



Stanthorpe Shire Council

Emu Swamp Dam Project

INITIAL ADVICE STATEMENT

- Rev 1
- 8 September 2006



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Abbreviations

CHMP	Cultural Heritage Management Plan
DDROC	Darling Downs Regional Organisation of Councils
DLGPSR	Department of Local Government Planning, Sport and Recreation
DNR	Department of Natural Resources
DNRM	Department of Natural Resources and Mines
DNRMW	Department of Natural Resources, Mines and Water
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Cth)
FSL	Full Supply Level
InAS	Initial Advice Statement
IQQM	Integrated Quality and Quantity Model
ML	megalitres
ML/a	megalitres per annum
NATA	National Association of Testing Authorities
OESR	Office of Economic and Statistical Research
PIFU	Planning Information and Forecasting Unit
ROP	Resource Operations Plan
SDPWO Act	State Development and Public Works Organisation Act 1971 (Qld)
SSC	Stanthorpe Shire Council
ToR	Terms of Reference
WRP	Water Resource Plan



1. Introduction

1.1 The Project

Stanthorpe Shire Council proposes to construct a water supply dam on the Severn River 15 km southwest of Stanthorpe. The project also includes a water supply pipeline to deliver water from the dam to Council's water treatment plant in Stanthorpe.

This Initial Advice Statement (InAS) describes the project, its benefits and impacts and presents possible mitigation measures to manage project related impacts.

Council is considering a larger dam option that would provide irrigation water for agricultural producers in the upper Severn River catchment.

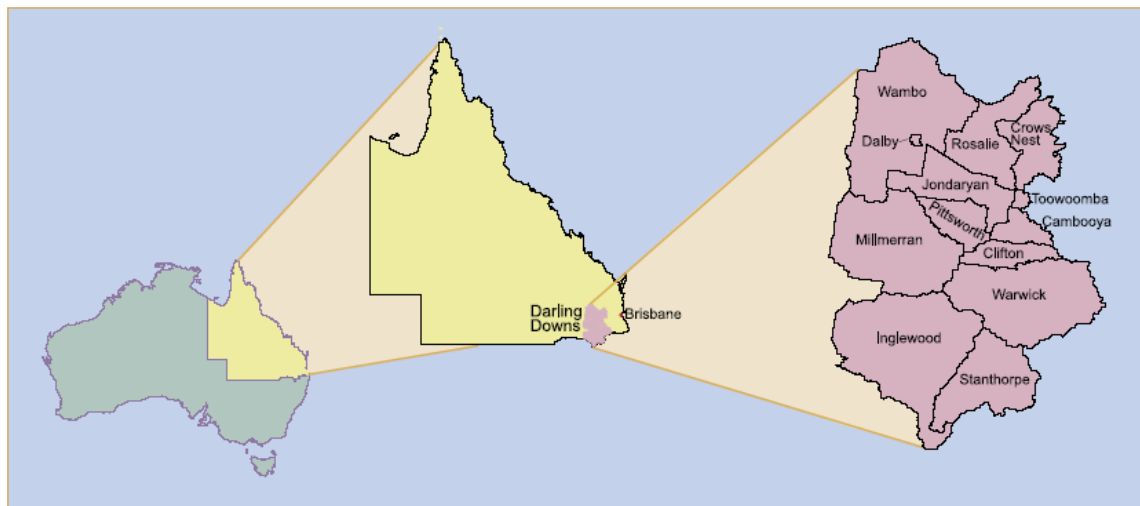
The Council's key objectives of the Project are to:

- develop a new urban water source for Stanthorpe Shire that overcomes the existing urban water deficiencies and provides capacity for anticipated residential and associated industrial and commercial growth;
- participate in a combined scheme (with irrigators) that also develops a new irrigation water source in the upper Severn River catchment. The irrigation water would provide improved security for existing horticultural practices and additional water for expanded agriculture;
- establish and operate a sustainable dam and water pipeline scheme;
- construct and operate a dam and water pipeline scheme that minimises adverse impacts on the surrounding bio-physical and social environments;
- construct and operate a dam and water pipeline scheme that complies with all relevant statutory obligations and with sound environmental management practices; and
- construct, design and operate a dam and water pipeline scheme that does not compromise environmental and social indicators and standards.

1.2 Dam Site and Location

The town of Stanthorpe is the largest town in Stanthorpe Shire. The Shire is located in the Darling Downs region and it is the most south-eastern shire of the region. Stanthorpe Shire's boundary forms part of the Qld/NSW State border (**Figure 1**). The Shire has an area of 2,697 square kilometres.

The proposed Emu Swamp dam is on the Severn River approximately 15 km southwest of Stanthorpe (**Figure 2**).



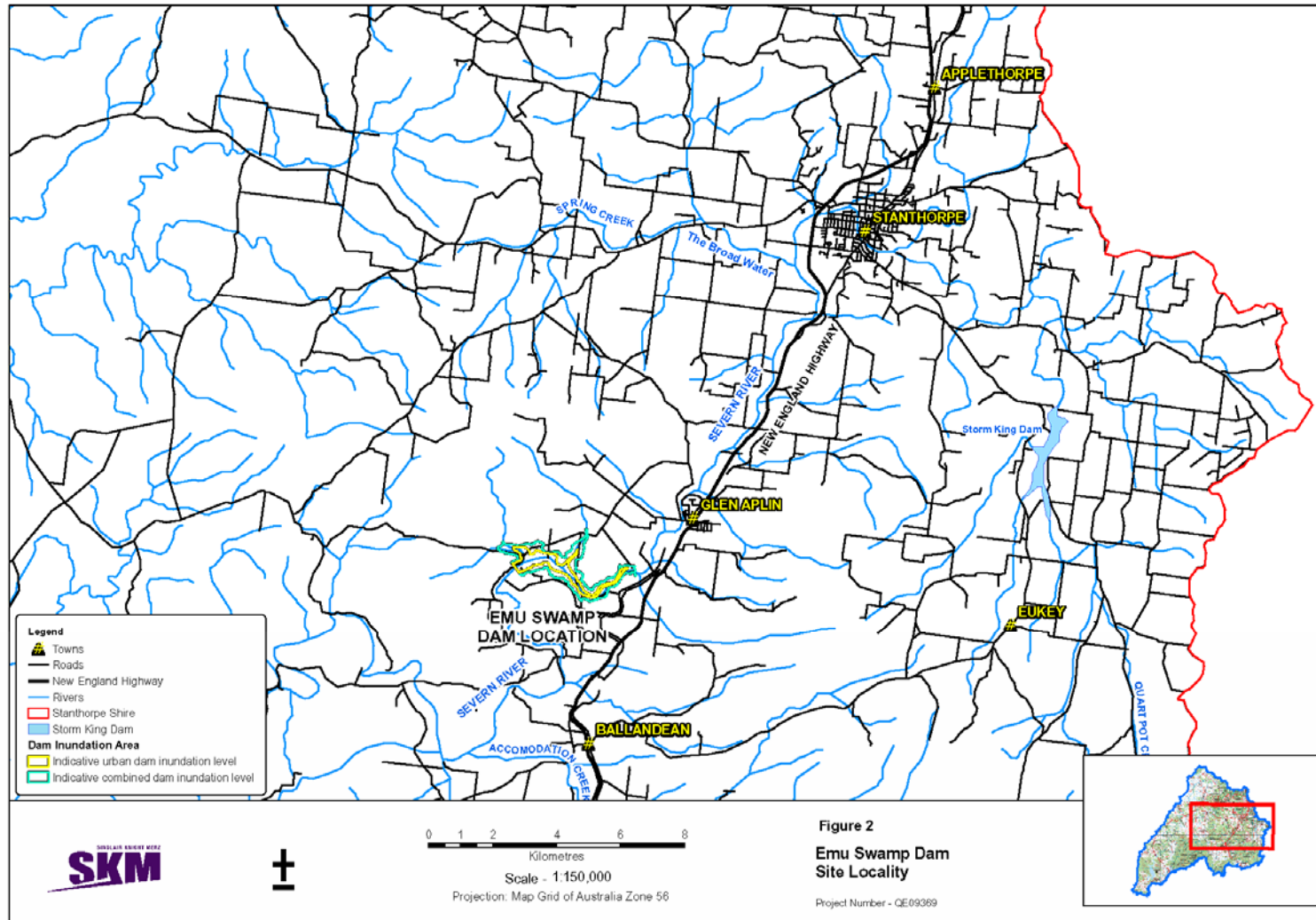
■ **Figure 1 - Location of Stanthorpe Shire**

Figure 2 shows the approximate location of the Emu Swamp dam. The final position of the dam wall, spillway and extent of the inundation area will depend on detailed surveys and engineering studies that will be undertaken during the preparation of the Environment Impact Statement for the project.

The location of the dam wall and inundation areas for the “urban only” and the “urban plus irrigation” (combined) dam options will be presented in detail in the Environmental Impact Statement.

The figures in the InAS that show the inundation area of the dam, include two full supply levels. These are for:

- the urban only option, which provides water for urban use; and
- urban plus irrigation option that includes water for both urban and irrigation uses.



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■ **Figure 2 - Emu Swamp Dam Site Locality**

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1.3 Background and Need for the Project

The town of Stanthorpe has experienced problems meeting urban water demand for many years and is now in urgent need of a new source.

Stanthorpe obtains its water from Storm King Dam. Storm King Dam was constructed in 1954. The dam has a storage volume of 2,180 ML at FSL and a yield of about 700 ML/a. Storm King Dam has been drawn down to low levels on numerous occasions over the last 20 years.

To manage urban water demand, Council has introduced a number of measures. In 1980 water meters were installed and consumers charged for excess water use. In 1996 charging for water was altered 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 and the dam is presently (August 2006) less than half full again.

The Shire's high value horticultural industry has also been constrained by water availability for many years and the Emu Swamp dam offers the best opportunity for using the unallocated irrigation water as efficiently as possible.

The upper parts of the Severn River catchment (above the Emu Swamp dam site) support an important irrigated horticulture industry. The irrigation water is obtained by harvesting overland runoff and by extractions from the tributaries of the Severn River. Irrigators have constructed many off-stream and on-stream structures to access the water resources of the area. There has been a demand for additional irrigation water over many years to meet growing horticultural development and the capacity to undertake further private water development, either off-stream or on-stream, is very limited.

The horticultural produce from Stanthorpe Shire is very important to Queensland. The area produces 90% of the State's apples and stone fruit and 50% of the State's wine grapes. Stanthorpe's unique climate provides “out of season” opportunities e.g. the Shire produces a large component of the State's summer vegetables. There are a number of high value growth niches that could be exploited with more reliable irrigation water.

Stanthorpe has had an urgent need for additional urban water for some years. Council has been proactive in identifying and investigating new water sources. The moratorium during the Water Resources Planning process delayed Council's progress but Council actively participated and is pleased that new water allocations have been secured.

Council is very keen to progress the Emu Swamp dam project and has initiated site surveys, geotechnical and engineering studies and consultation with affected landholders.



1.3.1 Previous Investigations

Numerous investigations of urban and irrigation water options have been undertaken over the last 25 years viz.

- DPI (Queensland Water Resources Commission) prepared reports on irrigation water options through the 1980s (QWRC 1980, 1983, 1985, 1986, 1988 and 1990). The Broad Water dam was the subject of the most detailed investigation but this did not proceed.
- Council also investigated urban water options in 1983 and 1984 (MJA 1983 and 1984).
- Council prepared Demand Management and Total Management Plans that reflected its water problems and approach to reducing urban water consumption (SSC 1994 and 1995).
- Council's urban water problems continued and further urban water sources were investigated in consultants reports (SKM 1997a and 1997b). A wide range of options were investigated with the best being dams at Emu Swamp and Ballandean.
- Council made submissions to the State Government's Water Advisory Council (SKM 1998).
- Integrated urban and irrigation water demands and supply options were investigated for the Emu Swamp and Ballandean dam sites (Stone 1998 and SKM 1999).

1.3.2 Council's Effluent Reuse Scheme

Council has been acutely aware of the value on water on the Granite Belt and has implemented an effluent reuse scheme to sell treated town sewage effluent to farmers.

The effluent reuse scheme began in 2001 when Council invited Expressions of Interest for the purchase of the effluent. Considerable interest was shown by farmers. Technical investigations were undertaken during 2003 – these works included the development of a scheme to supply 10 farmers and Council recreation areas; a detailed On Farm Sustainability Assessment; a draft Supply Agreement; a generic (effluent reuse) Farm Management Plan and an (effluent reuse) Scheme Management Plan.

Council negotiated Supply Agreements with the irrigators. The irrigators made capital cost contributions to the scheme and pay an annually adjusted rate per megalite that meets some of the operating and loan repayment costs. The Council meets the balance of the costs. The benefit to the Council was avoiding an expensive upgrade to the sewage treatment plant. The scheme was constructed in 2004 and extended in 2005 - all of the town's treated sewage effluent (about 400 ML/a) is now beneficially reused.

The effluent is used to irrigate turf, stonefruit, apples, pome fruit, grapes, strawberry runners, capsicum, parsley, leeks and other vegetables.



1.3.3 Water Resources Planning

In September 2000, the Queensland Department of Natural Resources and Mines (DNRM) imposed a moratorium on the development of water works in the Border Rivers catchment for the duration of its Water Resources Planning process. The WRP process and further investigations proceeded as follows.

- DNRM released the draft Border Rivers Water Resources Plan (DNRM 2002).
- Council made a submission to the draft WRP (SKM 2002).
- DNRM issued the final Border Rivers Water Resources Plan. The WRP allocated an additional 1,500ML/a of urban water and 3,500ML/a of irrigation water to the Border Rivers catchment (DNRM 2003).
- Council reviewed its urban water options with respect to the WRP process (SKM 2005) and decided to undertake additional hydrology work for the Emu Swamp and Ballandean sites.
- Additional IQQM modelling was undertaken (using the DNRMW model) to quantify water availability at the Emu Swamp and Ballandean sites. This work demonstrated that there was no substantial hydrological difference between the two sites. The work showed that 1,500 ML/a of high reliability (94% monthly reliability) urban water and about 1,780 ML/a of lower reliability (about 55% monthly reliability) irrigation water could be obtained.
- A review of work to date showed that the Emu Swamp and Ballandean sites were very similar however, the Emu Swamp site was potentially the least expensive and the least disruptive to community and environment. In May 2006 Council decided to concentrate its efforts on securing approval to construct a dam at the Emu Swamp site.
- Council updated its urban water needs analysis (SKM 2006) to confirm water demand trends.

The Urban Water Needs Analysis considered various population projections (based on the Department of Local Government, Planning, Sport and Recreation's Planning, Information & Forecasting Unit data) and further reductions in per capita water consumption (consistent with the SEQ Regional Water Supply Strategy, 2004) to project future water demands. Conservative industrial water demands were also made. The most optimistic outcome of this work was that the Council's existing water supplies would be exceeded by 2010 – a more realistic assessment was that the existing supplies were already exceeded and that Council was “living on borrowed time”. With the additional 1,500ML/a of urban water demands could be satisfied until 2035 or 2040 (depending on the demand growth scenario).

As part of the Water Resource Planning process the Department of Natural Resources, Mines and Water (DNRMW) is presently preparing a Resources Operations Plan (ROP) that, amongst other things, will provide the basis for the distribution of water allocations and for water trading within



the catchment. DNRMW advises that the ROP will provide an opportunity for consolidating irrigation water allocations at the Emu Swamp dam site.

1.3.4 Current Activities

The irrigators need to develop a suitable organisational mechanism for their involvement in the funding and operations of a combined urban and irrigation water scheme.

The irrigators have undertaken inspections of the Barossa Infrastructure Ltd project which is an irrigator owned and operated irrigation scheme in South Australia. The irrigators have also commissioned a consultant's investigation of irrigation scheme costs.

A considerable amount of work needs to be done by the irrigators before they are in a position to participate in a combined urban and irrigation water dam at Emu Swamp.

While the irrigators are undertaking their investigations, Council is proceeding with investigations into the urban water scheme viz:

- The preparation of this Initial Advice Statement and application for Significant Project Status.
- The commencement of the Community Consultation process including meetings with all affected landholders; preparation of fact sheets, media releases etc for public release; development of web based information; implementation of a Communications Management System to record inquiries from the public, stakeholders etc. The Community Consultation program is expected to evolve as the project progresses.
- The preparation of engineering field survey information for detailed investigations, negotiations etc.
- The preparation of a preliminary geotechnical and engineering study to define the dam, spillway and pipeline infrastructure and costs.
- The preparation of the EIS for the project.

1.4 Project Benefits

The development of the Emu Swamp dam will provide benefits to the urban and irrigated agriculture sectors as follows:

1.4.1 Urban Sector Benefits

Stanthorpe and the smaller villages are presently vibrant successful communities that will benefit from the water provided by the Emu Swamp dam in the following ways:



- an improved water supply will remove a major impediment to growth (and potentially a contributor to decline) and provides opportunities for urban growth including increased populations;
- Stanthorpe has a diverse base of food production industries and service providers and an improved water supply will provide opportunities to support and attract more diverse value adding businesses;
- Stanthorpe has a strong tourism sector and an improved water supply will provide opportunities to support and attract a wider range of tourism activities;
- Stanthorpe has a strong services sector that will be supported and enhanced by an increased urban population; and
- strengthened economics and security reinforce employment and improve the urban social fabric e.g. by providing opportunities and attractions to retain young people.

1.4.2 Irrigated Agriculture Sector Benefits

The irrigated agriculture sector will benefit from the Emu Swamp dam in the following ways:

- more reliable agricultural yields;
- increased agricultural production from the expansion of high value horticulture;
- increased economic viability for small farmers avoiding the population and social losses when small farmers are displaced by large scale corporate agriculture;
- increased opportunities for the production of value added agricultural products;
- increased opportunities for the retention and establishment agricultural service industries;
- increased opportunities to generate foreign exchange through export of agricultural commodities and processed goods; and
- increased economic strength locally and in the region provides flow-on benefits to the state and nation.

Social benefits associated with an increased irrigation water allocation include:

- additional employment for agricultural workers;
- additional employment for specialist trade/ skilled positions in agriculture and supporting industries;
- increased employment demand leads to increasing incomes that will help to bridge the present gap between the region and the state average incomes;



- increased employment demand supports and enhances specialist education and training facilities e.g. like the Queensland College of Wine Tourism; and
- increased regional economic strength means a stronger Council rating base that, in turn, leads to improved government infrastructure and services.

The maintenance of the rural ethos (independence and self-reliance) is important to both the urban and irrigated agriculture sectors. These communities identify a ‘clear’ link between water and jobs.

1.5 The Proponent

Stanthorpe Shire Council is the proponent of the Project.

This Initial Advice Statement has been prepared to provide information to:

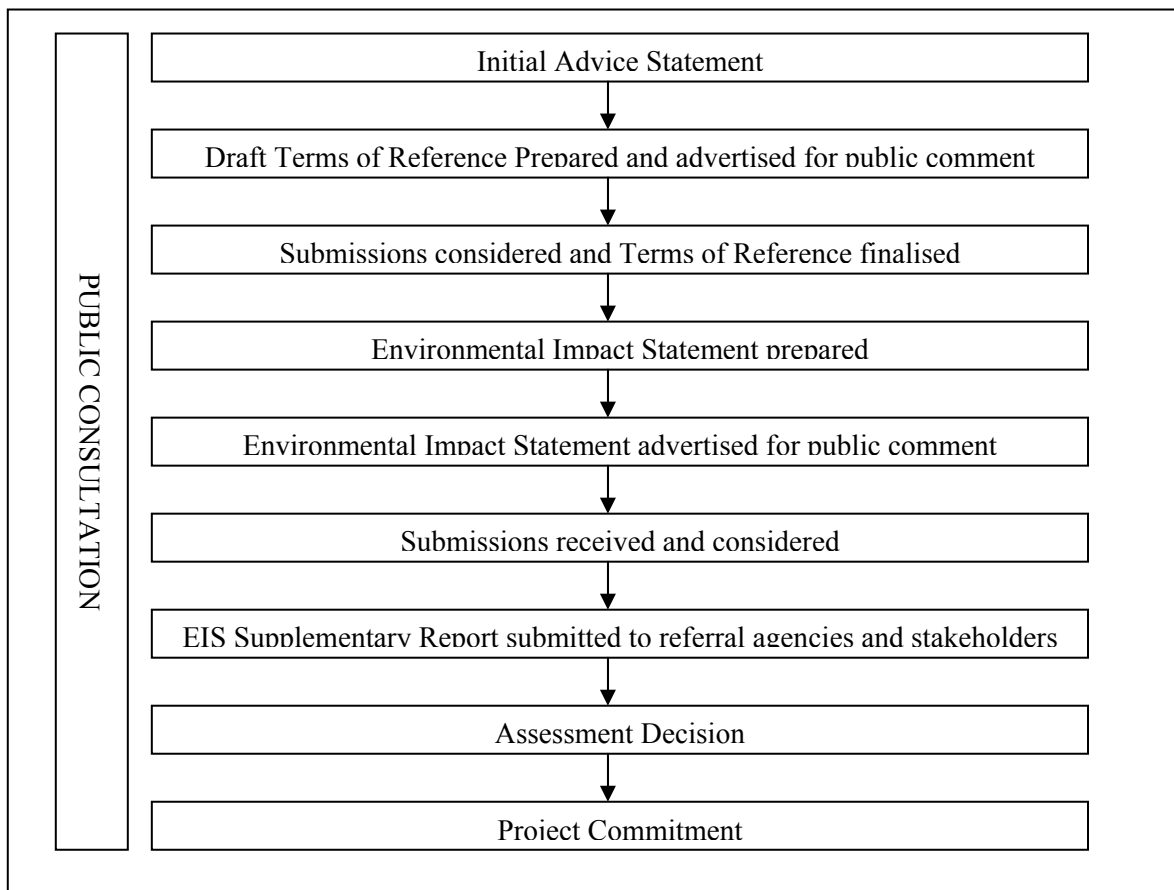
- enable determination of whether this project is a significant project under the *State Development and Public Works Organisation Act, 1971* for which an Environmental Impact Statement is required; and
- provide information to enable advising agencies and the public to have input into the Terms of Reference for the Environmental Impact Statement and to understand the scope of the project.

1.6 Environmental Impact Assessment Process

It is intended to seek ‘significant project’ status under Section 26 of the *State Development and Public Works Organisation Act 1971* (SDPWO Act). ‘Significant project’ status will centralise the coordination of the Environmental Assessment process.

The Environmental Impact Assessment (EIA) process encourages community consultation and protection of the environmental values of the site using best management practices.

The Environmental Impact Assessment process proposed for the Emu Swamp Dam is shown in **Figure 3**.



■ **Figure 3 - Environmental Impact Assessment Process**

The Environmental Impact Assessment process includes:

- This Initial Advice Statement (InAS);
- The draft and final Terms of Reference (ToR);
- The Environmental Impact Statement (EIS) and Supplementary report (if required), and
- An assessment decision and report made by the Co-ordinator General.

Public comment can be made on the draft ToR and EIS.



1.7 Project Approvals

The Emu Swamp dam project will require approvals under a number of other pieces of Queensland and Commonwealth legislation. These approvals are required under the following legislation:

- *Aboriginal Cultural Heritage Act 2003*;
- *Acquisition of Land Act 1967*;
- *Electricity Act 1994*;
- *Environment Protection and Biodiversity Conservation Act 1999 (Cth)*;
- *Environmental Protection Act 1994*;
- *Fisheries Act 1994*;
- *Forestry Act 1959*;
- *Integrated Planning Act 1997*;
- *Land Act 1984*;
- *Native Title Act 1994 (Cth)*;
- *Nature Conservation Act 1992*;
- *Queensland Heritage Act 1992*;
- *Transport Infrastructure Act 1994*;
- *Vegetation Management Act 1999*; and
- *Water Act 2000*.

These and other legislation will be considered during the EIS process.

1.8 Water Resources Plan and Resource Operations Plan Processes

Emu Swamp dam is located in the Border Rivers catchment and is covered by the Border Rivers WRP which was gazetted in December 2003.

The Border Rivers ROP is currently being prepared and the draft is expected to be released later this year.

The Emu Swamp dam project will be designed to conform to the Border Rivers WRP and ROP.

1.9 Land Acquisition

Investigations to date suggest that 15-20 properties will be affected by the 8,000 ML urban water dam option and several more by the 18,000 ML combined urban and irrigation dam option.



Emu Swamp dam will also inundate approximately three km of local roads for the 8,000 ML urban dam option. No further infrastructure impacts would occur with the 18,000 ML combined dam option.

The exact extent of inundation will be defined as part of the project's detailed investigation.

Council has already advised the affected landholders of the impact of the dam on their properties.. The extent to which these landholders are affected and hence the extent of land acquisition will be defined as part of the detailed investigations.

The proponent's acquisition policy will be to acquire any required land at a fair price based on independent valuation. The proponent will also make reasonable compensation for any relocation and/or disturbance experienced by affected landowners as a result of the inundation.

1.10 Community and Stakeholder Consultation

The community views and attitudes toward the project are important. The community needs to have a clear understanding of the project and the Council needs to have a clear understanding of community view.

A stakeholder consultation program is underway and includes the following elements:

- individual meetings with landholders;
- use of the Council's weekly newspaper column in the Stanthorpe Border Post to provide information on the status of the project;
- media training for Council staff (training sessions with media about the project);
- development of fact sheets to be made available to the public;
- website based information about the project;
- communications Management System (CMS) to register all stakeholders, inquiries and communications; and
- project information line, to be run through Stanthorpe Shire Council.

All community input is being managed in the CMS. The CMS is used to register stakeholders; log correspondence and consultation with stakeholders (including meetings, phone calls, and written submissions); and document and track key issues.

Reports generated from the information stored in the CMS will be used to inform project investigations and consultation needs.



2. Description of the Project

2.1 Overview

Various reports on water supplies in the Stanthorpe Shire have been prepared over the past 25 years. Initially these reports examined large dam options but in the more recent reports the dam options were reduced in size as a reflection of the influence of the Water Resources Planning process.

More recent studies have focused on the Severn River, with the most recent being the Stanthorpe Water Supply Dam Options Review (SKM 2005). This review examined five dam site options and two of these were considered the most viable.. These were the Ballandean site, near the town of Ballandean and the Emu Swamp site.

Additional modelling was undertaken using DNRMW's IQQM model to compare the yields at both Ballandean and Emu Swamp. The modelling showed that there was no significant yield difference between the two sites.

A comparison of the two sites indicated that they were very similar, however Emu Swamp was likely to have the lower capital cost and a lesser impact on the community and environment. Consequently, Council selected Emu Swamp as the preferred site for the construction of a new water supply dam.

2.2 Infrastructure Components

2.2.1 Emu Swamp Dam

Stanthorpe Shire Council has decided to undertake an engineering study for two dam options.

- Option 1 – with an allocation of 1,500 ML/a of urban water from the Severn River under the Border Rivers Water Resources Plan. Preliminary yield investigations indicate that a storage volume of 8,000 ML is required to deliver this allocation.
- Option 2 – with 1,500 ML/a of urban water allocation plus an additional 1,780 ML/a of irrigation water from the Severn River. Preliminary yield investigations indicate that a storage volume of 18,000 ML is required to deliver the urban and irrigation allocations.

The decision on whether to construct an urban only or combined urban and irrigation dam will not be taken for some time. As a result, both dam options will be assessed in the EIS.



2.2.2 Intake Structure

It is anticipated that a variable level intake structure will be required so that the urban water supply can be extracted at different levels in the dam water column to ensure that water that is extracted from the dam is of the highest possible quality.

The intake structure will be examined as part of the engineering study and the proposed intake structure arrangement will be described in detail in the EIS.

2.2.3 Fish Passage

The need for a fishway on the Emu Swamp dam is yet to be determined. The passage of migratory fish past the Emu Swamp dam (and associated devices) will be examined in the project EIS. This investigation will be the basis for an application to the Department of Primary Industries and Fisheries concerning the need for a fishway.

2.2.4 Environmental and Pass-through Flow Management

It is proposed to provide an upstream weir/flume for measuring low stream flows.

An outlet structure is proposed to allow controlled release of environmental and pass-through flows.

The environmental and pass-through flow management devices will be examined in the engineering study and presented in the description of the project to be included in the EIS.

2.2.5 Urban Pipeline

A water supply pipeline will be constructed to deliver water from the dam to Council's water treatment plant at Mt Marley.

It is expected that the pipeline will be located in the road reserves of Fletcher Road, the New England Highway and Mackenzie / Britannia / Lock Streets in Stanthorpe town.

The size and route of the urban pipeline will be described and assessed in the EIS.

2.2.6 Irrigation Pipeline

The need for and route/s of an irrigation pipeline/s is yet to be determined and will be considered as part of the decision regarding the supply of irrigation water from the Emu Swamp dam.

The irrigators would be the proponent for irrigation pipelines and they will not be examined in the EIS for this project.



2.2.7 Pump Stations

The sizing and location of pump stations will be undertaken as part of the engineering study for the urban pipeline.

It is anticipated that a major pump station will be located adjacent to the Emu Swamp dam on land that would be acquired for the dam. An additional smaller pump station and break pressure tank may be required at Stanthorpe. This pump station and break pressure tank would be located on Council land at its works depot or sewage treatment plant.

Details of pump stations will be provided in the EIS.

2.2.8 Roads, Electricity and Telecommunications

The inundation area of the Emu Swamp dam will cover a section of Emu Swamp Road and Stalling Lane. It is proposed to construct new roads to restore the access interrupted by the inundation. This would require additional acquisition of road reserves.

The inundation is likely to affect existing underground telecommunications services and aerial electricity services.

The nature and extent of impacts of the dam on roads, electricity and telecommunications infrastructure will be determined by Council in an engineering study, which will be reported in the EIS.

2.3 Construction

It is anticipated that the construction of the Emu Swamp dam and pipeline will take 15 to 18 months.

It is expected that the peak construction workforce will be 50 to 75 skilled and unskilled construction workers. The operational workforce is expected to be sourced by an increase in SSC's existing workforce.

Details of the project construction timeframe will be presented in the EIS.

2.3.1 Construction Material Sources

The source and supply of construction materials for the dam will be assessed as part of the engineering study for the project. The types of construction materials needed to construct the dam will be dependent on and influences the dam type e.g. concrete aggregates are required for a roller compacted concrete dam while clays are required for earthfill dams.



It is considered likely that construction materials will need to be quarried from the inundation area of the dam. The quarrying operations and sourcing of construction materials (and associated impacts) will be examined in the EIS.

2.4 Operation of the Dam

Operation of the Emu Swamp dam will be in accordance with the Border Rivers Resources Operations Plan that is currently being prepared.

The operating rules will include environmental and pass-through flow requirements.

Operating rules for the Emu Swamp dam will be examined in the EIS.

2.5 Cost Estimates

Cost estimates for the project will be prepared as part of the engineering study and will be presented in the EIS. The indicative project value is in the order of \$35 million to \$50 million.



3. Description of the Existing Environment

3.1 Regional Setting

Stanthorpe Shire has some of Australia's best horticultural land and is located close to Brisbane and its international sea and air links.

Stanthorpe Shire, together with the Darling Downs, is known as a centre of excellence for education, development of food and fibre products and associated technologies (DDROC 2005). Consequently, the major land uses of the region are agriculture, tourism, manufacturing, retail and education.

The region is an extensive primary producer, particularly in the areas of wine, meat processing, organic foods, horticulture and floriculture. These products are major contributors to the region's economy and offer significant future opportunities for value adding industries.

Much of the tourism is also related to the agricultural nature of the area, with the Darling Downs region attracting around 1.3 million domestic visitors each year.

Stanthorpe Shire is also well known for a number of events which celebrate local culture, lifestyle and attractions. Local fine foods, fresh produce and wines provide an increasingly attractive drawcard to the region.

Stanthorpe has recently opened the Queensland Wine Tourism College which delivers training in viticulture, hospitality, business and wine tourism to students from all areas (DDROC 2005).

3.2 Economy

The Stanthorpe Shire economy has a strong agricultural focus. The most recent statistical information shows that the Stanthorpe Shire agricultural sector is growing and maintaining its level of importance in Queensland agriculture. **Table 1** presents this information for Stanthorpe Shire and Queensland.



■ **Table 1 Value of Agricultural Production, Stanthorpe Shire**

Commodity	1997/1998			1999/2000			2001/2002		
	Stanthorpe	Qld	% of Qld	Stanthorpe	Qld	% of Qld	Stanthorpe	Qld	% of Qld
Area of holdings (1000ha)	198.3	148,186	0.1	178.7	178,698	0.1	169.1	141,388	0.1
Apples & stonefruit (\$M)	31.4	36	87	35.7	41	87	43.8	47	94
Vegetables (\$M)	30.9	471	7	33.0	541	6	43.4	677	6
Grapes (\$M)	1.6	13	13	1.8	17	11	2.6	24	11
Total Crops (\$M)	67.9	3,309	2.1	73.7	3,557	2.1	91.9	3,883	2.4
Beef & Wool (\$M)	7.7	1,706	0.4	4.5	2,440	0.2	9.7	3,705	0.3
Livestock slaughter (\$M)	4.4	1,872	0.2	4.2	2,668	0.2	4.4	3,697	0.1
Livestock products (\$M)	4.7	607	0.8	0.9	546	0.2	5.3	501	1.1
Total Agriculture (\$M)	77.1	5,787	1.3	78.8	6,771	1.2	101.6	8,081	1.3

Source: Office of Economic and Statistical Research (OESR), Queensland Treasury

Stanthorpe is the predominant producer of apples and stonefruit in the State. Stanthorpe is also an important grape producer.

Stanthorpe's climate provides "out of season" agricultural opportunities e.g. the Shire produces a large proportion of the State's summer vegetables. This is one of several growth niches that could be exploited with more reliable irrigation water.

The Stanthorpe agricultural sector is constrained by the lack of additional irrigation water. The Emu Swamp dam project has the potential to improve the agricultural sector of the economy.

While agriculture is important to the Stanthorpe economy there is significant diversification into trade, education and services. The industry employment information shown in **Table 2** compares the more important sectors for Stanthorpe and Queensland.



■ **Table 2 Employment by Industry, 1996 and 2001**

Industry	1996		2001	
	Stanthorpe	Queensland	Stanthorpe	Queensland
Agriculture, forestry & fishing	28.8%	5.2%	28.0%	4.9%
Manufacturing	7.6%	10.5%	3.6%	10.7%
Construction	5.7%	7.2%	5.5%	7.1%
Wholesale trade	4.7%	5.6%	4.3%	5.1%
Retail trade	10.9%	14.1%	13.1%	15.3%
Accommodation, cafes & restaurants	5.6%	5.5%	5.4%	5.6%
Govt administration & defence	4.0%	5.1%	3.3%	4.8%
Education	8.2%	7.2%	7.6%	7.6%
Health & community services	7.9%	9.3%	8.8%	9.6%

Source: Australian Bureau of Statistics

The recent launch of the first Queensland College of Wine Tourism is of considerable significance to Stanthorpe in terms of youth retention potential, educational opportunities, ongoing employment and development of the wine tourism industry.

Aside from the commencement of the new college, Stanthorpe has experienced strong residential building activity over the past few years with many new town and rural dwellings being approved. New housing estates have recently been approved to accommodate the growing interest in Stanthorpe's attractive lifestyle. The Council has also recently approved a new supermarket and specialty shop development and new childcare facilities (Growing Economic Growth 2006).

3.3 Land Use

3.3.1 Catchment

The Severn River catchment upstream of the proposed dam site includes the town of Stanthorpe and the villages of Cottonvale, Thulimbah, The Summit, Amiens, Applethorpe and Glen Aplin.

Storm King Dam is located on Quart Pot Creek – one of the larger tributaries to the Severn River. The Broadwater is the other major tributary.

The catchment upstream of the dam site includes the Passchendaele State Forest (FTY 1498), the Pozieres State Forest (FTY 1378) and the Broadwater State Forest (FTY 1379) and intensely developed horticultural farm land. The horticulture is “broken up” by extensive areas of granite outcrops and associated vegetation. The catchment area contains a large number of farm dams.

3.3.2 Town Planning

Under the Stanthorpe Shire Planning Scheme the proposed dam site and its surrounds are included in the Rural Zone (Stanthorpe Shire Council 2004).



Council's Rural Land Suitability Regulatory Map identifies the area as Rural Suitability Area B which has a descriptor as Limited Crop Land - a complex of crop land, pasture land and non-agricultural land.

As a planning objective Suitability Area B land is considered to be potentially good agricultural land that should be conserved for rural use. Individual land parcels need to be assessed to confirm that they are suitable for agriculture.

The Desired Environmental Outcomes for the Planning Scheme seek a balance of environmental, economic and social wellbeing goals.

One of the key Water Supply Proposals in Supporting Document 1 - Explanation of Background to Scheme Measures is *To investigate and locate a future source of water supply for Stanthorpe which maximises yield for expenditure and minimises environmental and social dislocation.*

Town planning issues will be addressed during the EIS process.

3.4 Land Ownership

Riparian land in the impoundment area along the Severn River is a combination of freehold and leasehold land. The watercourse forms the property boundary for these lots.

Issues associated with the impact of the project on property and land ownership will be addressed during the EIS.

3.5 Native Title

Recent investigations indicate there are not any registered Native Title claims over the proposed dam site and inundation area. Appropriate efforts will be made to identify and consult any Native Title claimants and traditional owners during the preparation of the EIS.

3.6 National and State Parks

The Passchendaele, Pozieres and Broadwater State Forests are located in the upper parts of the catchment.

Two National Parks are located in relatively close proximity to the proposed Emu Swamp dam location. Girraween National Park is approximately 11 km east and the Sundown National Park is approximately 13 km to the south-west.

Girraween National Park comprises a significant part of the Accommodation Creek catchment but this stream flows into the Severn River downstream of the proposed Emu Swamp dam site and therefore the National Park would be unaffected by a new dam.



The Severn River flows into the Sundown National Park approximately 30 km downstream from the Emu Swamp dam site. The potential effects of the proposed dam on the Sundown National Park will be examined during the EIS process.

3.7 Recreation

The catchment has a wide range of urban and rural recreational activities.

Stanthorpe is an attractive town set in a valuable rural sector where activities range from vineyards, wineries and orchards to sheep and cattle grazing. Stanthorpe has significant recreational draw cards including the museum and other historical buildings in the town centre, the nearby National Parks.

The Emu Swamp dam will enhance the visual attractiveness of its impoundment area.

It is anticipated that there will be community interest in fishing, boating and swimming activities in the impoundment. There are water quality issues associated with these activities when undertaken on dams used for supply of drinking water. These matters will be investigated during the EIS and a recommendation will be made about the desirability or otherwise of allowing such activities.

3.8 Climate

The Granite Belt is the coldest area in Queensland – this gives it a unique character that adds to its attractiveness. The colder climate is essential for some of the agricultural crops grown in the area.

Stanthorpe has a warm summer, cold winter climate. The mean daily maximum temperature is 21.6°C and the mean daily minimum temperature is 8.8°C.

Stanthorpe receives a moderate mean annual rainfall of 769mm.

Stanthorpe has mean wind speeds of 12.4 km/h (9am) and 14.1 km/h (3pm). The closest available wind rose is for Tenterfield and that suggests the predominant wind direction is from the north-east.

The monthly climate variation is shown in **Table 3**.



■ **Table 3 Stanthorpe Climate Statistics (BOM Stn 041095, 1973 – 1999)**

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean daily max temp (°C)	27.4	26.4	24.9	22.0	18.3	15.4	14.7	16.2	19.4	22.5	25.2	27.1
Mean daily min temp (°C)	15.5	15.5	13.8	9.5	5.5	2.5	0.9	2.0	5.1	8.9	11.7	14.1
Mean days < 0°C	0.0	0.0	0.0	0.4	4.4	10.5	14.4	11.7	3.8	0.6	0.0	0.0
Lowest temp (°C)	4.4	3.3	2.8	-2.0	-6.1	-10.6	-9.4	-7.8	-5.6	-2.2	1.1	4.4
Mean rain (mm)	97.3	86.5	66.5	43.0	47.0	47.1	50.0	42.8	52.3	69.4	74.0	93.8
90% rain (mm)	181	180	151	97	92	100	93	89	109	118	129	167
10% rain (mm)	26.9	20.7	11.7	5.0	6.9	7.6	9.3	6.2	6.4	27.1	24.4	28.3
Mean rain days	10.0	9.4	8.8	6.2	7.2	7.5	7.5	6.7	6.5	8.1	8.4	9.8
Wind speed 9am (km/hr)	12.9	13.2	12.3	12.1	11.2	10.7	10.8	12.6	13.9	13.3	13.6	12.1
Wind speed 3pm (km/hr)	13.2	13.4	12.9	13.4	13.5	14.1	14.6	15.7	15.5	14.4	14.9	13.0

Detailed climate data for the project will be described in the EIS.

3.9 Topography

The upper parts of the catchment in a crescent from The Summit, Thulimbah and Cottonvale in the east around to Bullecourt and Bapaume are more than 900m in elevation with some high points to nearly 1000 m. These areas drain south to The Broadwater. Preliminary contours of area are shown in.

Spring Creek rises in the west and flows north and east to join The Broadwater.

The Quart Pot Creek catchment is located in the east and drains through Stanthorpe town. The stream runs north to Storm King Dam and then north-west to Stanthorpe. The upper areas of the catchment are more than 1000m high and the elevation at Storm King Dam is about 870m.

The junction of The Broadwater and Quart Pot Creek forms the Severn River. This junction is to the south-west of Stanthorpe and has an elevation of about 780m.

The Severn River flows south-west and at the Emu Swamp dam site has an elevation of about 730m.

The catchment and sub-catchments are generally typified by elevated steep margins with plains of low to moderate relief and numerous knolls and spurs.

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3.10 Geology

There are three main geology types present at the dam site. The dominant geology type is granite from the early Triassic Period. The lithology of this geology type is summarised below and the extent is shown in **Figure 5**:

- Pink, medium-grained, moderately porphyritic (fluorite-muscovite-allanite-hornblende-opaque oxide) biotite monzogranite; locally with mafic enclaves (to ~10 cm); rare miarolitic cavities.

The other two geology types present are also granitoid from the Triassic period, and are described as follows:

- Pale pink to reddish pink, white, buff, brown or pale to medium grey, fine to coarse-grained, even-grained to porphyritic, miarolitic biotite leucogranite; minor relatively biotite-rich monzogranite; and
- Pale pink to pale pinkish grey, medium-grained, moderately porphyritic, leucocratic biotite monzogranite to syenogranite? (locally); scarce titanite-hornblende-biotite monzogranite, fine-grained highly porphyritic leucocratic biotite monzogranite.

The geology of the site will be investigated by drilling and field inspection during the engineering study and EIS process.

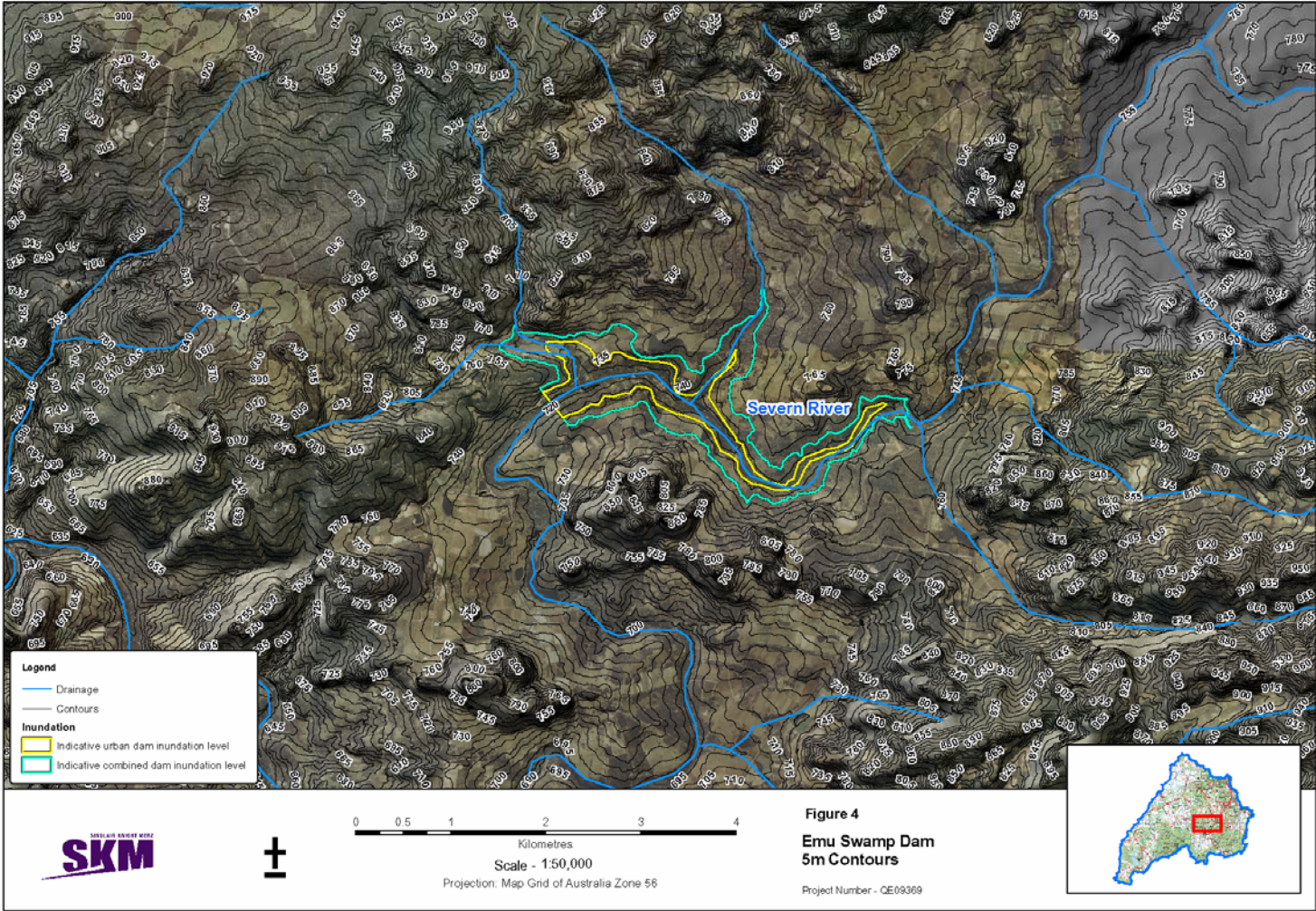
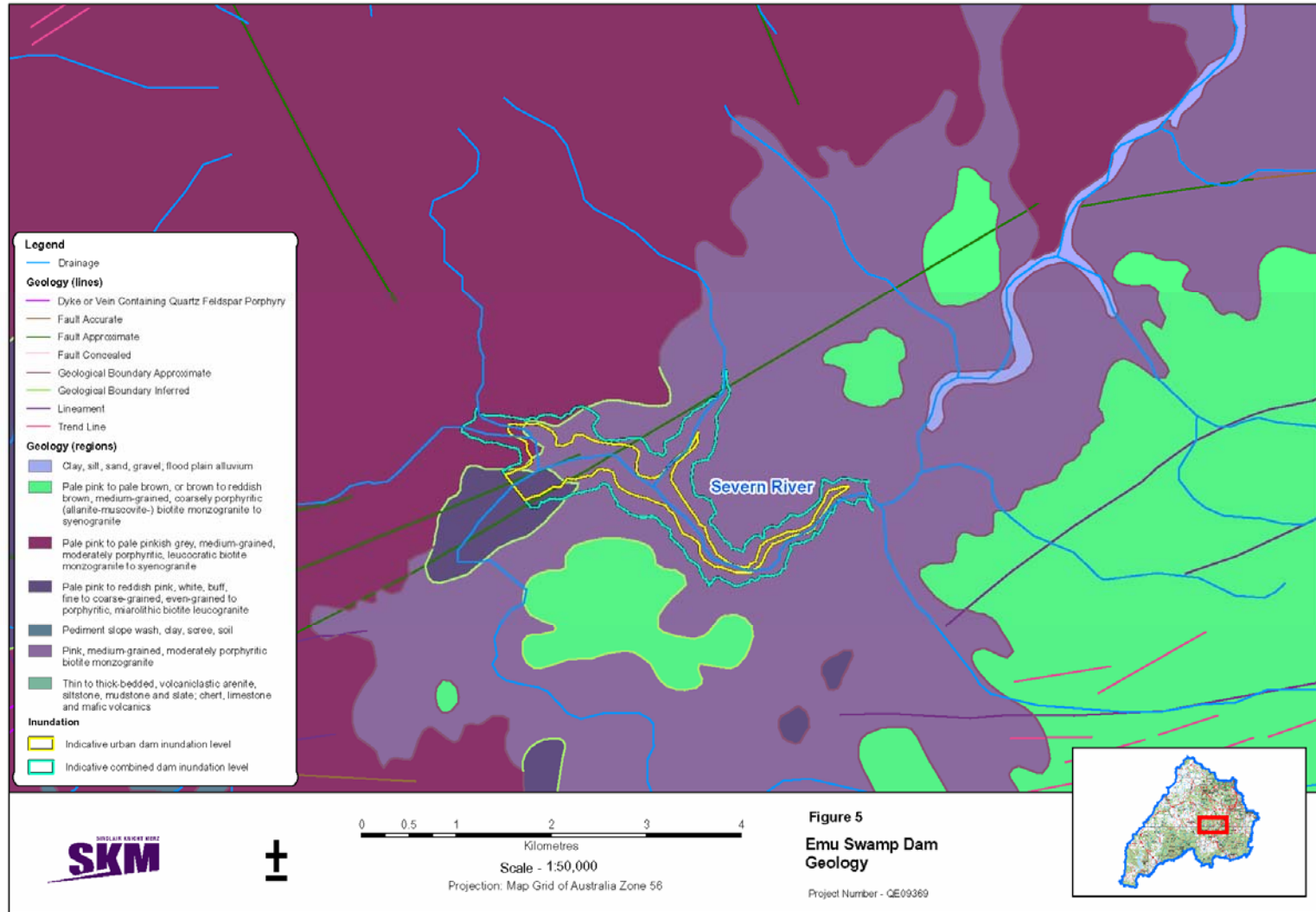


Figure 4 - Emu Swamp Dam 5m Preliminary Contours

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■ **Figure 5 - Emu Swamp Dam Geology**

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3.11 Soils and Land Types

The soils in the catchment have been broadly characterised (Reid 1975) and are described below and with soil extents shown in **Figure 6**:

- Gritty Siliceous Sands;
- Gritty Siliceous sands amongst rock outcrops; and
- Acidic, Texture-contrast Soils.

An assessment of the soils distribution in a 10 km wide strip along the Severn River axis from Applethorpe to Ballandean (SKM 1999a) indicated that 31% of the area was Rock Outcrop; 40% was Acidic, Texture-contrast Soils; 19% was Deep Siliceous Sands; 6% was Shallow, Gravely Loams and 4% was other soil types.

The catchment soils are not rich in nutrients but they have characteristics that suit some horticultural crops.

The land types in the catchment have been broadly characterised (DNR / Maher 1996) as follows:

- Granite Hills;
- Granite Rises – Uniform Sands;
- Elevated Granite Plains; and
- Undulating Granite Plains.

An assessment of the land type distribution in a 10km wide strip along the Severn River axis from Applethorpe to Ballandean (SKM 1999a) indicated that 33% of the area was Undulating Granite Plains; 25% was Granite Hills; 20% was Granite Rises – Uniform Sand; 7% was Elevated Granite Plains and 15% was other land types.

The Granite Hills have slopes averaging 10-15% with Banca the most common soil type. Banca soils have a gritty, slightly acid A horizon with a bleached subsurface.

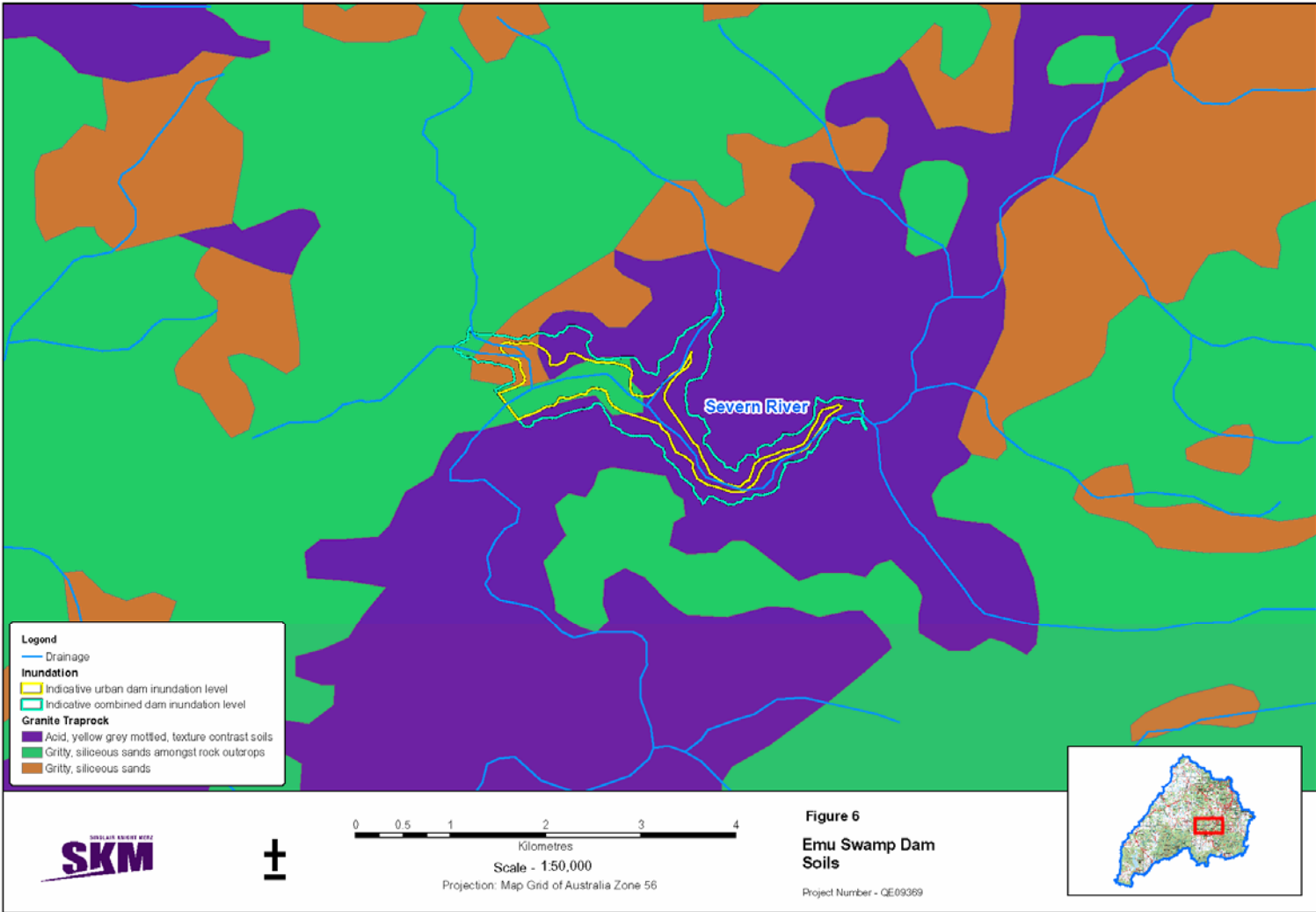
The Granite Rises – Uniform Sands occur lower in the landscape on gentle slopes and include soils that are generally alluvial sands.

The Elevated Granite Plains are gently sloping (2-4%), generally non-rocky and the predominant soils have deep texture contrast with a very dark grey to dark brown sand topsoil overlying bleached and mottled clay subsoils. Drainage is a limitation to agriculture on these soils.



The Undulating Granite Plains occur in the colluvial valleys, have gently undulating topography and are generally not rocky. Soils similar to those found in the Elevated Granite Plains predominate in this land type.

The soils and land types at the dam site can be categorised as above and this will be done when the inundation area/s are defined in the engineering study and EIS.



■ **Figure 6 - Emu Swamp Dam Soils**

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3.12 Tin Mining

The Stanthorpe area has a history of alluvial tin mining. Local residents advise that the Severn River was mined for tin. The history of tin mining and the potential for loss of mineral resources (by inundation at the dam site) will be assessed in the EIS.

3.13 Stream Flows

Stream flow records in the Severn River catchment are quite limited with the most useful being those from the Farnbro gauge (Station 416310A) on the Dumaresq River from September 1962.

Stream flows for the Border Rivers catchment have been developed from rainfall and stream flow records and used in the DNRMW's IQQM model for assessing yield at the Emu Swamp dam site.

Flood flows for the Emu Swamp dam site will be determined as part of the engineering study and will be presented in the EIS.

3.14 Water Quality

The Stanthorpe Water Ambient Monitoring Program has been collecting water quality data from the Stanthorpe area for the past 18 months. There is data available on major ions, nutrient and pesticides.

Existing water quality data will also be obtained from DNRMW.

Water quality in the Severn River at the site of the Emu Swamp dam will be described in the EIS.

3.15 Groundwater

The geology of the catchment does not support a significant groundwater resource.

There are some areas in the Granite Belt where groundwater that accumulates in pockets of alluvium may be important at the individual farm scale but it is considered there are no significant groundwater resources that would be impacted by the project.

Further examination of groundwater issues will be undertaken during the preparation of the EIS.

3.16 Flora and Fauna

The inundation area of the proposed Emu Swamp dam is likely to overlay two endangered regional ecosystems, type 13.3.1 and 13.12.9 and may overlay a small area of type 13.12.2, classed as not of concern. The status and descriptions for these ecosystem types are summarised below (**Table 4**).



■ **Table 4 Summary of Regional Ecosystems**

Regional Ecosystem ID	% Composition	Status	Short Description
13.3.1	100	Endangered/	<i>Eucalyptus blakelyi</i> woodland on alluvial plains
13.12.2	100	Not of Concern	<i>Eucalyptus andrewsii</i> , <i>E. youmanii</i> woodland on igneous rocks
13.12.9	100	Endangered	<i>Eucalyptus blakelyi</i> and/or <i>E. caliginosa</i> woodland to open forest on igneous rocks

The distribution of Regional Ecosystems is shown on **Figure 7**.

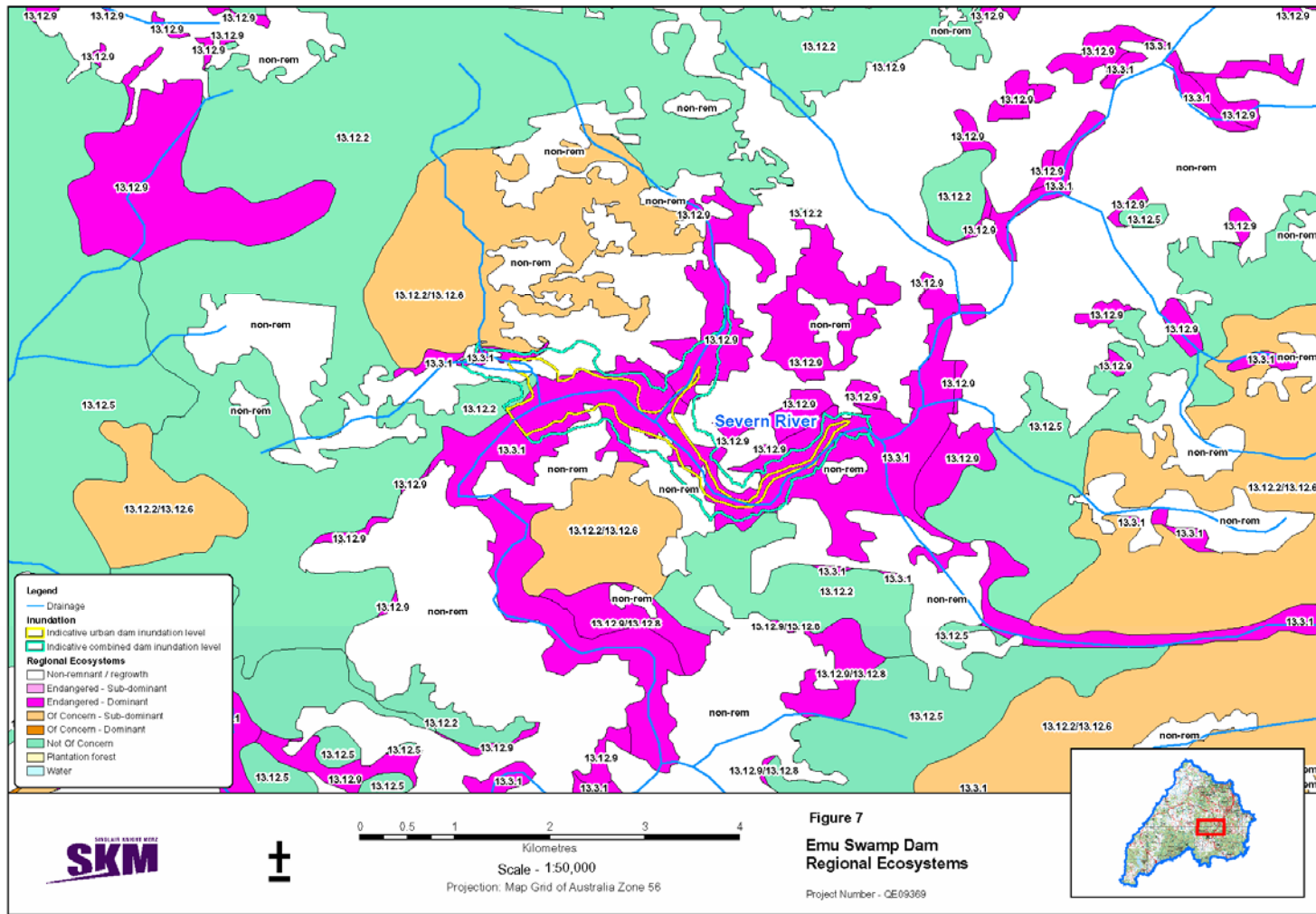
A HerbreCs database search was also undertaken for the proposed site. A total of 2,562 flora records were listed for the area. Of these 46 species are listed as endangered, vulnerable or rare under the *Nature Conservation Act 1992*.

The distribution of threatened flora species is shown on **Figure 8**. Published information about riparian vegetation for the dam site is limited.

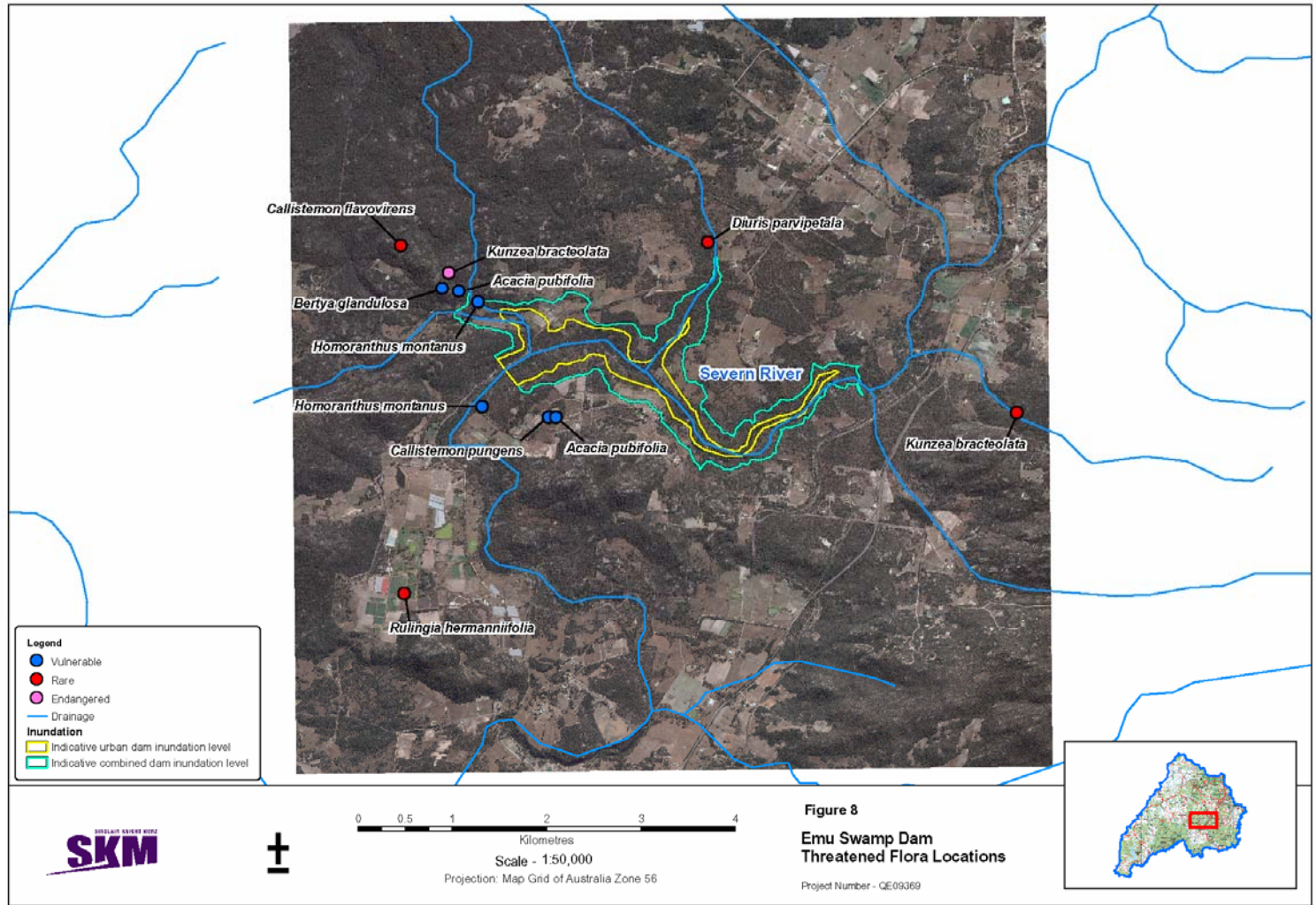
Fauna database searches (Wildnet and EPBC Protected Matters Search) were undertaken for the site. These searches listed five birds, one mammal and one reptile (as threatened under the NCA) and one bird and two reptiles (as threatened under the *Environment Protection Biodiversity Conservation Act 1999*).

Published information about aquatic flora and fauna for the region is limited and primarily relates to areas downstream of the proposed dam site. Seven to ten naturally occurring and stocked native fish species would be expected in the area and two are restricted to upland streams.

Field surveys of the site and inundation area of the dam will be undertaken for the EIS and will confirm or discount the presence of these species.



■ **Figure 7 - Emu Swamp Dam Regional Ecosystems**



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■ **Figure 8 - Emu Swamp Dam threatened Flora Locations**



3.17 Noise

The noise levels at the dam site are typical of those in a rural setting.

An assessment of construction and operation related noise impacts will be undertaken as part of the EIS and appropriate mitigation measures will be developed, where there is an impact on local residents.

3.18 Air Quality

Air quality in the area surrounding the site of the Emu Swamp dam is expected to be good due to the lack of industry or activities that would affect air quality.

An assessment of construction related air quality impacts will be undertaken as part of the EIS and appropriate mitigation measures will be developed, where there is an impact on local residents.

3.19 Landscape and Visual Amenity

The Severn River catchment is typical of a rural area. In places there has been substantial replacement of native vegetation with horticultural crops and grazing lands. There are also areas of native forest on adjacent hillsides and elevated locations. The Emu Swamp dam will be located at a low point in the landscape and will be visible from the immediate vicinity of the dam.

3.20 Cultural Heritage

Aboriginal activities often concentrated on watercourses because of the availability of food and water. Therefore there is a potential for artefacts and places of cultural significance to be identified in the vicinity of the dam site.

The *Aboriginal Cultural Heritage Act 2003* requires proponents to demonstrate that any cultural heritage values have been identified through a review of databases, consultation with local people and by site assessments. No sites have been identified in an initial desktop review of cultural heritage databases, however consultation will be undertaken with relevant traditional owner groups in the area to ensure any interests of local groups are identified.

Issues of European cultural significance will be investigated during the development of the EIS.

A Cultural Heritage Management Plan (CHMP) will be developed to ensure artefacts and cultural material located during construction are managed appropriately.

3.21 Social

3.21.1 Demography

The 2003 population of Stanthorpe Shire was estimated to be 10,614 persons (Australian Bureau of Statistics 2006).

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3.21.2 Population Growth

The DLGPSR's Planning Information and Forecasting Unit (PIFU 2005) population growth projections for the Shire is presented in **Table 5**.

■ Table 5 PIFU Population Projections for Stanthorpe Shire

Year	Low Growth Scenario	Medium Growth Scenario	High Growth Scenario
2001 (census)	10,383	10,383	10,383
2003	10,614	10,614	10,614
2006	10,735	10,798	10,870
2011	10,952	11,125	11,310
2016	11,105	11,452	11,815
2021	11,186	11,763	12,363
2026	11,218	12,064	12,947

The above whole of shire population projections assume declining annual growth rates e.g. the annual growth rate for the medium projection falls from 0.77% in 2006 to 0.51% in 2026.

Projections for the urban (water supply) populations have been prepared (SKM 2006) and are shown in **Table 6**.

■ Table 6 Urban (Water Supply) Population Projections

Year	Low Growth Scenario ¹	Medium Growth Scenario ¹	High Growth Scenario ²
2005	5,484	5,484	6,160
2010	5,692	5,956	6,727
2020	6,105	6,642	7,583
2030	6,521	7,455	8,566
2040	6,938	8,361	9,642
2050	7,359	9,390	10,841

Notes: 1. Stanthorpe, Wallangarra and Jennings 2. Stanthorpe, Wallangarra, Jennings and the Villages

The urban population projections used the medium and high PIFU annual growth rates to 2026 and assume the 2026 rate continue until 2050 which is the adopted water supply planning period.

These (declining) growth rates have been used for estimating future water demands – current population growth rates are considered to be much higher and it is believed that the projections are very conservative (on the low side).

3.21.3 Employment

Unemployment in Stanthorpe Shire was estimated at 7.1% in June 2003 as compared to a state average of 6.3% (Australian Bureau of Statistics 2006).



Historically, unemployment rates in Stanthorpe Shire have been slightly lower than the state average. In the 1996 and 2001 censuses the rates were respectively 8.7 and 8.0% for the Shire and 9.6 and 8.2% for the state.

The 2003 data suggests a worsening of unemployment in Stanthorpe Shire relative to the state average. This accords with trends that suggest smaller rural agricultural communities are “loosing out” to larger urban centres.

High unemployment and low wages are worsening problems in rural communities and projects like the Emu Swamp dam that help to provide employment opportunities in the Shire are very desirable.

Employment figures and a description of the Stanthorpe labour market will be provided in the EIS.



4. Mitigation of Environmental Impacts

4.1 Water Quality

Performance criteria for the management of water quality will be based on guidelines established from:

- the Queensland Environment Protection (Water) Policy (1997);
- the National Water Quality Management Strategy : Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC 2000); and
- the draft Queensland Water Quality Guidelines (2004).

During construction temporary erosion and water quality protection measures will be required to prevent release of contaminants into the Severn River. These measures will include sediment barriers; removal of sediment from waters prior to discharge; reinstatement of disturbed areas; storage and handling of chemicals, fuels, oils etc and spill response procedures.

Monitoring of water quality in the impoundment and downstream will be required and responses (e.g. release of water, mixing, aeration etc) made if water quality objectives are not achieved.

4.2 Flow Regulation

Flow regulation objectives will be determined by the Resources Operations Plan.

The Operator will monitor and report on inflows and releases for the impoundment.

4.3 Flora and Fauna

The advantages and disadvantages of clearing the vegetation in the impoundment area will be assessed during the EIS and approvals phase.

Clearing and site preparation works will be limited to the agreed areas.

Clearing will be required to provide an adequate working area for the dam and its ancillaries. Cleared vegetation on the site, access roads and pipeline routes will be cleared, chipped and sold off-site. Topsoil will be stripped and stockpiled for later use. The construction areas will be levelled by standard cutting and filling practices.

Vegetation that is to be retained will be protected during and after construction. Particular attention will be made to preserving downstream aquatic and riparian vegetation.



4.4 Cultural Heritage

No items that would be impacted by the proposed construction of the Emu Swamp dam were identified on the Register of the National Estate or on the Queensland Heritage Register.

An assessment (including consultation and field inspections) of the indigenous and non-indigenous heritage issues will be undertaken. A draft CHMP will be prepared for the project and will be widely circulated as part of the consultation process.

The CHMP will outline the procedures for mitigating any negative impact from the construction of the dam and associated activities on areas of cultural significance to traditional owners.

4.5 Noise

Potential noise sources on the site will mainly occur during the construction phase with activities such as drilling, blasting, concrete pouring being the most disruptive. Increased vehicle movements will occur during construction.

Vehicle movements will not be noticeable during operations.

The construction site will be located approximately 1 km from the nearest residence. At this distance and with appropriate controls in place, noise impacts should be manageable. Noise attenuation equipment will be fitted on appropriate plant to meet sound power level limits and construction activities will be organised to minimise disruption.

Noise complaints will be logged, analysed and responded to appropriately.

4.6 Air Quality

Air quality impacts will be mainly from the production of dust during construction activities. The assessment of air quality impacts will be undertaken to ensure compliance with the *Environmental Protection Act 1994*, and the *Environmental Protection (Air) Policy 1997*.

Dust is a potential construction impact and to control its effects, water will be used for dust suppression of disturbed areas. Clearing will only occur in areas that are required for the project footprint.

4.7 Solid Waste Management

Construction of dam will generate some volume of waste material, particularly packaging, tyres and waste oils from machinery, and wastewater from the construction site facilities. These wastes will be recycled where feasible, or disposed at an appropriately licensed facility.

Operation of the dam is not expected to generate any significant wastes.



General rubbish will be sorted into separate skips to aid reuse. Unusable waste will be disposed of at a licensed facility.

Chemicals and oils will be stored, handled, and disposed of according to relevant regulations.

4.8 Hazard and Risk

A qualitative assessment of the major hazards and risks associated with the project will be performed. The major hazards and risks posed by the project are likely to be associated with dam failure and river water quality. These risks will be managed through the design process.

A Safety Management System will be produced to provide a framework of management principles. This will provide for the identification and appropriate management of hazards associated with project activities, to ensure that they are carried out safely.

4.9 Infrastructure and Traffic

The dam impoundment will inundate sections of Emu Swamp Road and Stalling Lane. Temporary and permanent diversions will be constructed to maintain access at current levels. It will be necessary to determine the level of construction traffic and appropriate routes to assess the need to upgrade the local road network.

Sections of existing aerial electricity lines will need to be relocated – the electricity supply will also need to be upgraded for the pipeline pump station. These works will be organised to minimise disruption to existing services.

Telecommunications will be similarly affected and handled with minimal disruption.

The construction of the dam and pipeline will increase heavy vehicle and total vehicle movements on the New England Highway – Department of Main Roads requirements like a Pavement Impact Assessment and a Traffic Management Plan will be complied with.

Construction traffic will be required to avoid Council's local road network where possible.

4.10 Social and Environmental Impacts

Additional water from the water storage will be provided for urban and (possibly) irrigation demands. The benefits associated with additional water include:

- The security of water supply provides the capacity to accommodate new development opportunities and to enhance existing development.
- Increased economic activity provides impetus for filling production and services gaps with skilled workers and businesses deciding to remain or to relocate to the area.



- Increased water for irrigation provides opportunities for increased and new agricultural production.
- Increased water for irrigation provides opportunities for the development of support and processing industries and associated employment.

There will be adverse social effects for those directly affected by inundation and the process of land acquisition will require sensitivity and appropriate compensation to ensure these individuals are treated fairly. This is the Proponent's objective.

Potential inundation effects include:

- Loss of landholdings.
- Loss of agricultural land affecting existing business viability.
- Impediment to residents to make longer-term plans while the decision on whether or not to proceed with the dam is being finalised.
- Emotional loss.

The project will include acquisition of affected land and involve both consultation and compensation.

4.11 Environmental Management Plans

A draft Environmental Management Plan (EMP) will be prepared to provide strategies for the planning, design, construction and operation of the project to ensure safe, efficient and environmentally sensitive outcomes.

The EMP will provide Local and State Authorities and the Proponent with a framework to confirm compliance with relevant policies and requirements.

The EMP will also provide the community with evidence that the management of the project will be conducted in an environmentally acceptable manner.



5. Monitoring and Reporting

5.1 Overview

Environmental monitoring and reporting will be undertaken through the construction and operations phases of the project.

The operation of the dam will be in accordance with the (yet to be released) Border River Resources Operations Plan. It is anticipated the ROP will include environmental and flow monitoring requirements.

Other agencies will also have input to the development of environmental monitoring programs and they will receive appropriate reports on these activities from the Proponent.

5.2 Construction Phase

Measuring, monitoring and evaluating will be key activities of the environmental management plans.

Monitoring means the setting in place and operation of various procedures to monitor, measure and record the level of impact on the environment during the execution of the work. The monitoring of environmental impact shall be carried out in accordance with the monitoring requirements for each element of the EMP, the relevant legislation and the conditions of any specific permit or approval.

Monitoring procedures will be developed in accordance with standard protocols and the requirements of the relevant agencies. All equipment used for environmental monitoring will be calibrated and maintained to the standards recommended the supplier/ manufacturer. Records of calibration and maintenance for each piece of monitoring equipment will be held on site.

Environmental monitoring samples, if taken, will be sent for analysis to a NATA registered laboratory. All records of laboratory analysis results and quality assurance will be auditable and available for inspection, on request, by regulatory agency representatives.

The Baseline Environmental Monitoring Program will be developed during the EIS and approvals phase of the project. It will be commenced before or during the construction phase and continue after.

The Construction Environmental Monitoring will be developed during the EIS and approvals phase and is expected to include habitat protection, water quality, construction noise and dust, erosion control and management of waste, chemicals, explosives, fuels, oils etc.



Environmental summary reports will be produced for the duration of the construction works. Copies of the reports shall be held on site and will be available for regulatory agency inspection. The report shall include, but is not limited to the following:

- Record of inspections;
- A list of any performance criteria that have not been met, the corrective action taken and a description of the magnitude of any possible environmental impact;
- A register of complaints detailing:
 - The originator of the complaint
 - The complaint investigation
 - The validity of the complaint
 - The response of remedial action
- Results of any surveys carried out.

5.3 Operation Phase

Environmental monitoring will continue after construction to provide a basis for tracking changes to the ecosystems and resource availability. Monitoring and reporting will also be a requirement of the ROP.

The ongoing environmental monitoring program will be developed as part of the EIS and approvals process, with reference to the development of the Resource Operations Plan and is expected to include flow releases, water quality, biological assessment and visual inspections.

An annual Environmental Summary Report will be prepared each calendar year by the Operator containing, in part, the following information:

- Summary of the periodic and specific monitoring reports;
- Fluctuations in water storage level;
- Environmental and pass-through releases;
- Water quality monitoring;
- Biological indicator monitoring; and
- Fish passage.

This report will be submitted to the appropriate agencies and will be made available to the public.



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