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EXECUTIVE SUMMARY

SunWater Ltd is the Proponent for the Connors River Dam and Pipelines Project. For over 80 years, SunWater has specialised in the investigation, design, construction, maintenance and operation of water infrastructure. SunWater also manages bulk water supply to rural, urban and industrial customers.

SunWater owns and operates bulk water supply and distribution infrastructure located throughout regional Queensland with an estimated replacement value of $6.9 Billion and supplying about 40% of the water used commercially in Queensland via 23 water supply schemes and three subsidiary companies. SunWater services approximately 6,000 water supply customers including mining, industrial and manufacturing companies, local governments, power stations, irrigators and statutory water boards. SunWater has extensive experience in water supply development, and has the support systems in place to enable it to effectively implement the Project and ensure compliance with relevant legislation, including certified quality, environmental and workplace health and safety management systems.

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ES1.1 Description of the Project

The Project is the construction and operation of Connors River Dam and associated water distribution infrastructure in Central Queensland.

Rapid recent and planned growth in the coal mining industry has created increased demand for water in the Isaac Connors sub-region. Over recent years, the Queensland Government has developed a range of strategic planning and policy initiatives to support this mining development. The Connors River Dam and Pipelines Project is recognised in all the relevant planning documents as the preferred water supply alternative in the region. Urban demand is a small component of overall demand, and is strongly related to mining development. Agricultural demand exists but is relatively minor and likely to be price constrained.

Water from the dam (approximately 49,500 ML/a) will be transported via pipeline as far as Moranbah (133 km) and will service coal mines (and associated communities) in the Bowen Coal Basin and surrounds. The pipeline component of the Project includes a trunk pipeline only and does not include potential future connecting lateral pipes. Water will also be released downstream for purchase and use by irrigators (up to 5000 ML/a) and for environmental purposes.

The Project is located in Central Queensland on the Connors River at 95.7 km AMTD, some 5 km downstream of the junction of Murray and Collaroy Creeks. The site is approximately 274 km upstream of the junction of the Connors/Isaac/Mackenzie River system with the Fitzroy River and 562 km from the Fitzroy River barrage, the upstream limit of tidal intrusion. The system drains the western slopes of the Connors Range, which is part of the mountain range that separates the area from the coastal plains around Sarina. The Project is approximately 110 km due east of

Moranbah and some 70 km south of Sarina. The capacity of the dam will be 373,662 ML at a Full Supply Level (FSL) of 169.1 m AHD and it will inundate an area of approximately 5,850 ha from a catchment of 129,140 ha. A regional locality plan is shown in Figure ES-1 and the extent of inundation is shown in Figure ES-2.

The Project also includes the following components for the dam and surrounds:

- upgrading 20 km of the Connors River Collaroy Road from the Marlborough Sarina Road to the proposed dam site;
- closing sections of the Connors River Collaroy Road, Collaroy Tierawoomba Road and Killarney Collaroy Road;
- establishing a rock quarry, sand extraction and road base extraction area near the dam;
- removal of existing low voltage electrical transmission infrastructure;
- relocation of a telecommunications tower;
- construction of new 66kV supply lines, likely from Nebo to the dam. The location of this supply line will be determined by electricity providers;
- provision of a temporary construction camp near the dam site;
- installation of telephone and data services for construction camp accommodation, dam site office and permanent dam facilities;
- installation of new gauging stations at headwater and tailwater of the new dam and at major tributaries upstream of the dam; and
- provision of a recreation area at the dam.

The pipeline component of the Project also includes:

- a permanent, very low level causeway crossing of the Connors River approximately 6 km downstream of the dam;
- temporary pipeline construction crossings of Funnel Creek and Denison Creek;
- new shallow water bores and associated turkeys nest storages at a number of pipeline watercourse crossings;
- establishing sand extraction areas in or adjacent to watercourses in the region;
- construction of 66kV power lines from Nebo to the pump stations; and
- two temporary construction camps on the pipeline route.

The capital cost of the Project is $824.3M (at concept design estimates), with $316.2M associated with the dam and $508.1M for the pipeline.

The construction period is programmed for between mid-2011 and early 2014, and with allowances for approvals, design and construction processes the targeted commissioning period for the Project is early 2014.


HUGHENDEN
Amelia Ck
Cape River
MACKAY
Suttor Ck
SARINA
Belyando River
Suttor River
NEBO
Connors River Dam
MORANBAH
Great Barrier Reef
Isaac River
ST LAWRENCE
MUTTABURRA
CLERMONT
Roper Ck
MARLBOROUGH
Dair River
ARAMAC
Mackenzie River
Tartrus Weir
CAPELLA
Eden Bann Weir Raising
YEPPOON
Thomson River
ROCKHAMPTON
Fitzroy River Barrage
LONGREACH
BARCALDINE
Nogoa River
EMERALD
Rookwood Weir
ILFRACOMBE
Alice River
JERICHO
Fairbairn Dam
BLACKWATER
Fitzroy River
DUARINGA
GLADSTONE
FITZROY BASIN
CALLIOPE
Barcoo River
ALPHA
SPRINGSURE
ISISFORD
Nogoa River
MIRIAM VALE
BLACKALL
ROLLESTON
BILOELA
Comet River
Clematis Ck
Dawson River
TAMBO
Nive River
MONTO
BUNDABERG
Ward River
THEODORE
GIN GIN
Langlo River
Bedurie Ck
Warrego River
Maranoa River
Sandy Ck
Nathan Dam
CHILDERS
EIDSVOLD
HERVEY BAY
Merivale River
Burnett River
BIGGENDEN
MUNDUBBERA
Mary River
TAROOM
GAYNDAH
MARYBOROUGH
TIARO
Bulloo River
ADAVALE
Cannon Ck
Paroo River
MURGON
GYMPIE
CHARLEVILLE
MITCHELL
NOOSA
QUILPIE
ROMA
YULEBA
KINGAROY
MILES
CHINCHILLA
NANANGO
NAMBOUR
Area of interest
Cairns
Mt Isa
Mackay
Longreach
Gladstone
BRISBANE
Cunnamulla
Key Map
Roads
Rivers
Preferred Pipeline Alignment
Ramsar Sites (QLD)
Existing Weirs and Barrages Downstream
Proposed Dams & Weirs
Catchment Boundary (Fitzroy Basin)
GBRMPA Protected Areas
Projection: GDA 1994 - Zone 55
Figure ES-1
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Kilometres
Scale 1:4,000,000
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SW 234666
SunWater
Making Water Work
SKM
CONNORS RIVER DAM AND PIPELINES
LOCALITY PLAN

LEGEND

- Connors River Dam Site
- Preferred Pipeline Alignment
- Major Rivers
- Major Streams
- Main Road
- Cadastre
- Full Supply Level (169.1m AHD)

Projection: GDA 1994 - Zone 55

Figure ES-2

0 1 2 4
Kilometres

Scale 1:150,000 (A4)

N

SunWater Making Water Work

SKM

CONNORS RIVER DAM AND PIPELINES

Extent of Inundation

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ES1.2 The Environmental Impact Assessment process

On 19 January 2008, the proponent lodged an Initial Advice Statement (IAS) for the Project with the Queensland Coordinator-General (CG). The IAS provided an outline of the proposed Project, including the Project rationale and its potential impacts.

On 7 March 2008, the CG declared the Project to be a "significant Project for which an EIS is required", pursuant to section 26(1) (a) of the *State Development and Public Works Organisation Act 1971* (Qld) (SDPWO Act).

On 25 September 2008, the Commonwealth Minister for the Environment, Heritage and the Arts determined that the Project is a "controlled action" under the EPBC Act due to the likely potential impacts on matters of national environmental significance. The controlling provisions under the EPBC Act are:

- sections 12 and 15A (World Heritage properties);
- sections 15B and 15C (National Heritage places);
- sections 16 and 17B (Wetlands of International importance);
- sections 18 and 18A (Listed threatened species and communities); and
- sections 20 and 20A (Listed migratory species).

As a consequence, the Project requires assessment and approval under the EPBC Act. The Australian Government has accredited the EIS process, to be conducted under the SDPWO Act, under a Bilateral Agreement between the Australian and Queensland Governments. This will enable the EIS to meet the impact assessment requirements under both Australian and Queensland legislation. The Project will require approval from the responsible Commonwealth Minister under Part 9 of the EPBC Act before it can proceed.

The Department of Infrastructure and Planning (DIP) is managing the EIS process on behalf of the CG. The DIP has invited relevant Australian, Queensland and local government representatives and other relevant authorities to participate in the process as advisory agencies.

ES1.3 Background and need for the Project

ES.1.3.1 Strategic planning

In 2005, the government released the Coal Infrastructure Program of Actions (CIPA) detailing approximately $4.2 billion worth of coal-related infrastructure (DIP 2005, updated in 2008) to meet the growing needs of the coal industry. With respect to water, the proposed developments covered by the Program of Action included the Connors River Dam and Pipelines Project to service demand for water in the northern Bowen Basin.

The Statewide Water Plan (SWP; Department of Infrastructure and Planning, 2006) established a plan to balance water supply with increasing demand from urban communities, industry and rural users, to improve water security, and support ongoing economic growth. The SWP was, with respect to the Fitzroy Basin, based on the Central Queensland Regional Water Supply Strategy (CQRWSS, NRW 2006a). The CQRWSS identified future water needs for the sub regions and

the preferred water supply option for meeting these needs. Within the Isaac Connors catchment the Connors River Dam was identified as the best option for meeting the short to medium-term water needs within the sub-region which could not be met by the Burdekin–Moranbah pipeline. The CQRWSS placed a high priority on the Project.

Under the Statewide Water Plan, the State government committed $56.5 million for the development of Connors River Dam and $60 million for pipelines to distribute water from Connors River Dam;

Subsequent to development of the SWP, the Connors River Dam and Pipelines project was included in the *Program of Works, Statewide Water Grid Regional Water Infrastructure projects* approved by the Governor in Council under Part 3 of the SDPWO Act on 13 December 2007. This program directs the designated proponents of the projects (SunWater in the case of the Connors River Dam and Pipelines Project) to undertake all necessary investigations in order to obtain environmental approvals and prepare a business case for their respective designated regional water projects.

ES.1.3.2 Demand studies

In 2007, the Coal Infrastructure Task Force commissioned a report to assess water demand and supply options for coal mining in the Bowen and Surat Basins for the period 2007 to 2027. The report forecast both a low and high case of water demand for the Bowen Basin at the base case year of 2006. The peak demand forecast for the Bowen Basin was 52,000ML/a (high) and 43,000ML/a (low) with maximum demand for both reached around 2020. The report reiterated the findings of the CQRWSS that the Connors River Dam and Pipelines project was the preferred medium to long-term surface water supply option for the Bowen Basin.

Subsequent to the Coal Infrastructure Task Force 2007 report, SunWater initiated an updated assessment of the demand from mining customers within the Bowen Basin and surrounds. This assessment included a series of in-confidence meetings with current and future planned mining and industry operators in the Bowen Basin (and surrounds) conducted over the 2007 to 2009 period. The SunWater assessment confirmed that adequate water supply is a critical factor for coal industry growth in the region. The medium to long term expansion of the coal sector remains unaffected by recent economic events, with growth being driven by a long-term commodities demand 'super-cycle' due largely to the urbanisation of developing countries.

The SunWater assessment (2009) estimates an ultimate demand for Connors River Dam water of over 50,000ML/a of high priority allocation for coal mining and industry. This assessment considered the supply now available from the recently completed Burdekin to Moranbah Pipeline.

In summary, rapid recent and planned growth in the coal mining industry has created increased demand for water in the Isaac Connors subcatchment. Over recent years, the Queensland government has developed a range of strategic planning and policy initiatives to support this mining development. The Connors River Dam and Pipelines Project is recognised in all the relevant documents as the preferred alternative water supply in the region.

ES.1.3.3 Consequences of not proceeding with the Project

The SWP states that water is fundamental to the world-class quality of life in Queensland, to economic growth, and to our environment and notes that population and economic growth increases pressure on existing water supplies. Climate variability and climate change compound these pressures, increasing the need for a range of water management strategies that includes diverse supply sources and locations. The SWP specifically identified the Connors River Dam

and Pipelines Project for funding, based on the findings of the CQRWSS. The CQRWSS includes a detailed risk analysis that considers the following risks:

- climate change / climate variability;
- water demands;
- availability of supply;
- environmental issues;
- social issues;
- economic and financial issues; and
- stakeholder interests.

As with the SWP, the CQRWSS highlights the importance of secure, sustainable water supply in supporting lifestyle, growth and prosperity.

The Queensland Government has committed that the availability of suitable infrastructure will not be an impediment to the planned development of mining in the Bowen Basin.

To do nothing in relation to increasing the availability and security of water supply in Central Queensland and particularly the Bowen Basin is not an acceptable option in the light of these Queensland Government imperatives. Not proceeding with this Project, which has been demonstrated to be the most suitable solution for water security in the sub-region, would place a constraint on planned mining activity and forego the social and economic benefits likely to be associated with that activity.

ES1.4 Alternatives considered

Alternatives considered to secure the supply of water to the Bowen Basin have included:

- recycling, system management and water use efficiency;
- groundwater;
- coal seam gas water;
- desalination;
- surface water supplies;
- 'do nothing' option; and
- within-Project alternatives.

Several of these options have been considered over a period of many years, including alternative locations for the dam site within the region. A new surface water supply in the form of a dam is the only option that can feasibility satisfy the identified demand for the quantity and quality of water required. Following a staged assessment process, undertaken as part of CQRWSS, Connors River Dam at the Mount Bridget site was selected as the preferred alternative.

ES.1.4.1 Within-Project alternatives

ES.1.4.1.1 Dam

The Connors River (Mount Bridget) dam site was first investigated in 1976 by the Queensland Irrigation and Water Supply Commission as part of an overall assessment of the water resources of the Isaac River and its tributaries. In addition to the Connors River site, locations for dam sites on the Isaac River were investigated (115.8km and 206.8km) but both were discounted in favour of the more hydrologically and geotechnically favourable Connors River site.

Locations along the Connors River other than at the 95.7km site were investigated but they too were considered less favourable. The 95.7km site extends across the narrowest part of the valley and the geology of the site is more favourable than any other location along the river.

Alternative dam configurations have been considered as part of the design process for Connors River Dam. A number of FSLs were considered, from 163.9 m AHD to 169.1 m AHD. The final FSL of 169.1m AHD was selected based on assessments of demand, yield and satisfying the WRP requirements for the Fitzroy Basin downstream of the Connors River Dam.

Dam types considered for the site include concrete faced rockfill, earth and rockfill, mass concrete and roller compacted concrete (RCC). Both the earth and rockfill and the concrete faced rockfill arrangements included a spillway located in the saddle of the upper left abutment. The spillway width required to meet the WRP objectives required a substantial amount of excavation and this proved uneconomical. Both arrangements were rejected on that basis.

The RCC dam had the advantage of being able to incorporate a range of spillway widths centrally within the structure. It is also a robust structure even during the construction stage. RCC dams can withstand overtopping during the construction stage with minimal degradation of the works. This is not the case for concrete faced and earth and rockfill dams where significant damage can occur if the flood event is greater than the temporary diversion works can accommodate. With proper planning and management, RCC is a rapid form of construction and this has the potential to reduce construction costs and the period of construction impacts.

ES.1.4.1.2 Pipeline

Two broad pipeline route alternatives from Connors River Dam to Moranbah were considered (Figure ES-3); one southerly more direct route and one northerly route which made greater utilisation of existing easements. Within each of these options a number of alternatives were considered.

The northern pipeline option was selected as the preferred option because it:

- minimises construction costs;
- is closer to major demand nodes including towns and mines;
- reduces maximum elevations along the route;
- minimises the clearance of remnant vegetation and important habitat;
- maximises the use of existing road reserves and co-locating with existing infrastructure as far as possible;
- avoids incompatible land uses such as mining leases; and

- minimises impacts to private property owners, including disruption of operations and potential spread of weeds from access tracks traversing from one property to the next.

ES1.5 Existing environment, potential impacts and mitigation measures

The Project including all components of dam, pipeline and associated infrastructure works is expected to generate a wide extent and variation in scale of impacts, both negative and positive. The more significant impacts and mitigation measures which have been incorporated into the Project's Environmental Management Plans are detailed below.

The impact assessment process has utilised a significant number of existing studies and research, field studies and new research, published and unpublished information, professional and expert input and review, community and agency consultation and consultant professional input.

ES.1.5.1 Climate and natural disasters

The Project area has a predominantly dry climate with warm to hot wet summers and mild dry winters. The Project area has limited vulnerability to natural hazards. There is a medium bushfire risk and the region occasionally experiences some flooding associated with cyclone activity.

The Project generally has a limited vulnerability to the impact of climate change with the greatest potential impact a reduction in yield as a result of decreased annual rainfall and increased evaporation.

ES.1.5.2 Landscape character and visual amenity

The visual catchment of the Connors River Dam is remote and largely contained within a relatively closed valley surrounded by mountainous terrain. Access to this area is limited and there are very limited visually sensitive receptors.

There will be no significant visual impact in the immediate vicinity of the dam and water storage area during construction as there is no public access to the area. However there will be visual impacts during operation.

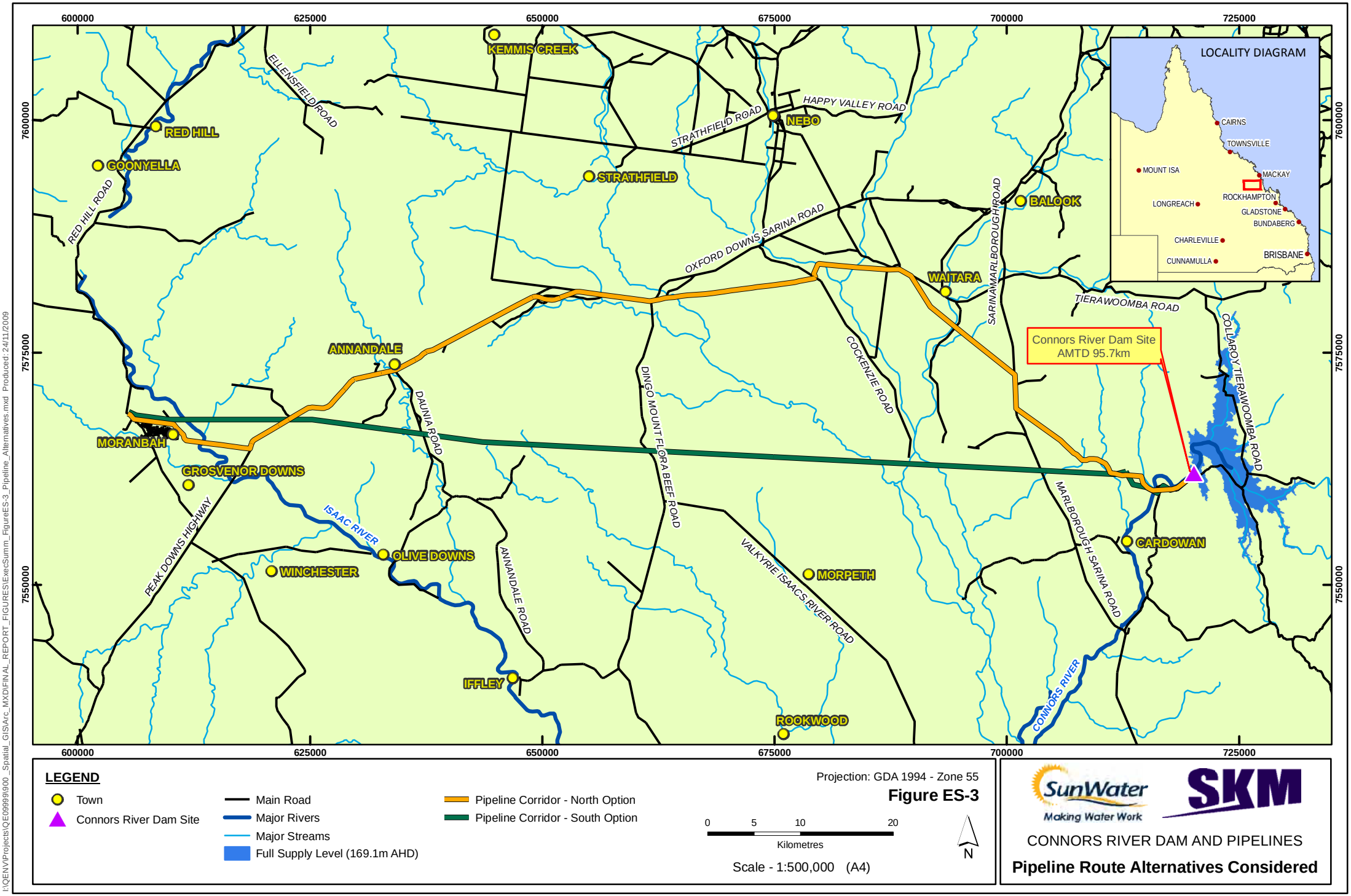
It is expected that visitors will be attracted to the area to view the dam and undertake recreational activities. For these people, the view of the dam and water storage area will be a positive experience. The addition of water as a visual element and its association with the surrounding land and topography is likely to increase the visual amenity perceived by visitors to a moderately high scenic value level.

Views will be restricted from the ridgelines and slopes surrounding the dam wall and water storage area due to lack of access. Only the landholders are able to access these areas. There are also no sensitive receptors within these elevated areas.

The changes to the landscape character and visual amenity of the surrounding catchment are limited as the construction and operational impacts are mostly limited to the dam wall and water storage area.

Overall, the visual impact from the other infrastructure associated with the dam is considered minor.

Impacts can be minimised by locating the infrastructure away from sensitive receptors wherever possible and retaining existing vegetation. Re-vegetation of disturbed areas will further reduce the impact on visual amenity.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KEMMIS CREEK
ELLENSFIELD ROAD
HAPPY VALLEY ROAD
STRATHFIELD ROAD
NEBO
RED HILL
GOONYELLA
RED HILL ROAD
STRATHFIELD
BALOOK
SARINA MARLBOROUGH ROAD
OXFORD DOWNS SARINA ROAD
WAITARA
TIERAWOOMBA ROAD
COLLAROY TIERAWOOMBA ROAD
Connors River Dam Site
AMTD 95.7km
ANNANDALE
DAUNIA ROAD
DINGO MOUNT FLORA BEEF ROAD
COCKENZIE ROAD
MORANBAH
GROSVENOR DOWNS
ISAAC RIVER
PEAK DOWNS HIGHWAY
OLIVE DOWNS
WINCHESTER
ANNANDALE ROAD
VALKYRIE ISAACS RIVER ROAD
MORPETH
MARLBOROUGH SARINA ROAD
CARDOWAN
IFFLEY
ROOKWOOD
CONNORS RIVER
LOCALITY DIAGRAM
CAIRNS
TOWNSVILLE
MOUNT ISA
MACKAY
ROCKHAMPTON
LONGREACH
GLADSTONE
BUNDABERG
CHARLEVILLE
BRISBANE
CUNNAMULLA
LEGEND
Town
Connors River Dam Site
Main Road
Major Rivers
Major Streams
Full Supply Level (169.1m AHD)
Pipeline Corridor - North Option
Pipeline Corridor - South Option
Projection: GDA 1994 - Zone 55
Figure ES-3
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5
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20
Kilometres
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Scale - 1:500,000 (A4)
SunWater
Making Water Work
SKM
CONNORS RIVER DAM AND PIPELINES
Pipeline Route Alternatives Considered
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ES.1.5.3 Geology and soils

The dam is on extremely stable hard rock foundations, ideal for the purpose. High rainfall and relief in the upper catchment combine to produce regular flood events resulting in extreme sheet and gully erosion that have transported virtually all indigenous soils downstream along the river valley so that the dam will have minimal effect on soils.

The potential impact of construction and operation on soil erosion is considered to be minor. However, mitigation measures would be employed around all construction activities to minimise erosion and sediment transport. Pipeline construction would be completed by restoring the land surface to pre-disturbance condition as far as practicable and as soon as possible after completion of construction.

ES.1.5.4 Land use and infrastructure

The dam and water storage area will impact on existing rural land uses, tenures and infrastructure during the construction and operational phases. Land inundated within the affected properties results in a loss of rural land and the most productive areas of the properties. These affected properties will be acquired, generally in full. Access to the Collaroy State Forest will be severed. Furthermore, a number of roads and part of the Bicentennial Trail within the dam and surrounds will be inundated, impacting on access. These impacts are mitigated by the properties being acquired and consultation with the Bicentennial National Trail Organisation.

The pipeline route will be located within or contiguous with a number of existing easements, roads and rail corridors minimising the potential impact on land uses, and the need for new or full width easements. In those sections where the pipeline resides within existing infrastructure corridors, impacts surrounding the future expansion of these facilities will be limited. The impact is likely to be minimal with the pipeline underground for most of its length, although the land use above the pipeline may be limited and a change in tenure may be required.

The provision of water to service the needs of mining operations would support mining within the area, and support development of existing towns. This is consistent with the Regional Plan and the planning schemes which support the mining industry, infrastructure and growth of the local towns of Nebo and Moranbah.

ES.1.5.6 Land contamination

The EIS identified five potential cattle dip sites and four groups of farm buildings within the dam and surrounds with the potential for contamination. Further investigation of these sites will be undertaken to establish the extent and significance of contamination, and remediation requirements. None of these sites were located within the dam construction area or listed on the EMR.

Aerial photography indicates no notifiable activities are located near the pipeline route. Therefore contaminated land is not likely to be encountered during the construction of the pipeline.

If required, remediation of contaminated sites will be undertaken prior to inundation of the water storage area or construction of the pipeline.

Draft Construction and Operational EMPs have been prepared which include measures to prevent the contamination of land and water, and the management of unforeseen contamination. A construction health and safety plan will be prepared to manage exposure to potentially contaminated sites during construction.

ES.1.5.7 Terrestrial flora

Regional Ecosystems impacted by the Project are summarised in Table 1.

- Dam and surrounds

Eleven Regional Ecosystems (REs) within the dam and surrounds (inundation area plus 250 m mapping buffer), were identified by field survey. No Endangered REs are mapped. No regional ecosystems within the dam and surrounds are considered representative of threatened Ecological Communities as defined by the EPBC Act. Consideration has been given to RE 8.12.16 (and component VC's 1a, 1b and 1c) as being a potential representation of the Endangered EPBC significant community listed as 'Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions'. Reference to DEWHA (2001b) indicates that the RE 8.12.6 is not included under the EPBC classification given that: the ecosystem is mapped as an outlier of the CQC Bioregion; and semi-evergreen vine thickets on granitoid lithologies are not included under the EPBC Act classification.

- Pipeline

A total of 15 REs are mapped within the pipeline easement including three Endangered REs, three Of Concern REs, and nine Not of Concern REs. The Brigalow (*Acacia harpophylla* dominant and co-dominant) ecological community, currently listed in EPBC as Endangered, is identified as occurring within the pipeline easement.

Table 1 Summary of assessable vegetation impacted by the Project

Regional Ecosystems	RE Short Description	VM Act Status	Area (ha) within dam construction and Inundation Area	Area within preferred pipeline alignment	TOTAL PROJECT
8.12.5	*Corymbia intermedia, E. portuensis* ± *Lophostemon spp.* ± *Syncarpia glomulifera* ± *Banksia integrifolia*, open-forest to closed-scrub on Mesozoic to Proterozoic igneous rocks.	*not of concern*	<0.01		<0.01
8.12.16	Low microphyll vine forest to semi-evergreen vine thicket on drier sub coastal hills on Mesozoic to Proterozoic igneous	*of concern*	4.49		4.49

Regional Ecosystems	RE Short Description	VM Act Status	Area (ha) within dam construction and Inundation Area	Area within preferred pipeline alignment	TOTAL PROJECT
11.3.1	*Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains	*endangered*		0.42	0.42
11.3.2	*Eucalyptus populnea* woodland on alluvial plains	*of concern*	176.31	19.8	196.11
11.3.4, 11.3.4a	*Eucalyptus tereticornis* and/or *Eucalyptus* spp. tall woodland on alluvial plains	*of concern*	719.53	15.9	735.43
11.3.9	*Eucalyptus platyphylla, Corymbia* spp. woodland on alluvial plains	*not of concern*	61.75	1.6	63.35
11.3.25**	*Eucalyptus tereticornis or E. camaldulensis* woodland fringing drainage lines	*not of concern*	724.26	4.38	728.64
11.4.8	*Eucalyptus cambageana* woodland to open forest with *Acacia harpophylla* or *A. argyrodendron* on Cainozoic clay plains	*endangered*		<0.01	<0.01
11.4.13	*Eucalyptus orgadophila* open woodland on Cainozoic clay plains	*not of concern*		4.1	4.1
11.5.3	*Eucalyptus populnea* ± *E. melanophloia* ± *Corymbia clarksoniana* on Cainozoic sand plains/remnant surfaces	*not of concern*	14.50	50.9	65.40
11.5.9, 11.5.9a	*Eucalyptus crebra* and other Eucalyptus spp. and Corymbia spp. woodland on Cainozoic sand plains/remnant surfaces.	*not of concern*	192.36	7.51	199.87
11.7.2	Acacia spp. woodland on Cainozoic lateritic duricrust. Scarp retreat zone	*not of concern*		4.92	4.92
11.9.5	*Acacia harpophylla*	*endangered*		1.14	1.14

Regional Ecosystems	RE Short Description	VM Act Status	Area (ha) within dam construction and Inundation Area	Area within preferred pipeline alignment	TOTAL PROJECT
	and/or *Casuarina cristata* open forest on fine-grained sedimentary rocks				
11.10.7	*Eucalyptus crebra* woodland on coarse-grained sedimentary rocks	*not of concern*		0.78	0.78
11.12.1	*Eucalyptus crebra* woodland on igneous rocks	*not of concern*	139.28	24.81	164.09
11.12.2	*Eucalyptus melanophloia* woodland on igneous rocks	*not of concern*		0.46	0.46
11.12.8	*Eucalyptus shirleyi* woodland on igneous rocks	*of concern*	8.63	0.60	9.23
11.12.9	*Eucalyptus platyphylla* woodland on igneous rocks	*not of concern*	15.53		15.53
Remnant			2056.77	137.39	2194.16
Non-remnant			3914.92	260.19	4175.11
TOTAL			5971.69	397.58	6369.27

** Specialist riparian community for offset consideration

Potential impacts and mitigation measures

Potential impacts to terrestrial flora are assessed as follows:

- Loss of 2057 ha of remnant vegetation within the dam construction and inundation area, including 970.80 ha Of Concern REs and a further 724.26 ha is riparian (related to a watercourse);
- Loss of 137 ha of remnant vegetation along the preferred pipeline alignment, including 1.56 ha of Endangered RE (Brigalow), 36.3 ha of Of concern REs and 4.38 ha of riparian;
- Loss of 1.92 ha of known habitat for *Cerbera dumicola* (Rare, NC Act) and the loss of an estimated 576 plants;
- Loss of 4.5 ha of known habitat and 725 ha of potential habitat for *Eucalyptus raveretiana* (Vulnerable, EPBC Act);

- Loss of 6.59 ha of potential habitat for the rainforest vines, *Marsdenia hemiptera* and *Rourea brachyandra* and rainforest shrub, *Actephila sessiliflora*. (each Rare, NC Act) If any plants are identified during a pre-construction survey of potential habitat, a translocation program will be implemented; and

- Loss of known habitat for Rare plants along the pipeline easement.

Impacts along the pipeline, particularly to Brigalow, may be reduced through further refinement of the alignment.

An offset strategy has been proposed that will compensate for the loss of remnant vegetation and of habitat. The strategy primarily relates to a commitment by SunWater to manage a large area of the catchment of the dam for the primary purpose of achieving the necessary environmental offsets. The strategy will be finalised through discussion with DERM, DEWHA and DIP.

Impacted individuals of rare and threatened plants will be translocated to suitable translocation sites where this is feasible and if not, seeds of local provenance will be used to produce replacement specimens that will be used in rehabilitation.

ES.1.5.8 Terrestrial fauna

A total of 190 terrestrial vertebrates were recorded from surveys in the vicinity of the dam. This included 14 amphibian, 31 reptile, 112 bird and 33 mammal species. An additional 24 species are listed for the dam study area by the Queensland Museum, WildNet, and Birds Australia databases. Accordingly, the cumulative number of species known from the study area is 214 species. Some species that were previously known but were not recorded included waterbirds such as Eurasian Coot (*Fulica atra*) and Dusky Moorhen (*Gallinula tenebrosa*) that are likely to be influenced by water availability or species more typical of closed and moist habitats such as Noisy Pitta (*Pitta versicolor*) and Brown Cuckoo-Dove (*Macropygia amboinensis*), which may be records from the eastern extremities of the study area or from the ranges beyond.

Nine species listed under the EPBC Act and/or the NC Act have been recorded within the dam study area, including three listed EVR species, Cotton Pygmy-goose, Little Pied Bat and Southern Squatter Pigeon. The remainder of listed species are migratory.

A total of 143 terrestrial vertebrate species were recorded from surveys in the vicinity of the pipeline route. This included 5 amphibians, 16 reptiles, 119 birds and 7 mammals. One species, Squatter Pigeon, is listed as Vulnerable under both the NC Act and EPBC Act, Cotton Pygmy-goose and Black-necked Stork are listed as Rare under the NC Act and Cotton Pygmy-goose is also listed as Migratory under the EPBC Act. Three non-EVR species, Great Egret, White-bellied Sea-Eagle and Rainbow Bee-eater, are also considered to be Migratory under Commonwealth legislation. The culturally significant Short-beaked Echidna and Koala were also recorded.

Potential impacts to terrestrial fauna are assessed as follows:

- While there will be a loss of fauna habitat within the water storage area, not clearing vegetation within 1.5 m vertical below FSL, establishment of vegetation offsets and utilisation of the purchased properties in the dam catchment for environmental purposes (primarily as offsets for biodiversity conservation) will reduce the risk to Low (as low as reasonably practicable).

- The water storage area will reduce the habitat connectivity around the perimeter of the storage and between areas upstream and downstream of the storage. It is not possible to fully mitigate this impact so SunWater intends to offer an offset package that includes management of the purchased properties in the dam catchment for environmental purposes.
- While there will be a loss of fauna habitat on the pipeline route, minimisation of the clearing requirement, rehabilitation, VM offsets and the offset package associated with properties near the dam, will reduce the risk to Low (as low as reasonably practicable).
- There will be a number of minor impacts associated with the construction phase of the project such as a temporary increase in artificial night lighting, vibration, dust and noise impacts. The temporary nature of these impacts and their limited geographic extent indicate that significant and enduring impacts on terrestrial fauna are unlikely.
- Feasible mitigation actions are described and these are reflected in the Environmental Management Plans and as such are also included as Proponent Commitments
- Risks to species of conservation significance are low.

ES.1.5.9 Aquatic flora

The aquatic flora community in the dams and surrounds study area is diverse. Fewer genera (nine) were recorded in the pipeline study area. Macrophyte coverage was highest at the off-stream sites during both pre- and post-wet season surveys. *Cyperus* spp. sedges (emergent) were the most common macrophytes (i.e. the most widespread).

There are no aquatic flora species or communities listed under the EPBC Act or in Queensland under the NC Act that are recorded from or are likely to occur in the study areas.

Paragrass (*Urochloa mutica*) was the only exotic macrophyte recorded in the study area.

Construction and operation of the dam has the potential to impact aquatic flora through direct loss during construction and filling of the dam, and a shift in species composition during operation of the dam. However, the native species lost during construction are expected to colonise the inundation area, and no species of conservation significance will be affected.

Construction of the pipeline has the potential to result in a very small and temporary loss of aquatic flora, either due to direct disturbance, or impacts to water quality. However, the native communities are expected to recover after construction.

These impacts will be effectively managed and mitigated through Environmental Management Plans for erosion and sediment control, dam operations, and rehabilitation of both temporary and permanent creek crossings; and implementation of best-practice fuel-handling and storage in accordance with Australian Standard AS 1940 (2004).

There will be no discernable impacts to flow in the Fitzroy River or downstream, and the dam is not expected to impact on the water quality or sediment input of the Fitzroy Estuary; therefore no significant impacts on estuarine and marine flora, including in the Great Barrier Reef and the Shoalwater and Corio Bays Area Ramsar site, are expected.

The cumulative impacts of existing and proposed water infrastructure developments can be managed and are likely to be minor however each future project will be required to assess its own impacts and the cumulative impact.

Based on this risk assessment, the impacts relevant to aquatic flora can be effectively managed and the residual risks are acceptable.

ES.1.5.10 Aquatic fauna

The white-throated snapping turtle was recorded in the study area and this species is listed as 'least concern' in Queensland under the Nature Conservation (Wildlife) Regulation 2006, but has been identified as a high priority for conservation in the DERM's species prioritisation framework. There is a high probability that the Fitzroy River turtle is present in the dam and surrounds study area. The Fitzroy River turtle is listed as 'vulnerable' both in Queensland and nationally under the EPBC Act. There are no other aquatic fauna species or communities listed in Queensland or under the EPBC Act that are recorded from or are likely to occur in the study areas.

No exotic aquatic fauna were recorded in the study area.

Aquatic fauna in the study area is currently not impacted by impoundments or flow regulation but is by non-water resource development (land clearing and cattle grazing).

Construction and operation of the dam has the potential to impact surrounding aquatic fauna through:

- direct loss of habitat within the inundation area;
- alteration of flows and water levels in the downstream environment;
- changes to water quality and sedimentation above and below the dam;
- creation of temporary and permanent barriers to dispersal and migration; and
- creation of potentially suitable habitats for noxious and/or introduced species.

Construction of the pipeline has the potential to impact surrounding aquatic fauna through:

- the direct loss of fauna at waterway crossings;
- changes to water quality, erosion and sedimentation surrounding near pipeline crossings;
- the translocation of noxious and/or introduced species; and
- fuel and oil spills.

These impacts will be effectively managed and mitigated through Environmental Management Plans for erosion and sediment control, dam construction and operations (including factors such as rehabilitation of habitat in the inundation area and effective design of the fishway), rehabilitation of both temporary and permanent creek crossings, and implementation of best-practice fuel-handling and storage.

There will be no discernable impacts to flow in the Fitzroy River or downstream, and the dam is not expected to impact on the water quality or sediment input of the Fitzroy Estuary; therefore no significant impacts on estuarine and marine fauna (or fisheries productivity), including in the GBR and the Shoalwater and Corio Bays Area Ramsar site, are expected.

Where proposed other water infrastructure in the Fitzroy Basin is operated to provide ecologically critical environmental flows, and are fitted with effective fishways, the cumulative impacts of this water infrastructure to aquatic fauna are expected to be minimal and acceptable. This will need to be confirmed by the impact assessment process for each development as details of design and operation become available.

ES.1.5.11 Surface water

Surface water impact assessment showed that the adopted preliminary operations strategy will mitigate all identified risks through a combination of environmental and compensation release strategies. In particular:

- the risk of impacts to existing users and the environment through changed river flows is low and will be managed through the dam operational strategy;
- both the Environmental Flow Objectives and the Water Allocation Security Objectives within the Fitzroy Basin WRP can be met with the dam in place;
- the flood risk during construction and operation is low and will be managed through a combination of construction timing, flood management plan and land purchase strategy;
- the possibility of changes to stream bed profiles, channel morphology and local drainage patterns is low and will be managed through appropriate construction management plans and procedures;
- fish passage will be provided through a fishway at the dam and appropriately designed drainage structures and waterway crossings to mitigate the potential impact of the dam as a barrier to fauna movement;
- given the potential impact of climate change on the region the dam represents an additional, valuable resource;
- geomorphic processes for the Connors River are likely to be maintained for the post-dam case and the residual risk is generally low. While sediment supply downstream may be reduced, this is not considered significant and may be slightly beneficial because current rates of sediment delivery and transport are much higher than pre-development conditions. Although some localised erosion and sedimentation impacts may occur, overall the risks to fluvial geomorphology are low to medium.

Over 5900 ha of predominantly grazing land will be taken out of agricultural production by the footprint of the Project. Additional surrounding land will largely be managed for environmental purposes which will greatly reduce sediment and nutrient runoff from the Connors River catchment. Of the reduced sediment that does run off, the impoundment will trap approximately 247,000 tonnes per year. The Project allows for 5000 ML/a of Medium Priority water to be purchased for irrigated agriculture downstream of the dam. A maximum of 833 ha of land could be developed, most likely to irrigate cereal and fodder crops, however a significant proportion of the additional water is more likely to be used for improving the security of existing users rather than establishing new cropping land. Even if new land is converted to irrigation, the

large amount of upstream land removed from grazing would far outweigh any possible increase in erosion rate from the change in downstream land use.

ES.1.5.12 Ground water

Three types of aquifers exist within the study area, a shallow Alluvial Aquifer, Tertiary Basalt Aquifer and a Basement Rock Aquifer. The Alluvial Aquifer is the uppermost aquifer (overlying and adjacent to outcrop areas of the Tertiary Basalt and Basement Rock Aquifer) and is considered susceptible to impacts.

Direct vertical recharge occurs in the Alluvial Aquifer via rainfall, leakage from surface water systems and overbank flow and through-flow from the underlying Basement Rock Aquifer. Recharge in the Basement Rock and Tertiary Basalt Aquifer is from rainfall in outcrop areas or from overlying or adjacent Alluvial Aquifer if in hydraulic connection.

Groundwater discharge in the Alluvial Aquifer occurs primarily as down-valley through flow or discharge into streams. Groundwater discharge in the Basement Rock and Tertiary Basalt Aquifer is expected to occur as seeps along the base of slopes or by through-flow to the Alluvial Aquifer where they are in hydraulic connection.

There is a moderate to high degree of connection between groundwater and surface water. At a catchment scale, streams are dominantly losing however it is highly likely that some reaches of the Funnel Creek, Connors River are gaining for at least some of the time.

The Project will extract groundwater for use during the construction of the pipeline. Groundwater extraction bores will be placed in the Alluvial Aquifer associated with Funnel, Denison and Bee Creeks. It is estimated that approximately 140 ML in total will be required for the Project.

It is considered that potential groundwater impacts arising from the Project can be addressed through implementation of appropriate management activities and monitoring.

ES.1.5.13 Surface water quality

The existing environment is indicative of a slightly disturbed system, somewhat impacted by grazing land use and pasture improvement.

Potential impacts are separated into construction and operational phases.

- during construction, the main risk is the mobilisation of sediment and nutrients from disturbed areas of the construction areas (dam, pipeline and associated infrastructure), and the potential impacts that may occur to waterways. These risks are minimised by the construction approach proposed and the implementation of sediment and erosion control plans;
- during construction, the potential for contaminants (e.g. hydrocarbons, wastewater) to enter waterways exists, but the proposed mitigation measures during construction will minimise these risks;
- during the first filling period, increased nutrient levels are expected as the soils are inundated and the terrestrial vegetation decomposes within the water storage. These impacts will be mitigated by the development and implementation of a first release strategy.

- during operation of the dam, there will be localised impacts on flow (in the mid range of flows). Base flows, fishway releases and key EFOs will be maintained. Sediment and nutrient runoff rate from the catchment into the dam is likely to be lower than at present. As a result, no significant adverse impacts on downstream water quality are expected;
- water quality in the storage will be monitored during operation so that appropriate measures can be put into place if required, such as sourcing water from a different depth before discharge; and
- during operation of the pipeline negligible impacts are expected from small volumes of water released by scouring and pigging.

ES.1.5.14 Air quality

Dispersion modelling was used to predict PM_{10} and TSP concentrations and dust deposition rates at sensitive receivers for the construction of the Project.

The modelling indicated that the Project will not cause exceedances of DERM air quality goals at the nearest sensitive receivers.

Operational air quality impacts are likely to be minor; however the Project will result in a change in the areas affected by motor vehicle exhaust due to the creation of a recreational area at the Dam.

ES.1.5.15 Greenhouse gas

The greenhouse gas emissions from the construction and operation of the Project represent approximately 0.1% of Australia's greenhouse gas emissions. The construction program has been designed to maximise energy efficiency and minimise greenhouse gas emissions from the works. The continued implementation of SunWater's Energy Management Standard will minimise greenhouse gas emissions from the operation of the Project.

ES.1.5.16 Noise and vibration

Sensitive receivers and acoustic quality environmental values to be protected have been identified and potential noise and vibration levels have been predicted using modelling and fundamentals as follows:.

- risk of noise and vibration nuisance impacts from dam construction is low given the distance between construction activities and sensitive receivers; mitigation is provided by the terrain; and
- risk of noise and vibration nuisance impacts from pipeline construction at sensitive receivers is low, given that construction activities will be temporary and will be occurring during the day when potential for nuisance impacts will be the lowest.

When assessed against the Project noise and vibration goals, noise and vibration levels at sensitive receivers were found to comply.

ES.1.5.17 Waste

The management of waste associated with the construction, construction site decommissioning and operation of the Project will be undertaken in accordance with relevant legislative requirements, guidelines and the EMP.

It is anticipated that much of the waste generated as a result of the works can be beneficially reused within the Project or in nearby projects. Where wastes cannot be reused, recycling opportunities will be maximised. Appropriate facilities exist in the local region to accept wastes that need to be disposed off-site.

While the construction and operation of the Project will produce wastes that pose a risk to the health of workers, public and the environment, appropriate management of these wastes will reduce the risk to Low.

ES.1.5.18 Transport

Traffic and transport impacts have been assessed by:

- identifying the transport methods and routes associated with the Project, including proposed new or alterations to transport-related infrastructure, and the construction of any Project-related plant or utilities;
- identifying the source, composition, timing and routes, of inputs and outputs of traffic generation for the Project; and
- assessing the potential impacts of Project related traffic on the State and local government controlled road network and the required mitigation measures.

The assessment has found that peak transport activity for the entire Project is estimated as during pipe line bedding material delivery concurrent with the delivery of pipes. This would take place during normal (non-RCC) dam construction activity in late 2011/early 2012. The assessment has found that the increase in traffic generated by the Project during its peak construction period will not affect the level of service (LOS) experienced by drivers on roads affected by the Project. Peak hour volumes on these roads are low and the priority controlled intersections in the Project area, including the intersection between Connors River Collaroy Road and Marlborough Sarina Road, are expected to continue to operate with low delays and acceptable LOS. In addition, the construction works will not affect the range of vehicle types using these State controlled roads, so no change in the geometry of the existing roads will be required.

In terms of the local road network, the dam site access of Connors River Collaroy Road will be upgraded to a two (2) lane paved rural road and closed to public access at its new terminus. Road segments of Collaroy Tierawoomba Road and Killarney Collaroy Roads will be closed due to inundation; severing access to a number of properties. It is not proposed to restore access but to purchase the properties. Both roads would become terminal roadways as a result of the road closures. While demand for through movements is low, alternative through routes will be accommodated by Marlborough Sarina Road.

A number of mitigation measures and routes have been identified and/or recommended to mitigate impacts to the State controlled and local roads. These measures will be reviewed with the construction and haulage contractors once they are appointed and the road impact assessment will then be revised to reflect the actual routes and transport methods to be used. Specific mitigation measures and strategies in their implementation will be determined at detailed Project design.

ES.1.5.19 Non-indigenous cultural heritage

Searches of the National Heritage Register, Commonwealth Heritage Register including the Australian Heritage Places Inventory, the Queensland Heritage Register and the National Trust of Queensland register and database revealed no places listed within the Project area.

There were no visible historic places in the immediate vicinity of the dam wall; thus the recording of historic sites was focussed on the five pastoral stations affected by the inundation area (Collaroy, Marylands, Undercliff, Doreen and Ridgelands). The Collaroy homestead will be isolated by the water storage area and several outbuildings may be inundated while the old Marylands homestead and associated structures will be inundated. The Undercliff, Doreen and Ridgelands homesteads and associated structures will not be inundated but Ridgelands will be isolated through road severance.

In regard to structures, Collaroy and Marylands contained the best range of station buildings. However, there was no observed significant technical achievement in regard to the structures at these properties. Collaroy is the most important historic property as it demonstrates the principal characteristics of a class of cultural places as it has evidence of the structural development of a pastoral property over a long period of time.

Given the pipeline corridor is located in or adjacent to road or other easements for a considerable length, it is unlikely that any heritage places will be impacted. There are no houses or significant structures actually on or within 100 m of the alignment.

No sites listed on any national, State or local government register will be impacted by the construction of the Project.

As a possibility exists that unknown sites may be present in the area, section 89 of *the Queensland Heritage Act 1992* would apply in regard to the requirement to give notice about discovery of archaeological artefact if anything is found within the Project area.

No heritage conservation action is required in relation to existing buildings or structures on any of the five properties in the inundation area. It was suggested during consultation with landholders that actions may need to be taken to ensure that when properties are vacated, there is no opportunity for vandalism.

ES.1.5.20 Indigenous cultural heritage

SunWater is addressing all aspects of its duty of care in regard to investigating Aboriginal cultural heritage associated with the Project area and developing ongoing management strategies in consultation with the appropriate Aboriginal parties in line with the requirements of the Aboriginal Cultural Heritage Act.

Woora Consulting Pty Ltd (Woora) is the registered Aboriginal Cultural Heritage Body for the proposed dam and surrounding area and part of the pipeline route. The Barada Barna People QC08/11, QUD380/08 (BB) hold a native title claim (registered on Friday 9 October 2009), that encompasses the entire Project area. As such, the BB People are the sole Aboriginal Party for the inundation area and surrounds and the pipeline route for the purposes of section 34 and 35 of the Aboriginal Cultural Heritage Act.

Prior to 9 October, SunWater had been dealing on cultural heritage matters with a number of other parties with deregistered native title claims over the area, however, upon the registration of the BB claim, the BB People became the Aboriginal Party for the project area for the purposes of section 34 and 35 of the Aboriginal Cultural Heritage Act.

In September 2008 SunWater formally initiated a CHMP process with Barada Barna Kabalbara Yetimarla #4 (BBKY #4) (a previous native title claimant group) over the dam and inundation area. In May 2009, a CHMP was agreed and executed with Woora acting on behalf of BBKY #4 and its native title claimants for all areas potentially affected by the

construction and operation of the water storage component of the Project. In addition, a Cultural Heritage Service Agreement (CHSA) was established and executed with Woora for the implementation of a cultural heritage survey of a major part of the pipeline route.

SunWater has since confirmed with the BB native title claimants that Woora is authorised to act on their behalf and represent their interests. The BB claimants have also confirmed that cultural heritage surveys undertaken by Woora can be used to inform the development of a cultural heritage management plan (CHMP) and that the results and recommendations of the Woora surveys represent the cultural heritage interests of the BB People.

Under the agreed methodology in the CHMP, Woora completed a cultural heritage survey of the water storage component of the project in August 2009 and submitted a survey report to SunWater. At the time of writing this EIS, Woora was also in the process of carrying out a survey of the proposed pipeline route under the CHSA with SunWater. A number of specific areas for associated infrastructure remain to be surveyed. These will be undertaken when decisions regarding design and location of associated infrastructure are finalised.

The results of the surveys will inform negotiations for the 'agreed recommendations' to be incorporated into the CHMP sections relating to the management of cultural heritage found within the dam and surrounds, and the pipeline route. Pursuant to the terms of the CHMP and CHSA entered into with Woora the content of the survey reports is confidential.

Potential impacts and mitigation measures

The potential impact to Aboriginal cultural heritage resulting from construction (and operation) of the Project will be assessed based on Archaeologist reported results of cultural heritage surveys for the Project Area undertaken by Woora.

Pursuant to the terms of a CHMP to be agreed between SunWater and the BB claimants for the dam and surrounds and the pipeline route, specific tailored management strategies are to be adopted to mitigate potential impacts. These will be developed from the management recommendations set out in the survey reports. These recommendations will be discussed, further developed and ultimately determined at CHMP 'agreed recommendations' meetings between SunWater and BB as the endorsed Aboriginal party.

Under the CHMP development process, construction of the Project cannot proceed until SunWater and the relevant Aboriginal Parties have reached formal agreement on the impacts to Aboriginal cultural heritage and potential mitigation measures.

It is anticipated that all cultural heritage surveys will be completed and reported by the end of 2009. This will allow ample time for CHMP development and agreement prior to the proposed start of construction in 2011.

Management strategies in the CHMP will cover:

- the clearing and construction component of the Project;
- future activities/operations associated with the Project which may impact on Aboriginal cultural heritage; and
- processes to manage these impacts for as long as the Project remains in place.

ES.1.5.21 Social environment

Construction and operation of the Project will have a number of impacts for local and regional communities. In the short term, the primary benefits of the Project would be the creation of employment, training and procurement opportunities for local communities and businesses. However, the potential for communities to realise these benefits would be dependent on the nature of training and education that is provided pre-construction, and on the implementation of local procurement policies by SunWater and the construction contractors.

In the longer term social impacts of the Project generally relate to:

- the acquisition of pastoral properties and loss of farming land within the inundation area;
- changes for local residents who are required to relocate from properties acquired for the Project Compensation will be paid to directly affected property owners in accordance with relevant legislation;
- impacts on community values associated with the loss of rural land and agricultural lifestyles;
- changes to local access and connectivity in the vicinity of the inundation area, due to closure of local roads;
- potential restrictions on the use of land and farming operations within the pipeline easement;
- beneficial social and economic development opportunities supported by a more reliable water supply to the region; and
- improved access for local communities to recreational facilities provided at the dam.

The majority of social impacts associated with the Project would be experienced during the construction phase and would generally relate to:

- increased construction traffic on local and regional roads, and community concerns relating to road safety;
- temporary disruption to farming operations along the pipeline route during construction of the pipeline;
- increased demand for some social services, especially health and emergency services;

Potential impacts of construction on local and regional communities will be effectively managed through the design of the Project and implementation of mitigation and environmental management measures. In particular, the establishment of construction camps to accommodate construction workers will address impacts associated with increased demand for housing and accommodation. This would also help to reduce demand for services and facilities in local towns as well as impacts on community cohesion and population and demography of local towns.

The provision of buses to transport workers between construction camps and work sites and from regional centres to construction camps would also assist in reducing construction traffic on local and regional roads and road safety impacts, particularly associated with fatigue related accidents.

Early and ongoing consultation and communication with directly affected property owners will also help to manage impacts of the pipeline's construction on the use of land and farming operations of properties along the pipeline route. This will include information on matters relation to environmental management and mitigation and land access protocols.

ES.1.5.22 Economic environment

The Project will provide an overall positive impact in terms of providing additional water security to support the development of the coal mining industry, to ensure water supplies for regional urban development and to offer opportunities for additional agricultural development.

The current global economic situation is unlikely to affect the Project impact as the global economy is expected to be well into recovery before the Project starts.

Some impacts will be temporary and largely driven by the construction process and the impact this will have on the local economy, whilst other impacts are more permanent in their nature and driven by the ongoing provision of water by the dam and pipeline. However, while there are very large on-going potential benefits contingent on the Project's completion, the bulk of these benefits are not included in this impact assessment as they are subject to additional and separate investment decisions (e.g. mining expansion plans) and not part of the terms of reference for this economies and management of impacts assessment.

During construction, the Project will generate direct employment opportunities for about 570 workers over the 20 month construction period, peaking at about 620 workers during construction of the dam. The construction workforce for each component of the Project includes:

- an average of 200 people for construction of the dam, peaking to 250 people during the dam construction period. this includes some 20-30 professional staff;
- up to 300 people for the pipeline construction;
- approximately 35 road construction workers, plus professional staff;
- approximately 25 workers for the aggregate quarry, plus initial clearing and site establishment teams; and
- approximately 10 workers for sand extraction, plus an early works team.

In addition, the Project will provide opportunities for local and regional businesses through demand for goods and services. This is likely to create indirect employment opportunities, which would also have positive benefits for local residents. It is estimated that 40 per cent of the workforce will be employed on a fly-in fly-out basis, 40 per cent employed from the nearby coastal areas and up to 20 per cent from the immediate area (Moranbah, Nebo etc.). Flow on employment created by the construction is estimated to be an additional 4,000 FTE jobs in Queensland and 4,800 nationally. Ongoing operation of the dam and pipeline will require an estimated 6-8 full time positions and create some 14-19 FTE flow on jobs. Given the nature of these operational jobs it is likely that a significant number of these will be created in the region.

Assessment indicates that construction of the Project could add over $700 million to Gross State Product (GSP). The on-going contribution from operation of the Project could add some $3.5 million per annum directly to GSP and some $9.5 million per annum in total (direct and indirect effects).

Economic costs in the form of forgone production will also result from the Project. The largest of these are agricultural losses where land once used for agricultural will form part of the storage and inundation area. The cost however is considered to be small relative to regional production.

ES.1.5.23 Hazard and risk

The failure hazard category has important impacts on the design work to be undertaken to achieve the required reliability of the structure under the various failure modes. Based on the preliminary estimate of population at risk and severity of damages presented above, the Connors River Dam is expected to be assigned a *High C* sunny day failure hazard.

The acceptable flood capacity for a dam is based on the assigned hazard category. In Queensland, this must be undertaken according to the Guidelines on Acceptable Flood Capacity for Dams (DNRW, 2007) which deviates slightly from the comparable ANCOLD requirements.

The fallback option for a *High C* hazard category dam is that it is required to have adequate spillway capacity to safely pass a flood with an AEP between 1 in 10,000 and the PMPDF (AEP of 1 in 800,000 for the dam). However, due to the uncertainty of the hazard category at this time, the Connors River Dam spillway has been designed to pass the Probable Maximum Flood (PMF) which significantly exceeds this requirement.

The final design should include a quantitative risk assessment consistent with the requirements of the ANCOLD Guidelines on Risk Assessment (2003b). This will involve demonstrating compliance with ANCOLD societal and individual risk criteria as well as demonstrating that the risks posed by the dam are As Low As Reasonably Practicable (ALARP).

The risk assessment shows that the residual risks of the Project are no higher than moderate with most being related to typical construction activities that are regularly managed through the contractor selection process. Operational risks relate to public safety at the dam and public access to the pipeline especially during maintenance activities.

Provided competent construction and operation of the dam and pipeline is in place there are no identified residual risks that are abnormal or pose an increased level of uncertainty in achieving the objectives for this Project.

ES.1.5.24 Cumulative impacts

The EIS has presented an overview of the impacts of the Project and the potential for cumulative impacts arising from the Project construction and operation. The only potentially significant cumulative impacts identified are changes to flow regime (local), use of medium priority yield by irrigators and vegetation clearing. These impacts are offset by the management and mitigation measures described in the EIS and are balanced against the significant positive social and economic benefits of the Project.

ES.1.5.25 Matters of National Environmental Significance (MNES)

No listed threatened flora species were recorded from the inundation area and surrounds. One listed threatened flora species was recorded from the pipeline alignment, Black Ironbox (*Eucalyptus raveretiana*). Two threatened flora species are considered potential occurrences, *Digitaria porrecta* and *Dicanthium queenslandicum*.

Two EPBC listed 'endangered' ecological communities are identified as occurring or potentially occurring on the immediate pipeline alignment, being;

- Brigalow (*Acacia harpophylla* dominant and co-dominant); and

- Bluegrass (*Dichanthium* spp.) dominant grasslands of the Brigalow Belt Bioregions (North and South) (Endangered), are identified as potentially occurring within the easement.

One listed threatened fauna species was recorded from the inundation area and surrounds, the Southern Squatter Pigeon (*Geophaps scripta*). One additional species is considered likely to occur in the inundation area and surrounds, the Fitzroy River Turtle (*Rheodytes leukops*).

Eight threatened fauna species are considered likely to occur on the pipeline alignment, namely the Red Goshawk, Australian Painted Snipe, Star Finch, Yakka. Skink, Greater Robust Fine-lined Slider, Dunmall's Snake, Brigalow Scalyfoot and Ornamental Snake

There are no Endangered species known from the inundation area and no important separate populations of any Vulnerable species or Listed Migratory species.

Potential impacts on Threatened Species and Ecological Communities have been considered at length. The Project is considered unlikely to have a significant adverse impact on any species or ecological community of National Environmental Significance.

Consequential actions and cumulative impacts of the proposed action have been considered. From a comprehensive assessment of cumulative impact, it is considered that there are two core environmental issues associated with cumulative impact: changes to flow regime, and clearing of vegetation. Changes to flow regime are mitigated a short distance downstream of the dam, and as such, significant impacts on matters of NES downstream are considered unlikely. The clearing of vegetation will be offset by protection of extensive tracts of habitat around the water storage. These areas will be managed for the purpose of maintaining their value as environmental offsets.

The Great Barrier Reef Marine Park is located some 560km downstream of the dam. Assessment of impacts on downstream flows and water quality indicates that significant impacts on the World Heritage Values of the Marine Park are unlikely. The Shoalwater and Corio Bay Wetlands are similarly separated from the project area and significant impacts are unlikely. The Project will not affect achievement of the outcomes specified in the Reef Plan and is highly likely to assist in attaining those outcomes.

A series of mitigation measures are proposed which minimise the risk to Matters of National Environmental Significance as far as practically possible.

ES1.6 Approach to environmental management

A number of recommendations have been made in this Environmental Impact Statement (EIS) in relation to the management of environmental impacts during the construction and operation of the Project. These recommendations will require actions to be taken during the design, construction and operational life of the Project.

The mitigation of impact and realisation of beneficial outcomes identified in the environmental impact assessment process will require an effective management framework and implementation. Detailed environmental management plans (EMPs) will need to be prepared. Some aspects of the EMPs will need to be approved by the Queensland Government and others will need to be approved by SunWater prior to the commencement of construction and operation of the Project. Existing laws, regulations, codes and the like determine the approval roles and responsibilities of both the Queensland Government and SunWater.

The EIS provides for draft EMPs which set out the project commitments to avoid or minimise potential environmental impacts of the project as identified in the EIS, identification of environmental aspects to be managed and how environmental values may be protected and enhanced. Included are Construction and Operational Environmental Management Plans, CEMP and OEMP respectively, which are dynamic documents as they incorporate continuous improvement. Each plan will be updated to incorporate further information, approval conditions, and changes in environmental management procedures in the light of ongoing monitoring results, new techniques, and relevant legislative requirements.

ES1.7 Recommendations

Having regard for the benefits and the impacts of the Project presented in this EIS, it is a recommendation of the EIS that the Project proceeds subject to:

a) developing and implementing detailed EMPs for the construction phase and the operational phase;

b) developing and implementing a scheme of effective mitigation measures and proponent commitments such as those set out in the EIS; and

c) finalising the offset strategy.

In making the recommendation, the Coordinator-General is requested to:

1) assess the EIS;

2) recommend the Project proceed; and

3) state conditions for the Project under section 39 (1) (a) of the *State Development and Public Works Organisation Act 1971*.