Six Mile Creek Dam (Lake Macdonald)

Safety Upgrade Project

Initial Advice Statement

September 2017

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ABBREVIATIONS

Abbreviation	Description
AHD	Australian Height Datum (height above Mean Sea Level)
ANCOLD	Australian National Committee on Large Dams
Cth	Commonwealth
CAP	Communications Action Plan
CRG	Community Reference Group
DAF	Department of Agriculture and Fisheries (Qld)
DEWS	Department of Energy and Water Supply (Qld dam safety regulator)
DEE	Department of the Environment and Energy (Cth)
EHP	Department of Environment and Heritage Protection (Qld)
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EP Act	*Environmental Protection Act 1994* (Qld)
EPP Water	*Environmental Protection (Water) Policy 2009* (Qld)
EP Regulation	*Environmental Protection Regulation 2008* (Qld)
EPBC	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
ESA	Environmentally Sensitive Area
EV	Environmental Values
IAR	Impact Assessment Report
IAS	Initial Advice Statement
LGA	Local Government Area
NC Act	*Nature Conservation Act 1992* (Qld)
Planning Act	*Planning Act 2016 (Qld)*
PMF	Probable Maximum Flood
Qld	Queensland
RE	Regional Ecosystem
TEC	Threatened Ecological Community (Cth)
VM Act	*Vegetation Management Act 1999* (Qld)

EXECUTIVE SUMMARY

Six Mile Creek Dam, commonly referred to as Lake Macdonald, is located on the Sunshine Coast in Noosa Shire and is one of two principal raw water sources that supply potable drinking water to the residents of Noosa Shire. The dam was constructed in the early 1960s and was raised in 1979 to create the current storage. Ownership was transferred from Noosa Council to Seqwater on 1 July, 2008.

Six Mile Creek Dam requires an upgrade ('the Project') to meet modern standards and the performance requirements of the Queensland dam safety regulations into the future. The upgrade will allow the dam to better manage severe weather and earthquake events. The upgrade will preserve the storage at its current 8,000 ML capacity and its Full Supply Level (FSL) of 95.32 m Australian Height Datum (AHD).

The objective of the Project is to ensure the dam can meet performance standards into the future. This includes improving the spillway discharge capacity and earthquake stability while maintaining water supply security. Studies have considered a range of options including decommissioning of the dam, retrofit of strengthening works and new build options.

Six Mile Creek Dam provides an important source of raw water for the Noosa Water Treatment Plant (WTP), which supplies water to the Sunshine Coast region. The lake is also used as a recreation facility for the community, with support for rowing, paddling, fishing, and foreshore recreation, including the Noosa Botanical Gardens.

A number of protected species are known to occur or potentially occur in and around Six Mile Creek, including Lake Macdonald. In particular, four Matters of National Environmental Significance (MNES – EPBC Act) species are of interest in relation to Six Mile Creek: Mary River cod (Maccullochella mariensis), Australian lungfish (Neoceratodus forsteri), Mary River turtle (Elusor macrurus) and white-throated snapping turtle (Elseya albagula). The lake also serves an environmental function within the region, with a fish hatchery for the nationally significant Mary River Cod located on the northern foreshore.

The proponent, Seqwater, produces a safe, secure and reliable water supply to 3.1 million South East Queenslanders, as well as providing essential flood mitigation services and water for irrigation to rural customers. In its role, Seqwater is required to comply with the Queensland Dam Safety Guidelines under the *Water Supply (Safety and Reliability) Act 2008*. Like all major dam operators across Australia, Seqwater also seeks to meet national guidelines as defined by the Australian National Committee on Large Dams (ANCOLD).

In 2012-13, Seqwater commissioned an independent risk assessment across its portfolio of 26 regulated dams to develop an understanding of the major dam safety risks within the portfolio and to provide a management tool to prioritise future risk reduction works. The risk assessment also provided a dam safety risk reduction strategy that comprised a staged approach to manage the financial impacts to Seqwater's business while proactively managing the key dam safety risks with a defined timeframe. For Six Mile Creek Dam, the assessment identified 12 potential failure modes and the societal risk was assessed to be unacceptable according to the ANCOLD societal risk criteria. In addition, it was found that the dam infrastructure could not safely pass the Probable Maximum Flood (PMF). Subsequent inspection of the spillway revealed corrosion of the spillway anchorages and it was concluded that the risk position at Six Mile Creek Dam would continue to deteriorate with time.

While the approvals pathway for the Project has not yet been determined, studies conducted as part of an Impact Assessment Report (IAR) or Environmental Impact Statement (EIS) will describe the existing or baseline environment, assess potential impacts of Project activities, identify mitigation and management measures to address those impacts, and detail the management framework that Seqwater will adopt to manage and protect environmental values. The required studies will be determined by the Terms of Reference (EIS) or Scoping Document (IAR) and may include:

- land use
- water resources
- air quality
- noise and vibration
- flora and fauna
- social and economic impact
- cultural heritage (indigenous and non-indigenous)
- traffic and transport
- visual amenity
- waste management

Most of the Project's potential impacts will be construction related, and a Project Construction Environmental Management Plan (CEMP) will be developed as part of the IAR or EIS. The CEMP will describe the environmental values of the Project area and will establish environmental commitments for the project. The CEMP is one of the primary tools used by Seqwater for management of the potential environmental impacts.

The purpose of this Initial Advice Statement (IAS) is to assist the Coordinator-General in determining whether the project should be declared a 'coordinated project' under Part 4 of the *State Development and Public Works Organisation Act 1971* (SDPWO Act) and the level of assessment required.

Due to the importance of the Project to community safety and the regional provision of potable water, Seqwater believes that the Project would benefit from a declaration as a Coordinated Project by the Coordinator-General under Part 4 of the SDPWO Act.

The proposed approach to build and operate the upgraded dam generally within the existing dam footprint is expected to significantly reduce the potential environmental, social and economic impacts of the project.

As such, the use of an Impact Assessment Report (IAR) approach under the SDPWO Act is requested as the prudent coordinated project pathway

1. INTRODUCTION

1.1 Background

Six Mile Creek Dam, commonly referred to as Lake Macdonald, is located on the Sunshine Coast in Noosa Shire and is one of two principal raw water sources that supply potable drinking water to the residents of Noosa Shire. Ownership of the dam was transferred from Noosa Council to Seqwater on 1 July, 2008. The Project site and its position within the shire are presented in Figure 1-1.

The dam requires an upgrade to meet modern standards and the performance requirements of the Queensland dam safety regulations into the future. The upgrade will allow the dam to better manage severe weather and earthquake events.

The objective of the upgrade is to ensure the dam can meet performance standards into the future. This includes improving the spillway discharge capacity and earthquake stability while maintaining water supply security. Studies have considered a range of options including decommissioning of the dam, retrofit of strengthening works and new build options.

The dam was constructed in the early 1960s and subsequently raised in 1979. The dam consists of a zoned earthfill embankment (501 m long) at a height of around 15 m, and a central concrete lined spillway over the embankment (79 m wide, around 11 m high).

In 2012, Seqwater commissioned a Portfolio Risk Assessment of its 26 of regulated dams. The key risk issues identified during the risk assessment for Six Mile Creek Dam were piping through the embankment and foundation liquefaction under the spillway.

The societal risk for Six Mile Creek Dam plots just above the ANCOLD defined limit of tolerability. Based on the definitions provided by ANCOLD, this risk is considered unacceptable and action should be taken. Further information regarding the societal risk is provided in Section 3.3.

Concept level upgrade studies and site investigations were commissioned and undertaken in 2014. On the basis of these investigations, interim risk reduction work was completed on the spillway in December 2014, including replacement of horizontal joint dowels to improve structural connections between slabs and the sealing of open spillway joints.

Further investigations were undertaken in 2015 to progress technical aspects (preliminary design) of the proposed upgrade options, to better understand the potential environmental impacts of the Project; to facilitate obtaining environmental approvals; and to develop a final business case in late 2016. Community engagement on the Project began in May 2015, with a community reference group established to provide ongoing community input and feedback throughout the life of the Project.

1.2 Purpose and scope of the IAS

The purpose of this Initial Advice Statement (IAS) is to assist the Coordinator-General in determining whether the project should be declared a ‘coordinated project’ under Part 4 of the SDPWO Act and the level of assessment required. The IAS identifies the potential Project impacts (positive and negative) to be investigated in detail in either the Project IAR or EIS.

Accordingly, the IAS provides Project information to interested and affected stakeholders and the general public. It identifies additional approvals that may be required for the implementation of the Project once the Coordinator-General assessment is complete. The IAS includes consideration of the construction and operational phases of dam upgrade.

1.3 Coordinated Project Declaration

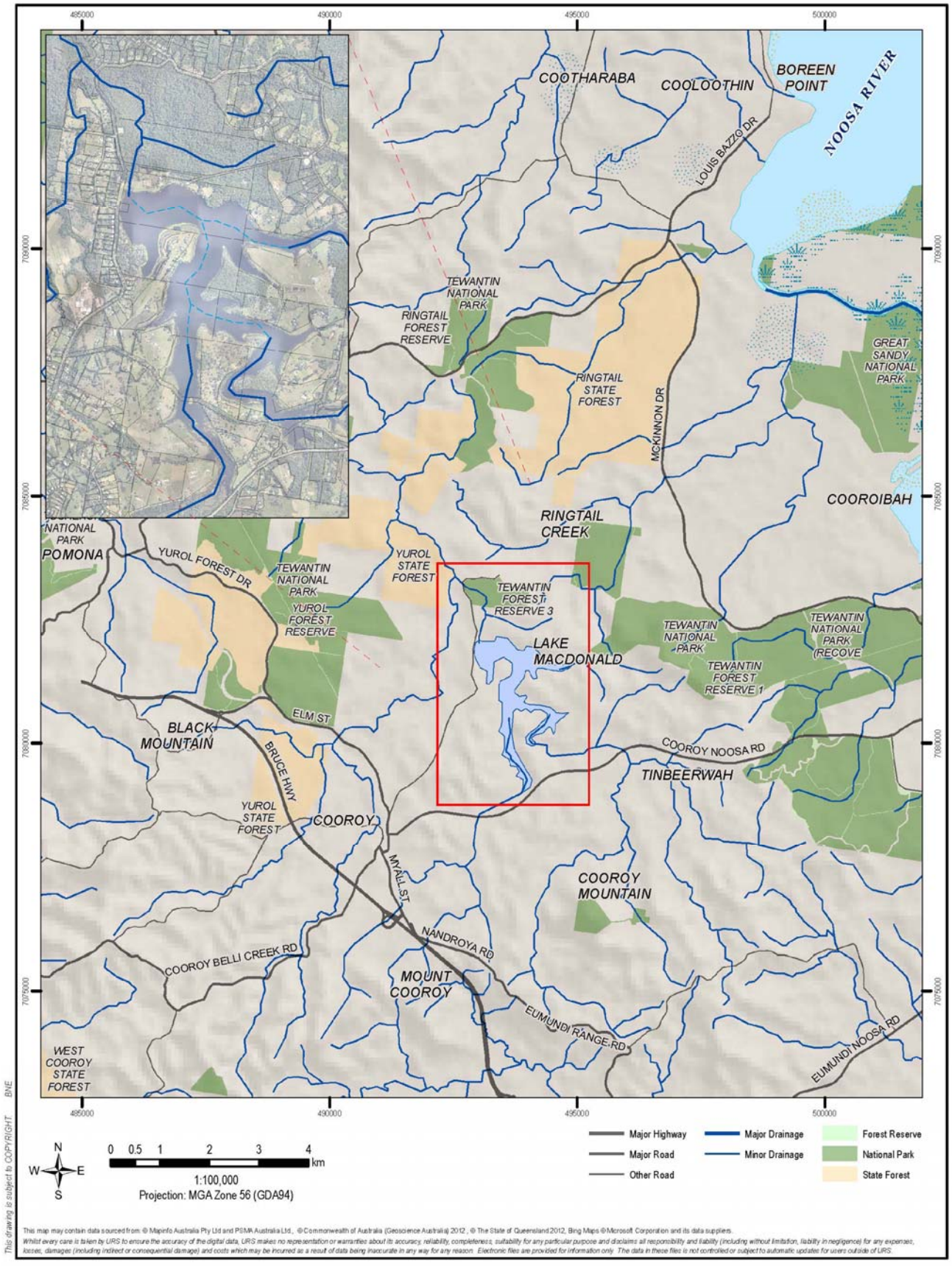
Due to the importance of the Project to community safety and the regional provision of potable water, Seqwater believes that the Project would benefit from declaration as a Coordinated Project by the Coordinator-General under Part 4 of the SDPWO Act.

The proposed approach to build and operate the upgraded dam generally within the existing dam footprint is expected to significantly reduce the environmental, social and economic impacts of the Project. Nevertheless, there will be several key environmental concerns that require focused assessment to fully identify impacts and develop appropriate mitigation measures.

On the basis that the Project's scale and extent is anticipated to have known environmental impacts, that are able to be managed through well understood environmental risk mitigation measures, the use of an Impact Assessment Report (IAR) process under the SDPWO Act is requested as the prudent coordinated project pathway.

Justification for using the more targeted IAR process is summarised in Section 6.1 (potential project impacts) and Section 7.1 (Environmental Management and Mitigation Measures).

Figure 1-1 Regional location of Lake Macdonald and project area



2. THE PROPONENT

Seqwater is a statutory authority (the Queensland Bulk Water Supply Authority) established under the *South East Queensland Water (Restructuring) Act 2007*.

Seqwater was formed on 1 January, 2013 through a merger of three State-owned water businesses, the SEQ Water Grid Manager, LinkWater and the former Seqwater. The business is also responsible for the long term planning of the region's future water needs, a function that was formerly undertaken by the Queensland Water Commission.

Seqwater is responsible for producing a safe, secure and reliable water supply to 3.1 million South East Queenslanders, as well as providing essential flood mitigation services and water for irrigation to rural customers.

Seqwater is one of Australia's largest water businesses, with the most geographically spread and diverse asset base of any Australian capital city water authority, managing more than $11 billion of water supply assets and the natural catchments of the region's major water supply sources. This includes dams, weirs, conventional water treatment plants and climate resilient sources of water through the Gold Coast Desalination Plant and the Western Corridor Recycled Water Scheme. A 600 km reverse flow pipeline network allows drinking water to be transported to where it is needed most, from the Sunshine Coast to Greater Brisbane, to Redlands and south to the Gold Coast.

Pursuant to the *South East Queensland Water (Restructuring) Act 2007*, Seqwater's responsible Ministers are:

- Honourable Mark Bailey MP, Minister for Main Roads, Road Safety and Ports and Minister for Energy, Biofuels and Water Supply
- Honourable Curtis Pitt MP, Treasurer, Minister for Aboriginal and Torres Strait Islander Partnerships and Minister for Sport

Seqwater reports on performance to the responsible Ministers on a regular basis through quarterly reports and an annual report. The Seqwater Chairperson regularly liaises with the responsible Ministers and provides *ad hoc* briefings as required.

Seqwater also has corresponding relationships with the Department of Energy and Water Supply and Queensland Treasury. These relationships cover reporting, oversight and regulation of business activities.

The proponent's head office is located in Ipswich at the following address:

Seqwater

117 Brisbane Street

Ipswich QLD 4305

3. NATURE OF THE PROPOSAL

3.1 Scope of the Project

As discussed in the introduction section, the Project relates to potable water security and supply in the Sunshine Coast region. Seqwater proposes to upgrade Six Mile Creek Dam to meet performance requirements of the current Queensland dam safety regulations and to ensure that dam safety is secured for the future. The upgrade will allow the dam to better manage severe weather and earthquake events.

The proposed upgrade of Six Mile Creek Dam does not change the scale of the existing water impoundment. The dam's Full Supply Level (FSL) will remain the same post-upgrade and the proposed dam infrastructure will largely occupy the existing footprint.

Finalisation of the preferred option for detailed design is not yet complete, due to ongoing geotechnical investigations at the site, but will involve upgrading the existing structure through improving the embankments and replacing the spillway. Seqwater expects the details of the preferred option to be determined by October 2017, but it is not anticipated to differ significantly from the proposed works described below. The finalised option will be the basis for environmental assessments as part of the IAR or EIS.

Upgrade of Six Mile Creek Dam will involve lowering the lake (impoundment) level to facilitate construction, removal of the existing spillway and construction of a new concrete spillway founded on weathered rock, and improvements to the existing embankments. More details of the key components are provided below.

- Temporary work in preparation for removal of the existing spillway:
    - Installation of a temporary sheet pile cofferdam upstream of the existing dam to maintain a reduced impoundment level at 90.5 m AHD during construction (10.5% capacity).
    - Lowering the impoundment level to 90.5 m AHD, by way of pumping, to reduce the life safety risk associated with potential failure of the temporary cofferdam.
    - Excavation of the existing spillway structure. The bulk of the existing spillway is expected to be removed in four to five days.
    - Construction of a low-flow diversion between the cofferdam and removed spillway (through the work site) to channel nominal catchment inflows during the construction phase.
- Construction of a new spillway structure with a mass concrete foundation based in the underlying weathered rock. The spillway will be constructed from the foundation level of the existing dam 'in the dry' and will be sequenced to allow the low-flow diversion to operate throughout the Project to manage catchment inflows. With the spillway foundations complete, the new spillway will comprise a labyrinth-type with a crest width of 135 m, designed to safely pass flood waters to meet the Queensland Guidelines on Acceptable Flood Capacity (DEWS 2013), which is discussed further in section 3.3.
- Right (eastern) embankment construction – Demolition of the existing embankment; foundation improvement works to address seepage, piping and liquefaction risks; and major reconstruction of a flatter embankment section (i.e. reduced embankment slope)
- Left (western) embankment construction – Reduction of the embankment height to flatten the slope and improve stability, while also installing a 1.5 m concrete parapet wall on the

crest to preserve the existing bank height. A filter buttress will also be installed on the downstream toe of the embankment to address piping and stability risks. The proposed approach to flatten the embankment, by reducing the earthfill height and substitute a concrete wall on the crest, allows the required stability to be achieved while minimally affecting the existing alignment of Lake Macdonald Drive and associated pipelines.

- Potentially construct a saddle dam on Collwood Road – The need for a saddle dam is still to be determined, based on ground levels, final design option, and expected flood water levels. If needed, a 100-150 m section of Collwood Road (approx.) immediately east of Noosa WTP, would be built up by 1-2 m via an earthen embankment (Figure 3-1). This would ensure that flood waters are channelled through the proposed dam spillway, rather than shortcutting through a low section, though this will depend on expected flood water levels.

During construction, stormwater flows in Six Mile Creek will pass over the cofferdam through the work area via a diversion channel. Stormwater management within and through the work area will be required.

There will be no requirement for an on-site quarry as concrete aggregates and rip rap materials will be imported from offsite sources. Existing embankment materials excavated from under the spillway slabs and the right embankment will be stockpiled on site for use in embankment reconstruction. There may be the requirement for an earthfill borrow area to supply supplementary embankment material. A borrow source/location has not yet been identified but could be located along the perimeter of the storage or with target spoil material stockpiled at the right abutment during previous construction works, pending assessment of the suitability of these materials.

The proposed dam safety upgrade concept design is shown in Figure 3-1.

3.2 Land use

The Project location, inundation footprint and land use is not proposed to change from the existing Six Mile Creek Dam and associated water impoundment (Lake Macdonald). The project location is presented in Figure 3-2.

Figure 3-1 Proposed dam safety upgrade (concept design – indicative only)

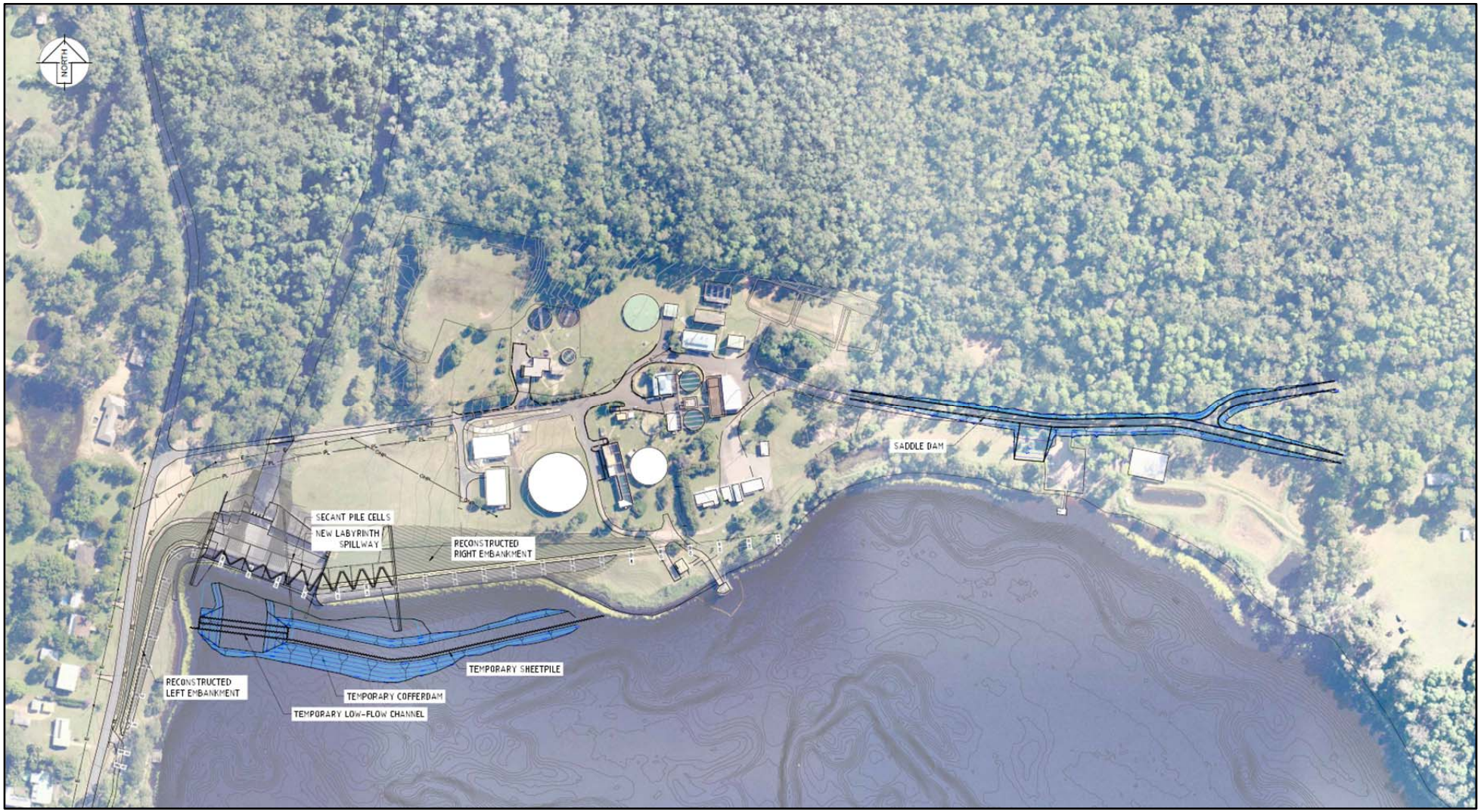
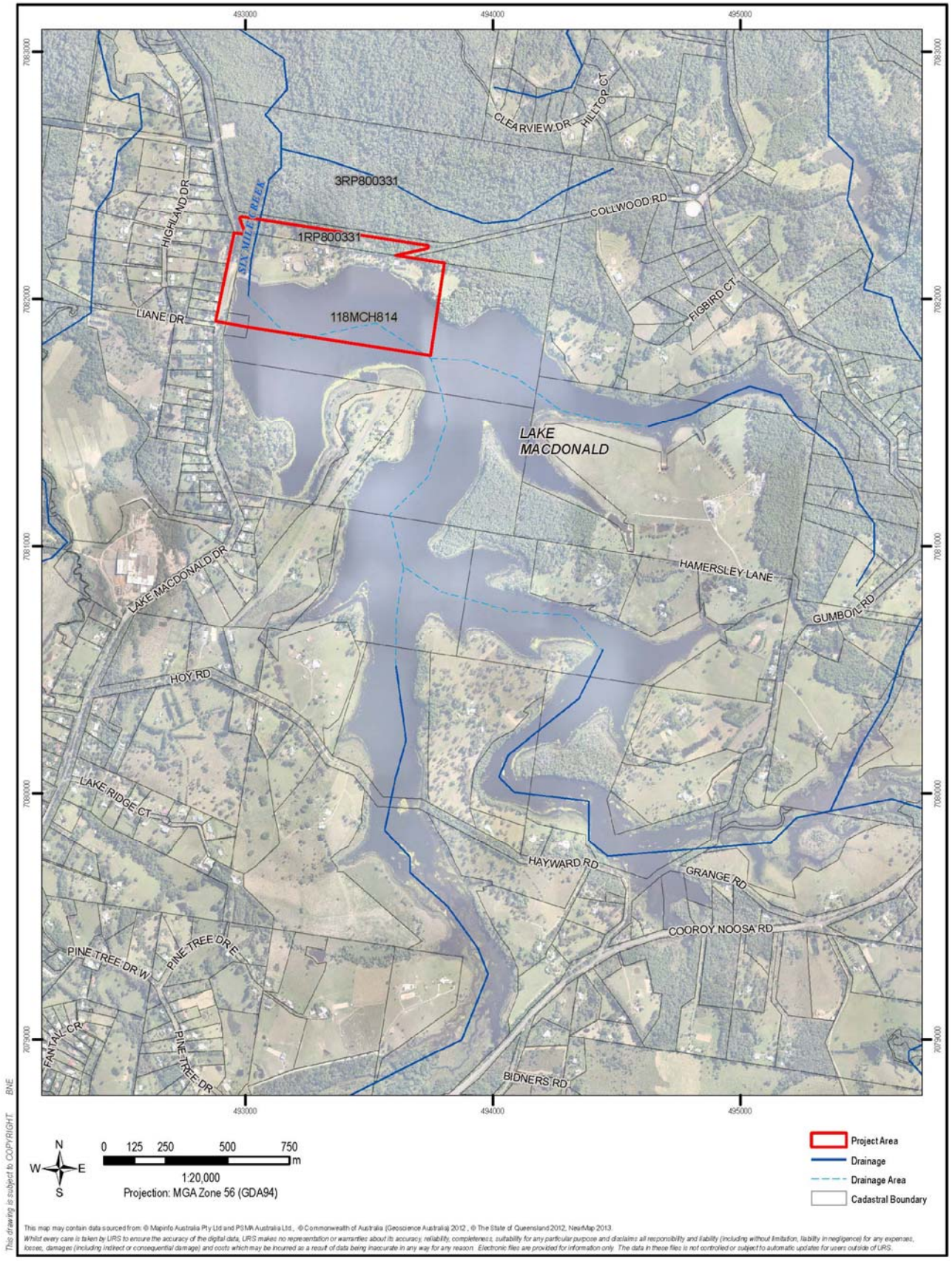


Figure 3-2 Project area



3.3 Project need, justification and alternatives considered

In 2012, Seqwater commissioned a Portfolio Risk Assessment (PRA) of its 26 regulated dams, which includes Six Mile Creek Dam. The purpose of undertaking a PRA for Seqwater's major dam assets was to provide a tool to prioritise site-specific dam safety investigations and dam safety improvement investments. It enables the establishment of a prioritised program of works to demonstrate Seqwater's commitment to meeting its obligations as a dam owner while also recognising Seqwater's responsibilities to the community of South East Queensland as a good steward of public resources.

The risks associated with a dam failure typically have a low probability of occurrence but incur extreme consequences. To ensure a consistent approach to these types of risks across dams throughout Australia, the Australian National Committee on Large Dams (ANCOLD) has developed the Guidelines on Risk Assessment (2003). The Seqwater PRA was undertaken in accordance with the ANCOLD Guidelines.

The PRA was also undertaken with reference to the Queensland Guidelines on Acceptable Flood Capacity (DEWS 2013), which requires that "dam owners should ensure that their dam can safely pass floods up to the Acceptable Flood Capacity" (AFC). AFC has been a significant driver of Seqwater dam improvement projects, due to the high standards and mandatory timeframes to meet the standards. The PRA methodology addresses the AFC risk assessment procedure and also ensured that:

- each dam was reviewed by an expert panel to ensure that all viable paths to failure were identified
- the risk to life at each dam was assessed using a consistent methodology
- dam safety issues were prioritised within the context of risk to life
- opportunities to stage upgrades could be identified.

The dam safety issues (hazards) that feed into a risk profile include flood capacity, earthquake stability, dam design, changing of standards, downstream development, and anticipated unknowns. These issues are then balanced against consequence for the dam site and surrounds (e.g. loss of life, environmental damage, economic losses). In addition to quantifying risks and enabling prioritisation across Seqwater's dam assets, the risks are also compared with ANCOLD guidelines on societal risks and tolerability for existing dams.

For Six Mile Creek Dam, the identified key risks were failure by piping through the embankment during flood, and liquefaction of foundation materials under the spillway due to earthquake. Factors that contribute to the key risks of Six Mile Creek Dam failure include the original dam design and changing of design standards, deterioration of structural elements (based on recent condition assessment), downstream development leading to greater population at risk, and presence of alluvial sands in the dam foundations with potential for liquefaction during earthquake.

The PRA estimated societal risk for Six Mile Creek Dam at just above the ANCOLD defined limit of tolerability. Based on societal risk criteria provided by ANCOLD, action should be taken to reduce the risk.

The PRA also found that Six Mile Creek Dam does not satisfy the DEWS AFC guideline and requires an upgrade to meet the requirements. The AFC guideline stipulates that prioritisation of upgrades should be based on risk, related to the limit of tolerability. The current prioritisation of an upgrade for Six Mile Creek Dam is in line with the outcomes of Seqwater's PRA.

3.3.1 Alternatives to Project – Risk Reduction Options

As part of Seqwater's Dam Improvement Program, a range of options were considered to reduce the safety risks identified for Six Mile Creek Dam. In general, the options considered were:

- Adopt risk reduction strategies – this option would maintain the dam in its current condition, but limit the impact of dam failure by reducing the population at risk. This would be done primarily through the purchase of 'at risk' properties downstream of the dam, and would also include improvements to dam monitoring and early warning systems. This option would fail to satisfy legislative risk requirements, and was ruled out.
- Partial dam upgrade – this option was eliminated due to the presence of potentially liquefiable material beneath the existing spillway foundation and the associated residual dam safety risks of post-earthquake dam performance.
- Reconstructing the embankment and relocating the spillway to the right of the dam – this option was subsequently eliminated due to poor foundation conditions, regulatory approval, land ownership and environmental issues.
- Decommissioning the storage – this option was subsequently eliminated primarily due to the potential impacts on Seqwater operations, the cost of providing an alternate water source to meet future demand, and the potential long-term environmental impacts of rehabilitating the Six Mile Creek ecosystem.
- Replacing Six Mile Creek Dam with a 2,000 ML weir structure located downstream of the existing dam – this option was subsequently eliminated due to the need to augment the regional water supply with an additional storage identified at Coles Crossing Weir, an increase in the downstream flooding impacts and potential water quality and environmental impacts due to the smaller storage size.
- New dam options – a range of new dam options was considered in locations upstream, downstream and at the existing dam location. These new dam options looked attractive and a preferred upstream dam location was initially preferred. However the costs of the new dam options increased substantially based on the outcomes of geotechnical investigations undertaken in 2015 and a new dam was ruled out.

The preferred dam upgrade option and description are presented in Section 3.1.

3.4 Key Project components to be declared

Activities to enable upgrading the existing Six Mile Creek Dam include:

- temporary lowering of Lake Macdonald
- creation of a laydown area and concrete batching plant
- temporary works to manage water flows through the construction area (refer to Section 3.1)
- construction of a new outlet
- construction of a new spillway
- upgrading of the dam embankments
- construction of saddle dam on Collwood Road (still to be confirmed)
- construction of fish passage infrastructure – either at the Six Mile Creek Dam site or delivery of a suitable offset.

3.5 External infrastructure requirements

The Project site can be accessed through two existing roads, Collwood Road and Lake Macdonald Drive. Most construction traffic will use these roads to access the project site. Mains power and potable water will be required during construction for site utilities and to support construction activities. These will be supplied as existing services.

3.6 Project timeframes

The proposed commencement and completion of each Project phase, including the design, is listed in Table 3-1. Construction commencement is scheduled around the April-May period of 2019, as a likely time of lower incident rainfall. These conditions will facilitate drawdown of the lake and rapid demolition of the existing spillway. Despite these plans, commencement of construction is contingent on actual forecast weather and also on water levels in South-East Queensland grid-connected dams at that time.

Table 3-1 Key phases and timeframes for the project

Activity	Timeframe	Status
Phase 1 - Planning and concept design (including investigative works)	2014	Complete
Phase 2 - Options assessment and preliminary design	2015-16	Complete
Phase 3 - Design expert review and design optimisation	2017	Underway
Phase 4 - Detailed design and approvals	2017-18	Pending finalised option and business case approval
Phase 5 - Construction	2019-20	Planned (subject to approvals) Likely timeframe: 18-24 mth

3.7 Construction and operational processes

As the preferred option is an upgrade of the existing dam, most construction activities will occur in previously disturbed areas.

A reliable water supply will be needed for concrete batching, moisture conditioning of the soil for the embankment construction and dust suppression. Water supply for construction purposes will be supplied through existing infrastructure on-site.

Existing roads (Lake Macdonald Drive and Collwood Road) will be used to bring construction materials and equipment on site (e.g. concrete aggregates, construction equipment). The proposed construction site will include a network of access roads from the east side of the Noosa Water Treatment Plant (WTP) to the west side of the WTP and within the construction footprint. The WTP will continue to operate throughout construction.

Soil and rock excavated from inside the foundation cells may not be suitable for re-use and may require on-site disposal. Removal of other materials, such as concrete and steel, from the existing embankment may require off-site disposal.

Temporary construction measures to manage and maintain a lowered lake (e.g. cofferdam and low-flow channel) are expected to be in place for the duration of the construction phase. This is estimated to be 18-24 months. Throughout the construction phase, exclusion of public access to the dam embankment is likely (i.e. the vicinity of construction). Public access to other parts of the lake area is expected to be restricted only where warranted for public safety. Further investigation and planning for public access will be required, and will include community consultation.

3.8 Workforce requirements during construction and operation

Workforce numbers have not yet been assessed but are estimated to be less than 100 construction workers in total. There will be no camp style accommodation and it is envisaged that workers will stay in local communities and commute to the site daily. Employment opportunities would not extend beyond construction, as operation of the upgraded asset would be largely similar to the existing situation

3.9 Economic indicators

Based on concept design work undertaken to date, the Project's capital expenditure ranges from $85 million to $90 million. The cost estimate will be further developed as part of the Project's detailed design process. The capital expenditure for the Project has been identified in Seqwater's Dam Capital Works Program, which is provided to the Queensland Government for budgeting purposes, as described in Section 3.10.

Due to the nature of the Project, the economic benefits are expected to be mainly confined to the local and regional level during the construction phase. The construction phase will contribute to the local economy through direct and indirect employment. Local companies will be provided with some increased business opportunities, particularly related to sourcing of construction materials.

Following construction, existing operational requirements will recommence and will contribute to the local and regional economy through direct and indirect employment, related to Seqwater's continued operation of the dam and associated WTP, as well as associated activities and tourism.

3.10 Financing requirements and implications

The Queensland Bulk Water Supply Authority (Seqwater) is a Statutory Body under the *Financial Accountability Act 2009* and the *Statutory Bodies Financial Arrangements Act 1982*. As a Statutory Body, Seqwater does not exist in perpetuity and the State of Queensland is the successor in law at the expiry date. Seqwater is controlled by the State of Queensland, which is the ultimate parent.

The Queensland Government's support for Seqwater includes facilitating the provision of funding facilities through Queensland Treasury Corporation (QTC) to ensure the availability of funds to meet the working capital and capital works requirements of Seqwater. Funding requirements are generally met through operating revenue, but any funding shortfall is met with QTC loan facilities.

In support of funding requirements, capital works planning is documented in an Asset Portfolio Master Plan (APMP), which is Seqwater's primary capital planning document, covering short, medium and long term capital projects and programs. The APMP includes the 2017-18 capital budget and forward estimates, including the Six Mile Creek Dam upgrade capital works. The APMP also forms the basis of Seqwater's capital submission to the Queensland Competition Authority (QCA), which regulates Seqwater and recommends bulk water prices.

4. LOCATION OF KEY PROJECT ELEMENTS

4.1 Location

The Project area within the local context is shown in Figure 3-2. The closest town to Lake Macdonald is Cooroy, with the town centre being approximately 10 km from the proposed construction area. Tewantin and Noosa are the next closest urban centres. The proposed construction area is adjacent to Lake Macdonald Drive and Collwood Road. Residential properties are present on the western side of Lake Macdonald Drive within approximately 100 m of the proposed construction area.

4.2 Tenure

There is no intended change in the dam's footprint or tenure as a result of the Project. The construction footprint is located within Lot 118 MCH814, Lot 1 RP800331 and also within the road reserves of Lake Macdonald Drive and Collwood Road as presented in Figure 3-2. The tenure of Lot 118 MCH814 and Lot 1 RP800331 is freehold and owned by the proponent. Lake Macdonald Drive and Collwood Road are road reserves controlled by Noosa Shire Council.

As described in Section 5.2, the Project is located in the Noosa council area and falls under the Noosa Plan.

5. DESCRIPTION OF THE EXISTING ENVIRONMENT

5.1 Natural environment

5.1.1 Land

The area surrounding the Project site can be roughly divided into two areas. Upstream land is characterised by undulating pasture and a high proportion of semi-rural residential land-uses. Downstream land is characterised by minor rural and semi-rural residential properties, and large areas under forest and sections of Tewantin National Park. Existing land uses within the catchment are reflected in the planning scheme zones shown on Figure 5-6.There are several biodiversity values identified in the vicinity of Six Mile Creek Dam, particularly on downstream land, including wetlands, Tewantin National Park and conservation corridors.

State mapping of wetlands shows that both riverine and palustrine wetlands associated with Six Mile Creek occur downstream of the spillway. As depicted in Figure 5-1, the palustrine wetland is mapped entirely within Tewantin National Park, while riverine wetlands are mapped immediately downstream of the existing Six Mile Creek Dam spillway. Lake Macdonald is mapped as a lacustrine wetland. No Ramsar wetlands are mapped within the Project area.

Tewantin National Park comprises numerous protected areas within the region, the closest of which is immediately north of the Noosa WTP. Tewantin National Park supports remnant vegetation contiguous with other local protected areas:

- the Great Sandy National Park
- Harry Spring Conservation Park
- Yurol State Forest
- Ringtail State Forest.

Bioregional and subregional conservation corridors have been identified in the more developed bioregions of Queensland through the Biodiversity Planning Assessment (BPAs). The biodiversity significance of an area is determined by its ecological value, such as rarity, diversity, fragmentation, habitat condition, resilience, threats, and ecosystem processes.

Remnant areas north of the Six Mile Creek Dam spillway are mapped as being of State significance under the BPA corridor mapping, as presented in Figure 5-2. Areas in which essential habitat mapping and State significant corridors overlap are mapped as State significant corridors for endangered, vulnerable and rare (EVR) taxa.

Lake Macdonald supports habitat values for native fish, waterbird, amphibian, and reptile fauna. Species of conservation significance also potentially utilise the lake. Details of existing flora and fauna within Lake Macdonald are summarised in Section 5.1.5.

The geology of the Project site was also reviewed, based on the Queensland DME 1:100,000 series map (1999), which indicates that the Project site is underlain by quaternary alluvium overlying Upper Triassic-Jurassic period Myrtle Creek sandstone comprised of quartzose sandstone, orthoquartzite, sub-labile to labile sandstone, siltstone and shale. Geology has played a key role in the need for the Project, and will be a focus for design. Geology and soils are not expected to be affected by the proposed Project, given the scale and existing situation, and will not be discussed further in project impacts.

Figure 5-1 Regional ecosystems and environmental sensitive areas

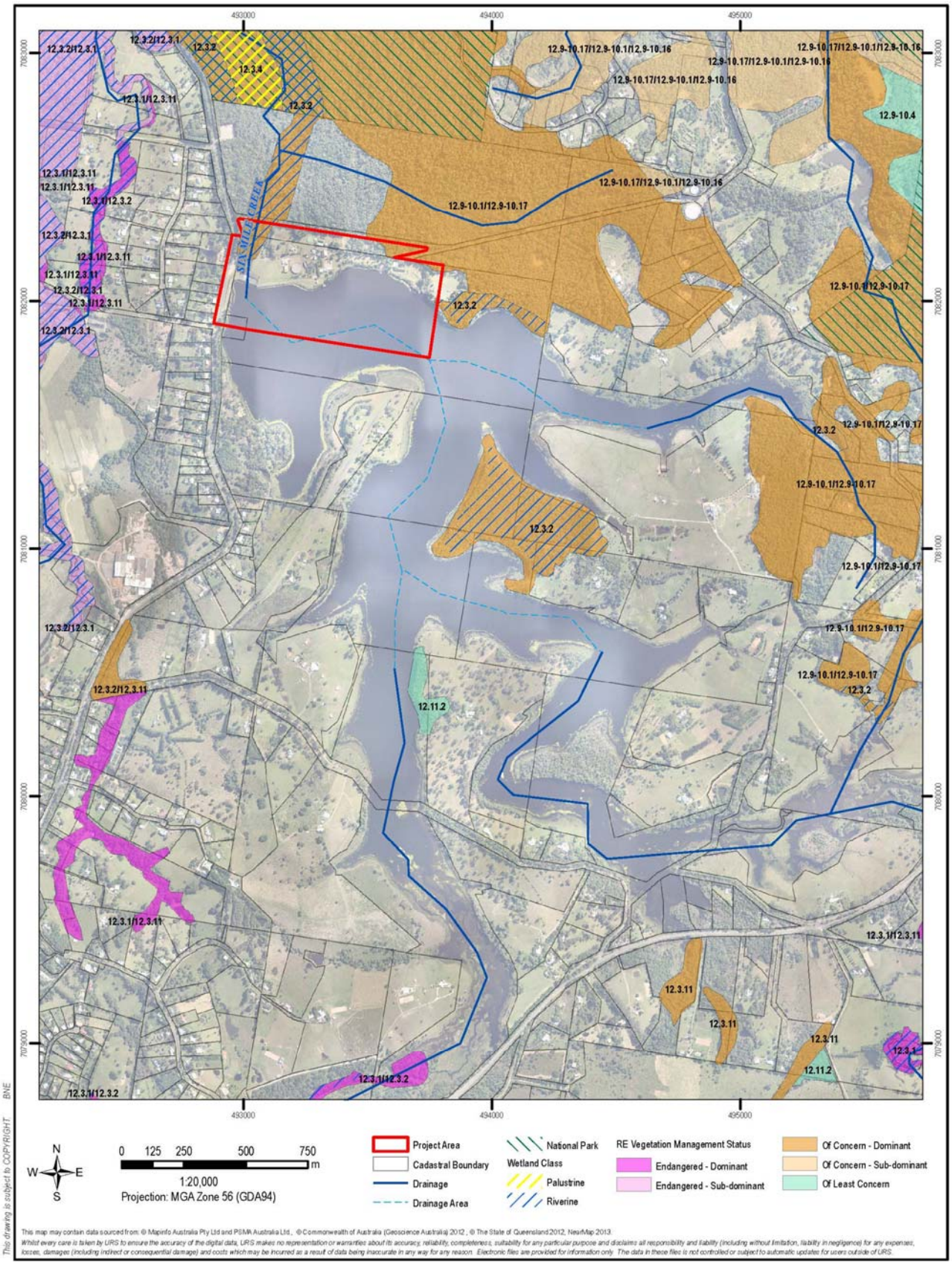
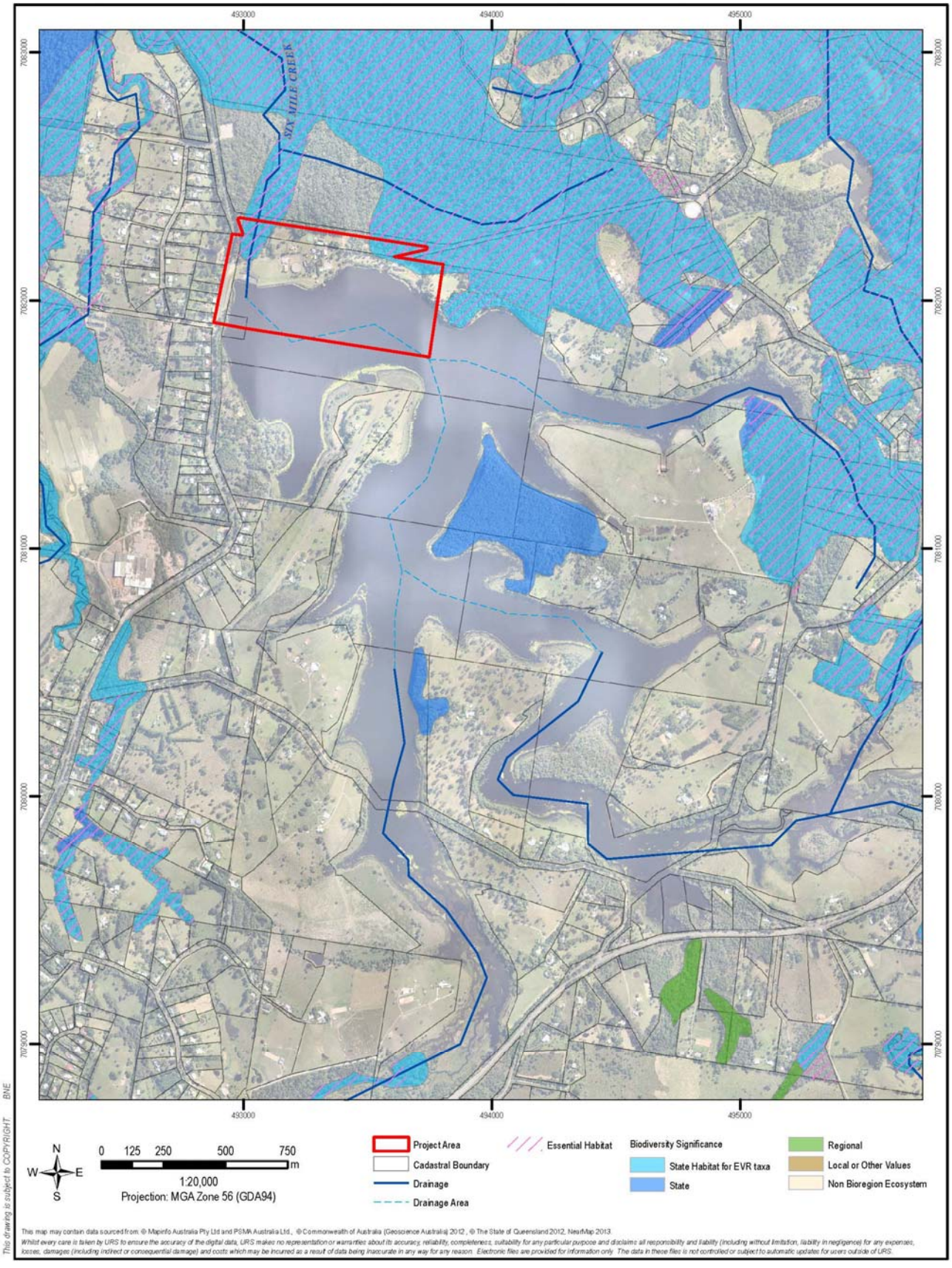


Figure 5-2 Lake Macdonald BPA corridor mapping and essential habitat



5.1.2 Water

As part of the Mary Basin Resource Operations Plan (ROP), Seqwater operates Six Mile Creek Dam under licence to impound and take water. Six Mile Creek in its entirety extends from headwaters around Cooroy northwards to the Mary River near Gympie.

Six Mile Creek Dam is located 5-10 km downstream of the main headwater tributaries and 40 km upstream of confluence of Six Mile Creek and the Mary River (Figure 5-3). In general, the dam catchment is previously disturbed by clearing for logging and farming.

As a water storage asset, the existing dam and proposed upgrade are intimately related to waterways and flooding. While Six Mile Creek Dam is primarily a water storage dam with no flood mitigation objectives, a comparison of the inflow and outflow at Six Mile Creek Dam indicates that the dam currently provides some level of flood attenuation (*Lake Macdonald Dam – Preliminary Design Hydrology, Seqwater 2009*).

During Project construction, flooding of the site is expected to occur because of the location of necessary works within the dam outlet area. An estimate of the number of days where construction site flooding may occur is provided in Table 5-1. Note that this represents flows greater than the capacity of the proposed low-flow channel through the construction site and should not affect areas proposed for construction lay-down and concrete batching.

Table 5-1 Number of days per season that the average daily inflow rate exceeds low-flow channel capacity

Exceedance Probability	Season				Annual
	Summer	Autumn	Winter	Spring	
50%	0	0	0	0	1
20%	0	1	0	0	3
10%	2	1	0	0	5
5%	3	3	1	0	7
1%	5	4	3	2	11
Maximum	8	6	3	3	12

The Project area has defined waterway environmental values (EVs) and water quality objectives under the *Environmental Protection (Water) Policy 2009* (within the Mary River environmental values and water quality objectives, Basin No. 138, including all tributaries of the Mary River). There are defined EVs and water quality objectives for Six Mile Creek. The EVs identified for the surface water environment within the Project area are summarised in Table 5-2.

5.1.2.1 Environmental Flows

The Mary Basin ROP includes operating rules to achieve ecological outcomes in Six Mile Creek downstream of the dam. The stated outcomes are to minimise changes to the low flow regime of the creek, and to minimise changes to the hydraulic habitat requirements of species such as the Mary River cod and lungfish.

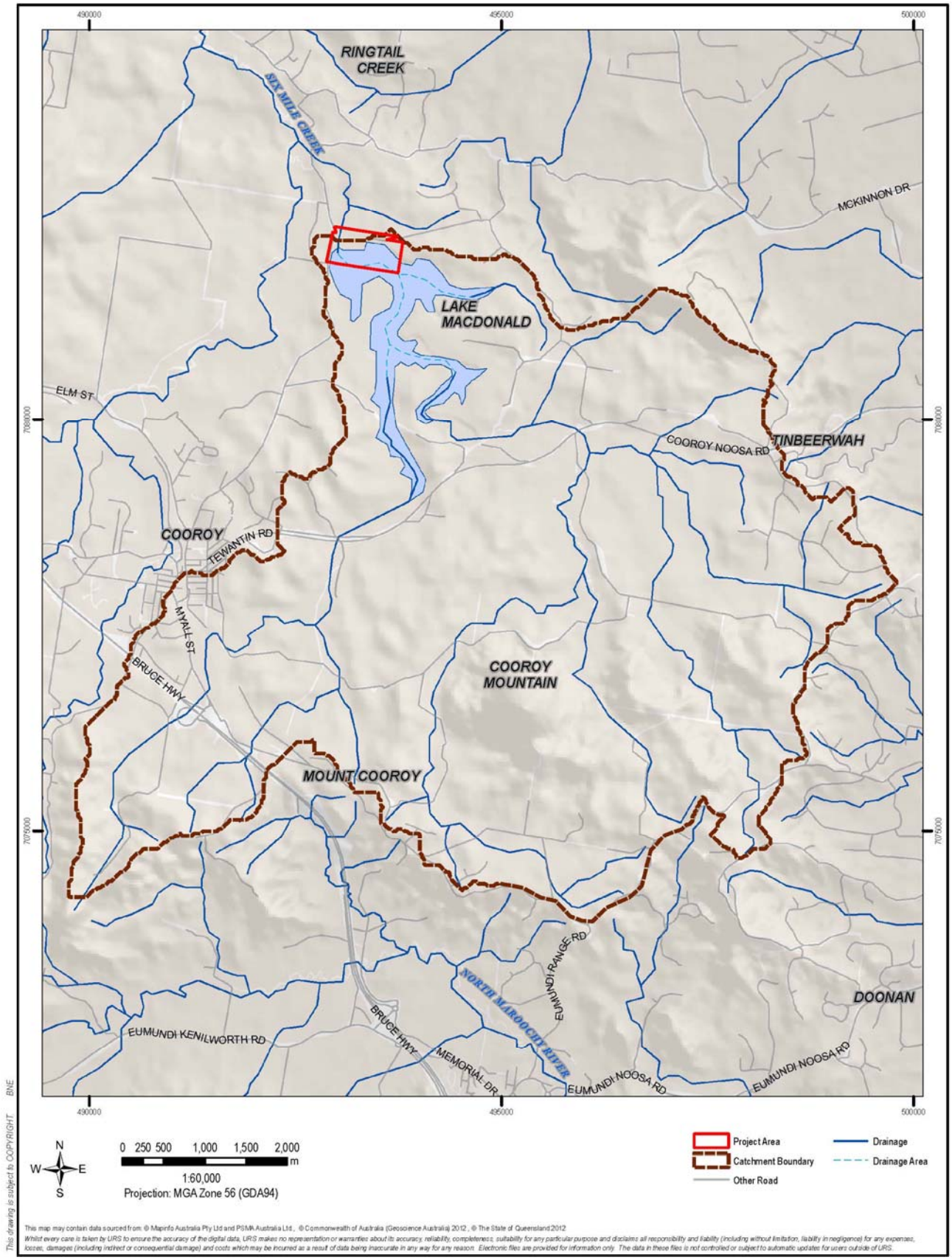
Seqwater's water licence to interfere with the flow of water (impound Six Mile Creek) under the Mary Basin ROP provides for these outcomes through a condition for daily releases from the dam when catchment inflows occur.

Table 5-2 Environmental values for surface waters within the project area

Environmental values	Mary River Basin	
	Six Mile Creek – freshwater	Mary River – upland freshwater
Aquatic ecosystems	✓	✓
Irrigating crops	✓	✓
Agriculture (farm use)	×	✓
Stock watering	✓	✓
Aquaculture	✓	✓
Human consumption	✓	✓
Primary recreation	✓	✓
Secondary recreation	✓	✓
Visual appreciation	✓	✓
Raw drinking water	✓	✓
Industrial use	×	✓
Cultural and spiritual values	✓	✓

✓ = Environmental Value applicable to surface water resources within the Project area.
× = Environmental Value not applicable to surface water resources within the Project area.

Figure 5-3 Lake Macdonald catchment



5.1.3 Air

The air quality within the Project area and surrounds is considered to be consistent with a semi-rural setting and of high quality. Localised air quality impacts are from dust generated from stock movements, dust of natural origin, bushfires and controlled burns, and vehicular movements on unsealed roads. Several townships are located near the Project area. These townships generate localised air emissions from motor vehicles as well as domestic, industry and business activities.

5.1.4 Ecosystems

The Project area (depicted in Figure 3-2) is located within the South East Queensland bioregion, which is known to have high floristic and faunal diversity created by the bioregion's unique combination of landform, soil and climate (Sattler and Williams, 1999). Population expansion within the bioregion is a major threat to biodiversity, with rapid changes to the established land use patterns occurring, particularly along the coastal lowlands (Sattler and Williams, 1999). In addition to land use changes, threats to biodiversity values include impact from weeds and feral animals.

The Lake Macdonald water body and vegetation along Six Mile Creek are situated within the Southern Coastal Lowlands subregion. This subregion is centred on sedimentary rocks of the Nambour Basin and includes marine and estuarine sediments and the high dunes of the southern offshore islands. Major vegetation types within this province are heathlands and banksia woodlands, *Melaleuca quinquenervia* forests and woodlands, mangrove forests, sedgelands and *Eucalyptus racemosa* and *E. pilularis* open forests and tall forests (Sattler and Williams, 1999).

Within the Project area, vegetation to the north east of the spillway is situated within the Great Sandy subregion. This subregion comprises sand masses and the sandstone hills and riverine plains of the upper Noosa River catchment. Major vegetation types include notophyll rainforest, mixed eucalypt open forests, banksia woodland and *Melaleuca quinquenervia* woodland (Sattler and Williams, 1999).

The Project is surrounded by a semi-rural residential area (Lake Macdonald suburb) directly to the west and supports large tracts of remnant vegetation to the north, west and east. Remnant vegetation is largely contained within a network of National Parks and state forests. Cattle grazing occurs to the south of the dam.

Current Queensland Department of Environment and Heritage Protection (EHP) mapping of the area depicts five Regional Ecosystems (REs) as occurring either within or in proximity to the Project area. These are detailed below in Table 5–3 and their extent in relation to the Project area is depicted in Figure 5–1.

Table 5-3 Regional Ecosystems (RE) mapped within the project area

RE Code	Short description	Status	
		VM Act[1]	Biodiversity[2]
12.3.2	*Eucalyptus grandis* tall open forest on alluvial plains.	Of concern	Of concern
12.3.4	*Melaleuca quinquenervia*, *Eucalyptus robusta* open forest on or near coastal alluvial plains.	Of concern	Of concern

12.9-10.1	Shrubby open forest often with *Eucalyptus resinifera*, *E. grandis*, *Corymbia intermedia* on sedimentary rocks.	Of concern	Of concern
12.9-10.16	*Araucarian microphyll* to notophyll vine forest on sedimentary rocks.	Of concern	Endangered
12.9-10.17	Open forest complex often with E*ucalyptus acmenoides, E. major, E. siderophloia* +/- *Corymbia citriodora* on sedimentary rocks.	Least concern	No concern at present

1 - *Vegetation Management Act 1999* class as per EHP (2015)

2 - Biodiversity Status as per EHP (2015)

High value regrowth containing endangered and of concern regional ecosystems is mapped immediately north of Lake Macdonald.

EPBC Act protected Threatened Ecological Communities (TEC) do not occur within the Project area, based on analogous Queensland RE mapping. The endangered RE 12.3.1 (Gallery rainforest (notophyll vine forest) on alluvial plains) occurs west of the Project area on private property. This RE is analogous with the critically endangered EPBC TEC *Lowland Rainforest of Subtropical Australia*, but occurs outside the Project footprint.

5.1.5 Flora and fauna

Conservation significant flora and fauna values listed in State and Commonwealth legislation were targeted in a desktop assessment undertaken in 2013 and a subsequent review undertaken in 2015 to incorporate updates to desktop databases. These values include significant vegetation communities, flora, fauna and aquatic species, habitat and dispersal corridors.

Identified conservation significant flora and fauna species include any Critically Endangered, Endangered, Vulnerable or Near Threatened taxa listed as per:

- The *Queensland Nature Conservation (Wildlife) Regulation, 2006* under the provisions of the *Nature Conservation Act 1992* (Qld) (NC Act)
- The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Target species also included migratory bird species listed under:

- Convention of Migratory Species of Wild Animals (Bonn Convention)
- Bilateral agreements between Australia and Japan (JAMBA), Australia and China (CAMBA), and Australia and Republic of Korea (ROKAMBA).

A search of the biodiversity databases identified the potential presence of conservation significant vegetation communities and flora and fauna species. Other areas of environmental significance such as wetlands and essential habitat were also identified.

In addition, desktop database searches were supplemented with field studies of aquatic ecology for the Project (FRC, 2016) and detailed ecology assessments in the Project area undertaken for the Northern Pipeline Interconnector Stage 2 (LinkWater, 2008)

5.1.5.1 Desktop information

A search of the biodiversity databases (DEE, 2016; Queensland Herbarium, 2013; DSITIA, 2013 and Queensland Museum, 2013) identified 15 flora and 26 fauna conservation significant species as potentially occurring in the area. These species and their respective legislative status are listed in Appendix C.

In addition to the biodiversity databases, migratory fauna listed under the EPBC Act are regarded as conservation significant fauna. The database review identified 11 migratory fauna as potentially occurring in the project area. These species are listed in Appendix C.

Queensland remnant vegetation (RE) mapping of project area also provides a spatial representation of likely occurrence of conservation significant species with respect to essential habitat. The extent of essential habitat within the vicinity of the Project area is presented in Figure 5-2. Essential habitat indicates that the following conservation significant fauna species are likely to occur in the project area and surrounds.

- Giant barred frog *(Mixophyes iteratus*)
- Koala (*Phascolarctos cinereus*)
- Wallum froglet (*Crinia tinnula*)
- Wallum rocketfrog (*Litoria freycineti*)
- Mary River cod (Maccullochella mariensis)
- Australian lungfish (Neoceratodus forsteri)
- Mary River turtle (Elusor macrurus)
- White-throated snapping turtle (Elseya albagula).

High value regrowth communities mapped the area are also mapped as essential regrowth habitat for the koala (*Phascolarctos cinereus*) by EHP.

5.1.5.2 Field studies

As part of the Project's planning phase, Seqwater commissioned assessment of aquatic fauna and habitats within Six Mile Creek and in Lake Macdonald, with particular focus on conservation significant species. The assessment, undertaken by FRC Environmental (FRC, 2016) combined desktop, expert opinion and field based assessment. FRC (2016) findings in relation to conservation significant species are provided in Table 5-4.

In addition to conservation significant species, FRC (2016) found that:

> Diverse fish communities were found in each of the assessment zones, with many of the fish species caught requiring to undergo migration to complete their life-history. Some species present in the downstream zone were not caught in the upstream zone, indicating that the dam wall is a barrier to movement and excludes these species from the upstream zone. Some of the fish species caught also require diadromous migration (i.e. migration between freshwater and estuarine or marine waters to complete the life cycle), although a number of diadromous species that were expected were not present in the survey samples, which suggests the possibility of cumulative impacts to fish passage between the estuary and Six Mile Creek by barriers in the lower Mary River. Two species of pest fish were caught, eastern Gambusia and swordtails.

Six Mile Creek also supports four common native species of freshwater turtle, with the upstream zone having higher richness and abundance of turtles than the downstream zone.

Field studies of terrestrial flora and fauna have not yet been undertaken, but previous studies for the Northern Pipeline Interconnector Stage 2 (LinkWater, 2008) provide sufficient information on the known occurrence of conservation significant species. Details of these species are provided in Table 5-4.

Table 5-4 Conservation significant species and known occurrence

Species	Known occurrence
Mary River cod (*Maccullochella mariensis*) (Endangered)	The Mary River cod has a preference for deep pool habitats with large woody debris and is therefore sensitive to changes in water levels. This species is known to occur in Six Mile Creek, particularly within the downstream zone of Lake Macdonald. The population downstream can be classed as key breeding population within a key habitat area, therefore a significant source of recruitment (FRC, 2016). It is also likely that a small population exists within Lake Macdonald and may be classed as a breeding population with limited recruitment (FRC, 2016). This is likely to be attributed to historical stocking of Mary River cod within the lake.
Australian lungfish (*Neoceratodus forsteri*) (Vulnerable)	This species is known to occur in Six Mile Creek, particularly within the downstream zone of Lake Macdonald. However, the abundance of lungfish in this area is much lower than in other tributaries of the Mary River where submerged aquatic plants are abundant (FRC, 2016). An aquatic assessment conducted by FRC (2016), in consultation with experts in this field, concluded that the population downstream of the dam can be classed as breeding population, with limited recruitment. It was determined that some recruitment by Australian lungfish may occur in Six Mile Creek downstream of the dam in undercut banks amongst fine root systems some years, though breeding habitat is marginal compared with other known areas of occupancy such as Mary River tributaries. The population within Lake Macdonald is unknown as there is little survey data available. FRC (2016) noted that the limited suitable habitat and fluctuations in water levels that currently occur are likely to limit the abundance and recruitment success of lungfish. While the species is likely to occur within Lake Macdonald, it is well documented that lungfish do not breed in impounded waters (Kind, 2002). FRC (2016) concluded that the population within Lake Macdonald can be classed as non-breeding, occasional occurrence in marginal habitat.
Mary River turtle (*Elusor macrurus*) (Endangered)	The Mary River turtle has been identified as potentially occurring within Six Mile Creek on a periodic basis, though is considered unlikely to breed in this area (FRC, 2016). Six Mile Creek is not identified as one of the Mary River tributaries known to contain significant populations of the species (Limpus, 2008). It has been concluded that the species is likely to utilise Six Mile Creek as a dispersal and migration corridor to an extent, though the existing dam would be a barrier to movement (FRC, 2016). The Lake provides suitable but limited non-breeding habitat for the Mary River turtle. Any population within the Lake has been classed as a non-breeding population, occasional occurrence in marginal habitat (FRC, 2016). Recent surveys by FRC (2016) conducted within and around Lake Macdonald did not identify any individuals.

Species	Known occurrence
White-throated snapping turtle (*Elseya albagula*) (Critically endangered)	The white-throated snapping turtle is been identified as potentially occurring within Six Mile Creek on a periodic basis, though it is considered unlikely to breed in this area (FRC, 2016). Six Mile Creek is not identified as one of the Mary River tributaries known to contain significant populations of the species (Limpus, 2008). Aquatic surveys undertaken by FRC found there to be limited suitable habitat for residing and breeding in the downstream section of Six Mile Creek. The white-throated snapping turtle population downstream is considered to be rare, and have limited recruitment (FRC, 2016). Very little survey data is available on the white-throated snapping turtle within Lake Macdonald. Aquatic surveys conducted within, upstream and downstream of Lake Macdonald did not identify any individuals. Following the aquatic assessment and consultation with experts, it was concluded that Lake Macdonald provides very limited suitable habitat and the population within the dam has been classed as species rare, non-breeding (FRC, 2016).
Giant barred frog (*Mixophyes iterates*) (Endangered)	A Queensland essential habitat record for the giant barred frog is located along Six Mile Creek approximately 150 m downstream of the dam, and a second record is located approximately 1.2 km further downstream. Critical habitat for the giant barred frog is defined in the Recovery plan for stream frogs of south-east Queensland 2001 – 2005 (Hines et al, 2002) as permanent freshwater streams from 0-700 m altitude, in rainforest and other forest communities of the McPherson, Main, D'Aguilar, Blackall Range, Conondale Range and the Bunya Mountains. This includes narrow riparian rainforest remnants along streams and their major tributaries including Mary River, of which Six Mile Creek is a major tributary. The abundance or distribution of this species in the area has not been quantified through field surveys at this stage of the project. The environmental assessment will undertake targeted surveys for the giant barred frog along Six Mile Creek, targeted areas of the impoundment and Collwood Road.
Koala (*Phascolarctos cinereus*) (Vulnerable)	Essential habitat for koala is mapped across the remnant vegetation communities downstream of the Project area, particularly RE 12.3.2 and RE 12.9-10.1/12.9-10.17. Both REs occur extensively in the surrounding area. A preliminary assessment of the vegetation that may require clearing has been undertaken using the koala habitat assessment tool (coastal context) provided in the EPBC Act referral guidelines for the vulnerable koala. According to this assessment, the vegetation communities along Six Mile Creek are 'habitat critical to the survival of the species'. However, the area of vegetation within the Project area is minimal and on the edge of large forested areas, where fragmentation or creating isolated patches of vegetation is unlikely.
Southern penda (*Xanthostemon oppositifolius*) (Vulnerable)	The southern penda is known from three general localities in south-east Queensland, covering a range of approximately 250 km. It is known from Kin Kin–Boreen Point–Cooroy District (near Noosa); Teddington Weir (south of Maryborough); and Granite Creek–Broken Creek (south-west of Miriam Vale) (Barry & Thomas, 1994; Queensland Herbarium, 2008). Penda is found predominantly along watercourses, on sandy clays derived from sedimentary rocks. Penda grows in various types of vine forest with Hoop Pine (Araucaria cunninghamii var. cunninghamii) emergents, or in transitional rainforest with rainforest species restricted to a developing understorey or mid-storey (Barry & Thomas, 1994). Specimens are known to occur near Six Mile Creek and Lake Macdonald, though these known locations are outside of the Project area. In the vicinity of Lake Macdonald, specimens were generally found in association with RE 12.3.1 (Gallery rainforest (notophyll vine forest) on alluvial plains), which occurs along the Six Mile Creek (Left Arm), west of the Lake (LinkWater, 2008).

Some information on the known occurrence of migratory birds listed under the EPBC Act was also available for the Project area and surrounds, based on a Lake Macdonald Catchment Care Group publication (LMCCG, 2001). Recorded species and known habitat characteristics are provided in Table 5-5.

Table 5-5 Migratory species and known occurrence

Species	Known occurrence
Cattle egret (*Ardea ibis*)	This species has previously been recorded at Lake Macdonald (LMCCG, 2001). It is a highly mobile species noted to be widespread and common according to migration movements and breeding localities surveys (DoE, 2017). Cattle egrets occur in a variety of habitats from wetlands to farmland with livestock to rubbish tips. No breeding sites are known near the Project area; however, the species breeds around wetlands and therefore it is possible for breeding sites to be present. Field surveys will be conducted to determine the presence of any breeding sites in the vicinity of the proposed works.
Eastern great egret (*Ardea modesta*)	This species has previously been recorded at Lake Macdonald (LMCCG, 2001). It is widespread across Australia and inhabits a wide range of wetland habitats, including both inland and coastal, saline and freshwater (DoE, 2017).
Glossy ibis (*Plegadis falcinellus*)	This species has previously been recorded at Lake Macdonald (LMCCG, 2001). Glossy ibis is highly mobile and inhabits large areas of suitable habitat, moving across its migratory range depending on rainfall (DoE, 2017).

5.1.6 Amenity

The amenity of the Project area includes the aspects of noise and vibration, visual aesthetics and odour. The existing environment within the Project area and adjacent surrounds for these aspects is considered to be consistent with a semi-rural setting. Localised noise and vibration impacts are primarily from vehicular movements in the vicinity of the Project area.

5.2 Social and economic environment

The Project is located in a semi-rural area within the Noosa Shire local government area. The region surrounding the Project area supports small to medium sized country and coastal towns, and dispersed rural to semi-rural populations. The predominant land uses include agriculture, forestry, rural residential, and a variety of uses such as conservation, tourism and recreational activities.

The Noosa Shire Council is a re-established Council following its de-amalgamation from the Sunshine Coast Regional Council on 1 January, 2014.

Noosa Shire comprises a population of around 50,000, with population growth accelerating for the first time in many years, growing 1.4% in 2014 (compared to 1.2% the previous two years). At the same time, population growth across South East Queensland (SEQ) has slowed. Given the importance of population growth to the Noosa Shire economy, this is a noticeable and important change.

The Noosa Shire economy is typical of a lifestyle and tourism destination. Much of the economy is geared towards tourism and population-driven industry sectors (i.e. retail,

accommodation and food services, health care, etc.). The economy is reliant on tourism and population growth to generate economic growth. Gross Regional Product (GRP) in Noosa Shire was just under $2.6 billion in 2013-14. Growth of GRP in Noosa Shire over 2013-14 was 5.6%, compared to 1.8% and 2.3% for the SEQ Region and State, respectively. Over the last five years GRP growth in Noosa Shire has averaged 2.4% per annum compared to 2.2% per annum for SEQ and 2.1% for Queensland as a whole.

Lake Macdonald is situated in a picturesque landscape and is a popular recreation destination. Facilities include a number of Seqwater and council parks as well as the Noosa Botanic Gardens, which is situated on the Lake foreshore. The lake is a popular picnic and walking destination, and also supports fishing, paddle craft and non-powered boating activities.

5.2.1 Accommodation and housing

There will be no need for additional accommodation of construction or operational workforce personnel as a result of the Project. It is envisaged that the construction workforce will be locally sourced and, where required, can be housed in existing local accommodation.

The operational workforce requirements for the new dam are expected to be unchanged and will be a continuation of existing Seqwater employment arrangements.

5.2.2 Cultural heritage (Indigenous and non-Indigenous)

Aboriginal cultural heritage is recognised, protected and conserved under the provisions of the *Aboriginal Cultural Heritage Act 2003,* which is administered by the Department of Aboriginal and Torres Strait Islander Partnerships (DATSIP). The Cultural Heritage Party for the area is the Kabi Kabi First Nation, but there is no Cultural Heritage Body for the area. It should also be noted that the National Native Title Tribunal has accepted for registration a native title claim by Kabi Kabi First Nation, which includes the Project area, and so Kabi Kabi First Nation are likely to remain as the Cultural Heritage Party. Further information on native title is provided in section 5.5.3.

A search of the DATSIP Cultural Heritage Database and Register Identified one Cultural Heritage site point is registered within Lot 118 MCH814. It is listed as a Cultural Site and Earthen Arrangement. Anecdotal evidence has also indicated the presence of other potentially culturally significant sites in the vicinity of the Project. Further investigation is required to assess these locations and any management needs. Under the *Aboriginal Cultural Heritage Act 2003* this Project is classed as a Category 5 activity. It is anticipated that a Cultural Heritage Management Plan will be required for the project.

The *Queensland Heritage Act 1992* provides for the conservation of Queensland's cultural (non-indigenous) heritage. No recorded places were identified within proximity to Lot 118 MCH814 (i.e. that have achieved registration under the provisions of the *Queensland Heritage Act 1992*). The nearest heritage places identified are the Cooroy Railway Station (602381) and the Cooroy Lower Mill Site Kiln (602688), both located in the town of Cooroy. Within the broader Noosa Shire there are eight other places listed on the Queensland Heritage Register, including the Cooroora Masonic Temple (former) (602423), the Pomona Police residence and former station, lock up and courthouse (602515), Alfredson's Joinery, Pre-Cut Workshop and Sawmill (602690), Mill Point Settlement Site (601280), Kin Kin Sawmill (602686), Noosa River Caravan Park (602706), The Majestic Theatre (602969) and Halse Lodge (601393).

A search of the Australian Heritage Register was also undertaken. There are no places of heritage significance recorded in proximity of Lot 118 MCH814. The nearest heritage place listed on the Australian Heritage Register is the Glass House Mountains National Landscape. A heritage study will be undertaken as part of the IAR or EIS to determine if any heritage values are at risk and to determine how best to manage them.

5.3 Built environment

There are no coordinated projects or relevant significant infrastructure projects identified in proximity to the Project area.

The Project area is typical of a semi-rural setting in terms of existing infrastructure, and is supplemented by infrastructure requirements for small-lot rural residential properties along Lake Macdonald Drive as well as the existing Six Mile Creek Dam and associated WTP. The area is serviced by rural roads and services infrastructure and services located within the vicinity of the existing dam are shown on Figure 5-4 and include:

- Reticulated water to the majority of residential dwellings to the west of the Project area
- Connection to council's sewer network is limited within the Project area. However, there is a sewer main along the alignment of Lake Macdonald Drive in Cooroy
- Hard infrastructure for the management of stormwater in the Project area is limited. The majority of stormwater is captured and diverted through the use of open and unlined spoon and table drains following road alignments
- Low voltage power (≤35 kV) and telecommunication infrastructure is present within the Project area.

5.4 Traffic and transport

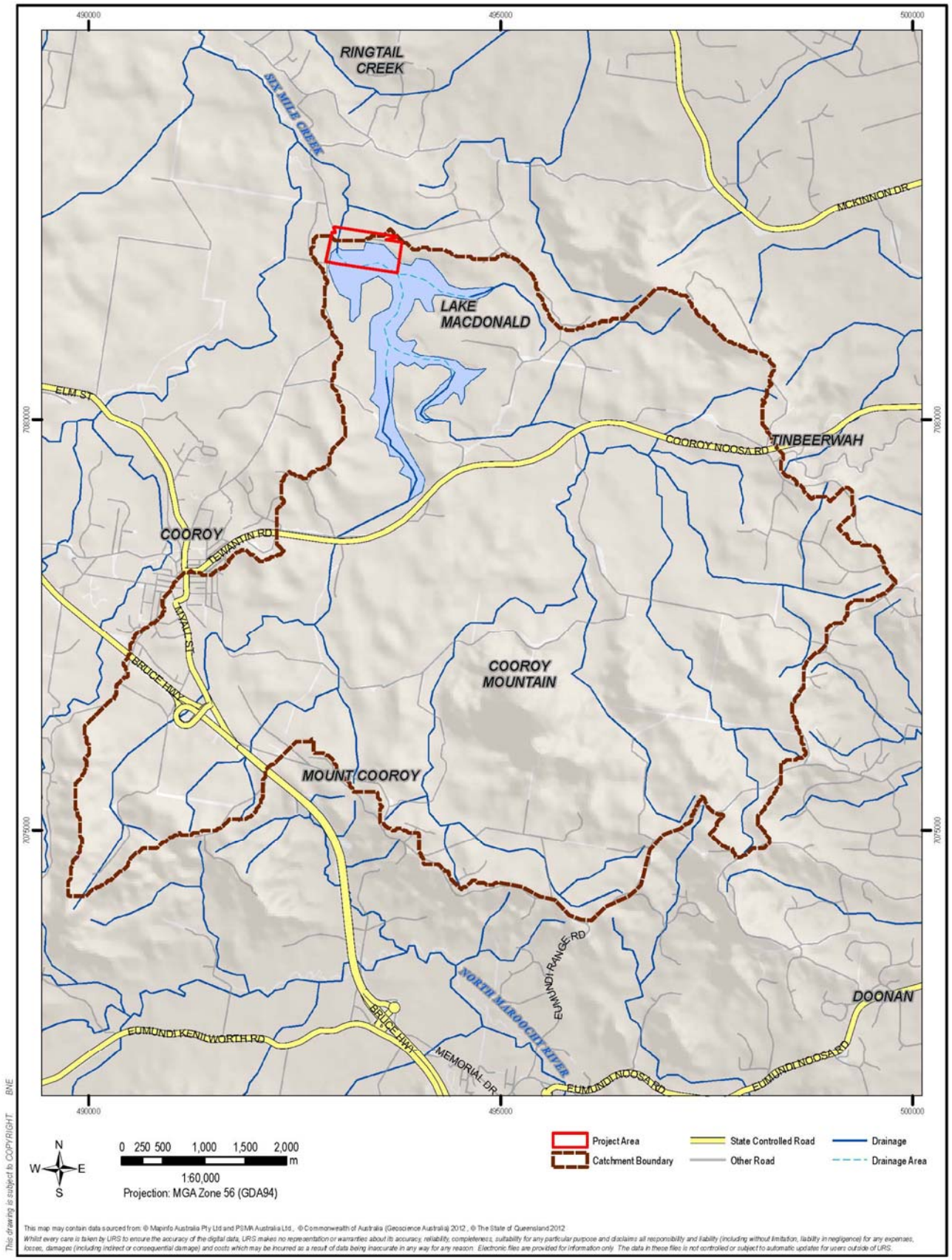
The Project area is serviced by a range of State controlled roads and council roads (refer Figure 5-5). The main transport routes connecting major townships in the region include:

- Bruce Highway (State controlled)
- Cooroy – Noosa Road (State controlled)
- Lake Macdonald Drive
- Collwood Road
- Gumboil Road
- Clearview Drive
- Highland Drive
- Old Tewantin Road
- Figbird Court
- Hammersly Lane
- Hoy road
- Sivyers Road
- Grange Road
- Hayward Road

The primary airport servicing the area is the Sunshine Coast Airport in Marcoola.

Figure 5-4 Lake Macdonald services

Figure 5-5 State controlled roads and council roads



5.5 Land use and tenures

5.5.1 Key local and regional land uses

The Six Mile Creek Dam catchment is relatively small, characterised by undulating pasture and a high proportion of semi-rural residential land-uses and 'lifestyle' type allotments. Existing land uses within the catchment are reflected in the planning scheme zones shown on Figure 5-6 and show larger rural lots, historic smaller rural allotments and more recent rural residential developments. The zoning assigned to allotments within the Project area includes Rural Settlement, Rural, Community Services and Open Space Conservation as prescribed by the Noosa Plan. As classified by the Queensland Land Use Mapping Program (QLUMP), the catchment contains various land use areas including:

- grazing native vegetation
- intensive animal husbandry
- plantation forestry
- irrigated perennial horticulture
- residential
- manufacturing and industrial
- commercial services
- waste treatment and disposal
- other minimal uses (see Figure 5-7).

The Noosa Water Treatment Plant is located on the right embankment of the dam and is also operated and owned by Seqwater. Several recreational land uses also occur on Seqwater land adjacent to the right embankment through leases. These uses include a Mary River cod hatchery, Camp Cooroora (operated by The Scout Association of Australia, Queensland Branch Inc.), and water-based recreation facilities such as a rowing club. Further downstream land uses are rural and semi-rural residential properties, and large areas under forest and sections of Tewantin National Park.

5.5.2 Key local and regional land tenures

Most of the land in Six Mile Creek Dam catchment is freehold, as shown on Figure 5-8. Other tenures within the catchment include small areas of Lands Lease, National Park and Reserve. Downstream of the catchment, a much larger proportion of the land is in the protected area estate and includes areas of the Tewantin National Park and areas of Forest Reserve.

5.5.3 Native title

There is currently no registered Cultural Heritage Body for Lot 118 MCH814, on which the Project works will occur. However the area is under a Registered Native Title Application (QC2013/003 – QUD280/2013) by the Kabi Kabi First Nation. It is unknown when a determination on this application is anticipated.

The Aboriginal Parties for Lot 118 MCH814 include:

- Kabi Kabi People (QC2013/003 – QUD280/2013)

Figure 5-6 Noosa Plan zones

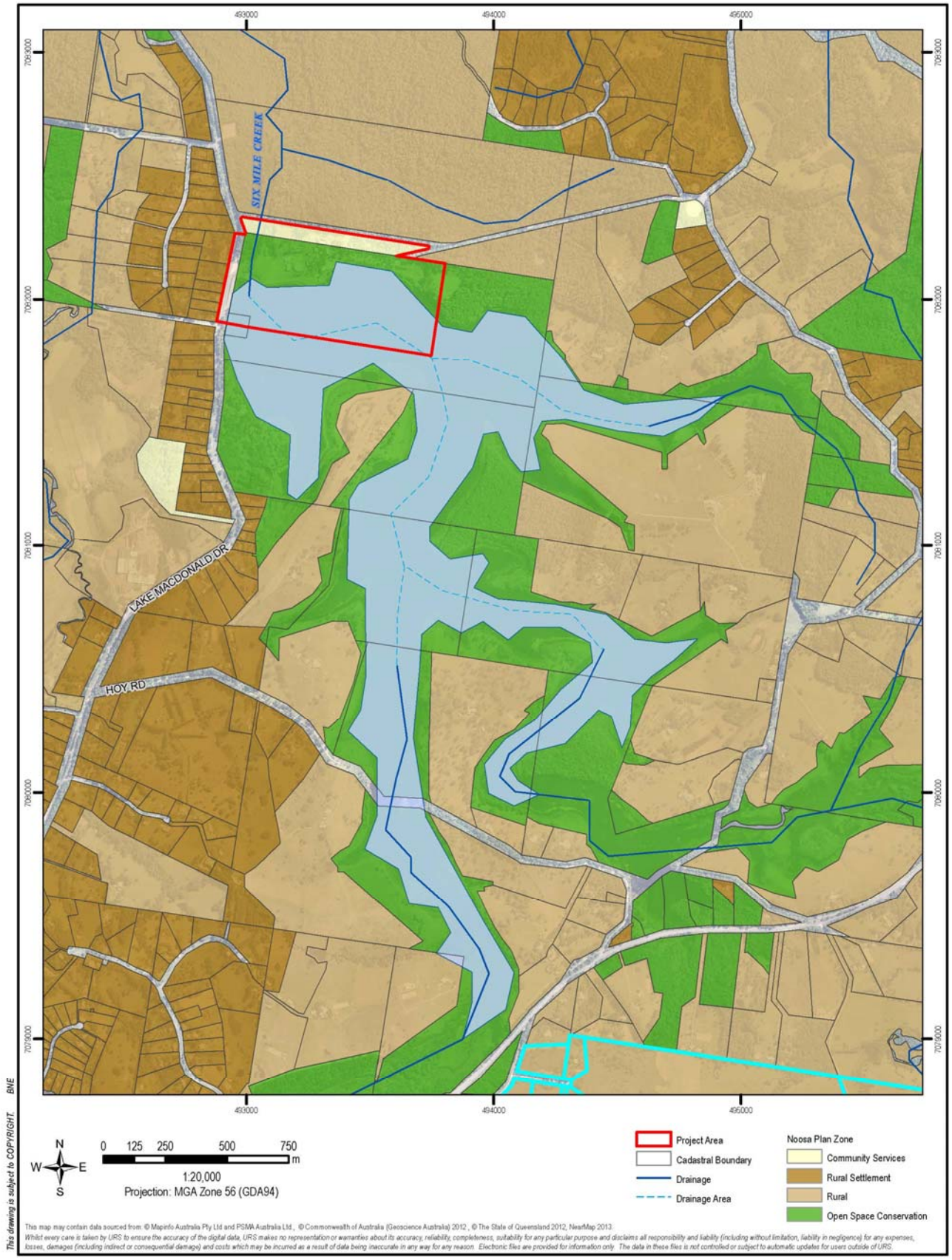


Figure 5-7 Land use

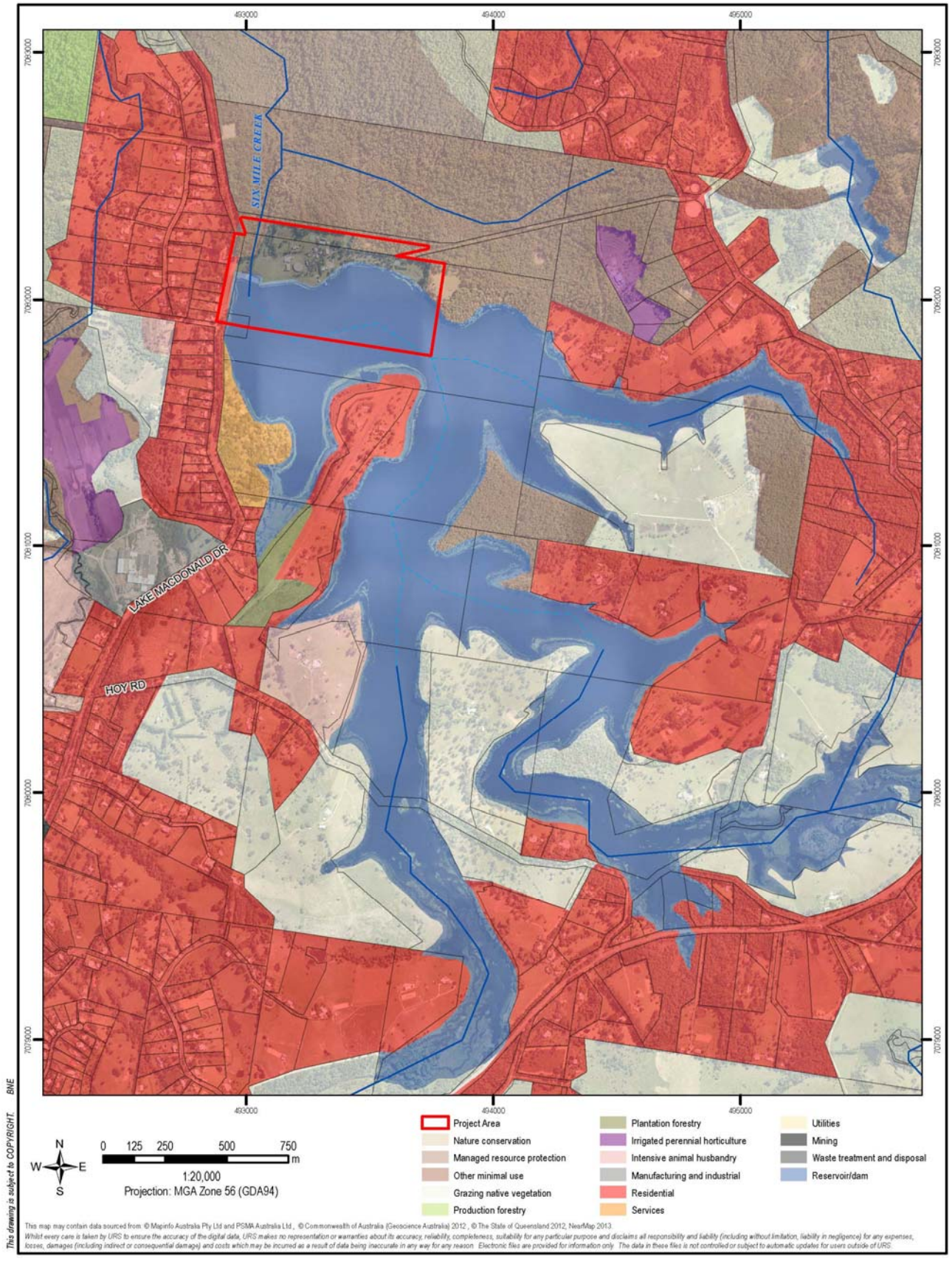
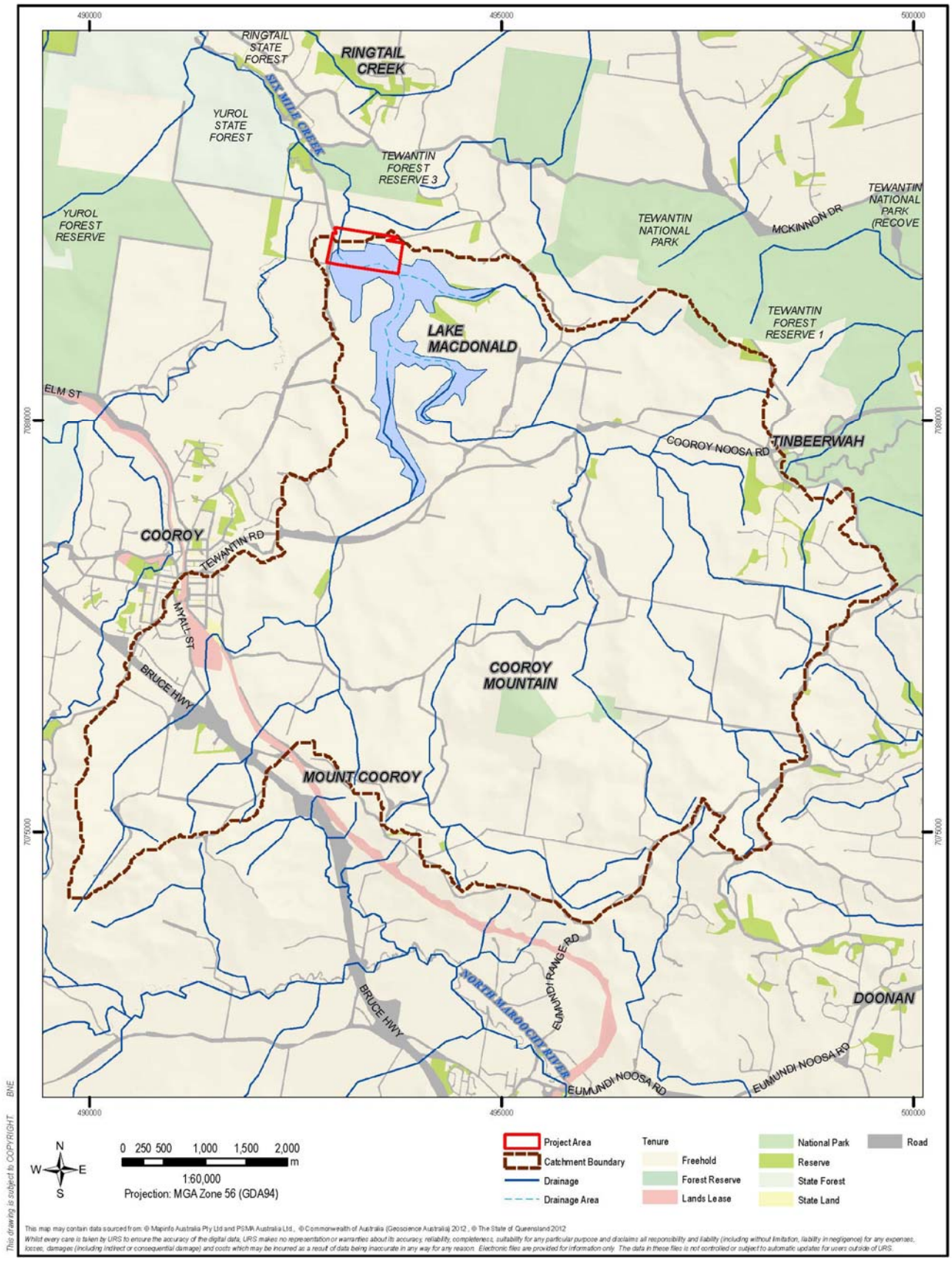


Figure 5-8 Existing land tenure



5.6 Planning instruments, government policies

The following section provides an overview of the key legislation, policies and plans considered relevant to the Project. A detailed list of the likely project approvals, and the relevant legislation, is provided in Appendix A.

5.6.1 Commonwealth

Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act (Cth) 1999* (EPBC Act) is the Commonwealth Government's central piece of environmental legislation. The EPBC Act protects nine Matters of National Environmental Significance (MNES) including:

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

The EPBC Act provides a process for environmental assessment and approval of proposed actions that may have a significant impact on MNES, known as 'controlled actions'. Under the EPBC Act, proponents proposing an action that may impact upon a MNES must refer the proposal to the Commonwealth Department of the Environment and Energy (DEE). This referral is used by the Commonwealth Minister for Environment to assist in deciding whether the proposal requires assessment and approval under the EPBC Act.

If the Project is deemed to be a controlled action it will be assessed under the EPBC Act in accordance with the Bilateral Agreement between the Commonwealth and the State of Queensland under Section 45 of the EPBC Act relating to environmental assessment. The application of the EPBC Act to this Project is discussed further in Section 6.6.

Native Title Act 1993

The *Native Title Act (Cth) 1993* (NT Act) provides for the recognition and protection of native title rights for Australia's Indigenous people, as well as providing a legislative approach to address issues concerning native title. The legislation provides for the determination of native title claims, the treatment of future acts, which may impact on native title rights, and consultation and/or notification of relevant native title claimants where future acts are involved.

Aboriginal and Torres Strait Islander Heritage Protection Act 1984

The purpose of this act is to preserve and protect places, areas and objects of particular significance to Aboriginal people. This act is normally implemented through the provisions of the *Queensland Aboriginal Cultural Heritage Act 2003*.

5.6.2 State

The following Queensland state legislation could be triggered by the Project and will be considered in the approvals process.

Aboriginal Cultural Heritage Act 2003

The purpose of the *Aboriginal Cultural Heritage Act 2003* (ACH Act) is to provide for the effective recognition, protection and conservation of Aboriginal cultural heritage.

Biosecurity Act 2014

The *Biosecurity Act 2014* came into effect on 1 July 2016 and is designed to ensure consistent, modern, risk-based and less prescriptive approach to biosecurity in Queensland.

Environmental Protection Act 1994

The *Environmental Protection Act 1994* (EP Act) is the principal environmental regulatory framework for environmental management and protection in Queensland. The EP Act objective is to protect the natural environment and associated ecological systems and processes while allowing for continued sustainable development.

The EP Act requires the Project's potential environmental impacts to be assessed and that measures be proposed to avoid or minimise any adverse impacts. To achieve this, the EP Act regulates activities that will or may have the potential to cause environmental harm.

Environmental Protection Regulation 2008

The EP Regulation supports and supplements the environmental assessment process outlined under the EP Act. It also specifies environmentally relevant activities (ERAs) that require approval, associated thresholds, specific approval details and reporting requirements.

Environmental Offsets Act 2014

The *Environmental Offsets Act 2014* (EO Act) coordinates the delivery of environmental offsets across jurisdictions. The EO Act purpose is to offset significant residual impact on prescribed environmental matters.

The *Environmental Offsets Regulation 2014* provides details on prescribed activities regulated under existing legislation and prescribed environmental matters to which the Act applies.

Fisheries Act 1994

Section 3 of the *Fisheries Act 1994* (Fisheries Act) provides for the use, conservation and enhancement of the community's fisheries resources and fish habitats in a way that seeks to:

a) Apply and balance the principles of ecologically sustainable development; and

b) Promote ecologically sustainable development.

The Fisheries Act, in conjunction with the *Planning Act 2016* (Planning Act), regulates the construction or raising of a barrier across waterways (including partial barrier) that may limit or further limit fish passage (waterway barrier works). Waterway barrier work is assessable development under the Planning Act unless it complies with accepted development criteria, under schedule 7, part 3, item 6 of the *Planning Regulation 2016*.

Land Act 1994

The Land Act 1994 (Land Act) provides the framework for State land, such as leasehold, roads and reserves and their subsequent management.

Under Chapter 4, Part 4 of the Land Act, a permit to occupy is required for the occupation of a reserve, road or area of unallocated State land. An application for a temporary road closure may also be required.

Land Protection (Pest and Stock Route Management) Act 2002

The *Land Protection (Pest and Stock Route Management) Act 2002* (Land Protection Act) outlines provisions for preventing the spread of declared pest species.

The subordinate *Land Protection (Pest and Stock Route Management) Regulation 2003* identifies declared plants and animals that are targeted for control because they are pest species and outlines practices to prevent their spread throughout Queensland.

Section 77 of the Land Protection Act outlines that unless the Proponent possesses a Declared Pest Permit, the Proponent will have an obligation to undertake reasonable steps to maintain the land comprising the Project Site free of class 1 and class 2 pests (as defined in the Land Protection Act) and to stop the spread of declared pests to other areas.

Local Government Act 2009

The purpose of the *Local Government Act 2009* (LG Act) is to outline the extent of local government responsibilities and powers within their respective jurisdictions. The Act provides local governments with the power to enact and enforce laws within the relevant local government area. These laws usually relate to the protection of amenity or other values important to communities including local roads, noise, light, waste management, vegetation, animals, parks and fencing.

Nature Conservation Act 1992

The *Nature Conservation Act 1992* (NC Act) is administered by EHP and regulates the environmental impacts on plants and animals through the protected plants framework and species management program requirements.

Planning Act 2016

The *Planning Act 2016* (Planning Act) establishes a system of land use planning (planning), development assessment and related matters that facilitates the achievement of ecological sustainability in Queensland. The Act coordinates development assessment in association with many of the other acts outlined below.

The Planning Act:

- manages the process by which development takes place, including ensuring the process is accountable, effective and efficient and delivers sustainable outcomes
- manages the effects of development on the environment (including managing the use of premises)
- coordinates and integrates planning at local, regional and state levels.

The assessment of the Project will consider the State Planning Policy (including the Queensland Plan) and South East Queensland Regional Plan, which applies to the area in which the Project is located.

Queensland Heritage Act 1992

The *Queensland Heritage Act 1992* (Heritage Act) protects heritage areas that are considered to be of State significance and are placed on the Queensland Heritage Register, administered by the Queensland Heritage Council. Local heritage is also addressed in the Act, with local governments being required to establish their own heritage registers.

State Development and Public Works Organisation Act 1971

The *State Development and Public Works Organisation Act 1971* (SDPWO Act) provides a framework for coordinated and environmentally responsible infrastructure planning and development to support Queensland's economic and social progress. The SDPWO Act provides the Queensland Coordinator-General with the power and responsibility to assess and authorise the most significant and complex projects.

Section 26 of the SDPWO Act permits the Queensland Coordinator-General to declare a project to be a 'coordinated project' for the purpose of requiring the proponent to prepare an EIS or an IAR.

The preparation of an IAR or EIS in accordance with Part 4 of the Queensland SDPWO Act also satisfies the requirements of Section 8 of the Commonwealth EPBC Act.

Vegetation Management Act 1999

The *Vegetation Management Act 1999* (VM Act), in conjunction with the Planning Act, regulates the conservation and management of vegetation communities and clearing of vegetation. The VM Act provides a State-wide system for the management of native vegetation on freehold and leasehold land based on the concept of regional ecosystem (RE) areas. The conservation status of each RE is assigned as one of three categories: 'endangered', 'of concern' or 'least concern', based upon an estimate of the regional ecosystem's pre-clearing distribution, and how much of it remains.

Schedule 10, part 3 of the *Planning Regulation 2016* makes clearing of native vegetation on prescribed land assessable development which requires a development permit, unless the clearing is otherwise exempt.

Waste Reduction and Recycling Act 2011

The main objectives of the Act in relation to waste management are to: promote waste avoidance and reduction; reduce the overall impact of waste generation; promote resource recovery and efficiency actions; promote the sustainable use of natural resources; encourage the use of recovered resources; and ensure a shared responsibility between government, business and industry and the community.

The Act is supported by the Waste Reduction and Recycling Regulation 2011, which provides mechanisms to achieve the objectives of the Act.

Water Act 2000

The *Water Act 2000* (Water Act) provides a framework for the sustainable management of Queensland's non-tidal water resources and riverine quarry material.

With respect to the Project, the Water Act establishes systems for the planning, allocation and use of non-tidal water, including regulation of impoundments. Allocation of quarry material and riverine protection provided for by the Act will be of relevance.

6. POTENTIAL PROJECT IMPACTS

6.1 Justification for IAR Process – Potential Impacts

As outlined in Section 1.3, Seqwater believes that the proposed approach to build and operate the upgraded dam generally within the existing dam footprint significantly reduces the environmental, social and economic impacts of the Project compared to typical large infrastructure projects on green-field sites. On this basis, an Impact Assessment Report (IAR) approach under the SDPWO Act is Seqwater's preferred coordinated project pathway.

The following sections will outline the likely areas of notable impact, and the basis for this judgement, with a view to demonstrate the specific key environmental concerns that require focused assessment. Most other environmental values are expected to be minimally impacted by the proposed project and can be mitigated/managed through established environmental management practices that reflect industry best practice, and would be typically documented in a Construction Environmental Management Plan (CEMP) and associated sub-plans. This would be typical for many aspects that are associated with construction projects.

The predicted impacts outlined in section 6 are based on ongoing planning and development for the Project, which began in 2011. Various options and planning phase assessments for the proposed Project (the selected option) have compiled and refined potential environmental impacts over time to inform project planning, and form the basis of impacts presented in this IAS. Identification of potential impacts has also been developed through the involvement of a range of stakeholders, including several independent consultants and many internal Seqwater stakeholders, such as dam operators, hydrologists, biosecurity officers, catchment rangers, environment and heritage staff. Based on the length of time in development and the breadth of stakeholders involved, the predicted impacts outlined below are as accurate and certain as possible. It should also be noted that the Project site is an existing operational dam, with associated catchment management. As such, the existing environment and impacts of a dam at the site are well known to Seqwater.

In addition to the assessments/reports on environmental and statutory approvals, several targeted preliminary impact assessments have been undertaken to inform project planning. In particular, ecological assessments have been undertaken as outlined below.

- Terrestrial ecology – desktop assessment (URS, 2014)
- Aquatic ecology – desktop assessment and field survey (FRC, 2016)
- Aquatic biopassage – preliminary options assessment (AECOM, 2016)

Further discussion on the key environmental concerns for the Project is also provided in Section 7.1.

6.2 Natural environment

6.2.1 Land

The impact on land based environmental values is anticipated to be minimal, given the type and scale of the Project. Any impacts on this environmental value will largely relate to construction activities, where the footprint of these activities is small and located primarily on

Seqwater property with existing infrastructure, as well as some road reserve land also affected.

Soils and geology are not expected to be significant concerns because the Project will be largely constrained to the existing disturbed areas of the Noosa WTP and dam site. The Project will not change the landscape or inundate any additional land, and will affect only local area soils to the extent of a drying and rewetting cycle in the impoundment footprint during construction.

Visual amenity will be temporarily affected during construction, due to lowering the lake and a visible construction site. The impact assessment undertaken as part of the IAR or EIS will identify key land values within the Project area and determine any associated potential impacts. Identified mitigation measures will be outlined in the IAR or EIS.

6.2.2 Water

This environmental value is anticipated to be a key environmental concern that would require focused assessment.

Potential environmental impacts in relation to water, arising from Project activities, comprise:

- increased sediment in surface water bodies resulting from earthwork activities, leading to changes in surface water quality
- erosion of stream banks and impoundment banks resulting from lowering the lake for construction, leading to changes in surface water quality
- exposure of acid sulfate soils from deep excavations as the site is identified as having a high risk of inland acid sulfate soils due to geology below the spillway, leading to changes in surface water quality
- inadvertent release of potential pollutants to surface water bodies from activities such as vehicle refuelling/wash-down and uncontrolled or controlled release of contaminated water or treated/untreated sewage leading to changes in surface water quality
- potential effects to groundwater flow and its quality as a result of temporary lowering of the impoundment and dewatering during construction of the dam wall
- decrease in water quality in the impoundment due to the lowering of the water level to 90.5 m AHD
- increase in downstream discharge water volumes when lowering Lake Macdonald impoundment, with associated downstream erosion risks
- potentially altering the flow regime of operational releases with an upgraded dam (depending on fish passage and associated assessments)
- alteration of downstream flood risk during construction

Due to the nature of the Project, there may be a range of impacts on water values. These impacts will range from typical construction project impacts (e.g. construction impacts on water quality) to more complicated site-specific impacts due to temporary lowering of the impoundment. Based on the variety of potential impacts and complexity/unknowns around some areas, Seqwater proposes focused assessment to inform mitigation measures.

Hydraulic assessments and modelling have been undertaken for the Project, particularly around downstream flooding during construction. No substantial water quality assessments for the construction phase of the Project have been undertaken to date and are expected to be incorporated into the IAR/EIS process.

Operation of the upgraded dam will effectively reinstate the existing downstream flow regime, as per the operating rules of the Mary Basin ROP. Therefore, the project is unlikely to have any significant operational impacts on the downstream waterway and threatened aquatic species compared to the existing situation. Optimisation of releases for flows will occur during the detailed design phase with the view to improve the performance of the current situation.

An assessment of impacts and risks to water quality and surface water hydraulics associated with the various phases of the Project will be undertaken as part of the IAR or EIS.

6.2.3 Air

The Project has the potential to impact on air quality, as well as contributing to increased greenhouse gas concentrations. Air quality may be impacted by the Project as a result of:

- dust emissions from clearing, exposed soils and stockpiles, including for on-site concrete batching
- combustion emissions from operational plant, such as compressors, diesel generators, tracks, piling equipment, cranes etc.

The Project site is located in proximity to sensitive receptors, such as rural residential properties and terrestrial ecosystems (national park). As such, dust impacts will be an important aspect to manage, but will be limited to a construction stage impact from typical construction activities such as ground disturbance, stockpiling and concrete batching. These activities are well known in the construction industry and are manageable through existing practices. Air quality is not anticipated to require focused assessment to inform appropriate mitigation measures.

Greenhouse gas emissions from construction activities (including lowering the lake) will be considered, but are not expected to be a significant Project impact due to its scale. In operation, the Project will reinstate the existing situation and is greenhouse gas emissions should remain in line with typical reservoir emissions.

The assessment of the air quality and suitable mitigation measures will be outlined in the Project IAR or EIS.

6.2.4 Ecosystems

The Project will require localised vegetation removal for construction, which may include some vegetation mapped as Regional Ecosystem (RE). Nevertheless, the area of vegetation removal will be minimal, constrained to Seqwater's existing land, and will not fragment any habitat or create isolated patches of vegetation in the area. In the context of the wider region, the Project's impact on ecosystems relating to vegetation removal will not be significant. Additionally, EPBC Act protected TECs do not occur within the Project area. The local impacts of vegetation removal for construction is discussed further in the flora and fauna section

Operation of the upgraded dam is anticipated to have no additional negative impact on ecosystems compared with the existing Six Mile Creek Dam and impoundment.

6.2.5 Flora and fauna

This environmental value is anticipated to be a key environmental concern that would require focused assessment, predominantly in relation to aquatic flora and fauna.

The potential environmental impacts of the Project on terrestrial ecology include vegetation clearing and fauna habitat loss. There is also potential for impacts on threatened flora and fauna due to localised vegetation clearing for construction. Due to the small scale of the Project footprint and previous disturbance for dam and WTP construction/operation, the potential for significant impacts on terrestrial ecology is considered to be limited. There is also an increased risk of weed invasion in the surrounding forested area, however this aspect should be readily manageable.

The potential environmental impacts of the Project on aquatic ecology are largely due to:

- lowered lake level
- potential change in flow regime downstream of the dam site during construction and operation
- potential changes in water quality downstream of the dam during construction, and
- operational function of the new spillway.

The Project will require temporary lowering of water levels in Lake Macdonald. The dam will be lowered to approximately 10-20% capacity to allow safe working conditions on the spillway and embankments. Lowering the water level in the impoundment has the potential to create shallower pools, thereby resulting in some habitat loss or degradation both in the impoundment and potentially downstream in Six Mile Creek.

During construction, the conditions of Six Mile Creek and receiving environments may be temporarily affected by any changes in flow regimes from Lake Macdonald, though the specifics of these changes have not yet been determined. It is anticipated that water will be progressively released from Lake Macdonald, so as not to flood the downstream environment. During construction, a low flow diversion channel will be maintained at all times to ensure downstream flows can pass through the dam site with suitable water quality. Higher flows will also be passed through the site by controlled overtopping of the coffer dam. This is expected to occur several times per year during construction. It will be important to maintain incident high flows during spring and summer months when the Mary River cod tends to move upstream to Six Mile Creek from Mary River.

Additionally, water quality of the downstream flows during construction may impact on aquatic species, though these water quality impacts are discussed in Section 6.2.2 – Water.

Operational phase impacts are not expected to be significant as the upgraded dam will effectively reinstate the existing situation with regard to downstream flow regime and barrier size. The upgraded dam will alter the spillway type, from a sloped ogee crest to a vertical labyrinth weir, and so there are potential impacts on aquatic fauna during spills in relation to injury and stranding following spills. These aspects have been considered during Project planning and preliminary controls devised, which are further discussed in section 7.2.4.

Investigations into the installation of an aquatic biopassage structure (fishway) are underway as part of the Project. There is currently no upstream aquatic biopassage at Six Mile Creek

Dam and downstream movement is provided only through spillway flows. While the Project will have no additional impact on fish passage in Six Mile Creek compared to the existing situation, current legislation stipulates that the upgraded dam is likely to require some level of upstream fish passage to meet the State fisheries objectives for waterway barriers or the provision of an appropriate offset as agreed with the regulator. Aquatic biopassage to facilitate movement over the dam may be implemented if deemed feasible and likely to provide beneficial outcomes for target species.

Potential impacts of particular relevance to matters of state environmental significance (MSES) will be addressed in the IAR or EIS chapters that identify potential impacts and mitigation measures for Environmentally Sensitive Areas (ESAs) and terrestrial ecological values. Potential impacts of particular relevance to Matters of National Environmental Significance (MNES) will be separately addressed in the standalone EPBC report appended to the IAR or EIS that identifies potential impacts and mitigation measures for all relevant MNES.

6.2.6 Amenity

6.2.6.1 Noise and vibration

The Project has the potential to have an impact on noise and vibration values as a result of:

- increased vehicular movements
- foundation works, including piling
- excavation works
- earthworks
- concrete batching
- other construction activities.

The Project site is located in proximity to sensitive receptors, and so construction noise will impact on receptors if not adequately managed. Conversely, vibrational impacts during construction are expected to be minimal because of the type of construction works that are proposed (e.g. drilled secant piles rather than driven).

As with air quality, potential noise impacts will be essentially limited to the construction stage. These activities are well known in the construction industry are manageable through well-established practices. As such, noise and vibration are not anticipated to require focused assessment to inform appropriate mitigation measures.

The assessment of the Project's noise and vibration aspects and suitable mitigation measures will be outlined in the Project IAR or EIS.

6.2.6.2 Visual aesthetics and odour

During construction, the Project will impact the visual amenity of visitors to the local area and those residents located close to Lake Macdonald due to construction of the new dam wall and the temporary lowering of the impoundment water level. Additionally, the temporary lowering will expose normally inundated soil and associated aquatic vegetation, which may result in an odour impact on local residents and those visiting the Project area.

The potential for odour impacts during impoundment lowering will require consideration, but impacts are expected to manageable through planning. Impacts on visual aesthetics during construction are unavoidable, and will require assessment. This aspect will be largely incorporated into community engagement and social impact assessment, which is discussed in section 6.3.

The assessment of the Project's visual aesthetics and odour aspects and suitable mitigation measures will be outlined in the Project IAR or EIS.

6.3 Social and economic impact

This value is anticipated to be a key environmental concern that would require focused assessment.

Potential social and economic issues arising from the Project will likely only occur during the construction phase. They are expected to include:

- construction impacts for near neighbours. Impacts could include noise, dust, odour, visual aesthetics and traffic.
- short term road closures (e.g. Lake Macdonald Drive or Collwood Road), to accommodate minor road realignment and service relocations.
- changes to recreation facilities and activities during construction or on completion of the Project.
- short-term impacts to services to surrounding residential dwellings.

The potential for construction phase impacts on the surrounding community is high, given the relatively quiet, rural residential nature of the area, and the extent of recreation that occurs on or around the lake. A Project Community Reference Group (CRG) was established early in the planning phase as a means of communicating the need for the works, the options available, and the likely impacts. The CRG members were selected as representative of community interests and as a means to disseminate project information to the wider local community during project planning. Information on the CRG and planning for wider community engagement is discussed further in section 10.

By establishing a Project CRG, Seqwater has commenced the process of raising community awareness of the potential social impacts and as well gathering information on impacts that are most significant to the community, and how they might be managed. In addition to the early engagement that has been undertaken, in-depth assessment of social impacts will be highly important and requiring focused assessment and tailored mitigation measures.

It is expected these impacts can be managed throughout Project delivery and will be addressed as part of the Project IAR or EIS.

6.3.1 Accommodation and housing

There is not anticipated to be any material impacts on accommodation and housing as a result of the Project.

6.3.2 Social and recreational services

There is not anticipated to be any additional pressure on social or recreational services in the local area due to the construction workforce.

6.4 Cultural Heritage

6.4.1 Indigenous

This value is anticipated to be a key environmental (heritage) concern that would require focused assessment. The reason for this is primarily based on duty of care guidelines, rather than a prediction of impacts on indigenous cultural heritage. It also recognises the importance of engaging traditional owners when undertaking construction works, particularly for works involving waterways.

Potential impacts on cultural heritage arising from Project activities include the possibility of discovering or disturbing previously unknown cultural heritage sites or artefacts. In the vicinity of the Project site, there is one registered site recorded on the DATSIP register and database so it is reasonable to assume further cultural material may be present in the vicinity.

The Project has been assessed as being a Category 5 risk under the Cultural Heritage Duty of Care Guidelines. This rating has been assigned based on the significant earthworks for the Project and the proximity of works to a registered site. It should be noted though that the proposed earthworks will predominantly occur within the existing Seqwater footprint that has been previously cleared.

Where an activity is proposed under Category 5 there is generally a high risk that it could harm Aboriginal cultural heritage. In these circumstances, the activity should not proceed without a cultural heritage assessment.

An assessment of impacts and risks for cultural heritage at the various phases of the Project will be undertaken as part of the IAR or EIS and the Cultural Heritage Party for the Project area (Kabi Kabi First Nation) will be engaged as part of this assessment.

6.4.2 Non-indigenous

No registered European heritage sites occur within the Project area, based on the Queensland and Australian heritage databases. Nevertheless, the area has a rich history of European settlement and so confirmation of this finding will be required during the IAR or EIS process. No impacts on European heritage are anticipated, based on the preliminary assessment.

6.5 Built environment

The Project's potential impacts on built infrastructure are expected to be minimal because no new service infrastructure will be required. The greatest potential for impact is regarding road access to the site. Access routes have not yet been finalised, but there may be some required alterations to road conditions, such as a turning lane from Lake Macdonald Drive into the Project site or sealing Collwood Road where it is currently unsealed.

Although transport routes and the number of truck movements have not been finalised, impacts on local roads are expected during construction. Finalisation of routes and haulage estimates over the life of construction will be required during detailed design to facilitate road impact assessment as part of the Project IAR or EIS. While this assessment is necessary, road impacts are not anticipated to be a key concern because this aspect is relatively typical of a construction project with material import/export requirements. As such, the type of assessment and potential mitigation measures are established and well known to the industry. The assessment of the Project's traffic and transport aspects and suitable mitigation measures will be outlined in the Project IAR or EIS.

6.6 MNES under EPBC Act

This environmental value is anticipated to be a key environmental concern that would require focused assessment.

An EPBC Act Protected Matters search has been undertaken for the Project site (Appendix B). The search report indicates that MNES are likely to occur in the Project area and may be affected by the proposed works. Most MNES are unlikely to be significantly impacted by the Project, but the following may be affected and require detailed assessment in an IAR/EIS:

- Listed threatened species and communities
- Listed migratory species.

Based on initial discussions with DEE, temporary construction impacts are likely to be the main interest of assessment and mitigation measures for MNES. In particular, potential construction impacts on threatened terrestrial and aquatic species are anticipated to have a significant impact and require targeted mitigation measures. Further discussion on existing assessments and likely impacts are provided in relevant flora and fauna sections of the IAS (Sections 5.1 and 6.2). The construction impacts are likely to affect listed migratory species to some extent, but are not anticipated to constitute a significant impact given the temporary nature of changes, and abundance of similar freshwater water bodies in the region.

For operation of the upgraded dam, the Project will effectively reinstate the existing situation, and so is likely only to have any significant impacts on threatened aquatic species in relation to downstream flows. Initial discussions with DEE indicate that assessment of operational impacts would focus on any changes compared with the existing dam arrangement. For example, impact on threatened aquatic specie through changes in environmental flow releases or ability to move downstream during high flow events. Seqwater anticipates that the upgraded dam will result in improvements on the existing operational scenario, including optimisation of environmental releases and specific spillway design features for safe downstream passage of fauna during spills. These aspects will be further developed during detailed design and the IAR/EIS process.

Given the potential for Project impacts discussed above, an EPBC Act referral will be required to address legislative requirements in relation to MNES. Seqwater will submit an EPBC referral for the project shortly after submission of the coordinated project application. Seqwater expects that the Project could be declared a ‘controlled action’ and, if that is the case, requests the use of a bilateral assessment process.

7. ENVIRONMENTAL MANAGEMENT AND MITIGATION MEASURES

7.1 Justification for IAR Process – Key Concerns and Mitigations

Seqwater Experience

Construction and environmental management for working in watercourses and building new or upgraded dams are a normal part of Seqwater's business, as the principal dam owner and operator for South-East Queensland's water supply. Relevant examples of dam projects requiring major works, and associated management of potential impacts, are provided below. Similarities of the works between these examples and the proposed work at Six Mile Creek Dam are also noted.

- Maroon Dam Flood Capacity Upgrade (2015) – Significant earthworks were undertaken in the spillway and dam toe (downstream) to improve spillway hydraulic performance and for added stability of the existing earthen dam embankment. The earthworks involved excavating approximately 160,000 m^3 of earth downstream of the spillway to re-align the spillway chute with Burnett Creek. The earthworks required significant material handling, stockpiling and conditioning for on-site reuse, similar to that proposed at Six Mile Creek Dam. The works also required installation of a temporary coffer dam on Burnett Creek to maintain a dry working area and facilitate haulage. Commensurate environmental management was required, including the main elements of dust suppression, and erosion and sediment control to protect water quality in Burnett Creek.

- Moogerah Dam Flood Capacity Upgrade (2015) – Strengthening works were undertaken on the downstream foundations of the concrete arch dam to improve stability in extreme floods. Similar works to those proposed at Six Mile Creek Dam include a temporary coffer dam on Reynolds Creek, in-stream excavation and construction, and in-stream water quality management.

- Hinze Dam Stage 3 Upgrade (2011) – Major construction works were undertaken to increase the storage capacity of the dam. The works involved raising the dam embankment by around 15 m and associated spillway modifications to increase FSL. The project also involved corresponding environmental assessment, undertaken as a coordinated project.
  In common with the proposed Project, the Hinze Dam Stage 3 Upgrade involved upgrading an existing functional dam, which required allowances for spillway flows through the site and the use of temporary coffer dams for dry work areas. Significant mitigation measures were required to manage water quality of any construction site stormwater discharges to the Nerang River. The implemented construction measures included erosion and sediment controls (including substantial stormwater diversions and sediment basins), chemical and pollution controls, in-stream sediment controls, and a comprehensive monitoring program for controls and water quality to ensure ongoing effectiveness of those controls.

- Wivenhoe Dam Spillway Upgrade (2005) – Works involved construction of a second, auxiliary spillway at Wivenhoe Dam to cater for severe flood events, in addition to the original design flood capacity. The project involved excavation of around 500,000 m^3 of sandstone, construction of the second spillway and dam wall strengthening works, construction of a new road bridge over the spillway, and on-site reuse of excess

material for landscape modification/habitat creation.
Of particular interest was the excavation and construction of a new spillway on a functioning dam, requiring water quality management in the lake. The project also involved significant material handling requirements and reuse of excess spoil on-site.

- Lowering of impoundment levels – In the past five years, Seqwater has temporarily or permanently lowered impoundments at several dams in south-east Queensland. Pertinent examples are Leslie Harrison Dam (lowered 3 m to 50% capacity), Cooloolabin Dam (lowered 3 m to 60% capacity), and Sideling Creek Dam (lowered 2 m to 65% capacity). Experience gained from these examples will be applied to the proposed Project, including potential water quality risks, revegetation characteristics of exposed land and management of releases during lowering.

In addition to the site-specific aspects discussed above, all of the major projects required environmental management of bulk earthworks, truck movements and haulage, spoil disposal/reuse, construction in waterways, community and recreation impacts, and indigenous cultural heritage. Through these, and many other projects, Seqwater has demonstrated a track record of experience and responsible management of similar issues to that required for the proposed Project at Six Mile Creek Dam.

Construction environmental management practices and documentation for recent dam construction projects will be reviewed and incorporated into this Project where relevant. It is also worth noting that much of the corporate knowledge from the above projects has been retained within Seqwater, through retention of key staff within the organisation.

Key Environmental Concerns

The key environmental concerns identified in Section 6 are summarised below. These are based on Seqwater's understanding of the Project and local area, as well as relevant preliminary assessments, though it should be noted that these key areas are likely to be refined during development of an IAR scoping document, based on assessment by the Coordinator-General and relevant stakeholders.

If an IAR process is confirmed, the environmental values identified as key environmental concerns are expected to require focused assessment to confirm the specific impacts of the Project and develop targeted mitigation strategies or potentially provide benefits compared with the existing dam scenario.

- Flora and fauna – will be the main focus of investigations and overlaps with a number of other environmental values
- Water – relates to both flooding (inherent to the Project) and downstream flow regime (where it relates primarily to aquatic flora and fauna)
- MNES – where it crosses over with flora and fauna
- Indigenous Cultural Heritage – requires focused investigations as per duty of care expectations, but the Project is expected to have no significant impacts and can be managed through standard assessments, consultation and mitigation measures.
- Social Impacts and community engagement – with a focus on Seqwater's desire to engage with the local community and regional stakeholders on the proposed Project.

Other Environmental Values

In addition to the key environmental concerns, it is anticipated that other environmental values will be subject to lesser or well-known impacts as a result of the Project and can be identified without focused assessment. These impacts are expected to be managed through well understood and widely practiced measures to avoid or mitigate potential negative impacts of the Project.

Measures to avoid or mitigate potential negative impacts (including those identified for key environmental concerns) will be documented in various management plans, which utilise a well-established framework to implement the desired environmental outcomes. The following management plans are proposed for various aspects of the Project:

- Construction Environmental Management Plan (CEMP) and associated sub-plans to specifically address key environmental concerns
- Dam Lowering Management Plan
- Social Impact Management Plan
- Traffic Management Plan
- Cultural Heritage Management Plan.

7.2 Natural environment

7.2.1 Land

Earthworks related to the Project will require an erosion and sediment control plan (ESCP) which will be a sub-plan of the CEMP. This plan will specifically address the proposed demolition of the existing spillway, which will be undertaken over a short duration to minimise the risk of inclement weather. The ESCP will be consistent with current practice for construction projects and align with International Erosion Control Association (IECA) guidance.

Impacts on environmental values of land (soils and geology) are not expected to be a material issue during construction. Any impact mitigation measures, as described above, are expected to be relatively typical of a construction project and conform to industry best practice.

7.2.2 Water

Focused assessment will be required to confirm the Project impacts on water values and appropriate mitigation measures. Nevertheless, many of the impacts identified in section 6.2.2 are manageable construction impacts that are typical of a construction project in and around waterways. Examples are water quality impacts from increased sediment or other potential chemical pollutants used in construction. Such impacts and mitigations will be documented in the CEMP.

Other potential impacts that are not typical construction impacts will benefit from focused assessment, such as temporary lowering of the impoundment. The controlled reduction of the water level from the Six Mile Creek Dam impoundment, and its safe management throughout

construction, will require careful planning. A Dam Lowering Management Plan will be developed to document the range of impacts and mitigation measures related to this aspect, including dewatering for impoundment lowering and the management of erosion, water quality and aquatic fauna in the lowered impoundment. The plan is anticipated to include the monitoring of water quality and environmental flows with comparison to baseline levels.

Flood risk during construction has cross-over with construction planning and safety for the Project, as it feeds into the design and height of the temporary coffer dam for construction. Flood risk associated with the project will be documented within the IAR or EIS, but assessments and management plans are anticipated to be incorporated into dam operations and dam safety aspects of the Project.

Downstream low flows during construction are proposed to remain in accordance with the operating rules of the Mary Basin Resource Operations Plan (ROP). As such, the construction phase of the Project should not change the existing downstream flow regime. The low flows are anticipated to be achieved through low-flow channel function, as the lowered lake will have limited storage/buffering capacity and will therefore spill during most rainfall events in the catchment. Other arrangements, such as pumping or syphoning, may also be put in place to provide alternative means of providing downstream low flows during construction.

As discussed in Section 6.2.2 on the potential impacts, operation of the upgraded dam will effectively reinstate the existing downstream flow regime, as per the operating rules of the Mary Basin ROP. Therefore, the project is unlikely have any significant operational impacts on the downstream waterway and threatened aquatic species compared to the existing situation. The Project's operational impacts on Six Mile Creek flow regime will be considered as part of the IAR or EIS, largely in relation to aquatic fauna. An updated framework for environmental flow releases may be considered as part of the Project, but will be subject to focused assessment in association with Seqwater's existing water licence conditions under the Mary Basin ROP

Groundwater impacts are not expected to be a material issue during construction due to the lack of sensitive receptors. This will be confirmed during the IAR or EIS process, but any impact mitigation measures are expected to be relatively typical for a construction project, noting that there may be some cross-over with other values such as terrestrial ecology for Groundwater Dependent Ecosystems (if present).

7.2.3 Air

Air quality impacts including dust will be managed through the CEMP. Any impact mitigation measures are expected to be relatively typical of a construction project and conform to industry best practice relating to exposed soils, stockpiles and construction equipment.

7.2.4 Flora and fauna

Effects on ecosystems (particularly aquatic) will be carefully monitored and, as far as practical, managed during construction. Monitoring and management plans will be implemented for the species present in Lake Macdonald and areas immediately downstream of the construction area.

Terrestrial flora and fauna impacts will be minimised as far as practical through the design stage and will be managed through the CEMP. Impacts are expected to be modest as Seqwater intends to largely constrain construction requirements to within the existing WTP

site. Where clearing is needed, vegetation offsets and rehabilitation will be proposed to account for unavoidable impacts, in line with industry best practice and regulatory guidelines.

The Project's expected operational impacts on ecosystems will be limited to aquatic flora and fauna. Operation of the upgraded dam will effectively reinstate the existing situation, including impoundment level (FSL) and downstream flow regime, as per the operating rules of the Mary Basin ROP. The lake ecosystem will be affected by the temporary lowering for construction, and following the project will refill and regenerate naturally.

The upgraded dam is unlikely to have any significant operational impacts on the downstream waterway and threatened aquatic species compared to the existing situation. The upgraded dam will, at a minimum, follow the same operational rules for environmental flow releases as required under the current Mary Basin ROP. Optimisation of environmental flows will occur during the detailed design phase with the view to improve the performance of the current situation. This optimisation will be subject to focused assessment in association with Seqwater's existing water licence conditions under the Mary Basin ROP.

Project planning has considered the need for fauna passage (biopassage) in association with the upgraded dam. In particular, the preliminary design to date has incorporated specific spillway design features for safe downstream passage of fauna during spills. These features involve provision of sequential plunge pools to minimise the risk of injury associated with fauna contacting hard structures, and the provision of controlled drainage to minimise fauna stranding on cessation of spillway flows. Further refinement of these features will be undertaken through detailed design, in conjunction with environmental assessment and specialist input.

Project planning for aquatic biopassage has also included assessment of upstream movement opportunities, as is likely to be required with State approvals. During the Project planning phase, Seqwater assessed the potential benefits and detriments of providing upstream biopassage at the site, and also looked at the context of the dam site within the wider Mary River catchment. Assessments included preliminary options assessment for aquatic biopassage infrastructure (a fishway) given existing on-site constraints. A number of potential options have been considered to improve aquatic biopassage, including both on-site and off-site projects, and these will be subject to further assessment and stakeholder negotiation. Initial consultation with regulators indicates that on-site aquatic biopassage is strongly preferred, and so an on-site option is likely to be implemented if deemed feasible and likely to provide beneficial outcomes for target species. Seqwater proposes to undertake detailed aquatic biopassage options assessment for the upgraded dam to refine previous work and to shortlist or select one option to take forward for stakeholder consultation and detailed design.

Due to the complexity around retrofitting fish passage at an existing dam site, with respect to yield of the water storage and existing infrastructure constraints, industry best practice and standard conditions are unlikely to be applicable to the Project for this value. Further work is also required to clarify the risk of pest species being introduced into Lake Macdonald through aquatic biopassage. In particular, community members, as part of the CRG, have highlighted invasive pest fish (e.g. tilapia) in Mary River as a concern.

7.3 Built environment

There is a potential for impacts to the supporting road infrastructure. The surrounding road network will be assessed as part of the IAR or EIS process and result in discussions with the appropriate local and state organisations to agree any required management plans.

Any impact mitigation measures are expected to be typical of a construction project and be manageable through application of standard published conditions.

7.4 Cultural heritage management plan (Indigenous)

The project has been assessed as a Category 5 activity under the Cultural Heritage Duty of Care Guidelines (Queensland Aboriginal Cultural Heritage Act 2003). It is anticipated that a cultural heritage management plan (CHMP) will be required and consultation with the appropriate Cultural Heritage Party for the Project area will be undertaken. The CHMP will provide the construction team with guidance on how to identify and manage any potential Indigenous finds on site.

Relevant management and mitigation measures are expected to conform to industry best practice, per established CHMP standards.

7.5 Non-indigenous cultural heritage management

A non-indigenous cultural heritage survey of the Project site will be undertaken as part of the IAR or EIS process. No heritage listed sites are located in proximity to the site and due to the relatively modern age of the existing dam and water treatment structures, the heritage values of the site are expected to be negligible. However, any finds will be handled in accordance with the legislative requirements.

7.6 Greenhouse gas management plan

A greenhouse gas management plan will be developed as required. This aspect is not anticipated to be a significant component of the Project's environmental impacts because of its scale and nature.

7.7 Waste management

Waste streams, volumes and requirements for the treatment and disposal of wastes generated during construction will be documented in a Project Management Plan. Opportunities for the beneficial reuse/recycling of materials from the existing dam structure will be described. The types of wastes generated by the Project are anticipated to be inert construction wastes, requiring minimal special management for reuse or disposal (e.g. soils, embankment fill).

Any impact mitigation measures such as reuse opportunities are expected to be straight-forward and conform to industry best practice.

7.8 Hazard and risk, and health and safety

Hazard and risk and health and safety assessments and management plans will be developed as required for the construction phase of the Project. Many of the components will be engineering-focused and covered in the required design documents.

7.9 Environmental management

As described in Section 7.1, several management plans will be developed as part of the Project's environmental assessment and approvals phase. These management plans will reflect Seqwater's ongoing commitment to environmental management during construction and will incorporate management measures identified during the assessment process.

As part of the construction phase of the Project, and as referred to throughout section 7, a Construction Environmental Management Plan (CEMP) will be developed and will form an important management tool for the Project's impacts and mitigation measures. The CEMP will incorporate environmental and social mitigation measures from the IAR or EIS as a framework for the ongoing management, monitoring, reporting and improvement during construction. Its primary purpose will be to identify the environmental values potentially affected by the Project and detail measures to manage the risk of potential adverse impacts to these environmental values. For each component, the CEMP will outline the following:

- environmental values
- potential impacts
- environmental protection objectives
- management controls
- monitoring programs.

8. APPROVALS PROCESS

Seqwater seeks declaration of the Project as a coordinated project pursuant to the SDPWO Act (Qld). As part of this declaration, Seqwater seeks to utilise the IAR process. Information to support the IAR process for this Project is provided throughout the IAS and highlighted in Sections 1.3, 6.1 and 7.1.

Section 5.6 outlines the Acts and policies that were assessed as relevant to the Project. The approvals required to undertake the Project will be confirmed through the subsequent IAR or EIS process. A preliminary review of the likely approvals required for the Project has been undertaken and documented in Appendix A.

Once the Project description has been sufficiently completed, following concept design optimisation and commencement of detailed design, a finalised list of required approvals will be presented as part of either the IAR or EIS. As a result, further approvals may be identified, while others that were identified at the preliminary stage (Appendix A) may not be required.

The approvals that Seqwater intends to be coordinated during the IAR or EIS process are identified in Appendix A. Note that these are based on the assessment of required approvals at the concept design stage the Project. The required approvals are subject to change during detailed design development, as described above.

9. COSTS AND BENEFITS SUMMARY

The primary Project benefit is to deliver continued safety of the dam infrastructure to secure an essential potable water asset into the future. The Project will also safeguard an existing community landscape and associated recreational facilities.

The Project will bring some additional short term economic benefits to the regional economy during construction through the provision of construction and engineering services. The costs associated with the Project will be short term in duration and associated primarily with the lowering of Lake Macdonald and the construction of the proposed dam safety upgrade.

10. COMMUNITY AND STAKEHOLDER CONSULTATION

Seqwater will consult and engage with stakeholders and the local community in accordance with regulatory requirements and in consideration of relevant guidelines. This includes local, Queensland and Commonwealth Government authorities, potentially affected neighbours, local communities and special interest groups in the Project area.

A Communications Action Plan (CAP) has been developed and Seqwater has commenced early engagement with the local community including the establishment of a Project Community Reference Group (CRG). The CAP aligns with the engagement approach of the International Association of Public Participation (IAP2), including the core values and spectrum of public participation.

The CAP provides for communications and community engagement activities (factsheets, website, attendance at local events, community information stands, information sessions etc.) during the Project's lifecycle, including an IAR or EIS process. Community feedback is managed within Seqwater's Customer Relationship Management Policy (POL-00049) and enquiries are tracked through a supporting stakeholder database.

Community engagement to date has included the establishment of the Project CRG, which has met several times, as well as regular e-news updates distributed to interested residents that will continue to be delivered on a regular basis throughout the duration of the project. In addition, residents and recreational users of the Lake and other facilities will have the opportunity to provide feedback regarding the Project through the use of web/app based community engagement mapping software (Social Pinpoint).

The IAR or EIS will describe the consultation that has taken place and how the responses from the community and government authorities have been incorporated into the design and outcomes of the Project. A public consultation report will be included in the IAR or EIS, which will identify how the CAP was implemented and will present a summary of results of the IAR or EIS consultation process.

Community feedback

In May 2015, Seqwater established a Community Reference Group (CRG) for the Six Mile Creek Dam (Lake Macdonald) Safety Upgrade Project. The CRG acts as a reference group for community input and feedback on the project and members are a conduit for the local community.

The CRG works to:

- identify the positive and negative impacts of the Project on community interests
- provide Seqwater with relevant and timely community feedback to assist in addressing issues and opportunities resulting from the Project
- provide Seqwater with an indicator of community perceptions and understanding of the Project
- convey project information to the broader community through members' networks.

The eight members of the CRG were selected to achieve a diverse representation of the local community and include neighbours of Lake Macdonald, recreation users, catchment groups and special interest groups.

Since its establishment, CRG members have provided input and feedback on the conceptual designs, community impacts and the desired future state for Lake Macdonald. In depth conversations have included (but have not been limited to):

- explanation of Seqwater's Portfolio Risk Assessment and regulatory requirements under the Water Act
- the requirement to remove and reconstruct the current dam
- the proposed methods of construction work
- design options and comparative costs between design options
- IAR / EIS application process
- geotechnical drilling investigations
- discussions pertaining to construction sequencing
- the potential impacts of the construction works to nearby residents
- potential alterations to recreation facilities during construction
- potential methods to manage traffic and noise during construction
- stakeholder mapping – the CRG has been involved in identifying stakeholder groups and their needs
- discussion regarding downstream environmental flows
- safety aspects for downstream residents
- fish passage options.

A goal of the CRG is to ensure the community understands the need for the upgrade, the scope of work, likely impacts and the benefits of the Project. Matters of concern, as raised by the CRG, are addressed in the meetings with the most up to date information available, this has resulted in a well informed and engaged CRG.

A number of CRG meetings have been hosted to date, to coincide with newly available information or proposed changes to the Project schedule. An introductory meeting was held in late 2015 and three meetings were held in 2016. Subsequently, the CRG agreed to postpone further meetings until the Project progressed past geotechnical assessments and new information was available for discussion.

11. REFERENCES

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APPENDIX A – APPROVAL SCHEDULE

Legislative Reference	Approval type	Agency and Consultation	Description	Project Element	Coordinated approval
Commonwealth Legislation					
***Environment Protection and Biodiversity Conservation Act 1999* (Cth)**					
Sections 18 and 18A (Listed threatened species and communities Sections 20 and 20A (Listed migratory species)	EPBC Act Referral – controlled action or not a controlled action	Department of the Environment and Energy (Cth)	Due to the presence or Listed Migratory Species, High Value Koala Habitat and the potential occurrence of threatened species, the Project should be referred to DEE to determine if the proposed works constitute a 'controlled action' under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).	Whole of project	Yes
***Native Title Act 1993* (Cth)**					
Part 2, Division 3, Subdivision K	Native Title notification	National Native Title Tribunal	Under the *Native Title Act 1998* (Cth), the valid grant of a freehold estate (other than certain types of Aboriginal and Torres Strait Islander land) on or before 28 December 1996 is known as a 'previous exclusive possession act'. This means that native title has been extinguished over Lot 118 on MCH814. If any works or access are proposed over reserve land near the Project site (identified as Lot 143 on MCH989), this may be a future act affecting native title. In this situation, the future act regime under the Act would need to be complied with.	Whole of project	No
State Legislation					
State Development and Public Works Organisation Act 1971 (Qld)					
Part 4	Coordinated Project declaration	Coordinator-General	A Coordinated Project declaration is sought.	Whole of project	N/A
Planning Act 2016 (Qld)					
Planning Act 2016 Chapter 2, Part 5	Infrastructure Designation	SARA	A Minister or local government may designate land for development of infrastructure, such as water cycle management. Infrastructure designation may be pursued, but is considered unlikely at the preliminary stage. Alternatively, necessary development approvals will be obtained pursuant to the IDAS.	Whole of project	No

Legislative Reference	Approval type	Agency and Consultation	Description	Project Element	Coordinated approval
The Noosa Plan 2006	Development Permit – Material Change of Use	Noosa Shire Council	A development approval may be required for a material change of use for a concrete batching plant.	Concrete Batching Plant	Yes, if required
Planning Regulation 2016, Schedule 10, Part 6, Division 4 *Fisheries Act 1994* (Qld)	Development Permit - Operational Works for constructing or raising waterway barrier works	SARA and DAF	A development permit is required for constructing or raising of waterway barrier works in Six Mile Creek, if the barrier limits fish stock access and movement along a waterway. Fish stock access and movement will not be further limited by the Project, but modifications to the spillway are assumed to trigger this approval.	Dewatering; Embankments; Spillway	Yes
Planning Regulation 2016, Schedule 10, Part 3 *Vegetation Management Act 1999* (Qld)	Development Permit- Operational Works for clearing native vegetation	SARA and DNRM	A development permit for operational works may be required for the clearing certain vegetation. Clearing requirements will be confirmed through detailed design.	Embankments; Concrete Batching Plant; Access Track	Yes
Planning Regulation 2016, Schedule 10, Part 19, Division 2 *Water Act 2000* (Qld)	Development Permit - all aspects of development for removing quarry material from a watercourse or lake	SARA and DNRM	A development permit may be required for the removal of quarry material from Lake Macdonald or Six Mile Creek, if the material is taken for a productive purpose.	Temporary Cofferdam; Embankments	Yes, if required
Planning Regulation 2016, Schedule 3, Part 2, Table 1, Item 1 *Building Act 1975* (Qld)	Accepted development – building works	N/A	Seqwater is a public sector entity and all building work carried out on its behalf is accepted development under the Planning Act and does not require a development permit. All works must comply with relevant provisions for the building work (section 21(5) of the *Building Act 1975*).	NA	No
Environmental Protection Act 1994 (Qld)					
Environmental Protection Regulation 2008, Schedule 2, Part 9, Item 41.	Environmental authority – prescribed ERA	EHP	An environmental authority is required for carrying out prescribed environmentally relevant activities (ERAs). ERAs may be triggered by construction activities, such as quarrying or screening material. Specific project requirements will be determined through detailed design.	Material extraction; Material screening	Yes, if required
***Water Act 2000* (Qld)**					
Water Act 2000, Section 814	Riverine Protection Permit to excavate or place fill in a watercourse or lake	DNRM	A riverine protection permit may be required for excavating or placing fill in Six Mile Creek or Lake Macdonald, if the works do not comply with the 'Riverine protection permit exemption requirements (WSS/2013/726)'	Dewatering; Temporary Cofferdam; Embankments	Yes, if required

Legislative Reference	Approval type	Agency and Consultation	Description	Project Element	Coordinated approval
***Nature Conservation Act 1992* (Qld)**					
Nature Conservation (Wildlife Management) Regulation 2006, Chapter 4, Part 2, Division 4	Clearing Permit – Protected Plants	EHP	A clearing permit may be required for clearing proposed within a high risk area on the Protected Plants Flora survey Trigger Map. Clearing requirements will be determined through detailed design.	Concrete Batching Plant; Access Track; Road Realignment	Yes
Nature Conservation (Wildlife Management) Regulation 2006 Chapter 7, Part 3	Permit to tamper with animal breeding places	EHP	Removal or disturbance of native animal breeding places by earthwork activities, requiring a permit with approved species management program.	Concrete Batching Plant; Access Track; Road	Yes, if required
***Land Act 1994* (Qld)**					
Division 2, Part 2, Chapter 3	Temporary road closure Permit to occupy	Minister for Natural Resources and Mines and Noosa Shire Council	An application for a temporary road closure and permit to occupy may be required for works required on the shoulder of Lake Macdonald Drive. Requirements will be confirmed through detailed design.	Whole of project	Yes
***Local Government Act 2009* (Qld)**					
Noosa Council Local Laws 1 & 4 (Roads) and Subordinate Local Law 1 & 4 (Interference with Local Government Roads)	Approval to interfere with a local government road	Noosa Shire Council	Approval may be required under the Local Law to undertake certain activities on the shoulder of Lake Macdonald Drive. Requirements will be confirmed through detailed design.	Whole of project	Yes
***Aboriginal Cultural Heritage Act 2003* (Qld)**					
Aboriginal Cultural Heritage Act 2003 (Qld), Part 7	Cultural Heritage Management Plan	DATSIP	All persons must take all reasonable and practicable measures to ensure their activities do not harm Aboriginal cultural heritage. The duty of care applies regardless of the tenure of the land (i.e. whether located on freehold land) and regardless of whether it has been identified or recorded in a database. Consultation with the Aboriginal party for an area may be necessary if there is a high risk that the activity may harm Aboriginal cultural heritage. Additionally, if an EIS is required, an approved Cultural Heritage Management Plan (CHMP) is mandatory.	Whole of project	Yes

APPENDIX B – EPBC ACT PROTECTED MATTERS SEARCH

Australian Government
Department of the Environment and Energy

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.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

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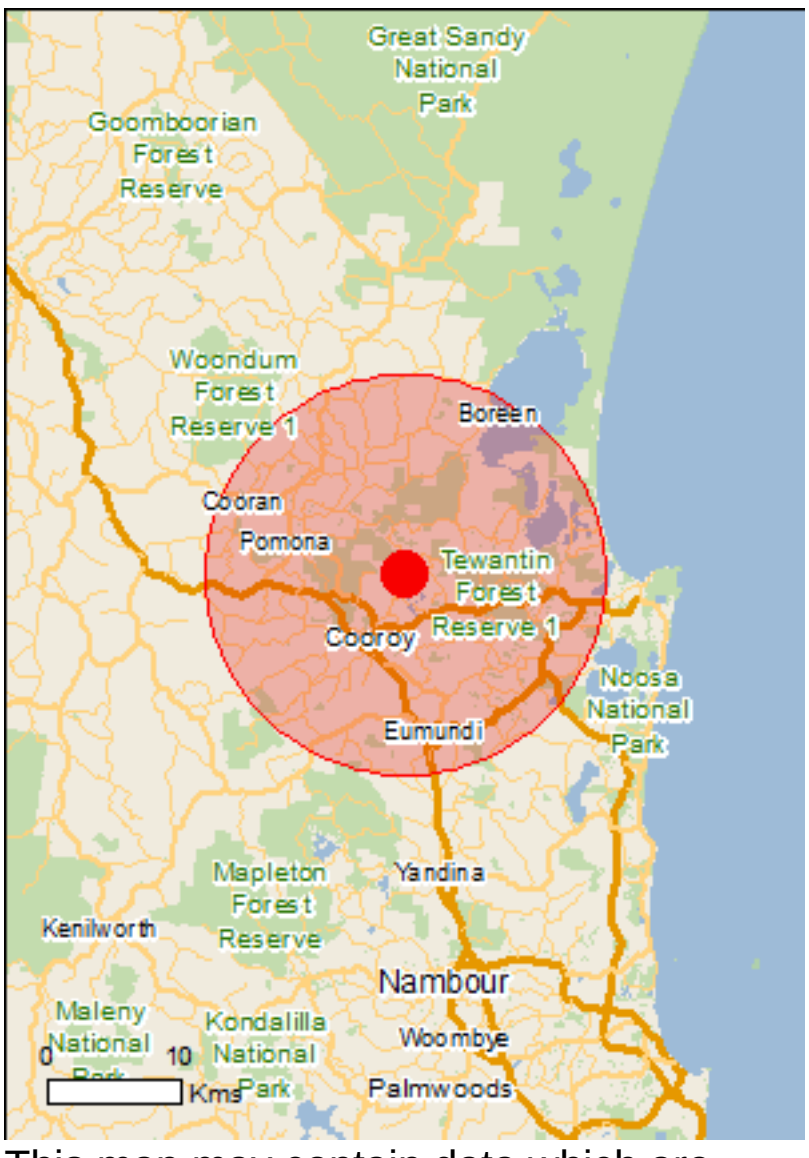

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Coordinates

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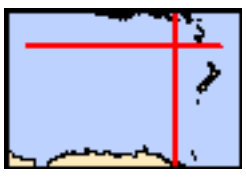

Summary

Matters of National Environmental 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:	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	2
Listed Threatened Species:	86
Listed Migratory Species:	49

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 http://www.environment.gov.au/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 Land:	None
Commonwealth Heritage Places:	1
Listed Marine Species:	90
Whales and Other Cetaceans:	13
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

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

State and Territory Reserves:	41
Regional Forest Agreements:	None
Invasive Species:	42
Nationally Important Wetlands:	2
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar) [Resource Information]

Name	Proximity
Great sandy strait (including great sandy strait, tin can bay and tin can	30 - 40km upstream

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.

Name	Status	Type of Presence
Lowland Rainforest of Subtropical Australia	Critically Endangered	Community likely to occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Cyclopsitta diophthalma coxeni Coxen's Fig-Parrot [59714]	Endangered	Species or species habitat likely to occur within area
Dasyornis brachypterus Eastern Bristlebird [533]	Endangered	Species or species habitat may occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Species or species habitat may occur within area
Diomedea antipodensis gibsoni Gibson's Albatross [82270]	Vulnerable	Species or species habitat may occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat may occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species

Name	Status	Type of Presence
		habitat known to occur within area
Fregetta grallaria grallaria White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area
Geophaps scripta scripta Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat may occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat likely to occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area
Poephila cincta cincta Southern Black-throated Finch [64447]	Endangered	Species or species habitat may occur within area
Pterodroma neglecta neglecta Kermadec Petrel (western) [64450]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Thalassarche cauta cauta Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta steadi White-capped Albatross [82344]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Species or species habitat may occur within

Name	Status	Type of Presence
		area
Turnix melanogaster Black-breasted Button-quail [923]	Vulnerable	Species or species habitat likely to occur within area
Fish		
Epinephelus daemelii Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat may occur within area
Maccullochella mariensis Mary River Cod [83806]	Endangered	Species or species habitat known to occur within area
Neoceratodus forsteri Australian Lungfish, Queensland Lungfish [67620]	Vulnerable	Species or species habitat known to occur within area
Frogs		
Litoria olongburensis Wallum Sedge Frog [1821]	Vulnerable	Species or species habitat known to occur within area
Mixophyes iteratus Giant Barred Frog, Southern Barred Frog [1944]	Endangered	Species or species habitat known to occur within area
Insects		
Argynnis hyperbius inconstans Australian Fritillary [88056]	Critically Endangered	Species or species habitat may occur within area
Phyllodes imperialis smithersi Pink Underwing Moth [86084]	Endangered	Breeding may occur within area
Mammals		
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area
Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat likely to occur within area
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
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat known to occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area

Name	Status	Type of Presence
Xeromys myoides Water Mouse, False Water Rat, Yirrkoo [66]	Vulnerable	Species or species habitat known to occur within area
Other		
Macrozamia pauli-guilielmi Pineapple Zamia [5712]	Endangered	Species or species habitat likely to occur within area
Plants		
Acacia attenuata [10690]	Vulnerable	Species or species habitat known to occur within area
Allocasuarina emuina Emu Mountain Sheoak, Mt Emu She-oak [21926]	Endangered	Species or species habitat likely to occur within area
Archidendron lovelliae Bacon Wood, Tulip Siris [13451]	Vulnerable	Species or species habitat known to occur within area
Arthraxon hispidus Hairy-joint Grass [9338]	Vulnerable	Species or species habitat likely to occur within area
Baloghia marmorata Marbled Balogia, Jointed Baloghia [8463]	Vulnerable	Species or species habitat likely to occur within area
Boronia keysii Key's Boronia [21632]	Vulnerable	Species or species habitat known to occur within area
Bosistoa transversa Three-leaved Bosistoa, Yellow Satinheart [16091]	Vulnerable	Species or species habitat likely to occur within area
Cryptocarya foetida Stinking Cryptocarya, Stinking Laurel [11976]	Vulnerable	Species or species habitat known to occur within area
Cryptostylis hunteriana Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat likely to occur within area
Eucalyptus conglomerata Swamp Stringybark [3160]	Endangered	Species or species habitat likely to occur within area
Floydia praealta Ball Nut, Possum Nut, Big Nut, Beefwood [15762]	Vulnerable	Species or species habitat likely to occur within area
Lepidium peregrinum Wandering Pepper-cress [14035]	Endangered	Species or species habitat may occur within area
Macadamia integrifolia Macadamia Nut, Queensland Nut Tree, Smooth-shelled Macadamia, Bush Nut, Nut Oak [7326]	Vulnerable	Species or species habitat known to occur within area
Macadamia ternifolia Small-fruited Queensland Nut, Gympie Nut [7214]	Vulnerable	Species or species habitat known to occur within area
Macadamia tetraphylla Rough-shelled Bush Nut, Macadamia Nut, Rough-shelled Macadamia, Rough-leaved Queensland Nut [6581]	Vulnerable	Species or species habitat likely to occur within area
Phaius australis Lesser Swamp-orchid [5872]	Endangered	Species or species habitat known to occur

Name	Status	Type of Presence within area
Planchonella eerwah Shiny-leaved Condoo, Black Plum, Wild Apple [17340]	Endangered	Species or species habitat likely to occur within area
Plectranthus torrenticola [55728]	Endangered	Species or species habitat likely to occur within area
Prasophyllum wallum Wallum Leek-orchid [55148]	Vulnerable	Species or species habitat likely to occur within area
Prostanthera spathulata [88266]	Vulnerable	Species or species habitat known to occur within area
Romnalda strobilacea [5948]	Vulnerable	Species or species habitat likely to occur within area
Samadera bidwillii Quassia [29708]	Vulnerable	Species or species habitat known to occur within area
Sophora fraseri [8836]	Vulnerable	Species or species habitat may occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area
Triunia robusta Glossy Spice Bush [14747]	Endangered	Species or species habitat known to occur within area
Xanthostemon oppositifolius Penda, Southern Penda, Luya's Hardwood [8738]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Delma torquata Adorned Delma, Collared Delma [1656]	Vulnerable	Species or species habitat may occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Furina dunmalli Dunmall's Snake [59254]	Vulnerable	Species or species habitat may occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Saiphos reticulatus Three-toed Snake-tooth Skink [88328]	Vulnerable	Species or species

Name	Status	Type of Presence
		habitat may occur within area
Sharks		
Carcharias taurus (east coast population)		
Grey Nurse Shark (east coast population) [68751]	Critically Endangered	Species or species habitat likely to occur within area
Carcharodon carcharias		
White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron		
Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Breeding likely to occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Anous stolidus		
Common Noddy [825]		Species or species habitat likely to occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes		
Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area
Calonectris leucomelas		
Streaked Shearwater [1077]		Species or species habitat may occur within area
Diomedea exulans		
Wandering Albatross [89223]	Vulnerable	Species or species habitat may occur within area
Fregata ariel		
Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
Fregata minor		
Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat likely to occur within area
Macronectes giganteus		
Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli		
Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Sternula albifrons		
Little Tern [82849]		Species or species habitat may occur within area
Thalassarche cauta		
Tasmanian Shy Albatross [89224]	Vulnerable*	Species or species habitat may occur within area
Thalassarche melanophris		
Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Migratory Marine Species		

Name	Threatened	Type of Presence
Balaena glacialis australis Southern Right Whale [75529]	Endangered*	Species or species habitat likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Dugong dugon Dugong [28]		Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat known to occur within area
Manta alfredi Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat may occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Orcaella brevirostris Irrawaddy Dolphin [45]		Species or species habitat likely to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Breeding likely to occur within area

Name	Threatened	Type of Presence
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Breeding known to occur within area
Migratory Terrestrial Species		
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Heritage Places [Resource Information]

Name	State	Status
Historic		
Cooroy Post Office	QLD	Listed place

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Anseranas semipalmata Magpie Goose [978]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat may occur within area
Cuculus saturatus Oriental Cuckoo, Himalayan Cuckoo [710]		Species or species habitat known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Species or species habitat may occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat may occur within area
Diomedea gibsoni Gibson's Albatross [64466]	Vulnerable*	Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Species or species habitat likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Sterna albifrons Little Tern [813]		Species or species habitat may occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Species or species habitat may occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area
Fish		
Acentronura tentaculata Shortpouch Pygmy Pipehorse [66187]		Species or species habitat may occur within area
Campichthys tryoni Tryon's Pipefish [66193]		Species or species habitat may occur within area
Corythoichthys amplexus Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area
Corythoichthys ocellatus Orange-spotted Pipefish, Ocellated Pipefish [66203]		Species or species habitat may occur within area
Festucalex cinctus Girdled Pipefish [66214]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
Hippichthys cyanospilos Blue-speckled Pipefish, Blue-spotted Pipefish [66228]		Species or species habitat may occur within area
Hippichthys heptagonus Madura Pipefish, Reticulated Freshwater Pipefish [66229]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus kelloggi Kellogg's Seahorse, Great Seahorse [66723]		Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus trimaculatus Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720]		Species or species habitat may occur within area
Hippocampus whitei White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240]		Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Micrognathus andersonii Anderson's Pipefish, Shortnose Pipefish [66253]		Species or species habitat may occur within area
Micrognathus brevirostris thorntail Pipefish, Thorn-tailed Pipefish [66254]		Species or species habitat may occur within area
Microphis manadensis Manado Pipefish, Manado River Pipefish [66258]		Species or species habitat may occur within area
Solegnathus dunckeri Duncker's Pipehorse [66271]		Species or species habitat may occur within area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Solegnathus spinosissimus Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Solenostomus paegnius Rough-snout Ghost Pipefish [68425]		Species or species habitat may occur within area
Solenostomus paradoxus Ornate Ghostpipefish, Harlequin Ghost Pipefish, Ornate Ghost Pipefish [66184]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Mammals		
Dugong dugon Dugong [28]		Species or species habitat known to occur within area
Reptiles		
Acalyptophis peronii Horned Seasnake [1114]		Species or species habitat may occur within area
Aipysurus laevis Olive Seasnake [1120]		Species or species habitat may occur within area
Astrotia stokesii Stokes' Seasnake [1122]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Disteira kingii Spectacled Seasnake [1123]		Species or species habitat may occur within area
Disteira major Olive-headed Seasnake [1124]		Species or species habitat may occur within area
Emydocephalus annulatus Turtle-headed Seasnake [1125]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Hydrophis elegans Elegant Seasnake [1104]		Species or species habitat may occur within area
Laticauda laticaudata a sea krait [1093]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and other Cetaceans [Resource Information]

Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Orcaella brevirostris Irrawaddy Dolphin [45]		Species or species habitat likely to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Breeding known to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Alyxia	QLD
Arthur Harrold	QLD
Bellbird Stud	QLD
Bill Huxley	QLD
Bryn Glas	QLD
Cooloothin	QLD
Cooroibah Environmental Reserve	QLD
Dangerbridge	QLD
Doonella Wetlands	QLD
Eumundi	QLD
Goat Island (Noosa River)	QLD
Great Sandy	QLD
Great Sandy 2	QLD
Great Sandy National Park	QLD
Harry Spring	QLD
Haven	QLD
Johns Property addition to Great Sandy National Park	QLD
Kildey's Dangerbridge	QLD
Kingsgate Drive	QLD
Mapleton	QLD
Mapleton	QLD
Mount Cooroy	QLD
Mount Eerwah	QLD
Mount Pinbarren	QLD
NOF-DANGERBRIDGE	QLD
Noosa	QLD
Noosa North Shore	QLD
Penda Scrub	QLD
Sheep Island	QLD
Six Mile Creek	QLD
Symplocos	QLD
Tainsh's	QLD
Tewantin	QLD
Tuchekoi	QLD
Tuchekoi	QLD
Una Corbould	QLD
Verrierdale Rise	QLD
Weyba	QLD
Woondum	QLD
Woondum	QLD
Yurol	QLD

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Annona glabra Pond Apple, Pond-apple Tree, Alligator Apple,		Species or species

Name	Status	Type of Presence
Bullock's Heart, Cherimoya, Monkey Apple, Bobwood, Corkwood [6311] Anredera cordifolia		habitat likely to occur within area
Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643] Asparagus aethiopicus		Species or species habitat likely to occur within area
Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425] Asparagus africanus		Species or species habitat likely to occur within area
Climbing Asparagus, Climbing Asparagus Fern [66907]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. rotundata Bitou Bush [16332]		Species or species habitat likely to occur within area
Dolichandra unguis-cati Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Hymenachne amplexicaulis Hymenachne, Olive Hymenachne, Water Stargrass, West Indian Grass, West Indian Marsh Grass [31754]		Species or species habitat likely to occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Parthenium hysterophorus Parthenium Weed, Bitter Weed, Carrot Grass, False Ragweed [19566]		Species or species habitat likely to occur within area
Prosopis spp. Mesquite, Algaroba [68407]		Species or species habitat likely to occur within area
Protasparagus densiflorus Asparagus Fern, Plume Asparagus [5015]		Species or species habitat likely to occur within area
Protasparagus plumosus Climbing Asparagus-fern, Ferny Asparagus [11747]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and		Species or species

Name	Status	Type of Presence
Sterile Pussy Willow [68497]		habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area

Nationally Important Wetlands [Resource Information]

Name	State
Lake Weyba	QLD
Noosa River Wetlands	QLD

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

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.

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

Where very little information is available for 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 reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

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

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

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

Coordinates

-26.38214 152.93242

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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APPENDIX C – CONSERVATION SIGNIFICANT FLORA AND FAUNA (DATABASE SEARCHES)

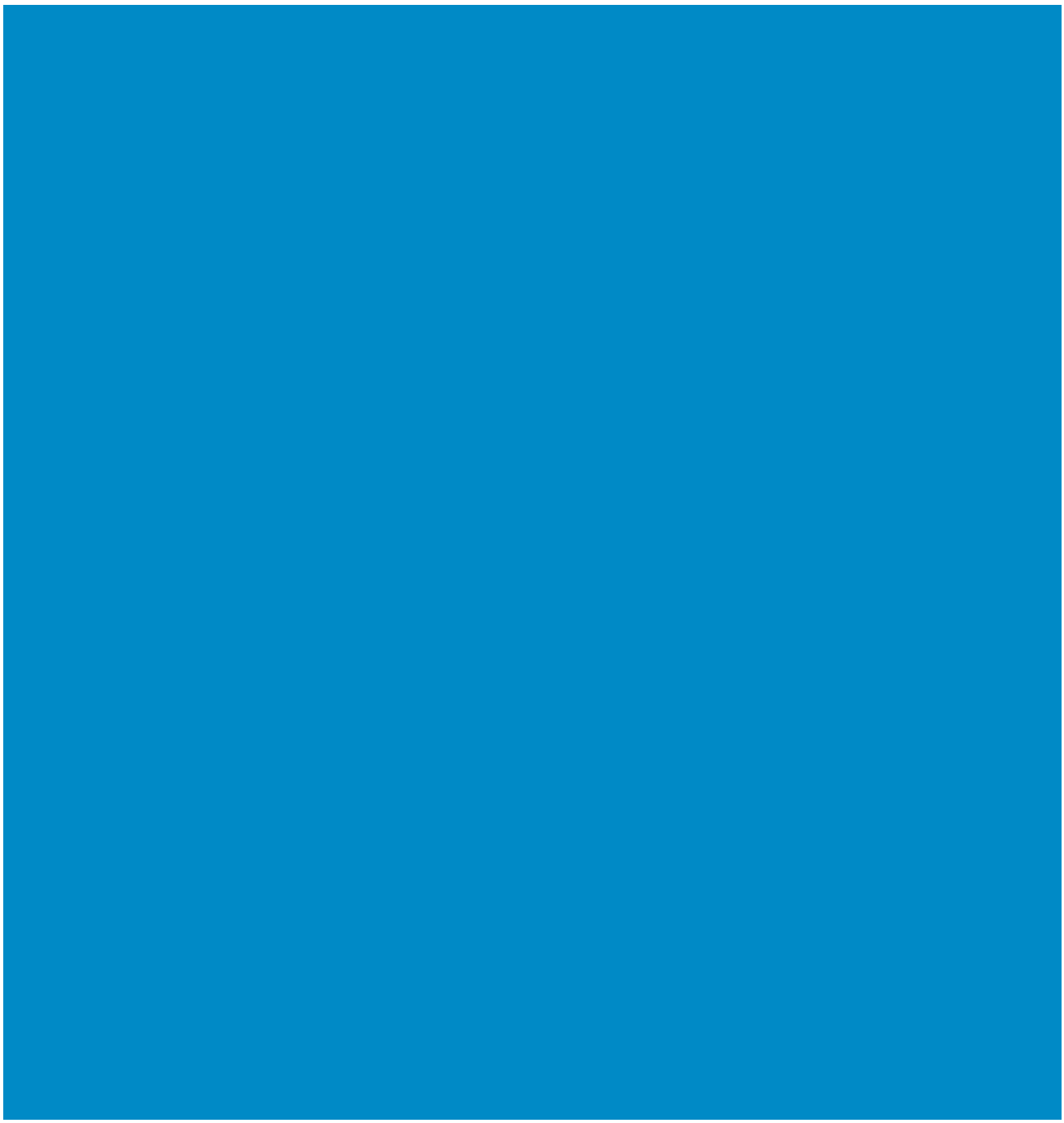
Biodiversity database results: conservation significant flora and fauna

Scientific name	Common name	EPBC status	NC Act status
Flora			
Acacia attenuata	-	Vulnerable	Vulnerable
Archidendron lovelliae	bacon wood	Vulnerable	Vulnerable
Arthraxon hispidus	hairy-joint grass	Vulnerable	Vulnerable
Baloghia marmorata	marbled balogia	Vulnerable	Vulnerable
Bosistoa transversa	three-leaved bosistoa	Vulnerable	-
Cryptocarya foetida	stinking cryptocarya	Vulnerable	-
Floydia praealta	ball nut	Vulnerable	Vulnerable
Macadamia integrifolia	macadamia nut	Vulnerable	Vulnerable
Macadamia ternifolia	small-fruited Queensland nut	Vulnerable	Vulnerable
Phaius australis	lesser swamp-orchid	Endangered	Endangered
Phebalium distans	Mt Berryman phebalium	Critically endangered	Endangered
Prostanthera sp. Mt Tinbeerwah (P.R.Sharpe 4781)	-	Vulnerable	Vulnerable
Symplocos harroldii	hairy hazelwood	-	Near threatened
Triunia robusta	-	Endangered	Endangered
Xanthostemon oppositifolius	penda	Vulnerable	Vulnerable
Fauna			
Anthochaera phrygia	regent honeyeater	Critically endangered, migratory	Endangered
Botaurus poiciloptilus	Australasian bittern	Endangered	-
Cyclopsitta diophthalma coxeni	double-eyed fig-parrot (Coxen's)	Endangered, migratory	Endangered
Dasyornis brachypterus	eastern bristlebird	Endangered	Endangered
Erythrotriorchis radiatus	red goshawk	Vulnerable	Endangered

Scientific name	Common name	EPBC status	NC Act status
Lathamus discolor	swift parrot	Endangered	Endangered
Poephila cincta cincta	black-throated finch (southern)	Endangered	Endangered
Podargus ocellatus plumiferus	plumed frogmouth	-	Vulnerable
Rostratula australis	Australian painted snipe	Endangered	Vulnerable
Turnix melanogaster	black-breasted button-quail	Vulnerable	Vulnerable
Crinia tinnula	wallum froglet	-	Vulnerable
Litoria freycineti	wallum rocketfrog	-	Vulnerable
Litoria olongburensis	wallum sedge frog	Vulnerable	Vulnerable
Mixophyes iteratus	giant barred frog	Endangered	Endangered
Chalinolobus dwyeri	large-eared pied bat	Vulnerable	Vulnerable
Dasyurus hallucatus	northern quoll	Endangered	-
Dasyurus maculatus maculatus (SE mainland population)	spot-tailed quoll	Endangered	Vulnerable
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)	koala	Vulnerable	Vulnerable
Pteropus poliocephalus	grey-headed flying-fox	Vulnerable	-
Coeranoscincus reticulatus	three-toed snake-tooth skink	Vulnerable	-
Delma torquata	collared delma	Vulnerable	Vulnerable
Elusor macrurus	Mary River turtle	Endangered	Endangered
Elseya albagula	White-throated snapping turtle	Critically endangered	-
Furina dunmalli	Dunmall's snake	Vulnerable	Vulnerable
Maccullochella mariensis	Mary River cod	Endangered	-
Neoceratodus forsteri	Australian lungfish	Vulnerable	-

Desktop review results: EPBC migratory fauna

Scientific name	Common name	Migratory group
Cuculus optatus	oriental cuckoo	Migratory terrestrial species
Apus pacificus	fork-tailed swift	Migratory marine birds
Hirundapus caudacutus	white-throated needletail	Migratory terrestrial species
Merops ornatus	rainbow bee-eater	Migratory terrestrial species
Monarcha melanopsis	black-faced monarch	Migratory terrestrial species
Monarcha trivirgatus	spectacled monarch	Migratory terrestrial species
Myiagra cyanoleuca	satin flycatcher	Migratory terrestrial species
Rhipidura rufifrons	rufous fantail	Migratory terrestrial species
Ardea alba	great egret	Migratory wetlands species
Ardea ibis	cattle egret	Migratory wetlands species
Pandion haliaetus	osprey	Migratory wetlands species

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