS8C and construction benches for TS2C, TS3C, TS4C, TS6C, TS7C, TS8C and TS10D. Despite the extensive historical clearing of native riparian vegetation on the Coxs River, the banks appear generally stable. With the implementation of recommended mitigation measures (see section 6) it is unlikely that vegetation removal would substantially impact the resident aquatic biota in the Coxs River. This includes measures such as, where reasonable and feasible, the trunk base and root ball would left in place, as an alternative to full vegetation removal.</p>

Key threatening process	Assessment
	<p>Riparian vegetation would be removed for establishing and maintaining the extent of vegetation clearing for the transmission lines and to upgrade access tracks up to 6 m wide across 'Unnamed tributary of Wangcol Creek (a)' and 'Unnamed tributary of Wangcol Creek (c)'. The two unnamed waterways have been classified as Type 3 – minimally sensitive key fish habitat.</p> <p>The location of the transmission line easement and proposed access tracks where it crosses the two unnamed waterways is near the headwaters with limited water availability (see photographs in Table 4.1). These sections of the waterways are not likely to support fish. The reduction of riparian vegetation in these areas would therefore have a likely negligible impact to aquatic biota.</p> <p>More detail on riparian vegetation removal is provided in Technical Report 2 – Biodiversity Development Assessment Report.</p>
The removal of large woody debris from NSW rivers and streams	<p>There was no large woody debris observed during the aquatic habitat assessment in the unnamed tributaries of Wangcol Creek crossed by the transmission line easement (i.e. 'Unnamed tributary of Wangcol Creek (a)') or the tributary near the Mount Piper 330 kV substation (i.e. 'Unnamed tributary of Wangcol Creek (c)') where the tracks may need to be modified. However, new large woody debris can be created over time by tree limbs falling off, trees falling over, or by branches or logs being transported downstream during periods of flow.</p>
The introduction of fish to freshwaters in a river catchment outside their natural range	<p>There is limited potential for the introduction of fish to freshwaters in a river catchment outside their natural range, during project construction and operation.</p> <p>As discussed in section 5.2.1, if dewatering of the oxbow of the Coxs River is required for construction of the proposed culvert crossing, this would be managed in consultation with DPIRD (Fisheries). This consultation with DPIRD (Fisheries) would include measures to prevent any invasive fish that may be present in the oxbow from being discharged to a natural waterway, as required under the FM Act and <i>Biosecurity Act 2015</i>.</p>

5.5 Impact summary

The habitat assessment identified there are three waterways providing key fish habitat (see Figure 4.5) that are intersected by the project footprint. A summary of potential impacts to aquatic biota and key fish habitat in these waterways is provided in Table 5.3. No impacts are expected to threatened aquatic biota as there are no threatened fish or aquatic invertebrate species, populations or communities expected to occur in the waterways in and adjacent to the project footprint.

Additional discussion on potential impacts to minor waterways is provided in Technical Report 1 – Water Impact Assessment.

Table 5.3 Summary of potential project impacts to aquatic biota and key fish habitat

Waterway	Potential project impact to aquatic biota and key fish habitat	
	Construction	Operation
<p>'Unnamed tributary of Wangcol Creek (a)'</p> <p>Class 3 – Minimal fish habitat Type 3 – Minimally sensitive key fish habitat.</p> <p>Activities directly impacting on the waterway:</p> <ul style="list-style-type: none"> – Access tracks crossing the waterway may be upgraded and widened – Maintenance of existing access tracks – Vegetation removal for establishing and maintaining vegetation clearance requirements for the transmission lines 	<p>Given the existing key fish habitat in 'Unnamed tributary of Wangcol Creek (a)' is <i>Class 3 – Minimal fish habitat / Type 3 – Minimally sensitive key fish habitat</i>, with limited pooled water and highly constrained fish passage the construction impacts to key fish habitat are expected to be minor, with negligible impacts to aquatic biota.</p> <p>Potential impacts from the instream works associated with vegetation removal and access track upgrades include:</p> <ul style="list-style-type: none"> – Minor (up to 60m²) loss or alteration of Class 3 – Minimal fish habitat / Type 3 – Minimally sensitive key fish habitat. This includes disturbance of waterway bed and bank reducing habitat or feeding opportunities for some fish or aquatic invertebrates (if present). 	<ul style="list-style-type: none"> – Minor and periodic/ infrequent maintenance of (i) vegetation in the transmission line easement and (ii) access tracks, would result in negligible impacts to water quality. – Potentially, depending on the design of the waterway crossing, changes to the bed or banks where the project footprint intersects the waterway, and extension of the existing erosion control structure (if required). Given the poor-quality habitat and existing constraints on fish passage, these changes to the bed or banks would be expected to have negligible impact to aquatic biota, including fish passage. – No further impacts on the waterway condition, hydrology, water quality or aquatic biota of the 'Unnamed tributary of Wangcol Creek (a)' is expected.

Waterway	Potential project impact to aquatic biota and key fish habitat	
	Construction	Operation
<p>Activities indirectly impacting on the waterway:</p> <ul style="list-style-type: none"> – Transmission structure (20D) installation upgradient 	<ul style="list-style-type: none"> – There is no large woody debris currently observed in the waterway and therefore, no expected loss of this habitat. If present at the time of construction, removal would be required. – Direct harm (i.e. mortality or injury) to aquatic biota is not expected during instream works due to the position in the headwaters of the waterway, and the low water level. – Negligible impacts to aquatic biota are expected in 'Unnamed tributary of Wangcol Creek (a)' due to removal of riparian vegetation for establishing and maintaining vegetation clearance requirements for the transmission lines and for access track upgrades as there is limited ponded water (i.e. limited potential for aquatic fauna to inhabit these areas). – Minor, localised and temporary impact on water quality (primarily increased turbidity) due to bed and bank disturbance instream and in riparian areas, which would have a negligible impact to aquatic biota. – Given the existing restricted fish passage, the temporary installation of instream erosion control structures (if required) is unlikely to impact fish passage in this waterway. <p>With appropriate mitigation, impacts from the installation of transmission structure 20D, located upgradient of 'Unnamed tributary of Wangcol Creek (a)' to water quality can likely be avoided. However, given the poor quality habitat and low water levels, minor temporary impacts to water quality are expected to have negligible impacts on aquatic biota.</p>	<ul style="list-style-type: none"> – Based on the above, a negligible impact to aquatic biota in 'Unnamed tributary of Wangcol Creek (a)' is expected during project operation.
<p>'Unnamed Tributary of Wangcol Creek (c)'</p> <p>Downstream of the track and pipe culvert crossing on the north-eastern side of the Mount Piper 330 kV substation.</p> <p>Class 3 – Minimal fish habitat Type 3 – Minimally sensitive key fish habitat</p> <p>Activities directly impacting on the waterway:</p> <ul style="list-style-type: none"> – Access tracks crossing the waterway may be upgraded and widened – Maintenance of existing access tracks 	<p>As habitat downstream of the pipe culvert has been identified as <i>Class 3 – Minimal fish habitat / Type 3 – Minimally sensitive key fish habitat</i>, construction impacts to key fish habitat in these sections are expected to be minor, with negligible impacts to aquatic biota.</p> <p>Potential impacts from instream works associated with vegetation removal for establishing and maintaining vegetation clearance requirements for the transmission lines and upgrades to access tracks on 'Unnamed Tributary of Wangcol Creek (c)' downstream of the pipe culvert include:</p> <ul style="list-style-type: none"> – Minor (up to 60 m²) loss or alteration of Class 3 – Minimal fish habitat / Type 3 – Minimally sensitive key fish habitat. This includes disturbance of waterway bed and bank reducing habitat or feeding opportunities for some fish or aquatic invertebrates (if present). 	<ul style="list-style-type: none"> – Minor and periodic/ infrequent maintenance of (i) vegetation in the transmission line easement and (ii) access tracks, would result in negligible impacts to water quality. – Potentially, depending on the design of the waterway crossing, changes to the bed or banks where the project footprint intersects the waterway, and extension of the existing erosion control structure (if required). Given the poor-quality habitat and existing constraints on fish passage, these changes to the bed or banks would be expected to have negligible impact to aquatic biota, including fish passage. – No further impacts on the waterway condition, hydrology, water quality or aquatic biota of the 'Unnamed tributary of Wangcol Creek (c)' is expected.

Waterway	Potential project impact to aquatic biota and key fish habitat	
	Construction	Operation
<p>Activities indirectly impacting on the waterway:</p> <ul style="list-style-type: none"> Construction compound, located near the Mount Piper 330 kV substation, is adjacent (within 10 m) to the waterway 	<ul style="list-style-type: none"> There is no large woody debris currently observed in the waterway and therefore, no expected loss of this habitat. If present at the time of construction, removal would be required. Direct harm (i.e. mortality or injury) to aquatic biota is not expected during instream works due to the water level and restrictions to fish passage upstream and downstream. Removal of riparian vegetation, although root balls will be retained where feasible. Minor, localised and temporary impact on water quality (primarily increased turbidity) due to bed and bank disturbance instream and in riparian areas, which would have a negligible impact to aquatic biota. Given the existing restricted fish passage, including the existing pipe culvert and creek diversions upstream, and disconnection from Wangcol Creek downstream, the temporary installation of instream erosion control structures or alteration of the waterway crossing (if required), is unlikely to impact fish passage in this waterway. 	<p>Based on the above, a negligible impact to aquatic biota in 'Unnamed tributary of Wangcol Creek (c)' is expected during project operation.</p>
<p>Coxs River</p> <p>Class 1: Major fish habitat Type 2: Moderately sensitive key fish habitat</p> <p>Activities directly impacting on the waterway (potential impact to bank stability):</p> <ul style="list-style-type: none"> Installation of transmission structures in riparian zone (TS2C, TS4C and TS8C) Construction benches in the riparian zone (2C, 3C, 4C, 6C, 7C, 8C, 10D) Vegetation removal for establishing and maintaining vegetation clearance requirements for the transmission lines <p>Activities indirectly impacting on the waterway (potential changes to habitat quality):</p> <ul style="list-style-type: none"> Vegetation removal and ground disturbance for establishing and maintaining vegetation clearance requirements for the transmission lines Access track upgrades adjacent to waterway <p>No instream works are proposed in Coxs River.</p>	<ul style="list-style-type: none"> No instream works are proposed in the Coxs River and, therefore direct disturbance/ loss of the <i>Class 1: Major fish habitat, Type 2: Moderately sensitive key fish habitat</i> or aquatic biota is not expected Negligible impacts on aquatic biota from minor, localised and temporary impacts on water quality (primarily increased turbidity) from ground disturbance, erosion and sediment transport. Altered floodplain and fish passage if flooding occurs during the construction period. These temporary, localised changes to conditions would be expected to have only minor impacts to aquatic biota. Removal of riparian vegetation for construction of transmission structures and construction benches located in the Coxs River riparian zone. Root balls will be retained where feasible. The removal of riparian vegetation along the Coxs River may have a minor, localised impact on aquatic biota through reduced shading and habitat material, and the potential of minor, localised changes in bank stability. 	<ul style="list-style-type: none"> Minor and periodic/ infrequent maintenance of (i) vegetation in the transmission line easement and (ii) condition of access tracks, would result in negligible impacts to key fish habitat. No further impacts on the waterway condition, water quality or aquatic biota of Coxs River is expected. Based on the above, a negligible impact to aquatic biota in Coxs River is expected during project operation.

Waterway	Potential project impact to aquatic biota and key fish habitat	
	Construction	Operation
Unnamed tributary (oxbow) of Coxs River Class 4: Unlikely key fish habitat	<ul style="list-style-type: none"> – Disconnected oxbow of the Coxs River may require dewatering to construct the culvert crossing. This waterway is not key fish habitat, but fish may occur. Dewatering may directly impact on fish through stress, injury or death through entrainment. If invasive fish are present, there is the potential for invasive fish or aquatic invertebrates to spread if water is discharged to another waterways. 	<ul style="list-style-type: none"> – None identified.

5.6 Cumulative impacts

Section 21.2 of the EIS outlines the methodology for the assessment of cumulative impacts including the methods for identifying what projects have been considered as part of the issue-specific cumulative impact assessments for the project. The assessment has been undertaken in accordance with the Cumulative Impact Assessment Guidelines for State Significant Projects (DPIE, 2022d).

The following 10 projects within 20 km of the project were identified for consideration as part of the cumulative assessment and are shown in Figure 5.2:

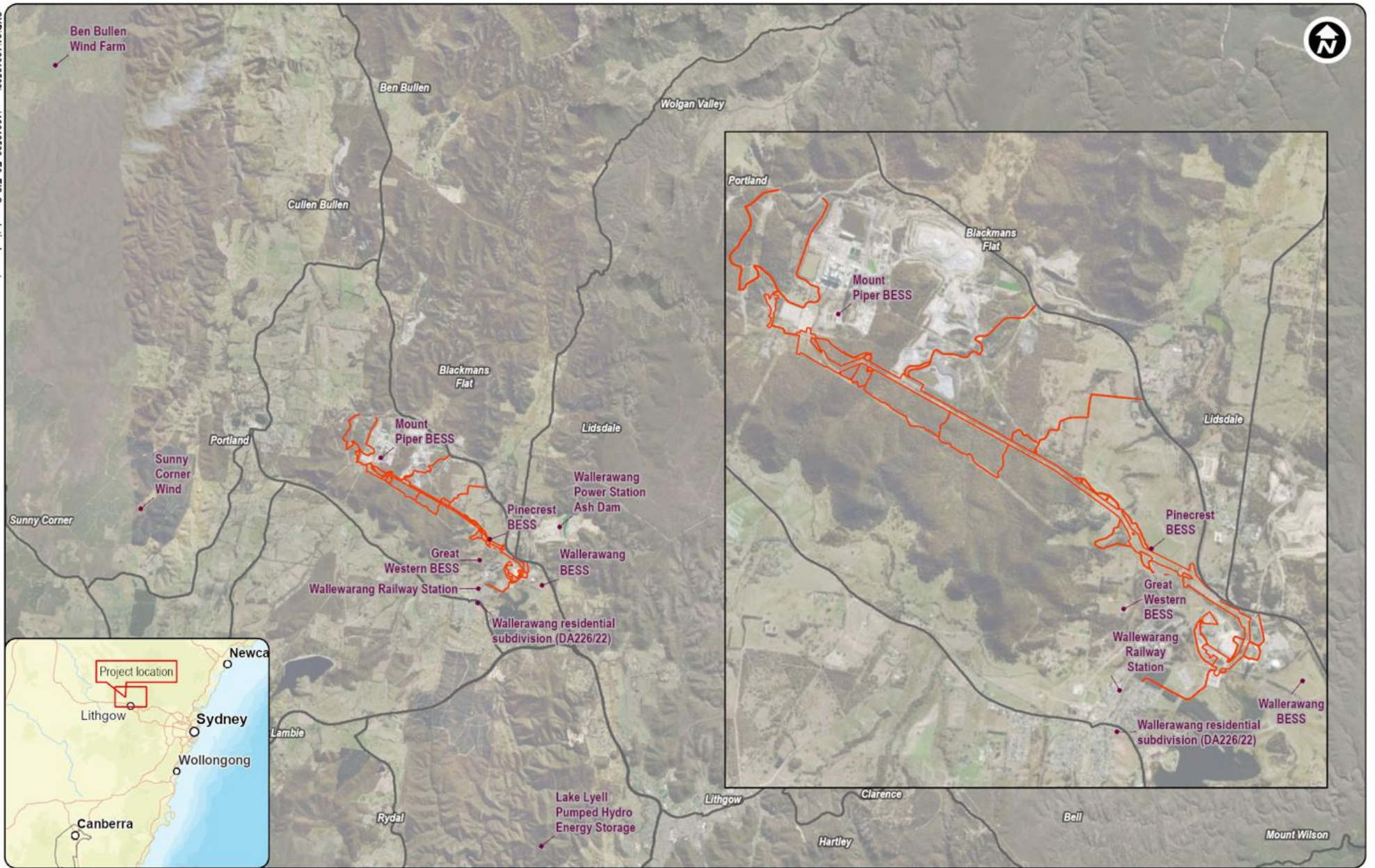
- Wallerawang Battery Energy Storage System
- Mount Piper Battery Energy Storage System
- Great Western Battery Energy Storage System
- Pinecrest Battery Energy Storage System
- Lake Lyell Pumped Hydro Energy Storage
- Ben Bullen Wind Farm
- Sunny Croner Wind Farm
- Wallerawang Power Station Ash Dam
- Wallerawang residential subdivision (DA226/22)
- Wallerawang Station upgrades.

Table 5.4 outlines the potential cumulative impacts relevant to each project.

With consideration to the 10 projects, only three projects were considered to have the potential to impact on the same receiving environments of riparian vegetation and aquatic biota and habitats. These included the three Battery Energy Storage System projects (Wallerawang, Mount Piper and Great Western). The Mount Piper Battery Energy Storage System project footprint overlaps the waterway identified as '*Unnamed tributary of Wangcol Creek (c)*' and is considered to have the greatest potential to result in cumulative impacts. However, there is very limited information in the Mount Piper Battery Energy Storage System environmental assessment documents on key fish habitat impacts and more broadly aquatic ecology impacts. As a result, a detailed review and identification of cumulative impacts could not be undertaken for the Mount Piper Battery Energy Storage System.

Based on available information, the three projects in combination, all of similar scale and nature, would not likely result in increased cumulative impacts to waterways, aquatic biota and key fish habitats with the implementation of their respective mitigation and management measures.

Given the potential for cumulative impacts from the Mount Piper Battery Energy Storage System project, it is recommended that consultation with the proponent and construction contractor is undertaken to seek further information and identify opportunities to effectively manage potential cumulative impacts on the '*Unnamed tributary of Wangcol Creek (c)*'.



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Date: 17/07/2025

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Kilometres
Grid: GDA2020 MGA Zone 56

Figure 5.2 Projects considered in cumulative assessment

Table 5.4 Cumulative impacts

Relevant future project	Scope	Approximate location	Status/timeframe/operational period	Potential for cumulative impact
Wallerawang BESS	Design changes to optimise the layout of the approved Wallerawang BESS (500 MW and 1,000 MWh of battery storage capacity)	500 m east of the project footprint	Approved 4/8/2022 Current modification at response to submissions stages Construction period of 1 to 2 years, expected to commence from 2025, construction does not appear to have commenced Operational period unchanged	<p>Potential cumulative impacts may occur as the Wallerawang BESS is adjacent to the Coxs River and Lake Wallace.</p> <p>No cumulative impacts in flooding or water quality associated with the Wallerawang BESS are anticipated. The Wallerawang BESS assessment indicates the proposed stormwater mitigation measures would allow the Wallerawang BESS to meet NorBE² criteria.</p> <p>Impacts to aquatic habitat from the Wallerawang BESS are likely to be localised and minor as no instream works are proposed.</p> <p>As potential impacts to aquatic biota and key fish habitat from the project are likely to be minor during construction and negligible during operation, cumulative impacts are expected to remain at minor to negligible.</p>
Mount Piper BESS	Development of a grid-scale BESS with a capacity of up to 500 MW	Immediately north of the project footprint	Approved 15/11/2024 Construction period of 18-24 months expected to commence from mid-2026 at the earliest Potentially operational by 2027/2028 and would operate for about 20 years	<p>Potential cumulative impacts may occur as the Mount Piper BESS is adjacent to Mount Piper 300 kV substation, and its footprint overlaps the waterway identified in Figure 3.1 as '<i>Unnamed tributary of Wangcol Creek (c)</i>'.</p> <p>The surface and groundwater assessments for the Mount Piper BESS identified potential impacts are readily managed through approved mitigation and management measures.</p> <p>Key fish habitat is briefly discussed in the Mount Piper BESS BDAR. It indicates the potential for interaction of the Mount Piper BESS footprint with a third-order waterway mapped as key fish habitat. No further assessment or conclusion on aquatic ecology impacts was provided.</p> <p>The nature and scale of the cumulative impacts to aquatic ecology cannot be identified as potential impacts to aquatic ecology are not described in the Mount Piper BESS environmental assessments.</p>

² Neutral or Beneficial Effect (NorBE) on water quality assessment

Relevant future project	Scope	Approximate location	Status/timeframe/operational period	Potential for cumulative impact
Great Western BESS	Development of a 500 MW / 1,000 MWh BESS and associated infrastructure	300 m west of the project footprint	Approved 2/11/2023 Project has not yet commenced construction and construction start date is not known however is expected to occur over 12-14 months once the modification is approved The BESS is intended to have an operational life of up to 20 years	Potential cumulative impacts may occur as the Great Western BESS footprint crosses Pipers Flat Creek, which is located downstream of the project footprint. Negligible impacts from the Great Western BESS to surface water and flooding are documented by AECOM (2021). The impact assessment states there are no aquatic habitat impacts relating to the Fisheries Management Act 1994. Pipers Flat Creek is outside of the project footprint. With mitigation, project impacts to water quality in waterway downstream of the project footprint and soil disturbance during construction, are expected to be negligible. Therefore, negligible cumulative impacts are expected to Pipers Flat Creek from these projects.
Pinecrest BESS	Development of 500 MW battery storage capacity and 1,000 MWh of storage with (2-hour duration) connecting to the grid via underground cabling	Layout shown in scoping report is located within project footprint, with Transgrid undertaking ongoing consultation with Banpu Energy regarding positioning of the site.	Scoping report prepared with SEARs not yet issued EIS is expected to be submitted in early 2026 Construction period of 18 months commencing in late 2026 if approved. Operations proposed to start in 2028	No detailed information is available to assess cumulative impacts from the project and the Pinecrest BESS. Based on the likely Pinecrest BESS location, as published on the Pinecrest BESS website, there is potential for the Pinecrest BESS to directly and/ or indirectly impact on the unnamed tributary of Pipers Flat Creek. The scale and nature of potential impacts are not identified in the Pinecrest BESS environmental assessments. However, Pipers Flat Creek is outside of the project footprint. With mitigation, project impacts to water quality in waterways downstream of the project footprint and soil disturbance during construction, are expected to be negligible. Therefore, negligible cumulative impacts are expected to Pipers Flat Creek from these projects.

Relevant future project	Scope	Approximate location	Status/timeframe/operational period	Potential for cumulative impact
Lake Lyell Pumped Hydro Energy Storage	Development of the Lake Lyell Pumped Hydro Energy Storage Scheme (that will provide between 300 to 350 MW of electricity generating capacity for up to 8 hours during peak demand)	10 km south of the project footprint	EIS in preparation Technical design expected to conclude in 2025. Construction expected commence in late 2026 and to take four years with operation commencing in 2029	The Lake Lyell Pumped Hydro Energy Storage is located in the Coxs River catchment. Review of the footprint indicates the Lake Lyell Pumped Hydro Energy Storage would be located entirely downstream of the project footprint and downstream of Lake Wallace. As a result of the Lake Lyell Pumped Hydro Energy Storage's location downstream and 10 km away, the potential for cumulative surface water impacts is considered unlikely. Potential impacts to aquatic ecology from the Lake Lyell Pumped Hydro Energy Storage occurs in different areas within the Coxs River catchment. Potential impacts to aquatic ecology are not expected to occur from the project on the Coxs River in these areas (i.e. downstream of Lake Wallace). Therefore, cumulative impacts of these projects on the same aquatic receivers are not expected.
Ben Bullen Wind Farm	Construction of approximately 64 wind turbine generators, a BESS and ancillary infrastructure	20 km north-west of the project footprint	EIS in preparation Construction in 2028 for 18-24 months Operational life of 35 years+	The Ben Bullen Wind Farm is located 20 km away from the project footprint and is not anticipated to interact with waterways relevant to this assessment.
Sunny Corner Wind Farm	Construction of approximately 80 wind turbine generators, a BESS and ancillary infrastructure	6 km west of the project footprint	EIS in preparation Construction in 2030 for 36 months Operational life of 30 years	The Sunny Corner Wind Farm is located 6 km away from the project footprint and is not anticipated to interact with waterways relevant to this assessment.
Wallerawang Power Station Ash Dam	Use of part of the lands lying north of the Castlereagh Highway that were once used by the former Wallerawang Power Station as coal ash dam repositories	Immediately north of the project footprint	Approved 13/10/2023 The modification proposes an additional ten years for the importation of capping material	The EIS indicates there is no change to approved water management proposed under the modification with no impacts to water resources identified. No cumulative impacts are therefore expected.
Wallerawang residential subdivision (DA226.22)	Torrens Subdivision – 1 Lot into 54 Residential Allotments, 4 New Roads, 2 lots for drainage and public reserve Allotment	19 Barton Avenue Wallerawang 2 km south-west of the project footprint	Currently being re-exhibited till 13 June 2025	As the Residential subdivision DA226/22 site is anticipated to drain directly into Lake Wallace rather than waterways related to the project (i.e. Pipers Flat Creek and the Coxs River) no cumulative impacts are expected.

Relevant future project	Scope	Approximate location	Status/timeframe/operational period	Potential for cumulative impact
Wallerawang Railway Station upgrade	Works to upgrade the existing station, closed in 1989, so that passenger services can be restated.	850 m southwest of project footprint	<p>Project has been announced on Transport for NSW website</p> <p>Early enabling works will be carried out from March to August 2025.</p> <p>Once the design is finalised, construction will commence later in 2025, with re-opening of the station planned for late 2026</p>	The projects position within the existing Wallerawang Gwabegar Rail Line station means impact to aquatic ecology is considered to be limited. Land on which the project is located is expected to drain indirectly into Lake Wallace to the east and therefore no cumulative impacts are expected.

6. Mitigation and management of impacts

Table 6.1 outlines the mitigation and management measures that would be implemented to protect aquatic biota and key fish habitat. These mitigation measures have been identified for the potential impacts identified in section 5 and summarised in Table 5.3.

Technical Report 1 – Water Impact Assessment identifies mitigation and management measures that are also relevant for mitigating impacts on aquatic biota and their habitat, through reducing potential impacts to water quality, hydrology and waterway condition including development of:

- a soil and water management plan outlining measures to manage potential soil and water quality impacts during construction
- an erosion and sediment control plan.

DPIRD (Fisheries) would be consulted during development of the soil and water management plan, which will include any proposed dewatering and discharge of water to or from waterways.

More detail on these proposed mitigation measures is provided in Technical Report 1 – Water Impact Assessment.

Table 6.1 Aquatic ecology mitigation and management measures

Impact	Mitigation measure	Timing
Removal of riparian vegetation around Coxs River	Following construction, consider initiatives to improve riparian zones for aquatic biota, such as rehabilitation and revegetation, in consultation with DPIRD and WaterNSW (for flooding perspective) and relevant stakeholders. Where feasible and reasonable initiatives exist, they are to be implemented during post-construction site restoration.	Post construction
Instream works in minimal key fish habitat of unnamed tributaries of Wangcol Creek	Construction activities occurring in or adjacent to waterways providing key fish habitat, including Class 1 (major) 'Coxs River' to Class 3 (minimal) fish habitat 'Unnamed tributaries of Wangcol Creek (a) and (c)', are to minimise any additional restriction to fish passage from current conditions and be undertaken in accordance with: <ul style="list-style-type: none"> – the Policy and guidelines for fish habitat conservation and management (DPI, 2013) – the Controlled activities – Guidelines for watercourse crossings on waterfront land (DPE, 2022b). 	Construction
Spread of invasive fish species	Any invasive fish will not be discharged to a natural waterway as required under the Fisheries Management Act 1994 and Biosecurity Act 2015.	Construction
Surface water dewatering at culvert crossings	Consult with DPIRD on the management of aquatic biota for any proposed dewatering of the Coxs River oxbow for construction of the culvert crossing, and any proposed discharge of surface water to/ from waterways.	Construction

7. Conclusion

This aquatic ecology impact assessment considered potential impacts on aquatic biota and key fish habitat, as required by the SEARs. This includes consideration of the existing waterway type and condition, the potential for threatened aquatic species, informed by a desktop assessment, and the outcomes of a site-based aquatic habitat assessment in December 2024.

Except for the Coxs River, the waterways intersecting the project footprint are small (first to third) order waterways with low water levels and high disturbance from adjacent land uses. The waterways in and adjacent to the project footprint identified as providing key fish habitat (third order or higher) are:

- The Coxs River: *Class 1 – Major fish habitat, Type 2 – Moderately sensitive key fish habitat*
- ‘Unnamed tributary of Wangcol Creek (a)’: *Class 3 – Minimal fish habitat, Type 3 – Minimally sensitive key fish habitat*
- ‘Unnamed tributary of Wangcol Creek (c)’: *Class 3 – Minimal fish habitat, Type 3 – Minimally sensitive key fish habitat.*

The project is expected to have localised and minor impacts to key fish habitat, and negligible or minor impacts to aquatic biota, including in the Coxs River, which provides higher value habitat. This is based on the following assessment findings:

- There is limited key fish habitat within or adjacent to the project footprint and the waterways. Riparian vegetation around the waterways has also been previously disturbed. Some sections of the ‘Unnamed tributary of Wangcol Creek (c)’, in proximity to the proposed Mount Piper compound, are highly modified from channel diversions, concrete lining, resulting in substantially modified riparian vegetation. Therefore, proposed construction activities for access tracks and the Mount Piper construction compound, in the vicinity of the ‘Unnamed tributary of Wangcol Creek (c)’ are not expected to impact aquatic biota or key fish habitat.
- Instream works and associated habitat loss and disturbance from establishing and maintaining the extent of vegetation clearing for the transmission lines, building new access tracks and widening existing ones will also be limited to a small area (maximum of 60 m² for each creek) of *Type 3: minimally sensitive habitat* in the headwaters of two tributaries of Wangcol Creek. These waterways, ‘Unnamed tributary of Wangcol Creek (a) and (c)’ have already been disturbed by existing tracks. Fish passage is constrained in these waterways, due to these existing tracks and there is insufficient water to support fish passage. As such, the potential impacts on fish passage in these waterways are considered negligible.
- The proposed removal of riparian vegetation along the Coxs River may have a minor impact on aquatic biota through reduced shading and habitat material, and the potential of minor changes in bank stability. Negligible impacts to aquatic biota are expected in ‘Unnamed tributary of Wangcol Creek (a) and (c)’ due to removal of riparian vegetation for the widening of the transmission line easement and access tracks as there is limited ponded water (i.e. limited potential for aquatic fauna to inhabit these areas).
- No impacts are expected to threatened aquatic biota as there are no threatened fish or aquatic invertebrate species expected to occur in the waterways in and adjacent to the project footprint.

With the implementation of proposed mitigation and management measures, potential impacts on aquatic biota and habitat will be minimised further.

Cumulative impacts have the potential to occur, largely associated with the Mount Piper BESS project. Consultation is recommended with the proponent and the contractor to identify effective measures to minimise cumulative impacts on minimal key fish habitat of ‘*Unnamed tributary of Wangcol Creek (c)*’.

8. References

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Appendices

Appendix A

Protected Matter Search Tool Results



Australian Government

Department of Climate Change, Energy,
the Environment and Water

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 18-Feb-2025

[Summary](#)

[Details](#)

[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar)	4
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	58
Listed Migratory Species:	8

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <https://www.dcceew.gov.au/parks-heritage/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	19
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	1
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	12
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	1
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar Wetlands) [\[Resource Information \]](#)

Ramsar Site Name	Proximity
Banrock station wetland complex	800 - 900km upstream from Ramsar site
Riverland	800 - 900km upstream from Ramsar site
The coorong, and lakes alexandrina and albert wetland	900 - 1000km upstream from Ramsar site
The macquarie marshes	300 - 400km upstream from Ramsar site

Listed Threatened Ecological Communities [\[Resource Information \]](#)

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text
Natural Temperate Grassland of the South Eastern Highlands	Critically Endangered	Community may occur within area
Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion	Endangered	Community may occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community may occur within area

Listed Threatened Species [\[Resource Information \]](#)

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.

Number is the current name ID.

Scientific Name	Threatened Category	Presence Text
BIRD		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Aphelocephala leucopsis Southern Whiteface [529]	Vulnerable	Species or species habitat likely to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Callocephalon fimbriatum Gang-gang Cockatoo [768]	Endangered	Species or species habitat known to occur within area
Calyptorhynchus lathami lathami South-eastern Glossy Black-Cockatoo [67036]	Vulnerable	Species or species habitat likely to occur within area
Climacteris picumnus victoriae Brown Treecreeper (south-eastern) [67062]	Vulnerable	Species or species habitat known to occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat may occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat may occur within area
Melanodryas cucullata cucullata South-eastern Hooded Robin, Hooded Robin (south-eastern) [67093]	Endangered	Species or species habitat likely to occur within area
Neophema chrysostoma Blue-winged Parrot [726]	Vulnerable	Species or species habitat may occur within area
Polytelis swainsonii Superb Parrot [738]	Vulnerable	Species or species habitat known to occur within area
Pycnoptilus floccosus Pilotbird [525]	Vulnerable	Species or species habitat likely to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Stagonopleura guttata Diamond Firetail [59398]	Vulnerable	Species or species habitat known to occur within area
FISH		
Macquaria australasica Macquarie Perch [66632]	Endangered	Species or species habitat known to occur within area
Prototroctes maraena Australian Grayling [26179]	Vulnerable	Species or species habitat may occur within area
FROG		
Litoria booroolongensis Booroolong Frog [1844]	Endangered	Species or species habitat likely to occur within area
INSECT		

Scientific Name	Threatened Category	Presence Text
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Paralucia spinifera Bathurst Copper Butterfly, Purple Copper Butterfly, Bathurst Copper, Bathurst Copper Wing, Bathurst-Lithgow Copper, Purple Copper [26335]	Vulnerable	Species or species habitat known to occur within area
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MAMMAL

Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Endangered	Species or species habitat known to occur within area
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Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat likely to occur within area
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Nyctophilus corbeni Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat may occur within area
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Petauroides volans Greater Glider (southern and central) [254]	Endangered	Species or species habitat known to occur within area
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Petaurus australis australis Yellow-bellied Glider (south-eastern) [87600]	Vulnerable	Species or species habitat likely to occur within area
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Petrogale penicillata Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat may occur within area
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Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Endangered	Species or species habitat known to occur within area
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Pseudomys novaehollandiae New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat may occur within area
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Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour may occur within area
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PLANT

Scientific Name	Threatened Category	Presence Text
Acacia bynoeana Bynoe's Wattle, Tiny Wattle [8575]	Vulnerable	Species or species habitat may occur within area
Banksia penicillata a banksia [91058]	Endangered	Species or species habitat likely to occur within area
Boronia deanei Deane's Boronia [8397]	Vulnerable	Species or species habitat may occur within area
Cryptostylis hunteriana Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat may occur within area
Eucalyptus aggregata Black Gum [20890]	Vulnerable	Species or species habitat known to occur within area
Eucalyptus pulverulenta Silver-leaved Mountain Gum, Silver-leaved Gum [21537]	Vulnerable	Species or species habitat likely to occur within area
Eucalyptus robertsonii subsp. hemisphaerica Robertson's Peppermint [56223]	Vulnerable	Species or species habitat may occur within area
Euphrasia arguta [4325]	Critically Endangered	Species or species habitat may occur within area
Haloragodendron lucasii Hal [6480]	Endangered	Species or species habitat may occur within area
Hibbertia acaulothrix [87409]	Endangered	Species or species habitat may occur within area
Kunzea cabbagei [11420]	Vulnerable	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Leptospermum petraeum [21810]	Critically Endangered	Species or species habitat may occur within area
Leucochrysum albicans subsp. tricolor Hoary Sunray, Grassland Paper-daisy [89104]	Endangered	Species or species habitat may occur within area
Persoonia hindii [65950]	Endangered	Species or species habitat likely to occur within area
Persoonia hirsuta Hairy Geebung, Hairy Persoonia [19006]	Endangered	Species or species habitat may occur within area
Persoonia marginata Clandulla Geebung [10852]	Vulnerable	Species or species habitat may occur within area
Pomaderris brunnea Rufous Pomaderris, Brown Pomaderris [16845]	Vulnerable	Species or species habitat may occur within area
Pomaderris cotoneaster Cotoneaster Pomaderris [2043]	Endangered	Species or species habitat may occur within area
Prasophyllum petilum Tarengo Leek Orchid [55144]	Endangered	Species or species habitat may occur within area
Prasophyllum sp. Wybong (C.Phelps ORG 5269) a leek-orchid [81964]	Critically Endangered	Species or species habitat may occur within area
Pultenaea glabra Smooth Bush-pea, Swamp Bush-pea [11887]	Vulnerable	Species or species habitat likely to occur within area
Rhizanthella slateri Eastern Underground Orchid [11768]	Endangered	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat known to occur within area
REPTILE		
Aprasia parapulchella Pink-tailed Worm-lizard, Pink-tailed Legless Lizard [1665]	Vulnerable	Species or species habitat likely to occur within area
Eulamprus leuraensis Blue Mountains Water Skink [59199]	Endangered	Species or species habitat likely to occur within area
Hoplocephalus bungaroides Broad-headed Snake [1182]	Endangered	Species or species habitat may occur within area
Listed Migratory Species [Resource Information]		
Scientific Name	Threatened Category	Presence Text
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Commonwealth Lands [\[Resource Information \]](#)

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State
Communications, Information Technology and the Arts - Telstra Corporation Limited	
Commonwealth Land - Australian Telecommunications Commission [12474]	NSW

Listed Marine Species [\[Resource Information \]](#)

Scientific Name	Threatened Category	Presence Text
Bird		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat likely to occur within area overfly marine area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat may occur within area overfly marine area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area overfly marine area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat may occur within area overfly marine area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area overfly marine area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area overfly marine area
Neophema chrysostoma Blue-winged Parrot [726]	Vulnerable	Species or species habitat may occur within area overfly marine area
Pterodroma cervicalis White-necked Petrel [59642]		Species or species habitat may occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area overfly marine area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area

Extra Information

State and Territory Reserves [\[Resource Information \]](#)

Protected Area Name	Reserve Type	State
Gardens of Stone	State Conservation Area	NSW

EPBC Act Referrals [\[Resource Information \]](#)

Title of referral	Reference	Referral Outcome	Assessment Status
Angus Place West	2022/09270		Assessment
McPhillamys Gold Project - Modification 1	2023/09704		Assessment
Mount Piper to Wallerawang Transmission Line Upgrade Project	2024/09855		Assessment
Mt Piper Battery Energy Storage System (BESS)	2023/09660		Completed

Controlled action

Title of referral	Reference	Referral Outcome	Assessment Status
Controlled action			
Coalpac Consolidation Project- open cut mine	2010/5776	Controlled Action	Completed
Stage 2 Extension of the Pine Dale Coal Mine	2012/6326	Controlled Action	Completed
The Neubeck Coal Project, NSW	2013/6880	Controlled Action	Completed
Not controlled action			
Extension of Mt Piper Power Station, Mt Piper, NSW	2009/5049	Not Controlled Action	Completed
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed
Mt Piper Power Station Ash Placement Project	2010/5506	Not Controlled Action	Completed
Not controlled action (particular manner)			
Aerial baiting for wild dog control	2006/2713	Not Controlled Action (Particular Manner)	Post-Approval
Pine Dale Coal Mine Stage 1 Yarraboldy extension	2011/6016	Not Controlled Action (Particular Manner)	Post-Approval

Bioregional Assessments			[Resource Information]
SubRegion	BioRegion	Website	
Sydney	Sydney Basin	BA website	

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data is available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance on the contents of this report.

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions when time permits.

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded breeding sites; and
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence](#)
- [Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact us](#) page.

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