Emu Swamp Dam project:

Coordinator-General's evaluation report on the environmental impact statement

September 2014

The Department of State Development, Infrastructure and Planning is responsible for driving the economic development of Queensland.

An electronic copy of this report is available on the Department of State Development, Infrastructure and Planning's website at **www.dsdip.qld.gov.au**

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Synopsis

This report evaluates the potential impacts of the proposed Emu Swamp Dam project (the project). It has been prepared pursuant to section 35 of the *State Development and Public Works Organisation Act 1971* (SDPWO Act).

The proponent is the Southern Downs Regional Council (SDRC). SDRC proposes to establish a combined urban and irrigation dam with a storage capacity of 10 500 megalitres (ML) with an inundation area of 196 hectares (ha), as well as associated pump stations and pipeline infrastructure. Emu Swamp Dam is proposed to be constructed on the Severn River, approximately 15 kilometres (km) south-west of Stanthorpe. The dam would yield 2490 ML per annum and contribute to the security of urban water supply for the Stanthorpe urban area as well as provide an opportunity to provide high security of water supply to agricultural users. .

I have considered the environmental impact statement (EIS) documentation, issues raised in public submissions, information and advice I have received from state government agencies and the Commonwealth Department of the Environment.

The following provides an overview of my evaluation.

Project rationale

Stanthorpe's water is supplied by Storm King Dam (SKD), which has a storage capacity of 2180 ML and an annual water allocation of 700 ML for urban water under the Border Rivers Resources Operations Plan (ROP). The town's current demand for urban water has risen to approximately 695 ML per annum—a demand that is expected to increase, despite restrictions and other water conservation initiatives. The dam has almost run dry on several occasions—most recently in 2008 following a prolonged drought—despite the imposition of severe water restrictions that saw the annual yield fall to 445 ML compared to the historical average of 654 ML. In terms of high reliability of supply (based on 98 per cent monthly reliability), only a baseline yield of 370 ML can be taken from the dam per annum.

SDRC commissioned studies in 2010 that analysed opportunities to improve the reliability of Stanthorpe's water supply, including alternative options to the proposed Emu Swamp Dam project. Other options considered were ruled out by the proponent because of a range of factors including yield, costs and environmental impacts.

Matters of national environmental significance

The project's construction and inundation area will impact on the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) listed threatened ecological community (TEC) White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (box-gum grassy woodland) and habitat for a range of threatened species of flora and fauna.

I am satisfied that the avoidance and mitigation measures committed to outlined by the proponent would reduce the significant residual impacts to the greatest extent possible.

The total significant residual impact on the box-gum grassy woodland community is expected to be 72.29 ha after the implementation of all avoidance and mitigation measures.

The project is also expected to result in significant residual impacts on 45 individual prickly bottlebrush and 18.1 ha of border thick-tailed gecko habitat.

The proponent's offsets plan has identified a number of potential environmental offsets sites that demonstrate that the rehabilitation of land would result in no net loss of the box-gum grassy woodland, prickly bottlebrush or Border thick-tailed gecko.

I have recommended conditions of approval to the Commonwealth Minister for the Environment to minimise impacts on the EPBC Act listed TEC (box-gum grassy woodland community) and threatened species. Conditions requiring a final environmental offsets plan are included to address any significant residual impacts that may result from the project.

Matters of state environmental significance

Regional ecosystem (RE) mapping identified six 'endangered' and one 'of concern' RE types within the inundation area and pipeline easements. Approximately 72.29 ha of the 'endangered' REs overlap with the EPBC Act listed TEC (box-gum grassy woodland) and would be covered by the proposed offset for this ecological community. The remaining 27.7 ha of 'endangered' REs and 4.66 ha of the 'of concern' REs not overlapping with the TEC would be largely mitigated following enhancement of the buffer area. The remaining residual impact of 19.8 ha of 'endangered' RE 13.3.1x1 will be required to be offset.

As the prickly bottlebrush and the border thick-tailed gecko are listed under both State and Commonwealth legislation, the overlapping significant residual impacts on these species would be covered by Commonwealth offset requirements.

I am satisfied that the avoidance, mitigation and offsets proposals proposed for the EPBC Act listed TEC (box-gum grassy woodland), and the 'endangered' RE 13.3.1x1 adequately address the impacts to 'of concern', 'endangered' REs and listed species.

The proponent has to finalise the offset proposal during detailed design and identify any significant residual impacts to fish passage, protected wildlife habitat, connectivity of environmentally sensitive areas and high ecologically significant wetlands in the impacted area.

Water resources and water quality

The Severn River is located within the Granite Belt catchment, which is part of the Border Rivers Drainage Basin. The Severn River is an ephemeral stream characterised by a rocky bottom, pools and riffles. The EIS reported that 26 artificial barrier structures are located on the river from the confluence of Quart Pot Creek and the Broadwater to Nundubbermere Falls in Sundown National Park. These weirs act as barriers to the river flow and are primarily used for private use such as stock and domestic uses.

Water resources

The *Water Act 2000* and Water Resource (Border Rivers) Plan 2003 (WRP) provide a sustainable framework for allocating and managing water to achieve a balance between consumption and the environment. The WRP identifies 1500 ML of unallocated water for town water supply and 3000 ML of unallocated water for irrigation and associated industry. The proponent has proposed to use the Emu Swamp Dam to extract 750 ML of water for urban water supply and 1740 ML for irrigation. The WRP's integrated quantity and quality model indicates the volumes can be taken at high reliability—greater than 99 per cent for urban water and greater than 96 per cent for irrigation. Environmental flow objectives (EFOs) can be achieved 100 per cent of the time whilst extracting for both purposes. The EFOs have been set for a range of flow scenarios to ensure a healthy riverine environment is maintained.

I am satisfied that the proponent has conducted the appropriated investigations and has demonstrated the project would be consistent with the Water Act and WRP.

Water quality

The existing surface water quality is indicative of a slightly to moderately disturbed ecosystem, affected by surrounding agricultural development, land clearing, grazing and historic tin mining. Due to the surrounding agricultural land uses, the existing water quality does not achieve the prescribed water quality objectives for some nutrients and chemical parameters—aluminium, zinc, copper and dissolved oxygen.

A range of construction and operational activities have the potential to impact upon water quality—for example, increased sedimentation and erosion during construction. The proponent has committed to develop an erosion and sediment control management plan and undertake water quality monitoring to meet the standards set out in the Queensland Water Quality guidelines for stormwater quality and flow during construction.

An environmental authority (EA) is required to undertake extractive activities for the construction of the dam. I am satisfied the commitments made by the proponent for the construction of the dam and the requirements of the EA will address any water quality impacts during construction.

During operation, the dam will need to protect the environmental values downstream and ensure a suitable quality of water for the Mt Marlay water treatment plant for potable use.

A 200-metre-wide vegetated buffer around the dam would be established to minimise the potential for nutrients and sediment to enter the dam. I require the buffer to be in place prior to inundation of the dam.

I am satisfied that my conditions will ensure suitable water quality is maintained during the construction and operation of the dam.

Land use

The proponent proposes to seek ministerial approval for a community infrastructure designation (CID) to cover the proposed area of land for the Emu Swamp Dam and associated infrastructure.

A CID negates the need to obtain development approvals for any assessable development under the relevant local government planning scheme and for any reconfiguring of lots in relation to the project.

Should the minister approve the CID, the planning scheme would be amended to reflect the designation.

Where the land forms part of a CID, I have nominated recommendations and conditions for the minister's consideration for the proposed designation.

Conclusion

I consider the proponent has met the environmental impact assessment requirements of the SDPWO Act and sufficient information has been provided to enable a thorough evaluation of the potential impacts of the project.

My evaluation concludes that the Emu Swamp Dam and its urban pipeline will improve water security and support economic growth in Stanthorpe and surrounding areas.

There are local, regional and state benefits to be derived from the development, and any adverse environmental impacts can be avoided, minimised, mitigated or offset through the implementation of the proponent's mitigation measures and commitments outlined in the EIS documentation. My conditions and recommendations in this report have been formulated to further manage all impacts associated with the project.

I approve the project to proceed subject to the conditions and recommendations set out in the appendices of this report. I expect the proponent to fully implement all commitments.

This report will be provided to the Commonwealth Minister for the Environment, pursuant to section 36(2) of the State Development and Public Works Organisation Regulation 2010 and the bilateral agreement between the State of Queensland and the Australian Government to support a decision on the controlled action for this project pursuant to section 133 of the EPBC Act.

A copy of this report will be provided to the proponent and relevant state government agencies, and be made publicly available at: **www.dsdip.qld.gov.au/emu-swamp-dam**

Barry Broe

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Barry Broe
Coordinator-General

29 September 2014

1. Introduction

This report has been prepared pursuant to section 35 of the *State Development and Public Works Organisation Act 1971* (Qld) (SDPWO Act) and provides an evaluation of the environmental impact statement (EIS) for the Emu Swamp Dam project (the project). The report:

- summarises the key issues associated with the potential impacts of the project on the physical, social and economic environments at the local, regional, state and national levels
- presents an evaluation of the project, based on information contained in the EIS, additional information to the EIS (AEIS), submissions made on the EIS and information and advice from advisory agencies and other parties
- states conditions under which the project may proceed.

Additional information and investigations will be provided during the project's design phase and further assessments undertaken as part of subsequent approval processes.

This report represents the conclusion of the Coordinator-General's impact assessment process under the SDPWO Act and the assessment bilateral agreement between the State of Queensland and the Commonwealth.

2. About the project

Southern Downs Regional Council (SDRC) administers areas surrounding Warwick, Allora, Stanthorpe and Killarney. SDRC is responsible for delivering municipal services such as the supply of water.

SRDC proposes to develop Emu Swamp Dam to improve urban water security for Stanthorpe and surrounding towns, and supply irrigation water for agricultural production. The proposal includes pipelines, an access road and a recreational area.

SDRC has considered a number of options for delivering the project. The current preferred approach is for SDRC to establish a proprietary company under the *Corporations Act 2011* (Cwlth) to construct and operate the dam and associated pipeline infrastructure.

The dam at full supply level (FSL) would be 738 metres (m) Australian Height Datum (AHD), with an inundation area of 196 ha, resulting in the dam holding 10 500 ML. The proposed annual urban extraction volume for Emu Swamp Dam is 750 ML per year (ML/year) and the proposed irrigation component is 1740 ML/year. The main dam barrier would be a roller-compacted concrete (RCC) structure with a total crest length of 576 m and a maximum height of 19.8 m.

The proposed urban pipeline would extend 23.2 km to the Mt Marlay water treatment plant and would traverse along Fletcher Road, the New England Highway, several other existing road reserves and short sections of private land. The proposed irrigation pipeline is to be supplied by the urban pipeline and would extend 102 km along existing road reserves with some short sections crossing through private land.

As a result of the proposed inundation, the existing Stalling Lane would no longer be accessible from Emu Swamp Road. To maintain access to two properties on Stalling Lane, a new access road would be constructed from Fletcher Road to the western end of the existing Stalling Lane.

The proposal would also include a 322-hectare buffer surrounding the inundation area, which is intended for conservation purposes and to assist in protecting the water quality of the dam and maintaining environmental values, biodiversity and ecological connectivity through the area.

Public recreation facilities including barbeque area, toilet facilities and boat ramp would also be provided on the south-western side of the inundation area.

2.1 Location

The proposed dam is located on the Severn River (refer to figures 2.1 and 2.2) between Fletcher Road and Emu Swamp Road, 5 km north of Ballandean and 15 km south-west of Stanthorpe. The inundation area would affect 18 properties and the buffer area would affect a further two properties. The urban pipeline would affect two properties and the irrigation pipeline would affect seven properties. The access road to Stalling Lane would affect an additional two properties.

The Severn River is located in the Granite Belt catchment, which forms part of the Border Rivers catchment and the headwaters of the Murray–Darling Basin. The catchment is approximately 1300 km^2 and includes the Broadwater, Cannon Creek, Quart Pot Creek, Four Mile Creek, Accommodation Creek and the Severn River that flows in a south-westerly direction.

The project area (including the pipelines) is located entirely within the Stanthorpe Plateau province of the New England Tableland Bioregion. The current dominant surrounding land uses in the area include grazing and horticulture with some residential and minor tourism and industrial uses.

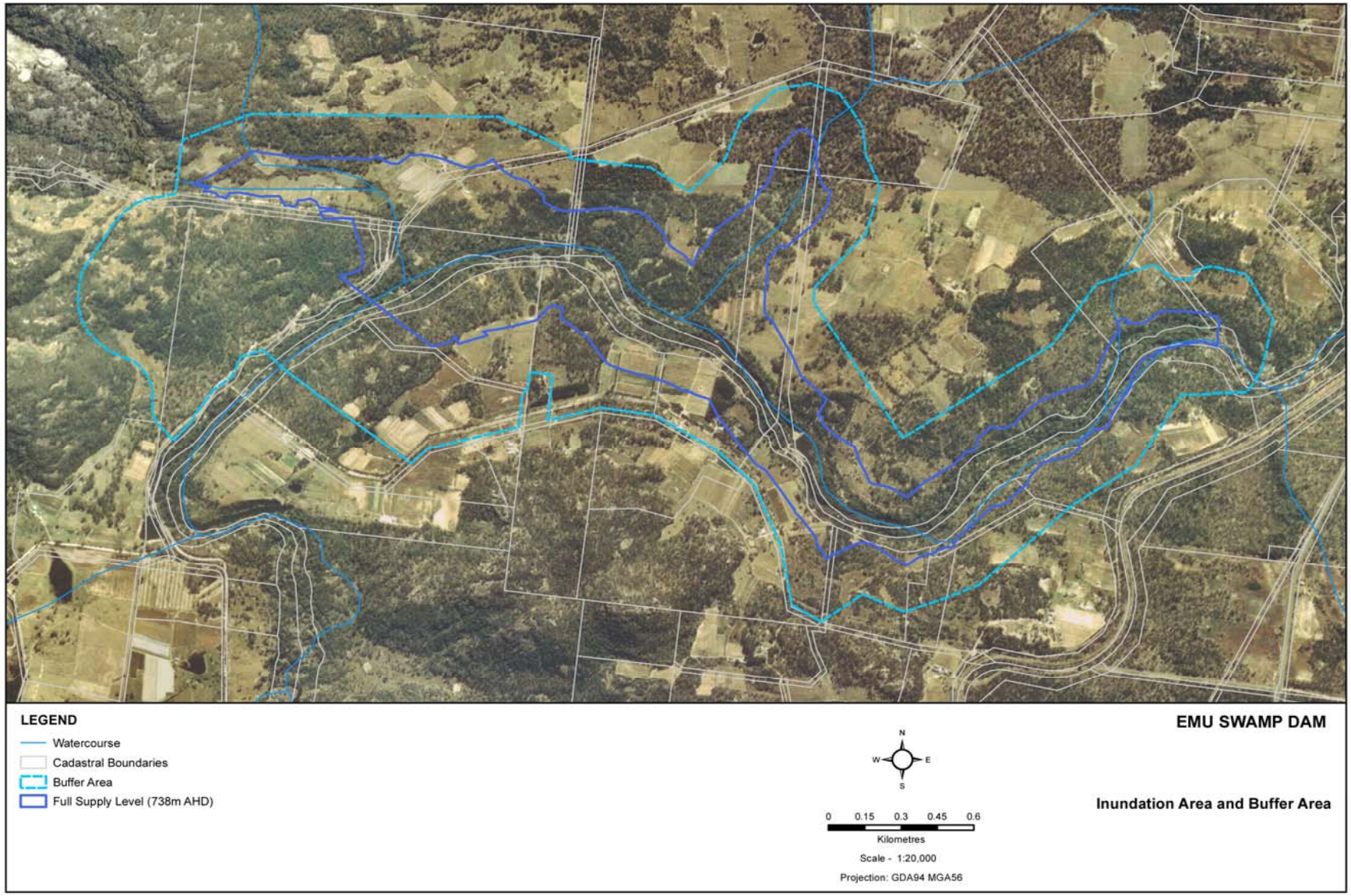

Figure 2.1 Inundation and buffer areas

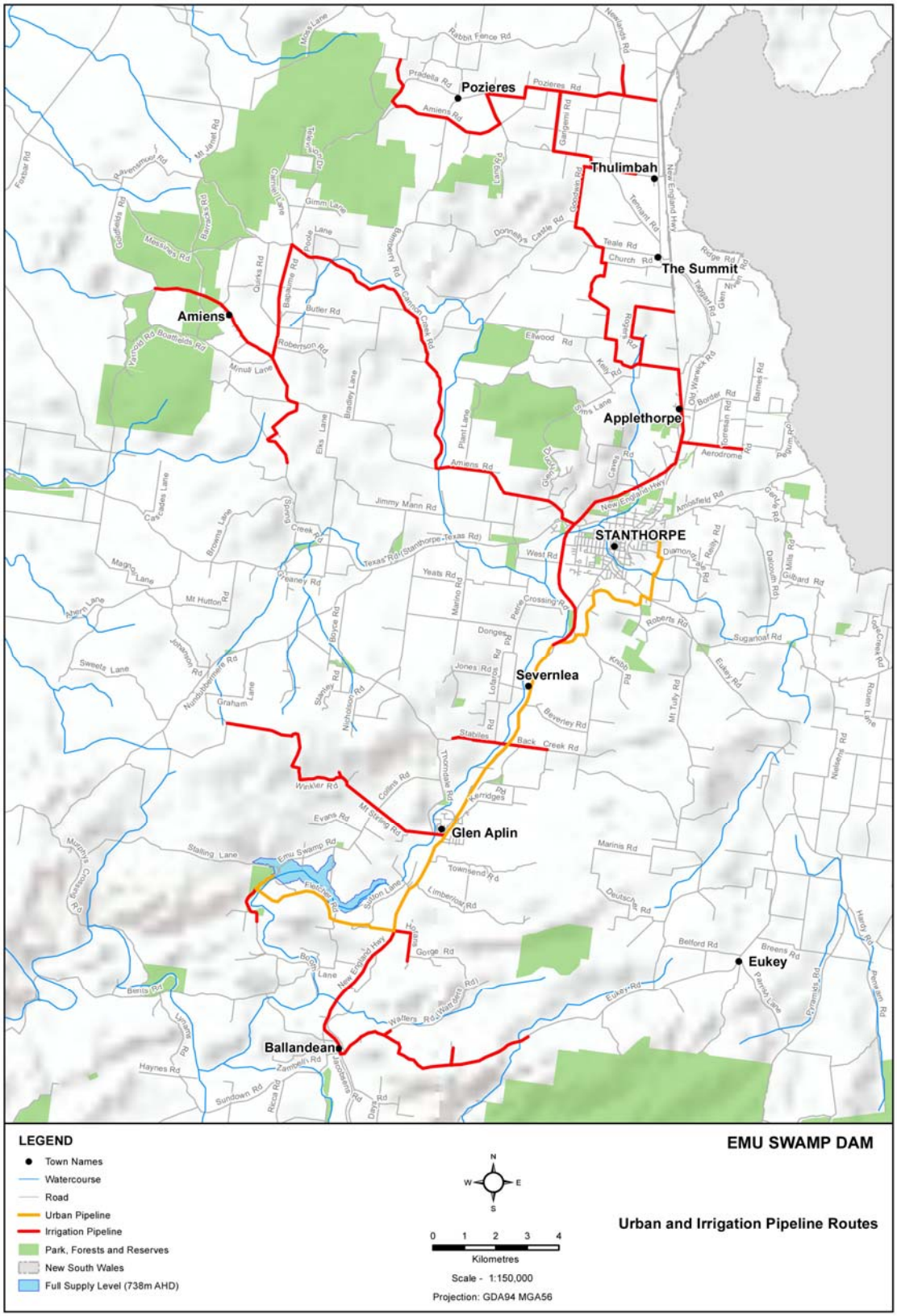

Figure 2.2 Urban and irrigation pipeline routes

Several state reserves are in the vicinity of the project area including Girraween, Bald Rock and Sundown National Parks, and the Donnybrook State Forest. These provide habitat for a diversity of flora and fauna species.

The Severn River is an ephemeral river with variable flows. There has been considerable water supply development in the Severn River including 26 barriers between the confluence of the Broadwater, Quart Port Creek and Nundubbermere Falls, approximately 33 km downstream of the proposed dam site. These dams and weirs have significant impact on environmental flows and restrict fish passage during periods of low to moderate flows.

There are no mapped lacustrine (lake or riverine) or palustrine (e.g. swamp) wetlands within the project area. The closest lacustrine wetland areas are associated with a private weir and farm dams downstream from the inundation area.

The condition of the aquatic habitat within the section of the Severn River that passes through the project area is considered to be moderate to good with the exception of some upstream and downstream sites that have been cleared of riparian vegetation.

The section of the Severn River, where the inundation area is proposed, passes through a gently sloping valley in a granite landscape. The valley slopes around the inundation area are rocky with numerous granite tors and rock boulder-piles, interrupted by flatter areas of loamy granite soils and rock pavements.

A large proportion of the inundation area has been modified by historical land clearing and continued agricultural and grazing land uses. These areas have also been disturbed and degraded by feral deer, pigs and rabbits and weed infestation. As a result, approximately half of the inundation area is comprised of non-remnant vegetation (e.g. groundcover dominated by grasses and regrowth vegetation).

The remaining site includes mixed areas of open eucalypt woodland/forest, shrubby regrowth and riparian shrubland along the length of the Severn River. The woodland and open forest communities are dominated to varying degrees by Youman's stringybark (*E.youmanii*), Blakely's red gum (*E.blakelyi*), orange gum (*E.prava*), broad-leaved apple (*Angophora subvelutina*) and black cypress pine (*Callitris endlicheri*).

The section of the Severn River within the inundation area is fringed by a semi-continuous to continuous corridor of riparian shrubland vegetation dominated by narrow-leaved tea-tree (*Melaleuca alternifolia*), sticky wattle (*Acacia viscidula*), weeping tea-tree (*Leptospermum brachyandrum*) and callistemon (bottlebrush) species.

The proposed access road to the existing Stalling Lane is located to the north of the existing Emu Swamp Road. This area has been partially cleared for grazing and also includes areas of open woodland dominated by New England blackbutt (*E.andrewsii)*, Youman's stringybark and callitris species.

The existing road reserves where the pipeline corridors are proposed have been impacted by the construction of the existing roads. Vegetation along the proposed pipeline route is considered to be highly fragmented, which has also been impacted by timber extraction and grazing livestock. Ground cover in these areas has also been heavily grazed and typically comprises grasses and developing shrub layers.

2.2 Construction

Construction works are expected to occur six days a week, Monday to Saturday with specific works such as crushing, screening operations of the RCC batch plant and concrete laying of the RCC wall proposed as night-time works for three to four months. The proponent proposes to undertake the construction works associated with the RCC batch plant and laying of the RCC wall utilising two ten-hour shifts, seven days a week. Additional approvals will be required for works occurring outside of Monday to Saturday 6.30 am – 6.30 pm.

Constructing the dam would require site clearing and preparation works. The construction laydown areas are proposed to be located within the inundation footprint or existing cleared areas (e.g. proposed recreation area).

Construction would also involve quarrying and extraction of 5000 m^3 of sand from the inundation area over an area of approximately 100 m × 200 m and to a maximum quarry depth of 5 m.

A concrete batching plant would be located at the dam construction site and would source rock material, sand and water from the site. Rock aggregate and sand would both be stockpiled onsite prior to batching, while cement and fly ash will be transported to the site and stored in silos.

The location of the urban and irrigation pipelines is shown in Figure 2.2.

The pipeline easement would be aligned within road reserves to reduce ecological impacts. Pipeline trenches would be constructed using a 30 tonne (t) excavator for the urban pipeline and a small trenching machine/backhoe for the irrigation pipelines. Construction pipeline components along the New England Highway would require a working corridor with a width of 12.5 m for the urban pipeline and 7.5 m for the irrigation pipeline. The working corridor for the pipeline components along local roads would be 5 m in width for both the urban and irrigation pipelines. The construction will involve a combination of buried and above-ground pipe. The final alignment of the urban and irrigation pipelines would be confirmed during the detailed design stage.

The construction of the dam would result in the closure of Emu Swamp Road from the west of the Fletcher Road intersection to the east of the impoundment area. This would in turn remove access to the existing Stalling Lane connecting to Emu Swamp Road for two properties. A Stalling Lane deviation is to be provided from Fletcher Road to the western end of Stalling Lane to maintain access for these properties.

Following completion of the site construction works, the site will be rehabilitated, materials cleared and all construction infrastructure removed. The quarry excavation will be partially filled with excess rock from the dam and pipelines construction. The final quarry excavation walls will be shaped at a stable slope to eliminate steep unsafe faces.

2.3 Operation

The project will operate in accordance with the 2011 Border Rivers Resources Operations Plan (ROP), which will define how to manage water infrastructure and will comply with the *Water Act 2000* framework.

The irrigation pipeline will be controlled by a radio telemetry linked supervisory control and data acquisition (SCADA) system. Farm delivery points will include magnetic flow meters, actuated valves and a radio receiver/transmitter powered by solar panels.

2.4 Decommissioning

The nominal engineering life of the project is expected to be 100 years, though it is likely to be maintained beyond that period provided that it continues to meet dam safety requirements and provide for the water supply needs of Stanthorpe. The dam may be decommissioned during or after the engineering design life, if it suffers damage that cannot be repaired to meet safety standards.

2.5 Project rationale

The project has two objectives:

- increasing the water supply for the town of Stanthorpe and outlying villages
- providing a secure source of irrigation water to supplement existing water supplies for irrigators.

The town of Stanthorpe has had difficulty meeting urban water demand for many years. Stanthorpe obtains its water from Storm King Dam (SKD), which was constructed in 1954, has a storage volume of 2180 ML at full supply level (FSL) and a yield of about 700 ML/year. SKD has been below 20 per cent capacity for extended periods. This has necessitated SDRC introducing demand management measures such as water meters (1980) and consumer charges for excess water use. In 1996, SDRC altered water charges so that consumers paid for all water used (two-part tariff). In addition to metering, restrictions on water use have been imposed 13 times, during drought conditions, in the past 30 years. The restrictions have become more or less permanent.

SDRC's horticultural industry has been constrained by water availability for many years, so the project's proposed unallocated irrigation water would benefit the industry. The upper part of the Severn River catchment (above the Emu Swamp Dam site) supports an irrigated horticulture industry. Irrigation water is obtained by harvesting overland runoff and by extractions from the tributaries of the Severn River. Irrigators have constructed off-stream and on-stream structures. SDRC cite increasing demand for additional irrigation water to meet growing horticultural development and the capacity to undertake further private water development, either off-stream or on-stream, is very limited. The Southern Downs Region produces 90 per cent of the State's apples and stone fruit and 50 per cent of the State's wine grapes. Stanthorpe's unique climate provides out-of-season opportunities (e.g. the region produces a large component of the State's summer vegetables).

3. Environmental impact assessment process

On 5 February 2007, the then Coordinator-General declared this project a 'coordinated project' under section 26(1)(a) of the SDPWO Act.

In undertaking this evaluation, I have considered the following:

- the proponent's initial advice statement (IAS)
- the proponent's EIS
- comments and issues raised in submissions from advisory agencies, non-government organisations (NGOs) and the public relating to the EIS
- the proponent's additional information to the EIS (AEIS) and issues raised in submissions from advisory agencies on the AEIS
- revised reports and documentation from the proponent in response to agency submissions on the AEIS
- advice from the Australian Government Department of the Environment (DE).

The steps taken in the project's EIS process are documented on the project's webpage at **www.dsdip.qld.gov.au/emu-swamp-dam**.

On 3 January 2007, a delegate of the then Commonwealth Minister for the Environment determined the project is a 'controlled action' under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The 'Evaluation of matters of national significance' (MNES) section of this report lists each controlling provision under the EPBC Act and explains the extent to which the Queensland Government EIS process addresses the actual or likely impacts of the project on the matters covered by each provision.

Fifteen submissions were received on the draft TOR for the EIS—11 from state government agencies, two from NGOs and two from public submitters.

Twenty-seven submissions were received on the EIS—one from DE, nine from state government agencies, one from an NGO and 11 from private individuals.

On 7 April 2008, additional information was requested from the proponent to address matters raised in submissions on the EIS, which included:

- groundwater, particularly connectivity with the alluvium and impacts of water drawdown
- water management and surface water quality impacts in the Suttor River and downstream
- justification on groundwater modelling methodology
- terrestrial and aquatic ecology
- regional impacts relating to groundwater, listed threatened species, four final mine voids and the local community
- revised air quality material
- revised social impact material.

On 4 February 2010, the proponent deferred the work on the project. On 19 February 2013, the proponent advised it would complete the impact assessment process, and provided an AEIS to my office on 12 March 2014 that addressed matters raised in submissions on the EIS.

The AEIS was released for advisory agency comment between 2 April 2014 and 2 May 2014. Twelve submissions were received on the AEIS—one from the Commonwealth Government and 11 from state government agencies.

4. Project approvals

Following the release of this evaluation report, the project will require approvals from the Australian, state and local government agencies before it can lawfully proceed. These are listed in Table 4.2.

Table 4.1 lists approvals sought by the proponent directly from this Coordinator-General's evaluation report.

Table 4.1 Approvals addressed as part of this report

Project component/ activity	Relevant approval	Legislation	Authority
Whole of project	EPBC approval	EPBC Act	DE
Whole of project	Community Infrastructure Designation (CID)	*Sustainable Planning Act 2009* (SP Act)	Local government or a Minister
Whole of project	Material change of use (MCU) development application for utility installation (if not designated as community infrastructure).	Southern Downs Regional Council Planning Scheme 2013	SDRC
Whole of project	Reconfiguring of a lot (code assessable) approval (if not designated as community infrastructure)	SDRC Planning Scheme	SDRC
Whole of project	Operational works permit for vegetation clearing (if not designated as community infrastructure)	*Vegetation Management Act 1999* (VM Act)	State Assessment and Referral Agency (SARA)
Inundation area, pipeline and access road	Clearing permit for the taking of a protected plant	*Nature Conservation Act 1992* (NC Act)	Department of Environment and Heritage Protection (DEHP)
Whole of project	A Species Management Program to be submitted for consideration in relation to tampering with animal breeding places	Nature Conservation (Wildlife Management) Regulation 2006	DEHP

Project component/ activity	Relevant approval	Legislation	Authority
Dam	Operational work that is the construction of a referable dam	SP Act *Water Supply and Safety Reliability Act 2008*	SARA
Construction of the dam wall and taking of water for construction activities	Operational works permit for taking or interfering with water from a watercourse	*Water Act 2000*	SARA
Whole of project	Resource Operations Licence (ROL) or Interim Resource Operations Licence (IROL)	Water Act	Department of Natural Resources and Mines (DNRM)
Whole of project	Water entitlement or interim water entitlement	Water Act	DNRM
Whole of project	Riverine protection permit for excavating or placing fill in a watercourse	Water Act	DNRM
Dam wall	Development permit for waterway barrier works	*Fisheries Act 1994*	SARA
Inundation area, pipeline and access road	Clearing permit for the taking of a protected plant	NC Act	DEHP
Quarrying and sand extraction, crushing and screening plants, regulated waste storage	Environmental Authority (EA) for the following environmentally relevant activities (ERAs): • ERA 8 Chemical storage • ERA 16 (2b) • ERA 16 (2a)ERA 16 (3a)	*Environmental Protection Act 1994* (EP Act)	SARA

Table 4.2 Required approvals (not addressed as part of this report)

Project component/ activity	Relevant approval	Legislation	Authority
Whole of project	Compliance with relevant measures for parcels of land that do not meet the native title extinguishment principles	*Native Title Act 1993*	National Native Title Tribunal
Dam	Certification of Failure Impact Assessment	*Water Supply and Safety Reliability Act 2008*	DNRM
Quarrying and sand extraction from State land	Sales permit	*Forestry Act 1959*	Department of Agriculture, Fisheries and Forestry (DAFF)

Project component/ activity	Relevant approval	Legislation	Authority
Allocation of quarry material that is in a watercourse which is the property of the State	Quarry material allocation notice	Water Act	DNRM
Whole of project	Rehabilitation permit for catching of fauna during construction	NC Act	DEHP
Whole of project	Wildlife movement permit	NC Act	DEHP
Construction	A cultural heritage management plan (CHMP)	*Aboriginal Cultural Heritage Act 2003* (ACH Act)	Department of Aboriginal and Torres Strait Islander and Multicultural Affairs (DATSIMA)
Interference with local government roads and controlling pests during construction activities.	Compliance with relevant Local Laws	SDRC Local Laws No. 4 and No.7	SDRC
Pipeline	Wayleave agreement for crossing a rail corridor	*Transport Infrastructure Act 1994* (TI Act)	Department of Transport and Main Roads (DTMR)/ Queensland Rail (QR)
Inundation area, pipeline	Permit to occupy required for development within a reserve	*Land Act 1994*	DNRM
Pipeline	Road corridor permit required to maintain, operate or conduct ancillary works and encroachments on a state-controlled road	TI Act	DTMR
Pipeline	Interfering with a state-controlled road required to carry out road works or to interfere with a state-controlled road	TI Act	DTMR
Inundation area, pipeline	Road closure permit required for closing local government roads	*Land Act 1994*	DNRM
Inundation area, pipeline	Notice to the relevant electricity entity of works near electricity works	*Electricity Act 1994*	Relevant electricity entity

4.1 Australian Government approval

The EIS process has been undertaken in accordance with the requirements of the bilateral agreement between the Queensland and Australian governments relating to environmental assessment. Information in this report will be considered by the Commonwealth Minister for the Environment in making a determination, pursuant to section 133 of the EPBC Act.

4.2 State government approvals

4.2.1 Approvals process under the Water Act

The Water Resource (Borders Rivers) Plan (WRP) identifies 1500 ML of unallocated water for town water supply and 3000 ML of unallocated water for irrigation and associated industry within the Stanthorpe Water Management Area. The proponent has proposed to use the project to extract 750 ML of water for urban supply purposes and 1740 ML for irrigation purposes.

Prior to construction of the project, the proponent will require an operational works development approval for interfering with water under the SP Regulation. Once this approval is received, the proponent will require a ROL to interfere with water and a water entitlement to take water under the Water Act. Consequently, the current ROP will need to be amended to detail how the water reserved for the project would be allocated and what the operating and reporting requirements for the new infrastructure would be. These processes would apply to the water entitlement of 750 ML for town water supply and 1750 ML for irrigation purposes to be granted. It is noted that the Water Act also provides for interim ROLs and interim water entitlements, which can be used to operate water infrastructure while the ROP is being amended or approved.

The proponent must confirm with the Chief Executive of the Water Act, prior to commencing construction, the following matters:

- the means by which it intends to allocate water to third parties (tender, auction etc.)
- the approvals pathway most appropriate for the project (interim ROL or ROL).

4.2.2 Environmentally relevant activities

Under the EP Act, an EA issued by DEHP is required to carry out an ERA. Relevant ERAs for the project include:

- ERA 8—chemical storage
- ERA 16 (2b)—quarry operation more than 100 000 t but not more than 1 000 000 t in a year
- ERA 16 (2a)—sand extraction between 5000 t and 10 000 t in a year
- ERA 16 (3a)—sand screening for 5000 t to 100 000 t of material in a year.

DEHP has provided conditions for these ERAs, which are included in Appendix 2 of this report.

4.2.3 Community infrastructure designation

The proponent intends to seek community infrastructure designation (CID) for the project (water cycle management infrastructure) under Chapter 5 of the SP Act. A minister or a local government may designate land for community infrastructure. This process facilitates the integration of land use and infrastructure planning and the efficient and cost-effective provision of infrastructure.

Development that has a CID does not require approval under the relevant local government planning scheme or for any reconfiguration of lots in relation to the project.

In order for the project to be designated as community infrastructure, the approving minister must be satisfied that:

- adequate environmental assessment and public consultation have been carried out and that issues raised during public consultation have been adequately taken into account
- the project passes the public benefit test, which includes justifying that the project provides for the efficient and timely supply of community infrastructure, satisfies a government commitment to supply the community infrastructure, will facilitate implementation of legislation/policies or will facilitate the efficient allocation of resources.

Following designation of the project, the SDRC Planning Scheme would need amendment to reflect the designation. Where the land forms part of a CID, the conditions detailed in Appendix 1 are recommended to be included in the community designation under the SP Act.

4.3 Local government approvals

As the proponent intends to seek a CID for the project, the development will be exempt from approvals under the local government planning scheme. Notwithstanding, the proponent will need to comply with the local laws for interfering with local government roads and controlling pests during construction and any other relevant local laws.

If the CID is not granted for the project, the provisions of the SDRC Planning Scheme will apply. Accordingly, it is anticipated the following approvals would be required:

- MCU development approval for utility installation (unless the project is operated by the proponent)
- reconfiguration of a lot (code assessable)
- any other approvals that may apply.

5. Evaluation of matters of national environmental significance

5.1 Introduction

An assessment of potential impacts on MNES has been undertaken in accordance with the bilateral agreement between the Commonwealth and the Queensland governments. The Coordinator-General has conducted an EIS process that meets the requirements of Commonwealth and Queensland legislation and this chapter presents the findings of the Coordinator-General's assessment on MNES.

5.2 Project assessment and approvals

The EPBC Act establishes an Australian Government process for assessing environmental impacts and approving proposed actions that are likely to have a significant impact on MNES.

On 20 December 2006, the proponent referred the project to the then Commonwealth Environment Minister (referral number 2006/3201) to determine whether the project is a 'controlled action' with respect to potential impacts on MNES under section 75 of the EPBC Act.

On 3 January 2007, a delegate of the minister determined the project is a 'controlled action'. The relevant controlling provisions under the EPBC Act are sections 18 and 18A (listed threatened species and communities).

Under the bilateral agreement (made under section 45 of the EPBC Act), if a controlled action is a 'coordinated project' for which an 'EIS is required' under the SDPWO Act, certain types of projects do not require assessment under Part 8 of the EPBC Act. The agreement enables the EIS to meet the impact assessment requirements of both Commonwealth and Queensland legislation.

Under Part 4 of the SDPWO Act and Part 13 of the State Development and Public Works Organisation Regulation 2010 (SDPWO Regulation), the Coordinator-General must ensure the assessment report evaluates all relevant impacts that the action has, will have, or is likely to have, and provide enough information about the action and its relevant impacts to allow the Commonwealth Minister for the Environment to make an informed decision whether or not to approve the action under the EPBC Act.

The controlled action may be considered for approval under section 133 of the EPBC Act, once the Minister has received the Coordinator-General's EIS evaluation report (prepared under section 35 of the SDPWO Act).

This section of the report addresses the requirements of the TOR and the Queensland Government's assessment as specified by Schedule 1 of the bilateral agreement and Part 13 of the SDPWO Regulation.

5.3 Listed threatened species and communities

In deciding whether or not to approve the proposal for the purposes of a subsection of section 18 or section 18A of the EPBC Act, and what conditions to attach to such an approval, the Commonwealth Environment Minister must not act inconsistently with:

- Australia's obligations under the:
  - Biodiversity Convention
  - Convention on Conservation of Nature in the South Pacific (Apia Convention)
  - Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
- a recovery plan or threat abatement plan.

The minister also must, in deciding whether to approve the taking of the action, have regard to any approved conservation advice for the species or community.

5.3.1 Avoidance and mitigation measures

Clearing and disturbance

The project would involve vegetation clearing and earthworks within the proposed inundation area, access road to Stalling Lane and pipeline routes. Vegetation (1.5 ha) would also be cleared from the proposed recreation area.

Inundation area

Constructing the dam would result in the permanent loss of habitat from the proposed inundation area. This includes removing approximately 197 ha of vegetation, comprising 135.1 ha of remnant and 61.9 ha of non-remnant vegetation. Removing 4.4 km of riparian vegetation from the inundation area along the Severn River has the potential to isolate patches of remnant vegetation and impact on local ecological connectivity. Some of the remnant vegetation proposed to be removed includes a number of threatened flora and a critically endangered threatened ecological community (TEC). The vegetation also provides habitat for threatened fauna species.

The proponent proposes to mitigate the impacts by rehabilitating the proposed 322-hectare buffer area adjacent to the inundation footprint. The existing buffer area site is considered to be modified by past clearing and agricultural practices and includes 121 ha of land that has been either cleared or is degraded (containing non-remnant vegetation). The proponent proposes to improve the quality of habitat within the buffer area to mitigate impacts associated with the removal of habitat and connectivity within the inundation area. The proponent also proposes to secure offset sites adjacent to the buffer areas that, in addition to the buffer area, would assist in maintaining connectivity throughout the project area.

Rehabilitation works would involve the removing weeds and crop areas from the buffer and planting vegetation in the cleared areas. Plantings would be a mix of vegetation communities likely to reflect the communities already present in the buffer area. Habitat would also be improved within the buffer area by placing habitat features, such as large rocks and logs obtained during the site preparation and clearing works. The quality of

habitat within the buffer area would be improved through weed and pest management and fencing to exclude cattle and pest or feral animals.

It is intended that the buffer area would become a nature refuge where land uses would be limited to protect water quality within Emu Swamp Dam and maintain ecological connectivity around the dam. If the buffer area does not meet the requirements for a nature refuge, the proponent will use an alternative legally binding mechanism for protection such as a covenant under the *Land Title Act 1994*.

Urban and irrigation pipelines

The urban and irrigation pipeline routes would be primarily constructed along existing road reserves to minimise vegetation clearing and would require 29.5 and 51.4 ha of vegetation to be removed, respectively. These areas of vegetation are not expected to provide significant habitat for any threatened fauna species as these areas are degraded and highly fragmented. Threatened fauna species within, and in areas adjacent to, the pipeline routes would be avoided through pipeline design. The proponent has committed to maintain a minimum working corridor width to confine impacts to this area, and to further reduce potential impacts on threatened flora (refer Appendix 4). The pipeline construction area would be rehabilitated with native ground covers and shrubs following construction.

Access road to Stalling Lane

The proposed construction of the access road to Stalling Lane would involve removing 2.6 ha of vegetation. The road alignment would be designed to avoid impacts on threatened flora.

Further commitments relevant to clearing and disturbance

Other commitments relevant to clearing and habitat disturbances during construction include undertaking clearing in stages to provide opportunities for fauna to move from the area and using the fauna spotters/catchers to ensure any fauna identified in the clearing areas are appropriately relocated to prevent injury.

The proponent has also committed to develop and implement a Weed Management Plan and a Vertebrate Pest Management Plan to manage weeds and pests in the project area (refer Appendix 4).

Hydrological changes

Water would be released from the dam through a multi-level off-take structure, a fishway, or over the spillway during periods of high flow.

The proposed dam is not expected to impact on flow regimes upstream.

Impacts on downstream habitat

Changes to downstream flow regimes were assessed at a number of locations downstream of the dam on the Severn River. These locations were selected to reflect changes in flow regimes in the reach downstream of the dam to Accommodation Creek (Ballandean gauge), downstream of the Accommodation Creek confluence and in Sundown National Park (Farnbro gauge).

Modelling undertaken to determine changes in flow depths at these locations under existing and the developed scenarios indicated that the dam would reduce flow depths downstream (in the order of 100 millimetres (mm) at the Ballandean gauge and in the order of 0–20 mm at the Farnbro gauge). This decrease would not substantially impact in-stream ecological requirements downstream from the dam. Loss of habitat during periods of low flow would be mitigated by the proposed environmental releases.

The proponent has developed an environmental release strategy to ensure that the natural flow regime for low flows and the ephemeral nature of the Severn River is maintained downstream of the proposed dam.

The strategy would involve releasing an amount from the dam that is equivalent to the inflow, up to 30 ML/d, as flows are received). When flows in excess of 30 ML/d are received by the dam, 30 ML/d would be released to continue on downstream. These environmental releases are based on achieving ecological outcomes consistent with maintaining a healthy riverine environment, floodplains and wetlands.

Stream flow and climate change

The results show that the Severn River is predicted to have similar impacts on flow regime due to climate change with or without the proposed Emu Swamp Dam. Therefore, with the environmental release strategy in place, the proposed dam is not predicted to exacerbate changes to the Severn River that are caused by climate change.

Barriers to waterway passage

Obstruction of fish passage during construction

During construction, the site would be a barrier to aquatic fauna. The obstruction of flow and passage would be mitigated by using a diversion channel to connect the river upstream and downstream of the construction site. The river would first be routed around the right abutment works and then diverted through a conduit until all the other works have been completed.

Works would include temporary stream diversions, coffer dams and temporary ponds to trap runoff water. These structures may temporarily block movement of and/or entrap aquatic fauna. Entrapment of aquatic fauna would be reduced by progressing works in a single direction, which would provide an opportunity for aquatic fauna to move from the works area. In the event that aquatic fauna become trapped during these works, it would be appropriately relocated. Translocation of fish species would be undertaken in accordance with the DAFF *Fish Salvage Guidelines,* which outline requirements for handling, removing, storing, transporting and releasing trapped fish.

During construction, the proponent has proposed to undertake directional drilling at locations where the pipelines would cross any watercourses. This would allow pipelines to be installed without disrupting flows and fish passage, in addition to reducing disturbances to riparian and watercourse habitat.

Obstruction of flow and passage by the dam

The proposed dam wall would act as a barrier to aquatic fauna (e.g. fish, platypus, turtles) without the provision of passage devices. The dam design would include passage devices to maintain the passage of aquatic fauna up and downstream of the dam.

The fishway would be designed in consultation with the DAFF and biologists with experience in fishway design. The design would allow for fish to exit via two upstream exit channels and would reflect the ecology and swimming ability of the various aquatic fauna in the Severn River.

Safe downstream passage over the spillway would also be provided through a cut-in, in the dam crest. The spillway design would also include features (plunge pool and smooth spillway) to minimise injury and mortality of fish passing over the spillway during increased flows. The proponent has committed to construct a plunge pool that is the same width as the spillway and to consult with DAFF and DEHP in determining the appropriate depth and length.

Impacts on water quality

The proponent has proposed a number of measures for construction and operational stages of the project to maintain and improve water quality of the receiving environment.

The risk of sedimentation of waterways from vegetation clearing would be reduced by undertaking clearing and earthworks activities during the dry season and the construction of sediment dams prior to vegetation clearing and earthworks activities.

All works during construction would be undertaken in accordance with an Erosion and Sediment Control Management Plan and stormwater runoff would be managed to reduce nutrient and contaminant-laden runoff from entering waterways

Refuelling and maintenance activities would be undertaken in bunded areas and fuels and chemicals would also be stored within bunded areas that are designed and constructed in accordance with Australian Standards.

The proponent has proposed to monitor water quality during construction (every second month with four event-based occasions per year when inflows exceed 30 ML/d) upstream and downstream of the construction works. Water quality monitoring would also be undertaken during dam operations.

I therefore consider that the project is unlikely to have an unacceptable indirect impact on aquatic fauna (e.g. Bell's turtle and Murray cod), provided that adequate measures are undertaken to ensure no adverse impacts on water quality.

Impacts on groundwater resources

Geological mapping records indicate three major geological formations underlying the project area including Stanthorpe Adamellite, Ruby Creek Granites and Quaternary Alluvium. Stanthorpe Adamellite is the dominant geological formation underlying the inundation area, the foundations of the proposed dam wall and urban and irrigation pipeline route. There is a minor section of Ruby Creek Granites also underyling the

irrigation pipeline within the section to the north of Stanthorpe and a minor outcrop in the south west section of the inundation area. The irrigation pipeline also runs parallel to and occasionally crosses a section of the Quaternary Alluvium associated with the Severn River.

The geotechnical investigations undertaken for the EIS indicated that the regional geology associated with Stanthorpe Adamellite/Ruby Creek Granite formations in the project area have an inferred low in-situ permeability and an absence of permeability within the bedrock matrix. This would indicate that there is limited groundwater movement within the bedrock. Due to the regional geology it is considered there are no major groundwater resources in the project area.

The majority of vegetation communities in the project areas are expected to use groundwater to some degree. However, due to the regional soil and geology, they are expected to have a low dependence on groundwater levels (i.e. relying instead on moisture retained in the soil).

The EIS indicated that potentially impacted groundwater-dependent ecosystems in the project area are spatially limited to localised areas of riparian vegetation along the Severn River. The vegetation in this area is considered to be opportunistically dependent on groundwater where the groundwater depths are shallow (less than the rooting depth of the vegetation).

The EIS indicated that excavation works may be required before the dam wall foundations are installed, and dewatering activities may be required if these works intercept groundwater. These activities could cause groundwater drawdown and reduce water availability to local groundwater-dependent ecosystems. However, the impact is considered to be negligible as the vegetation in the project area is not heavily dependent on groundwater. Trenching activities associated with the construction of the pipelines are not expected to intercept groundwater.

The EIS indicated that potential leaks from the dam wall into surrounding bedrock could impact on groundwater levels in the vicinity of the inundation area. The proponent has committed to reduce this risk through grouting the dam foundation to reduce seepage loss and installing drains to relieve groundwater pressures. Vegetation is unlikely to be impacted by soil saturation (waterlogging) as the amount of waterlogging is expected to be insignificant.

Groundwater impacts are not expected to have an adverse impact on vegetation within the project area, provided the proponent implements suitable management measures to avoid impacting groundwater levels. The proponent has committed to monitor groundwater levels and quality 12 months prior to development and during the first 12 months of dam operations to identify any impacts and to inform remediation options where required.

Consequential impacts

Land clearing

There is limited potential for expanded irrigation activities and industrial and non-residential uses associated with project to significantly increase land clearing.

Historically, much of the local region has been cleared for agricultural and grazing practices (more than 50 per cent of the former Stanthorpe Shire region is mapped as non-remnant vegetation). Most areas of remaining native vegetation in the region are in areas that have limited agricultural productivity. Regulatory provisions for clearing remnant vegetation under the EPBC Act, VM Act and NC Act would also reduce the likelihood of remnant areas of vegetation being cleared.

The proposed irrigation entitlement of 1740 ML/year is a small increase (16 per cent) above current mean annual irrigation entitlements, which means that most of the water would be used to meet yield requirements for existing irrigation areas.

Water quality impacts

I consider that the additional water available for farm-related irrigation activities would not create significant additional surface water runoff. Granite belt farmers already adopt efficient water saving strategies including using micro-sprays and drip irrigation to reduce water use and losses from water storages. These strategies would be expected to reduce the amount of surface water runoff from farming areas, thereby reducing downstream water quality impacts. The low potential for additional vegetation clearing would also reduce the potential for water quality impacts.

5.3.2 Threatened ecological communities

A search of the EPBC protected matters search tool (PMST) database identified four ecological communities potentially occurring in the project area. Three communities were listed under the EPBC Act as a TEC after the controlled action decision was made for the project and therefore, in accordance with EPBC Act subsection 158A(4), are not considered in this assessment. These include:

- natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales (NSW) and southern Queensland
- New England peppermint (*Eucalyptus nova-angelica*) grassy woodlands
- weeping myall woodlands.

The TEC that is considered as part of this assessment is the white box-yellow box-Blakely's red gum grassy woodland and derived native grassland (box-gum grassy woodland) which is listed as critically endangered under the EPBC Act. This community was identified within the inundation area, access road to Stalling Lane and pipeline footprints and proposed buffer area.

White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland

Background

The box-gum grassy woodland ecological community is characterised by a species-rich understorey of native tussock grasses, herbs, scattered shrubs (where shrub cover comprises less than 30 per cent cover), and a dominance or prior dominance of white-box (*E.albens*), yellow-box (*E.melliodora*) and Blakely's red gum (*E. blakelyi*) trees. This ecological community occurs along the western slopes and tablelands of the Great Dividing Range from southern Queensland through NSW to central Victoria and has

been heavily cleared across its range. The remaining extent of this community across its range is highly fragmented, and typically occurs in small, isolated patches.

On-ground surveys for this community were undertaken by suitably qualified personnel and surveys were undertaken during the appropriate time of the year. Surveys were undertaken in winter when the dominant eucalypts species are flowering and identifiable.

Key threats to this ecological community include vegetation clearing and habitat modification associated with agriculture and the development of residential, urban and public infrastructure, inappropriate fire regimes, weed infestation and dryland salinity.

There is a national recovery plan for this species: *National Recovery Plan for White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.*The plan identifies a range of landscape processes that have the potential to degrade quality of this community, including weed invasion and animal pests, salinity, declining tree health and regeneration and disease. The plan also identifies a range of conflicting land management practices that could have a potential adverse impact on this community, including grazing regimes and pasture management, changed fire regimes and inappropriate revegetation management.

Key recovery actions in this plan that are relevant to the project include:

- ensuring development assessments of this community are undertaken by a qualified ecologist at an appropriate time of year
- managing pest animals that are considered to be a significant threat to this community (e.g. feral rabbits, goats, pigs and deer)
- managing weeds, exotic plants and diseases
- maintaining or improving connectivity between box-gum grassy woodland between remnant and or other native vegetation
- excluding domestic livestock to reduce pressures from grazing and trampling.

The community is also listed as a priority ecological community under the *Northern Rivers Regional Biodiversity Management Plan* for NSW. The recovery actions prescribed in this plan are consistent with the recovery actions listed in the national recovery plan for this species.

The box-gum grassy woodland is listed as an ecological community that may be impacted by *Phytophthora cinnamomi* in the *Threat Abatement Plan for Disease in Natural Ecosystems Caused by Phytophthora cinnamomi. Phytophthora cinnamomi* is a soil-borne fungus that can be spread in infested soil, plant material and water. This pathogen attacks the roots and root crown, which can lead to dieback of the plant. Dieback caused by this pathogen is listed as a key threat to the box-gum grassy woodland community.

Assessment of residual impacts

The total significant residual impact on this community is expected to be 72.29 ha.

Ground-truthing surveys indicated the project is likely to impact on 83.76 ha of this community within the project area, including 71.55 ha in the inundation area, 0.74 ha in

the access road to Stalling Lane footprint and 11.47 ha in the urban and irrigation pipeline corridor.

The proponent has committed to avoid the 11.47 ha identified in the urban and irrigation pipelines corridor. The impact associated with removing 72.29 ha of this community from the inundation area and the access road to Stalling Lane footprints is considered unavoidable. Approximately 111 ha of this community would be set aside in the buffer area.

Both the national and regional recovery plans identify a number of site management practices that are considered essential for the recovery of this community. Such practices are considered to provide for the ongoing survival and reproduction of flora and fauna species that comprise the community.

The proposed management activities within the buffer area that are relevant to the recovery of this community include:

- The proposed sites are kept free of pest animals in accordance with a Vertebrate Pest Management Plan (refer Appendix 4).
- The proposed site is kept free of invasive weeds in accordance with a Weed Management Plan (refer Appendix 4). Hygiene protocols would also be implemented to prevent the introduction or spread of weeds and diseases.
- The management of domestic livestock is listed as priority action for this community in the regional recovery plan. The proponent has committed to reduce grazing pressures on this community by excluding domestic livestock from the project site and buffer area (refer Appendix 4).

These management practices are consistent with best practice measures in the national recovery plan for this species and are therefore considered to be consistent with *National Recovery Plan for White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.*

The proponent has proposed measures to reduce the risk of introducing and/or spreading *Phytophthora cinnamomi* including implementing quarantine and hygiene protocols during construction and translocation activities associated with rehabilitating the buffer area. The management of feral pests, in particular feral pigs, would also reduce the potential for introducing and spreading this pathogen.

These measures are considered to be consistent with the Threat Abatement Plan for Disease in Natural Ecosystems Caused by *Phytophthora cinnamomi*.

Offsets

The proponent has demonstrated that the residual impacts can be adequately offset by securing potential offset sites and the proposed management actions. Approximately 867 ha of potential offset sites in the local region were identified as providing suitable offsets for this community. The proponent would engage with landholders once the biodiversity offset strategy has been endorsed by the Australian Government.

All offset areas are proposed to be secured by a legally binding mechanism, such as a covenant, and would be managed by the proponent. The offset areas are proposed to be actively revegetated and rehabilitated to improve the quality of communities on

these sites and adequately managed to maintain the quality of these sites (i.e. implementation of weed, pest animal, fire and grazing management practices).

It is anticipated that the selected offset sites, in addition to the proposed buffer area, would improve the quality of box-gum grassy woodland communities and connectivity between communities in the local area. This would produce a net biodiversity conservation gain for this community, which is key requirement of regional recovery plan.

I consider that the proponent has adequately identified the significant residual impacts on the box-gum grassy woodland ecological community and has demonstrated that these impacts can be adequately offset.

Conclusion

The proponent has adequately identified the potential impacts that the project poses to the box-gum grassy woodland.

I require the proponent to manage impacts through the conditions recommended in this report, to ensure that there are no unacceptable impacts on the box-gum grassy woodland, including:

- avoiding and limiting disturbance to habitat
- setting aside and rehabilitating the buffer area
- providing offsets for significant residual impacts.

In light of the proposed mitigation measures and conditions recommended in this report, I consider the impacts to the box-gum grassy woodland to be not unacceptable or inconsistent with the national recovery plan for this community or the relevant threat abatement plans.

5.3.3 Threatened flora

A search of the EPBC PMST database identified 17 species of threatened flora listed under the EPBC Act as potentially occurring within the project area. These species are listed in Table 5.1.

Table 5.1 EPBC listed threatened flora species potentially occurring

Common name *Scientific name*	EPBC Act status	NC Wildlife Regulation status	Likelihood of occurrence
Velvet wattle *Acacia pubifolia*	Vulnerable	Vulnerable	Species or species habitat likely to occur within area
Rupp's wattle *Acacia ruppii*	Endangered	Vulnerable	Species or species habitat likely to occur within area
Granite boronia *Boronia granitica*	Endangered	Endangered	Species or species habitat likely to occur within area
Granite rose *Boronia repanda*	Endangered	Endangered	Species or species habitat likely to occur

Common name *Scientific name*	EPBC Act status	NC Wildlife Regulation status	Likelihood of occurrence
			within area
Ooline *Cadellia pentastylis*	Vulnerable	Vulnerable	Species or species habitat likely to occur within area
Black-clubbed spider-orchid *Caladenia atroclavia*	Endangered	Endangered	Species or species habitat likely to occur within area
Prickly bottlebrush *Callistemon pungens*	Vulnerable	Vulnerable	Species or species habitat likely to occur within area
Wallangarra white gum *Eucalyptus scoparia*	Vulnerable	Vulnerable	Species or species habitat likely to occur within area
Black grevillea *Grevillea scortechinii*	Vulnerable	Vulnerable	Species or species habitat known to occur within area
Mountain mouse bush *Homoranthus montanus*	Vulnerable	Vulnerable	Species or species habitat likely to occur within area
Kardomia granitica	Vulnerable	Endangered	Species or species habitat likely to occur within area
Wandering pepper-cress *Lepidium peregrinum*	Endangered	Least concern	Species or species habitat likely to occur within area
Rusty desert phebalium *Phebalium galndulosum subsp.eglandulosum*	Vulnerable	Vulnerable	Species or species habitat known to occur within area
Phebalium whitei	Vulnerable	Vulnerable	Species or species habitat likely to occur within area
Siah's backbone *Streblus pendulinus*	Endangered		Species or species habitat likely to occur within area
Tylophora woollsii	Endangered	Endangered	Species or species habitat likely to occur within area
Macrozamia machinii	Vulnerable	Listed as vulnerable for its listing as *Macrozamia plurinervia*	Species or species habitat likely to occur within area

The Wallangarra white gum (*Eucalyptus scoparia*) was listed under the EPBC Act as a threatened species after the controlled action decision was made for the project.

Therefore, in accordance with the EPBC Act, subsection 158A(4) is not considered in this assessment.

Habitat assessment

Whilst a number of threatened flora species have been identified as potentially occurring within the project area, field surveys indicated that the project area provides limited suitable habitat for several of the flora species identified in Table 5.1.

Habitat assessments indicated that the following species have a low likelihood of occurring in the project area due to the absence of suitable habitat:

- The ooline is unlikely to occur due to the absence of Queensland RE 13.11.7 low microphyll vine forest on metamorphics. This species has been recorded from Sundown National Park, approximately 25 km from the project site.
- The black-clubbed spider orchid is unlikely to occur due to the absence of RE13.12.1 *E.campanulata* open forest on igneous rocks. This species has been recorded from Girraween National Park.
- The wandering pepper-cress is unlikely to occur due to the absence of riparian open forest dominated by river red gum (*Eucalyptus camaldulensis*) and river she-oak (*Casuarina cunninghamiana*) with a variably dense shrubby understorey. This species has been recorded from Tenterfield, approximately 38 km south of the project site.
- Siah's backbone is unlikely to occur due to the absence of rainforest habitat. This species has been recorded from Sundown National Park, approximately 25 km south-west of the project site.
- The *Macrozamia machinii* is unlikely to occur due to the absence of open forest dominated by apple-gum (*Angophora Leiocarpa)*, stringybark she-oak (*Allocasuarina inophloia)*, white cypress (*Callitris glaucophylla*) and brown hazelwood (*Lysicarpus angustifolius*). This species has been recorded from Inglewood, approximately 82 km north-west of the project site.

Habitat assessments indicated that there is habitat potentially suitable in the project area for:

- The Rupp's wattle associated with Queensland REs 13.12.2 and 13.12.9; however, no plants were recorded during field surveys. This species has been recorded from Wyberba, 14 km south of the project site.
- The granite boronia associated with Queensland REs 13.12.5 and 13.12.6. This species has been recorded from Girraween National Park, approximately 7 km from the project area.
- The mountain mouse bush associated with Queensland REs 13.11.1, 13.12.5 and 13.12.6. This species has been previously recorded from Fletcher Road and Stalling Lane in the project area; however, was not recorded during field surveys. Field surveys indicated that these areas were heavily disturbed and had been subject to fire several months prior, which may have caused the loss of this species in the area.

- The *Kardomia granitica* associated with Queensland RE 13.12.6; however, no plants were recorded during field surveys. This species has been recorded from Ballandean, approximately 6 km south of the project site.
- The rusty desert phebalium associated with box-gum grassy woodland; however, no plants were identified in the project area. This species has been recorded from eastern side of Passchendaele State Forest, approximately 21 km north of the project site.
- The *Phebalium whitei* associated with the box-gum grassy woodland; however, no plants were identified in the project area. This species has been recorded from Bald Rock Creek in Girraween National Park approximately 7 km from the project area.
- The *Tylophora woollsii* associated with Queensland RE 13.12.2; however, no plants were recorded during field surveys. This species has been recorded from Girraween National Park, approximately 7 km from the project area.

Four of the species listed in Table 5.1 were identified during field surveys comprising:

- velvet wattle (*Acacia pubifolia*)
- granite rose (*Boronia repanda*)
- prickly bottlebrush (*Callistemon pungens*)
- black grevillea (*Grevillea scortechinii*).

One other species listed under the EPBC Act, was also identified in the project area. This species the McKie's stringybark (*E.mckieana*) is listed as vulnerable under the EPBC Act. This species was recorded approximately 1 km west of the proposed pipeline alignment and 4 km south of the FSL footprint. However, no plants were identified as being present within the proposed impact area and the project is therefore not expected to have an unacceptable impact on this species.

Velvet wattle (*Acacia pubifolia*)

Background

The velvet wattle is listed as vulnerable under EPBC Act. The species grows in dry scrubby woodland on granite, sandy, stony, and loam soils and has been previously recorded on two sites in NSW and one site in Queensland near Wyberba to the south of the project site. The distribution of this species overlaps with the box-gum grassy woodland.

Key threats to this species include altered fire regimes, grazing by domestic livestock and feral goats, removal of and fragmentation of habitat for agriculture, mining, roads and development.

There is an approved conservation advice for this species: *Approved Conservation Advice for Acacia pubifolia.*

Key priority recovery actions in this conservation advice that are relevant to the project include:

- ensuring that infrastructure development activities involving substrate or vegetation disturbances do not adversely impact on known populations

- preventing grazing pressures at known sites through exclusion fencing or other barriers
- developing and implementing a suitable fire management strategy, determining where an ecological burn is required
- implementing national translocation protocols if establishing additional populations is considered necessary and feasible
- encouraging landholders with existing populations of this species to manage populations appropriately
- investigating formal conservation arrangements (e.g. covenants) to protect important populations.

Assessment of residual impacts

The project is not expected to impact on this species.

Fifteen plants were recorded during field surveys, predominantly in the areas to the west of the proposed access road to Stalling Lane. This species has also been previously recorded (11 records) immediately west of the inundation area and in the proposed pipeline corridor along Fletcher Road.

The proponent has committed to modify the alignment of the proposed access road to Stalling Lane to avoid impacts on the *Aacacia pubifolia* (refer Appendix 4).

The proposed management activities within the buffer area that are relevant to the recovery of this community include:

- fencing the buffer area to exclude cattle and other grazers (e.g. feral deer and goats)
- developing and implementing a Fire Management Plan for the construction and operational stages of project
- propagating threatened flora species within the buffer area in accordance with the principles described in the *Guidelines for the Translocation of Threatened Plants in Australia* (refer Appendix 4)
- undertaking seed collection, cutting collection, propagation, retrieval of whole plants from clearing areas, transport, hygiene, planting, timing, maintenance and monitoring in accordance with an operational management plan (refer Appendix 4)
- developing and implementing a weed management plan for the buffer area, access road to Stalling Lane and urban and irrigation pipelines (refer Appendix 4)
- formalising a legally binding mechanism to secure the buffer area for conservation purposes (i.e. for the purpose of protecting the water quality and maintaining ecological connectivity around the dam) such as a Nature Refuge or covenant under the *Land Title Act 1994.*

Conclusion

The proponent has adequately identified the potential impacts that the project could have on *Aacacia pubifolia*. The approved conservation advice has been considered in the assessment.

I require the proponent to manage impacts through the conditions recommended in this report, to ensure that there are no unacceptable impacts on *Aacacia pubifolia*, including:

- avoiding and limiting disturbance to habitat
- setting aside and rehabilitating the buffer area.

In light of the proposed mitigation measures and conditions recommended in this report, I consider the potential impacts on the *Aacacia pubifolia* to be not unacceptable.

Granite rose (*Boronia repanda*)

Background

The granite rose is listed as endangered under EPBC Act. The distribution of this species is restricted to the granite belt region near Stanthorpe and northern NSW border area. Within Queensland, this species is restricted to rocky sites amongst granite outcrops and scree, and on slopes with boulders within dry sclerophyll forest and heathland in well-drained sandy granitic soils. The Queensland population is estimated to be approximately 1000 individual plants.

Key threats to this species include clearing for forestry plantations and frequent fire events.

There is an approved conservation advice for this species: *Approved Conservation Advice for Boronia repanda (Repand Boronia).* This species is also listed as a priority species in the regional recovery plan: *Northern Rivers Regional Biodiversity Management Plan for New South Wales*. The recovery actions prescribed in this plan are consistent with the recovery actions listed in the conservation advice for this species.

The *Recovery Plan for the Boronia granitica (Granite Boronia)* is considered to provide management prescriptions that are relevant to the granite rose. Recovery actions in the *Boronia Granitica* recovery plan that are relevant include effective fire management strategies including determination of appropriate fire frequency, control of feral goats and maintaining genetic variability through propagation.

Key priority recovery actions in the conservation advice and recovery plans that are relevant to the project include:

- protection from inappropriate fire regimes (i.e. not burnt more frequently than 8–10 years and preferably have fire excluded for at least 20–30 years)
- managing feral goats and other feral animal species that pose a threat to this species
- minimising adverse impacts from land use at known sites and ensuring there is no disturbance in areas where *Repand Boronia* occurs, excluding necessary actions to manage the conservation of the species
- investigating options for linking, enhancing or establishing additional populations
- implementing national translocation protocols (i.e. in accordance with *Guidelines for the Translocation of Threatened Plants in Australia*) if establishing additional populations is considered necessary and feasible.

Assessment of residual impacts

The project is not expected to impact on this species.

A group of 50–100 individual plants was identified during field surveys in a patch of disturbed roadside vegetation on Pozieres Road and is expected to occur in the areas adjacent to the irrigation pipeline corridor.

Plants along the pipelines are not expected to be impacted because the pipeline construction corridor would be located on the southern side of the road to avoid direct impacts on this species.

The proposed management activities within the buffer area and pipeline route which are relevant to the recovery of this community include:

- managing risks to existing environmental values through the implementation of a fire management plan for the construction and operational stages of the project
- managing pest animal species including goats and other feral animals in the proposed project areas in accordance with a Vertebrate Pest Management Plan (refer Appendix 4)
- rehabilitating and maintaining roadside vegetation adjacent to the proposed pipeline route which may improve habitat and connectivity for this species in the local area
- propagating threatened flora species in accordance with national translocation protocols for threatened plants.

Conclusion

The proponent has adequately identified the potential impacts that the project poses to *Boronia repanda*. The approved conservation advice has been considered in the assessment.

I require the proponent to manage impacts through conditions recommended in this report, to ensure there are no unacceptable impacts to *Boronia repanda*, including avoiding and limiting disturbance to habitat.

In light of the proposed mitigation measures and conditions recommended in this report, I consider the impacts to the *Boronia repanda* to be not unacceptable or inconsistent with the recovery plans relevant to this species.

Prickly bottlebrush (*Callistemon pungens*)

Background

The prickly bottlebrush is listed as vulnerable under the EPBC Act. This species occurs along rocky watercourses usually with sandy granite and occasionally basalt creek beds. The known distribution of this species is restricted to the Stanthorpe region in Queensland and the Northern Tablelands of north-eastern NSW. The distribution of this species also overlaps with the box-gum grassy woodland EPBC Act listed TEC.

Terrestrial flora surveys undertaken for the EIS in 2006/2007 identified:

- seven individual plants in the inundation area
- four individual plants in the access road to Stalling Lane alignment

- four individual plants in the urban pipeline corridor
- three individual plants close to the irrigation pipeline corridor.

Additional targeted surveys undertaken in July 2013 confirmed 38 additional plants within the proposed inundation area (FSL footprint).

Three groups of prickly bottlebrush were also identified 5, 7.5 and 9.5 km downstream from the proposed inundation area. A total of 249 individual plants was identified within these groups. The population in this area is the largest known stand in the Stanthorpe Plateau region.

Key threats to this species include inappropriate fire regimes (frequency, duration and intensity of fires); grazing pressures from livestock and feral goats; habitat destruction; and clearing and fragmentation for agriculture, mining, roads and urban development. There is an approved conservation advice for this species: *Approved Conservation Advice for Callistemon pungens.*

Relevant priority recovery actions in the conservation advice that are relevant to the project include:

- developing appropriate fire management strategies—a 5–15 year fire regime is considered suitable for the survival of this species)
- managing grazing pressures from livestock and pest animals
- managing development activities to avoid adverse impacts on known populations and formalising conservation arrangements.

Assessment of residual impacts

The total significant residual impact on this community is expected to be 45 individual plants, which is the sum of plants identified in the inundation area during the 2006–07 and 2013 surveys. This residual impact would be associated with the permanent loss of habitat within the proposed inundation area. The removal of these plants would also be expected to divide the existing population into two separate populations and subsequently reduce connectivity between the populations.

Plants along the pipelines and access road to Stalling Lane are not expected to be impacted as the alignments would be designed to avoid the areas where these plants are located. The proponent has committed to modify the alignment of the proposed pipelines and access road to Stalling Lane to avoid impacts on this species (refer Appendix 4).

The proposed management activities within the buffer area that are relevant to the recovery of this community include:

- managing risks to existing environmental values by implementing a Fire Management Plan for the construction and operational stages of the project
- fencing the buffer area to exclude cattle and other pest animals (e.g. feral goats) (refer Appendix 4)
- formalising a legally binding mechanism to secure the buffer area for conservation purposes (i.e. to protect water quality and maintain ecological connectivity around the dam) such as a nature refuge or covenant under the *Land Title Act 1994.*

Offsets

The proponent would be required to offset the loss of 45 plants. The proposed offset would involve propagating plants from seeds collected from impact areas and planting individual plants (160 individuals) into suitable habitat at four separate sites (to improve chances for propagation success). The proponent has identified several suitable sites for planting on land owned by the proponent, the buffer area and third party properties. At least 300 individuals would be propagated to ensure that there is a sufficient store in the event of plant failure.

Propagation from seed collected is deemed more suitable than directly translocating whole plants (due to risk of damage), as plants in this type produce large amounts of seed annually and germinate readily.

The actual propagation sites would be determined following consultation with DE during the negotiation of the final offset package.

Conclusion

The proponent has adequately identified the potential impacts that the project could have on *Callistemon pungens*. The approved conservation advice has been considered in the assessment.

I require the proponent to manage impacts through the conditions recommended in this report, to ensure that there are no unacceptable impacts on *Callistemon pungens*, including:

- avoiding and limiting disturbance to habitat
- providing offsets for significant residual impacts.

In light of the proposed mitigation measures and conditions recommended in this report, I consider the impacts to *Callistemon pungens* to be not unacceptable.

Black grevillea (*Grevillea scortechinii*)

Background

The black grevillea is listed as vulnerable under the EPBC Act. The distribution of this species is restricted to four locations near Stanthorpe, typically occurring on flats and lower slopes in well-drained sandy-loamy granitic soils within sclerophyll woodland or remnant roadside associations. The distribution of this species also overlaps with the box-gum grassy woodland EPBC Act listed TEC.

Key threats to this species include land clearing for pasture and orchard development and activities associated with roadsides and private land such as roadside burning, grading, clearing and weed invasion.

There is an approved conservation advice for this species: *Approved Conservation Advice for Grevillea scortechinii subsp. scortechinii (Black Grevillea).*

Relevant priority actions in the conservation advice that are relevant to the project include:

- developing appropriate fire management strategies

- managing grazing pressures from livestock and pest animals
- managing sites to prevent the introduction and spread of invasive weeds
- managing development activities to avoid adverse impacts on known populations and formalising conservation arrangements
- ensuring that road widening/maintenance activities and other infrastructure or development activities do not adversely impact on known populations.

Assessment of residual impacts

The project is not expected to impact on this species.

This species was not identified within any of the project impact areas. A population of this species consisting of 50 individuals was identified along Pozieres Road to the north of the project area during field surveys undertaken in 2007. The proposed urban and irrigation pipeline corridor would be designed to avoid this population.

The proponent has committed to collecting seed and cuttings from the impacted plants to translocate into suitable areas of habitat adjacent to the pipeline construction corridors. Propagation from cuttings has been shown to be successful for other grevillea species. The translocation of this species is proposed to be undertaken in accordance with national translocation protocols (*Guidelines for the Translocation of Threatened Plants in Australia),* which is also a requirement of the conservation advice for this species.

The proposed management activities within the pipeline corridors which are relevant to the recovery of this community include:

- developing and implementing a Weed Management Plan
- managing risks to existing environmental values by implementing a fire management plan for construction and operational stages of the project
- managing pest animal species in the pipeline areas in accordance with a vertebrate pest management plan
- excluding livestock from the pipeline areas (refer Appendix 4).

Conclusion

The proponent has adequately identified the potential impacts that the project could have on *Grevillea scortechinii*. The approved conservation advice has been considered in the assessment.

I require the proponent to manage impacts through the conditions recommended in this report, to ensure there are no unacceptable impacts on *Grevillea scortechinii*.

In light of the proposed mitigation measures and conditions recommended in this report, I consider the impacts to the *Grevillea scortechinii* to be not unacceptable.

5.3.4 Threatened fauna

Threatened fauna are those species and subspecies of birds, fish, frogs, insects, mammals, molluscs, crustaceans and reptiles that have been assessed as being at risk of extinction. The EPBC Act lists threatened fauna species and promotes their recovery

using conservation advice, recovery plans, threat abatement plans and assessment and approval provisions.

Desktop surveys were initially undertaken to identify species that have been previously recorded from the region and local area. This included a search of the EPBC protected matters database, Wildnet Australia, Birds Australia and Queensland Museum databases. Information collected from these database searches was used to inform survey site locations and the appropriate survey methodologies for identifying the presence of potentially occurring species.

Terrestrial ecology surveys were undertaken within the project area for the EIS in 2006 and 2007. Terrestrial field surveys were undertaken for the summer period from 19–23 December 2006 and for the autumn/winter period from 26 May and 1 June 2007. Surveys were undertaken by appropriately qualified personnel in accordance with the Queensland Environmental Protection Agency *Guidelines for Flora and Fauna Surveys* which was the appropriate guideline to use at this point in time.

A total of 187 terrestrial fauna species was identified in the surveys, including 35 species of mammal, 118 species of bird, 23 species of reptiles and 11 amphibian species.

Aquatic ecology field surveys were initially undertaken in late spring 2006 (10 sites) and early autumn 2007 (10 sites). Surveys were undertaken upstream, within and downstream of the proposed inundation area and at two sites on Accommodation Creek and Bald Rock Creek.

In 2012, the former SEWPaC (now DOE) requested that the fauna survey data be brought up to date and that the survey guidelines for Australia's threatened bats, birds, frogs, fish, mammals and reptiles be used inform survey methodologies for identifying the presence of potentially occurring fauna.

In response, the proponent undertook a gap analysis of the threatened fauna species survey methodology and effort undertaken for the project against the relevant survey guidelines. The EIS states that surveys were undertaken generally in accordance with survey guidelines. However while generally in accordance there are some limitations which are discussed later in this chapter.

Follow up targeted aquatic fauna surveys were undertaken in 2013 to reflect non-drought conditions and to verify the presence of any threatened aquatic species. Eleven sites were surveyed for aquatic fauna in autumn 2013 and 14 sites were surveyed in spring 2013. This included targeted surveys for the Bell's turtle (*Wollumbinia belli*).

Avifauna (birds)

A search of the EPBC protected matters database identified eight species of threatened bird listed under the EPBC Act as potentially occurring within the project area. These species are listed in Table 5.2.

Table 5.2 Threatened bird species with the likelihood to occur in the project area

Common name *Scientific name*	EPBC Act status	NC Wildlife Regulation status	Likelihood of occurrence
Regent honeyeater *Anthochaera phrygia*	Endangered, migratory	Endangered	Species or species habitat known to occur within area
Australasian bittern *Botaurus poiciloptilus*	Endangered	Least concern	Species or species habitat known to occur within area
Eastern bristlebird *Dasyornis brachypterus*	Endangered	Endangered	Species or species habitat likely to occur within area
Red goshawk *Erythrotriorchis radiates*	Vulnerable	Endangered	Species or species habitat known to occur within area
Squatter pigeon (southern) *Geophaps scripta scripta*	Vulnerable	Vulnerable	Species or species habitat may occur within area
Swift parrot *Lathamus discolor*	Endangered	Endangered	Species or species habitat likely to occur within area
Black-throated finch (southern) *Poephila cincta cincta*	Endangered	Endangered	Species or species habitat may occur within area
Australian painted snipe *Rostratula australis*	Endangered	Vulnerable	Species or species habitat likely to occur within area

The Australian bittern (*Botaurus poiciloptilus*) was listed under the EPBC Act as a threatened species after the controlled action decision was made for the project and therefore, in accordance with EPBC Act subsection 158A(4), cannot be considered in this assessment.

No species of threatened bird listed under the EPBC Act were identified during field surveys.

Surveys undertaken to detect the presence of threatened bird species were generally in accordance with the 2010 *Survey Guidelines for Australia's Threatened Birds.* However there were some limitations in the survey effort and methodologies undertaken by the proponent including:

- The diurnal bird census surveys were only undertaken for a total of five hours over ten days across the summer and autumn/winter surveys. This shorter survey effort may not have identified a number of threatened bird species. The recommended survey effort for the identifying the regent honeyeater is 20 hours over ten days and the recommended survey effort for the swift parrot is 20 hours over eight days.

- The EIS indicated that birds were identified via direct observation or by calls during diurnal bird census surveys. No broadcasting surveys (where recorded vocalisations broadcasted over loud speaker to solicit response) were undertaken, which may have reduced the likelihood of identifying the regent honeyeater.

Habitat assessment

Whilst the species in Table 5.2 are listed as potentially occurring, surveys of the site indicated that there is limited habitat to support a number of these species. Habitat assessment indicated:

- The presence of modified habitat and low diversity of seeding grasses would reduce the likelihood of the southern-black throated finch using the site. The likelihood of this species occurring is also considered to be low as the last record of this species occurring in the Stanthorpe region was in 2002 and the species is also presumed to be regionally extinct from northern NSW.
- The absence of semi-evergreen vine thickets and vine forest communities in the project area and the ephemeral nature of the Severn River would limit the use of the site by the red goshawk. This species has been recorded from Tenterfield approximately 38 km south of the project site.
- The absence of swamp and limited sedge land wetland habitat within the project area would limit the use of the site by the Australian painted snipe. The closest record of this species to the project site is to the north of Stanthorpe, approximately 15 km to the north of the site.
- There is habitat potentially suitable for the squatter pigeon within the project area. Areas of potentially suitable habitat are predominantly located within the areas of open woodland vegetation closest to the farm dams to the south-east of the inundation area. Whilst there is potentially suitable habitat, the likelihood of this species occurring is considered to be low as there are no records of this species in the project area. The closest record of this species is from Sundown National Park.
- There is potentially suitable habitat for the eastern bristlebird along the riparian areas of the site. In Queensland, this species mostly occurs in tall, dense, grassy groundcover in open eucalyptus forests or woodlands that are present throughout the site. However, the species is considered unlikely to occur as there are presently four known populations in the southern Queensland/northern NSW. The closest known population is from Mt Barney National Park approximately 95 km to the north of the site.
- The absence of favoured food trees in the project area would limit the use of the site by the swift parrot. However, the species may use the site to move through the landscape. This species prefers box-iron gum, however also forages on other eucalyptus species when these resources are scarce including those that make up box-gum grassy woodland communities (particularly yellow-box) which are present throughout the site. The likelihood of this species occurring is considered to be low as there are no records of species in the project. On the mainland of Australia this species typically returns to the same foraging areas each year. The closest record of this species is from Warwick approximately 62 km from the proposed inundation area.

- Whilst there are two Queensland Wildnet database records of the regent honeyeater in the study area the limited number of favoured food trees in the project area would restrict the use of the site. This species prefers the nectar from iron-bark-box associations and is known to forage on the flowers of the yellow-box and other eucalyptus species that are present within the site. This species is known to breed to the west of Warwick, approximately 70 km to the north of the project site and is considered to potentially use the site to move through the landscape.

The proposed offset areas and rehabilitation within the buffer area associated with box-gum grassy woodland ecological communities would benefit these bird species.

Mammals

A search of the EPBC PMST database identified nine species of threatened mammal listed under the EPBC Act as potentially occurring within the project area. These species are listed in Table 5.3.

Table 5.3 Threatened mammal species and likelihood of occurrence in the project area

Common name *Scientific name*	EPBC Act status	NC Wildlife Regulation status	Likelihood of occurrence
Large-eared pied bat *Chalinolobus dwyeri*	Vulnerable	Vulnerable	Species or species habitat may occur within area
Spotted-tailed quoll *Dasyurus maculatus maculatus* (south-eastern mainland population)	Endangered	Vulnerable	Species or species habitat known to occur within area
South-eastern long-eared bat *Nyctophilus corbeni*	Vulnerable	Listed as vulnerable for its listing as *Nyctophilus timoriensis* (South-eastern form)	Species or species habitat may occur within area
Brush-tailed rock-wallaby *Petrogale penicillata*	Vulnerable	Vulnerable	Species or species habitat likely to occur within area
Koala *Phascolarctos cinereus* (combined populations of Qld, NSW and the ACT)	Vulnerable	Vulnerable (south east Queensland bioregion)	Species or species habitat known to occur within area
Long-nosed potoroo *Potorous tridactylus tridactylus*	Vulnerable	Vulnerable	Species or species habitat may occur within area
New Holland mouse *Pseudomys novaehollandiae*	Vulnerable	Least concern	Species or species habitat may occur within area
Hastings river mouse *Pseudomys oralis*	Endangered	Vulnerable	Species or species habitat likely to occur within area
Grey-headed flying-fox *Pteropus poliocephalus*	Vulnerable	Least concern	Foraging, feeding or related behaviour may occur within

Common name *Scientific name*	EPBC Act status	NC Wildlife Regulation status	Likelihood of occurrence
			area

Two of the species identified were listed under the EPBC Act as a threatened species after the controlled action decision was made for the project and therefore, in accordance with EPBC Act subsection 158A(4), cannot be considered in this assessment. These include:

- koala (*Phascolarctos cinereus*)
- New Holland mouse (*Pseudomys novaehollandiae*).

Habitat assessment

Surveys undertaken by the proponent were generally in accordance with the *Survey Guidelines for Australia's Threatened Mammals.* However, there were some limitations including:

- Survey effort undertaken to determine the presence of the spotted-tailed quoll was less than required and not all the recommended survey methodologies were undertaken. However, it has been assumed that this species occurs based on suitable foraging habitat within the project area.
- No roost searches were undertaken to determine potential roosting habitat for threatened bats during the appropriate season (when bats are most active).

Whilst the species in Table 5.3 are listed as potentially occurring, surveys of the site indicated that there is limited habitat to support these species. Habitat assessment indicated:

- The absence of areas containing *Angophora leiocarpa, Eucalyptus camaldulensis, Angophora costata, Eucalyptus largiflorens* woodland habitat and vegetation with distinct canopies and dense cluttered shrub layers would reduce the likelihood of south-eastern long-eared bat occurring in the project area. This species has been recorded at a location west of Tenterfield approximately 37 km south-west of the proposed inundation area.
- There are a number of granite outcroppings in the inundation area; however, there are no rocky outcrops or cliffs that have caves and ledges to provide suitable refuge habitat for the brush-tailed rock wallaby. There is also limited habitat for this species with regard to the lack of dense rainforest, vine thicket and wet sclerophyll woodland vegetation typically associated with this species. The nearest record of this species is from Sundown National Park approximately 30 km south-east of the proposed site.
- The limited number of forested areas containing dense ground strata and high structural diversity would limit the use of the site by the long-nosed potoroo. There are also no records of this species occurring within the project area. The nearest record of this species is from Tenterfield approximately 38 km south-west of the proposed inundation area.

- There are suitable feed trees (flowering eucalypts) for the grey-headed flying-fox throughout the project area. However, there are no known flying fox camps in or near the project area and the subject area is not a known feeding ground. The nearest record of this species is from Tenterfield approximately 40 km from the proposed inundation area.
- There is suitable habitat for the Hastings River mouse along the Severn River within the project site associated with sedge species, Carex, Juncus and Cyperus spp. However there are no records of this species occurring within the project area. The nearest record of this species is from the Timbarra Plateau 30 km east of Tenterfield.

Only two of the species in Table 5.3 were identified during field surveys. This included the koala and large-eared pied bat.

The spotted-tailed quoll (*Dasyurus maculatus maculatus*) was not identified during field surveys, however was reported as occurring in the project area by a landholder. There are also Queensland Museum records for this species from the Ballandean area 6 km from the project site.

Large-eared pied bat (Chalinolobus dwyeri)

The large-eared pied bat is listed as vulnerable under the EPBC Act. The distribution of this species is discontinuous and ranges from Shoalwater Bay in Queensland to Ulladulla in NSW.

There no existing records of this species in the local area; however, there are previous records from Mt Barney and Koreelah National Parks, approximately 40–50 km north-east of the project site.

This species is known to occur within several kilometres of clifflines and rocky terrain and is known to forage in fertile valleys and areas with moderately tall to taller trees along watercourses. The species is dependent on the presence of roosts for shelter and appears to roost predominantly in caves and overhangs in sandstone cliffs.

No maternity roost sites for this species are known in Queensland. Maternity roost sites appear to be very specific in structure and are predominantly found in arch caves with dome roofs that are high and deep enough to allow juvenile bats to learn to fly.

Key threats to this species include interference with maternity and roosting sites, mine induced subsidence of clifflines, disturbances from recreational activities, habitat disturbance by introduced fauna and livestock, predation by feral animals, vegetation clearing and fires in the proximity of roosting sites.

There is a national recovery plan for this species: *National Recovery Plan for the Large-eared Pied Bat Chalinolobus dwyeri.* The overall objective of the recovery plan is to ensure the persistence of viable populations of the large-eared pied bat throughout its biogeographic range.

Whilst this species is not listed in any threat abatement plan, it is considered that foxes (*Vulpes vulpes*) and other feral animals (e.g. feral goats) are a potential threat to this species through predation and disturbances to habitat.

The large-eared pied bat is also listed as a priority species in the regional recovery plans: *Border Ranges Rainforest Biodiversity Management Plan* for NSW and Queensland and a *Northern Rivers Regional Biodiversity Management Plan* for NSW. The recovery actions prescribed in this plan are consistent with the recovery actions listed in the national recovery plan for this species.

Recovery actions that are relevant to the project include:

- protecting known roosts and associated foraging habitats
- conducting a program to control introduced species, such as goats, where necessary
- promoting establishment of vegetation linkages across cleared or partially cleared landscapes through the use of mixed-species timber plantations, riparian rehabilitation, shelter belts and targeted revegetation programs
- ensuring that a net biodiversity conservation gain is achieved when assessing and approving applications for any development or activity
- protecting vegetation communities, ecosystems and habitats from inappropriate fire regimes and integrate weed control programs with bush rehabilitation, regeneration and fire programs.

Assessment of residual impacts

The project is not expected to have a residual impact on this species following the implementation of the proposed mitigation measures.

This species was identified by its call during the Anabat surveys undertaken in December 2006. The EIS indicated that the rocky outcrops and overhangs, most commonly found in *Eucalyptus andrewsii*-dominated woodland on the rocky hillsides to the west and south of the project area, are considered likely to provide roosting habitat for this species. Surveys undertaken to detect the presence or absence of this species during the EIS were considered to be limited, as no roost searches were undertaken during the appropriate season (when the species is most active). Based on limited survey work, it was considered that there was not enough evidence to confirm the presence or absence of this species.

The proponent completed additional survey work to determine the availability of potential roosting sites and associated foraging habitat within the project area and the suitability of these sites for the large-eared pied bat.

The Anabat dataset collected during 2006–07 EIS surveys was also reviewed in 2014. This review indicated that the calls analysed had a very low recording quality. While the recording had some characteristics of a large-eared pied bat call, it did not show all the characteristics to positively identify it as this species. The additional survey work undertaken in 2014, indicated a low likelihood of this species occurring in the project area. However a precautionary approach has been undertaken for this species, due to limitations of survey work and the requirement of the recovery plan to protect known roosting and associated foraging habitat..

Based on the results of surveys, there are no known priority sites for this species in the project area. Results of additional survey work indicate that the proposed dam is not

expected to have a direct impact on any potential roosting sites as no suitable roost sites were found within the inundation footprint. However, surveys identified 156 ha of potential foraging habitat within the proposed inundation footprint, including 119 ha of primary foraging habitat within 1 km of a potential roost site. A number of potential roost sites and extensive areas of associated potential primary foraging habitat were identified in broader landscape outside the proposed inundation area.

Based on these findings, the project would be expected to cause a loss of 156 ha of potential foraging habitat including 119 ha of primary foraging habitat. This area of potential foraging habitat is not directly connected to any potential roost site. The potential roost site and associated foraging habitat identified to the south of the project site is separated from the impacted area by land that has been cleared for agriculture and grazing. This area of cleared land would be included in the proposed buffer area and its rehabilitation would be expected to provide 120 ha of additional potential foraging habitat for this species.

The proponent's commitment to rehabilitate the buffer area prior to construction, and to clear vegetation in stages, would reduce the duration of short-term impacts on foraging habitat.

The proposed management activities that are relevant to the recovery of this community include:

- managing pest animal species in the proposed project areas, which would include the management of goats and other feral animal species that pose a threat to this species
- managing risks to existing environmental values by providing fire protection. The proponent has also proposed to develop and implement a Fire Management Plan for construction and operation
- proposed rehabilitation of the buffer area, which would be expected to provide a net gain in potential foraging habitat for this species in the local area
- proposed rehabilitation of the buffer area and offsets for the box-gum grassy woodland, which would be expected to improve connectivity in the local area and therefore assist in providing vegetation linkages across cleared or partially cleared landscapes
- secure the buffer area for conservation purposes under a nature refuge or other covenant.

These management practices are considered to be consistent with the *National Recovery Plan for the Large-eared Pied Bat Chalinolobus dwyeri.*

Conclusion

The proponent has adequately identified the potential impacts that the project would have on the large-eared pied bat.

I require the proponent to manage impacts through the recommended conditions to ensure there are no unacceptable impacts to large-eared pied bat, including:

- avoiding and limiting disturbance to habitat
- setting aside and rehabilitating the buffer area

- improving quality of existing foraging habitat.

In light of the proposed mitigation measures and conditions recommended in this report, I consider that the impacts to large-eared pied bat are not unacceptable or inconsistent with the recovery plan for the large-eared pied bat or relevant threat abatement plans.

Spotted-tailed quoll (Dasyurus maculatus maculatus)

Background

The spotted-tailed quoll is listed as endangered under the EPBC Act. This species occurs in south-east Queensland coastally from Bundaberg to the border and inland to Monto and Stanthorpe.This species has a preference for mature wet forest habitat, however it has been recorded in a wide range of habitats including wet sclerophyll forest and inland riparian and river red gum forests. The spotted-tailed quoll requires large areas of relatively intact vegetation to forage and suitable den sites such as hollow logs, tree hollows, rock outcrops or caves.

The EIS stated that there is suitable habitat for foraging and dens in the rocky areas to the west and south of the inundation area. The EIS stated that the majority of the proposed pipeline routes do not provide suitable habitat for this species.

The key threats to this species include loss and/or degradation of habitat, predation from red foxes and domestic dogs, competition with feral animals including cats and foxes for prey species, changed fire regimes, road mortalities and poisoning by cane toads.

The spotted-tailed quoll is listed as a priority species in the regional recovery plans: *Border Ranges Rainforest Biodiversity Management Plan* for NSW and Queensland and a *Northern Rivers Regional Biodiversity Management Plan for New South Wales*.

Relevant recovery actions that are relevant to the project include:

- protecting habitat from inappropriate fire regimes
- managing threats posed by pest species—e.g. cane toad and European red fox.

The spotted-tailed quoll is listed as a threatened species at risk from fox predation in the 2008 *Threat Abatement Plan for Predation by the European Red Fox.* It is also listed as a threatened species that is highly impacted by cane toads in the 2011 *Threat Abatement Plan for the Biological Effects, Including Lethal Toxic Ingestion Caused by Cane Toads.*

Assessment of residual impacts

The project is not expected to have a residual impact on this species.

The EIS indicated that the proposed clearing within the dam (FSL) footprint would result in the loss of approximately 135 ha of potential foraging habitat for this species. The rehabilitation of the buffer area would mitigate the loss of potential foraging habitat for this species. Improvement of habitat and connectivity through this area would potentially provide greater foraging opportunities for this species due to the increased

number of prey species that would be expected to use the buffer area (e.g. birds, small reptiles and mammals).

The proposed management activities that are relevant to the recovery of this community include:

- The proponent's proposed vertebrate pest management strategy would include the management of the European fox, feral dogs and cats which would assist in reducing impacts from feral animals on the spotted-tail quoll in the project area. This is considered to be not inconsistent with the 2008 *Threat Abatement Plan for Predation by the European Red Fox*.
- No cane toads were identified during field surveys; however, extensive populations are known to exist in the north and east of the of the SDRC area. The proponent would be required to adhere to strict hygiene protocols to prevent the introduction of cane toads to the site via vehicles and construction materials. This is considered to be not inconsistent with the 2011 *Threat Abatement Plan for the Biological Effects, Including Lethal Toxic Ingestion Caused by Cane Toads.*
- The proponent has proposed to manage risks to existing environmental values by providing protection from fire. The proponent has also proposed to develop and implement a fire management plan for construction and operation.

Conclusion

The proponent has adequately identified the potential impacts that the project would have on the spotted-tailed quoll.

I require the proponent to manage impacts through the recommended conditions, to ensure that there are no unacceptable impacts to spotted-tailed quoll, including:

- avoiding and limiting disturbance to habitat
- setting aside and rehabilitating the buffer area
- improving quality of existing foraging habitat.

In light of the proposed mitigation measures and conditions recommended in this report, I consider that the impacts to spotted-tailed quoll are not unacceptable or inconsistent with the regional recovery plan or relevant threat abatement plans.

Reptiles

A search of the EPBC PMST database identified four species of reptile listed under the EPBC Act as potentially occurring within the project area. These species are listed in Table 5.4.

Table 5.4 Threatened reptile species with the likelihood to occur in the project area

Common name *Scientific name*	EPBC Act status	NC Wildlife Regulation status	Likelihood of occurrence
Collared delma *Delma torquate*	Vulnerable	Vulnerable	Species or species habitat may occur within area
Dunmall's snake	Vulnerable	Vulnerable	Species or species habitat may occur

Furina dunmalli			within area
Granite-belt thick-tailed gecko *Uvidicolus sphyrurus*	Listed as Vulnerable for its listing as *Uvidicolus sphyrurus*	Listed as near threatened for its listing as *Nephrurus sphyrurus*	Species or species habitat likely to occur within area
Bell's turtle *Wollumbinia belli*	Vulnerable	Least concern	Species or species habitat known to occur within area

Habitat assessment

Whilst the reptile species in Table 5.4 are listed as potentially occurring, surveys of the site indicated that there is limited supporting habitat for these species. Habitat assessment indicated:

- Whilst some areas of the site provide suitable micro-habitat in terms of exposed rocky outcrops, fallen timber and leaf litter, the absence of REs 11.3.2, 11.9.10, 11.10.1, 11.10.4 (brigalow belt bioregion REs) would reduce the likelihood of the collared delma occurring in the project area. The closest record of this species is from Whitestone State Forest approximately 108 km north-west of Stanthorpe.
- Whilst some areas of the site provide suitable micro-habitat in terms of fallen timber and leaf litter, the absence of brigalow (*Acacia harpophylla*) forest and woodland would reduce the likelihood of the Dunmall's snake occurring in the project area. The Dunmall's snake is also considered unlikely to occur as this species has been mostly found at a lower elevation (between 200–500 m above sea level) than the project site. The closest record of this species is from the Bebo State Forest (elevation of 305 m) approximately 98 km west of the proposed inundation area.

Only two of the species listed in Table 5.4 were identified during field surveys. This included:

- border thick-tailed gecko (*Uvidicolus sphyrurus*)
- bell's turtle (*Wollumbinia belli*).

Border thick-tailed gecko (Uvidicolus sphyrurus)

The border thick-tailed gecko is listed as vulnerable under the EPBC Act. The species typically occurs in undisturbed remnants of dry sclerophyll open forest and woodland associated with outcrops of granite, basalt, sandstone and metamorphic rocks and has preference for sites with boulders, rock slabs, fallen timber and deep leaf litter. This species has a patchy distribution throughout the north-western slopes and northern tablelands of NSW and the Stanthorpe region of southern Queensland. The distribution of this species also overlaps with box-gum grassy woodland EPBC Act-listed TEC.

One individual border thick-tailed gecko was recorded within the inundation area of the dam during targeted field surveys undertaken during the summer survey in 2013. The resident population in this area is considered to be important as it is located between two large conservation reserves (Girraween National Park and Sundown National Park) which are known to support the species.

The key threats to this species include habitat clearing for agriculture and development, the collection of bush rock and dead wood for fires, inappropriate fire regimes, grazing

and trampling of habitat by domestic stock and feral goats, predation by feral cats and the European red fox.

There is an approved conservation advice for this species: *Approved Conservation Advice for Underwoodisaurus sphyrurus (Border Thick-tailed Gecko).*

The border thick-tailed gecko is listed as a priority species in the regional recovery plan: *Northern Rivers Regional Biodiversity Management Plan* for NSW. The recovery actions prescribed in this plan are consistent with the priority actions listed in the conservation advice for this species.

The border thick-tailed gecko is also listed as a threatened species at risk from fox and feral cat predation in the 2013 *Threat Abatement Plan for Predation by the European Red Fox: Five Yearly Review* and 2008 *Threat Abatement Plan for Predation by Feral Cats*. Relevant priority recovery actions that are relevant to the project include:

- managing threats to areas of vegetation where this species occurs, including fire regimes (focusing on reducing the frequency of burning in rocky woodland and forests)
- preventing the collection of dead fallen timber for firewood in areas where the species is known to occur
- preventing grazing pressures from domestic livestock on known sites through exclusion fencing or other barriers
- implementing the appropriate management recommendations outlined in the threat abatement plans for European red fox, feral cats and goats
- retaining bush rock within the species' habitat
- ensuring development activities in areas where the border thick-tailed gecko occurs do not adversely affect known populations
- investigating formal conservation arrangements such as the use of covenants, conservation agreements or inclusion in reserve tenure
- identifying key habitats and corridors where revegetation can provide links between key populations and investigating options for linking, enhancing or establishing additional populations.

Assessment of residual impacts

The project is expected to result in the loss of 88.54 ha of potentially suitable habitat from the proposed inundation area including 18.13 ha of primary (rocky habitat associated with REs 13.12.2 and 13.12.6) habitat and approximately 70 ha of secondary habitat associated with REs 13.12.5, 13.12.8 and 13.12.9 (used for movement and foraging). The removal of habitat from the inundation area would also be expected to remove east-west habitat connectivity for this species along the Severn River.

The loss of habitat and connectivity would be addressed by rehabilitating the buffer area to improve habitat and habitat connectivity in the medium to long term. The proponent has committed to rehabilitate the proposed buffer area which would include removing weeds and planting appropriate flora species (refer Appendix 4).

Whilst the proposed rehabilitation of the buffer area would be expected to provide a medium to long-term net benefit for the resident population, there remains a risk associated with the time lag between the commencement of rehabilitation activities and the point at which the habitat becomes suitable for the species. Construction of the dam would displace the resident population and it is considered that the resident population may not initially use the buffer area as the current area provides limited habitat. As such, the short-term residual impact of the project on this species would include 18.13 ha of primary habitat (REs 13.12.2 and 13.12.6) and 70.41 ha of secondary habitat (REs 13.12.5, 13.12.8 and 13.12.9).

The proponent has identified suitable primary habitat (REs 13.12.2 and 13.12.6) on third party properties adjoining the regeneration buffer area around the FSL area which may be secured to provide offsets for this species.

The proposed offset strategy for the box-gum grassy woodland community (which this species overlaps with) in addition to the proposed rehabilitation of the buffer area adjacent to the dam, would also improve habitat and habitat connectivity for this species in the local region.

In addition to providing offsets the proponent would be required to rehabilitate the buffer area in advance, prior to construction.Staged clearing would also be undertaken to reduce impacts on this species.

The proponent will also undertake pre-clearing surveys within the proposed inundation area and relocate individual species into suitable habitats within the buffer area (refer Appendix 4). The proponent has further committed to the following:

- threats to vegetation containing occurrences on this species in the project area (e.g. clearing) would be mitigated by rehabilitating the buffer area and any significant residual impacts would be offset
- provide gas-fired BBQs in the proposed recreational area to discourage recreational users from collecting wood
- exclude grazing livestock from the project and offset areas including the areas which contain suitable habitat for this species
- salvage suitable habitat features from the inundation area such as large rocks and logs from the impact area and place these features into suitable habitats within the adjacent buffer area
- commit to a strategy to offset any significant residual impact on this species, to ensure that there is no net loss of this species and consequently no adverse impact on populations in this region
- the proposed buffer area and offset sites would be subject to formal conservation arrangements.

The proponent’s assessment identified that the project area supports an important population. The proponent’s offset strategy for the box-gum grassy woodland community which this species overlaps with in addition to the offset sites proposed for this species and the proposed rehabilitation of the buffer area adjacent to the dam would improve habitat and habitat connectivity for this species in the local region

The proponent has committed to manage pest animal species in the proposed project areas which would include the management of foxes and feral cats. This is considered to be not inconsistent with the 2013 *Threat Abatement Plan for Predation by the European Red Fox: Five Yearly Review* and 2008 *Threat Abatement Plan for Predation by Feral Cats*.

Conclusion

The proponent has adequately identified the potential impacts that the project would have on the border thick-tailed gecko. The approved conservation advice has been considered in the assessment.

I require the proponent to manage impacts through the conditions I have set, to ensure that there are no unacceptable impacts on the border thick-tailed gecko, including:

- avoiding and limiting disturbance to habitat
- setting aside and rehabilitating the buffer area
- providing adequate offsets for significant residual impacts.

In light of the proposed mitigation measures and conditions recommended in this report, I consider that the impacts on the border thick-tailed gecko are not unacceptable or inconsistent with the regional recovery plan or threat abatement plan.

Bell's turtle (Wollumbinia belli)

Bell's turtle is listed as vulnerable under the EPBC Act and as a priority threatened species for conservation in the Queensland Government Back on Track species prioritisation framework.

The known distribution of the bell's turtle is restricted to three known isolated populations occurring in Bald Rock Creek in southern Queensland and the headwaters of the Namoi and Gwydir Rivers in northern NSW. The Queensland population is small (estimated less than 400 individuals) and primarily occurs within an 8 km reach in Bald Rock Creek. This species is restricted to permanent cold flowing and well-oxygenated upland streams found around 700 m above sea level.

The key threats to this species include pollution and sedimentation of river habitat, damage to riparian areas by agricultural practices, alteration of natural stream flows associated with water extraction and predation of nests by the European red fox.

There is an approved conservation advice for this species: *Approved Conservation Advice for Elseya belli (Bell's Turtle).*

The bell's turtle is also listed in the 2013 *Threat Abatement Plan for Predation by the European Red Fox: Five Yearly Review* as a threatened species at risk from fox predation.

Priority actions in the conservation advice that are relevant to the project include:

- developing management plans to maintain or restore natural river flows to catchments
- managing any changes to hydrology that may result in changes to water table levels, increased run-off, sedimentation or pollution

- ensuring chemicals or other mechanisms used to eradicate weeds or for agriculture do not have a significant adverse impact on bell's turtle
- protecting areas of riparian vegetation in areas of known habitat and potential habitat for bell's turtle
- implementing relevant threat abatement plans or feral animal management plans and managing threats at known sites in reserve areas and on private property to control foxes
- managing trampling pressures on riparian vegetation from livestock and establishing exclusion fencing along river banks on private and public land to reduce grazing pressures.

Assessment of residual impacts

EIS surveys recorded one individual bell's turtle downstream from the proposed dam site near Somme Lane. This location is outside of its known population range. This species was also recorded at the reference site in Bald Rock Creek where this species is known to occur. Additional targeted surveys were undertaken in May and September 2013. No Bbell's turtles were identified directly up or downstream from the dam site during the additional surveys. This species was again identified at the reference site at Bald Rock creek during these additional surveys.

The survey methodologies and survey effort undertaken by the proponent to identify the presence of the bell's turtle is considered to be not in accordance with the *Survey Guidelines for Australia's Threatened Reptiles.*

Limitations in the proponent's survey methodologies may have led to under-reporting of the species in the survey area. Taking a precautionary approach, I have conditioned the proponent to undertaken further surveys prior to any on-ground works to provide more certainty about whether this species is present in the project area.

These surveys must be undertaken in accordance with *Survey Guidelines for Australia's Threatened Reptiles* and in accordance with any survey requirements stipulated by DEHP. In the case that turtles are found to occur in the project area (i.e. move upstream and downstream of the proposed dam wall), the proponent would be required to implement a turtle passage device which has been designed in consultation with an aquatic biopassage expert and DEHP. This device would need to be tested prior to construction and monitored during operation to ensure that the device provides adequate passage for this species. The proponent contended that the proposed environmental releases and spills will contribute to maintaining a flow regime that is consistent with the current flow regime in the Severn River and therefore not affect turtle nesting beyond what would occur under the existing flow regime.

The proposed management activities that are relevant to the recovery of this community include:

- replacing a number of weirs that are currently impacting on flows in the Severn River with an impoundment that would be designed to maintain natural flows (i.e. environmental flows and spills from the dam would contribute to maintaining a flow regime that is consistent with the current flow regime in the Severn River)

- managing surface water runoff to reduce sedimentation and transportation of sediment-associated contaminants to receiving waterways
- appropriately storing chemicals and hazardous materials, including herbicides, on site in bunded areas, to avoid adverse impacts on the receiving environment from spills or leaks
- implementing a vertebrate pest management strategy to ensure the project and offset sites are kept free of pests including the European red fox and other feral pests that pose a threat to the bell's turtle. This would assist in reducing fox and other feral animal populations in the local region and the potential for predation on the bell's turtle. This is considered to be not inconsistent with the 2013 *Threat Abatement Plan for Predation by the European Red Fox: Five Yearly Review*
- excluding livestock from the dam, buffer and offset areas including areas containing riparian habitat.

Conclusion

The proponent has adequately identified the potential impacts that the project would have on bell's turtle. The approved conservation advice has been considered in the assessment. I require the proponent to manage impacts through the recommended conditions to ensure that there are no unacceptable impacts no the bell's turtle including:

- ensuring passage is not significantly impeded by the dam
- through testing, demonstrates the ability of the turtle passage to ensure passage through the dam is not impeded
- manage the quality of water within the project site
- limit the area of disturbance of aquatic habitat.

In light of the proposed mitigation measures and conditions recommended in this report, I consider that the potential impacts on bell's turtle are not unacceptable or inconsistent with the regional recovery plan or relevant threat abatement plans.

Fish

A search of the EPBC PMST database identified one species of threatened fish listed under the EPBC Act as potentially occurring within the project area. This species, the Murray cod (*Maccullochella peelii*) is listed as vulnerable under the EPBC Act.

Murray cod (Maccullochella peelii)

The Murray cod is found extensively throughout the Murray Darling Basin in the south-eastern region of Australia. This species is found in a range of habitats from clear rocky streams to turbid rivers and billabongs. The EIS states that the Murray cod has been introduced to the upper Severn River catchment and that this area is not considered part of its natural range.

Key threats to this species include altered flow regulation from weir impoundments, irrigation channels and direct pumping from rivers; habitat degradation through the loss of snags (woody debris such as fallen tree trunks or branches), lowered water quality

caused by flow diversions, impoundments and dry periods; barriers; and pests and weeds.

This species has a national recovery plan: *National Recovery Plan for the Murray Cod Maccullochella peelii peelii,* which lists key actions required for the recovery of Murray cod populations. The overall objective of the recovery plan is to manage self-sustaining populations for conservation, fishing and cultural purposes.

Key recovery actions that are relevant to the project include:

- developing and implementing flow management practices to benefit the recovery of Murray cod populations
- facilitating fish passage for Murray cod in both upstream and downstream directions
- developing a plan for amelioration of cold water pollution for Murray cod throughout the Murray Darling Basin and ensure that existing infrastructure is used correctly.

Assessment of residual impacts

The project is not expected to have a residual impact on this species.

This species was recorded from Bents Weir, approximately 15 km downstream from the proposed dam wall during the 2007 surveys. However it was not recorded during the targeted surveys undertaken in 2013. There are no confirmed records of this species upstream of the proposed dam.

Impacts on this species would be reduced by providing a fishway to facilitate passage of this species upstream and downstream of the proposed dam.

Cold water pollution is not considered to be an issue for the project as the average depth of the dam would be 5 m, which would reduce the potential for significant reductions in temperature at depth. The use of multi-level off-take structures would also assist in minimising cold water pollution.

The proponent would be required to ensure that environmental releases from the dam meet the environmental flow objective requirements of the WRP. Maintaining these environmental flows is intended to preserve natural downstream conditions to ensure that the proposed dam does not adversely affect downstream aquatic fauna including the Murray cod.

Conclusion

The proponent has adequately identified the potential impacts that the project could have on the Murray cod.

I require the proponent to manage impacts through the recommended conditions to ensure there are no unacceptable impacts on the Murray cod, including:

- limiting the area of disturbance of aquatic habitat
- managing the quality of water within the project site

installing and managing a fishway.In light of the proposed mitigation measures and conditions recommended in this report, I consider that the potential impacts on the Murray cod are not unacceptable or inconsistent with the recovery plan for the Murray cod.

5.4 Principles of ecologically sustainable development

My assessment of the project has taken into account the principles of ecologically sustainable development, which as defined in Part 1, section 3A of the EPBC Act, are:

- **the integration principle**: decision making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations
- **the precautionary principle**: if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation
- **the inter-generational principle**: that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations
- **the biodiversity principle**: the conservation of biological diversity and ecological integrity should be a fundamental consideration in decision making
- **the valuation principle**: improved valuation, pricing and incentive mechanisms should be promoted.

My report has analysed the EIS and AEIS concerning the long-term and short-term economic, environmental, social and equitable considerations that are relevant to the project.

The potential impacts of the project are addressed by conditions that restrict environmental impacts, impose strict monitoring and adopt environmental standards which, if not achieved, require the application of timely response mechanisms to avoid adverse impacts.

The proposed conditions will ensure potential impacts on listed threatened species and communities are reduced and mitigated to the greatest extent possible. These conditions would allow the project to be delivered and operated in a sustainable way to protect the environment for future generations and preserve matters of national environmental significance.

I have considered the importance of the conservation of biological diversity and ecological integrity in relation to all of the controlling provisions for this project, and the assessment in my report reflects that consideration.

My evaluation of the project also considers a range of information on the economic costs, benefits and impacts of the project. I have sought to ensure that the costs of compliance with the conditions are reasonable to the extent that the project can proceed and make a fair contribution to environmental protection.

I have considered the above principles in my evaluation of project impacts. Based on the completion of a comprehensive environmental assessment process, proponent commitments, my stated conditions for the project and recommendations for conditions to be placed on subsequent State and Commonwealth approvals, I am satisfied that the project complies with the provisions of Part 1, section 3A of the EPBC Act.

It is recommended that the Commonwealth consider the conditions of approval in Appendix 3, in addition to the State's conditions listed in Appendix 1 and 2.

6. Evaluation of state environmental impacts

6.1 Surface water resources

6.1.1 Existing environment

The dam is proposed to be constructed on the Severn River, within the Granite Belt catchment, which is part of the Border Rivers Drainage Basin. The Granite Belt catchment consists of six major streams, including Broadwater Creek, Cannon Creek, Quart Pot Creek, Four Mile Creek, Accommodation Creek and the Severn River. The catchment area of the proposed dam is 586 km^2, which represents 45 per cent of the Granite Belt catchment and 1.4 per cent of the Border Rivers catchment in Queensland.

The Border Rivers Drainage Basin is regulated through the WRP, which details a range of environmental flow objectives (EFOs) and water allocation security objectives (WASOs) for the basin. These are determined through the Integrated Quantity and Quality Model (IQQM), which estimates of long-term water availability and water use. The ROP has been prepared for the purposes of implementing the WRP and it sets out the rules by which the water infrastructure is to be operated.

The IQQM used as part of the EIS has a baseline data period from 1890–1996 indicates that the Severn River is characterised by a significant variation in the average flows. The highest flows occur from January to March and July to August. Accommodation Creek inflows increase the mean monthly flows to the Severn River substantially. However, since 1890 the flows have been significantly reduced due to the introduction of water infrastructure in the catchment. The model indicates that the flows are below 1 ML/d for 36 per cent and 53 per cent of the time for the predevelopment scenario (assumes no development in the catchment) and existing entitlements scenario (with all existing water entitlements considered).

The Severn River is divided hydraulically into reaches by 26 weirs and the length of the reaches ranges from 1.4 km to 3.6 km. As part of the EIS, a preliminary assessment of the hydraulic behaviour of the section of the river where the dam is proposed to be constructed was undertaken for 50 per cent annual exceedence probability (AEP) and the 1 per cent AEP flood events. The results showed that the weirs downstream of the dam at adopted middle thread distance (AMTD) 260.5 km and upstream of the dam AMTD 266.2 km are not drowned out even in a 1 per cent AEP event.

Rainfall across the overall catchment varies throughout the seasons, with the majority of rainfall occurring between October and March. Evaporation also varies with seasons, with mean monthly evaporation being greater than mean monthly rainfall for all months.

6.1.2 Impacts and mitigation measures

Construction

The EIS reported that flood events during construction are one of the main risks to the proposed dam. As the Severn River is a relatively steep stream and the delay time between rainfall and runoff can be quite short, there is a risk of overtopping of the RCC dam wall during construction. To manage this risk, the proponent will monitor upstream rainfall during the works so that appropriate actions can be implemented to protect the RCC wall. Furthermore, the construction of the RCC wall will occur in a scheduled manner and the river flows will be gradually diverted through completed works, which will further reduce this risk.

The EIS also identified that a 125-kilometre pipeline will be constructed to supply water from the dam to Mt Marlay water treatment plant and irrigators. The pipeline will cross creeks and therefore require construction of seven significant creek crossings to avoid impact on the hydraulic capacity of the creeks.

Operation

The effect of extreme weather events on the river flow and availability has been considered in the IQQM modelling. The IQQM model considered historic droughts and large rainfall events over a period of 106 years. It has been identified that the RCC wall and the spillway can withstand the probable maximum flood (PMF), which can be reasonably expected to occur at the proposed location. Climatic extremes will be considered as part of the design of the embankment and spillway and the design will accord with the relevant Australian National Committee on Large Dams Guidelines (ANCOLD).

A flooding assessment has been undertaken for flood scenarios with and without the proposed dam for the two per cent AEP event and the one per cent AEP flood events. The assessment identified that some flooding may occur in areas surrounding the inundation area. As a result, the proponent will acquire the land to the FSL (738 m AHD) and establish a 200 m buffer around the dam to accommodate for this impact. The assessment also identified that there will be some minor reduction in peak flood level downstream of the dam location.

The EIS identified that the proposed dam is predicted to increase flooding by approximately 0.1 m at the extent of the protected buffer (4.5 km upstream of the dam). However, this increase is very localised. Within 500 m upstream of this location this impact is reduced to a negligible level.

Dam design

The proposed dam design must comply with ANCOLD guidelines. The *Water Supply (Safety and Reliability) Act 2008* provides that a failure impact assessment must be undertaken where a dam has a height of more than 8 m and a storage capacity of more than 500 ML.

Where a failure impact assessment reveals that a population of more than two persons will be at risk, the dam will be classed as a referable dam and the provisions of the Water Act and SP Act and associated regulations will apply to the project.

The proponent undertook the dam safety risk assessment in accordance with the ANCOLD guidelines and relevant legislation and policies which were in place in 2007 when the EIS was prepared. The assessment included the identification of the risks associated with construction and operation activities, risks to the project workforce, the community and the environment. Risk criteria included flood capacity, populations at risk, impacts upon the population, the environment and economic loss, potential incident induced failures, off-site risks, public safety, static, pipeline, seismic and consequence assessments. Site inspections and ground-truthing were undertaken in support of the hazard and risk assessments.

The risk conclusions reached were that the project is a referable dam, 'High C' Incremental Flood Hazard Category Dam and will require a failure impact assessment prior to undertaking detailed design.

The proponent has committed to undertake a failure impact assessment study, which will include safety management practices and systems, emergency response, dam safety, design, construction and operations and maintenance at the design stage of the project (refer Appendix 4).

Environmental release strategy

In order to meet the EFOs of the WRP for Farnbro (Node J), the proponent will implement the following environmental release strategy:

- pass flows up to 30 ML/d through the dam
- inflows that are greater than 30 ML/d, only 30 ML a day is released.

These releases are intended to avoid impacts on downstream users and aquatic ecology. Refer to the 'Listed threatened species and communities' section for further information on the potential impacts on aquatic ecology.

The EIS utilised the Granite Belt catchment IQQM with a simulation period from 1890 to 1996. The model predicted the performance of the proposed dam, with the following findings:

- the predicted mean annual diversion for the town water supply as 698 ML at a monthly reliability of 93 per cent and 1302 ML at a monthly reliability of 75 per cent for the irrigation water supply
- the dam is above or at near full capacity (less than 1 m below the FSL) for 32 per cent of the time, above 50 per cent capacity for 62 per cent of the time and it fails for about 6 per cent of the time (falls below the minimum operating level of 726 m AHD)
- the dam is likely to spill on average 33 days per year, with the average time period between each spill being 0.6 years
- with the environmental release strategy in place, the dam has 40–50 per cent probability of filling up within the first year of operations
- the proposed dam will be designed to achieve current EFOs under the WRP.

The AEIS used a refined IQQM with a simulation period from 1 January 1889 to 31 December 2011. This data consisted of additional rainfall, evaporation and streamflow data for three climate change scenarios representing the tenth percentile,

fiftieth percentile (median) and ninetieth percentile. The results indicate the dam will be highly reliable in providing urban and irrigation water, with reliability being greater than 99 per cent for the monthly and annual provision of urban water. The results indicate that the irrigation water supply is reduced under some climate conditions, with reliability expected to reduce from 96.6 per cent under current climate conditions to 89.3 per cent under the ninetieth percentile climate change conditions. However, this is identified as significantly above other comparable water supply schemes, under a range of climate change conditions.

Due to an extended dry period, the AEIS identified the end of 2007 as the only time that the dam would fail to meet the water supply requirements. However, the model also identified that the dam was above, at or near-full capacity for 55 per cent of the time with potential to fail for less than 1 per cent of the time.

Concern was raised regarding the proposed environmental release strategy and its ability to replicate natural flow regimes and trigger ecological function. The AEIS noted that the extended IQQM model predicts that, on average, the dam spills 46 days per year and the average period between spills is 5 months, with the average spill duration period being 14 days. The AEIS provides further assessment of potential flow changes on the basis of the extended IQQM model. The pre-development and post-development scenarios were compared taking parameters such as flow volumes and gauge depth. The three nominated locations used to facilitate this assessment, were:

- the Severn River downstream of the proposed dam site at Ballandean Gauge, which shows the change to stream flow in the reach downstream of the dam to Accommodation Creek
- the Severn River immediately downstream of the confluence with Accommodation Creek, which shows the changes to stream flow for the Severn River downstream of the Accommodation Creek confluence
- the Dumaresq River at Farnbro, which shows the changes in stream flow in the Sundown National Park.

The change in depth at all of the above locations is predicted to be negligible and therefore unlikely to generate impacts on the water quality of the river and the in-stream ecological requirements. Refer to the ‘Listed threatened species and communities’ section for further information on potential impacts upon on the aquatic ecology.

6.1.3 Coordinator-General’s conclusions

I consider that EIS and AEIS included adequate information to demonstrate that the project is unlikely to adversely impact the community and the Severn River. The proponent is committed to designing the project in accordance with the ANCOLD guidelines to ensure the proposed dam does not fail and adversely affect the community and the surrounding environment.

I consider the environmental release strategy adequate to meet the EFOs and WASOs of the WRP and note that this release strategy will avoid impacts on downstream users and aquatic ecology.

I have made recommendations in Appendix 2 that outline the requirements for subsequent approvals under the Water Act. The proponent should follow the recommendations to obtain the approvals required for the project. Recommended conditions are also provided for an approval required under the *Water Supply (Safety and Reliability) Act 2008.*

6.2 Geology and soils

6.2.1 Existing environment

The dominant geological formation underlying the overall project area (dam, inundation area and the pipelines) is known as the Stanthorpe Adamellite, which consists of high-potassium granites that are resistant to weathering and are tectonically stable. The irrigation pipeline also crosses a section of the Ruby Creek Granites (south-west of the dam) and the Quaternary Alluvium which consists of clay, silt, sand, gravel and flood plain alluvium.

The EIS identified the uniform coarse gritty silicious sands of variable depth to weathered bedrock (granite) as the dominant soil type. The loamy sands occurring predominantly in the inundation and dam area, and uniform coarse sands occurring in the pipeline areas are generally identified as being of low dispersivity, with some level of acidity and low salinity levels. The AEIS identified mottled clayey subsoils (sodic soils) present within patches of the urban and irrigation pipeline areas.

DNRM mapping indicates two faults running through the inundation area and one running north of the Glen Aplin township and across the irrigation pipeline. Preliminary geotechnical investigations of the dam site have not identified faults or known geological structures. The EIS noted that further geotechnical investigations will be undertaken as part of the detailed design stage of the project to confirm if any faults are present.

The EIS reported that the local streams and rivers in the project area are inherently stable and have suffered little erosion because of the regional granite and traprock geologies. There are 26 barriers (e.g. weirs) along the Severn River, starting from the confluence of Quart Pot Creek and the Broadwater to the Nundubbermere Falls in Sundown National Park. These barriers capture some of the granular soils of the river and affect the velocity of the water flow, thereby influencing erosion of the river banks.

6.2.2 Impacts and mitigation measures

The key environmental risks associated with soils are soil erosion and sedimentation; saline/sodic affected runoff; soil dispersion and salinity; wind erosion and dust nuisance. The EIS reported a moderate risk of sediment being removed from exposed surfaces and transported to natural drainage paths within the overall project area. This risk is assessed as high in the case of topsoil stockpiles as there are higher chances of material being moved by wind or rain events when there is excessive loose material stockpiled in close proximity to a natural drainage pathway.

The EIS reported a low risk of soil dispersion or salinity for all soils within the project area. In the case of sodic soils which could be encountered during excavations at a

depth of below 50 centimetres (cm), the risk is assessed as moderate. Sodic soils are more prone to dispersion than other soils due to high levels of sodium.

Public submissions on the EIS raised concerns regarding the accurate representation of the location of sodic soils. In response, the proponent has committed to undertake additional soil surveys to determine the extent of these soils and to facilitate preparation of a soils management plan prior to construction.

Public submissions also raised the concern that high soil permeability in the inundation area could affect the performance of the dam. In the AEIS, the proponent confirmed that the performance of the dam is unlikely to be affected because the soils in this area are granite bedrock of low to moderate permeability. In order to verify this, the proponent has committed to undertake additional testing of the dam wall.

In accordance with the *Best Practice Erosion and Sediment Control* (IECA 2008) a detailed erosion and sediment control management plan will be prepared and implemented prior to construction. This plan will identify control measures necessary to manage erosion and sedimentation during construction and operation of the project. Mitigation measures, including but not limited to, strict control of temporary and permanently exposed areas, appropriate stockpile management and monitoring of major downstream waterways during flow events will verify if impacts from sedimentation, salinity and pH are occurring. Should erosion monitoring results show no significant increase from background levels, then mitigation strategies will be maintained. Should the erosion monitoring results show a significant increase or disturbance to waterways, then the erosion and sediment controls will be reviewed and upgraded appropriately. These management strategies will ultimately ensure that the environmental flow release objectives are met. Refer to the 'Surface water resources' section for further details on the project's environmental flow strategy.

6.2.3 Contaminated land

Contaminated land investigations for the project area, including searches of the Environmental Management Register and Contaminated Land Register, indicated there is no contaminated land, no potential notifiable activities and no potential contamination issues within the proposed dam and buffer areas. However, the EIS indicated potential contamination concerns along the proposed pipeline route, including four service stations and three properties within railway corridors. The EIS stated that possible areas of contamination will be avoided. A qualified contaminated site professional will be present on site to observe and monitor construction activities for potential contaminates. Additionally, the construction occupational health and safety plan will contain procedures for potential worker exposure protection.

6.2.4 Coordinator-General's conclusions

I consider that the EIS and AEIS have sufficiently demonstrated that the geology and soils of the overall project site will be suitable for the proposed project. To further assure the community of the suitability of the soils for the project, I note that the proponent has committed to undertake further testing of the site using pits and trenches across the dam axis to confirm that sound cut-off conditions can be established for the project. Furthermore, the proponent is committed to undertaking

additional soil surveys in order to determine the full extent of sodic soils and additional geotechnical investigations to confirm presence of faults. The relevant commitments are set out in Appendix 4.

6.3 Groundwater

6.3.1 Existing environment

The EIS has identified no major groundwater resources within the project area. Geotechnical drilling conducted along the dam alignment and within the inundation area has encountered groundwater at a depth of 3 m to 12 m below ground level (mBGL). This water is described as fresh to slightly brackish, with acidity levels ranging from slightly acidic to alkaline. A review of the Department of Natural Resources and Water (DNRW) groundwater database records identified groundwater at levels ranging from 1.22 to 34.34 mBGL within 7 km of the inundation area, 6.1 mBGL within 2 km of the urban pipeline and 11 mBGL within 800 m of the irrigation pipeline.

The EIS noted that the Stanthorpe Adamellite and the Ruby Creek Granite geological foundations are likely to host groundwater in joints, weathered zones and small scale defects due to increased permeability. Due to the localised nature of groundwater in the faults, the EIS concluded that there will be no impact on any major groundwater resources.

Six existing groundwater uses have been identified within a 3 km radius of the inundation area and 14 within a 3 km radius of the proposed irrigation pipeline. Of the total 20 bores, 17 are no longer used and the remaining 3 are currently used for stock purposes. However, these bores are not located in vicinity of the dam.

Terrestrial vegetation that is potentially dependent on shallow groundwater has been identified on the outskirts of the Severn River. For a description of potential impacts and corresponding mitigation measures on this vegetation refer to the 'Listed threatened species and communities' section of this report.

Assessment methodology

Groundwater impact assessment has been undertaken on the basis of interpretation of regional geological mapping records published by Bureau of Mineral Resources (1972) together with regional (1:100 000) mapping records published by the Department of Natural Resources and Water (DNRW) and the Geological Survey of Queensland (2005). As part of the preliminary geotechnical investigations, six boreholes and nine test pits were constructed along the dam footprint in 2006. Slug tests were undertaken in the open boreholes to estimate the hydraulic properties of the bedrock.

6.3.2 Impacts and mitigation measures

The construction and operation of the project has potential to impact upon the existing groundwater levels, groundwater quality and surrounding groundwater users.

Groundwater levels and water quality

The geotechnical investigations indicated that the dam wall has the potential to leak water into the surrounding bedrock when water levels in the dam are greater than in the surrounding Stanthorpe Adamellite and Ruby Creek Granite foundations. This may cause localised increase in groundwater levels in the vicinity of the inundation area and to also affect the water quality of the groundwater hosted within the surrounding bedrock.

The EIS reported that these impacts are likely to be negligible, as the surrounding Stanthorpe Adamellite and Ruby Creek Granite are being of low permeability and the absence of a major groundwater resource. To ensure potential impacts are avoided or managed, the proponent is committed to undertaking grouting of the dam foundation and installation of drains to control groundwater pressure and reduce the seepage loss.

The EIS also noted that the groundwater quality impacts are likely to be negligible, as the quality of the surface water stored in the dam and the surrounding groundwater is of a comparable raw water quality. Therefore, any leakage is unlikely to change the existing quality of the surrounding groundwater. Storage of chemicals, fuels and waste during construction will be undertaken in accordance with relevant guidelines, further eliminating potential impacts on groundwater quality.

No impacts on groundwater are anticipated from the pipelines because the trenches that will accommodate the pipelines are shallow.

The project may cause groundwater drawdown as a result of dewatering activities required to enable excavation works for installation of dam wall foundations. Drawdown has potential to affect the water availability for six groundwater users located within 3 km of the inundation area and 14 users located within 3 km of the irrigation pipeline. However, these impacts are likely to be negligible due to the distance of these groundwater bores to the construction site and the fact that the project is also unlikely to affect the groundwater levels and water quality collectively.

The proponent has committed to manage the potential groundwater impacts, monitoring changes in groundwater levels and groundwater quality 12 months prior to construction and during the first 12 months of the dam operations. Groundwater quality monitoring will also be undertaken on a quarterly basis, monitoring for pH, conductivity, dissolved oxygen (DO), REDOX potential and temperature. If any significant change to groundwater levels or quality occurs, the works may temporarily cease and a more detailed and targeted groundwater quality monitoring program will be introduced.

Drilling and construction required for the installation of groundwater monitoring bores will be undertaken in accordance with the Minimum Construction Requirements for Water Bores in Australia (ARMCANZ, 2003). Bores installed to a depth of greater than 6 mBGL will be registered with DNRW in accordance with the provisions of the Water Act.

6.3.3 Coordinator-General's conclusions

I consider that the proponent has provided sufficient information in the EIS and AEIS to demonstrate that the project is unlikely to affect the groundwater quality and groundwater users surrounding the project area. To further assure the community, the

proponent has committed to implement a groundwater monitoring program during construction and operation to monitor and respond to changes in groundwater levels and groundwater quality.

6.4 Water quality

6.4.1 Existing environment

The existing surface water quality is indicative of a slightly to moderately disturbed ecosystem, affected by surrounding agricultural development, land clearing, grazing and historic tin mining. For majority of the parameters, water quality generally complies with the water quality objectives (WQO) of the *Queensland Water Quality Guidelines* (QWQG)[1] and the ANZECC/ARMCANZ Guidelines.[2] Due to the surrounding agricultural land uses, runoff and geological nature of the area, there are some non-compliances in terms of nutrient (phosphorus and nitrogen), some physicochemical parameters (aluminium, zinc and copper) and DO concentrations.

The EIS reported that no testing of human health parameters such as bacteria and blue-green algae were undertaken. Given that the Severn River is an ephemeral[3] water body with no standing waters (apart from the existing weirs located downstream of the dam) there is little or no ability for blue green algae to develop. Furthermore, the EIS also noted that no blooms of blue-green algae have been reported at the SKD which is located within the same catchment as the proposed dam.

The EIS reported that of the four herbicides analysed, diuron was the only herbicide reported to be in high concentrations. However it does not exceed the health-based guideline values.

The *Australian Drinking Water Guidelines*[4] (ADWG) address the microbial limits, the physical and chemical requirements and the radiological limits of drinking water. The water in the proposed dam will be pumped to the existing Mt Marlay Water Treatment Plant, for treatment as potable water. The requirements for designing a rigorous water quality monitoring program, with suitable levels of quality control are also stipulated in the ADWG and were considered in the preparation of the EIS. Operational water quality parameters related to organic carbon and colour are also identified in the ADWG.

Water samples were taken at 17 locations as part of the Stanthorpe Water Assessment and Monitoring Project (SWAMP) (monthly basis from 2005 to 2007) and a one-off program undertaken from November to December 2006 and April 2007. The AEIS also

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[1] Department of Environment and Heritage Protection 2009, *Queensland Water Quality Guidelines*, Version 3, July 2013. Viewed on 24 July 2014.
[2] Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand 2000, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Volume 1*. Viewed on 24July 2014.
[3] Australian Government, National Health and Medical Research Council and Natural resource Management Ministerial Council 2011, *Australian Drinking Water Guidelines 6.* Version 2.0 Updated December 2013. Viewed on 24 July 2014, https://www.nhmrc.gov.au/_files_nhmrc/publications/attachments/eh52_aust_drinking_water_guidelines_update_131216.pdf

provided further water quality data—one set during a drought in 2006–07 and one set between 2008 and 2012 to identify water quality during non-drought conditions.

Water samples were taken from the adjacent catchment, upstream and downstream of the proposed dam. The data was evaluated against the WQOs set out in the ANZECC/ARMCANZ and the QWGQ. Usually this data is reviewed against the WQOs identified in the Environmental Protection (Water) Policy 2009 (EPP (Water)), however the EPP (Water) does not list WQOs for the Severn River or the Murray Darling Basin, within which the river is located. As a result, the EIS assessment defaulted to the WQOs set out in the ANZECC/ARMCANZ.

Additional herbicide and insecticide data was provided as part of the AEIS. This data was collected between 2008 and 2010 at Quart Port Creek, upstream and downstream of Stanthorpe, and represents an area upstream of the dam during a period of increased runoff (i.e. non-drought conditions).

6.4.2 Impacts and mitigation measures

A range of construction and operation-related activities could impact upon the existing water quality conditions. The impacts of constructing the dam are primarily associated with the increase of sedimentation and erosion process. This may be caused by establishing the temporary water storage in the impoundment area; construction of the coffer dam; excavation of the upper bedrock along the footprint of the dam and construction of ancillary infrastructure such as access roads, hardstand areas for offices and car parking.

Contamination of water may also occur as a result of increased risk of chemical, concrete, and tarmac spills into the river during construction and site establishment. Establishing the urban and irrigation pipelines may cause excessive erosion, sediment runoff and water contamination through vegetation clearing activities, pipe delivery and stringing, construction of pump stations, valve chambers and other parts of the dam infrastructure.

The impacts of the dam wall and spillway are mainly related to the potential reduction of water flow at the dam site. This may reduce the degree of water mixing in the water column, therefore reducing the temperature and levels of DO which could increase the potential for growth of algal blooms. The change in water flow may also affect water quality conditions by affecting the amount of water in the catchment, the degree of mixing and sedimentation processes.

The proponent has committed to implement a range of mitigation measures to manage construction and operational impacts of the project on water quality. The key mitigation measures include the implementation of an erosion and sediment control management plan (ESCP) and monitoring water quality during construction and operation.

A 200-metre-wide vegetated buffer will be established around the dam for the purposes of protecting water quality within the dam. This buffer will delay surface runoff by acting as a sink for nutrients and minimising potential nutrient and sediment runoff. Sediment ponds and flocculants will also be utilised to effectively capture and treat stormwater prior to being discharged into the river. Bunding and appropriate storage of chemicals and hazardous goods will also be undertaken.

The construction water quality monitoring will involve a routine water quality monitoring program (every second month with four event-based occasions per year when inflows exceed 30 ML/d) upstream and downstream of the construction works for parameters such as temperature, pH, turbidity, nuisance algae, DO and others. Water quality monitoring will also be undertaken during the operations of the dam—monitoring parameters such as temperature, pH, turbidity, colour, organic carbon, nuisance algae, chlorophyll-a, herbicides, DO, phosphorus and others.

A fixed water quality meter with a data logger will be installed at the outlet pipe, which will ensure that water sourced by the Mt Marlay Water Treatment Plant is of satisfactory quality throughout the life of the dam.

Site-specific water quality guidelines will be established for upstream and downstream locations which will allow for water quality compliance to be undertaken during the construction and operation of the dam.

Concerns about the risk of cumulative water quality impacts from increased urban, industrial, other non-residential uses and agricultural runoff were raised during the EIS. To monitor occurrence of any contaminant accumulation within the system and enable a more targeted approach for managing responsible sources in the catchment, the proponent has committed to annually assess biota and sediments within, and downstream of Emu Swamp Dam for a standard set of heavy metals (including methyl-mercury) and a broad pesticide screen including herbicides, insecticides, and fungicides for comparison to relevant guideline documents (e.g. ANZECC 2000 and QWQG 2009). The proponent has also proposes to monitor fish, bivalves and sediment at the deepest point within the dam and at one site downstream (<2 km from the dam wall) annually for the life of the monitoring program.

6.4.3 Coordinator-General's conclusions

I consider that the proponent has provided sufficient information in the EIS and AEIS to demonstrate that the water quality of Severn River will not be adversely affected. The proponent is committed to establishing site-specific water quality guidelines and to monitoring water quality before, during and after construction in both the dam and the pipeline outlet point to ensure sufficient time to respond to changes in water quality.

6.5 Matters of state environmental significance

This section of the report provides an assessment of matters of state environmental significance (MSES) that may be impacted by the project.

For coordinated projects, the Coordinator-General has the powers necessary to decide state offsets as part of the broad conditioning powers under the SDPWO Act. While I will take advice from state agencies on offsets for the project and consider the Queensland environmental offsets framework and provision of the *Environmental Offsets Act 2014,* I will determine and approve any state offsets for significant residual impacts that are considered necessary over and above Australian Government requirements. I will not require any additional offsets for impacts on MSES if the Australian Government required an offset for the same values. The following sections of my report outline the residual impacts to MSES.

6.5.1 Protected wildlife habitat

Protected plants

Desktop studies and field surveys recorded a detailed flora inventory of the site. Thirty-eight flora species listed in the Queensland Nature Conservation (Wildlife) Regulation 2006 are identified as potentially occurring within the project area. The EIS indicated that 13 of these flora species have been previously recorded in the project area. These species are provided in Table 6.1.

Table 6.1 Flora species identified by HERBRECS and Wildnet database searches

Common name Species name	NC Act status	EPBC Act status
Velvet wattle *Acacia pubifolia*	Vulnerable	Vulnerable
Bertya glandulosa	Vulnerable	Not listed
Granite boronia *Boronia granitica*	Endangered	Endangered
Repand boronia *Boronia repanda*	Endangered	Endangered
Diuris parvipetala	Vulnerable	Not listed
Hairy hop-bush *Dodonaea hirsute*	Vulnerable	Not listed
Wallangarra white gum *Ecalyptus scoparia*	Vulnerable	Vulnerable
Black grevillia *Grevillia scortechinii*	Vulnerable	Vulnerable
Mountain mouse bush *Homoranthus montanus*	Vulnerable	Vulnerable
Green bottlebrush *Melaleuca flavovirens*	Near threatened	Not listed
Prickly bottlebrush *Melaleuca williamsii*	Vulnerable	Vulnerable under the EPBC Act for its listing as *Callistemon pungens*
Rusty desert phebalium *Phebalium glanulosum* subsp. *Elgandilosum*	Vulnerable	Vulnerable
Long-tailed green hood *Pterostylis woollsii*	Near threatened	Not listed

Ground-truthing flora surveys undertaken for the EIS identified seven flora species within the project area, including six of the species listed in Table 6.1. These species include:

- black grevillea (*Grevillea scortechinii subsp. scortechinii*)
- greater rock lily (*Thelionema grande*) (listed as near threatened under NC Act)

- green bottlebrush (*Melaleuca flavovirens*) (listed as near threatened under NC Act)
- *Mirbelia confertiflora* (listed as near threatened under NC Act)
- prickly bottlebrush (*Melaleuca williamsii* syn. *Callistemon pungens*)
- repand boronia (*Boronia repanda*)
- velvet wattle (*Acacia pubifolia*).

The black grevillea, prickly bottlebrush, repand boronia and the velvet wattle are assessed detail in the Listed threatened species and communities' section . The assessment provided in the MNES chapter indicated that the project would not have an unacceptable impact on these species. Impacts on black grevillea, repand boronia and the velvet wattle could be adequately avoided through pipeline alignment design and mitigated by revegetating the buffer area. The assessment also indicated that the significant residual impacts on the prickly bottlebrush could be adequately offset through the proposed offset strategy.

Impacts on *Mirbelia confertiflora* would also be avoided by through the design of the pipeline alignment. The residual impact on *Melaleuca flavovirens* and *Thelionema grande* after mitigation of the buffer area is seven and five individual plants respectively. Under the Queensland Offsets Regulation 2014 there is no requirement to offset these species as they are listed as near threatened.

Impacts to the *Melaleuca flavovirens* and *Thelionema grande* would be mitigated by translocating or propagating these species into the buffer area. The residual impact after mitigation is seven *Melaleuca flavovirens* and five *Thelionema grande*. Both species are listed as near threatened under the NC Act. Under the Queensland Offsets Regulation 2014 is no requirement to offset residual impacts on these species.

Protected animals (terrestrial)

Fauna surveys identified 187 species of terrestrial fauna. The conservation significant fauna species that were identified during field surveys are provided in Table 6.2.

Table 6.2 Protected fauna species identified within the project area

Common name Species name	NC Act status	EPBC Act status
Mammals		
Large-eared pied bat *Chalinolobus dwyeri*	Vulnerable	Vulnerable
Spotted-tailed quoll *Dasyurus maculatus maculatus* (southeastern mainland population)	Vulnerable	Endangered
Short beaked echidna *Tachyglossus aculeata*	Special least concern	Not listed
Koala *Phascolarctos cinereus*	Special least concern, Vulnerable (south-east Queensland bioregion)	Vulnerable (combined populations of Qld, NSW and the ACT)
Birds		

Turquoise parrot *Neophema pulchella*	Near threatened	Not listed
Square-tailed kite *Lophoictinia isura*	Near threatened	Not listed
Reptiles		
Granite-belt thick-tailed gecko *Uvidicolus sphyrurus*	Listed as near threatened for its listing as *Nephrurus sphyrurus*	Listed as Vulnerable for its listing as *Uvidicolus sphyrurus*

The granite belt thick-tailed gecko, large-eared pied bat and spotted tail quoll are also listed as threatened species under the EPBC Act and are covered in detail in the MNES section of this report. The assessment provided in that chapter indicated that the project would not have an unacceptable impact on these species. Impacts on the large-eared pied bat and spotted-tail quoll could be adequately mitigated by revegetating the buffer area. The significant residual impacts on the granite belt thick-tailed gecko could be adequately offset through the proposed offset strategy.

Koala

The project is not expected to have a residual impact on this species.

Suitable koala habitat was identified within the FSL area and one koala was heard calling at the survey site in this area. The project is located in the New England Tableland bioregion. Koalas in this region are not listed as vulnerable; however, are listed as a special least-concern animal section 34(3)(a) of the Nature Conservation (Wildlife) Regulation 2006. The SDRC local government area is described in Schedule 1, section 2 of the Nature Conservation (Koala) Conservation Plan 2006 as a 'koala district C' wildlife district. Koalas within this district are classified as least concern species due to a generally lower perceived threat to their survival.

The project is expected to result in the loss of 78.75 ha of suitable koala habitat within the FSL and pipeline footprint. The vegetation proposed to be cleared within the FSL and pipeline construction corridor is not considered to be primary koala habitat.

The loss of suitable koala habitat in the project area would be mitigated through the proposed revegetation of the buffer area which would involve planting koala food tree species. The EIS indicated there would not be any residual impact on this species after enhancing the buffer area.

Whilst the project site is not within a koala district A or B, the proponent has proposed to undertake clearing works in accordance with sequential clearing provisions of the Nature Conservation (Koala) Conservation Plan 2006 and to use a koala spotter during these works. These measures would assist in reducing injuries to koalas during construction. Impacts to the koala would be also reduced by programming the construction period to avoid the koala birthing season between December and January and by providing signage to reduce vehicle speeds on construction access roads. Impacts on the koala in this area would also be mitigated through pest management strategies which including the management of feral dogs.

Short-beaked echidna

The project is not expected to have a residual impact on this species.

A short-beaked echidna was incidentally observed on Cannon Creek Road as road kill along the proposed irrigation pipeline route during the 2006 surveys. The echidna is listed as a special least concern animal under section 34(3)(b) of the Nature Conservation (Wildlife) Regulation 2006.

The EIS indicated that the project would impact on 155.38 ha of potential habitat for this species. This impact would be mitigated by rehabilitating the buffer area.

Turquoise parrot

The project is not expected to have a residual impact on this species.

The turquoise parrot is listed as near threatened under Schedule 5 of the Nature Conservation (Wildlife) Regulation 2006. Field surveys identified suitable sheltering, foraging and breeding habitat for this species within the inundation area and pipeline footprints.

The project would be expected to result in the loss of 111 ha of suitable habitat within the inundation area and pipeline footprint. Impacts would be mitigated by rehabilitating habitat in the buffer area and along the pipeline corridors. Impacts on this species would also be mitigated during construction by implementing measures to reduce injury to animals during vegetation clearing works and by retaining suitable habitat features including hollow bearing trees.

Square-tailed kite

The project is not expected to have a residual impact on this species.

The square-tailed kite is listed as near threatened under Schedule 5 of the Nature Conservation (Wildlife) Regulation 2006. Field surveys identified one individual in the project area.

The project would be expected to result in the loss of 111 ha of suitable habitat within the inundation area and pipeline footprint. Impacts would be mitigated by rehabilitating habitat in the buffer area and along the pipeline corridors.

Protected animals (aquatic)

Aquatic field surveys were undertaken for the EIS during late spring 2006 and early autumn 2007. These surveys were undertaken at 10 sites upstream, within and downstream of the proposed dam site. Two of these sites were outside of the area directly impacted by the development and included a site at Bald Rock Creek and another at Accommodation Creek.

Additional aquatic surveys were undertaken from 9 to 15 September 2013. Surveys were undertaken across 13 sites within proposed dam site as well as upstream anddownstream of the proposed dam site.

One protected aquatic fauna species, the platypus, was recorded during surveys. The platypus is listed as a special least concern species under the Nature Conservation

(Wildlife) Regulation 2006. Three individuals were recorded during the 2013 surveys including two individuals downstream and one upstream.

The proponent has clarified that no platypus burrows were identified in the proposed inundation area during aquatic field surveys and that the existing weirs in this area would restrict the passage of platypus (except during periods of high flow).

The loss of 4.5 km of riverine habitat was addressed during the EIS process. The area is potentially used by platypus for foraging habitat. It is considered that this may require an offset. I have conditioned the proponent to prepare and submit an offset plan prior to construction to address any significant residual impacts on protected wildlife habitat, including platypus habitat.

As environmental flows are to be maintained during the operation of the dam, I consider that the proposed dam is not expected to adversely impact on flow regimes in the Severn River and therefore would not impact on downstream platypus habitat

I consider that the dam is not expected to act as a barrier to passage for this species, provided that the proposed fishway is designed to accommodate its passage. I have conditioned the proponent to ensure that requirements of other aquatic fauna are considered during the fish passage design and implementation process.

I also consider that the project would not have any indirect impacts on platypus and other aquatic species, provided that adequate measures are undertaken during the construction and operational stages to ensure no adverse impacts on water quality.

6.5.2 Regulated vegetation

Regional ecosystems

RE mapping identified six 'endangered' and one 'of concern' RE types within the inundation area and pipeline easements. These REs are provided in Table 6.3.

Table 6.3 Residual impacts on endangered and of concern regional ecosystems

RE	VM Act status	Total area of residual impact (ha)	Overlap with box-gum grassy woodland TEC?
13.3.1	Endangered	26.35	Y
13.3.1x1	Endangered	20.5	N
13.12.8	Endangered	0	Y
13.12.9	Endangered	52.74	Y (6.5 ha not overlapping)
13.12.9/13.12.8	Endangered	0	Y
13.12.6	Of concern	4.67	N

Approximately 72.29 ha of the 'endangered' REs (REs 13.3.1 and 13.12.9) overlap with the EPBC Act listed TEC (box-gum grassy woodland) and therefore the residual impacts on these REs would be covered by the offset for this ecological community.

The remaining 27.7 ha of 'endangered' REs (20.5 ha of 13.3.1x1, 0.7 ha of 13.3.1 and 6.5 ha of 13.12.9) and 4.66 ha of the 'of concern' REs (RE 13.12.6) not overlapping with the EPBC Act listed TEC (box-gum grassy woodland) would be partially mitigated

following enhancement of the buffer area. The residual impact after the mitigation of the buffer would be 19.8 ha of 'endangered' RE 13.3.1x1 and 2.8 ha of 'of concern' RE 13.12.6. This is likely to be a significant residual impact and would be considered a significant residual impact under the current Queensland Government *Environmental Offsets Policy Draft Significant Impact Guidelines 2014* and require an offset.

Watercourse vegetation

Wetland mapping indicates that the project area contains a wetland of high ecological significance on a map of referable wetlands (HES wetland). This HES wetland is based on the presence of REs 13.3.1 and 13.3.1x1 (a sub-unit of 13.3.1) which include vegetation on alluvial plains (riverine sediment) and riverine or fringing riverine wetland vegetation.

While 13.3.1 is a component of the EPBC Act listed TEC (box-gum grassy woodland), the sub-unit 13.3.1x1 is not. RE 13.3.1x1 would therefore not be covered offset requirements for box-gum grassy woodland. As 13.3.1 and 13.3.1x1 make up the HES wetland, they would need to be considered unseparated. The residual impact on the HES wetland would be 45.44 ha. This may constitute a significant residual impact and require an offset.

Essential habitat

The project area also includes essential habitat for three species of flora listed under the *Nature Conservation Act 1992* which are provided in Table 6.4. The residual impact on essential habitat after mitigation of the buffer area is 14.20 ha of essential habitat for *Bertya recurvata*. This may be considered a significant residual impact and would therefore require offsetting.

Table 6.4 Residual impact on essential habitat

Common name Species name	NC Act status	Area impacted (ha)	Mitigation in buffer area (associated with REs that are mandatory habitat factors for these species	Residual impact (ha)
Bertya recurvata	Endangered	65	13.5 ha RE 13.12.2 1.9 ha RE 13.12.6 28.76 ha RE 13.12.8 6.64 RE 13.12.9	14.20
Granite boronia *Boronia granitica*	Endangered	10	13.5 ha RE 13.12.2 1.9 ha RE 13.12.6	None
Mountain mouse bush *Homoranthus montanus*	Vulnerable	27	13.5 ha RE 13.12.2 30.6 ha RE 13.12.5 1.9 ha RE 13.12.6	None

6.5.3 Connectivity areas

The proponent's Biodiversity Offset Strategy for Emu Swamp Dam indicates that the impacts on connectivity would be adequately mitigated through the rehabilitation of the buffer area in addition to the proposed adjacent offset sites for the EPBC Act listed TEC (box-gum grassy woodland). Whilst connectivity would be maintained for the TEC, there would be a loss of ecosystem function for the riverine component of this corridor. This may therefore be considered a significant residual impact which would require offsetting. This offset requirement could be potentially co-located with offsets for the HES wetland and protected wildlife habitat (platypus).

6.5.4 Fish passage

Construction

During construction, the site would represent a barrier to aquatic fauna. The obstruction of flow and passage would be mitigated through the use of a diversion channel to connect the river upstream and downstream of the construction site. The river would be first routed around the right abutment works and then diverted through a conduit until all the other works have been completed.

Works would include temporary stream diversions and the construction of coffer dams and temporary ponds to trap runoff water. These structures may temporarily block movement of or entrap aquatic fauna. Entrapment of aquatic fauna would be reduced by progressing works in a single direction, which would provide an opportunity for aquatic fauna to move from the works area. In the event that any aquatic fauna become trapped during these works, it would be appropriately relocated. Translocation of fish species would be undertaken in accordance with the DAFF Fish Salvage Guidelines.

Where the pipeline infrastructure crosses watercourses, the proponent has undertaken to install this infrastructure without disrupting flows and fish passage and to minimise disturbances to riparian and watercourse habitat.

Operation

The proposed dam wall would act as a barrier to aquatic fauna (e.g. fish, platypus, turtles) without the provision of passage devices. The dam design would include passage devices to maintain the passage of aquatic fauna up- and downstream of the dam.

The proponent committed to design the fishway in consultation with DAFF and biologists with experience in fishway design. The design would allow for fish to exit via two upstream exit channels and would reflect the ecology and swimming ability of the various aquatic fauna in the Severn River. The proponent has committed to prepare a detailed operating manual for the fishway, including all contingency plans. The operation manual would be included with the application for constructing the waterway barrier works (refer Appendix 4).

Safe downstream passage over the spillway would also be provided through a cut-in, within the dam crest. The spillway design would also include features (plunge pool and smooth spillway) to minimise injury and mortality of fish passing over the spillway

during increased flows. The proponent has committed to construct a plunge pool that is the same width of the spillway and to consult with DAFF and DEHP on the plunge pool depth and length.

I have conditioned the proponent to maintain adequate fish passage during the construction and operation of the project and to design the fish passage device in consultation with DAFF.

The concept design of the dam would also include design features that enable passage of turtles and other aquatic fauna such as platypus.

6.5.5 Weeds and animal pests

Weeds

Forty-nine exotic plant species were recorded in the project area during field surveys. This included six declared plants and four weeds of national significance. These are listed in Table 6.5.

Table 6.5 Declared plants and weeds of national significance recorded in the project area

Common name Species name	Classification under the *Land Protection (Pests and Stock Route Management) Act 2002*	Weed of national significance?
Mother of Millions *Bryophyllum sp*	Class 2	No
Small leaved Privet *Ligustrum sinense*	Class 3	No
Large leaved Privet *Ligustrum lucidum*	Class 3	No
Prickly Pear *Opuntia stricta*	Class 2	Yes
Blackberry *Rubus fruticosus agg.*	Not declared	Yes
Willow *Salix sp.*	Class 3	Yes
Fireweed *Senecio Madagascariensis*	Class 2	Yes

Other weed species identified in the project area that are of particular concern include the Japanese honey suckle (*Lonicera japonica*) and blackberry (*Rubus anglocandicans*) and African lovegrass (*Eragrostis curvula*).

Pest animals (terrestrial)

Four declared pest animals were recorded in the project are during field surveys undertaken for the EIS. These species are provided in Table 6.6.

Table 6.6 Declared pest animals recorded in the project area

Common name *i. Species name*	Classification under the *Land Protection (Pests and Stock Route Management) Act 2002*
Dog, other than a domestic dog *Canis lupis*	Class 2
European rabbit *Oryctolagus cuniculus*	Class 2
Feral pig *Sus scrofa*	Class 2
European red fox *Vulpes vulpes*	Class 2

Under section 77 of the *Land Protection (Pests and Stock Route Management) Act 2002*, landowners are required to ensure that land is kept free of Class 2 pests.

The proponent would manage weeds and pest animals within the buffer area and offset areas to ensure that the integrity of these areas is maintained. The proponent has committed to keep the proposed sites free of invasive weeds and pest animals in accordance with a weed management plan and vertebrate pest management plan (refer Appendix 4).

Pest animals (aquatic)

Seven species of fish were recorded across the aquatic surveys undertaken in 2006 and 2013, including five native and two exotic/noxious species. Fish communities observed within the project area reflected a low diversity and abundance of species and low rates of recruitment.

Mosquito fish (*Gambusia holbrooki*) which is declared a noxious fish under the Queensland Fisheries Regulation 2008 were abundant and widespread throughout the project area.

The proponent has committed to prepare a management plan to control exotic and pest fish species such as mosquito fish and goldfish within and downstream of the dam (refer Appendix 4).

I consider that weeds and pest animal species can be adequately managed.

6.5.6 Coordinator-General's conclusions

State offsets

I am satisfied that the buffer area surrounding the proposed dam would be enhanced to reduce the final significant residual impacts resulting from the project.

In addition to the offset requirements set out in the 'Evaluation of matters of national environmental significance' section of this report, which includes requirements to offset REs 13.3.1 and 13.12.9, additional offsets are likely to be required for RE 13.3.1 and 13.3.1x1 with regard to the HES wetland component of these REs.

Through detailed design, the proponent will finalise the offset plan and confirm any significant residual impacts to fish passage, protected wildlife habitat, connectivity of environmentally sensitive areas, essential habitat and high ecologically significant wetlands in the impacted area. This may involve further survey work for protected plants in accordance with the requirements of the NC Act and its regulations. The proponent may investigate opportunities to co-locate offsets where values overlap

I have imposed conditions requiring the proponent to prepare and submit an offset plan for approval prior to construction or impact on the values requiring offset. This would occur following the Commonwealth Minister for the Environment's decision on the MNES offsets plan.

6.6 Construction impacts

6.6.1 Air quality

Existing environment

Eight sensitive receptors are located near the project area; the nearest being approximately 100 m from the construction site. The EIS stated that the air quality in the local area is influenced by motor vehicle emissions from major roads; agricultural activity such as dust from cultivation and harvesting; smoke from domestic wood heaters; occasional bushfires and control burns; and regional windblown dust from dry inland areas.

Potential impacts and mitigation measures

The project has the potential to impact on air quality surrounding the project site through dust and particulate matter generated during the 18 months of construction.

During construction of the dam wall, dust will have the greatest potential to affect sensitive receptors. Excavation activities, blasting and wheel-generated dust from haul roads would be the primary contributors to dust. The proponent has committed to water haul roads and stockpiles, impose a 40 km/hr speed limit on haul roads, and minimise the size of cleared areas to control dust emissions. Blasting would only be undertaken only when favourable meteorological conditions are present—work would cease if high winds are blowing in the direction of sensitive receptors.

Dust emissions generated during construction would not be expected to cause nuisance to the nearest sensitive receptors if the mitigation measures are implemented.

Air quality mitigation measures for the project have been outlined in the project's Environmental Management Plan (EM plan). In addition, the EIS indicated the proponent would notify the community of proposed activity prior to undertaking dust-generating works and would provide a single point of contact for complaint handling.

Air quality impacts would occur along the pipeline route when the pipes are laid. The distance to sensitive receptors along the pipeline route is moderately large (greater than 500 m) except for two areas where the distance is approximately 30 m. The mitigation measures outlined above would be applied to the construction of the

pipeline, and the construction contractor (as part of subsequent approvals) would be required to prepare and implement air quality management plans.

Coordinator-General's conclusions

Further approvals will be required for ERAs under the EP Act. Additional air quality management plans for the construction of the pipeline will need to be submitted to council for approval.

Based on the temporary nature of impacts, the mitigation measures and approvals required for project activities that impact on air quality (ERA), I am satisfied that air quality impacts would be minimal and appropriately managed.

I am satisfied that air quality impacts generated by the project would be minimised, allowing the development to operate within the parameters set by the EPP (Air).

I have included conditions regulating the ERAs that are set out in Appendix 2 (Schedule 4).

6.6.2 Noise and vibration

Existing environment

There are eight sensitive receptors within 1 km of the dam wall construction site, and the nearest is approximately 100 m away. The distance to sensitive receptors along the pipeline route is typically large (greater than 500 m), except for two areas where distance is approximately 30 m.

As the project is located in a rural area, noise could be audible at sensitive receptors, even though noise levels would comply with the goals set out in the Environmental Protection (Noise) Policy (EPP(Noise)).

Potential impacts and mitigation measures

The main sources of construction noise would be equipment used to construct the dam wall, hauling quarried material to the dam site, preparing the site, constructing pipelines and blasting.

Construction noise levels would comply with the noise criteria set by the EPP (Noise) during the daytime. However, noise levels during night-time construction would exceed the sleep disturbance criteria set by the EPP (Noise) at the two closest sensitive receptors. At all other sensitive receptors, the predicted noise levels are estimated to comply with the noise goals outlined in the EPP (Noise).

The proponent committed to implement acoustic treatment to affected sensitive receptors to comply with the sleep disturbance criteria. If construction noise causes nuisance, the proponent would temporarily relocate the affected residents. The proponent will maximise the distance between sensitive receptors and construction operations such as noisy plants, generators, compressors and crushers to mitigate noise. Furthermore purpose-built barriers, acoustic enclosures or noise screens would be built to reduce the noise impact to sensitive receptors.

Monitoring and review of site noise management practices would be undertaken during construction to assess the effectiveness of mitigation measures. Additional noise impact mitigation measures are outlined in the project's EM Plan.

Vibration associated with project construction will not impact sensitive receptors due to their relatively large distance from the project site. The proponent committed to monitor vibration during construction to confirm this conclusion.

Two areas of the pipeline are within 30 m of sensitive receptors. The EIS stated that the mitigation measures used for the dam wall construction would also be incorporated into the construction of the pipelines. Additionally, the EIS stated that noise impacts associated with the pipeline construction would be short-term, as the construction moves along the pipeline route. The proponent has committed to assess noise impacts because the pipeline construction would be undertaken in parallel with the dam wall construction.

Blasting for the dam and pipelines would only be undertaken during the day, totalling three blasts per week, with the nearest sensitive receptor approximately 500 m away from the blast. The construction contractor will undertake pre- and post-condition surveys for all properties within 1 km of the dam construction site.

Blasting must comply with the vibration goals set in the EM Plan (refer to Table 6.7) and a detailed management plan will be implemented, compliant with AS 2187 *Explosives-Storage and Use Part 2: Use of explosives.* Monitoring would be undertaken at sensitive receptors to ensure compliance with the noise and vibration goals set out in the AEIS and a letter drop will notify sensitive receptors within a 1 km radius of the blasting activities for that week.

Table 6.7 Construction noise and vibration goals for the project

Project goals	Time period		
	Day (7 am – 6 pm)	Evening (6–10 pm)	Night (10 pm – 7 am)
Construction noise	$L_{Aeq, 1hr}$ 50 dB (A)	$L_{Aeq, 1hr}$ 50 dB (A)	$L_{Amax, 1hr}$ 52 dB (A) $L_{Aeq, 1hr}$ 37 dB (A)
Construction blasting (daytime only)			
Noise/overpressure	115 dB Lin Pk (9/10) 120 dB link Pk	N/A	N/A
Vibration	5 mm/s PPV (9/10) 10 mm/s PPV (Max)	N/A	N/A

The operation of the project also has the potential to create noise, mainly from pumping stations and the proposed recreation area.

Noise generated by the pumping station would be relatively low (below 75 dB at 1 m). Pumping stations can be enclosed to decrease noise levels, and the proposed pumping stations would be designed to comply with the low frequency noise criteria as set out in the *Assessment of Low Frequency Noise Guidelines (draft)* and a noise level of $L_{Aeq, 1 hour}$ 30 dB at sensitive receptors.

Additional detailed designs for the pipeline pumping stations would be required and would include the operational noise levels goals as part of further investigations once the pumping stations sites have been finalised and are operational.

Management procedures will be implemented to mitigate noise impacts generated in the recreation area and incorporated into the operational EM plan for the recreation area.

Coordinator-General's conclusions

Assessment of the noise impacts associated with the project was based on the acoustic quality objectives set out in EPP (Noise).

I note that a detailed assessment of noise levels would be undertaken once contractors have been commissioned as part of the subsequent ERA application process. Where ERAs are proposed, a detailed noise impact assessment is required. Additionally the proponent has committed to a noise impact assessment for the pump station sites, once the sites have been finalised. I require the proponent to comply with the noise conditions recommended for the EA.

I will require the proponent to undertake pre- and post-condition surveys for affected properties along the pipeline route and around the dam.

I am satisfied that the proponent's commitments and mitigation measures outlined in the project's EIS and EM Plan are adequate to mitigate the impacts of noise associated with both daytime and night-time works, and I also note the proponent's commitment to temporarily relocate affected persons impacted by noise level exceedences.

6.6.3 Transport and infrastructure

Existing local and state roads

The dam site connects to the New England Highway via Fletcher Road. Fletcher Road is a local government road and the New England Highway is a state-controlled road. The urban pipeline will be located within the New England Highway, a number of local government roads and across private properties. The northern section of the irrigation pipeline will be located within the New England Highway, Aerodrome Road, Ellwood Road, Church Road, and Amiens Road, all of which are local government roads. The western section of the irrigation pipeline will be located within the state-controlled road of Texas–Stanthorpe Road and the local government roads of Cannon Creek Road and Bapaume Roads.

Construction vehicles would access the dam site and urban pipeline construction site via Fletcher Road. Back Creek Road will be used to provide access for vehicles for the construction of the irrigation pipeline.

Construction

A mix of private vehicles, car-pooling and buses is proposed to convey the workers to the site. The peak average daily traffic volume is 210 vehicles. Workers are expected to travel from Stanthorpe (90 per cent) and south of the site (10 per cent).

Materials for the dam site and the pipeline will be sourced mainly from Brisbane. An average daily traffic volume of 22 vehicles comprising semi-trailers and B-doubles less than 19 m in length and 12 t trucks. The modelling to provide these estimates included construction and service vehicles.Five temporary construction sites will be used to store and assemble pipes, construction machinery and equipment and ancillary uses associated with the fabrication.

Impacts and mitigation measures

The projected increase in light vehicle and heavy vehicle traffic for a period of 64 weeks will not have a significant impact on the existing traffic operations on the roads surrounding the project area.

The following intersections would be affected by the project: New England Highway/Fletcher Road; Back Creek Road; Amiens Road; Aerodrome Road; Ellwood Road. Fletcher Road will require safety improvements and accessibility measures as part of the Traffic/Transportation Management Plan. These measures include improving sightline visibility, alteration of pavement markings, the length of a right hand turning slot, and information control devices which inform drivers of the presence of heavy vehicles and construction traffic.

The proponent has committed to prepare the Traffic/Transportation Management Plan and submit it to the DTMR Warwick office before submitting relevant operational works applications to council.

Roadworks will be required to upgrade Fletcher Road and the New England Highway prior to the design stage of the project. A Road Impact Assessment, Road-Use Management Plan and Pavement Impact Assessment will be undertaken in consultation with the DTMR.

Coordinator-General's conclusions

I am satisfied the project's transport or infrastructure impacts would be managed.

I am satisfied with the proposed upgrades to the Fletcher Road and New England highway intersection prior to commencement of construction and I note the proponent is committed to preparing and submitting a Traffic/Transportation Management Plan to DTMR before submitting relevant operational works applications. I have set recommendations that outline the requirements for subsequent approvals in Appendix 2. I expect the proponent to follow these to obtain those approvals.

I also note the proponent has committed to fund any new infrastructure and the relocation of infrastructure required by the project.

6.7 Cultural heritage

6.7.1 Non-Indigenous cultural heritage

Review of cultural heritage registers and site surveys of the inundation area were completed for the EIS and AEIS. There are possibly items of historical value within the project area and the EIS recommended further investigations and surveys be undertaken. The EIS stated that all sites would be recorded and where relevant

artefacts are located, they would be relocated to the Stanthorpe Historical Museum. A historic grave identified during surveys would either be left in place, the headstone relocated or the entire grave relocated.

The proponent has committed to obtaining advice from the relevant State or Commonwealth agency to protect the cultural heritage place, item or areas within the project site.

6.7.2 Indigenous cultural heritage

An aboriginal archaeological survey of the dam site, the inundation area, buffer area and the urban water supply pipeline route was undertaken in 2007. Traditional owners participated in the survey, results and recommendations. The 102 km corridor for the irrigation pipeline was not surveyed.

Eighteen aboriginal archaeological sites were identified within the dam site, inundation and buffer area. An area of Potential Archaeological Deposit was noted around Quart Pot Creek for a distance of 50 m on each site of the creek corridor. Information was provided to the survey team verbally by surrounding landowners.

An intention to prepare a CHMP pursuant to the ACH Act was advertised in accordance with the provisions of the legislation and guidelines. Traditional owners responded that they would be the endorsed aboriginal parties who would assist in the development of a CHMP for the project area.

A CHMP was prepared and executed between the proponent and the traditional owners in 2008. A copy of the plan was lodged with DATSIMA.

6.7.3 Native title

Native title has not been extinguished over some parcels of land within the project area. The proponent intends to implement notification procedures in accordance with the *Native Title Act 1993* (*Cwlth*) after completing the EIS process.

6.7.4 Coordinator-General's conclusions

The proponent has committed to undertake the relevant due diligence procedures and identifications prior to construction in respect of National Heritage, Commonwealth Heritage and the National Estate. I expect the proponent will implement this commitment and other commitments in respect of cultural heritage matters outlined in Appendix 4.

6.8 Social impacts

6.8.1 Social environment

The proponent has undertaken a social impact assessment (SIA) as part of the EIS. Potential positive impacts include:

- local employment and training opportunities during construction
- a new recreational area for the community.

6.8.2 Impact assessment, mitigation and management

Community and stakeholder engagement

The proponent completed a community consultation process during preparation of the EIS. The community consultation report identified the following issues:

- property impacts, including land acquisition process and compensation
- employment and training opportunities provided by the dam, including during the construction phase, and through improved business opportunities following construction.

Workforce management

The project will require 96 full-time equivalent (FTE) persons. During peak construction of the project, including the dam and pipeline, 120 to 145 workers will be required. The proponent will aim to source construction workers from the local area and region. Thirty per cent of workers would be sourced locally, and 85 to 100 workers are expected to commute from urban centres such as Warwick and Tenterfield. The proponent has committed to implement an Employment and Training Strategy in consultation with key stakeholders, including local secondary schools, SRDC, TAFE, employment services and training providers.

Local business and industry content

This project provides further opportunities for local and regional businesses to provide goods, services and expertise. The proponent has committed to maximise opportunities for local business and industry from the project.

6.8.3 Coordinator-General's conclusions

I am satisfied that the SIA undertaken by the proponent is adequate and conclude that any adverse social impacts of the project would be minimal. Further, the mitigation measures outlined in the project's SIA and EIS would ensure any social impacts are appropriately managed.

I note the proponent's commitment to implement an Employment and Training Strategy to ensure the social benefits for the Southern Downs Region are maximised. In addition to this, I encourage the proponent to develop strategies for employing:

- a local workforce
- members of vulnerable and disadvantaged groups, including Indigenous people, people with a disability and people from non-English speaking backgrounds.

I note the proponent has committed to consult with community support agencies regarding rental impacts on low income earners, and with accommodation providers to ensure accommodation demands can be appropriately managed.

6.9 Economic impacts

6.9.1 Overview

Stanthorpe's water is supplied by SKD, which has a full storage capacity of 2180 ML and an annual allocation of 700 ML for urban water. The town's current demand for urban water has risen to approximately 695 ML per annum—almost the current SKD allocation—and is expected to continue to increase despite restrictions and other water conservation initiatives.

The AEIS identified Stanthorpe's lack of water security as a constraint on business investment and expansion, and Emu Swamp Dam as the best option for meeting the future demand for urban and irrigation water.

The construction and operation of Emu Swamp Dam and the urban and irrigation pipelines has the potential to add up to $139.1m in economic output to the Queensland economy.This section of the report is concerned with the potential economic impacts and benefits of the project for the Stanthorpe community, the SDRC region, and the Queensland economy identified during the EIS process.

6.9.2 Economic impact assessment

An economic impact assessment (EIA) was completed in accordance with the TOR for the EIS. The EIA reviewed the construction and operation of two variations of the project—a 5000 ML urban water supply option consisting of the dam and urban pipeline, and a combined 10 500 ML option that also included the irrigation pipeline to be funded by users. Both options were assessed as having potential economic benefits for Stanthorpe and the wider Darling Downs region.

During preparation of the AEIS for the combined option, the proponent commissioned an additional study to determine the potential demand from irrigators and commercial operators for water from Emu Swamp Dam, and the extent to which the project might facilitate growth and development in the region. Interviews with local and regional primary producers, commercial water users and other stakeholders identified the project's potential to support the continued diversification of the local and regional economies.

I also requested additional information during the preparation of the AEIS focusing in greater detail on urban water security matters, and the specific impacts and benefits for Stanthorpe and surrounding areas associated with the dam and urban pipeline.

All of the analysis undertaken has informed my assessment of the project's potential impacts, and the proponent's strategies to enhance the potential benefits for Stanthorpe and the wider region.

6.9.3 State and regional economic impacts

Section 2.3 of the AEIS identified the following as potential benefits from the construction and operation of Emu Swamp Dam and the urban and irrigation pipelines:

- $46.1m in economic output with direct and indirect outputs of $29m and $17.1m

- $16.9m in Gross Regional Product (GRP) with direct and indirect impacts of $10.2m and $6.7m
- 93 FTE jobs with direct and indirect employment of 32 and 61 FTEs.

Potential benefits for the Queensland economy during the construction phase include an additional:

- $139.1m in economic output with direct and indirect outputs of $87.6m and $51.5m
- $51m in Gross State Product (GSP) with direct and indirect impacts of $30.9m and $20.1m
- $28.6m in wages and salaries paid with direct and indirect impacts of $17m and $11.6m
- 281 FTE jobs with direct and indirect employment of 96 and 185 FTEs.

Recurrent benefits during the operational phase are primarily associated with the additional economic opportunities from enhanced water security. Operational benefits are expected to be largely retained within the SDRC region and include an additional:

- $43.2m in economic output with direct and indirect outputs of $37.1m and $6.1m
- $19m in GRP with direct and indirect impacts of $16.3m and $2.7m
- $14.3m in wages and salaries paid with direct and indirect impacts of $13m and $1.3m
- 180 FTE jobs with direct and indirect employment of 157 and 23 FTEs.

6.9.4 Water security

Water security has been a longstanding issue for Stanthorpe and other communities in the Granite Belt region. Studies have been completed to identify opportunities for improving the reliability of the town's water supply. The studies and alternative options to the Emu Swamp Dam project were considered in the EIS.

In 2010 and subsequent to the release of the EIS, the Queensland Government commissioned a future water demand analysis for South West Queensland that included communities within the SDRC area. Stanthorpe's projected demand for urban water was revised downwards in line with population growth projections, but is still expected to exceed the existing SKD urban water allocation by 2016, and to continue to increase to 952 ML per annum by 2056. The outcomes of the demand analysis are summarised in the AEIS.

In 2010 the Department of Environment and Resource Management (DERM) assessed the potential yield of the alternative water supply options canvassed in the EIS. This work established a significantly reduced supply baseline of 370 ML per annum to Stanthorpe from SKD at 98 per cent reliability. Despite a long history of high-level water restrictions, SKD has almost run dry on a number of occasions and the dam's existing allocation of 700 ML per annum was found to be achievable with only 94.4 per cent reliability.

6.9.5 Cost–benefit analysis

The economic benefit of the Emu Swamp Dam project can be measured as the consumer surplus, or the cost savings that accrue to individual water consumers. This saving is dependent on:

- future yields from SKD and the amount of Emu Swamp Dam water consumed
- Emu Swamp Dam water consumption charges
- the cost of alternative water to address future shortfalls from SKD (from the installation of rainwater tanks at an estimated cost of approximately $4800 per property).

A cost–benefit analysis (CBA) of Emu Swamp Dam and the urban pipeline was undertaken using different yield scenarios for SKD to determine the potential annual consumption of Emu Swamp Dam water by the following users:

- residential, commercial and industrial users in Stanthorpe
- residential and industrial consumers in areas outside Stanthorpe (such as Glen Aplin), and in the southern Stanthorpe corridor between Emu Swamp Dam and the Mt Marley water treatment plant
- a limited number of irrigation consumers adjoining Emu Swamp Dam or the pipeline corridor between Emu Swamp Dam and the Mt Marley water treatment plant.

A low SKD yield scenario reflecting the 2010 base case of 370 ML per annum at 98 per cent reliability demonstrated a net present value of $17m and a positive benefit–cost ratio (BCR) of 1.25. While a medium SKD yield scenario demonstrated a marginally negative BCR of 0.98, this scenario is based on the 2003–2008 drought period average yield of 536 ML per annum, which has a lower level of reliability.

Table 6.8 shows the potential economic benefit to Stanthorpe's urban water consumers and a limited number of irrigators in direct proximity to the urban pipeline, by obtaining their additional water from Emu Swamp Dam. The forecast annual benefit increases to approximately $5 360 000 per year by 2045.

Table 6.8 Forecast of Emu Swamp Dam water consumption and economics benefits

Water consumption	2017	2022	2027	2035	2045
Forecast annual consumption of Emu Swamp Dam water[5] (ML)	365	514	632	684	750
Economic benefit					
Forecast annual economic benefit[6] ($'000s)	2 608	3 676	4 515	4 891	5 360

[5] Based on the 98 per cent reliability baseline yield for SKM of 370 ML per annum.
[6] Assumes an alternative tank water cost of $8.31 per kl, and Emu Swamp Dam water consumption charges that are comparable with the existing urban water rate of $1.16 per kl

The capacity of Emu Swamp Dam to enhance the reliability of service for existing and future urban water consumers could lead to additional economic benefits for Stanthorpe and the region. Table 6.9 shows the projected annual economic benefits from removing residential water restrictions, would increase to approximately $700 000 per year by 2045.

Table 6.9 Forecast Emu Swamp Dam reliability of service economic benefits

Water consumption	2017	2022	2027	2035	2045
Number of property connections[7]	2 597	2 705	2 814	3 003	3 252
Economic benefit					
Forecast annual economic benefit ($'000s)	559	582	605	646	700

The results from all modelling scenarios in the CBA were subject to a degree of variation relating to the future cost of Emu Swamp Dam water for irrigation purposes. However, irrigation benefits are expected to account for a relatively small proportion of the overall benefits of Emu Swamp Dam and the urban pipeline compared to the economic value for Stanthorpe and surrounding areas of a cheaper and more reliable supply of urban water.

6.9.6 Coordinator-General's conclusions

The analysis of Emu Swamp Dam and the urban pipeline undertaken during the preparation of the EIS identified a number of potential benefits including:

- enhanced water security, as Stanthorpe's future demand for urban water is projected to exceed the long-term average and base case annual yield of SKD
- a reduction in the severity and frequency of water restrictions that have been imposed on Stanthorpe during recent years, leading to direct and indirect economic benefits for the community
- provision of additional water at significantly lower cost to residents compared to the next best option of installing rainwater tanks.

Should the proponent also proceed with the irrigation pipeline component, producers in the region will have the opportunity to secure additional water, thereby improving agricultural production. Both options have the potential to support economic development in the Granite Belt region.

I expect the proponent to maximise of the potential economic benefits to Stanthorpe and the Granite Belt region by:

- creating local employment opportunities over the life of the project, including opportunities for local Indigenous people and other groups who may be under-represented in the labour market

[7] Based on a 2011 estimate of 2 470 serviced properties within Stanthorpe and future household construction estimates.

- providing local and regional training and career development opportunities for employees
- equitably managing land access and acquisition processes.

I expect the proponent to fully implement the commitments set out in Appendix 4. The SDRC should publish the results of commitments regularly throughout and post construction of the dam, to keep the community informed about the project.

7. Conclusion

In evaluating the project, I have considered the following:

- the EIS and AEIS
- submissions on the EIS and AEIS, including agency advice.

I am satisfied that the requirements of the SDPWO Act have been met and that sufficient information has been provided to enable the necessary evaluation of potential impacts, and inform the development of mitigation strategies and conditions of approval.

The environmental impact assessment commenced with the declaration of this project in February 2007 and has involved a comprehensive body of work by the proponent. More detailed work would occur in the detailed design phase of the project.

The potential impacts identified in the EIS documentation and submissions have been assessed. I consider that the mitigation measures adopted by the proponent and required by the conditions stated in this report would result in acceptable overall outcomes.

Based on the information provided by the proponent and outlined in the project rationale, I conclude that the project can deliver urban water security for the Stanthorpe and opportunities for economic development in the region.

Accordingly, I approve the Emu Swamp Dam project to proceed, subject to the conditions in appendices 1 and 2. In addition, I expect that the proponent commitments to be fully implemented as presented in the EIS documentation and summarised in Appendix 4 of this report.

To proceed further, the proponent will be required to:

- obtain EPBC Act approval
- obtain the relevant development approvals under the SP Act and Water Act
- finalise and implement the construction and operations EM plans
- finalise the environmental offsets plan.

If there are any inconsistencies between the project (as described in the EIS documentation) and the conditions in this report, the conditions shall prevail. The proponent must implement all the conditions of this report.

Section 5 of this report describes the extent to which the material supplied by SDRC addresses the actual or likely impacts on MNES of each controlled action for the project.

Copies of this report will be issued to:

- DE
- DEHP
- DTMR
- Department of Energy and Water Supply
- SDRC.

A copy of this report will also be available on the Department of State Development, Infrastructure and Planning's website at **www.dsdip.qld.gov.au/emu-swamp-dam**

This report will lapse three years from the date it is published on the department's website, or when an approval application is decided for the project.

Appendix 1. Imposed conditions

This appendix includes conditions imposed by the Coordinator-General under section 54B of the SDPWO Act. The conditions are relevant to applications for development approvals for those parts of the project where there is no relevant approval applicable under other legislation.

All of the conditions imposed in this appendix take effect from the date of this Coordinator-General's report.

These conditions do not relieve the proponent of the obligation to obtain all approvals and licences from all relevant authorities required under any other Act.

Pursuant to section 54D of the SDPWO Act, these conditions apply to anyone who undertakes the project, such as the proponent and an agent, contractor, subcontractor or licensee of the proponent, and any public utility providers undertaking public utility works as a result of the project.

To the extent that the project is subject to a community infrastructure designation, the conditions in this appendix are recommended requirements for the designation in accordance with section 43 of the SDPWO Act. The entity responsible for these conditions is the Coordinator-General.

Condition 1. Offset plan

(a) The proponent must prepare and submit an offset plan to the Coordinator-General for approval prior to the construction of the Emu Swamp Dam or prior to impacting on:
   (i) regional ecosystems 13.3.1, 13.3.1x1,13.12.6, and 13.12.9
   (ii) essential habitat
   (iii) fish passage
   (iv) protected wildlife habitat (protected plants)
   (v) protected wildlife habitat (protected animals)
   (vi) connectivity
   (vii) high ecological significance wetland for regional ecosystem 13.3.1 (including the sub set regional ecosystem 13.3.1x1)

Condition 2. Offset plan content

The proposed offset plan must include, but is not necessarily limited to:

(a) an evaluation of significant residual impacts to the following values:
   (i) regional ecosystems 13.3.1 (including the sub set regional ecosystem 13.3.1x1), 13.12.6, and 13.12.9
   (ii) essential habitat
   (iii) fish passage
   (iv) protected wildlife habitat
   (v) connectivity
   (vi) high ecological significance wetland for regional ecosystem 13.3.1 (including the sub set regional ecosystem 13.3.1x1)

(b) an offset to compensate for the significant residual impacts identified through part (a) of this condition, to the extent that the significant residual impacts are not compensated through offsets required by the Australian Government

(c) a detailed description of the land to which the plan relates, the values affected and the extent and likely timing of impact on each

(d) evidence demonstrating the values to be impacted can be offset

(e) the offset delivery mechanism(s) comprising one or more of: land-based offsets; direct benefit management plans; offset transfers and/or offset payments

(f) a legally binding mechanism that ensures protection and management of offset areas.

(g) a management strategy for each offset site that ensures appropriate management and rehabilitation measures are undertaken to compensate for the significant residual impacts.

Condition 3. Implementation of the offset plan

The proponent must implement the offset plan within two years of commencement of construction, or as directed by the Coordinator-General.

Appendix 2. Coordinator-General's recommendations

This appendix includes general recommendations, made under section 35(4) of the SDPWO Act. The recommendations relate to applications for development approvals for the project.

While the recommendations guide the assessment managers in assessing the development applications, they do not limit their ability to seek additional information or their power to impose conditions on any development approval required for the project.

Each recommendation nominates the entity responsible for the relevant approval.

Schedule 1. Recommendations for Nature Conservation Act approvals

The entity responsible for ensuring the following recommendations are implemented is DEHP.

Recommendation 1. Buffer rehabilitation

Prior to the clearing of *Tachyglossus aculeata*, *Phascolarctos cinereus, Neophema pulchella, Lophoictinia isura* habitat within the Emu Swamp Dam area; the Emu Swamp Dam buffer area must be rehabilitated to provide habitat condition that maintains structure, composition and function required for the following species:

(a) Short beaked echidna (*Tachyglossus aculeata*)

(b) Koala (*Phascolarctos cinereus*)

(c) Turquoise parrot (*Neophema pulchella*)

(d) Square-tailed kite (*Lophoictinia isura*).

Recommendation 2. Border thick-tailed gecko

(a) Searches by skilled personnel using suitable techniques and involving adequate effort, both in terms of time and geographic coverage, must be undertaken to locate individuals of this species.

(b) Measures to salvage the population of border thick-tailed gecko (*Uvidicolus sphyrurus*) in the area to be impacted by the Emu Swamp Dam must be implemented prior to the commencement of clearing and construction works.

(c) All individuals of *Uvidicolus sphyrurus* found must be relocated to areas supporting suitable habitat and microhabitat away from the impact zone, either in the Emu Swamp Dam buffer area or in appropriate vegetation communities in proposed offset areas.

Schedule 2. Recommendations for Fisheries Act approvals

The entity responsible for ensuring the following recommendations are implemented is DAFF.

Recommendation 3. Fish passage

(a) Up and downstream fish passage must be provided across the waterway barrier(s).

(b) The fish passage provided must cater for the whole fish community taking into account species, size classes, life stages and swimming abilities as well as the seasonal and flow related biomass of the fish community.

(c) The waterway barrier(s) and any associated infrastructure including, but not limited to intakes, walls, access structures, pipe works, spillways and dissipation devices are to be designed, constructed and maintained to avoid fish injury, mortality and/or entrapment.

(d) A person or entity that is suitably qualified and experienced in fish passage biology and fish passage design and construction, must supervise the construction of the approved works.

(e) The person or entity who supervised the approved works must prepare and submit to notifications@daff.qld.gov.au, a report detailing how supervision was provided, and the extent to which the 'as constructed' fish way/s complies with the approved fish way/s design.

(f) A monitoring program must be developed and implemented by a person or entity that is suitably qualified and experienced in fish passage biology, fish passage design and construction, to demonstrate the performance of the fish way/s.

(g) The effective operation of the fish passage aspects of the structure must be maintained for the life of the barrier. This maintenance must include regular, documented inspections of the structures (fish way, baffles, roughening etc.) especially after flood events, and prompt clearing of debris or rectifying any other failures, malfunctions, breakdowns or other impediments to fish movement.

Schedule 3. Recommendations for Transport Infrastructure Act approvals

The entity responsible for ensuring the following recommendations are implemented is DTMR.

Recommendation 4. Transport Infrastructure

(a) The proponent must implement all necessary measures to mitigate adverse impacts on the safety, condition and efficiency of state-controlled and local roads for all stages of the project.

(b) An impact assessment report must be submitted to DTMR for review and approval prior to the commencement of project construction, or some other time period agreed in writing with DTMR and address one or more of the following:

(i) construction of any required works (including site accesses) as and when included in an approved Road Impact Assessment (RIA)

(ii) payment of any contributions towards the cost of works, rehabilitation or maintenance as and when included in a RIA

(iii) undertaking or implementing any other action as and when stated in an approved Road-use Management Plan (RMP)

(iv) actions or payments as otherwise agreed in writing with DTMR or in an infrastructure agreement.

(c) The RIA prepared for (b) must be submitted to DTMR for review and approval six months prior to the anticipated commencement of the relevant project stage or as otherwise agreed in writing between the proponent and DTMR and should include but not be limited to:

(1) the upgrade of the intersection of Fletcher Road with the New England Highway, incorporating the outcomes of consultation with DTMR regarding road surfacing, road reserve requirements, road safety and traffic efficiency into the design of the intersection upgrade, including a proposed minimum channelised right hand turn

(2) any mitigation works or strategies recommended as a result of an assessment of current road safety along key transport roads in consultation with DTMR

(3) all pipelines in a state-controlled road reserve must be buried pipelines

(4) pipeline crossings of state-controlled roads must:

(a) be under-road bore only (not open-trench) and encased within an envelope pipeline

(b) include cathodic protection.

(ii) assessment of the pavement impacts of heavy vehicles on road infrastructure (including structures) on key routes used for hauling project construction inputs.

(d) The RMP(s) prepared for (b) should be submitted to DTMR for review and approval six months prior to the anticipated commencement of the relevant project stage.

Recommendation 5. Permits, approvals and traffic management plans

(a) To ensure efficient processing of the project's required transport-related permits and approvals, the proponent must undertake the following, no later than three months (or such other period agreed in writing with DTMR) prior to the commencement of construction works or significant project-related traffic:

(i) submit detailed drawings of any works required to mitigate the impacts of project-related traffic to DTMR for review and approval

(ii) obtain all relevant licences and permits required under the *Transport Infrastructure Act 1994* for works within the state-controlled road corridor (s33 for road works approval, s62 for approval of location of vehicular accesses to state roads and s50 for any structures or activities to be located in or carried out in a state-controlled road corridor)

(iii) obtain permits for any excess mass or over-dimensional loads for all phases of the project in consultation with DTMR's Heavy Vehicles Road Operation Program Office, as required by the *Transport Operations (Road Use Management) Act 1995*

(iv) prepare and implement a Construction Traffic Management Plan in accordance with DTMR's *Guide to preparing a Traffic Management Plan,* to include each site where road works are to be undertaken (including site access points, road intersections or other works undertaken in the state-controlled road corridor).

Definitions	
Road impact assessments	An acceptable RIA report is one developed by a suitably qualified person in accordance with the DTMR *Guidelines for Assessment of Road impacts of Development (2006)* (GARID) and includes: a) a completed DTMR 'Transport Generation proforma detailing project-related traffic and transport generation information or as otherwise agreed in writing with DTMR b) use of DTMR's Pavement Impact Assessment tools or such other method or tools as agreed in writing with DTMR c) a clear indication of where detailed estimates of project-related traffic are not available, and documentation of the assumptions and methodologies that have been previously agreed in writing with DTMR prior to RIA finalisation d) details of the final impact mitigation proposals, listing infrastructure-based mitigation strategies, including contributions to road works, rehabilitation, maintenance and summarising key road-use management strategies e) Australian Level Crossing Assessment Model (ALCAM) assessments of all rail crossings.
Road use management plans	An acceptable Road-use Management Plan (RMP) is one developed by a suitably qualified person in accordance with DTMR's *Guide to Preparing a Road-use Management Plan* for each stage of the project and includes: a) a table listing RMP commitments and provides confirmation that all works and road-use management measures have been designed and/or will be undertaken in accordance with all relevant DTMR standards, manuals and practices b) optimised project logistics and minimised road-based trips on all state-controlled and local roads.
Significant project-related traffic	An increase in project traffic equal to or greater than 5% in either traffic numbers (AADT) or axle loadings (ESAs), as outlined in the GARID

Recommendation 6. Agreement relating to railway corridor

(a) To ensure efficient processing of the project's required transport-related permits and approvals, the proponent should, no later than three (3) months prior to the commencement of construction, submit applications[8] to Queensland Rail as the railway manager for relevant agreements required under the *Transport Infrastructure Act 1994* for interfering with a railway.

(b) During the design of the project, the proponent should notify Queensland Rail of any project-related impact on known or potential areas containing protected plant species under Commonwealth and State legislation within the rail corridor.

(c) Where there are proposed works on railway land that is potentially contaminated (land listed on the Environment Management Register), the proponent should carry out soil testing to determine the level of contamination. Based on the results of the testing a disposal permit may be required.

[8] Information about the application is available on the Queensland Rail website (http://www.queenslandrail.com.au/NetworkServices/ThirdPartyCorridorAccess/Pages/ThirdPartyCorridorAccess.aspx).

Schedule 4. Recommendations for Environmental Protection Act approvals

The entity responsible for ensuring these recommendations are implemented is DEHP. These are recommended conditions for the environmentally relevant activities associated with the construction of the project.

Recommendation 7. General

(a) Any breach of a condition of this environmental authority must be reported to the administering authority as soon as practicably possible, or at the latest, within 24 hours of the breach occurring. Records must be kept including full details of the breach and any subsequent actions taken.

(b) All reasonable and practicable measures must be taken to minimise the likelihood of environmental harm being caused.

(c) An appropriately qualified person(s) must monitor, record and interpret all parameters that are required to be monitored by this environmental authority and in the manner specified by this environmental authority.

(d) All information, monitoring and records that are required by the conditions of this environmental authority must be kept for a period of at least 5 years and provided to the administering authority upon request.

(e) All analyses required under this environmental authority must be carried out by a laboratory that has NATA certification, or an equivalent certification, for such analyses. The only exception to this condition is for in-situ monitoring of water quality parameters.

(f) The activity must be undertaken in accordance with written procedures that:

  (i) identify potential risks to the environment from the activity during routine operations and emergencies

  (ii) establish and maintain control measures that minimise the potential for environmental harm

  (iii) ensure plant, equipment and measures are maintained in a proper and effective condition

  (iv) ensure plant, equipment and measures are operated in a proper and effective manner

  (v) ensure that staff are trained and aware of their obligations under the *Environmental Protection Act 1994*

  (vi) ensure that reviews of environmental performance are undertaken at least annually.

(g) When requested by the administering authority, monitoring must be undertaken, in the manner prescribed by the administering authority. The monitoring results must be provided to the administering authority upon request.

(h) Storage of chemicals and fuels in bulk or in containers of greater than 15 litres must be within a secondary containment system and releases from the containment system controlled in a manner that prevents environmental harm.

Recommendation 8. Air

(a) Odours, dust or airborne contaminants which are noxious or offensive or otherwise cause environmental nuisance must not be released to any sensitive place.

(b) For the period of construction of the activity, ambient dust deposition monitoring must be undertaken at a minimum of four (4) representative locations relevant to potentially affected nuisance sensitive places for the dust pollutant parameters specified in Table A1.

(c) The release of dust or particulate as a result of the activity must not exceed the levels identified in Table A1, when measured at any sensitive place using the methodology stated in Table A1.

Table A1. Air quality levels

Pollutant Type	Measured Level	Average Period	Methodology
Dust	120mg/m^2/day	Monthly	AS3580.10.1
PM_{10}	50µg/m^3	2 Hours	AS3580.9.6 or AS3580.9.9
Total Suspended Particles (TSP)	90µg/m^3	24 Hours	AS/NZS3580.9.3

Recommendation 9. Water

(a) Contaminants other than settled/treated stormwater must not be released from the site to surface waters.

(b) Contaminants must not be released to groundwater.

(c) The stormwater runoff from disturbed areas, generated by at least a 24-hour storm event with an average recurrence interval of one in five years, must be retained on site or managed to remove contaminants before release.

(d) Erosion and sediment control measures must be implemented and maintained to minimise erosion and the release of sediment from disturbed areas.

(e) The surface waters within the Severn River must be monitored at locations representative of at least one upstream and one downstream location relative to the place of works for the quality characteristics and at the frequency specified in Table A2.

Table A2. Water quality characteristics

Quality characteristic	Units	Frequency
pH	pH	On commencement and weekly thereafter
Turbidity	NTU	On commencement and weekly thereafter
Electrical Conductivity	µs/cm	On commencement and weekly thereafter

Recommendation 10. Noise

(a) Noise from the ERA must not cause environmental nuisance at a nuisance sensitive place.

(b) If the holder of the environmental authority can provide evidence through monitoring that the limits defined in Table A3, are not being exceeded then the holder is not in breach of Condition (a).

Table A3. Water quality characteristics

Noise Level dB(A) measured as $LA_{eq,adj,T}$	Monday to Sunday, including public holidays		
	7 am – 6 pm	6 pm – 10 pm	10 pm – 7 am
	Noise is measured at a 'noise sensitive place'		
Construction	50	45	37
Operation	45	37	33

(c) The method of measurement and reporting of noise levels must comply with the *Environmental Protection Regulation 2008*.

(d) Low frequency noise must not exceed 55 dB at a sensitive receptor.

Recommendation 11. Land

(a) Contaminants must not be released to land except as authorised by the conditions of this approval.

(b) Land that has been disturbed for activities conducted under this environmental authority outside of the area defined as 'Full Supply Level 738AHD' in Figure 3.1 Inundation Area and Buffer Area of the supplementary environmental impact statement, must be rehabilitated in a manner such that:

  (i) suitable species of vegetation are planted and established

  (ii) potential for erosion of the site is minimised

  (iii) the quality of water, including seepage, released from the site does not cause environmental harm

  (iv) potential for environmental nuisance caused by dust is minimised

  (v) the water quality of any residual water body does not have potential to cause environmental harm

  (vi) the final landform is stable.

(c) Land that has been disturbed for activities conducted under this environmental authority inside of the area defined as 'Full Supply Level 738AHD' in Figure 3.1 Inundation Area and Buffer Area of the supplementary environmental impact statement must be rehabilitated in a manner such that the final landform is stable.

(d) The final quarry excavation must be shaped with a maximum slope of 6H:1V.

Recommendation 12. Waste

All waste generated in carrying out the activity must be re-used, recycled or removed to a facility that can lawfully accept the waste.

Recommendation 13. ERA 63 sewage treatment—construction

The activity must be conducted in accordance with 'Eligibility criteria and standard conditions for sewage treatment works (ERA 63).

Recommendation 14. ERA 16 extractive and screening

(a) Activities associated with this ERA must not be conducted outside of the area defined as 'Full Supply Level 738AHD' in Figure 3.1 Inundation Area and Buffer Area of the environmental impact statement documentation for the Emu Swamp Dam Project.

(b) The holder of this environmental authority must ensure that blasting does not cause the limits for peak particle velocity and air blast overpressure in 0 to be exceeded at a sensitive place or commercial place.

Table A4. Blasting noise limits

Blasting noise limits	Sensitive or commercial blasting noise limits	
	7am – 6pm	6pm – 7am
Air blast overpressure	115dB (linear) peak for 9 out of 10 consecutive blasts initiated and not greater than 120dB (linear) peak at any one time.	No Blasting
Ground vibration peak particle velocity	5mm/second peak particle velocity for 9 out of 10 consecutive blasts and not greater than 10mm/second peak particle velocity at any time.	No Blasting

(c) The holder of this environmental authority may only burn vegetation cleared in the course of carrying out extraction activities provided the activity does not cause environmental harm at any sensitive place or commercial place.

Schedule 5. Recommendation for Land Act approvals

The entity responsible for ensuring these recommendations are implemented is DNRM.

Recommendation 15. Existing water reserve

Prior to the lodgement of any development applications and construction of the dam, the proponent is required to apply under the *Land Act 1994* to partially cancel the existing water reserve.

Recommendation 16. Permanent road closure

The proponent is required to lodge an application under the *Land Act 1994* to permanently close all roads which will be inundated by the dam and return them to unallocated state land.

Schedule 6. Recommendations for Land Protection (Pest and Stock Route Management) Act requirements

The entity responsible for ensuring these recommendations are implemented is DNRM.

Recommendation 17. Stock routes

A management plan must be developed and implemented to maintain adequate access for travelling stock on the Queensland Stock Route Network (i.e. Stanthorpe Texas Road and Amiens Road) during all phases of the Emu Swamp Dam project. This management plan must identify the relevant stock movement management authorities (e.g. Stock Route Management Unit or Land Protection Officer, Southern Downs Regional Council), instances when notification must be given to the relevant authority, and any alternative solutions proposed for when access for travelling stock is impeded.

Schedule 7. Recommendations for Water Act approvals

The entity responsible for ensuring these recommendations are implemented is DNRM.

Recommendation 18. Works to interfere

The proponent is required to hold an authority to interfere with water and must consult with the Chief Executive of the *Water Act 2000* to identify the required actions necessary for the

appropriate water authorisation (ROL or Interim ROL) to be granted prior to the construction of the dam.

Recommendation 19. Taking water

(a) The proponent must provide the Chief Executive of the *Water Act 2000* its offer in price per megalitre for the 750ML of water held in strategic reserve for town water supply.

(b) The proponent must provide the Chief Executive of the *Water Act 2000* with the following information to enable amendments to be made to the ROP or WRP, and to enable the granting of ROLs or Interim ROLs and water allocations or interim water allocations (if an Interim ROL is issued).

Information for the ROL and ROP:

(i) identify any water infrastructure (including clearly defining the details of the water infrastructure and its detailed operating rules)

(ii) if the water infrastructure identified includes a relevant dam—the full supply level for the dam

(iii) environmental management rules, seasonal assignment rules and water sharing rules

(iv) any other matters prescribed under regulation.

Information for the water allocations:

(v) the details of the person who holds, and how the person holds, the allocations (e.g. tenancy)

(vi) the nominal volume for the allocation

(vii) the location from which the water may be taken

(viii) the purpose for which the allocations are to be granted

(ix) the priority group (eg. medium or high).

(c) A supply contract for the allocation must exist if the water allocation holder is not the same entity as the ROL holder.

Recommendation 20. Temporary take of water

Should it be identified at any stage of the project that a water permit is required; the water permit must be obtained under the *Water Act 2000* prior to the taking of the water from a watercourse.

Recommendation 21. Quarry material

If material taken from the watercourse for the construction of the dam is either used off site or sold, the proponent will be required to obtain a Quarry Material Allocation Notice from DNRM.

Schedule 8. Recommendations for Water Supply (Safety and Reliability) Act approvals

The entity responsible for ensuring these recommendations are implemented is the Department of Energy and Water Supply (DEWS).

Recommendation 22. General

(a) The dam is to be kept safe, and be maintained and operated in accordance with the current versions of the following guidelines issued in Queensland under the *Water Supply (Safety and Reliability) Act 2008* (where specifically referred to in this dam safety condition schedule):

(i) *Queensland Dam Safety Management Guidelines*.

(ii) *Guidelines for Failure Impact Assessment of Water Dams*.

(b) The current Dam Safety Regulator in the State of Queensland is the Chief Executive, DEWS or the department's delegate officers.

Recommendation 23. Documentation

(a) Any documentation prepared in order to comply with these conditions must be stored securely until such time as the dam is decommissioned.

(b) The documentation must be made available for inspection by the Chief Executive, DEWS, within seven (7) days of a written request for access being received by the dam owner.

(c) On change of ownership of the dam, all documentation prepared in compliance with these conditions must be transferred to the new owner.

Recommendation 24. Incidents and failures

(a) In addition to the requirements detailed within the Emergency Action Plan (EAP), the dam owner must report in writing all incidents and failures (as defined in the *Queensland Dam Safety Management Guidelines – February 2002*) to the Chief Executive, DEWS, within seven (7) days of becoming aware of the incident or failure.

(b) The dam owner must advise the Chief Executive, DEWS, of any proposed remedial actions in writing within thirty (30) days of the incident or failure.

Recommendation 25. Design report

(a) The dam owner must provide a copy of the design report for Emu Swamp Dam to the Chief Executive, DEWS, at least thirty (30) days prior to any construction works.

(b) The design report should include:

(i) results of any additional hydraulic model studies during the design phase

(ii) results of foundation and other investigations carried out during the design phase

(iii) a complete set of construction drawings and specifications

(iv) final instrumentation arrangement for the dam.

(v) details of managing risk during construction.

Recommendation 26. Design and construction

(a) The dam is to be designed and constructed to comply with the relevant DEWS and ANCOLD guidelines (including requirements for the completion of a failure impact assessment).

(b) The Emu Swamp Dam must be constructed as per the final design drawings approved by the Chief Executive, DEWS.

(c) The dam owner must advise the Chief Executive, DEWS, of the 'practical completion of construction' of the works within seven (7) days of that point of construction being reached.

(d) Construction of any temporary works must be carried out in accordance with current engineering practice and standards.

(e) Any remedial works or reconstruction of the dam must be carried out in accordance with current engineering practice to ensure that the dam remains in accordance with the documentation listed within these conditions.

(f) Where remedial, reconstruction or upgrade works are proposed, a copy of the final design and construction methodology must be forwarded to the Chief Executive, DEWS, for consideration no later than thirty (30) days prior to commencement of any construction works.

Recommendation 27. Data book

(a) The dam owner must prepare a Data Book in accordance with this condition and the *Queensland Dam Safety Management Guidelines – February 2002*.

(b) The Data Book must be prepared by no later than 90 days after 'practical completion of construction' of the dam.

(c) The Data Book must include all information as is required in the *Queensland Dam Safety Management Guidelines – February 2002* including:

  (i) all pertinent records and history relating to the dam

  (ii) documentation of investigation, design, construction, operation, maintenance, surveillance, monitoring measurements and any remedial action taken during construction and subsequent operation of the dam

  (iii) known deficiencies such as seepage, cracking.

(d) The dam owner must ensure the Data Book is reviewed (and if necessary updated) in accordance with the *Queensland Dam Safety Management Guidelines – February 2002* by the 1st day of June of each calendar year.

(e) A written notification confirming that the Data Book has been reviewed (and if necessary updated) must be signed by the dam operator and submitted to the Chief Executive, DEWS, by the 30th day of June of that same calendar year.

Recommendation 28. 'As constructed' documentation

(a) The dam owner must develop 'as constructed' documentation for Emu Swamp Dam in accordance with this condition and the *Queensland Dam Safety Management Guidelines – February 2002*.

(b) The owner must provide one (1) copy of the 'as constructed' documentation to the Chief Executive, DEWS, on or within three (3) calendar months of 'practical completion of construction'.

(c) The 'as constructed' documentation must include:

  (i) a record of any decisions to adapt the nominated design to suit actual field conditions

  (ii) 'as constructed' drawings indicating the actual lines, levels and dimensions to which the structure is built

  (iii) a description of the construction process

  (iv) comprehensive photographs of the construction

  (v) summary of material test results

  (vi) summary of construction inspection reports

  (vii) initial instrumentation data.

(d) certification by an RPEQ that the works have been constructed in compliance with all relevant engineering standards.

Recommendation 29. Standard operating procedures

(a) The dam owner must develop Standing Operating Procedures (SOP) in accordance with the *Queensland Dam Safety Management Guidelines – February 2002*. The SOP must include the following activities:

  (i) Personnel training and procedural issues:

    (1) operator training

    (2) documentation control and review

    (3) setting of normal operation criteria.

(ii) Emergency action and incident reporting:

(1) accident and incident reports

(2) review of EAP including verification of emergency contact numbers

(3) communication procedures and procedures covering loss of communication

(4) maintenance of Dam Log Book for recording of surveillance inspections, equipment testing, planned and unplanned maintenance and incident details.

(iii) Critical operating procedures:

(1) inspection, testing and maintenance of critical mechanical and electrical equipment

(2) water level monitoring procedures

(3) communication security and failsafe procedures.

(iv) Monitoring and surveillance

(1) owners routine dam safety inspection including checklists and reporting requirements

(2) dam safety five-yearly comprehensive inspection (DS 11)

(3) inspection during and after flood or seismic events

(4) water level and piezometer monitoring procedures.

(b) The dam owner must submit a copy of the SOP to the Chief Executive, DEWS, within 30 days of the 'practical completion of construction'.

(c) The dam must be operated in accordance with the SOP.

(d) The dam owner must ensure the SOP are reviewed prior to Full Supply Level for Emu Swamp Dam being achieved for the first time and by the 1st day of June of each calendar year, and updated and/or added to if necessary.

(e) Where amendments are made to any SOP, the updated documents are to be forwarded to the Chief Executive, DEWS, by the 30th day of June of that same calendar year.

(f) Where no amendments are necessary, a written notification confirming that the SOP have been reviewed shall be signed by the dam owner and forwarded to the Chief Executive, DEWS, by the 30th day of June of that same calendar year.

Recommendation 30. Detailed operation and maintenance manuals

(a) The dam owner must prepare detailed Operation and Maintenance Manuals in accordance with the *Queensland Dam Safety Management Guidelines – February 2002*.

(b) The Operation and Maintenance Manuals must be prepared and finalised by three (3) months following the date of practical completion of construction.

(c) The dam owner must ensure that the Operation and Maintenance Manuals provide a comprehensive set of instructions on all equipment operated at the dam.

(d) The dam must be operated and maintained in accordance with the Operation and Maintenance Manuals.

(e) The dam owner must ensure the detailed Operating and Maintenance Manuals are reviewed, and if necessary updated, by the 1st day of June of each calendar year.

(f) A written notification confirming that the Operating and Maintenance Manuals have been reviewed, and if necessary updated, must be signed by the dam owner and forwarded to the Chief Executive, DEWS by the 30th day of June of that same calendar year.

Recommendation 31. Special inspections

(a) When directed by the Chief Executive, DEWS, a Special Inspection must be carried out at the cost of the dam owner and a report must be prepared in accordance with the *Queensland Dam Safety Management Guidelines – February 2002*.

(b) The Chief Executive, DEWS shall be advised in writing of the date of the inspection and may elect to observe any or all procedures involved in the inspection process.

(c) The dam owner must provide one copy of the Special Inspection Report to the Chief Executive, Department of Energy and Water Supply within thirty (30) days of completion of inspection.

Recommendation 32. Comprehensive inspections

(a) The dam owner must carry out a Comprehensive Inspection of the dam in accordance with the *Queensland Dam Safety Management Guidelines – February 2002*, within one (1) month of 'practical completion of construction' of the Emu Swamp Dam, and on or before every fifth anniversary thereafter.

(b) The Chief Executive, DEWS, shall be advised in writing of the date of the Comprehensive Inspection and may elect to observe any or all procedures involved in the inspection process.

(c) A Comprehensive Inspection Report detailing the findings of the Comprehensive Inspection in accordance with the *Queensland Dam Safety Management Guidelines – February 2002* must be submitted to the Chief Executive, DEWS, within three (3) months after completion of the Comprehensive Inspection.

Recommendation 33. Safety review

(a) The dam owner must carry out a Safety Review in accordance with the *Queensland Dam Safety Management Guidelines – February 2002* by the 1st day of June 2035.

(b) The dam owner must prepare a Safety Review Report and provide one (1) copy of the Safety Review Report to the Chief Executive, DEWS, within three (3) months of completing the review.

(c) Further safety reviews are to be carried out at twenty (20) year intervals, but may be required at more regular intervals by the Chief Executive, DEWS, in such cases as:

  (i) an absence of adequate documentation

  (ii) detection of abnormal behaviours of the structure

  (iii) changes to design standards or construction standards

  (iv) a regulatory requirement.

Recommendation 34. Decommissioning

(a) The dam must not be taken out of service (decommissioned) except in accordance with a Decommissioning Plan submitted to and accepted by the Chief Executive, DEWS.

(b) The Decommissioning Plan must indicate how the dam is to be rendered safe in the long term and how the contents are to be drained in a controlled and safe manner.

(c) The Decommissioning Plan must indicate how the dam fish passage will be maintained during and after decommissioning.

Appendix 3. Recommended conditions for approval for matters of national environmental significance

It is recommended that the Commonwealth consider the following conditions of approval in addition to the State's conditions listed in appendices 1 and 2.

Condition 1. Maximum clearing of box gum grassy woodland

The approval holder must not clear box White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland in excess of the maximum area specified for each project component within the Emu Swamp Dam area as specified in Table A5.

Table A5. Maximum clearing of box gum grassy woodland within Emu Swamp Dam

Project component	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (ha)	Overlapping RE (ha)	Maximum area (ha)
Full supply level	71.55	13.3.1 (25.3 ha) 13.12.9 (46.2 ha)	71.55
Urban pipeline	0	0	0
Irrigation pipeline	0	0	0
Access road to Stalling Lane	0.74	13.3.1 (0.34)	0.74

Definitions:

Box gum grassy woodland means the threatened ecological community White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland listed under the EPBC Act.

Emu Swamp Dam area means the following project components:

Table A6. Emu Swamp Dam area definitions

Project component	Location
Full supply level	The full supply level occurs at 738 m AHD as defined in the map *EMU SWAMP DAM SUPPLEMENTARY REPORT, Figure 3-1, Inundation Area and Buffer Area*
Urban pipeline	The urban pipeline right of way follows Fletcher Road, the New England Highway, Whiskey Gully Road, Brunckhorst Avenue, Hale Haven Drive, Rifle Range Road, Eukey Road/Sugar Loaf Road, Kingston Road, across private property, Greenup Street/Diamondvale Road and across SDRC land to the Mt Marlay water treatment plant

Irrigation pipeline	The irrigation pipeline right of way follows Eukey Road, the New England Highway, Horans Gorge Road, Mt Stirling Road, Winkler Road, Back Creek Road, Stabiles Road, Amiens Road, Cannon Creek Road, Bapaume Road, Swans Lane, Spring Creek Road, Barracks Road, Aerodrome Road, Applethorpe Road, Ellwood Road, Rogers Road, Church Road, Teale Road, Goodwin Road, Gangemi Road, Poziers Road, Newlands Road, Pfrunder Road, Pradella Road and Scotts Camp Road
Access road to Stalling Lane	Access road construction area connecting Emu Swamp Road to the western end of Stalling Lane. The coordinates of the centreline for the access road to Stalling Lane are: E151° 48' 51.367" S28° 45' 22.131" E151° 48' 49.081" S28° 45' 19.793" E151° 48' 48.632" S28° 45' 19.087" E151° 48' 48.463" S28° 45' 18.456" E151° 48' 48.530" S28° 45' 17.499" E151° 48' 48.609" S28° 45' 16.516" E151° 48' 48.473" S28° 45' 15.305" E151° 48' 48.150" S28° 45' 14.289" E151° 48' 47.503" S28° 45' 13.124" E151° 48' 46.852" S28° 45' 12.337" E151° 48' 45.791" S28° 45' 11.438" E151° 48' 44.549" S28° 45' 10.742" E151° 48' 43.462" S28° 45' 10.349" E151° 48' 41.542" S28° 45' 9.521" E151° 48' 40.649" S28° 45' 8.947" E151° 48' 39.593" S28° 45' 8.042" E151° 48' 38.713" S28° 45' 7.001" E151° 48' 38.033" S28° 45' 5.849" E151° 48' 37.665" S28° 45' 4.931" E151° 48' 37.423" S28° 45' 3.978" E151° 48' 37.304" S28° 45' 2.686" E151° 48' 37.366" S28° 45' 1.714" E151° 48' 37.649" S28° 45' 0.440" E151° 48' 38.155" S28° 44' 59.220" E151° 48' 38.674" S28° 44' 58.360" E151° 48' 39.922" S28° 44' 56.751" E151° 48' 42.028" S28° 44' 54.085" E151° 48' 42.895" S28° 44' 53.034" E151° 48' 44.607" S28° 44' 51.484" E151° 48' 45.885" S28° 44' 50.642" E151° 48' 47.834" S28° 44' 49.667"

Condition 2. Avoid clearing protected plants

The approval holder must not remove, kill, bury or otherwise impact any individuals of the following species within the urban pipeline, irrigation pipeline or access road to stalling lane:

(a) velvet wattle (*Acacia pubifolia*)

(b) granite rose (*Boronia repanda*)

(c) black grevillea (*Grevillea scortechinii*).

Condition 3. Listed flora species—*Callistemon pungens*

The approval holder must not remove, kill, bury or otherwise impact any individuals of the vulnerable flora species *Callistemon pungens* in excess of the number of individuals specified in Table A7.

Table A7. Maximum number of *Callistemon pungens*

Project component	Number of individual
Full supply level	45
Urban pipeline	0
Irrigation pipeline	0
Access road to Stalling Lane	0

Condition 4. Buffer rehabilitation

The approval holder must not clear any *Uvidicolus sphyrurus*, *Dasyurus maculatus maculatus*, or *Chalinolobus dwyeri* habitat within the Emu Swamp Dam area until the Minister has approved in writing a report prepared by a suitably qualified expert verifying that the emu swamp dam buffer area has been rehabilitated to such condition, and threatening processes reduced to such a level, that it will maintain the structure, composition and function required to provide habitat for the following species:

(a) border thick-tailed gecko (*Uvidicolus sphyrurus*)

(b) spotted-tailed quoll (*Dasyurus maculatus maculatus*)

(c) large-eared pied bat (*Chalinolobus dwyeri*).

Definitions:

Minister means the Commonwealth Minister with administrative responsibility for the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC) and includes a delegate of the Minister.

Suitably qualified expert means a person or persons, approved by the department in writing, with suitable training, qualifications and experience to successfully undertake the actions prescribed in the condition.

Threatening processes means processes that can adversely affect listed threatened species or threatened ecological communities and could include: animal pests; weeds; disease; grazing and fire.

Emu swamp dam buffer area means the area surrounding the full supply level area of the Emu Swamp Dam within the geographical area as defined in the map *EMU SWAMP DAM SUPPLEMENTARY REPORT, Figure 3-1, Inundation Area and Buffer Area.*

Condition 5. Aquatic fauna passage

The approval holder must ensure that passage for *Wollumbinia belli* is not be significantly impeded by the Emu Swamp Dam.

Definition:

Significantly impeded means a negative effect on any population of *Wollumbinia belli* as a result of limited movement of the species up or down stream as a result of the Emu Swamp Dam wall.

Condition 6. Aquatic fauna passage management

The approval holder must ensure that passage for *Wollumbinia belli* through the Emu Swamp Dam must not result in mortality or injury.

Condition 7. Bell's turtle (*Wollumbinia belli*)

The approval holder must not commence construction until the Minister has approved in writing a report prepared by a suitably qualified expert demonstrating measures for passage of *Wollumbinia belli* at Emu Swamp Dam have been designed to achieve Condition 5 and Condition 6

Condition 8. Aquatic fauna passage trial

The measures to achieve Condition 5 and Condition 6 must:

(a) be informed by a turtle passage trial; and

(b) make provision for modification of the passage design in the event of non-compliance with Condition 5 and/or Condition 6.

Definition:

Commence construction means commencement of site preparation and clearing of vegetation; earthworks, civil works and associated infrastructure (such as workshop, administration facilities, and amenities facilities). Construction does not include:

(a) Minor physical disturbance necessary to establish monitoring programs; or

(b) Activities that are critical to project activities that are associated with mobilisation of plant and equipment, materials, machinery and personnel prior to the start of development or construction only if such activities have no adverse impact on a matter of national environmental significance.

Condition 9. Offset Plan

The approval holder must prepare a proposed offset plan to address, in accordance with the EPBC Act Environmental Offsets Policy 2012, significant residual impacts to:

(a) Box-gum grassy woodland - 72.3 ha

(b) Callistemon pungens - 45 plants

(c) Uvidicolus sphyrurus - 18.1 ha

Condition 10. Offset plan approval

The approval holder must not commence construction of the Emu Swamp Dam until the Minister has approved in writing the proposed offset plan.

Condition 11. Offset plan content

The proposed offset plan must include:

(a) a detailed description of the land to which the offset plan relates, the values affected and the extent and likely timing of impact on each species of threatened ecological community

(b) detailed descriptions of how significant residual impacts for the affected threatened species or threatened ecological communities will be offset in accordance with the EPBC Act Environmental Offsets Policy 2012;

(c) a management strategy for each proposed offset site detailing how it will achieve the habitat quality standards proposed in the offset strategy Emu Swamp Dam Supplementary Report (Commercial-in-confidence Offset Proposal), 21 July 2014 (Revision 2).

Condition 12. Securing offset sites

The approval holder must purchase, obtain and secure tenure for the offsets proposed in the approved proposed offset plan within two years of commencement of construction, or as otherwise directed by the Minister.

Condition 13. Offset site management

The approval holder must implement the management strategy for each proposed offset site as proposed in the proposed offset plan approved by the Minister. The approval holder must submit a report to the Minister every two years, until notified otherwise by the Minister in writing, for the life of the approval on the anniversary of commencement of the project describing implementation of each management strategy and progress towards achieving the habitat quality standards proposed in the offset strategy *Emu Swamp Dam Supplementary Report (Commercial-in-confidence Offset Proposal), 21 July 2014 (Revision 2)*.

Appendix 4. Proponent commitments

Number	Commitment
General	
	SDRC will undertake the design of the dam and the development of operational arrangements in accordance with the Water Resources (Border Rivers) Plans 2003 (amended 2011).
	SDRC will continue to implement programs to reduce water usage in SDRC region through implementation of the endorsed Drought Management Plan.
	SDRC will obtain all necessary approvals for the Project as outlined in Appendix C of the AEIS.
	The maximum size of the working corridors for the construction of the pipelines are: 12.5m for urban pipeline along the New England Highway 7.5m for irrigation pipeline along the New England Highway 5m for irrigation pipeline along local roads.
	SDRC will maintain a buffer area of approximately 200 m in width around the inundations area and a total area of 322 ha. The buffer area will protect water quality in the dam and maintain local ecological connectivity.
Topography, geology, soils and geomorphology	
	SDRC will undertake additional geotechnical investigations at the dam to confirm presence of faults. SDRC will undertake further testing of the site using pits and trenches across the dam axis prior to design to confirm that sound cut-off conditions can be established for the project.
	SDRC will undertake additional soil surveys in order to determine the full extent of sodic soils.
	SDRC will require the construction contractor to prepare a Soil Management Plan (SMP) prior to construction. The SMP must be prepared by a Certified Practicing Soil Scientist (CPSS).
	SDRC will require the construction contractor to prepare an Erosion and Sediment Control Plan (ESCP) prior to commencement of construction. The ESCP will be prepared by a Certified Practitioner in Erosion and Sediment Control (CPESC) with reference to the guidelines Best Practice Erosion and Sediment Control (IECA 2008).
	SDRC will require the construction contractor to restore areas disturbed by construction works.
	SDRC will require the construction contractor to rehabilitate areas disturbed by construction works (excluding the inundation area) using soils capable of supporting vegetation communities suitable to the local environment. The disturbed land will be rehabilitated to a condition that is self-sustaining or to a condition where the maintenance needs are consistent with the post construction land use.
Planning and land use	
	Construction activities and the sourcing of most materials for the dam wall will be conducted within properties acquired for the dam.
	SDRC will remove all site infrastructure including landscaping, to ensure the site is compatible in the long term with the surrounding land uses following completion of construction works.

	SDRC will maintain access to properties affected by the construction of the pipeline through temporary alternative arrangements.
Land contamination	
	SDRC will prepare an Environmental Management Plan containing procedures for the correct disposal of any potentially contaminated soil.
	In the event of a large spill of chemicals, fuels, oils and any other hazardous matter, the site will be investigated, managed and remediated in accordance with the requirements of the *Environmental Protection Act 1994*.
	Standard procedures for the storage, handling, disposal and spill response for potentially hazardous waste materials will follow the Emergency Management Plan.
	Chemical storage will comply with Australian Standards and Material Safety Data Sheets (MSDS) requirements. MSDS for products kept on site will be readily available to employees and contractors.
Surface water resources	
	SDRC will construct a gauging station upstream of the proposed dam before construction commences.
	SRDC will construct and operate the dam in accordance with the Border Rivers Resource Operations Plan (as amended May 2011), to satisfy both the Environmental Flow Objectives (EFOs) and Water Allocation Security Objectives (WASOs).
	SDRC will design and construct all proposed drainage structures associated with the dam including those necessary for supporting facilities such as access roads to the appropriate design standards. All designs will incorporate an appropriate level of flood immunity, minimisation of impacts to upstream landholders and mitigation of the impacts of velocity and scour.
	SDRC will design and construct the RCC Wall and spillway in accordance with the standards set out in the Australian National Committee on Large Dam (ANCOLD) guidelines.
	SDRC will construct temporary water storages in the construction area and treat and reuse construction water onsite to reduce the impact on other regional water sources.
Surface water quality	
	SDRC will develop and implement site specific water quality guidelines in a construction EMP.
	SDRC will develop and implement ESCP to protect the water quality in the dam and downstream of any construction areas.
	SDRC will require the construction contractor to implement a program of manual collection of TSS and turbidity fortnightly during construction, inclusive of a variety of weather and runoff conditions.
	SDRC will monitor turbidity and TSS during the first year of operations on a monthly basis to establish change in the relationship during infilling and operation.
	SDRC will monitor fish, bivalves and sediment at the deepest point within the dam and at one site downstream (<2km from the dam wall) annually for the life of the monitoring program.
	SDRC will ensure that appropriate oil containment and oil spill recovery equipment will be available. Emergency response plans will be developed to manage any incidents.

	SDRC will install fixed site water quality loggers at the outlet pipe which is connected to the Urban Pipeline to ensure that water sourced by the Mt Marlay Water Treatment Plant is of a satisfactory quality.
	SDRC will undertake a routine (quarterly) water quality monitoring program in the dam for the first 3 years of operation for the following parameters: temperature, pH, and turbidity; nuisance algae (with specific reference to blue-green algae) and chlorophyll-a; and DO, Total Phosphorus, Total Nitrogen, Iron and Manganese.
	SDRC will develop and implement a baseline monitoring program for pesticide and herbicide use in drinking water catchments. Monitoring should be implemented in order to ensure that there are no cumulative effects caused by the dam. If exceedance values, listed in the ANZECC guidelines are reached then targeted monitoring upstream should be conducted in order to locate the source.
	SDRC will ensure that controlled burning/slashing and removal of the grass vegetation to ensure water quality in the lake is maintained.
Groundwater	
	SDRC will undertake grouting of the dam foundation and installation of drains to control groundwater pressure and reduce the seepage loss
	SDRC will establish observation bores in the vicinity of the dam to monitor changes in groundwater levels and groundwater quality 12 months prior to construction and during the first 12 months of the dam operations. Groundwater monitoring will be undertaken on a quarterly basis.
	On-going groundwater monitoring will be undertaken in the immediate vicinity of the dam wall as part of any geotechnical requirements for the Project.
Terrestrial ecology	
	SDRC will avoid threatened flora and vegetation communities along the urban and irrigation pipelines. SDRC will undertake the following during detailed design and construction: review of vegetation mapping field survey of mapping of vegetation communities and threated flora determine appropriate design and construction solution closely supervise construction rehabilitation maintenance.
	SDRC will modify the alignment of the proposed access road to Stalling Lane to avoid impacts on *Acacia Pubifolia* and *Callistomen Pungens*.
	SDRC will manage the buffer area for conservation purposes. SDRC will develop a Buffer Area Management Plan to provide specific measures for the regeneration of this area. The vegetation buffer area is of sufficient size and configured in a way to maintain local ecological connectivity.
	SDRC will fence the buffer area to exclude cattle and other animals.
	SDRC will meet the Project's offset requirement for residual impacts on MNES by securing and managing direct, land based offsets. SDRC will legally secure the final offset area using a legally binding mechanism. The final offset package will be agreed with DotE and offsets will be secured prior to the commencement of clearing activities.
	SDRC will meet the Project's offset requirement for residual impacts on MSES through a land-based offset or an offset payment.

	SDRC will prepare an Offset Area Management Plan (OAMP) for each of the final offset areas. The OAM will be developed in consultation with landholders, government agencies, specialists, qualified ecologists and on-ground providers. SDRC will ensure offset areas are managed by appropriately experienced and qualified personnel.
	SDRC will mitigate direct and indirect impacts to the EPBC listed White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland by: progressive rehabilitation of pipeline construction corridors with native ground covers and shrubs rehabilitation of the community in the buffer area in accordance with "A guideline for managing Box-Gum Grassy Woodlands (Rawlings *et al.* 2010) the removal of weeds in the buffer area and along the pipeline routes.
	SDRC will develop and implement a Weed Management Plan (WMP) for the buffer area, access road to Stalling Lane and urban and irrigation pipelines. Specific control techniques for highly invasive species identified in the locality will be incorporated into the WMP. Only trialled, successful methods will be incorporated into the WMP.
	SDRC will propagate threatened flora species occurring in the inundation area of the proposed dam. Threatened plants will be propagated in accordance with the principles described in Vallee *et al.* (2004) and under the guidance of the OAMP. The OAMP will cover all aspects of seed collection, cutting collection, propagation, retrieval of whole plants from clearing areas, transport, hygiene, planting, timing, maintenance and monitoring.
	SDRC will develop and implement a vertebrate pest management plan across the project area targeting foxes, pigs, cats and wild dogs.
	SDRC will salvage suitable habitat features such as large rocks and logs from the inundation area and place these into suitable habitats in adjacent buffer areas.
	SDRC will undertake pre-clearing surveys of suitable habitat within the inundation area and relocated individual Granite Belt Thick-Tailed Geckos into suitable habitats within the buffer area.
	SDRC will develop and implement an EMP including the following specific measures: areas to be cleared will be clearly marked by tape, pegs and other means staged clearing to allow safe dispersal of fauna sequential clearing in direction away from threatening processes fauna/spotter catchers present during clearing activities.
Aquatic ecology	
	SDRC will construct a plunge pool that is the same width of the spillway and to consult with DAFF and EHP in on the determining the appropriate depth and length.
	SDRC will construct a lock-style fishway on the proposed dam to provide fish movement both up and downstream. The detailed design of the fishway will reflect the ecology and swimming ability of the river's fish community.
	SDRC will prepare a detailed operating manual for the fishway, including all contingency plans. The operation manual will be included with the application for constructing the waterway barrier works.

	SDRC will undertake aquatic ecology monitoring during construction and operation to confirm the absence of direct impacts to key species including: targeted turtle surveys for Bell's turtle in the vicinity of the dam during a high activity period (October to December); and targeted searches for platypus burrows in the inundation area.
	SDRC will include design features on the proposed dam to enable the passage of each species of turtle likely to be found, including Bell's Turtle. The design features will be produced in collaboration with DEHP.
	SDRC will undertake a turtle monitoring program for a two year period after construction to assess the effectiveness of turtle passage at Emu Swamp Dam. SDRC will consult with DEHP regarding the design of the turtle monitoring program
	SDRC will maintain riparian habitat and in-stream woody debris along dam margins.
	SDRC will maintain passage for aquatic fauna during construction using diversion channels.
	SDRC will prepare a management plan to control exotic and pest species such as mosquitofish and goldfish.
	SDRC will undertake surveys of existing privately owned weirs upstream and downstream of the proposed dam. A team of specialists in consultation with Queensland Fisheries will develop concept designs to improve fish passage at existing weirs. SDRC will engage with weir owners, make concept designs available and a demonstration fishway will be constructed at one of the existing weirs, with the owner's permission, as part of the Project.
Air Quality and greenhouse gases	
	SDRC will require the construction contractor to comply with air quality management measures in the Environmental Management Plan.
	SDRC will require the construction contractor to undertake dust deposition monitoring in the vicinity of sensitive receptors adjacent to the construction site throughout the duration of construction.
	SDRC will require the construction contractor to undertake continuous air quality monitoring throughout the construction period to determine compliance with the air quality objectives.
	SDRC will actively investigate any dust complaint expeditiously and the complainant will be consulted on the outcomes and proposed future actions.
	SDRC will review annual energy use during operation of the dam to assist with on-going management of energy efficiency.
Noise and vibration	
	SDRC will arrange an alternative agreement for affected persons due to noise levels exceeding the noise criteria.
	SDRC will undertake a noise impact assessment will be undertaken for the pump station sites, once the sites have been finalised.
	SDRC will require the construction contractor to adhere to the construction noise and vibration goals for the Project.
	SDRC will require the construction contractor to prepare a Noise and Vibration Management Plan to minimise the noise levels emitted from the construction site.
	SDRC will provide acoustic treatment to both of nearest sensitive receptors to comply with the sleep disturbance criteria.

	SDRC will require the construction contractor to undertake pre-condition surveys for all properties within 1km of the dam construction site.
	SDRC will require the construction contractor to undertake post-condition surveys to confirm blasting for dam construction has not resulted in impacts to property.
	SDRC will require the construction contractor to notify all residents within a 1km radius of the blasts to be notified of the blasting activates by at least Monday morning of the week of the blast via letter drop. The notification will include the proposed blasting works including days of the week, time of the day, number of blasts etc.
	SDRC will require the construction contractor to undertake environmental noise compliance monitoring at the nearest sensitive receptor: at the commencement of construction activities; in response to a noise complaint; and where a review of upcoming construction schedule indicates a high likelihood for impact.
	SDRC is committed to investigate all complaints about noise promptly and appropriate action will be taken to reduce nuisance impacts. A register of noise complaints will be maintained.
Transport and infrastructure	
	SDRC is committed to providing a Traffic Management Plan (TMP) to DTMR prior to the submission of relevant operational works applications. The objective of the TMP is to manage the safety and performance of motorists and during construction. This plan will be developed in consultation with the relevant authorities and local community stakeholders.
	SDRC will fund any new infrastructure and the relocation of infrastructure required by the project
	SDRC is committed to providing a Road Impact Assessment, Road Use Management Plan and Pavement Impact Assessment. These assessment and plans will be developed in consultation with the relevant authorities and local community stakeholders.
	SDRC will require the construction contractor to operate a bus service for the construction work force between the construction site and Stanthorpe to reduce construction traffic.
	SDRC is committed to consulting with the DTMR: during the detailed design phase regarding maintenance access requirements for the pipeline within state-controlled road reserves providing ‘as constructed’ drawings.
	The use of a Channelised Right Turn Treatment with reduced length of right turn slot CHR(S) into Fletcher Road as part of the new intersection configuration will be discussed and agreed with DTMR with outcomes incorporated into the design of the intersection upgrade prior to construction.
	SDRC proposes to construct the final access road to the recreation area during construction to minimise noise impacts from machinery and construction traffic.
	As part of the Construction Communication Program a system of complaint reporting, investigation and response will be initiated allowing the local community the opportunity to provide feedback on traffic and safety issues.

	SDRC will require the construction contractor to use established truck routes and arterial roads for the haulage of construction materials in order to minimise truck traffic on local roads. Construction materials will not be brought to site at night to minimise amenity impacts.
	Any roads damaged by haul trucks during construction will be repaired post-construction. Any infrastructure to be relocated will be within existing infrastructure corridors, such as road reserves so that disturbance to land and vegetation is minimised.
Socio-economic	
	SDRC will implement an Employment and Training Strategy in consultation with key stakeholders, including local secondary schools, TAFE, employment services and training providers.
	SDRC will consult with community support agencies regarding rental impacts on low income earners and accommodation providers to ensure accommodation demands can be appropriately managed
	SDRC is committed to maximising opportunities for local business and industry from the project. This would include: sourcing construction materials from local industries and manufacturers consultation with local contractors and suppliers to identify potential opportunities and maximise benefits for local residents
	During the approvals and construction phase of the Project, SDRC will continue ongoing communications with the local community and stakeholders regarding such things as the Project approval process, timelines, key project milestones, regular construction updates, advice on blasting, transport issues and the results of EMP monitoring.
	SRDC will provide a complaints response system including promotion and provision of phone contact with construction management staff during hours of construction, and a follow up procedure which notifies complainants within 24 hours of the intended response to the issue raised.
Cultural heritage	
	SDRC will review the Cultural Heritage Management Plan (CHMP) with endorsed Aboriginal parties to manage the Aboriginal cultural heritage of the area in a culturally appropriate fashion in the context of the proposed development.
	SDRC will require the construction contractor to incorporate cultural heritage awareness into worker induction programs to minimise the risk of accidental damage to Aboriginal cultural heritage features.
	SDRC will undertake a systematic assessment of the Severn River Mining Precinct to ensure that the type and extent of any surviving archaeological material is researched, investigated, recorded and mitigated (if required).
	SDRC will develop a Heritage Management Plan (HMP) for the entire Project area prior to construction outlining a suitable strategy to protect sites and places of cultural heritage significance.
Visual amenity	
	SDRC/construction contractor will protect any native vegetation within the construction area with particular emphasis on conserving vegetation downstream, of the dam wall to act as a visual screen.
Waste management	
	SDRC will require the construction contractor to use recyclable materials for construction to promote cleaner production initiatives.

	SRDC will develop a waste management plan for the site which will include monitoring and auditing. This will include mechanisms to: reduce the amount of wastes generated where possible wastes (other than natural earth, soil or rocks) will be collected in suitable skips or bins reusing or recycling wastes at an appropriate facility will be done where feasible.
	Any wastes generated will be disposed at an appropriate licensed landfill and a licensed waste contractor will be used to transport wastes off site.
	Any hazardous materials used on site will be recorded in a Hazardous Materials Register.
	A waste management procedure will be developed, incorporating an approved waste tracking system for those wastes requiring tracking.
Hazard safety and risk	
	During construction SDRC will implement safety standards and occupational health standards that provide a basis for effective management of employee and public health and safety.
	SDRC will provide first aid and emergency rescue facilities and equipment during all phases of the Project. SDRC will ensure that appropriately trained personnel will be on site throughout the life of the project to provide first aid and respond to on-site emergencies as required.
	SDRC is committed to liaising with the DCS during the development of emergency plans including the development of fire management plans.
	MSDS information will be obtained and communicated to all site personnel involved in the storage, handling, use and disposal of hazardous substances and martials.
	SDRC will develop an Emergency Action Plan (EAP) for the dam. In developing the EAP, SDRC will undertake the following steps: determine and identify those conditions that could forewarn of an emergency and specify the actions to be taken and by whom and under what circumstances in consultation with the District Disaster Coordinator (DDC) for the impacted area (or the Disaster District Manager from the DCS), identify all jurisdictions, agencies and individuals who should be involved in the EAP (for example, local government, the Queensland Police Service and downstream residents); and identify response actions to be taken in response to potential emergencies.
	SRDC will liaise with local State Emergency Services and local paramedic and hospital services with respect to planning for Emergency response.
	SRDC will complete a Failure Impact Assessment Study according to ANCOLD guidelines. This will include safety management systems that will be developed for all operations in line with current guidelines as published by ANCOLD.
	An updated Operations and Maintenance manual will be prepared for the dam.

Appendix 5. Threat abatement plans and species recovery plans

Schedule 1. Threat abatement plans

Part A. Threat Abatement Plan for Predation by the European Red Fox

The goal of the threat abatement plan (TAP) is to minimise the impacts of foxes on biodiversity in Australia. The five main objectives and associated recovery actions in order to achieve this goal are as follows:

(a) Preventing foxes occupying new areas in Australia and eradicate foxes from high-conservation-value 'islands' by:

  (i) collating data on offshore islands and developing and implementing management plans to prevent, monitor, contain and eradicate any fox incursions.

(b) Promoting the maintenance and recovery of native species and ecological communities that are affected by fox predation by:

  (i) identifying priority areas for fox control and conducting and monitoring regional fox control in these areas

  (ii) applying incentives to promote and maintain on private or lease-hold land within or adjacent to priority areas.

(c) Improving knowledge and understanding of fox impacts and interactions with other species and other ecological processes by:

  (i) developing simple and cost effective methods for monitoring populations and impacts of foxes

  (ii) investigating interactions between foxes and native carnivores

  (iii) determining the nature of interactions between foxes and other pest animals

  (iv) identifying unintended effects of fox control conducted in isolation

  (v) estimating the environmental and other costs of impacts from foxes.

(d) Improving the effectiveness, target specificity, integration and humaneness of control options for foxes by:

  (i) conducting further work on the development of new, or improvements to existing control techniques

  (ii) investigating feasibility of control techniques to target foxes and not dingos in some areas

  (iii) developing training programs to assist land owners control foxes

  (iv) ensuring habitat rehabilitation and management of potential prey, competitors and predators of foxes are considered in fox control programs

  (v) continuing to promote procedures for the humane management of foxes.

(e) Increasing awareness of all stakeholders of the objectives and actions of this TAP, and of the need to control and manage foxes by:

  (i) promoting understanding of the threat to biodiversity posed by foxes and support for their control, including the use of humane and best-practice cost-effective controls.

Part B. Threat Abatement Plan for the Biological Effects, Including Lethal Toxic Ingestion Caused by Cane Toads

The goal of the TAP is to address the key threatening process (lethal toxic ingestion) of this species on native fauna in a feasible, effective and efficient manner. The three main objectives and associated recovery actions in order to achieve this goal are as follows:

(a) Identifying priority native species and ecological communities at risk from the impact of cane toads by:

  (i) Identifying native species, ecological communities and off-shore islands currently known to be at high to moderate risk.

  (ii) Identifying the ways in which cane toads impact the native species and ecological communities listed in (a)(i)

  (iii) Establishing and supporting research where impacts are unknown but may be high, to further understand the impact of cane toads on the native species and ecological communities. Where appropriate, research ways to assist with the recovery of priority native species and ecological communities.

  (iv) Developing a prioritisation tool to guide allocation of resources for protection of native species and communities. Apply it to native species and ecological communities identified: first from (a)(i), then from (a)(iii).

(b) Reducing the impact of cane toads on populations of priority native species and ecological communities by:

  (i) Focusing the management of cane toad impacts by Australian Government agencies on designated high priority native species and ecological communities, and seek cooperative action on priorities by jurisdictions and other stakeholders

  (ii) Implementing and monitoring emergency management of cane toad impacts for known high priority native species and ecological communities using currently available tools and techniques (e.g. trapping, fencing of small areas, manual removal from designated sites)

  (iii) Implementing or adjusting the management of cane toad impacts using available tools and techniques as new species and communities are added to the list of priority native species and ecological communities. Additional tools and techniques will become available with the registration of toxins for euthanasia of captured toads and development of other impact management or cane toad control techniques. Codes of practice and standard operating procedures for cane toad control will provide guidance on these techniques.

  (iv) Preparing guidelines, including codes of practice and standard operating procedures that can be applied to both emergency responses and on-going management for high priority native species and ecological communities for endorsement by the VPC.

  (v) Preparing and implementing management plans, (including identifying and addressing gaps in management techniques and tools) for designated high priority species and ecological communities on land managed by Australian Government agencies.

  (vi) Providing the guidelines for emergency and on-going cane toad management to all stakeholders. Liaising with responsible jurisdictions/agencies to encourage the preparation and implementation of such plans in their areas of responsibility. Where mutual obligations exist the Australian Government will work cooperatively to prepare such plans.

(vii) Monitoring the development and implementation of guidelines and cane toad management plans for designated high priority species and ecological communities.

(viii) Monitoring the literature about the spread and impact of the cane toad and review/amend guidelines and develop new management plans as required.

(ix) Establishing guidelines for humane management actions to control cane toads for VPC and Animal Welfare Committee endorsement.

(x) Distributing guidelines to all Australian Government agencies with land management responsibilities.

(xi) Seek cooperative adoption of guidelines by states/territories including incorporation in state based regulations as appropriate.

(c) Communicating information about cane toads, their impacts and the TAP by:

(i) Implementing a one-stop-shop webpage on the Department of Environment website with links to jurisdictional and stakeholder information on cane toads and including information on:

(1) the threat cane toads pose to biodiversity

(2) management actions to limit this threat

(3) guidelines for cane toad management

(4) information to help identify cane toads from other amphibians

(5) codes of practice and standard operating procedures

(6) management plans (as they are developed) for areas designated as high priority.

(ii) Encouraging monitoring, evaluation and reporting on cane toad management actions is maintained and communicated to stakeholders.

(iii) Ensuring Australian Government fact sheets and other communications material on cane toads are current and reflect the strategy developed in this TAP.

Part C. Threat Abatement Plan for Disease in Natural Ecosystems Caused by *Phytophthora cinnamomi*

The goal of the TAP is to minimise the impacts of *Phytophthora cinnamomi* on matters on national environmental significance (MNES) under the EPBC Act and priority biodiversity assets (that will include MNES) identified by the actions of the TAP. The three main objectives and associated recovery actions in order to achieve this goal are as follows:

(a) Identifying and prioritising for protection of biodiversity assets that are, or may be, impacted by *P.cinnamomi by:*

(i) Identifying species and communities at risk through assessing state/territory and Commonwealth lists of threatened species.

(ii) Identifying impacts and prioritising flora, fauna and communities at risk to inform *P.cinnamomi* management.

(iii) Identifying risk areas spatially to generate lists of biodiversity assets at risk from Phytophthora dieback—develop or utilise existing prioritisation frameworks.

(iv) Identifying priority biodiversity assets and areas for protection at a local scale—develop or utilise existing prioritisation frameworks.

(v) Improving and maintaining current monitoring programs.

(b) Protecting priority biodiversity assets through reducing the spread and mitigating the impacts of *P.cinnamomi* by:

(i) Assessing the appropriateness of registration of phosphite for management of *P.cinnamomi* in natural ecosystem contexts. If appropriate and feasible, initiate registration by the Australian Pesticides and Veterinary Management Authority.

(ii) Implementing control actions to protect priority biodiversity assets (as identified under Objective 1) from the impacts of *P.cinnamomi*.

(iii) Developing and implementing practices to minimise the inadvertent spread of *P.cinnamomi* to priority biodiversity assets.

(iv) Integrating management of *P.cinnamomi* with other natural resource management systems.

(v) Preparing guidelines to minimise risks from *P.cinnamomi* arising from Australian Government environment funding programs.

(c) Communication and training by:

(i) Determining stakeholders, key messages and the most efficient means of communicating with stakeholders on issues relating to *P.cinnamomi* impacts on priority biodiversity assets

(ii) Building awareness, developing and providing training for industry, land and tourism managers, peak organisations (recreation and outdoor education) and recreation clubs and societies.

(iii) Developing or adopting a national system of signage and alerts to guide park visitors and land managers in affected priority areas.

(iv) Acquiring and maintaining up to date information on *P.cinnamomi* and the progress of the TAP.

(v) Encouraging new partnerships (e.g. through the Australian Research Council or forestry, mining and nursery industries) to support the funding of research relating to the management of *P.cinnamomi* (and other Phytophthora species).

(vi) Increasing understanding of factors affecting pathogen distribution and expression (including climate change).

(vii) Undertaking susceptibility/natural resistance screening of priority species.

(viii) Developing improved techniques for rapid diagnosis of *P.cinnamomi* infestation, e.g. building on existing efforts for detection via water sampling, testing large volumes of soil (or quarried material) or remote methods such as use of digital multi-spectral imagery.

(ix) Assessing current disease management practices and explore scope for improvement.

(x) Undertaking further (new) research into efficient and cost effective (nationally applicable) techniques for:

(1) eradication methods for soil types other than porous soils (for which a method exists)

(2) management of impact through transferring resistant genes into taxa that show little resistance to *P.cinnamomi*.

(xi) Developing methods for restoration of priority sites that are degraded by *P. cinnamomi*.

(xii) Establishing repositories for collections of *P.cinnamomi* cultures and nationally available standards for collection and analysis of *P.cinnamomi* samples, in order to facilitate research on the genetic basis of resistance and genetic diversity of *P.cinnamomi.*

Part D. Threat abatement plan for competition and land degradation by unmanaged goats

The goal of this TAP is to minimise the impact of unmanaged goat competition and land degradation on biodiversity in Australia and its territories by:

- protecting affected native species and ecological communities
- preventing further species and ecological communities from becoming threatened.

The five main objectives and associated recovery actions in order to achieve this goal are as follows:

(a) prevent unmanaged goats occupying new areas in Australia and eradicate them from high-conservation-value 'islands' by:

  (i) Collating data on offshore islands, and on isolated mainland 'islands', assess their conservation value, the likelihood of significant biodiversity impacts from unmanaged goats, and if there are no goats, rank the level of risk from them being introduced and establishing populations

  (ii) Develop management plans to prevent, monitor and, if incursions occur, contain and eradicate any incursion by unmanaged goats, for 'islands' with high conservation values

  (iii) Implement management plans for high-conservation-value 'islands', including prevention and monitoring actions, and containment or eradication actions if incursions occur.

  (iv) Eradicate established populations of unmanaged goats from 'islands' with high conservation values where this is cost-effective, feasible and a high conservation priority.

(b) promote the maintenance and recovery of native species and ecological communities that are affected by competition and land degradation by unmanaged goats by:

  (i) Identify priority areas to control unmanaged goats

  (ii) Conduct and monitor regional goat control, through new or existing programs, in priority areas

  (iii) Apply incentives to promote and maintain on-ground control of unmanaged goats on private or leasehold lands within or adjacent to priority sites.

(c) improve knowledge and understanding of unmanaged goat impacts and interactions with other species and other ecological processes by:

  (i) Developing simple and cost-effective methods for assessing and monitoring the impact of unmanaged goats relative to other sources of impact, including reliable methods for monitoring their numbers and their effects at different densities on key native species

  (ii) Investigating interactions between unmanaged goats, other livestock species, rabbits, macropods and wild dogs to determine optimal approaches to integrated management of these species in the rangelands

  (iii) Identifying any unintended effects that controlling unmanaged goats may have if conducted in isolation from other management activities

  (iv) Investigating the relationship between unmanaged goat density and damage and benefits in different ecosystems.

(d) improve the effectiveness, target specificity and humaneness of control options for unmanaged goats by:

(i) Investigating opportunities to improve self-mustering trap systems that operate within a scheme of total grazing management, as well as investigate the potential of bore capping and new technologies to increase the effectiveness of waterpoint trapping

(ii) Assessing goat toxins for undesirable side-effects, such as off-target species impacts

(iii) Testing and disseminating information on exclusion fence designs regarding their cost-effectiveness for particular habitats or topography.

(iv) Developing training programs to help land managers identify locally appropriate control methods and the circumstances and times in which to apply them.

(v) Continuing to promote the adoption and adaptation of the model codes of practice and standard operating procedures for humane management of goats, in conjunction with the national feral livestock code of practice.

(vi) Promoting commercial use approaches that complement conservation objectives

(vii) Investigating the potential to integrate a range of conventional control techniques to eradicate isolated or island populations of unmanaged goats.

(e) increase awareness of all stakeholders of the objectives and actions of the TAP, and of the need to control unmanaged goats by:

(i) Promoting:

(1) broad understanding of the threat to biodiversity posed by unmanaged goats and support for their control

(2) basic protocols for effective control of unmanaged goats in conservation areas and farmlands including, for example, with primary producers of goats

(3) the importance of competition and land degradation by unmanaged goats as a key threatening process

(4) understanding and adoption of the actions to be undertaken under this plan

(5) the use of humane and cost-effective goat control methods

(6) the involvement of the community in controlling unmanaged goats.

(ii) Comparing the economic costs and environmental benefits of control activities.

Part E. Threat abatement plan for predation by feral cats

The goal of the TAP is to minimise the impact of feral cats on biodiversity in Australia and its territories by:

- Protecting affected native species and ecological communities
- Preventing further species and ecological communities from becoming threatened

The five main objectives and associated recovery actions in order to achieve this goal are as follows:

(a) Prevent feral cats occupying new areas in Australia and eradicate feral cats from high-conservation-value ‘islands’ by:

(i) collating data on offshore islands and developing and implementing management plans to prevent, monitor, contain and eradicate any cat incursions

(ii) working with communities to prevent incursion

(iii) monitoring native prey species in areas eradicated of cats.

(b) Promote the maintenance and recovery of native species and ecological communities that are affected by feral cat predation by:

(i) identifying priority areas for cat control and conducting and monitoring regional cat control in these areas

(ii) applying incentives to promote and maintain on private or lease hold land within or adjacent to priority areas.

(c) Improve knowledge and understanding of feral cat impacts and interactions with other species and other ecological processes by:

(i) Developing simple, cost-effective methods for monitoring the impacts of feral cats, including reliable methods for monitoring feral cats and key native species at different densities

(ii) Investigating interactions between feral cats and native carnivores to identify the relative significance of competition and predation by feral cats

(iii) Determining the nature of interactions between feral cats, foxes and wild dogs to effectively integrate control activities for all three species

(iv) Determining impacts of cat-borne diseases, such as toxoplasmosis, on native species.

(v) Identifying any unintended effects that feral cat control may cause if conducted in isolation from other management activities.

(d) Improve effectiveness, target specificity, humaneness and integration of control options for feral cats by:

(i) developing an effective toxin-bait for cats

(ii) determining appropriate baiting strategies

(iii) ensuring habitat rehabilitation and management of potential prey

(iv) testing and disseminating information on exclusion fence designs regarding cost-effectiveness

(v) continuing to promote the adoption and adaptation of model codes of practice and standard operating procedures for the humane management of feral cats.

(e) Increase awareness of all stakeholders of the objectives and actions of the TAP, and of the need to control and manage feral cats by:

(i) promoting understanding of the threat to biodiversity posed by feral cats and support for their control, including the use of humane and best-practice cost-effective controls

(ii) developing communication campaigns to accompany the release of new broadscale cat control techniques.

Schedule 2. Species recovery plans

Part A. National Recovery Plan for the Large-eared Pied Bat *Chalinolobus dwyeri*

The overall objective of the *National Recovery Plan for the Large-eared Pied Bat Chalinolobus dwyeri* is to ensure the persistence of viable populations of the large-eared pied bat throughout its biogeographic range.

Specific objectives and a summary of their recovery actions, identified in the recovery plan are as follows:

(a) Identifying priority roost and maternity sites for protection by:

(i) undertaking a review of all existing information on the large-eared pied bat

(ii) identifying and mapping known colonies within New South Wales and Queensland to develop habitat models

(iii) identifying priority colonies and sites for conservation management and protection

(iv) identifying and locate roost structures such as cave systems, old mine sites and geological formations that require surveying

(v) undertaking targeted surveys for the species to clarify distribution and abundance to identify priority roost sites for management prescriptions

(vi) producing revised distribution and habitat model and report on findings with recommendations for conservation and threat abatement.

(b) Implementing conservation and management strategies for priority sites by:

(i) protection of known roosts and associated foraging habitats and management of threats

(ii) installation of bat gates and remedial works at sites where required

(iii) establishing fire prescriptions for areas around each identified priority roost or maternity site

(iv) conducting a program to control introduced species, such as goats, where necessary

(v) undertaking monitoring to assess the impact of prescribed management strategies

(c) Educating the community and industry to understand and participate in the conservation of the large-eared pied bat by:

(i) initiating education and extension programs to increase the awareness and participation in the recovery plan

(ii) encouraging and assist community and industry groups to be involved in the recovery process

(iii) developing press releases for media and stakeholder groups to increase awareness and advise of progress.

(d) Researching the large-eared pied bat to augment biological and ecological data to enable conservation management by:

(i) Developing and implementing a research strategy that covers the following:

(1) Investigation of habitat requirements and determining factors responsible for the patchy distribution of the species

(2) Investigating roost and maternity sites to determine factors influencing selection and management

(3) Investigating diet and foraging strategy

(4) Identifying threatening processes.

(e) Determining the meta-population dynamics throughout the distribution of the large-eared pied bat by:

(i) Collecting and analysing genetic material from individuals across geographic range of large-eared pied bat to facilitate analysis of population genetics.

Part B. National Recovery Plan for the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland

The overall objective of the *National Recovery Plan White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* is to promote the recovery and prevent the extinction of the critically endangered ecological community, known as box-gum grassy

woodland. The specific objective to be achieved within the life-span of this recovery plan is to minimise the risk of extinction of the ecological community through:

- achieving no net loss in extent and condition of the ecological community throughout its geographic distribution
- increasing protection of sites with high recovery potential
- increasing landscape functionality of the ecological community through management and restoration of degraded sites
- increasing transitional areas around remnants and linkages between remnants
- bringing about enduring changes in participating land manager attitudes and behaviours towards environmental protection and sustainable land management practices to increase extent, integrity and function of box-gum grassy woodland.

Specific objectives and a summary of their recovery actions, identified in the recovery plan are as follows:

(a) Improve baseline information by:

  (i) Establishing agreed protocols across jurisdictions for the assessment of box-gum grassy woodland condition in year 1 of the recovery plan implementation, and apply these on an ongoing basis.

  (ii) Sharing data and reporting between jurisdictions, government and non-government agencies.

  (iii) Investigating the occurrence of box-gum grassy woodland in South Australia.

  (iv) Collating existing survey and mapping data relating to box-gum grassy woodland into a central, updatable repository for use by stakeholder government agencies in mapping extent, protected areas and priority areas. Update repository on an annual basis.

  (v) Identifying gaps in survey and mapping data across the predicted distribution of box-gum grassy woodland and engage communities and conduct future surveys to fill these gaps.

  (vi) Investigating the further use of remote sensing and other assessment techniques to assist with the preceding actions and with actions (b)(ii), (b)(iii) and (b)(iv).

  (vii) Establishing and applying protocols for non-technical monitoring of remnant areas. These should include as many of the elements as possible of the condition assessment protocols developed in (a)(i). These protocols are to reflect the condition assessment protocols developed under action (a)(i).

  (viii) Identify gaps in current monitoring to ensure the geographic range and ecological variation within the ecological community is represented, and to coordinate implementation and analysis of all monitoring.

  (ix) Improve baseline knowledge of condition and generate benchmark data against which sites can be assessed for management actions and cost effectiveness of revegetation ranked.

(b) Increase protection of box-gum grassy woodland by:

  (i) Developing and implementing an agreed strategy across jurisdictions for the establishment of a comprehensive, adequate and representative system of protected box-gum grassy woodland sites.

  (ii) Identifying gaps in current reserve and off-reserve conservation protection in representing the geographic and ecological variation within the ecological community.

(iii) Using results of action (b)(ii) identify key box-gum grassy woodland sites to be considered for acquisition by government and non-government acquisition programs, including degraded areas for restoration.

(iv) Using results of action (b)(ii), identify key sites important to the maintenance/improvement of landscape connectivity of box-gum grassy woodland remnants to be managed under conservation agreements or similar protection mechanisms.

(v) Negotiating protection for identified sites through a range of non-government organisations and Government in-perpetuity conservation and management agreements and protective covenants.

(vi) Continuing to encourage provision and uptake of funding for incentive and long-term stewardship schemes that target protection of box-gum grassy woodland remnants, especially on private land.

(vii) Avoiding where possible the conversion of public land containing box-gum grassy woodland to freehold and ensure it is managed appropriately.

(viii) Developing and implementing management plans incorporating best practice management for priority box-gum grassy woodland sites, including all reserves and public land sites.

(ix) Developing quantitative targets for areas reserved, improved and managed for conservation purposes.

(c) Improve community engagement by:

(i) Supporting the continued operation of the conservation management network (CMNs) in New South Wales, and extension of the grassy box woodland (GBW) CMN into Queensland and the Australian Capital Territory including employment of a national coordinator. Support continued operations of CMNs or other effective groups in Victoria (via bioregional networks or priority area basis).

(ii) Employing 10 part-time facilitators across the geographic extent of box-gum grassy woodland to support land managers and facilitate the implementation of actions in this recovery plan. Close consultation with regional natural resource management agencies will be encouraged to avoid duplication of effort. Provide further training and support to current extension staff in the conservation of box-gum grassy woodland.

(iii) Developing and maintaining a central database to support the implementation of the recovery plan including details of box-gum grassy woodland sites across the range of tenures and jurisdictions, details of conservation agreements/reservation areas, management activities, monitoring results and details of other initiatives as deemed appropriate.

(iv) Educating stakeholders in the identification, management, monitoring and benefits of box-gum grassy woodland remnants, including local government and state government infrastructure management agencies, through the distribution of information material, newsletters, exhibits at field days, workshops and training.

(v) Identifying Aboriginal interest in box-gum grassy woodland sites and facilitate Indigenous involvement in conservation management of remnant box-gum grassy woodland on Aboriginal and public land for the 5 year duration of the recovery plan.

(vi) Installing markers and signs, including utilising current signage programs, to indicate the location of high quality occurrences of Box-Gum Grassy Woodland along linear reserves including: roads, tracks, rail and utility easements.

(d) Continue ecosystem function and management research by:

(i) Investigating the long-term effects of management activities (e.g. grazing, fire regimes, mowing/slashing, fertilising, chemical use, regeneration, hydrology and drainage, feral animal control, weed control and prevention, cultivation), through research and monitoring of box-gum grassy woodland at selected sites across its range.

(ii) Identifying best practice models from existing research and individual site success (e.g. GBW CMN and action (c)(iii) to promote to stakeholders.

(iii) Identifying sites with high recovery potential and target restoration at these remnants for cost-effectiveness. Ensure identified sites cover a range of condition states (Appendix 3 of the recovery plan) so that cost effective models are investigated to improve functionality (transition of State 3 to State 2) and to restore understorey species (transition of State 2 to State 1).

(iv) Investigating the impact of high threat weeds on component species and develop control methods that will not adversely impact the existing diversity in Box-Gum Grassy Woodland. Nominate high threat weeds not already listed for noxious weed status in each jurisdiction.

(v) Surveying and analyse the distribution of component species other than vascular plants, (e.g. invertebrates, reptiles, birds and non-vascular plants), to gain an understanding of geographic variations and ecological relationships, and their management needs. Investigate the potential to develop faunal groups as indicators of condition. Incorporate research results into management practices including any regional differences.

(vi) Monitoring condition and diversity of protected sites under varying management regimes. Identify regional differences and causes.

(vii) Continuing to disseminate research results to stakeholders. Link with other organisations and programs (e.g. Greening Australia, Friends of Grasslands, Landcare groups, Nature Conservation Trust) to develop, promote and facilitate "best management" practice.

(e) Improve compliance and regulatory activities by:

(i) Developing and implementing a strategy to:

(1) enhance the understanding of government and non-government organisations regarding box-gum grassy woodland conservation issues

(2) improve consideration of box-gum grassy woodland conservation in the development consent process and/or in local/regional planning (e.g. CMA, local councils, livestock health and pest authorities, government agencies).

(ii) Integrating conservation issues associated with box-gum grassy woodland with other landscape conservation programs (e.g. land degradation, salinity control and biodiversity programs).

(iii) Requiring development assessments to be undertaken by qualified ecologists, at an appropriate time of year.

Part C. National Recovery Plan for the Murray Cod *Maccullochella peelii peelii*

The overall objective of the recovery plan is to manage self-sustaining populations for conservation, fishing and cultural purposes. Specific objectives and a summary of their recovery actions, identified in the recovery plan are as follows:

(a) Determine the distribution, structure and dynamics of Murray cod populations across the Murray Darling Basin (MDB) by:

(i) Reviewing and synthesize published information on the population structure, status and dynamics of Murray cod populations across the Basin.

(ii) Identify gaps in distribution and population data and develop and implement a survey program to obtain data to address this.

(iii) Determining the genetic composition of Murray cod populations throughout the Basin.

(iv) Identifying appropriate spatial management units for Murray cod management (jurisdictional, habitat zones, genetic management units) across their range.

(v) Prioritising the spatial management units that require urgent or specific management actions; monitor and maintain these units.

(vi) Identifying, protecting and repairing key aquatic and riparian habitats for Murray cod in each spatial management unit.

(vii) Determining the structure (age, size, spatial connectivity), dynamics, movement, dispersal and migration levels of Murray cod populations in and between each spatial management unit.

(viii) Investigating the role and relationships of Murray cod within the fish community.

(ix) Investigating the current reproductive status, age/size fecundity relationships, age at first reproduction, recruitment levels and longevity of key populations of murray cod.

(x) Modelling the significance of larger size classes to recruitment and sustainability of murray cod populations, and develop management strategies to achieve sustainability where skewed population structure is unsustainable.

(xi) Identifying key recruitment areas in each spatial management unit.

(xii) Identifying and quantifying the environmental parameters that drive recruitment and population growth, especially age-specific survivorships.

(xiii) Developing appropriate decision support tools and models that allow the future management actions for murray cod to be evaluated within a risk management framework.

(xiv) Developing and implementing an integrated, long-term monitoring program for assessing recovery of murray cod populations in each spatial management unit.

(b) Managing river flows to enhance recruitment to murray cod populations by:

(i) Determining the influence of flows on critical life history components, especially recruitment of larvae and juveniles, and movement.

(ii) Identifying and model flow regulation practices (timing of releases, volumes, rate of rise and fall etc.) to maximise recruitment to rehabilitate and sustain murray cod populations.

(iii) Monitoring population responses to prescribed flows and incorporate this knowledge into improved flow management practices.

(iv) Developing and implementing flow management practices to benefit recovery of murray cod populations.

(c) Undertaking risk assessments of threats and evaluate benefits of recovery actions on murray cod populations for each management unit by:

(i) Habitat Characteristics and Preferences

(1) Testing the effects of habitat manipulations such as moving snags on murray cod.

(2) Assessing the availability and condition of riparian and instream habitat in each spatial management unit, identify key areas for rehabilitation (e.g.

fencing riparian habitat, resnagging) and integrate this information into relevant river health strategies or other strategies.

(ii) Fish Passage

(1) Identifying barriers to movement of murray cod populations, particularly downstream.

(2) Facilitating fish passage for murray cod in both upstream and downstream directions.

(3) Monitoring the response of murray cod populations to improved fish passage.

(iii) Cold Water Pollution

(1) Quantifying the impacts of cold water pollution on murray cod populations in each spatial management unit.

(2) Developing a plan for the amelioration of cold water pollution for murray cod throughout the MDB, and ensure that existing infrastructure is used correctly.

(3) Determining, plan and implement a pilot site for remedial actions for cold water pollution for murray cod.

(4) Developing and implementing a monitoring program to assess the response of murray cod to remedial actions for cold water pollution.

(iv) Fish Kills

(1) Investigating the incidence, severity, causes of, and responses to fish kills involving murray cod.

(2) Determining the status of murray cod populations in areas affected by fish kills and develop management responses for short-term protection and population recovery.

(d) Determining the habitat requirements of murray cod life stages and populations by:

(i) Determining the habitat use by different life stages and populations of murray cod and identify key habitat conditions on which to focus management actions.

(ii) Surveying and map potential habitat, using ecological and bioclimatic information that may indicate the location of important habitat areas.

(iii) Developing and implementing protocols for rehabilitation of murray cod habitat and identify areas for rehabilitation to facilitate the expansion of murray cod populations into areas formerly occupied.

(iv) Developing and implementing management actions to protect structural habitats in floodplain channels.

(v) Identifying and protecting habitat areas critical to the survival of murray cod.

(vi) Developing contingency plans for issues critical to murray cod populations, that may occur due to unusual circumstances (e.g. drought refuges, poor water quality, isolated pools, block banks, etc).

(e) Managing the recreational fishery for murray cod in a sustainable manner while recognising the social, economic and recreational value of the fishery by:

(i) Determining the total annual harvest (including catch and release, unknown, unreported and illegal catch etc) of murray cod across the Basin, and within spatial management units.

(ii) Reviewing existing and potential fishing regulations and modify where appropriate to ensure sustainable murray cod fisheries.

(iii) Reviewing the use and impacts of set-lines as a capture method for murray cod and modify regulations if necessary.

(iv) Reviewing all compliance activities for murray cod across the MDB (including level and adequacy of enforcement, information provided regarding extent of illegal fishing/poaching and compliance of sale of fish) and modify as necessary to ensure murray cod is a priority management species to reflect the species' threatened status.

(v) Providing information to politicians, magistrates and the public on the community and conservation value of murray cod.

(vi) Determining the contribution of stocking programs to murray cod populations and fishing catch.

(vii) Investigating the impact of stocking hatchery-bred murray cod on wild populations.

(viii) Clarifying the existing uptake of ethical, low-impact practices by recreational fishers, and determine how to promote these ideals more broadly among anglers and the wider community.

(ix) Investigating damage and mortality rates of angler captured and released murray cod.

(x) Ensuring that murray cod being stocked into the wild, especially where wild populations already exist, are genetically and ecologically appropriate to the location.

(xi) Implementing the quality assurance measures for hatcheries outlined in *Managing Fish Translocation and Stocking in the MDB*.[9]

(f) Encouraging community ownership of murray cod conservation by:

(i) Promoting murray cod as an icon species to raise awareness of river health and sustainability in the community.

(ii) Documenting the significance of murray cod to the community, especially in Aboriginal culture and oral history, and for contemporary rural communities.

(iii) Assessing the level of public recognition, understanding and 'ownership' of murray cod, its ecology and the threats and management approaches to secure the long-term future of the species.

(iv) Developing and implementing a plan of community involvement (including anglers, angling clubs/associations and peak bodies and conservation groups) in the management and research of murray cod.

(v) Ensuring the results of research and management on murray cod are publicised through a variety of mediums such as scientific meetings, journal publications and articles for the popular press, including fishing magazines and websites, and interactions with peak bodies and agencies.

(g) Managing recovery plan implementation by:

(i) Establishing a long-term structure for the implementation of the murray cod recovery plan through the employment of a national murray cod recovery plan coordinator, with involvement of the recovery team and the Murray Cod Taskforce (MCT).

(ii) Developing interim targets for each spatial management unit to measure progress towards the aspirational goal towards recovery at the end of the first five years

[9] Wold Wildlife Fund 2003. *Managing Fish Translocation and Stocking in the Murray-Darling Basin*. Phillips, B. (ed). Statement, Recommendations and Supporting Papers. World Wildlife Fund Australia, Sydney

(iii) Engaging with all appropriate management agencies at an early stage in the recovery process to ensure that required management actions to protect and enhance cod populations will be integrated with existing river health strategies and implemented in a timely manner.

(iv) Compiling and transferring new knowledge and research results into an appropriate form for use by management agencies to develop management practices.

(v) Coordinating communication and exchange of information appropriate to the recovery program at National, State and regional levels.

(vi) Ensuring integration of murray cod recovery with major natural resource management programs and policies in the Basin, as well as State and regional programs.

(vii) Ensuring funding submissions are organised through appropriate management agencies each year (or as required).

(viii) Establishing a process for assessment (monitoring and evaluation) of recovery plan actions, including effective collation and dissemination of results.

(ix) Undertaking a formal review and evaluation at termination of this recovery plan.

Schedule 3. Approved conservation advice

Part A. Approved Conservation Advice for Acacia pubifolia

The following priority recovery and threat abatement actions can be done to support the recovery of *Acacia pubifolia*:

(a) Habitat Loss, Disturbance and Modification

(i) Monitor known populations to identify key threats

(ii) Monitor the progress of recovery, including the effectiveness of management actions and the need to adapt them if necessary.

(iii) Identify populations of high conservation priority

(iv) Ensure road widening and maintenance activities (or other infrastructure or development activities) involving substrate or vegetation disturbance in areas where A. pubifolia occurs do not adversely impact on known populations

(v) Control access routes to suitably constrain public access to known sites on public land

(vi) Suitably control and manage access on private land

(vii) Investigate formal conservation arrangements such as the use of covenants, conservation agreements or inclusion in reserve tenure, especially A. pubifolia populations near Warrabah National Park

(b) Trampling, Browsing or Grazing

(i) Develop and implement a stock management plan for roadside verges and travelling stock routes

(ii) Manage known sites to ensure grazing regimes do not adversely affect this species

(iii) Prevent grazing pressure at known sites through exclusion fencing or other barriers

(iv) Manage threats at known sites in reserve areas to control introduced pests such as goats

(c) Fire

(i) Develop and implement a suitable fire management strategy for A. pubifolia, including determining if and/or where an ecological burn is required

(ii) Consider the location of known A. pubifolia populations in regional fire plans and hazard reduction burn planning

(iii) Provide maps of known occurrences to local and state Rural Fire Services and land managers and seek inclusion of mitigative measures in bush fire risk management plans, risk register and/or operation maps

(d) Conservation Information

(i) Encourage landholders with existing populations of A. pubifolia to manage populations appropriately

(ii) Raise awareness of the species within the local community by involving local Landcare groups in the management of A. pubifolia

(e) Enable Recovery of Additional Sites and/or Populations

(i) Establish an ex-situ collection from a single provenance in collaboration with the Botanic Gardens Trust

(ii) Investigate options for linking, enhancing or establishing additional in-situ populations

(iii) Implement national translocation protocols *Guidelines for the Translocation of Threatened Plants in Australia* (2nd ed.) if establishing additional populations is considered necessary and feasible

Part B. Approved Conservation Advice for *Boronia repanda* (Repand Boronia)

The following regional priority recovery and threat abatement actions can be done to support the recovery of the Repand Boronia:

(a) Habitat Loss, Disturbance and Modification

(i) Investigate formal conservation arrangements, management agreements and covenants on private land, and for crown and private land investigate inclusion in reserve tenure if possible

(ii) Monitor known populations to identify key threats

(iii) Identify populations of high conservation priority

(iv) Ensure there is no disturbance in areas where Repand Boronia occurs, excluding necessary actions to manage the conservation of the species

(b) Conservation Information

(i) Raise awareness of Repand Boronia within the local community

(c) Enable Recovery of Additional Sites and/or Populations

(i) Investigate options for linking, enhancing or establishing additional populations

(ii) Implement national translocation protocols *Guidelines for the Translocation of Threatened Plants in Australia* (2nd ed.) if establishing additional populations is considered necessary and feasible

The following local priority recovery and threat abatement actions can be done to support the recovery of the Repand Boronia:

(d) Habitat Loss, Disturbance and Modification

(i) Protect populations of the species through the development of conservation agreements and/or covenants

(ii) Control access routes to suitably constrain public access to known sites on public land

(iii) Suitably control and manage access on private land and other land tenure

(iv) Minimise adverse impacts from land use at known sites.

(e) Fire

(i) Implement an appropriate fire management regime for local populations.

Part C. Approved Conservation Advice for *Callistemon pungens*

The following regional priority recovery and threat abatement actions can be done to support the recovery of *Callistemon pungens*:

(a) Habitat Loss, Disturbance and Modification

(i) Identify populations of high conservation priority

(ii) Manage threats to areas of vegetation that contain populations/occurrences/remnants of C. pungens

(iii) Ensure chemicals or other mechanisms used to eradicate weeds do not have a significant adverse impact on C. pungens

(iv) Ensure road widening and maintenance activities (or other infrastructure or development activities as appropriate) in areas where the C. pungens occurs do not adversely impact known populations

(v) Investigate formal conservation arrangements such as the use of covenants, conservation agreements or inclusion in reserve tenure.

(b) Invasive Weeds

(i) Develop and implement a management plan for the control of naturalised plants where they pose a threat to *C. pungens* in the local region.

(c) Fire

(i) Develop and implement a suitable fire management strategy for C. pungens

(ii) Identify appropriate intensity and interval of fire to promote seed germination

(iii) Provide maps of known occurrences to local and state Rural Fire Services and seek inclusion of mitigative measures in bush fire risk management plans, risk register and/or operation maps.

(d) Conservation Information

(i) Raise awareness of C. pungens within the local community.

(e) Enable Recovery of Additional Sites and/or Populations

(i) Undertake appropriate seed collection and storage

(ii) Undertake seed germination and/or vegetative propagation trials to determine the requirements for successful establishment

(iii) Investigate options for linking, enhancing or establishing additional populations

(iv) Implement national translocation protocols (Vallee et al., 2004) if establishing additional populations is considered necessary and feasible

The following local priority recovery and threat abatement actions can be done to support the recovery of *Callistemon pungens*:

(f) Habitat Loss, Disturbance and Modification

(i) Monitor known populations to identify key threats

(ii) Monitor the progress of recovery, including the effectiveness of management actions and the need to adapt them if necessary

(iii) Control access routes to suitably constrain public access to known sites on public land

(iv) Suitably control and manage access on private land

(v) Minimise adverse impacts from land use at known sites

(vi) Protect populations of the listed species through the development of conservation agreements and/or covenants

(g) Invasive Weeds

(i) Identify and remove weeds in the local area, which could become a threat to C. pungens, using appropriate methods

(ii) Manage sites to prevent introduction of invasive weeds, which could become a threat to C. pungens, using appropriate methods

(h) Fire

(i) Implement an appropriate fire management regime for local populations

Part D. Approved Conservation Advice for *Grevillea scortechinii subsp. scortechinii* (Black Grevillea)

The following priority recovery and threat abatement actions can be done to support the recovery of Black Grevillea:

(a) Habitat Loss, Disturbance and Modification

(i) Monitor known populations to identify key threats

(ii) Monitor the progress of recovery, including the effectiveness of management actions and the need to adapt them if necessary

(iii) Identify populations of high conservation priority

(iv) Ensure road widening and maintenance activities (or other infrastructure or development activities as appropriate) in areas where Black Grevillea occurs do not adversely impact on known populations

(v) Control access routes to suitably constrain public access to known sites on public land.

(vi) Minimise adverse impacts from land use at known sites

(vii) Investigate formal conservation arrangements such as the use of covenants, conservation agreements or inclusion in reserve tenure

(b) Invasive Weeds

(i) Identify and remove weeds in the local area, which could become a threat to Black Grevillea, using appropriate methods

(ii) Ensure chemicals or other mechanisms used to eradicate weeds do not have a significant adverse impact on Black Grevillea

(iii) Manage sites to prevent introduction of invasive weeds, which could become a threat to Black Grevillea, using appropriate methods.

(c) Fire

(i) Develop and implement a suitable fire management strategy for Black Grevillea

(ii) Identify appropriate intensity and interval of fire to promote seed germination or vegetation regeneration

(iii) Provide maps of known occurrences to local and state rural fire services and seek inclusion of mitigation measures in bush fire risk management plans, risk register and/or operation maps.

(d) Conservation Information

(i) Raise awareness of Black Grevillea within the local community, especially among landowners and road/rail maintenance staff.

(e) Enable Recovery of Additional Sites and/or Populations

(i) Undertake appropriate seed collection and storage

(ii) Investigate options for linking, enhancing or establishing additional populations

(iii) Implement national translocation protocols (Vallee et al., 2004) if establishing additional populations is considered necessary and feasible.

Part E. Approved Conservation Advice for *Underwoodisaurus sphyrurus* (Border Thick-tailed Gecko)

The following priority recovery and threat abatement actions can be done to support the recovery of the Border Thick-tailed Gecko:

(a) Habitat Loss, Disturbance and Modification

(i) Identify key habitats and corridors where revegetation can provide links between key populations

(ii) Manage threats to areas of vegetation that contain populations/occurrences of the Border Thick-tailed Gecko

(iii) Undertake survey work in suitable habitat and potential habitat to locate any additional populations/occurrences

(iv) Retain bushrock in its natural setting within the species' habitat and obtain rocks for gardens only from licensed dealers

(v) Ensure development activities in areas where the Border Thick-tailed Gecko occurs do not adversely affect known populations

(vi) Prevent the collection of dead fallen timber for firewood in areas where the species is known to occur

(vii) Provide fire wood in areas where recreational use overlaps with species habitat to preserve large fallen logs, leaf litter and groundcover vegetation. Encourage the use of gas fire BBQs in these areas

(viii) Minimise adverse impacts from land use at known sites

(ix) Investigate formal conservation arrangements such as the use of covenants, conservation agreements or inclusion in reserve tenure

(b) Trampling, Browsing or Grazing

(i) Develop and implement a stock management plan for roadside verges and travelling stock routes

(ii) Manage known sites on private property to ensure appropriate cattle and goat grazing regimes are conducted

(iii) Prevent grazing pressure at known sites on leased crown land through exclusion fencing or other barriers

(iv) Animal Predation or Competition

(v) Develop and implement a management plan for the control and eradication of feral goats in the local region.

(vi) Implement the appropriate management recommendations outlined in the threat abatement plans for European red fox, feral cats and goats.

(c) Fire

(i) Develop and implement a suitable fire management strategy for the Border Thick-tailed Gecko focusing on reducing the frequency of burning in rocky woodland and forests

(ii) Provide maps of known occurrences to local and state Rural Fire Services and seek inclusion of mitigation measures in bush fire risk management plans, risk register and/or operation maps.

(d) Conservation Information

(i) Raise awareness of the Border Thick-tailed Gecko within the local community

(ii) Enable Recovery of Additional Sites and/or Populations

(iii) Investigate options for linking, enhancing or establishing additional populations.

Part F. Approved Conservation Advice for Elseya belli (Bell's Turtle)

The following regional priority recovery and threat abatement actions can be done to support the recovery of Bell's Turtle:

(a) Habitat Loss, Disturbance and Modification

(i) Identify populations of high conservation priority

(ii) Protect areas of riparian vegetation in areas of known habitat and potential habitat for Bell's Turtle

(iii) Ensure chemicals or other mechanisms used to eradicate weeds or for agriculture do not have a significant adverse impact on Bell's Turtle

(iv) Manage any changes to hydrology that may result in changes to water table levels, increased run-off, sedimentation or pollution

(v) Establish aquatic reserves (including adjacent terrestrial habitats) in those reaches of the Namoi and Gwydir River drainages identified as prime habitat for the species

(vi) Monitor known populations to identify key threats

(vii) Monitor the progress of recovery, including the effectiveness of management actions and the need to adapt them if necessary

(b) Animal Predation or Competition

(i) Manage known sites in reserve areas and on private property to control foxes.

(c) Diseases, Fungi and Parasites

(i) Develop and implement suitable hygiene protocols to prevent further outbreaks of the blindness once a cause is identified.

(d) Conservation Information

(i) Raise awareness of Bell's Turtle within the local community, particularly among landholders

(ii) The following local priority recovery and threat abatement actions can be done to support the recovery of Bell's Turtle.

(e) Habitat Loss, Disturbance and Modification

(i) Control access routes to suitably constrain public access to known sites on public land

(ii) Undertake survey work in suitable habitat and potential habitat to locate any additional populations

(iii) Develop management plans to maintain or restore natural river flows to catchments.

(f) Trampling, Browsing or Grazing

(i) Establish stock watering points away from riverbanks in order to protect riverbanks from stock trampling to protect water quality and nesting sites

(ii) Establish exclusion fencing along river banks on private and public land to reduce grazing pressure.

(g) Animal Predation or Competition

(i) Implement relevant threat abatement plans or feral animal management plans

(ii) Manage threats at known sites in reserve areas and on private property to control foxes.

Acronyms and abbreviations

Acronym	Definition
µS/cm	microsiemens per centimetre
ACH Act	*Aboriginal Cultural Heritage Act 2003* (Qld)
ADWG	Australian Drinking Water Guidelines
AEP	annual exceedence probability
AEIS	additional information to the environmental impact statement
AHD	Australian Height Datum
AMTD	adopted middle thread distance
ANCOLD	Australian National Committee on Large Dams Guidelines
ANZECC	Australian and New Zealand Environment Conservation Council
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
AS/NZS	Australian Standard/New Zealand Standard
BCA	benefit–cost ratio
CBA	cost–benefit analysis
CHMP	cultural heritage management plan
CID	community infrastructure designation
CITES	Convention on International Trade in Endangered Species of Wild Flora and Fauna
cm	centimetre
dB	decibels
dB(A)	decibels measured at the 'A' frequency weighting network
DAFF	Department of Agriculture, Fisheries and Forestry
DATSIMA	Department of Aboriginal and Torres Strait Islander and Multicultural Affairs
DCS	Department of Community Safety
DE	The Commonwealth Department of the Environment
DNRM	Department of Natural Resources and Mines
DNRW	The former Department of Natural Resources and Water
DEHP	Department of Environment and Heritage Protection
DERM	The former Department of Environment and Resource Management
DO	dissolved oxygen
DSDIP	Department of State Development, Infrastructure and Planning
DTMR	Department of Transport and Main Roads (Qld)
EA	environmental authority
EIA	economic impact assessment
EFO	environmental flow objective
EIS	environmental impact statement
EM Plan	environmental management plan
EP Act	*Environmental Protection Act 1994* (Qld)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwlth)

Acronym	Definition
EPP	Environmental Protection Policy (water, air, waste, noise)
EPP (Air)	Environmental Protection (Air) Policy 2008
EPP (Noise)	Environmental Protection (Noise) Policy 2008
EPP (Water)	Environmental Protection (Water) Policy 2009
ERA	environmentally relevant activity
ESA	environmentally sensitive area
ESCP	erosion and sediment control plan
FSL	full supply level
FTE	full-time equivalent
GRP	gross regional product
GSP	gross state product
ha	hectares
IAS	initial advice statement
IQQM	Integrated Quantity and Quality Model
IROL	Interim Resource Operations Licence
km^2	square kilometre
km	kilometre
km/hr	kilometres per hour
L_{A1}	those noise levels that are exceeded for one per cent of each one-hour sample period
L_{Aeq}	the average A-weighted sound pressure level of a continuous steady sound that has the same mean square sound pressure as a sound level that varies with time
L_{Amax}	the maximum average A-weighted sound pressure measured over a specified period of time
m^3	cubic metre
m	metre
mBGL	metres below ground level
MCU	material change of use
ML	megalitres
ML/d	megalitres per day
ML/year	megalitres per year
mm	millimetre
MNES	matters of national environmental significance
MSES	matters of state environmental significance
NC Act	*Nature Conservation Act 1992* (Qld)
NGOs	non-government organisations
NSW	New South Wales
PM_{10}	particulate matter with equivalent aerodynamic diameter less than 10μm
PMF	probable maximum flood
PMST	EPBC protected matters search tool

Acronym	Definition
PPV	peak particle velocity, which is a measure of ground vibration magnitude and is the maximum instantaneous particle velocity at a point during a given time interval in mms^{-1}
QR	Queensland Rail
QWQG	Queensland Water Quality Guidelines
RCC	roller compacted concrete
RE	regional ecosystem
RIA	road impact assessment
RMP	road-use management plan
ROL	resource operations licence
ROP	resource operations plan
SARA	state assessment and referral agency
SCADA	supervisory control and data acquisition
SDPWO Act	*State Development and Public Works Organisation Act 1971* (Qld)
SDPWO Regulation	State Development and Public Works Organisation Regulation (Qld)
SDRC	Southern Downs Regional Council
SDRC Planning Scheme	Southern Downs Regional Council Planning Scheme 2013
SEWPaC	The former Commonwealth Department of Sustainability, Environment, Water, Population and Communities
SIA	social impact assessment
SKD	Storm King Dam
SP Act	*Sustainable Planning Act 2009* (Qld)
SWAMP	Stanthorpe Water Assessment and Monitoring Project
t	tonnes
TEC	threatened ecological community
TI Act	*Transport Infrastructure Act 1994*
TMP	traffic management plan
TOR	terms of reference
TSP	total suspended particles
VM Act	*Vegetation Management Act 1999* (Qld)
WASOs	water allocation security objectives
WQO	Water quality objectives
WRP	water resource plan

Glossary

Term	Definition
adopted middle thread distance (AMTD)	The distance in kilometres, measured along the middle of a watercourse, that a specific point in the watercourse is from the watercourse's mouth, the watercourse's junction with the main watercourse or the border between the State and New South Wales.
assessment manager	For an application for a development approval, means the assessment manager under the *Sustainable Planning Act 2009* (Qld).
bilateral agreement	The agreement between the Australian and Queensland governments that accredits the State of Queensland's EIS process. It allows the Commonwealth Minister for the Environment to rely on specified environmental impact assessment processes of the state of Queensland in assessing actions under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth).
coffer dam	A watertight enclosure pumped dry to permit construction work below the waterline
conduit	A pipe, tube, or the like, for conveying water or other fluid.
construction areas	The construction worksites, construction car parks, and any areas licensed for construction or on which construction works are carried out.
controlled action	A proposed action that is likely to have a significant impact on a matter of national environmental significance; the environment of Commonwealth land (even if taken outside Commonwealth land); or the environment anywhere in the world (if the action is undertaken by the Commonwealth). Controlled actions must be approved under the controlling provisions of the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth).
controlling provision	The matters of national environmental significance, under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth), that the proposed action may have a significant impact on.
coordinated project	A project declared as a ' coordinated project' under section 26 of the SDPWO Act. Formerly referred to as 'significant projects'.
Coordinator-General	The corporation sole constituted under section 8A of the *State Development and Public Works Organisation Act 1938* and preserved, continued in existence and constituted under section 8 of the SDPWO Act.
diurnal	Occurring or active during the daytime.

environment	As defined in Schedule 2 of the SDPWO Act, includes: f) ecosystems and their constituent parts, including people and communities g) all natural and physical resources h) the qualities and characteristics of locations, places and areas, however large or small, that contribute to their biological diversity and integrity, intrinsic or attributed scientific value or interest, amenity, harmony and sense of community i) the social, economic, aesthetic and cultural conditions that affect, or are affected by, things mentioned in paragraphs (a) to (c).
environmental effects	Defined in Schedule 2 of the SDPWO Act as the effects of development on the environment, whether beneficial or detrimental.
environmentally relevant activity (ERA)	An activity that has the potential to release contaminants into the environment. Environmentally relevant activities are defined in Part 3, section 18 of the *Environmental Protection Act 1994* (Qld).
ephemeral streams	Ephemeral streams are watercourses that do not have surface water flow for the entire year.
granite tor	A tor is a large, free-standing residual mass (rock outcrop) that rises abruptly from the surrounding smooth and gentle slopes of a rounded hill summit or ridge crest
imposed condition	A condition imposed by the Queensland Coordinator-General under section 54B of the SDPWO Act. The Coordinator-General may nominate an entity that is to have jurisdiction for the condition.
initial advice statement (IAS)	A scoping document, prepared by a proponent, that the Coordinator-General considers in declaring a coordinated project under Part 4 of the SDPWO Act. An IAS provides information about: • the proposed development • the current environment in the vicinity of the proposed project location • the anticipated effects of the proposed development on the existing environment • possible measures to mitigate adverse effects.
integrated quantity and quality modelling (IQQM)	Integrated quantity and quality modelling (IQQM) computer program means the department's Integrated Quantity and Quality Modelling computer program, and associated modelling, statistical analysis and reporting programs, that stimulate daily stream flows, flow management, storages, releases, instream infrastructure, water extractions, water demands and other hydrologic events in the plan area.

matters of national environmental significance	The matters of national environmental significance protected under the *Environment Protection and Biodiversity Conservation Act 1999*. The eight matters are: a) world heritage properties b) national heritage places c) wetlands of international importance (listed under the Ramsar Convention) d) listed threatened species and ecological communities e) migratory species protected under international agreements f) Commonwealth marine areas g) the Great Barrier Reef Marine Park h) nuclear actions (including uranium mines).
multi-level offtake	An offtake structure within a dam, which can take water from various depths, rather than just one. For instance, if the offtake is only at the bottom of the dam, releases of water may be cold, deoxygenated and nutrient-rich. A multi-level offtake allows releases to be made from upper layers where water quality is often better.
nominated entity (for an imposed condition for undertaking a project)	An entity nominated for the condition, under section 54B(3) of the SDPWO Act.
properly made submission (for an EIS or a proposed change to a project)	Defined under section 24 of the SDPWO Act as a submission that: a) is made to the Coordinator-General in writing b) is received on or before the last day of the submission period c) is signed by each person who made the submission d) states the name and address of each person who made the submission e) states the grounds of the submission and the facts and circumstances relied on in support of the grounds.
noxious fish	Fish that are declared as noxious under the Queensland Fisheries Regulation 2008 are fish that are, or may become a serious pest to native aquatic communities.
proponent	The entity or person who proposes a coordinated project. It includes a person who, under an agreement or other arrangement with the person who is the existing proponent of the project, later proposes the project.
riparian zone	A riparian zone or riparian area is the interface between land and a river or stream. Plant habitats and communities along the river margins and banks are called riparian vegetation.

slightly to moderately disturbed systems	Slightly to moderately disturbed systems — ecosystems in which aquatic biological diversity may have been adversely affected to a relatively small but measurable degree by human activity. The biological communities remain in a healthy condition and ecosystem integrity is largely retained. Typically, freshwater systems would have slightly to moderately cleared catchments and/or reasonably intact riparian vegetation; marine systems would have largely intact habitats and associated biological communities. Slightly– moderately disturbed systems could include rural streams receiving runoff from land disturbed to varying degrees by grazing or pastoralism, or marine ecosystems lying immediately adjacent to metropolitan areas.
stated condition	Conditions stated (but not enforced by) the Coordinator-General under sections 39, 45, 47C, 49, 49B and 49E of the SDPWO Act. The Coordinator-General may state conditions that must be attached to a: • development approval under the *Sustainable Planning Act 2009* • proposed mining lease under the *Mineral Resources Act 1989* • draft environmental authority (mining lease) under Chapter 5 of the *Environmental Protection Act 1994* (EPA) • proposed petroleum lease, pipeline licence or petroleum facility licence under the *Petroleum and Gas (Production and Safety) Act 2004* • non-code compliant environmental authority (petroleum activities) under Chapter 4A of the EPA.
works	Defined under the SDPWO Act as the whole and every part of any work, project, service, utility, undertaking or function that: a) the Crown, the Coordinator-General or other person or body who represents the Crown, or any local body is or may be authorised under any Act to undertake, or b) is or has been (before or after the date of commencement of this Act) undertaken by the Crown, the Coordinator-General or other person or body who represents the Crown, or any local body under any Act, or c) is included or is proposed to be included by the Coordinator-General as works in a program of works, or that is classified by the holder of the office of Coordinator-General as works.

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