Appendix A Terms of Reference

EMU SWAMP DAM

Stanthorpe Shire Council

Terms of Reference for an Environmental Impact Statement

UNDER PART (4) OF THE QUEENSLAND STATE DEVELOPMENT AND PUBLIC WORKS ORGANISATION ACT 1971

The Coordinator- General, June 2007

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PREFACE

The Stanthorpe Shire Council is the proponent for development of the Emu Swamp Dam project (the Proposal) about 15 kilometres south-west of Stanthorpe on the Severn River. The Proposal comprises a new urban water supply dam on the Severn River (8,000 ML) and pipeline (with associated pump stations) to Stanthorpe; and an option to develop a larger dam (18,000 ML) to provide irrigation water for agricultural producers in the upper Severn River catchment. The decision on whether to construct the urban only or combined urban and irrigation dam has not been made by Council.

Council advised the Coordinator-General (CG) that the key objectives of the development 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.

The Proposal was declared to be a "significant project" under section 26(1)(a) of the Queensland *State Development and Public Works Organisation Act 1971* (SDPWO Act) by the CG on 5 February 2007. Where this document refers to the Proposal, this should be read as referring to the urban water option (8,000ML) as well as the irrigation/industrial use option (18,000ML) and any relevant pipeline infrastructure.

Matters considered by the CG in deciding to declare this Proposal included information in an Initial Advice Statement prepared by the proponent; relevant planning schemes and policy frameworks; infrastructure impacts; employment opportunities; environmental effects; complexity of local, state and Australian government requirements; level of investment; and the Proposal's strategic significance. The declaration initiates the statutory environmental impact assessment procedure of Part 4 of the SDPWO Act, which requires the proponent to prepare an Environmental Impact Statement (EIS) for the Proposal.

The Department of Infrastructure (DI) is managing the environmental impact assessment process on behalf of the CG. The DI has invited relevant Australian, State and local government representatives and authorities to participate in the process as Advisory Agencies.

The statutory impact assessment process under the SDPWO Act is also the subject of a bilateral agreement between the Queensland and the Australian Governments in relation to environmental assessment under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The proponent referred the Proposal to the Australian Minister for the Department of Environment and Water Resources in accordance with the provisions of the EPBC Act. The Australian Minister decided, on 3 January 2007, that the Proposal constitutes a controlled action under section 75 of the EPBC Act. Sections 18 & 18A (Listed Threatened Species and Communities) are the controlling provisions under Part 3, Division 1 of this Act.

The first step in the impact assessment procedure is the development of Terms of Reference (ToR) for the preparation of an EIS. The process involves the formulation of draft ToR that are made available for public and Advisory Agency comment.

The proponent will prepare an EIS to address the ToR. Once the EIS has been prepared to the satisfaction of the CG, a public notice is to be placed in relevant newspapers circulating in the district and the State. The notice will state where copies of the EIS are available for inspection and how it can be purchased; that submissions may be made to the CG about the EIS; and the submission period. The proponent will be required to prepare a Supplementary EIS to address specific matters raised in submissions on the EIS, under the bilateral agreement.

At the completion of the EIS phase, the CG will prepare a report evaluating the EIS and other related material,

pursuant to section 35 of the SDPWO Act. The CG Report will include an evaluation of the environmental effects of the Proposal and any related matters. The CG Report will reach a conclusion about the environmental effects and any associated mitigation measures, taking into account all of the relevant material including the EIS; all properly made submissions and other submissions accepted by the CG; and any other material the CG considers is relevant to the Proposal, such as the Supplementary EIS, comments and advice from Advisory Agencies, technical reports on specific components of the Proposal and legal advice.

General EIS Format

The EIS should be written in a format matching these ToR or include guidelines (preferably as an appendix) describing how the EIS responds to the ToR. The EIS documentation is also to include:

- maps, diagrams and other illustrative material to assist in the interpretation of the information;
- a list of persons, interest groups and agencies consulted during the EIS;
- a list of advisory agencies consulted with an appropriate contact; and
- the names of, and work done by, all personnel involved in the preparation of the EIS.

The EIS should be produced on A4-size paper capable of being photocopied, with maps and diagrams on A4 or A3 size. The EIS should also be produced on CD ROM. CD ROM copies should be in ADOBE®PDF format for placement on the internet plus one copy in word format (unprotected). All compression must be down-sampled to 72 dpi (or ppi). PDF documents should be no larger than one MB in file size. The executive summary should be supplied in HTML 3.2 format with *.jpg graphics files. Text size and graphics files included in the PDF document should be of sufficient resolution to facilitate reading and enable legible printing, but should be such as to keep within the one MB file size.

Relevance of EIS Process to the Proposal

The Proposal involves development that would require an application for development approval for material change of use and/or impact assessment under the *Integrated Planning Act 1997* (IPA). Consequently, the CG report may, under section 39 of SDPWO Act, state one or more of the following for the assessment manager:

- the conditions that must attach to the development approval;
- that the development approval must be for part only of the development;
- that the approval must be preliminary approval only.

Alternatively the CG report must state for the assessment manager:

- that there are no conditions or requirements for the Proposal; or
- that the application for development approval be refused.

Further, the CG report must:

- give reasons if the report states that the application for development approval be refused; and
- be given to the assessment manager by the CG.

The relationship between the 'significant project' process under the SDPWO Act and development approval process under the IPA is noted in sections 36 to 42 of the SDPWO Act. Some key points to note include:

- the information and referral stage, and the notification stage of the Integrated Development Assessment System (IDAS) do not apply to development applications to the extent the application is for a material change of use, or requires impact assessment;
- there are no referral agencies under the IPA for the applications to the extent the application is for a material change of use, or requires impact assessment;
- a properly made submission about the EIS is taken to be a properly made submission about the application under IDAS;
- the CG's report is taken to be a concurrence agency's response for the applications to the extent the application is for a material change of use, or requires impact assessment; and

- providing a development application has been made and to the extent the application is for a material change of use, or requires impact assessment, the decision stage does not start until the CG gives the assessment manager a copy of the CG's report.

Further to the approvals that will be sought through the IDAS process, other approvals under a range of legislation including, but not limited to IPA and the *Environmental Protection Act 1994*, are likely to be required.

These ToR provide information in two broad categories:

Part A – Information and Advice on the preparation of the EIS.

Part B – Content of the EIS.

For further inquiries about the EIS process for the Proposal, please contact:

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ABBREVIATIONS

The following abbreviations have been used in this document:

ACH Act	*Aboriginal Cultural Heritage Act 2003*
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment and Conservation Council
BPA	Biodiversity Planning Assessment
CAMBA	China-Australia Migratory Bird Agreement
CG	The Coordinator General of the State of Queensland
CHMP	Cultural Heritage Management Plan
CLR	Contaminated Land Register
DPIF	Department of Primary Industries and Fisheries
DUAP	Department of Urban Affairs and Planning (NSW)
EIS	Environmental Impact Statement, as defined by Part 4 of the *State Development & Public Works Organisation Act 1971*
EM Plan	Environmental Management Plan
EMR	Environmental Management Register
EP Act	*Environmental Protection Act 1994* (Qld)
EPA	Environmental Protection Agency
EPBC Act	*Environment Protection & Biodiversity Conservation Act 1999* (C'th)
EPP (Air)	Environmental Protection (Air) Policy 1997
EPP (Noise)	Environmental Protection (Noise) Policy 1997
EPP (Waste)	Environmental Protection (Waste Management) Policy 2000
EPP (Water)	Environmental Protection (Water) Policy 1997
ERA	Environmentally Relevant Activity
ESD	Ecologically Sustainable Development
FSL	Full Supply Level
GQAL	Good Quality Agricultural Land in State Planning Policy 1/92: Development and the Conservation of Agricultural Land.
IAS	Initial Advice Statement, as defined by Part 4 of the *State Development & Public Works Organisation Act 1971*
IDAS	Integrated Development Assessment System
IP Act	Integrated Planning Act 1997 (Qld)
JAMBA	Japan-Australia Migratory Bird Agreement
NC Act	*Nature Conservation Act 1992*
NES	National Environmental Significance
PHA	Preliminary Hazard Assessment
QH Act	*Queensland Heritage Act 1992*
RE	Regional Ecosystem
REDD	Regional Ecosystem Description Database
SDPWO Act	*State Development & Public Works Organisation Act 1971* (Qld)
ToR	Terms of Reference, as defined by Part 4 of the *State Development and Public Works Organisation Act 1971*
VM Act	*Vegetation Management Act 1999* (Qld)

PART A - INFORMATION AND ADVICE ON PREPARATION OF THE EIS

Purpose of the Terms of Reference

These ToR are for an EIS for the Emu Swamp Dam Proposal. These ToR have been prepared in accordance with the requirements of Sections 29 and 30 of the *State Development & Public Works Organisation Act 1971* (SDPWO Act) and incorporate the requirements under the *Environment Protection & Biodiversity Conservation Act 1999* (the EPBC Act).

The objective of these ToR is to identify those matters that should be addressed in the EIS. These ToR are based on the initial outline of the Proposal given in the Initial Advice Statement (IAS). However, the ToR must not be interpreted as excluding from consideration any matters that are currently unforeseen, which may arise during ongoing scientific studies or which may arise from any changes in the nature of the Proposal during the preparation of the EIS, the community consultation process and associated documentation. In such circumstances, these matters must be included in the EIS.

The ToR also provides the framework for the EIS, including information on the purpose and role of the EIS and the factors considered significant for the Proposal. It indicates the types of studies and the data that must be provided in the EIS. All potentially significant impacts of the proposed development on the environment are to be investigated, and requirements for the mitigation of any adverse impacts are to be detailed in the EIS. Any prudent and feasible alternatives must be discussed and treated in sufficient detail. The reasons for selection of the preferred option must be clearly identified. The nature and level of investigations must be relative to the severity of potential consequences of possible events and the likelihood of those events occurring.

The Australian and Queensland Governments, from which the Proponent requires approvals, may request these ToR to be expanded or revised as required to address issues that emerge in the conduct of the EIS process. The CG has ultimate responsibility for decisions on matters of interpretation of the requirements of the ToR and all subsequent changes.

Culturally sensitive information should not be disclosed in the EIS or any associated documents and the disclosure of any such information should only be in accordance with the arrangement negotiated with the traditional custodians. Confidential information to be taken into consideration in making a decision on the EIS should be marked as such and included as a separate attachment to the main report.

An executive summary should be prepared and included in the EIS. It should be a separate document that can be made available to the public.

The EIS must address at least the requirements as set out in these ToR.

EIS Guidelines

The objective of the EIS is to identify potential environmental impacts and to ensure that adverse impacts are avoided where possible. Where unavoidable, impacts must be examined fully and addressed so that the development is based on sound environmental protection and management criteria.

The term environment refers to:

a) ecosystems and their constituent parts, including people and communities;
b) all natural and physical resources;
c) the qualities and characteristics of locations, places and areas, regardless of size, that stimulate biological diversity and integrity, intrinsic or attributed scientific value or interest, amenity, harmony and sense of community; and
d) the social, economic, aesthetic and cultural conditions which influence, or are affected by, the entities and attributes mentioned in paragraphs (a) to (c).

When considering the significance of an impact, the proponent must take account of both the intensity of the impact and the context in which it would occur.

The EIS is a public document. Its purpose is not only to provide information to regulatory agencies, but also to inform the public of the scope, impacts and mitigation measures of the Proposal. As such, the main text must be written in plain English avoiding jargon as much as possible. Additional technical detail may be provided in

appendices. The main text must not assume that a reader would have a prior knowledge of the Proposal site. It must not be necessary for the reader to have visited the site to understand the issues involved in the Proposal.

In brief, the EIS objectives must be to provide public information on the need for and likely effects of the Proposal, to set out acceptable standards and levels of impacts (both beneficial and adverse) on environmental values, and demonstrate how environmental impacts can be managed through the protection and enhancement of the environmental values. Discussion of options and alternatives and their likely relative environmental management outcomes is a key aspect of the EIS.

The EIS process followed will be as specified in the SDPWO Act.

An EIS must provide:

- a description of the relevant aspects of the existing social, economic, natural and built cultural environment;
- a description of the development Proposal and means of achieving the development objectives;
- definition and analysis of the likely impacts of the development on the environment;
- a framework against which Government decision-makers can consider the environmental aspects of the Proposal and set conditions for approval to ensure environmentally sound development;
- a definition of all significant impacts and a consolidated list of measures proposed to mitigate adverse effects; and
- recommendations on the need for and contents of any environmental management plans and/or operational plans to mitigate adverse effects.

EIS Objectives and Key Issues

Objectives

The objectives of the EIS are as follows:

- to provide information on the Proposal and development process to the community and decision makers;
- to comprehensively identify and evaluate all relevant issues associated with the Proposal;
- to identify all potential environmental, cultural, social, transport and land use planning impacts of the preferred concept, and recommend infrastructure and facilities needs together with other design and operational measures required to minimise or compensate for adverse impacts and enhanced benefits;
- to consult with the community and relevant stakeholders in the process of identifying, assessing and responding to the impacts of the Proposal;
- to identify all necessary licences, planning and environmental approvals including approval requirements pursuant to the EPBC Act, IP Act, EP Act, Water Act 2000, Fisheries Act 1994, Nature Conservation Act 1992 (NC Act), Vegetation Management Act 1999 (VM Act) and other legislation; and
- to provide an input to the decision-making process, assisting with the determination of whether to accept or modify the Proposal, approve it with conditions or carry out further studies.

Key Issues

The issues to be addressed as part of the EIS can be divided into the following categories:

- Proposal description, justification and alternatives;
- impacts on the biological environment;
- impacts on the physio-chemical environment;
- impacts on areas of cultural heritage value or Indigenous or non-indigenous significance;
- impacts on surrounding land uses and land use planning;
- social and economic issues, including impacts on local and regional businesses;
- safety and emergency;
- impact on traffic/transport and access; and
- cumulative effects of all key issues.

The EIS will be required to consider in detail relevant issues under each of these categories and all other impacts on the physical and social environment. The information required is described in the following sections.

Public Consultation on Terms of Reference

The draft ToR were publicly notified in the Weekend Australian and Courier Mail newspapers on 31 March 2007; the Stanthorpe Border Post on 3 April 2007 and on the Department of Infrastructure website inviting comment during the period from 2 April to 8 May 2007. The draft ToR were also publicly available for inspection at the Stanthorpe Shire Council offices, 61 Marsh Street, Stanthorpe.

A total of 15 responses to the invitation to comment on the draft ToR were received, including eleven responses from state government agencies and two from community conservation groups and two from private individuals. Copies of all submissions were forwarded to the proponent. The content of all submissions has been reviewed and considered by the CG in finalising the ToR for the EIS for the Proposal. Amendments to the draft ToR, which have arisen from recommendations made in submissions, are referenced in this document as footnotes.

The following is a list of responses and submissions received on the draft ToR:

No.	Agency/Organisation/Individual	Date	Abbrev
1	Department of Emergency Services*	04/05/07	DES
2	Department of Natural Resources and Water	08/05/07	DNRW
3	Department of Local Government, Planning Sport and Recreation*	08/05/07	DLGPSR
4	Mr Rob Simcocks	08/05/07	Simcocks
5	Environmental Protection Agency	08/05/07	EPA
6	Department of Main Roads	08/05/07	DMR
7	Mr Geoff Copland & Ms Karin Perisic	08/05/07	Copland
8	Queensland Health*	08/05/07	QH
9	Queensland Conservation Council	08/05/07	QCC
10	Department of Housing*	08/05/07	DoH
11	Department of Communities*	09/05/07	DLGPSR
12	Department of Primary Industries and Fisheries	09/05/07	DPIF
13	Queensland Transport*	10/05/07	QT
14	Department of State Development*	11/05/07	DSD
15	Toowoomba & Region Environment Council (no comments other than to endorse QCC submission)	14/05/07	TREC

* Note: these government agencies indicated that they did not have any comments on the draft ToR for the Proposal.

PART B - CONTENT OF THE EIS

Executive Summary

The function of the executive summary is to convey the most important aspects and options relating to the Proposal to the reader in a concise and readable form. It must use plain English and avoid the use of jargon and esoteric terms. The structure of the executive summary should follow that of the EIS, and focus strongly on the key issues and conclusions.

The Executive summary should be written as a separable document, able to be reproduced on request and distributed to interested parties who may not wish to read or purchase the EIS as a whole.

Glossary of Terms

A glossary of technical terms, acronyms and abbreviations must be provided.

1 Introduction

The function of the introduction is to explain why the EIS has been prepared and what it sets out to achieve. In particular, the introduction must address the level of detail of information required to meet the level of approval being sought (for example, whether the proponent is seeking only a preliminary approval through the Integrated Development Assessment System (IDAS) or a full approval with all relevant permits). It must also define the audience to whom it is directed, and contain an overview of the structure of the document. Throughout the EIS, factual information contained in the document must be referenced.

1.1 Proposal Proponent

Provide details of the Proposal proponent, including details of any joint venture partners, relevant experience and extent of business activities.

Provide details of any proceedings or other actions under a law of the Commonwealth or a State for the protection of the environment or the conservation and sustainable use of natural resources (an environmental law) against:

- the proponent; and
- the applicant(s) for any permit under an environmental law for the Proposal.

Provide details of the proponent's environmental policy and planning framework.

1.2 Proposal Description

Provide a brief description and illustrations of the key elements of the Proposal. Any major associated infrastructure requirements must also be summarised. Detailed descriptions of the Proposal must follow in Section 3.

Provide a brief description of studies or surveys that have been undertaken for the purposes of developing the Proposal and preparing the EIS. This must include reference to relevant baseline studies or investigations undertaken previously.

1.3 Proposal Objectives and Scope

A statement of the objectives which have led to the development of the Proposal and a brief outline of the events leading up to the Proposal's formulation, including alternatives, envisaged time scale for implementation and Proposal life, anticipated establishment costs and actions already undertaken within the Proposal area.

Describe the current status of the Proposal and outline the relationship of the Proposal to other developments or actions that may relate whether or not they have been approved. The consequences of not proceeding with the

Proposal must also be discussed.

1.4 The Environmental Impact Statement (EIS) Process

The purpose of this section is to make clear the methodology and objectives of the environmental impact statement under the relevant legislation.

1.4.1 Methodology of the EIS

This section must provide a description of the EIS process steps, timing and decisions to be made for relevant stages of the Proposal. This section must also indicate how the consultation process (which will be described in detail in Section 1.5) would integrate with the other components of the impact assessment, including the stages, timing and mechanisms for public input and participation. The information in this section is required to ensure:

- *relevant legislation is addressed;*
- *readers are informed of the process to be followed; and*
- *stakeholders are aware of any opportunities for input and participation.*

1.4.2 Objectives of the EIS

Having described the methodology of the EIS, a succinct statement must be made of the EIS objectives. The structure of the EIS can then be outlined as an explanation of how the EIS will meet its objectives. The reader must be able to distinguish the EIS as the key environmental document providing advice to decision makers considering approvals for the Proposal.

While the ToR for an EIS provide guidance on the scope of the EIS studies, they must not be seen as exhaustive or limiting. It is important for the proponent and its consultants to recognise that there cannot be perfect knowledge in advance of undertaking an EIS of what the EIS studies may find.

If it transpires during the preparation of the EIS that previously unforeseen matters not addressed in the ToR are found to be relevant to the assessment of impacts of the Proposal, those matters must be included in the EIS.

In addition, it is essential that the main text of the EIS must address all relevant matters concerning environmental values, impacts on those values and proposed mitigation measures. No relevant matter must be raised for the first time in an appendix or the draft Environmental Management Plan (EM Plan).

The role of the EIS in providing the Proposal's draft EM Plan must also be discussed, with particular reference to the EM Plan's role in providing management measures that can be carried over into conditions that would attach to any approval(s), environmental authorities and permits for the Proposal.

1.4.3 Submissions

The reader must be informed as to how and when public submissions on the EIS will be addressed and taken into account in the decision-making process.

The reader must also be informed of the standing of any submission they may make in regard to any application submitted by the proponent for statutory approval.

1.5 Public Consultation Process

An appropriate public consultation program is essential to the impact assessment. This section must outline the methodology that will be adopted to identify and mitigate socio-economic impacts of the Proposal. Information about the consultation that has already taken place and the results of such consultation must be provided.

To facilitate the assessment process, the proponent is strongly encouraged to regularly consult with Advisory Agencies and other appropriate stakeholders throughout the EIS process. This should include consultation with relevant indigenous traditional owner groups and the indigenous community.

It is the responsibility of the proponent, in consultation with Advisory Agencies, to identify legislation, policies and methodologies relevant to the EIS process, and to determine appropriate parts of the community which should be consulted during the EIS preparation stage. It is recommended that an open community consultation process be carried out, in addition to the legislated environmental impact assessment process. Copies of the EIS will be provided to all Advisory Agencies and on request to relevant individuals and peak groups with an interest in the Proposal.

The public consultation program must provide opportunities for community involvement and education. It may include interviews with individuals, information sessions, key stakeholder briefings, interest group meetings, production of regular summary information and updates, and other consultation mechanisms to encourage and facilitate active public consultation.

The public consultation process should identify broad issues of concern to local community and interest groups and should continue from project planning through construction, ongoing operation and maintenance. Refer to the Environmental Protection Agency (EPA) guideline "Issue Identification and Community Consultation".

1.6 Proposal Approvals

1.6.1 Relevant Legislation and Policy Requirements

This section must explain the legislation and policies controlling the approvals process. Reference must be made to the SDPWO Act, EP Act, IP Act, and other relevant Queensland laws. In particular, the EIS must demonstrate that the Proposal is consistent with the Water Resources (Border Rivers) Plan 2003, and any subsequent amendments, including that all environmental flow objectives and water allocation security objectives would be met. Any requirements of the Australian EPBC Act must also be included.

Describe the local government planning controls, local laws and policies applying to the development, and a list provided of the approvals required for the Proposal and the expected program for approval of applications.

This information is required to assess how the legislation applies to the Proposal, which agencies have jurisdiction, and whether the proposed impact assessment process is appropriate.

1.6.2 Planning Processes and Standards

This section must discuss the Proposal's consistency with existing land uses or long-term policy framework for the area (e.g. as reflected in local and regional plans), and with legislation, standards, codes or guidelines available to monitor and control operations on site. This section must refer to all relevant state and regional planning policies. This information is required to demonstrate how the Proposal conforms to state, regional and local plans for the area.

Describe any implications to the Proposal that arise from the Queensland Government ceding their rights over management of the Murray-Darling River system to the Australian government.

1.7 Accredited Process for Controlled Actions under Australian Legislation

The Proposal is a controlled action under the Commonwealth's EPBC Act and the Commonwealth has accredited the State's EIS process for the purposes of the Commonwealth's assessment under Part 8 of that Act.

The EIS must provide a stand-alone report as an appendix to the EIS that exclusively and fully addresses the potential impacts on the matters of National Environmental Significance that were identified in the 'controlling provisions' when the Proposal was declared a controlled action. These are also noted in the Preface of these ToR. Further guidance on the content of this stand alone report is provided at Appendix A3 of these ToR.

2 Proposal Need and Alternatives

2.1 Proposal Justification

The justification for the Proposal must be described, with particular reference made to the economic viability and

social benefits, including employment and spin-off business development, which the Proposal may provide. The status of the Proposal must be discussed in a regional, state and national context.

The implications of climate change on the Proposal's environmental economic, social feasibility and viability should be discussed.

2.2 Alternatives to the Proposal

This section must describe all alternatives that have been considered, including conceptual, technological and locality alternatives to the Proposal, and discussion of the consequences of not proceeding with the Proposal. Alternatives must be discussed in sufficient detail to enable an understanding of the reasons for preferring certain options and courses of action and rejecting others.

The process and criteria used for the selection of the specific water storage and infrastructure sites and design must be described. Reasons for selecting the preferred option(s) must include technical, commercial, social and natural environment aspects. The alternatives considered must include:

- demand reduction techniques;
- options for potable water supply only;
- other dam locations and pipeline routes, and associated infrastructure, in particular, discussion of practicable alternatives to the Proposal must include:
    - alternative locations considered, aided by maps and diagrams. The location options highlighting the preferred location for each component of the Proposal must be shown on topographical maps at a suitable scale;
    - a summary of the approval process for the alternative options if those options are subject to different approval processes than the preferred option;
    - the rationale for selection of the preferred location and reasons other options were rejected.
    - alternative water storages eg residential rainwater tanks;
    - a detailed comparative analysis of environmental impacts during construction and post construction, describing the extent and composition of the regional ecosystems affected, either directly or indirectly.

This section must summarise for each alternative:

- the full extent of land that is required or would be directly impacted (e.g. inundated lands);
- comparative environmental impacts;
- the economic costs and benefits to industry and the wider community, including directly affected enterprises;
- the regional social impacts including community disruption, related land use changes, employment, skills development and any workforce accommodation issues.

3 Description of the Proposal

The objective of this section is to describe the Proposal through its lifetime. This information is required to allow assessment of all aspects of the Proposal, including all phases of the Proposal from planning, construction, operation, rehabilitation and decommissioning. It also allows further assessment of which approvals may be required and how they may be managed through the life of the Proposal.

3.1 Overview of Proposal

Provide an overview of the Proposal to put the Proposal into context. Provide a description of the key components of the Proposal through the use of text and design plans where applicable; the expected cost and overall duration and timing of the Proposal; and the employment benefits from the construction and operational phases of the Proposal. Provide a summary of any environmental design features of the Proposal.

3.1.1 Dam

Provide details on aspects of the dam components of the Proposal including:

- Proposed dam type;
- maximum (final) crest height and spillway height;
- length and width of crest;
- extent of excavations for footings and wall construction;
- estimated headwater/tailwater difference at different flows (e.g. 75%, 50% 25%);
- dam capacity, average depth and maximum depth;
- inundation areas (and depth) for a range of water levels (including plan with tenure details and current land use) and the frequency of those inundation levels;
- estimated water yields (with appropriate allowances for environmental requirements);
- general design of outlet works including capacity and offtake level(s);
- any dissipaters at the downstream foot of the barrier;
- any additional water impoundment or control structures that may be constructed as part of the overall Proposal;
- the design and effectiveness of any proposed fishway or other fish transfer mechanisms, drawing on examples used on other dams or similar proposals; and
- the extent of the buffer zone, including any non-irrigation buffer zone around the inundation area.

3.1.2 Pipeline and Associated Infrastructure

Provide details on the following aspects of the pipeline and associated infrastructure (e.g. pump stations and balancing storage) components of the Proposal, including any pipelines and infrastructure associated with delivery of water for irrigation purposes and secondary distribution pipeline infrastructure:

- a map of the preferred route using cadastral and topographical maps at an appropriate scale;
- design parameters covering pipe grade, diameter(s), wall thickness, length, capacity, test and operating pressures, depth of cover of the pipe, cathodic protection, coating and design life;
- criteria for pipeline burial depth and above ground construction, along with pipeline orientation/location within any State-controlled or local government road reserves;
- above ground facilities – physical dimensions and construction materials for surface facilities along the pipeline route including information on pipeline markers;
- details of criteria to assess the minimum depth the pipeline is to be buried under creeks, rivers and ephemeral water ways, in particular any proposed river crossings taking into account Q100 flood events;
- with the aid of maps and diagrams, the location and/or frequency of cathodic protection points, off-take valves, pump stations, balance tanks, control valves (isolation points), pigging facilities (if applicable) and any other Proposal facilities and linkages to existing water supply infrastructure;
- criteria for design and location of any temporary or permanent access crossing for machinery, transport etc across any waterway (e.g. construction of causeways, bridges, culvert crossings etc) and any permanent access points or roads for maintenance purposes, in particular where they are adjacent to waterways. Describe the nature of any permanent access points;

- easement widths and access requirements along the route, including the use of existing areas of disturbance for pipeline access and future maintenance; and
- the expected use of existing water storage and distribution infrastructure.

3.1.3 Water Demand

Provide details on aspects of the water demand associated with the Proposal including:

- required annual urban and irrigation water volumes to meet supply needs;
- water reliability/security requirements;
- proposed water-use efficiency initiatives (e.g.. urban demand management, irrigation efficiency);
- peak load water demands;
- timing of irrigation water requirements;
- any other factors which may have a bearing on irrigation water demands, such as groundwater recharge considerations and other catchment water demands (where appropriate); and
- the expected location for the demand of both urban and agricultural water and the proportion of demand upstream as well as downstream.

3.1.4 Decommissioning

This section should present the strategies and methods for final closure, decommissioning, and rehabilitation of all Proposal elements.

Decommissioning of the Proposal, in terms of the removal of plant, equipment, structures and buildings should be described and the methods proposed for the stabilisation of the affected areas should be given. Information is to be provided on how buildings and structures would be removed or made safe, if left in situ.

Final rehabilitation of the Proposal sites should be discussed in terms of ongoing land use suitability, and any land management issues.

Provide details on the strategic approach to progressive and final rehabilitation, with a view to minimising the amount of land disturbed at any one time and any proposed disturbance to waterways and associated fisheries resources. This description should also outline rehabilitation success criteria for the decommissioning of the pipeline at the end of operational life. Pipeline decommissioning should be informed by appropriate Australian Standard (AS 2885.3) and the Australian Pipeline Industry Association Code of Environmental Practice.

3.2 Ecologically Sustainable Development

Provide a comparative analysis of how the Proposal conforms to the objectives for “ecological sustainable development” (see the National Strategy for Ecologically Sustainable Development (1992) available from the Australian Government Publishing Service).

This analysis should consider the cumulative impacts (both beneficial and adverse) of the Proposal from a life-of-project perspective, taking into consideration the scale, intensity, duration or frequency of the impacts to demonstrate a balance between environmental integrity, social development and economic development.

This information is required to demonstrate that sustainable development aspects have been considered and incorporated during the scoping and planning of the Proposal.

3.3 Location

The regional and local context of the Proposal must be described and illustrated on maps at suitable scales. Real property descriptions of the Proposal site must be provided. Maps should show the precise location of the Proposal area, and in particular:

- the location and boundaries of land tenures, in place or proposed, to which the Proposal area is or will be subject;
- configurations and boundaries of land resumptions;
- the location and boundaries of the Proposal footprint; and

- the location of any proposed buffers surrounding the working areas (for construction) and around the expected full supply level (FSL) of the storage.

These features should be overlain on a rectified air photo enlargement to illustrate components of the Proposal in relation to the natural and built features of the area.

Describe the method by which ownership, control or owners' consent is to be acquired for each real property description (tenure).

3.4 Construction

The extent and nature of the Proposal's construction phase must be described (as well as any works required off-site enabling construction to commence, e.g. road upgrades), including a map at reasonable scale that shows the footprint of the dam and construction works. The description must include the type and methods of construction, the construction equipment to be used and the items to be transported onto the construction site including the quarry sites from which any gravel/rock is extracted.

Any staging of the Proposal must be described and illustrated showing site boundaries, development sequencing and timeframes. The estimated numbers of people to be employed in the construction phase must also be provided with a brief description of where those people may be accommodated and/or how they will be transported to the site.

Provide a summary of the results of studies and surveys undertaken to identify the natural resources required to implement the Proposal. The location, volume, tonnage and quality of natural resources required must be described (e.g. land, water, forests, energy, etc.).

3.4.1 Dam

Provide a description of construction activities relating to the Proposal including:

- site access;
  - upgrading of roads, railways and other infrastructure;
  - clearing; and
  - establishment requirements for construction facilities;
- construction requirements including source and extraction of construction materials;
  - details of the method of construction of the dam walls and volumes of material required;
  - any staging of construction activities;
  - construction, realignment and/or upgrading of roads;
  - works needed within the impoundment including tree clearing (by manual methods and by inundation), blasting, excavation, dredging and transport infrastructure works; and
  - works downstream including erosion protection;
- type, source, quantity and method of transport of construction materials;
- general construction standards and site management including environmental and safety management;
- timetable for construction (particularly noting seasonal rainfall or flows);
- details of any potential disruption to flows in the waterway during construction and any diversion works required;
- relocation of existing infrastructure;
- construction of additional infrastructure required for operation;
- the hours of operation;
- emergency aid/medical facilities to be provided on site;
- the construction methods and containment/disposal of construction spoil;
- solid and liquid waste handling;
- machinery access/storage areas; and
- the number and type of vehicles, machinery and equipment used for excavation, construction and operation.

3.4.2 Pipeline and Associated Infrastructure

Provide a description of construction activities relating to both the urban supply pipeline and its associated infrastructure (e.g. pump stations) and the pipeline/s and infrastructure associated with delivery of water for

irrigation purposes including:

- a map showing location of any works;
- on-site plans, layouts, boundaries and elevations;
- detailed concept and staging (if any proposed) for additional pump stations facilities and locations;
- plant and machinery likely to be involved;
- supply and storage of materials – volume, composition, handling and storage during construction;
- anticipated timing, duration and progress of pipe laying;
- possible interruption of pipeline laying to other land activities, e.g. interruption to road and or rail traffic, or the relocation of existing infrastructure;
- extent that service corridors will be used during construction and maintenance;
- width of vegetation clearing required. This information must indicate where vegetation to be cleared has significant conservation value (such as sensitive environmental areas and creek crossings), and must also reference where in the EIS the impacts on such vegetation have been addressed;
- depth of trenching and burial of the pipeline; bedding materials (if any) including compaction techniques on the pipeline trench and in particular adjacent to and within waterways, to achieve bank stability;
- an assessment of expected physical and chemical properties and quantities of soil/rock to be excavated;
- procedures for trench construction and pipe-laying if rock is encountered, in particular whether ripping rock or blasting may be required and the necessary procedures especially in proximity to habitation and existing infrastructure and compliance with all relevant design and construction codes;
- typical crossing techniques including restoration works that would be used at creek crossings, and road, rail, and other service corridor crossings. Detail whether the flow of water will need to be altered within and/or diverted out of any waterway during pipeline construction. Where in-stream infrastructure is in place, identify the practicality of attaching the pipeline to these structures;
- management of weed seed spread including quarantine areas and wash-down facilities and the dispersal/destruction of weed seeds and contaminated vegetative matter;
- disposal of plant-matter left after clearing vegetation;
- details of the anticipated hydrostatic testing procedures (discussion of water usage for this activity must be addressed in section 3.6);
- testing the pipeline's integrity, including cathodic protection requirements, launcher and receiving scraper station and hydrostatic testing are to be outlined;
- cleanup and restoration (rehabilitation) of areas used during construction including camp sites and storage areas; and
- disposal/reuse of surplus excavated material and if this material can be coordinated with concurrent construction activities in the vicinity.

3.5 Operations

3.5.1 Dam

Provide a description of the proposed on-going management of the dam, inundation area and buffer zone including:

- arrangements for operation of the works, including:
  - flow releases, such as compensation, fishway, environmental, irrigation etc, including timing, volume, duration and downstream extent of releases;
  - operation of gates (if relevant);
  - the anticipated pattern of inundation;
  - operation of outlet works, including details of operation and administration;
  - proposals for remote operation; and
  - proposed staffing arrangements;
- how existing seasonal flows will be managed, drawing on baseline or predictive studies, at all stages of the Proposal;
- water treatment arrangements for provision for urban supply requirements, including
  - a description of treatment facilities, associated infrastructure, and treatment methods; and
  - a describe the integration of operations within the catchment;
- details of the minimum operating level and likely extraction regime, e.g. when water will be sourced and expected demands versus yield, including likely release timings;
- proposed access points associated with the increased storage;
- infrastructure for recreational purposes; and
- proposed operation of the fishway and/or other fish transfer mechanisms.

This section must describe the proposed system of allocation of water from the Proposal and any proposed high priority allocations to specific urban, rural or industrial users.

3.5.2 Pipeline and Associated Infrastructure

Detail the urban and irrigation pipeline and associated infrastructure operation and maintenance requirements including inspection and surveillance activities and frequency, the impact on waterways as a result of operation and maintenance activities and safety procedures.

Provide details on the operational requirements of the pump stations and balance tanks, including:

- management arrangements, including the administration and control of the facility;
- chemicals and hazardous goods to be utilised;
- security, public safety and emergency procedures, including ventilation;
- power back-up in emergency and potential impact on local supplies in the area; and
- appropriate sound-proofing.

The location and design of any new water distribution infrastructure (e.g. pump stations, canals, pipelines etc.) must be described, as well as the expected use of any such existing infrastructure. The capacity of any existing water infrastructure to accept additional loadings resulting from any new or increased allocations of water must also be described.

3.6 Infrastructure Requirements

Provide descriptions (with concept and layout plans) of requirements for constructing, upgrading or relocating all infrastructure in the vicinity of the Proposal area. The matters to be considered include such infrastructure as roads, rail, bridges, tracks and pathways, bore fields, power lines and other cables, wireless technology (e.g. microwave telecommunications), and pipelines for any services (whether underground or above).

3.6.1 Transport

Provide a brief overview of transport requirements for the Proposal. Full details of transport volumes, modes and routes must be provided in accordance with Section 4.9 Transport and Access Arrangements.

3.6.2 Water Supply and Storage

The water resource requirements of the Proposal must be critically determined including the quality and quantity of all water supplied to the site. In particular, the proposed and optional sources of water supply must be described (e.g. bores, any surface storages such as dams and weirs, municipal water supply pipelines).

Estimated rates of supply from each source (average and maximum rates) must be given. Any proposed water conservation and management measures must be described. Factors such as potential on-farm efficiencies, water conservation and re-use strategies must be evaluated.

Determination of potable water demand must be made for the Proposal, including the temporary demands during the construction period. Details must be provided of any existing town water supply to meet such requirements. If water storage and treatment is proposed on site, for use by the site workforce, then this must be described.

3.6.3 Stormwater Drainage

A description must be provided of the proposed stormwater drainage system for all components of the Proposal and the proposed disposal arrangements, including any off-site services.

3.6.4 Sewerage

This section must describe, in general terms, the sewerage infrastructure required by the Proposal. If it is intended that industrial effluent or relatively large amounts of domestic effluent are to be discharged into an existing sewerage system, an assessment of the capacity of the existing system to accept the effluent must be provided in section 4.5.

3.6.5 Water Distribution and Treatment Systems

The section must describe, in general terms, the expected scope of the potential water distribution and treatment systems to be used to distribute water from the proposed Proposal, to provide an understanding of generally how water from the Proposal will be distributed. Identify which of these systems are to be assessed under separate processes, and not form part of this EIS process.

3.6.6 Energy

The EIS must describe all energy requirements, including electricity, natural gas, and/or solid and liquid fuel requirements for the construction and operation of the Proposal. The locations of any easements must be shown on the infrastructure plan. Energy conservation must be briefly described in the context of any Australian, state and local government policies.

3.6.7 Telecommunications

The EIS must describe any impacts on existing telecommunications infrastructure (such as optical cables, microwave towers, etc.) and identify the owners of that infrastructure.

3.6.8 Workforce and Accommodation

Describe the number of personnel to be employed, the skills' base of the required workforce and the likely sources (i.e. local, regional or overseas) for the workforce during the construction and operational phases for each aspect of the Proposal. The estimated number of people to be employed during construction and operations and arrangements for their transport to and from the project areas, including the proposed use of regional or charter air services should be provided.

Estimates should be provided according to occupational groupings and variations in the workforce numbers over the duration of the Proposal (e.g. histogram). The information should show anticipated peaks in worker numbers during the construction period.

Provide an outline of recruitment schedules and policies for recruitment of workers (addressing recruitment of local and non-local workers).

Prove a description of an accommodation strategy for the construction workforce that addresses the estimated housing needs of both single and accompanied construction workers. This should include details of the size, location and management of any temporary worker accommodation that will be required either on-site or off-site. Maps should be included as necessary to illustrate the site and should include the location of any proposed construction workers' accommodation on-site or in the vicinity of the Proposal. The strategy should also include details of the operational workforce and how such accommodation is proposed to be supplied.

If camp sites are to be used to accommodate the workforce, details on the number, location (shown on a map), proximity to the construction site and typical facilities for these sites should be provided. Information should include data relating to facilities for:

- food preparation and storage;
- ablution facilities;
- vector and vermin control;
- fire safety;
- dust and noise control in relation to proximity of camp site to the construction area; and

- the service personnel required to maintain the camp and the supply of services to each construction camp.

Local government approvals required for establishment and operation of such camps should be outlined.

3.6.9 Other Infrastructure

Provide a description of any other developments directly related to the Proposal not described in other sections, such as fuel storage areas, equipment hardstand and maintenance areas and technical workshops and laboratories.

3.6.10 Rehabilitation

This section must describe the options, strategies and methods for progressive and final rehabilitation of the environment disturbed by the Proposal. The strategic approach to progressive and final rehabilitation of the construction site must be described. A preferred rehabilitation strategy must be developed with a view to minimising the amount of land disturbed at any one time. The final topography of any excavations, waste areas and temporary dam sites must be shown on maps at a suitable scale.

Any proposals to divert waterways during construction, and, if applicable, proposals for the reinstatement of the waterways after construction has ceased, must be provided. A description of topsoil management must consider suitability, erosion and dispersion potential, transport, storage and replacement of topsoil to disturbed areas. Details must be provided of a weed management program for rehabilitated and disturbed areas covering a minimum period of two years following completion of construction.

3.6.11 Decommissioning

The practicality of decommissioning and potential decommissioning options of the dam and associated infrastructure must be addressed at a strategic level to provide an understanding of potential impacts and possible mitigation measures associated with this possible future phase.

4 Environmental Values and Management of Impacts

The functions of this section are:

- To describe the existing environmental values of the area that may be affected by the Proposal. Environmental values are defined in section 9 of the EP Act, environmental protection policies and other documents such as the Australian and New Zealand Environment and Conservation Council (ANZECC) 2000 guidelines and South East Queensland Regional Water Quality Management Strategy. Environmental values may also be derived following recognised procedures, such as described in the ANZECC 2000 guidelines. Environmental values must be described by reference to background information and studies, which must be included as appendices to the EIS.
- To describe the potential adverse and beneficial impacts of the Proposal on the identified environmental values.
- To describe any cumulative impacts on environmental values caused by the Proposal, either in isolation or by combination with other known existing or planned sources of contamination.
- To present environmental protection objectives and the standards and measurable indicators to be achieved.
- To examine viable alternative strategies for managing impacts. These alternatives must be presented and compared in view of the stated objectives and standards to be achieved. Available techniques, including best practice, to control and manage impacts to the nominated objectives must be discussed. This section must detail the environmental protection measures incorporated in the planning, construction, operations, rehabilitation and associated works for the Proposal. Measures must prevent, or where prevention is not possible, minimise environmental harm and maximise socio-economic and environmental benefits of the Proposal. Preferred measures must be identified and described in more detail than other alternatives.

Environmental protection objectives may be derived from legislative and planning requirements which apply to the Proposal, including Australian government strategies, State planning policies, local authority strategic plans, environmental protection policies under the EP Act, and any catchment management plans prepared by local water boards or land care groups. Special attention must be given to those mitigation strategies designed to protect the values of any sensitive areas and any identified ecosystems of high conservation value within the area of possible Proposal impact.

This section must address all elements of the environment, (such as land, water, air, waste, noise, nature conservation, cultural heritage, social and community, health and safety, economy, hazards and risk) in a way that is comprehensive and clear. To achieve this, the following issues must be considered for each environmental value relevant to the Proposal:

- Environmental values affected: describe the existing environmental values of the area to be affected, including values and areas that may be affected by any cumulative impacts (refer to any background studies in appendices - note such studies may be required over several seasons). It must be explained how the environmental values were derived (e.g. by citing published documents or by following a recognised procedure to derive the values).
- Impact on environmental values: describe quantitatively the likely impact of the Proposal on the identified environmental values of the area. The cumulative impacts of the Proposal must be considered over time or in combination with other (all) impacts in the dimensions of scale, intensity, duration or frequency of the impacts.
- Cumulative impacts on the environmental values of land, air and water and cumulative impacts on public health and the health of terrestrial and aquatic ecosystems must be discussed in the relevant sections. This assessment may include air and water sheds affected by the Proposal and other proposals competing for use of the local air and water sheds.
- Where impacts from the Proposal will not be felt in isolation to other sources of impact, it is recommended that the proponent develop consultative arrangements with other industries in the Proposal's area to undertake cooperative monitoring and/or management of environmental parameters. Such arrangements must be described in the EIS.
- Environmental protection objectives: describe qualitatively and quantitatively the proposed objectives for enhancing or protecting each environmental value. Include proposed indicators to be monitored to demonstrate the extent of achievement of the objective as well as the numerical standard that defines the achievement of the objective (this standard must be auditable). The measurable indicators and standards

can be determined from legislation, support policies and government policies as well as the expected performance of control strategies. Objectives for progressive and final rehabilitation and management of contaminated land must be included.

- Control strategies to achieve the objectives: describe the control principals, proposed actions and technologies to be implemented that are likely to achieve the environmental protection objectives. Details are required to show that the expected performance is achievable and realistic.
- Monitoring programs: describe the monitoring parameters, monitoring points, frequency, data interpretation and reporting proposals.
- Auditing programs: describe how progress towards achievement of the objectives will be measured, reported and whether external auditors will be employed. Include scope, methods and frequency of auditing proposed.
- Management strategies: describe the strategies to be used to ensure the environmental protection objectives are achieved and control strategies implemented e.g. continuous improvement framework including details of corrective action options, reporting (including any public reporting), monitoring, staff training, management responsibility pathway, and any environmental management systems and how they are relevant to each element of the environment.
- Information quality: information given under each element must also state the sources of the information, how recent the information is, how any background studies were undertaken (e.g. intensity of field work sampling), how the reliability of the information was tested, and what uncertainties (if any) are in the information.

It is recommended that the final ToR and the EIS follow the heading structure shown below. The mitigation measures, monitoring programs, etc., identified in this section of the EIS must be used to develop the EM Plan for the Proposal (see section 5).

4.1 Land

This section describes the existing environment values for all land areas that may be affected by the Proposal, including areas affected by the pipeline route and any new permanent or temporary facilities constructed for the pipeline and associated dam and pipeline infrastructure.

4.1.1 Topography and Geomorphology

4.1.1.1 Description of Environmental Values

Maps must be provided locating the Proposal in both regional and local contexts. The topography of the proposed dam site must be detailed with contours at suitable increments (at one metre contours for the dam construction site), shown with respect to Australian Height Datum (AHD) and in relation to the FSL and buffer zone for the storage.

Significant features of the locality must be included on maps and be accompanied by appropriate commentary describing the significant topographical features. Such features would include any locations subsequently referred to in the EIS (e.g. the nearest noise sensitive locations) that are not included on other maps in section 4.1.

The topography surrounding the Proposal must be detailed at 1m increments with levels shown with respect to AHD features for watercourse crossings.

4.1.1.2 Potential Impacts and Mitigation Measures

The Proposal should be discussed in the context of major topographic features and any measures taken to avoid or minimise impact to such (if required).

The potential for the Proposal to adversely impact on the stability of landforms within the impoundment area, infrastructure areas and adjacent lands must be addressed in detail. This must include the stability and potential for erosion of periodically inundated land below FSL and the buffer zone and adjacent catchment areas. The stability and potential for erosion of the watercourse and associated riparian zone downstream of the Proposal must be addressed, including changes to sediment delivery, transport and deposition.

The proposed re-contouring and landscaping objectives of the Proposal should be described.

4.1.2 Geology and Soils

4.1.2.1 Description of Environmental Values

The EIS must provide a description, map at a suitable scale and a series of cross-sections of the geology of the Proposal dam site area, with particular reference to the physical and chemical properties of surface and sub-surface materials and geological structures within the proposed areas of disturbance. Geological properties that may influence ground stability (including seismic activity, if relevant), occupational health and safety, rehabilitation programs, or the quality of wastewater leaving any area disturbed by the Proposal must be described.

In locations where the age and type of geology is such that significant fossil specimens (such as of dinosaurs or their tracks) may be uncovered during construction, the EIS must address the potential for significant finds.

Soil profiles must be mapped at a suitable scale with particular reference to the physical and chemical properties of the soils which would influence erosion potential, dam and storm water run-off quality, rehabilitation and agricultural productivity of the land, including lands within the buffer zone and below the FSL of the dam that may be periodically exposed. Soil information must also be provided on soil stability and suitability for construction of Proposal facilities an appraisal of the depth and quality of useable soil must be undertaken.

Soils must be described according to the Australian soil and land survey field handbook (McDonald et al, 1990) and Australian soil classification (Isbell, 1996). Information must be presented according to the standards required in the Planning Guidelines: Identification of Good Quality Agricultural Land (GQAL) (DPI, DHLGP, 1993), and the State Planning Policy 1/92: Development and the Conservation of Agricultural Land. The area of GQAL that will be inundated must be clearly indicated, and an assessment of the potential for land use conflict with GQAL is required with investigations following the procedures set out in the planning guidelines referred to above.

Soil descriptions must include horizon differentiation and depths, field texture, colour, mottles, drainage, permeability and water holding capacity characteristics, soil structure, erosion hazard rating, pH and electrical conductivity. The location of each borehole must be accurately presented, and boreholes must equitably represent the different soil types present. Any highly erodible soils, sodic soils, saline sites and sites which are particularly susceptible to becoming saline (including downstream of the Proposal, where applicable) must be especially identified. Information must also be provided on soil stability and suitability to construction of all facilities and infrastructure. The investigation area must include all areas potentially affected by the Proposal including the buffer zone and associated infrastructure corridors.

4.1.2.2 Potential Impacts and Mitigation Measures

If geological conditions are conducive, the proponent must consider the possibility that significant fossil specimens (such as of dinosaurs or their tracks) may be uncovered during construction/operations and propose strategies for protecting the specimens and alerting the Queensland Museum to the find.

For all permanent and temporary landforms, possible erosion rates and management techniques must be described. For each soil type identified, erosion potential (wind and water) and erosion management techniques must be outlined. An erosion-monitoring program, including rehabilitation measures for erosion problems identified during monitoring, must also be outlined. Mitigation strategies must be developed to minimise soil loss rates, levels of sediment in rainfall runoff and wind-generated dust concentrations.

The report must include an assessment of likely erosion effects, especially those resulting from the removal of vegetation, both on-site and off-site for all disturbed areas such as:

- the dam site, including buildings;
- along the pipeline route;
- access roads or other transport corridors;
- any waste dumps; and
- dams, banks and creek crossings.

Methods proposed to prevent or control erosion must be specified and must be developed with regard to

preventing soil loss in order to maintain land capability/suitability and preventing significant degradation of local waterways by suspended solids.

The options for mitigation and the effectiveness of mitigation measures should be discussed with particular reference to sediment, acidity, salinity, sodicity and other emissions of a hazardous or toxic nature to the river systems.

A description of topsoil management must consider transport, storage and replacement of topsoil to disturbed areas. The minimisation of topsoil storage times (to reduce fertility degradation) must also be addressed.

4.1.3 Land Contamination

4.1.3.1 Description of Environmental Values

Areas of potential contamination within the inundation area and buffer zones, including but not limited to, Notifiable Activities as listed in Schedule 2 of the EP Act, historic mine sites etc, should be evaluated. Should potentially contaminated sites be identified, a preliminary site investigation must be conducted, on the basis that the scope of any preliminary site investigation should be consistent with the assessed level of risk at each site. The results of any preliminary site investigations undertaken should be summarised in the EIS and provided in detail in an appendix.

The following information should be discussed in the EIS:

- mapping of any areas listed on the Environmental Management Register or Contaminated Land Register under the EP Act;
- identification of any potentially contaminated sites not on the registers which may need remediation; and
- a description of the nature and extent of contamination at each site and a remediation plan and validation sampling.

4.1.3.2 Potential Impacts and Mitigation Measures

This section should provide details of any potential impacts from land contamination and proposed mitigation measures, including:

- a description of the nature and extent of existing or potential contamination at each site and a strategy for further investigation, remediation and validation sampling, if required.
- details of any potential risks to occupational or human health, as a result of any residual contamination levels, to any of the proposed uses of the dam, including recreational, agricultural or human consumption, including potential impacts on water quality.
- the means of preventing land contamination (within the meaning of the EP Act) should be addressed. Methods proposed for preventing, recording, containing and remediating any contaminated land should be outlined. Intentions should be stated concerning the classification (in terms of the Environmental Management Register and the Contaminated Land Register) of land contamination on the land after completion of construction of the Project.

The EIS must describe the possible contamination of land from aspects of the Proposal including waste, reject product, acid generation from exposed sulfidic material and spills at chemical and fuel storage areas.

The means of preventing land contamination (within the meaning of the EP Act) must be addressed. Methods proposed for preventing, recording, containing and remediating any contaminated land must be outlined. Intentions must be stated concerning the classification (in terms of the CLR) of land contamination on the land, processing plant site and product storage areas after Proposal completion.

The EIS must address the management of any existing or potentially contaminated land in addition to preventing and managing land contamination resulting from Proposal activities.

4.1.4 Land Use and Infrastructure

4.1.4.1 Description of Environmental Values

The EIS must provide a description of current land tenures and land uses, including native title issues, in the Proposal area, with particular mention of land with special purposes. The location and owner/custodians of native title in the area and details of native title claims must be shown.

Maps at suitable scales showing existing land uses and tenures, and the Proposal location, must be provided for the entire Proposal area and surrounding land that could be affected by the development. The maps must identify areas of conservation value in any locality that may be impacted by the Proposal. The location of all existing dwellings, significant structures and the zoning of all affected lands according to the existing (and draft where applicable) local government town planning schemes and strategic plans must be identified and mapped.

Describe the land use suitability of the affected area in terms of the physical and economic attributes. The assessment must set out soil and landform subclasses assigned to soil mapping units in order to derive land suitability classes.

Detail the nature of rural enterprises and the agricultural value of lands affected by the Proposal. Provide a land suitability map of the proposed and adjacent area, and setting out land suitability and current land uses, e.g. for grazing of native and improved pastures and horticulture.

The location and owner/custodians of all infrastructure tenures including reserves, roads and road reserves, railways and rail reserves and stock routes, covering the affected land must be shown on maps of a suitable scale. Indicate locations of gas and water pipelines, power lines and any other easements. Describe the environmental values affected by this infrastructure.

4.1.4.2 Potential Impacts and Mitigation Measures

The Proposal must be discussed in the context of major topographic features (including influences on stream configuration) and any measures taken to avoid or minimise impact to such.

The potential for the construction and operation of the Proposal to change existing and potential land uses of the Proposal site and adjacent and downstream areas must be detailed. Post operations land use options must be detailed including suitability of the area within the FSL and adjacent area (including buffer zone) to be used for agriculture or nature conservation. The factors favouring or limiting the establishment of those options must be given in the context of land use suitability prior to the Proposal and minimising potential liabilities for long-term management.

Provide a description of the following:

- management of the immediate environs of the Proposal including the buffer zones and/or restrictions on livestock access;
- individual properties and businesses affected by the Proposal – area and type of land inundated, property facilities affected, access changes to and within the property;
- the land acquisition strategy resulting from investigations into the land acquisition for the inundated areas;
- possible effect on town planning objectives and controls, including council zoning and strategic plans;
- opportunities for redevelopment around the inundation zone for a range of residential, recreational and other development types;
- constraints to potential developments and possibilities of rezoning upstream of the inundation zone;
- possible impacts on, or sterilisation of, identified mineral or energy resources and extractive industry deposits, the amount of sterilisation (if any) of the deposits resulting from the construction and/or operation of the Proposal;
- identification of any millable timber or quarry resources within the Proposal area and an assessment of the commercial value of these resources to satisfy the requirements of the Department of Natural Resources and Water;
- discussion of potential issues involved in proximity and/or co-location of other infrastructure services, and/or the separation requirements of the dam, including electric power transmission lines and electrified rail lines, or where construction and maintenance machinery is used in the vicinity of other infrastructure corridors;

- identification of any land units requiring specific management measures;
- description of possible impacts on surrounding land uses and human activities, including impacts to GQAL and forestry land (addressing loss of access to land, fragmentation of sites, increase of fire risk and loss of productive land for those purposes) as well as residential and industrial uses, and strategies for minimisation; and
- proposed measures to minimise impact on GQAL.

Provide an assessment of:

- the suitability of the pipeline route for co-location of other infrastructure services;
- identification of how easement widths and vegetation clearance in sensitive environmental areas have been minimised;
- the suitability of any pipeline alignment and the cost of alternatives in terms of corridors preserved by the Department of Main Roads for future transport needs;
- the potential issues involved in proximity of the water pipeline to electric transmission lines and electrified rail lines, both at crossing points, where lines run parallel, and where construction and maintenance machinery is used in the vicinity of other infrastructure corridors;
- discussion of the Proposal construction impacts on continued access to all parts of the properties fringing the Proposal, the effect on property management for stock, cropping and weed control, and the likely impacts on existing road networks (both farm and gazetted roads), including an assessment of any adverse/beneficial impacts on present or potential land use at FSL;
- discussion of the potential impact on upstream and downstream land uses (including conservation estates) from additional water made available as a consequence of the Proposal; and
- an assessment of the potential impacts of the Proposal on existing and potential irrigated agriculture and/or industrial developments and the possible conflict between these and other existing land uses.

This section must describe the connection between water quality needs in the proposed storage and post development land use options including suitability of agricultural practices in the catchment of the impoundment. Restrictions that may be imposed on current land use practices must be specifically indicated and the method/s for regulating these must be stated.

Incompatible land uses, whether existing or potential, adjacent to all aspects of the Proposal, including essential and proposed ancillary developments or activities and areas directly or indirectly affected by the construction and operation of these activities must be identified and measures to avoid and/or minimise impacts defined.

4.1.5 Landscape Character and Visual Amenity

4.1.5.1 Description of Environmental Values

Describe the existing character of the landscape that will be affected by the Proposal in general terms. This should ‘set the scene’ for the description of particular scenic values by providing a general impression of the landscape that would be obtained while travelling through and around it. Provide details on any changes that have already been made to the natural landscape since European settlement.

Provide a detailed description of the existing landscape features, panoramas and views that have, or could be expected to have, value to the community whether of local, regional, state-wide, national or international significance. Information in the form of maps, sections, elevations and photographs are to be used, particularly where addressing the following issues:

- identification of elements within the Proposal and surrounding area that contribute to their image of the town/city as discussed in the any local government strategic plan - city image and townscape objectives and associated maps;
- major views, view sheds, existing viewing outlooks, ridgelines and other features contributing to the amenity of the area, including assessment from private residences in the affected area;
- focal points, landmarks (built form or topography), gateways associated with Proposal site and immediate surrounding areas, waterways, and other features contributing to the visual quality of the area and the Proposal site;
- character of the local and surrounding areas including character of built form (scale, form, materials and colours) and vegetation (natural and cultural vegetation) directional signage and land use;
- identification of the areas of the Proposal that have the capacity to absorb land use changes without detriment to the existing visual quality and landscape character; and

- the value of existing vegetation as a visual screen.

4.1.5.2 Potential Impacts and Mitigation Measures

This section must analyse and discuss the visual impact of the Proposal on particular panoramas and outlooks. It must be written in terms of the extent and significance of the changed skyline as viewed from places of residence, work, and recreation, from road, cycle and walkways, from the air and other known vantage points day and night, during all stages of the Proposal as it relates to the surrounding landscape. The assessment is to address the visual impacts of the Proposal structures and associated infrastructure, using appropriate simulation. Sketches, diagrams, computer imaging and photos are to be used where possible to portray the near views and far views of the completed structures and their surroundings from visually sensitive locations. Special consideration is to be given to public roads, public thoroughfares, and places of residence or work, which are within the line-of-sight of the Proposal.

A strategy must be developed with a view to minimising the amount of land disturbed at any one time. The methods to be used for the Proposal, including re-contouring, topsoil handling and revegetation, must be described. Consideration must be given to the use of threatened plant species during any landscaping and revegetation.

Where the dam, roads and other infrastructure are to be constructed, proposals for the management of these structures after the completion of the Proposal must be given. A contour map of the area must be provided (if relevant). Also, the final drainage and seepage control systems and any long-term monitoring plans must be described.

Describe the potential impacts of the Proposal on the landscape character of the site and the surrounding area. Particular mention must be made of any changes to the broad-scale topography and vegetation character of the area, such as due to spoil dumps, excavated voids and broad-scale clearing. Detail must be provided of all management options to be implemented and how these will mitigate or avoid the identified impacts on the landscape and visual amenity of the affected areas.

Management of the lighting of the Proposal, during all stages, is to be provided, with particular reference to objectives to be achieved and management methods to be implemented to mitigate or avoid:

- the visual impact at night;
- night operations/maintenance and effects of lighting on fauna and residents;
- the potential impact of increased vehicular traffic; and
- changed habitat conditions for nocturnal fauna and associated impacts.

4.2 Climate

This section must describe the rainfall patterns (including magnitude and seasonal variability of rainfall), air temperatures, humidity, wind (direction and speed) and any other special factors (e.g. temperature inversions) that may affect air quality within the region of the Proposal. An assessment of historic rainfall patterns including geographic distribution within the catchment must also be provided.

Extremes of climate (droughts, floods, cyclones, etc) must also be discussed with particular reference to water management at the Proposal site. The vulnerability of the area to natural or induced hazards, such as floods and bushfires, must also be addressed. The relative frequency, magnitude and risk of these events must be considered.

The potential impacts due to climatic factors must be addressed in the relevant sections of the EIS. The impacts of rainfall on soil erosion must be addressed in section 4.1. The impacts of storm events on the capacity of waste containment systems (e.g. site bunding/stormwater management and tailings dams) must be addressed in section 4.3 with regard to contamination of waterways and in section 4.4 with regard to the design of waste containment systems. The impacts of wind, rain, humidity and temperature inversions on air quality must be addressed in section 4.5.

4.3 Water Resources

4.3.1 Surface Waterways

4.3.1.1 Description of Environmental Values

This section describes the existing environment for water resources that may be affected by the Proposal in the context of environmental values as defined in such documents as the EP Act, Environmental Protection (Water) Policy 1997 (EPP (Water)), ANZECC 2000 and the South East Queensland Water Quality Management Strategy. The definition of waters in the EPP (Water) includes the bed and banks of waters, so this section must address impacts on benthic sediments as well as the water column.

Where a licence or permit will be required under the *Water Act 2000* to take or interfere with the flow of water, this section of the EIS must provide sufficient information for a decision to be made on the application. Similarly, waterway barrier works may need approval under the *Fisheries Act 1994*, and if so must be addressed in the EIS.

A description must be given of the surface waterways and their quality and quantity in the area affected by the Proposal with an outline of the significance of these waters to the river catchment system in which they occur. The description must include historical and existing quantitative hydrological data and details of existing regulatory structures and other barriers up and downstream of the Proposal site. Details provided must include a description of existing surface drainage patterns, and flows in major streams and wetlands. Also provide details of the likelihood of flooding, history of flooding including extent, levels and frequency, and a description of present and potential water uses downstream of the areas affected by the Proposal. Flood studies must include a range of annual exceedence probabilities for affected waterways, where data permits.

The EIS must provide a description, with photographic evidence, of the geomorphic condition of any watercourses likely to be affected by disturbance or stream diversion. The results of this description must form the basis for the planning and subsequent monitoring of rehabilitation of the watercourses during or after the operation of the Proposal. Include details of the stream bed morphology at the downstream foot of the dam to assess the effect on the passage of fish.

An assessment is required of existing water quality in surface waters and wetlands likely to be affected by the Proposal. The basis for this assessment must be a monitoring program, with sampling stations located upstream and downstream of the Proposal. A detailed description of the monitoring program is required, including locations of sampling points, sampling regime, and other elements of the sampling/monitoring design. Complementary stream-flow data may also be obtained from historical records (if available) to aid in interpretation.

The water quality must be described, including seasonal variations or variations with flow where applicable. A relevant range of physical, chemical and biological parameters must be measured to gauge the environmental harm on any affected creek or wetland system.

Describe the watercourses to be crossed by the pipeline showing planned crossing locations on a map and any other waterways or water features, including drainage channels, gullies, flood-prone or low lying land on or adjacent to the Proposal site. Provide a discussion of alternative crossing locations in environmentally sensitive areas.

Describe the environmental values of the surface waterways of the affected area in terms of:

- values identified in the EPP (Water);
- sustainability, including both quality and quantity;
- physical integrity, fluvial processes and morphology of watercourses, including riparian zone vegetation and form;
- hydrology of floodplains, waterways and groundwater;
- the current operation of any water storage and distribution system on the Severn River, including yield, operating strategy, supply reliability, allocation and use of water supplies;
- any water resource plans, resource operation plan,land and water management plans relevant to the affected catchment;

- the historical (without current storages in the Severn River catchment) and current flow characteristics including seasonal flow patterns, flow volumes and duration both upstream and downstream of the proposed dam site;
- the changes in the parameters from pre-regulation (if applicable) to current and proposed post-Proposal conditions, and the corresponding changes that may be anticipated in:
    - in-stream and connected wetland morphology and ecology; and
    - sediment/nutrient/energy processes in the catchment;
    - in-stream and connected wetland morphology;
    - in-stream pools/runs;
    - in-stream riffles/rapids;
    - off-stream perennial pools (billabongs, ox-bow lakes etc); and
    - morphology, physical integrity (including stream bank erosion) and fluvial processes of the riparian zone within the potential impact area of the Proposal.
- siltation patterns, including seasonal/flow related variation;
- details of current or proposed flow management schemes for the waterway;
- details of the length of stream already impounded and the additional effect of the Proposal; and
- potential sources of water for construction.

Discuss the effects of predictable climatic extremes (droughts, floods) upon the structural integrity of the water impoundment structures containing walls, the quality of water contained, and flows and quality of water discharged.

Provide details on the following in regard to the construction phase of the Proposal:

- effects of drainage works, placement of fill, clearing or any other alterations to existing topography and landform on the hydrology of the site including any alteration to drainage patterns and the water table and secondary influence on flooding. If levee banks or stream diversionary constructions are proposed, the effects on neighbouring landholders must be considered, and any works requiring permits or licensing in accordance with the Water Act 2000 identified;
- timing of the construction works relative to likely periods of flooding and proposals to minimise the risk of adversely impacting downstream water quality; and
- measures to ensure weeds (including seeds) are not released into the water environment from machinery traversing creek systems or riparian areas.

Provide an assessment of the existing environment for water quality that may be affected by the Proposal in the context of environmental values as defined in such documents as the EP Act, EPP (Water) and ANZECC 2000. This assessment should emphasise the relationship between surface water flows and downstream water quality and ecosystem function and must consider the:

- existing surface and ground water quality in terms of physical, chemical and biological characteristics at the Proposal site and upstream and downstream of the site, including consideration of seasonal or flow variations where applicable;
- the water quality (historical, current) of the Severn River including areas and tributaries upstream and downstream of the proposed dam site, in comparison with water quality in adjacent catchments must be made (including records of blue-green algal blooms, and identification of long term, seasonal or other trends);
- any seasonal variation in water quality parameters (including temperature, dissolved oxygen, chlorophyll, turbidity, total suspended solids, pH, electrical conductivity, metals and nutrient levels, as well as phytoplankton including blue-green algae).
- a relevant range of physical, chemical and biological parameters must be included to gauge the impacts on the downstream environment. The water quality objectives for the river must be summarised, with reference to the Queensland Water Quality Guidelines 2006, the EPP Water and the latest ANZECC Guidelines where appropriate.

The basis for this assessment must contain a literature review supplemented by a monitoring program, with sampling stations located upstream and downstream of the Proposal site. Complementary stream-flow data must also be obtained from historical records (if available) to aid in interpretation.

4.3.1.2 Potential Impacts and Mitigation Measures

This section is to assess potential impacts on water resource environmental values identified in the previous

section. It will also define and describe the objectives and practical measures for protecting or enhancing water resource environmental values, to describe how nominated quantitative standards and indicators may be achieved, and how the achievement of the objectives will be monitored, audited and managed.

The EIS must describe the possible environmental harm caused by the Proposal to environmental values for water as expressed in the EPP (Water).

Water management controls must be described, addressing surface and groundwater quality, quantity, drainage patterns and sediment movements. The beneficial (environmental, production and recreational) use of nearby surface and groundwater must be discussed, along with the Proposal for the diversion of affected creeks during mining, and the stabilisation of those works. Monitoring programs must be described which will assess the effectiveness of management strategies for protecting water quality during the construction, operation and decommissioning of the Proposal.

Key water management strategy objectives include:

- protection of the integrity of the aquatic environment;
- protection of important local aquifers and protection of their waters;
- maintenance of sufficient quantity and quality of surface waters to protect existing beneficial downstream uses of those waters (including maintenance of in-stream biota, in-stream structure and processes and the littoral zone); and
- minimisation of impacts on flooding levels and frequencies both upstream and downstream of the Proposal.

Conduct a risk assessment for uncontrolled emissions to water due to system or catastrophic failure, implications of such emissions for human health and natural ecosystems, and list strategies to prevent, minimise and contain impacts.

The potential environmental harm to the flow and the quality of surface waters from all phases of the Proposal must be discussed, with particular reference to their suitability for the current and potential downstream uses, including the requirements of any affected riparian area, wetland, littoral zone, and any in-stream biological uses and water delivery. The impacts of surface water flow on existing infrastructure must be considered. Refer to the EPP (Water) and *Water Act 2000*, Water Resources (Borders River) Plan 2003. Particular emphasis must be given to likely impacts on the riparian and aquatic values of Sundown National Park in the context of environmental flows, water quality, aquatic ecology (community ecological and habitat) and aquatic species that are endangered, vulnerable or rare, this assessment must address how changes to the flows in the Severn River could impact on triggers for spawning or breeding.

The hydrological impacts of the Proposal must be assessed, particularly with regard to stream diversions, scouring and erosion, and changes to low flow and flooding levels and frequencies both upstream and downstream of the Proposal. When flooding levels will be affected, modelling of afflux must be provided and illustrated with maps. Assessment of impacts on the flow and the quality of surface waters and effects on ecosystems must include an assessment of the:

- likely effects on riparian habitats and off stream wetlands as a result of any temporary diversion of existing water courses;
- impacts of the Proposal on flow regime indicators and stipulate the assumptions made (e.g. release patterns, release capacity, consumptive uses) in reaching this assessment;
- flow regime for downstream environmental flow requirements for ecological health. Reference should be made to the Environmental Flow Objectives (EFO) in the Water Resources (Border Rivers) Plan 2003 and how these objectives are affected by the Proposal. The likelihood of not meeting the EFOs should be discussed and mitigation measures provided to ensure adequate environmental flows are maintained during the life of the dam;
- effect of environmental flow requirements on dam reliability and water availability for consumptive use;
- changes in the reliability of supply to current water entitlement holders downstream and the operation of existing water extraction;
- changes in flow patterns including changes in frequency, volumes and duration and changes in flows reaching estuarine waters, when compared at a meaningful scale with pre-regulation;
- current and predicted flows in the system;
- changes in flood regimes, including frequency of floodplain/wetland inundation and duration of inundation;

- evaluation of the impacts of potential environmental flow requirements and water for fishway operational requirements on the yield of the proposed storage and its viability;
- The hydrological impacts of the Proposal should be assessed, particularly with regard to the downstream effect on the confluence of the Severn River with Tenterfield Creek;
- proposals for the reinstatement of creeks, if the diversion of creeks is likely during construction or operations; and
- implications of any mitigating strategies on the engineering of the Proposal (e.g. the type of off-take required and outlet works as determined by environmental flow needs) must be reported.

Quality characteristics discussed must be those appropriate to the downstream and upstream water uses that may be affected. Chemical and physical properties of any waste water at the point of entering natural surface waters must be discussed along with potential impacts to downstream flora and fauna.

Provide an assessment of the potential to contaminate surface water resources and measures to prevent, mitigate and remediate. This assessment must include:

- surface water quality, quantity, drainage patterns and sediment movements;
- the beneficial use of surface water;
- monitoring programs to assess the effectiveness of management strategies for protecting water quality during the construction, operation and, if applicable, decommissioning of any temporary structures;
- quality of the water leaving the proposed dam construction site and infrastructure construction sites during construction and operation;
- quality of water released from the impoundment under proposed operating conditions and seasonal variation (including pollutant concentrations and relevant parameters such as pH, dissolved oxygen, turbidity, metals and suspended solids);
- quality of water within the impoundment and downstream under proposed operating conditions and seasonal variation (including potential for blue-green algae blooms) and implications for drinking water standards;
- potential impact of water quality changes on flora and fauna in and around the impoundment and downstream;
- the effects of depth and holding time of water within the storage, and the effects on downstream water quality under varying scenarios of flow release;
- potential for stratification and 'turn-over' of the storage and implications for water quality management for both water supply and aquatic fauna;
- the likelihood of infestation by water weeds which may have the potential to affect the water quality; and
- possible sources of water pollution or other changes in water quality including soil erosion, sedimentation, soil leachates, interaction with groundwater, drilling fluids, accidental spills, waste and sewage disposal and likely chemical composition of any leachate from introduced fill on the site.

In relation to water supply and usage, and wastewater disposal, the EIS must discuss anticipated flows of water to and from the Proposal area. The EIS must investigate the effects of predictable climatic extremes (storm events, floods and droughts) on: the capacity of the dams to contain flood waters, the structural integrity of the containing walls; and the quality of water contained, and flows and quality of water discharged. The design of all water storage facilities must follow the technical guidelines on site water management.

The need or otherwise for licensing of any dams or creek diversions, under the *Water Act 2000* must be discussed. Water allocation and water sources must be established in consultation with Department of Natural Resources and Water.

The Queensland Water Quality Guidelines 2006, ANZECC 2000 National Water Quality Management Strategy, Australian Water Quality Guidelines for Fresh and Marine Waters and the EPP (Water) must be used as a reference for evaluating the effects of various levels of contamination.

Options for mitigation and the effectiveness of mitigation measures must be discussed with particular reference to sediment, acidity, salinity and other releases of a hazardous or toxic nature to human health, flora or fauna.

4.3.2 Groundwater

4.3.2.1 Description of Environmental Values

The EIS must review the quality, quantity and significance of groundwater in the Proposal area, together with groundwater use in neighbouring areas and describe the existing environment for hydrogeology resources that may be affected by the Proposal in the context of environmental values as defined in such documents as the EP Act, EPP (Water) and ANZECC 2000.

The possible significance of the Proposal to groundwater depletion or recharge, or impact on any existing or potential saline water intrusion problem of existing aquifers, must also be addressed. The depth to groundwater, quantity and water quality and users of the groundwater in the vicinity of the Proposal must be detailed. The review must include a survey of existing groundwater supply facilities (bores, wells, or excavations) within the groundwater area impacted by the Proposal. This review is to include details on the:

- location;
- pumping parameters;
- draw down and recharge at normal pumping rates;
- seasonal variations (if records exist) of groundwater levels;
- basic water quality of the aquifer;
- proximity of the groundwater facilities to the Proposal and value of these facilities for rural, industrial and/or domestic use; and
- a description of the current use of groundwater within the impacted areas.

A network of observation points which would satisfactorily monitor groundwater resources both before and after commencement of operations must be developed.

This section must include reference to:

- Nature of the aquifer/s
    - geology/stratigraphy - such as alluvium, volcanic, metamorphic;
    - aquifer type - such as confined, unconfined; and
    - depth to and thickness of the aquifers.
- Hydrology of the aquifer/s
    - depth to water level and seasonal changes in levels;
    - groundwater flow directions (defined from water level contours);
    - interaction with surface water;
    - possible sources of recharge; and
    - vulnerability to pollution.

This section must include reference to:

The data obtained from the groundwater survey must also be sufficient to enable specification of the major ionic species present in the groundwater, pH, electrical conductivity and total dissolved solids.

Describe the environmental values of the underground waters of the affected area in terms of:

- values identified in the EPP (Water);
- sustainability, including both quality and quantity; and
- physical integrity, fluvial processes and morphology of groundwater resources.

4.3.2.2 Potential Impacts and Mitigation Measures

The EIS must include an assessment of the potential environmental harm caused by the Proposal to local groundwater resources.

The impact assessment must define the extent of the area within which groundwater resources are likely to be affected by the proposed operations and the significance of the Proposal to groundwater depletion or recharge, and propose management options available to monitor and mitigate these effects. The response of the

groundwater resource to the progression and finally cessation of the Proposal must be described.

Provide an assessment of the potential groundwater impacts in the environs of the Proposal including any alteration to drainage patterns or water table disruption. This assessment must include:

- activities that could affect the availability and quality of groundwater resources;
- impacts of vegetation clearing, sedimentation and salinity to local groundwater resources;
- impacts of the Proposal on the local ground water regime caused by the altered porosity and permeability of any land disturbance
- identification of groundwater resources proposed to be used by the Proposal, including a description of the quality, quantity, usage rate and required location of those resources;
- information on the characteristics of target aquifers, including seasonal variability, capacity to provide the required volumes of water at the expected usage rate, recharge potential and profile of existing extraction;
- assessment of the impacts of the required extraction of groundwater resources and proposed mitigation measures to reduce the impact of the Proposal on groundwater quality including the potential for interconnection between the target and underlying aquifers;
- the overall impacts of the Proposal (and any additional surface irrigation water) on local groundwater resources;
- where groundwater is determined to be at risk, options for the prevention or mitigation of such risk;
- decommissioning of temporary groundwater bores; and
- the need or otherwise for licensing of any groundwater bores under the *Water Act 2000*.

An assessment of the potential to contaminate groundwater resources and measures to prevent, mitigate and remediate such contamination must be provided. This assessment must include:

- groundwater quality, quantity and drainage patterns ;
- the beneficial use of groundwater;
- monitoring programs to assess the effectiveness of management strategies for protecting water quality during the construction, operation and, if applicable, decommissioning;
- potential impact of water quality changes on flora and fauna (including stygafauna communities) in and around the impoundment and downstream;
- the effects of depth and holding time of water within the storage;
- possible sources of water pollution or other changes in water quality including soil leachates, interaction with surface water, drilling fluids, accidental spills, waste and sewage disposal and likely chemical composition of any leachate from introduced fill on the site.

4.4 Air

4.4.1 Description of Environmental Values

This section describes the existing air environment that may be affected by the Proposal in the context of environmental values as defined by the EP Act and Environmental Protection (Air) Policy 1997 (EPP (Air)).

Ambient air quality conditions in terms of particulate matter must be described for any sensitive sites (see EPP (Air)) in proximity to the dam and associated infrastructure development areas, including any baseline monitoring results.

4.4.2 Potential Impacts and Mitigation Measures

This section defines and describes the objectives and practical measures for protecting or enhancing environmental values for air, to describe how nominated quantitative standards and indicators may be achieved, and how the achievement of the objectives will be monitored, audited and managed.

The objectives for air emissions must be stated in respect of relevant standards (ambient and ground level concentrations), relevant emission guidelines, and any relevant legislation, and the emissions modelled using a recognised atmospheric dispersion model.

Describe the quality and quantity of air emissions within the Proposal area expected during construction and operational activities. Impacts arising from dust generation from construction activities (including extractive

industries associated with provision of construction material); especially in areas where construction activities are adjacent to existing road networks or pass in close proximity to residences must be specifically described. This must also include environmental impact on terrestrial and aquatic animals and avifauna.

Where appropriate, the predicted average ground level concentrations in nearby areas must be provided. These predictions must be made for both normal and the worst case meteorological conditions must be identified. Ground level predictions must be made at any residential, industrial and agricultural developments believed to be sensitive to the effects of predicted particulate emissions. The techniques used to obtain the predictions must be referenced, and key assumptions and data sets explained. The assessment of the Proposal's impact on air quality must include at least the following matters:

- predicted changes to existing air quality from vehicle emissions and dust generation along haulage routes; and
- identification of climatic patterns that could affect dust generation and movement.

4.4.2.1 Greenhouse Gas Emissions and Abatement

This section of the EIS must:

- provide an inventory of the Proposal's emissions for each relevant greenhouse gas during construction, including material transportation, with total emissions expressed in 'CO2 equivalent' terms; and
- provide details on the Proposal's loss of annual greenhouse gas absorption capacity that will result from the clearing of vegetation.

The Australian Greenhouse Office Factors and Methods Workbook (available via the internet) can be used as a reference source for emission estimates and supplemented by other sources where practicable and appropriate.

- Air quality predictions must be compared to the relevant goals in the Environmental Protection (Air) Policy 1998 goals;

Provide details of the proposed the features designed to suppress or minimise emissions, including dusts and odours and how these will mitigate measures each identified impact relating to vehicle emission, dust generation and gaseous emissions.

This section of the EIS must also propose and assess greenhouse gas abatement measures. It must include:

- a description of the proposed measures (alternatives and preferred) to avoid and/or minimise greenhouse gas emissions directly resulting from construction of the Proposal; and
- an assessment of how the preferred measures minimise emissions.

4.5 Waste

This section must complement other sections of part 4 of the EIS by providing technical details of waste treatment and minimisation, with proposed discharge and disposal criteria, while other sections describe how those discharges and disposals would impact on the relevant environmental values. The purpose of this format is to concentrate the technical information on waste management into one section in order to facilitate its transfer into the EM Plan.

4.5.1 Character and Quantities of Waste Materials

Provide an inventory of all wastes to be generated by the Proposal during the construction and operational phases of the Proposal.

Schematic diagrams, which for the operational phase may be simplified versions of those provided in section 3.3, must be provided for each distinct stage of the Proposal (e.g. construction/site preparation, commissioning and operation) indicating the processes to be used and highlighting their associated waste streams (i.e. all waste outputs: solid, liquid and gaseous), including recycling efforts. The schematic diagrams, or an associated table, must cross-reference the relevant sections of the EIS where the potential impacts and mitigation measures associated with each waste stream are described.

Having regard for best practice waste management strategies and the Environmental Protection (Waste) Policy, the proposals for waste avoidance, reuse, recycling, treatment and disposal must be described in the appropriate sub-section below. Information must also be provided on the variability, composition and generation rates of all waste produced at the Proposal sites.

Cleaner production waste management planning must be detailed especially as to how these concepts have been applied to preventing or minimising environmental impacts at each stage of the Proposal.

This information is required to enable the resource management agencies and other stakeholders to assess the efficiency of resource use and allocation issues.

4.5.2 Potential Impacts and Mitigation Measures

This section defines and describes the objectives and practical measures for protecting or enhancing environmental values from impacts by wastes, describes how nominated quantitative standards and indicators may be achieved for waste management, and how the achievement of the objectives will be monitored, audited and managed.

This section must assess the potential impact of all wastes to be generated and provide details of each waste in terms of:

- operational handling and fate of all wastes including storage;
- methods of disposal (including the need to transport wastes off-site for disposal) proposed to be used for any trade wastes, liquid wastes and solid wastes;
- the potential level of impact on environmental values;
- proposed discharge/disposal criteria for liquid and solid wastes;
- measures to ensure stability of the dumps and impoundments must be described;
- methods to prevent, seepage and contamination of groundwater from stockpiles and/or dumps must be given; and
- market demand for recyclable waste (where appropriate) must be addressed.

Having regard for the Environmental Protection (Waste) Policy, the EIS must indicate the results of investigation into the feasibility of using waste minimisation and cleaner technology options during all phases of the Proposal. The EPA has also released draft guidelines covering aspects of waste management under this Environmental Protection (Waste) Policy, which must be addressed.

Cleaner production waste management planning must be detailed especially as to how these concepts have been applied to preventing or minimising environmental impacts at each stage of the Proposal.

The proposed location and suitability of any existing or proposed landfill to receive solid waste from construction and operational phases of the Proposal must be identified. Methods to be employed to prevent leachate from sites where solid waste has been deposited need to be identified and documented. These must include physical, impermeable barriers that are established as part of any waste disposal site.

Provide a description of the origin, quality and quantity of wastewater and any immiscible liquid waste originating from the Proposal. The EIS may need to consider the following:

- groundwater from excavations;
- drainage (i.e. run-off plus any seepage or leakage);
- seepage from other waste storages;
- domestic sewage treatment - disposal of liquid effluent and sludge; and
- water supply treatment plant - disposal of wastes.

4.6 Noise and Vibration

4.6.1 Description of Environmental Values

This section describes the existing environment values that may be affected by noise and vibration from the Proposal.

If the proposed activity could adversely impact on the noise environment, baseline monitoring must be undertaken at a selection of sensitive sites affected by the Proposal, including sites adjacent to the pipeline route, pump stations and balance tanks. Noise sensitive places are defined in the Environmental Protection (Noise) Policy 1997 (EPP (Noise)). Long-term measured background noise levels that take into account seasonal variations are required. The locations of sensitive sites must be identified on a map at a suitable scale. The results of any baseline monitoring of noise and vibration in the proposed vicinity of the Proposal must be described.

Sufficient data must be gathered to provide a baseline for later studies. The daily variation of background noise levels at nearby sensitive sites must be monitored and reported in the EIS, with particular regard given to detailing variations at different periods of the night. Monitoring methods must adhere to accepted best practice methodologies, relevant Environmental Protection Agency guidelines and Australian Standards, and any relevant requirements of the EPP (Noise).

Comment must be provided on any current activities near the Proposal area that may cause a background level of ground vibration (for example: major roads, quarrying activities, etc.).

4.6.2 Potential Impacts and Mitigation Measures

This section defines and describes the objectives and practical measures for protecting or enhancing environmental values from impacts by noise and vibration, describes how nominated quantitative standards and indicators may be achieved for noise and vibration management, and how the achievement of the objectives will be monitored, audited and managed. The assessment of noise impacts must include matters raised in the document "The health effects of environmental noise – other than hearing loss published by the enHealth Council, 2004" (or later editions), ISNB 0 642 82304 9.

Information, including mapped noise contours from a suitable acoustic model, must be submitted based on the proposed generation of noise. The potential environmental harm of noise and vibration at all potentially sensitive places, in particular, any place of work or residence must be quantified in terms of objectives, standards and indicators to be achieved. Particular consideration must be given to emissions of low-frequency noise; that is, noise with components below 200Hz. The assessment must also include environmental impacts on terrestrial and aquatic animals and avifauna, particularly migratory species. Proposed measures for the minimisation or elimination of impacts must be provided, including details and illustrations of any screening, lining, enclosing or bunding. A discussion must be provided of timing schedules for construction and operations with respect to minimising environmental nuisance and harm from noise.

Assessment must be made of the potential impacts (including compliance with relevant legislation) of blasting required for construction of the dam wall or other infrastructure construction, including potential buffers to minimise or eliminate these effects.

The assessment must also address off-site noise and vibration impacts that could arise due to increased road or rail transportation directly resulting from the Proposal.

4.7 Nature Conservation

4.7.1 Sensitive Environmental Areas

4.7.1.1 Description of Environmental Values

This section describes the existing environment values for nature conservation that may be affected by the Proposal. Describe the environmental values of nature conservation for the affected area in terms of:

- integrity of ecological processes, including but not limited to habitats of rare and threatened species;
- conservation of resources;
- biological diversity, including but not limited to habitats of rare and threatened species;
- integrity of landscapes and places including, but not limited to wilderness and similar natural places; and
- aquatic and terrestrial ecosystems.

The flora and fauna communities which are rare or threatened, environmentally sensitive localities including waterways, riparian zone, and littoral zone, rainforest remnants, old growth indigenous forests, wilderness and

habitat corridors must be described. The description must include a plant species list, a vegetation map at appropriate scale and an assessment of the significance of native vegetation, from a local and regional and state perspective. The description must indicate any areas of state or regional significance identified in an approved biodiversity planning assessment (BPA) produced by the EPA (e.g. see the draft Regional Nature Conservation Strategy for SE Qld 2001-2006).

The description of environmental values must include areas within, and those linked by, the State Wildlife Corridor that would be intersected by the inundation area of the dam. The description should be to the extent necessary for the subsequent assessment of impacts on wildlife that uses the corridor.

The EIS must identify issues relevant to sensitive areas, or areas, which may have, low resilience to environmental change. The capacity of the environment to assimilate disturbances must be assessed and the Proposal proximity to any biologically sensitive areas must be described. Areas regarded as sensitive with respect to flora and fauna have one or more of the following features (and which must be identified, mapped, avoided or effects minimised):

- important habitats of species listed under the NC Act and/or EPBC Act as presumed extinct, endangered, vulnerable or rare;
- regional ecosystems listed as 'endangered' or 'of concern' or 'not of concern' under State legislation, and/or ecosystems listed as presumed extinct, endangered or vulnerable under the EPBC Act;
- good representative examples of remnant regional ecosystems or regional ecosystems which are poorly represented in protected areas;
- sites listed under international treaties such as Ramsar wetlands and World Heritage areas;
- sites containing near threatened or bio-regionally significant species or essential, viable habitat for near threatened or bio-regionally significant species;
- sites in, or adjacent to, areas containing important resting, feeding or breeding sites for migratory species of conservation concern listed under the Convention of Migratory Species of Wild Animals, and/or bilateral agreements between Australia and Japan (Japan-Australia Migratory Bird Agreement, JAMBA) and between Australia and China (China-Australia Migratory Bird Agreement, CAMBA);
- sites containing common species which represent a distributional limit and are of scientific value or which contains feeding, breeding, resting areas for populations of species of special cultural significance (e.g.. echidna, koala and platypus);
- sites containing high biodiversity that are of a suitable size or with connectivity to corridors/protected areas to ensure survival in the longer term; such land may contain:
    - natural vegetation in good condition or other habitat in good condition (e.g. wetlands); and/or
    - degraded vegetation or other habitats that still supports high levels of biodiversity or acts as an important corridor for maintaining high levels of biodiversity in the area;
- a site containing other special ecological values, for example, high habitat diversity and areas of high endemism;
- ecosystems which provide important ecological functions such as: wetlands of national, state and regional significance; riparian vegetation; important buffer to a protected area or important habitat corridor between areas;
- sites of palaeontologic significance such as fossil sites;
- sites of geomorphological significance, such as lava tubes or karst;
- protected areas which have been proclaimed under the NC Act or are under consideration for proclamation; and/ or
- areas of major interest, or critical habitat declared under the NC Act or high nature conservation value areas or areas vulnerable to land degradation under the VM Act.

Reference must be made to both State and Commonwealth endangered species legislation and the proximity of the area to any World Heritage property. The VM Act and the findings of any regional vegetation management plan must also be referenced.

Key flora and fauna indicators must be identified for future ongoing monitoring. Surveys of flora and fauna need to be conducted throughout the year to reflect seasonal variation in communities and to identify migratory species. Also provide a full description of the survey methodology, including locations of sampling points, survey techniques, and sampling regime.

4.7.1.2 Potential Impacts and Mitigation Measures

This section defines and describes the objectives and practical measures for protecting or enhancing nature

conservation values, describes how nominated quantitative standards and indicators may be achieved for nature conservation management, and how the achievement of the objectives will be monitored, audited and managed.

The EIS must address any actions of the Proposal or likely impacts that require an authority under the NC Act, and/or would be assessable development for the purposes of the VM Act.

The discussion must cover all likely direct and indirect environmental harm due to the Proposal on flora and fauna particularly sensitive areas. Terrestrial and aquatic (freshwater) environments must also be covered. Also include human impacts and the control of any domestic animals introduced to the area. Strategies for protecting World Heritage Property and any rare or threatened species must be described, and any obligations imposed by state or Commonwealth legislation or policy or international treaty obligations must be discussed.

Strategies for collecting and preserving any significant fossils must be described.

Short-term and long-term effects must be considered with comment on whether the impacts are reversible or irreversible. Management strategies for both terrestrial and aquatic flora and fauna must be discussed in the main body of the EIS and provided in a working form in a Management Plan as part of the overall EM Plan for the Proposal. The EIS must discuss the potential for the proposal to cause fragmentation of remnant ecological communities and mitigation measures to maintain connectivity between these communities.

This section must outline the significance of clearing each species listed under the NCA according to the impact on local, regional and State populations. The practicality of relocating each species should be discussed in the context of suitable habitat and soil profile requirements, using examples of relocation success elsewhere, where available. Provide a description of any proposed relocation site/s, including the rationale for choosing the preferred site/s. The proponent's commitment to ongoing management and maintenance of any relocated populations should be outlined. For those species unable to be practically relocated, provide information about alternative mitigation measures. Consideration should be given to collecting seed and regenerating the species elsewhere within suitable ecological communities, establishing voluntary nature conservation agreements with neighbouring landowners to secure regrowth areas and ensure regeneration to remnant status, or other measures to offset the loss of species and communities. The proposed role of the proponent in managing the offset areas should be clearly stated.

Provide a full description of options for compensatory habitat measures and offsets, particularly within the region. This should describe how any compensatory habitat package or offsets developed for loss of terrestrial and aquatic flora and fauna habitats because of the Proposal relates to the species, populations or communities affected; the rationale for the selection of the compensatory habitat and/or offset package over other options; and the overall environmental difference (net loss/gain) that will occur in the extent, quality, ecological integrity and security of environmental values in the area/region due to the environmental gains from these packages compared to the loss (both short and long term and whether the impacts are reversible or irreversible) of environmental values. Reference to the code requirements of the VM Act should be made where relevant. Any departure from no net loss of ecological values must be described.

Where offset measures are proposed to address an identified impact, include:

- a description and an assessment of the expected or predicted effectiveness of the mitigation measures, including the timing of measures;
- any statutory or policy basis for the mitigation measures;
- the cost of the mitigation measures;
- the name of the agency responsible for endorsing or approving each mitigation measure or monitoring program; and
- a consolidated list of mitigation measures proposed to be undertaken to prevent, minimise or compensate for the impacts of the action.

[An environmental management plan that sets out the framework for continuing management, mitigation and monitoring programs for the relevant impacts of the action and the establishment of the proposed offsets, including any provisions for independent environmental auditing must be detailed in section 5.]

Details of all relevant impacts of the Proposal on matters of national environmental significance must be discussed in appendix A3.

4.7.2 Terrestrial Flora and Fauna

4.7.2.1 Description of Environmental Values

Vegetation mapping must provide vegetation mapping for all relevant Proposal sites including inundation areas, downstream riparian vegetation, quarry material site/s, construction site/s, pump stations, pipeline corridors, easements and adjacent areas. The terrestrial vegetation communities within these affected areas must be described at an appropriate scale (i.e. 1:10,000) with mapping produced from aerial photographs and ground truthing, showing the following:

- location and extent of vegetation types using the EPA's regional ecosystem type descriptions in accordance with the Regional Ecosystem Description Database [REDD] available at the EPA's website;
- location of vegetation types of conservation significance based on EPA's regional ecosystem types and occurrence of species listed as protected plants under the Nature Conservation (Wildlife) Regulation 1994 and subsequent amendments, as well as areas subject to the VM Act;
- the current extent (bioregional and catchment) of protected vegetation types of conservation significance within the protected area estate (national parks, conservation parks, resource reserves, nature refuges);
- any plant communities of cultural, commercial or recreational significance must be identified; and
- location and abundance of any exotic or weed species.

Within each defined (standard system) vegetation community, a minimum of three sites (numbers must be discussed with the EPA) must be surveyed for plant species in both summer and winter as follows:

- site data must be recorded in a form compatible with the Queensland Herbarium CORVEG database.
- the minimum site size must be 10 by 50 metres;
- a complete list of species present at each site must be recorded;
- the relative abundance of plant species present must be recorded;
- any plant species of conservation, cultural, commercial or recreational significance must be identified; and
- specimens of species listed as protected plants under the Nature Conservation (Wildlife) Regulation 1994, other than common species, are to be submitted to the Queensland Herbarium for identification and entry into the HERBRECS database.

Sensitive or important vegetation types must be highlighted, including any riparian vegetation and natural grasslands, and their value as habitat for fauna and conservation of specific rare floral and faunal assemblages or community types. The existence of rare or threatened species must be specifically addressed. The surveys must include species structure, assemblage, diversity and abundance. The description must contain a review of published information regarding the assessment of the significance of the vegetation to conservation, recreation, scientific, educational and historical interests. Any special landscape values of any natural vegetation communities must also be described.

The location of any horticultural crops in the vicinity of the site must be shown.

The extent of occurrence of important local and regional pest plants (weeds), particularly declared plants under the *Land Protection (Land and Stock Route Management) Act 2002* must be shown on a map at an appropriate scale. A weed management strategy will be required.

Existing information on plant species may be used instead of new survey work provided that the data is derived from surveys consistent with the above methodology. Methodology used for flora surveys must be specified in the appendices to the EIS.

The terrestrial and riparian fauna occurring in the areas affected by the Proposal must be described, noting the broad distribution patterns in relation to vegetation, topography and substrate. The description of the fauna present or likely to be present in the area must include:

- species diversity (i.e. a species list) and abundance of animals, including amphibians, birds, reptiles, mammals and bats;
- any species that are poorly known but suspected of being rare or threatened;
- habitat requirements and sensitivity to changes; including movement corridors and barriers to movement;
- the location and estimated population of any rare, threatened or otherwise noteworthy species/communities in the study area, including discussion of range, habitat, breeding, recruitment,

feeding and movement requirements, and current level of protection (e.g. any requirements of protected area management plans);
- use of the area by migratory birds, nomadic birds, and other terrestrial fauna; and
- the location and estimated population of feral or pest animals.

The EIS must indicate how well any affected communities are represented and protected elsewhere in the province where the Proposal occurs.

4.7.2.2 Potential Impacts and Mitigation Measures

Describe the nature and extent of impacts to flora and fauna species that will result from direct disturbances to terrestrial habitats, including the clearing and inundation of vegetation communities associated with the dam and pipeline infrastructure construction and operation. Provide an assessment of the long-term impacts on these communities with particular emphasis on the disruption to wildlife movements between areas of known and or protected biological diversity.

The potential environmental harm to the ecological values of the area arising from the construction, and operation of the Proposal including clearing, salvaging or removal of vegetation must be described, and the indirect effects on remaining vegetation must be discussed. Proposals to minimise the impacts on vegetation must be described and must address the conservation, such as by relocation, of protected plants and retaining vegetation in the dam footprint until water levels warrant its removal. Provide an assessment of the impacts of placing the inundation area within the State Wildlife Corridor that links Girraween National Park with Sundown National Park to the south west and large areas of State Forest to the north west.

The potential environmental harm on flora and fauna due to any alterations to the local surface and ground water environment must be discussed with specific reference to environmental impacts on riparian vegetation or other sensitive vegetation communities. Measures to mitigate the environmental harm to habitat or the inhibition of normal movement, propagation or feeding patterns, and change to food chains must be described. Discuss the potential for fauna to be trapped in open trenches during construction of the pipeline and how this can be reduced.

The provision of buffer zones and movement corridors, and strategies to minimise environmental harm on migratory and nomadic animals must be discussed.

Weed management strategies are required for containing existing weed species (e.g.. parthenium and other declared plants) and ensuring no new declared plants are introduced to the area*, i*n accordance with the *Land and Protection (Pest and Stock Route Management) Act 2002* and relevant local plans and strategies*.* Pest animal management strategies and practices must also be addressed. The study must develop strategies to ensure that the Proposal does not contribute to increased encroachment of a feral animal species. Reference must be made to the local government authority's pest management plan when determining control strategies.

Rehabilitation of disturbed areas must incorporate, where appropriate, provision of nest hollows and ground litter.

4.7.3 Aquatic Flora and Fauna

4.7.3.1 Description of Environmental Values

If no recent biota surveys/studies have been conducted in and downstream of the Proposal area, the aquatic flora and fauna occurring in the areas affected by the Proposal must be described from studies undertaken, noting the patterns and distribution in the waterways and/or associated aquatic environments.

This section must provide a description of the habitats and flora compositions (using maps) potentially impacted by the Proposal, including distribution of pool and riffle formations; presence of snags, overhanging vegetation, aquatic macrophytes, sand and gravel bars; sediment type; river profile (bank width and depth). The description should include the habitat requirements and the sensitivity of aquatic flora species to changes in flow regime, water levels and water quality in the Proposal areas. The discussion of the flora present or likely to be present at any time during the year must include, but not be limited to, the following habitats:

- in-stream pools/runs;

- in-stream riffles/rapids;
- off-stream perennial pools (billabongs, ox-bow lakes etc); and
- off-stream ephemeral pools.

The aquatic vegetation in the area affected by the Proposal must be described, noting:

- the extent and location of rooted aquatic vegetation communities;
- the presence and current extent of free-floating aquatic vegetation;
- the presence of any rare, threatened or otherwise noteworthy aquatic species or communities downstream of the site of the Proposal or within watercourses which will be inundated;
- the presence of any introduced significant local and regional weed species ;and
- the significance of aquatic vegetation to native fauna.

A description of the habitat requirements and the sensitivity of aquatic flora species to changes in flow regime, water levels and water quality in the Proposal areas must be described. Special requirements of aquatic plant species or communities, including exotic species, related to management of the impoundment or flow regime downstream of the Proposal site must be discussed. A description of the known extent of introduced invasive species in the Severn River system must be presented. The impact of existing impoundments and downstream flow regime on the natural aquatic flora must be discussed. Reference should be made to relevant studies on the Severn River and other similar catchments to estimate the natural state.

The location of significant local and regional weed species in the vicinity of the Proposal site must be shown.

The extent of occurrence of rare or threatened species must be specifically addressed. The description should contain a review of published information regarding the assessment of the significance of the vegetation to conservation, recreation, scientific, educational and historical interests.

The aquatic fauna occurring in the areas affected by the Proposal must be described noting the patterns and distribution in the waterways. A description of the habitat requirements and the sensitivity of aquatic fauna species to changes in flow regime, water levels and water quality in the Proposal areas must be described. There must be a discussion of how well any affected communities are represented and protected elsewhere, the migratory patterns of aquatic fauna species in the study area. The assessment of the fauna present or likely to be present must include:

- diversity and abundance (where feasible and practicable) of animals, including fish, reptiles, aquatic mammals, macro invertebrates, and amphibians occurring in the waterways within the Proposal areas (movement requirements must be considered and their seasonal variations);
- any rare or threatened species and their habitat;
- habitat requirements and sensitivity to changes, including movement corridors and barriers to movement;
- a description of the conditions necessary for migration of potentially affected species including minimum flows, seasonal conditions, stream characteristics and migratory behaviour;
- a description of the capacity of artificial devices (e.g., fish ladders) to emulate natural conditions and support and sustain successful migration (this should include a review of the success of existing similar structures used elsewhere);
- commercial and recreational fish species which are present within the waterways; and
- introduced significant local and regional pest species.

4.7.3.2 Potential Impacts and Mitigation Measures

Provide an assessment of potential impacts on aquatic flora impacted by the Proposal including:

- changes to flow regime downstream based on the proposed flow regime and resultant changes to habitat (pools, riffles, bank stability, connections to wetlands, etc) and consequential floristic changes, including the effect of changes in salinity, sediment, nutrients, etc;
- effects of increased level in the impoundment and projected impacts of variations in the level of the impoundment on aquatic and riparian habitat (e.g. pools, riffles) and flora, particularly in creeks flowing into the impoundment;
- effects of changes to flow regimes on spawning and breeding of animals both within the inundation area and downstream, including the Sundown National Park;
- potential for regeneration around the Proposal;

- the importance of the habitat types at the Proposal site in the context of the river system and the proportion of comparable habitat elsewhere in the system;
- effect of floristic changes on the aquatic fauna habitat and food supply both within any impoundment and downstream to marine areas;
- the impact of proposed in-stream structures including water off takes, dam infrastructure, changed transport infrastructure and fish transfer devices;
- the potential for, and mitigation measures to prevent, the creation of new mosquito and biting midge breeding sites (including during construction e.g. in quarries and borrow pits);
- proposed stream diversions, causeway construction and crossing facilities, stockpiled material and other impediments that would restrict free movement of fish and measures to avoid impacts upon fish spawning periods;
- impacts of barriers to interbreeding opportunities between populations;
- an assessment of the potential for the incidence of blue-green algae outbreaks as a result of the Proposal must be detailed, along with potential mitigation and management measures;
- identification of the conservation importance of identified populations at the regional, state and national levels; and
- determination of the potential for the introduction of or facilitation of exotic, non-indigenous and noxious plants and animals.

This section must also assess the sensitivity of habitats and their species composition to all foreseen direct and indirect effects, including potential disturbances and changes resulting from the proposed works, e.g. changes in water quality and the potential changes to species populations including faunal species movement requirements (including any seasonal changes to those requirements). Specific attention should be given to rare or threatened species and strategies for protecting these species must be described, and any obligations imposed by State and Australian government threatened species legislation or policy must be discussed.

Impacts during construction and operation of the Proposal must be assessed in the context of both short and long term durations. Measures to mitigate the impact on habitat or the inhibition of normal movement, propagation or feeding patterns, and change to food chains must be described. Any provision for buffer zones and movement corridors, or special provisions for migratory, nomadic and aquatic animals must be discussed.

Consideration of the cumulative impacts from existing disturbances and the proposed disturbance to the aquatic ecosystem and the ability of the ecosystem to absorb the additional impact of the Proposal must be presented. Consideration of the cumulative impacts from targeted development arising from the provision of water through the Proposal on aquatic fauna, habitat and fisheries must be presented. Sufficient baseline data at the Proposal site and up and downstream of the site must be provided to determine changes.

4.8 Cultural Heritage

4.8.1 Description of Environmental Values

This section describes the existing cultural heritage values that may be affected by the Proposal. Describe the environmental values of the cultural landscapes of the affected area in terms of the physical and cultural integrity of the landforms.

A cultural heritage study will be required that will describe indigenous and non-indigenous cultural heritage sites and places, and their values. A permit to conduct the research and survey will be required under the provisions of the *Aboriginal Cultural Heritage Act 2003* and/or the *Queensland Heritage Act 1992*.

Any such study must be conducted by an appropriately qualified cultural heritage practitioner and must include the following:

- ***l***iaison with relevant indigenous community/communities concerning:
  - places of significance to that community (including archaeological sites, natural sites, story sites etc;
  - appropriate community involvement in field surveys;
- any requirements by communities and /or informants relating to confidentiality of site data must be highlighted. Non-indigenous communities may also have relevant information;
- a systematic survey of the proposed development area, including all associated infrastructure and easements to locate and record indigenous and non-indigenous cultural heritage places;
- significant assessment of any cultural heritage sites/places located;

- the impact of the proposed development on cultural heritage values; and
- a report of work done which includes background research, relevant environmental data and methodology, as well as results of field surveys, significance assessment and recommendations.

4.8.2 Potential Impacts and Mitigation Measures

This section defines and describes the objectives and practical measures for protecting or enhancing cultural heritage environmental values, describes how nominated quantitative standards and indicators may be achieved for cultural heritage management, and how the achievement of the objectives will be monitored, audited and managed.

The environmental harm to cultural heritage values in the vicinity of the Proposal must be managed under a cultural heritage management plan (CHMP) developed specifically for the Proposal. The CHMP will provide a process for the management of cultural heritage places both identified and sub-surface at the Proposal sites. It is usual practice for the CHMP to be based on information contained in archaeological and/or anthropological reports on the survey area and cultural reports and/or information from affiliated traditional owners. The CHMP must address and include the following:

- a process for including Aboriginal people associated with the development areas in protection and management of indigenous cultural heritage;
- processes for mitigation, management and protection of identified cultural heritage places and material in the Proposal areas, including associated infrastructure developments, both during the construction and operational phases of the Proposal;
- provisions for the management of the accidental discovery of cultural material, including burials;
- the monitoring of foundation excavations and other associated earthwork activities for possible sub-surface cultural material;
- cultural awareness training or programs for Proposal staff; and
- a conflict resolution process.

The development of the CHMP must be negotiated with the lead agency, the Department of Natural Resources and Water.

Any collection of artefact material as part of a mitigation strategy will need to be done by an appropriately qualified cultural heritage practitioner holding a permit under provisions of the *Aboriginal Cultural Heritage Act 2003*.

4.9 Transport

4.9.1 Transport Methods and Routes

Describe arrangements for the transport of plant, equipment, products, wastes and personnel during both the construction and operational phases of the Proposal. The description must address the use of existing facilities and all requirements for the construction, upgrading or relocation of any transport related infrastructure.

Information must be provided on road transportation requirements on public roads for both construction and operations phases, including:

- the volume, composition (types and quantities), origin and destination of goods to be moved including construction materials;
- the volume of traffic generated by workforce personnel, visitors and service vehicles;
- method of movement (including vehicle types and number of vehicles likely to be used);
- anticipated times at which movements may occur;
- details of vehicle traffic and transport of heavy and oversize indivisible loads (including types and composition); and
- the proposed transport routes.

4.9.2 Potential Impacts and Mitigation Measures

The EIS must provide sufficient information to make an independent assessment of how the state-controlled and local government road networks will be affected by the Proposal. Sufficient information must also be provided to enable an independent assessment of how the rail network (including infrastructure) will be affected. In both cases the impact on stakeholders along all transport routes must be detailed and how any impacts will be managed.

The EIS must include a detailed analysis of the impact of construction and operational traffic generated by the Proposal with particular concern for impacts on road infrastructure, road users and road safety.

The EIS must consider the potential impacts of haulage of construction inputs, such as pipe and other materials, on public roads and consider impact mitigation costs when choosing the mode of haulage (road vs. rail). If haulage is undertaken by road, impacts must be addressed in a Transport/Traffic Management Plan as part of the Environmental Management Plan.

The EIS must also assess potential impacts and propose mitigation measures, if necessary, for the following:

- road safety issues arising from any need for diversion of traffic during construction of the Proposal, especially laying pipeline in or near road reserves;
- need for increased road maintenance and upgrading; and
- environmental values of any new roads or road realignments not covered elsewhere in the EIS.

The EIS needs to identify impacts on the state-controlled and local government road networks and to indicate clearly the corrective measures necessary to address adverse road impacts and the costs involved. This will require the proponent to compare the traffic situation and road conditions with, and without, the Proposal. In assessing road impacts of the Proposal, the proponent should use the Department of Main Roads "Guidelines for Assessing Road Impacts of Development (2006)", which is available at www.mainroads.qld.gov.au > Inside Main Roads > Publications > Road Related.

Information about the impacts and proposed measures for dealing with those impacts must be prepared by the proponent in close consultation with the local district office of the Department of Main Roads.

The EIS must provide details of the impact of the Proposal on any current or proposed rail infrastructure.

Provide information on product spill contingency plans and the adequacy of equipment and facilities to deal with possible spills for the transport nodes of the Proposal. Indicate whether there is a need to update the plans based on increase in frequency of traffic and volumes to be transported.

Additional water transport issues that must be considered include the potential of the Proposal to impact on recreational craft in the river.

4.10 Social Environment

4.10.1 Description of Environmental Values

This section describes the existing social values that may be affected by the Proposal.

The social amenity and use of the Proposal area and adjacent areas for rural, agricultural, forestry, fishing, recreational, industrial, educational or residential purposes must be described. Consideration must be given to:

- community infrastructure and services, access and mobility;
- population and demographics of the affected community;
- local community values, vitality and lifestyles;
- recreational, cultural, leisure and sporting facilities and activities in relation to the affected area;

- health and educational facilities;
- on-farm activities near the proposed activities;
- number of properties directly affected by the Proposal; and
- number of families directly affected by the Proposal, this must include not only property owners but also families of workers either living on the property or workers where the property is their primary employment.

Describe the social values for the affected area in terms of the integrity of social conditions, including amenity and liveability, harmony and well being, sense of community, access to recreation, and access to social and community services and infrastructure.

Social, economic and cultural values are not as easily separated as physical and ecological values. Therefore it may be necessary for some material in this section to be cross-referenced with section 4.9 Cultural Heritage and section 4.11 Economy.

4.10.2 Potential Impacts and Mitigation Measures

This section defines and describes the objectives and practical measures for protecting or enhancing social values, describes how nominated quantitative standards and indicators may be achieved for social impacts management, and how the achievement of the objectives will be monitored, audited and managed.

The social impact assessment of the Proposal must consider the information gathered in the community consultation program and the analysis of the existing socio-economic environment, and describe the Proposal's impact, both beneficial and adverse, on the local community. The impacts of the Proposal on local and regional residents, community services and recreational activities are to be analysed and discussed for all stages of the development. The nature and extent of the community consultation program are to be described and a summary of the results incorporated in the EIS.

The social impact assessment must include sufficient data to enable state authorities, such as Queensland Health and Education Queensland, to plan for the continuing provision of public services in the region of the Proposal. Proponents of proposals that are likely to result in a significant increase in population of an area must consult the relevant management units of the state authorities, and summarise the results of the consultations in the EIS. The summary must discuss how the impacts of population increase on public services, particularly health and education, would be mitigated.

The social impact assessment of the Proposal is to be carried out in consultation with the Department of Communities. The assessment of impacts must describe the likely response of affected communities and identify possible beneficial and adverse impacts (both immediate and cumulative). These impacts must be considered both at the regional and local level.

Taking into account the relevant demographic, social, cultural and economic profiles, provide an assessment of impacts on:

- local residents, current land uses and existing lifestyles and enterprises, including land acquisition and relocation issues and property valuation and marketability, community services and recreational activities;
- local and state labour markets, with regard to the source of the workforce. This information is to be presented according to occupational groupings of the workforce. In relation to the source of the workforce, information is required as to whether the proponent, and/or contractors, is likely to employ locally or through other means and whether there are initiatives for local employment opportunities;
- construction and operational workforces and associated contractors on housing demand, community services and community cohesion. The capability of the existing housing stock, including rental accommodation, to meet any additional demands created by the Proposal is to be discussed;
- any new skills and training to be introduced in relation to the Proposal. Adequate provision must be made for apprenticeship and worker training schemes. If possible, the occupational skill groups required and potential skill shortages anticipated must be indicated; and
- service revenue and work from the Proposal (e.g. provisioning, catering and site maintenance) would be likely to flow to existing communities in the area of the Proposal, particularly if a fly-in, fly-out workforce is proposed.

Discuss the potential environmental harm on the amenity of adjacent areas used for cropping, grazing, forestry, recreation, industry, education, aesthetics, or scientific or residential purposes. Describe the implications of the

Proposal for future developments in the local area including constraints on surrounding land uses.

The educational impacts of the proposed development are to be analysed and described, particularly in regard to:

- primary, secondary and tertiary educational sectors;
- improved appreciation of conservation areas; and
- environmental education for the general public.

For identified impacts to social values, suggest mitigation and enhancement strategies and facilitate initial negotiations towards acceptance of these strategies. Practical monitoring regimes must also be recommended.

4.11 Economic Environment

4.11.1 Description of Environmental Values

This section describes the existing economic environment that may be affected by the Proposal. The character and basis of the local and regional economies must be described including:

- economic viability (including economic base and economic activity, future economic opportunities, current local and regional economic trends, in particular drought and rural downturn etc);
- current property values; and
- historical descriptions of large-scale developments and their effects in the region.

The economic impact statement must include estimates of the opportunity cost of the Proposal and the value of ecosystem services provided by natural or modified ecosystems to be disturbed or removed during development.

4.11.2 Potential Impacts and Mitigation Measures

The function of this section is to define and describe the objectives and practical measures for protecting or enhancing economic values, to describe how nominated quantitative standards and indicators may be achieved for economic management, and how the achievement of the objectives will be monitored, audited and managed.

An economic analysis, including a cost-benefit analysis, must be presented from national, state, regional and local perspectives as appropriate to the scale of the Proposal. The general economic benefits from the Proposal must be described.

At a level of detail appropriate to the scale of the Proposal, the analysis is to consider:

- the significance of this Proposal on the local and regional economic context;
- the long and short-term beneficial (e.g.. job creation) and adverse (e.g.. competition with local small business) impacts that are likely to result from the development;
- the potential, if any, for direct equity investment in the Proposal by local businesses or communities;
- the cost to all levels of government of any additional infrastructure provision;
- implications for future development in the locality (including constraints on surrounding land uses and existing industry);
- the economic impacts of the Proposal on individuals, businesses, industries or communities, including proposed measures to mitigate any negative impact. Particular attention should be given to the extent and economic importance of any primary industries that occur within the area directly affected by the Proposal and identify any sites that may be impacted upon by the Proposal. This description should include the local and regional industrial water users, their current average volume requirements for water the use and purpose of the water used;
- the potential economic impact of any major hazard identified in section 4.13;
- the distributional effects of the Proposal including proposals to mitigate any negative impact on disadvantaged groups;
- the value of lost opportunities or gained opportunities for other economic activities anticipated in the future; and
- impacts on local property values.

Consideration of the impacts of the Proposal in relation to energy self-sufficiency, security of supply and balance of payments benefits may be discussed. Attention must be directed to the long and short-term effects of the Proposal on the land-use of the surrounding area and existing industries, regional income and employment and the state economy. The scope of any studies must be referred to the government for input before undertaking the studies.

For identified impacts to economic values, suggest mitigation and enhancement strategies and facilitate initial negotiations towards acceptance of these strategies. Practical monitoring regimes must also be recommended.

4.12 Hazard and Risk

4.12.1 Hazard and Risk Assessment

This section describes the potential hazards and risk that may be associated with the Proposal.

An analysis is to be conducted into the potential impacts of both natural and induced emergency situations and counter disaster and rescue procedures as a result of the Proposal on sensitive areas and resources such as forests, water reserves, State and local Government controlled roads, places of residence and work, and recreational areas.

A preliminary risk assessment for all components of the Proposal (dam wall, quarries, clearing, downstream flooding) shall be undertaken as part of the EIS process in accordance with appropriate parts of AS/NZS Risk Management Standard 4360:1999.

This section defines and describes the objectives and practical measures for protecting people and places from hazards and risk, describes how nominated quantitative standards and indicators may be achieved for hazard and risk management, and how the achievement of the objectives will be monitored, audited and managed.

Detail the environmental values likely to be affected by any hazardous materials and actions incorporated in the Proposal. The degree and sensitivity of risk must be detailed.

4.12.2 Risk Management Plans

The proponent must develop an integrated risk management plan for the whole of the life of the Proposal including construction and operation phases. The plan must include a preliminary hazard analysis (PHA), conducted in accordance with appropriate guidelines for hazard analysis (e.g. HAZOP Guidelines, NSW Department of Urban Affairs and Planning (DUAP)). The assessment must outline the implications for and the impact on the surrounding land uses, and must involve consultation with Department of Emergency Services, Queensland Fire and Rescue Authority, and Queensland Ambulance Service. The preliminary hazard analysis must incorporate:

- all relevant majors hazards both technological and natural;
- the possible frequency of potential hazards, accidents, spillages and abnormal events occurring;
- indication of cumulative risk levels to surrounding land uses;
- life of any identified hazards;
- description of processes, type of the machinery and equipment used;
- potential wildlife hazards such as crocodiles, snakes, and disease vectors; and
- public liability of the State for private infrastructure and visitors on public land.

The plan must include the following components:

- operational hazard analysis;
- regular hazard audits;
- fire safety, emergency;
- response plans;
- qualitative risk assessment; and
- construction safety.

Where relevant, each of these components must be prepared in accordance with the relevant NSW DUAP

Hazardous Industry Planning Advisory Paper (HIPAP).

4.13 Cumulative Impacts

The purpose of this section is to provide clear and concise information on the overall impacts of the Proposal, and to discuss the interrelationship of these impacts. This is in addition to the discussion of cumulative impacts which feature in the relevant sections. The cumulative impacts as they relate to particular issues (e.g. air, water, cultural heritage, social, noise) may also be discussed in this section. These impacts must be considered over time or in combination with other impacts because of the scale, intensity, duration or frequency of the impacts. In particular, the requirements of any relevant State Planning Policies, EPPs, National Environmental Protection Measures and any relevant Integrated Catchment Management Plans must be addressed.

The methodology to be used to determine the cumulative impacts of the Proposal must be discussed. The methodology must detail the scope or range of variables to be considered including, where applicable, relevant baseline or other criteria upon which the incremental aspects of the Proposal must be assessed.

4.14 Cross-Reference with the Terms of Reference

This section provides a cross reference of the findings of the relevant sections of the EIS, where the potential impacts and mitigation measures associated with the Proposal are described, with the corresponding sections of the ToR.

5 Environmental Management Plan

The environmental management plan (EM Plan) must be developed from the mitigation measures detailed in part 4 of the EIS. Its purpose is to set out the proponents' commitments to environmental management that is, how environmental values will be protected and enhanced.

The EM Plan is an integral part of the EIS, but must be capable of being read as a stand-alone document without reference to other parts of the EIS. The general contents of the EM Plan must comprise:

- the proponents' commitments to acceptable levels of environmental performance, including environmental objectives, i.e. levels of expected environmental harm, performance standards and associated measurable indicators, performance monitoring and reporting;
- impact prevention or mitigation actions to implement the commitments;
- corrective actions to rectify any deviation from performance standards; and
- the description of and timeframes for implementation of compensatory habitat measures and offsets developed for loss of flora and fauna habitats.

Through the EM Plan, the EIS's commitments to environmental performance can be used as regulatory controls through conditions to comply with those commitments. Therefore, the EM Plan is a relevant document for Proposal approvals, environmental authorities and permits, and may be referenced by them.

For further information, see the EPA guideline "Preparing Environmental Management Plans".

6 References

All references consulted must be presented in the EIS in a recognised format.

7 Recommended Appendices

A1. Final Terms of Reference for this EIS

A copy of the final ToR must be included in the EIS. Where it is intended to bind appendices in a separate volume from the main body of the EIS, the ToR at least must be bound with the main body of the EIS for ease of cross-referencing. A summary, cross-referencing specific items of the ToR to the relevant section of the EIS, must also be provided in section 4.14 of the EIS. For this purpose the ToR must be line numbered.

A2. Development Approvals

A list of all the approvals (including local law approvals) required by all phases of the Project must be presented (in the expected sequencing of applications) along with their corresponding regulating legislation and the approving authority.

A3. Potential Impacts on Matters of National Environmental Significance

The EIS must provide a stand-alone report that exclusively and fully addresses the issues relevant to the matters of national environmental significance (NES) that were identified in the 'controlling provisions' when the Proposal was declared a controlled action under Part 3, Division 1 of the EPBC Act.

Listed threatened species and communities that may be impacted by the proposed development include (and any additional threatened species listed under the EPBC Act and not listed below which may be impacted by the Proposal):

- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland *(*Critically Endangered);
- *Acacia pubifolia (*vulnerable*);*
- *Babingtonia granitica* (vulnerable)*;*
- *Boronia granitica* (endangered*);*
- *Cadellia pentastylis* (vulnerable*);*
- *Callistemon pungens (*vulnerable*);*
- *Digitaria porrecta* (endangered)*;*
- *Goodenia macbarronii* (vulnerable)*;*
- *Homoranthus montanus* (vulnerable)*;*
- Squatter Pigeon *(Geophaps scripta scripta*) – vulnerable;
- Swift Parrot (*Lathamus discolor*) – endangered;
- Black-throated Finch (*Poephila cincta cincta)* – endangered;
- Regent Honeyeater (*Xanthomyza phrygia*) – endangered;
- Spotted-tail Quoll (*Dasyurus maculatus maculatus*) – endangered; and
- Brush-tailed Rock-wallaby (*Petrogale penicillata*) – vulnerable.

The stand-alone report must follow the following template outline.

i) Introduction

ii) Description of Proposed Action (as it would impact on NES matters)

iii) Description of the Affected Environment Relevant to the Controlling Provisions (i.e. describe the features of the environment that are NES matters protected under the EPBC Act)

iv) Assessment of Impacts on NES Matters and Mitigation Measures

v) Conclusions

vi) References

The description and analysis of the potential impacts of the Proposal must address all aspects of the Proposal. All discussion of the potential impacts of the Proposal must address both potential direct and indirect impacts. The stand-alone report must discuss the presence and environmental requirements of any species of flora or fauna or ecological community, listed as threatened under the EPBC Act, potentially impacted by the proposed development.

A4. Study Team

The qualifications and experience of the study team and specialist sub-consultants and expert reviewers must be provided.

A5. Consultation Report

The summary Consultation Report appendix for an EIS under the SDPWO Act must commence by including the details of affected and interested persons, and the statement of planned consultation with those persons, originally provided with the ToR for an EIS. It must describe how 'interested' and 'affected persons,' and any 'affected parties' as defined in the EPBC Act, were identified.

A further list must be provided that includes the Australian, State and local government agencies consulted, and the individuals and groups of stakeholders consulted.

The Consultation Report appendix must summarise the results of the community consultation program, providing a summary of the groups and individuals consulted, the issues raised, and the means by which the issues were addressed. The discussion must include the methodology used in the community consultation program including criteria for identifying stakeholders and the communication methods used.

A6. Specialist Studies

All reports generated on specialist studies undertaken as part of the EIS are to be included as appendices. These may include:

- geology;
- soil survey and land suitability studies;
- waterway and groundwater hydrology;
- land use and capability studies;
- flora and fauna studies;
- economic and social studies, cost-benefit analyses;
- transport and traffic studies; and
- hazard and risk studies.

A7. Research

Any proposals for researching alternative environmental management strategies or for obtaining any further necessary information must be outlined in an appendix.

A8. List of Proponent Commitments

A list of all commitments made by the proponent in the EIS (in addition to the performance criteria stipulated in the EM Plan) must be provided along with a reference to the relevant section in the EIS.

ToR Section	ToR Requirement	EIS Section
1	**Introduction**	
	The introduction should:	
	■ explain why the EIS has been prepared and what it sets out to achieve;	1.4
	■ address the level of detail of information required to meet the level of approval being sought;	1.8, 1.2
	■ define the audience to whom it is directed;	1.6
	■ contain an overview of the structure of the document; and	1.5
	■ throughout the EIS, factual information contained in the document must be referenced	All sections
1.1	**Proposal Proponent**	
	The introduction should:	
	■ provide details of the Proposal proponent, including details of any joint venture partners, relevant experience and extent of business activities.	1.3
	■ provide details of any proceedings or other actions under a law of the Commonwealth or a State for the protection of the environment or the conservation and sustainable use of natural resources (an environmental law) against: - the proponent; and - the applicant(s) for any permit under an environmental law for the Proposal.	1.3
	■ Provide details of the proponent's environmental policy and planning framework.	5.2.3
1.2	**Proposal Description**	
	The introduction should:	
	■ provide a brief description and illustrations of the key elements of the Proposal;	1.1
	■ provide a summary of any major associated infrastructure requirements;	1.1
	■ provide a detailed description of the Proposal in Section 3; and	3
	■ provide a brief description of studies or surveys that have been undertaken for the purposes of developing the Proposal and preparing the EIS, including relevant baseline studies or investigations undertaken previously.	3.1.1.1
1.3	**Proposal Objectives and Scope**	
	The introduction should:	
	■ include a statement of the objectives which have led to the development of the Proposal;	1.2
	■ provide a brief outline of the events leading up to the Proposal's formulation, including alternatives, envisaged time scale for implementation and Proposal life, anticipated establishment costs and actions already undertaken within the Proposal area;	2.1, 2.4
	■ describe the current status of the Proposal;	1.8.3
	■ outline the relationship of the Proposal to other developments or actions that may relate whether or not they have been approved; and	1.9
	■ discuss the consequences of not proceeding with the Proposal.	2..3.1.1

ToR Section	ToR Requirement	EIS Section
1.4	**The Environmental Impact Statement (EIS) Process**	
	This section should make clear the methodology and objectives of the environmental impact statement under the relevant legislation.	1.4
1.4.1	**Methodology of the EIS**	
	The introduction should:	
	■ provide a description of the EIS process steps, timing and decisions to be made for relevant stages of the Proposal;	1.4
	■ indicate how the consultation process (which will be described in detail in Section 1.5) would integrate with the other components of the impact assessment, including the stages, timing and mechanisms for public input and participation;	1.6.4
	■ provide the relevant information to ensure: - relevant legislation is addressed; - readers are informed of the process to be followed; and - stakeholders are aware of any opportunities for input and participation.	1.8 1.4 1.6.4
1.4.2	**Objectives of the EIS**	
	This section should: ■ provide a succinct statement of the EIS objectives;	1.5
	■ outline the structure of the EIS as an explanation of how the EIS will meet its objectives;	1.5
	■ address all relevant matters concerning environmental values, impacts on those values and proposed mitigation measures;	1.5
	■ discuss the role of the EIS in providing the Proposal's draft EM Plan, with particular reference to the EM Plan's role in providing management measures that can be carried over into conditions that would attach to any approval(s), environmental authorities and permits for the Proposal.	1.5
1.4.3	**Submissions**	
	This section should include how and when public submissions on the EIS will be addressed and taken into account in the decision-making process.	1.4, 1.6.4
1.5	**Public Consultation**	
	This section should: ■ develop an appropriate consultation plan;	1.6, Appendix D
	■ outline the methodology that will be adopted to identify and mitigate socio-economic impacts of the Proposal;	1.6, Appendix D
	■ Provide information about the consultation that has already taken place and the results of such consultation;	1.6, Appendix D
	■ identify legislation, policies and methodologies relevant to the EIS process, and to determine appropriate parts of the community which should be consulted during the EIS preparation stage;	1.8, Appendix D
	■ provide opportunities for community involvement and education as part of the public consultation program. The program may include interviews with individuals, information sessions, key stakeholder briefings, interest group meetings, production of regular summary information and updates, and other consultation mechanisms to encourage and facilitate active public consultation; and	1.6, Appendix D
	■ the public consultation process should identify broad issues of concern to local community and interest groups and should continue from	1.6, Appendix D

ToR Section	ToR Requirement	EIS Section
	project planning through construction, ongoing operation and maintenance. Refer to the EPA guideline *"Issue Identification and Community Consultation".*	
1.6	**Proposal Approvals**	
1.6.1	**Relevant Legislation and Policy Requirements**	
	This section should: ■ explain the legislation and policies controlling the approvals process including but not limited to SDPWO Act, EP Act, IP Act, and other relevant Queensland laws;	1.8.2
	■ demonstrate that the Proposal is consistent with the *Water Resources (Border Rivers) Plan 2003,* and any subsequent amendments, including that all environmental flow objectives and water allocation security objectives would be met;	1.7.1
	■ include any requirements of the Australian EPBC Act must also be included;	1.8.1
	■ describe the local government planning controls, local laws and policies applying to the development, and a list provided of the approvals required for the Proposal and the expected program for approval of applications; This information is required to assess how the legislation applies to the Proposal, which agencies have jurisdiction, and whether the proposed impact assessment process is appropriate.	1.7.3, Appendix B
1.6.2	**Planning Processes and Standards**	
	This section should: ■ discuss the Proposal's consistency with existing land uses or long-term policy framework for the area (e.g. as reflected in local and regional plans);	5.2.3.1
	■ discuss the Proposal's consistency with legislation, standards, codes or guidelines available to monitor and control operations on site;	1.7,1.8
	■ refer to all relevant state and regional planning policies; and	1.8.2
	■ describe any implications to the Proposal that arise from the Queensland Government ceding their rights over management of the Murray-Darling River system to the Australian government. This information is required to demonstrate how the Proposal conforms to state, regional and local plans for the area.	1.9.3
1.7	**Accredited Processes for Controlled Actions under Australian Legislation**	
	The Proposal is a controlled action under the Commonwealth's EPBC Act and the Commonwealth has accredited the State's EIS process for the purposes of the Commonwealth's assessment under Part 8 of that Act. The EIS must provide a stand-alone report as an appendix to the EIS that exclusively and fully addresses the potential impacts on the matters of National Environmental Significance that were identified in the 'controlling provisions' when the Proposal was declared a controlled action. These are also noted in the Preface of these ToR. Further guidance on the content of this stand alone report is provided at Appendix A3 of these ToR.	Appendix C
2	**Proposal Need and Alternatives**	
2.1	**Proposal Justification**	
	This section should:	

ToR Section	ToR Requirement	EIS Section
	■ describe the justification for the Proposal, with particular reference made to the economic viability and social benefits, including employment and spin-off business development, which the Proposal may provide;	2
	■ discuss the status of the proposal in a regional, state and national context; and	1.9
	■ discuss the implications of climate change on the Proposal's environmental economic, social feasibility and viability.	11.6
2.2	**Alternatives to the Proposal**	
	This section should: ■ describe all alternatives that have been considered, including conceptual, technological and locality alternatives to the Proposal;	2.3
	■ discuss the consequences of not proceeding with the Proposal;	2.3
	■ discuss the alternatives in sufficient detail to enable an understanding of the reasons for preferring certain options and courses of action and rejecting others;	2.3
	■ describe the process and criteria used for the selection of the specific water storage and infrastructure sites and design;	2.3
	■ provide reasons for selecting the preferred option(s) must include technical, commercial, social and natural environment aspects;	2.3
	The alternatives considered must include: ■ demand reduction techniques;	2.3.2.1, 2.3.2.1
	■ options for potable water supply only;	2.3
	■ other dam locations and pipeline routes, and associated infrastructure, in particular, discussion of practicable alternatives to the Proposal must include:	2.3.1.7
	- alternative locations considered, aided by maps and diagrams. The location options highlighting the preferred location for each component of the Proposal must be shown on topographical maps at a suitable scale;	
	- a summary of the approval process for the alternative options if those options are subject to different approval processes than the preferred option;	2.3.1.7
	- the rationale for selection of the preferred location and reasons other options were rejected.	2.3.1.7
	- alternative water storages eg residential rainwater tanks;	2.3
	- a detailed comparative analysis of environmental impacts during construction and post construction, describing the extent and composition of the regional ecosystems affected, either directly or indirectly.	2.3
	This section must summarise for each alternative: - the full extent of land that is required or would be directly impacted (e.g. inundated lands);	2.3
	- comparative environmental impacts;	2.3
	- the economic costs and benefits to industry and the wider community, including directly affected enterprises;	2.3
	- the regional social impacts including community disruption, related land use changes, employment, skills development and any workforce accommodation issues.	2.3

ToR Section	ToR Requirement	EIS Section
3	**Description of the Proposal**	
3.1	**Overview of the Proposal**	
	This section should: ■ provide an overview of the Proposal to put the Proposal into context;	3.1
	■ provide a description of the key components of the Proposal through the use of text and design plans where applicable; the expected cost and overall duration and timing of the Proposal; and the employment benefits from the construction and operational phases of the Proposal; and	3.1
	■ provide a summary of any environmental design features of the Proposal.	3.1
3.1.1	**Dam**	
	This section should provide details on aspects of the dam components of the Proposal including: ■ proposed dam type;	3.1.1.1
	■ maximum (final) crest height and spillway height;	3.1.1.1
	■ length and width of crest;	3.1.1.1
	■ extent of excavations for footings and wall construction;	Figure 3-2
	■ estimated headwater/tailwater difference at different flows (e.g. 75%, 50% 25%);	7.1
	■ dam capacity, average depth and maximum depth;	3.1.1.1
	■ inundation areas (and depth) for a range of water levels (including plan with tenure details and current land use) and the frequency of those inundation levels;	Figure 3-3/ 7.1.2.6, 7.2.2.6
	■ estimated water yields (with appropriate allowances for environmental requirements);	3.1.1
	■ general design of outlet works including capacity and offtake level(s);	3.1.1.1
	■ any dissipaters at the downstream foot of the barrier;	3.1.1.1
	■ any additional water impoundment or control structures that may be constructed as part of the overall Proposal;	n/a
	■ the design and effectiveness of any proposed fishway or other fish transfer mechanisms, drawing on examples used on other dams or similar proposals; and	3.1.1.2
	■ the extent of the buffer zone, including any non-irrigation buffer zone around the inundation area.	3.1.1
3.1.2	**Pipeline and Associated Infrastructure**	
	This section should provide details on the following aspects of the pipeline and associated infrastructure (e.g. pump stations and balancing storage) components of the Proposal, including any pipelines and infrastructure associated with delivery of water for irrigation purposes and secondary distribution pipeline infrastructure: ■ a map of the preferred route using cadastral and topographical maps at an appropriate scale;	Figure 3-5
	■ design parameters covering pipe grade, diameter(s), wall thickness, length, capacity, test and operating pressures, depth of cover of the pipe, cathodic protection, coating and design life;	3.1.2, 3.1.3,

ToR Section	ToR Requirement	EIS Section
	■ criteria for pipeline burial depth and above ground construction, along with pipeline orientation/location within any State-controlled or local government road reserves;	3.1.2, 3.1.3
	■ above ground facilities – physical dimensions and construction materials for surface facilities along the pipeline route including information on pipeline markers;	3.1.2, 3.1.3
	■ details of criteria to assess the minimum depth the pipeline is to be buried under creeks, rivers and ephemeral water ways, in particular any proposed river crossings taking into account Q100 flood events;	7.1.3.4, 7.2.3.4
	■ with the aid of maps and diagrams, the location and/or frequency of cathodic protection points, off-take valves, pump stations, balance tanks, control valves (isolation points), pigging facilities (if applicable) and any other Proposal facilities and linkages to existing water supply infrastructure;	Figure 3-5
	■ criteria for design and location of any temporary or permanent access crossing for machinery, transport etc across any waterway (e.g. construction of causeways, bridges, culvert crossings etc) and any permanent access points or roads for maintenance purposes, in particular where they are adjacent to waterways. Describe the nature of any permanent access points;	7.1.2.1, 7.1.3.1
	■ easement widths and access requirements along the route, including the use of existing areas of disturbance for pipeline access and future maintenance; and	5.3.2
	■ the expected use of existing water storage and distribution infrastructure.	3.4.2
3.1.3	**Water Demand**	
	This section should provide details on aspects of the water demand associated with the Proposal including: ■ required annual urban and irrigation water volumes to meet supply needs;	2.2
	■ water reliability/security requirements;	2.2
	■ proposed water-use efficiency initiatives (e.g.. urban demand management, irrigation efficiency);	2.3.1.2
	■ peak load water demands;	2.1.1
	■ timing of irrigation water requirements;	7.1.3.6
	■ any other factors which may have a bearing on irrigation water demands, such as groundwater recharge considerations and other catchment water demands (where appropriate); and	2.2.2
	■ the expected location for the demand of both urban and agricultural water and the proportion of demand upstream as well as downstream.	5.3.3
3.1.4	**Decommissioning**	
	This section should: ■ present the strategies and methods for final closure, decommissioning, and rehabilitation of all Proposal elements;	3.4.5
	■ describe, in terms of the removal of plant, equipment, structures and buildings, the decommissioning of the Proposal and the methods proposed for the stabilisation of the affected areas should be given;	3.4.5
	■ discuss the final rehabilitation of the Proposal sites in terms of ongoing land use suitability, and any land management issues;	
	■ provide details on the strategic approach to progressive and final rehabilitation, with a view to minimising the amount of land disturbed at any one time and any proposed disturbance to waterways and associated fisheries resources.	3.2.1

ToR Section	ToR Requirement	EIS Section
	■ outline rehabilitation success criteria for the decommissioning of the pipeline at the end of operational life. ■ Pipeline decommissioning should be informed by appropriate Australian Standard (AS 2885.3) and the Australian Pipeline Industry Association Code of Environmental Practice	3.4.5
3.2	**Ecologically Sustainable Development**	
	This section should: ■ provide a comparative analysis of how the Proposal conforms to the objectives for "ecological sustainable development" (see the National Strategy for ESD (1992) available from the Australian Government Publishing Service);	3.5
	■ consider the cumulative impacts (both beneficial and adverse) of the Proposal from a life-of-project perspective, taking into consideration the scale, intensity, duration or frequency of the impacts to demonstrate a balance between environmental integrity, social development and economic development; This information is required to demonstrate that sustainable development aspects have been considered and incorporated during the scoping and planning of the Proposal.	5.3.3
3.3	**Location**	
	This section should: ■ describe the regional and local context of the Proposal;	
	■ illustrate the regional and local context of the Proposal on maps at suitable scales;	Figure 1-1
	■ provide real property descriptions of the Proposal site; and	5.3.1
	■ describe the method by which ownership, control or owners' consent is to be acquired for each real property description (tenure).	5.3.1
	Maps should show the precise location of the Proposal area, and in particular:	
	- the location and boundaries of land tenures, in place or proposed, to which the Proposal area is or will be subject;	Figure 5-3/ 5-4
	- configurations and boundaries of land resumptions;	Figure 5-3/ 5-4
	- the location and boundaries of the Proposal footprint; and	Figure 5-3/ 5-4
	- the location of any proposed buffers surrounding the working areas (for construction) and around the expected full supply level (FSL) of the storage.	Figure 5.3/ 5-4
	These features should be overlain on a rectified air photo enlargement to illustrate components of the Proposal in relation to the natural and built features of the area.	Figure 3-1
3.4	**Construction**	
	This section should: ■ describe the extent and nature of the Proposal's construction phase (as well as any works required off-site enabling construction to commence, e.g. road upgrades), including a map at reasonable scale that shows the footprint of the dam and construction works;	3.2
	■ describe the the type and methods of construction, the construction equipment to be used;	3.2
	■ describe the items to be transported onto the construction site including the quarry sites from which any gravel/rock is extracted;	3.2

ToR Section	ToR Requirement	EIS Section
	■ describe any staging of the Proposal, including illustrations showing site boundaries, development sequencing and timeframes;	3.2
	■ provide the estimated numbers of people to be employed in the construction phase, and a brief description of where those people may be accommodated and/or how they will be transported to the site;	3.4.4
	■ provide a summary of the results of studies and surveys undertaken to identify the natural resources required to implement the Proposal; and	3.2.4
	■ describe the location, volume, tonnage and quality of natural resources required (e.g. land, water, forests, energy, etc.).	3.2.4
3.4.1	**Dam**	
	■ This section should provide a description of construction activities relating to the Proposal including:	
	- site access;	Figure 3-2
	- upgrading of roads, railways and other infrastructure;	3.4
	- clearing; and	3.2.1.1
	- establishment requirements for construction facilities;	3.2.1.1
	■ construction requirements including source and extraction of construction materials;	3.2.4.1
	- details of the method of construction of the dam walls and volumes of material required;	3.2.1.1
	- any staging of construction activities;	3.1.1.1
	- construction, realignment and/or upgrading of roads;	3.2.1.3
	- works needed within the impoundment including tree clearing (by manual methods and by inundation), blasting, excavation, dredging and transport infrastructure works; and	3.2.1.1
	- works downstream including erosion protection;	3.2.1.1
	■ type, source, quantity and method of transport of construction materials;	3.2.4.1
	■ general construction standards and site management including environmental and safety management;	18.3, 19.3.15
	■ timetable for construction (particularly noting seasonal rainfall or flows);	3.2.2
	■ details of any potential disruption to flows in the waterway during construction and any diversion works required;	3.2.5
	■ relocation of existing infrastructure;	13.2.3
	■ construction of additional infrastructure required for operation;	3.4
	■ the hours of operation;	3.2.5
	■ emergency aid/medical facilities to be provided on site;	18.5.2
	■ the construction methods and containment/disposal of construction spoil;	17.2.5
	■ solid and liquid waste handling;	17.2.5
	■ machinery access/storage areas; and	3.2.1.1, Figure 3.6

ToR Section	ToR Requirement	EIS Section
	■ the number and type of vehicles, machinery and equipment used for excavation, construction and operation.	3.2.3.1
3.4.2	**Pipeline and Associated Infrastructure**	
	This section should provide a description of construction activities relating to both the urban supply pipeline and its associated infrastructure (e.g. pump stations) and the pipeline/s and infrastructure associated with delivery of water for irrigation purposes including: ■ a map showing location of any works;	Figure 3.5
	■ on-site plans, layouts, boundaries and elevations;	Figure 3.5
	■ detailed concept and staging (if any proposed) for additional pump stations facilities and locations;	Figure 3.5
	■ plant and machinery likely to be involved;	3.2.3.2
	■ supply and storage of materials – volume, composition, handling and storage during construction;	3.2.4.2
	■ anticipated timing, duration and progress of pipe laying;	3.2.2
	■ possible interruption of pipeline laying to other land activities, e.g. interruption to road and or rail traffic, or the relocation of existing infrastructure;	13.2.3
	■ extent that service corridors will be used during construction and maintenance;	3.2.1.2, 3.2.1.3
	■ width of vegetation clearing required. This information must indicate where vegetation to be cleared has significant conservation value (such as sensitive environmental areas and creek crossings), and must also reference where in the EIS the impacts on such vegetation have been addressed;	3.2.1.2, 3.2.1.3
	■ depth of trenching and burial of the pipeline; bedding materials (if any) including compaction techniques on the pipeline trench and in particular adjacent to and within waterways, to achieve bank stability;	3.2.1.2, 3.2.1.3
	■ an assessment of expected physical and chemical properties and quantities of soil/rock to be excavated;	4.3.1.2
	■ procedures for trench construction and pipe-laying if rock is encountered, in particular whether ripping rock or blasting may be required and the necessary procedures especially in proximity to habitation and existing infrastructure and compliance with all relevant design and construction codes;	3.2.1.2, 3.2.1.3
	■ typical crossing techniques including restoration works that would be used at creek crossings, and road, rail, and other service corridor crossings. Detail whether the flow of water will need to be altered within and/or diverted out of any waterway during pipeline construction. Where in-stream infrastructure is in place, identify the practicality of attaching the pipeline to these structures;	7.1.2.4, 7.1.3.4
	■ management of weed seed spread including quarantine areas and wash-down facilities and the dispersal/destruction of weed seeds and contaminated vegetative matter;	19.3.10, 17.3.2
	■ disposal of plant-matter left after clearing vegetation;	19.3.7, 17.3.2
	■ details of the anticipated hydrostatic testing procedures (discussion of water usage for this activity must be addressed in section 3.6);	n/a
	■ testing the pipeline's integrity, including cathodic protection requirements, launcher and receiving scraper station and hydrostatic testing are to be outlined;	3.3.1
	■ cleanup and restoration (rehabilitation) of areas used during construction including camp sites and storage areas; and	3.4.5
	■ disposal/reuse of surplus excavated material and if this material can be coordinated with concurrent construction activities in the vicinity.	17.3.2

ToR Section	ToR Requirement	EIS Section
3.5	**Operations**	
3.5.1	**Dam**	
	This section should: ■ provide a description of the proposed on-going management of the dam, inundation area and buffer zone including:	3.3.1, 3.3.2
	■ arrangements for operation of the works, including:	
	- flow releases, such as compensation, fishway, environmental, irrigation etc, including timing, volume, duration and downstream extent of releases;	3.3, 7.1.2.7, 7.1.3.7
	- operation of gates (if relevant);	n/a
	- the anticipated pattern of inundation;	7.1.2.6, 7.1.3.6
	- operation of outlet works, including details of operation and administration;	3.3
	- proposals for remote operation; and	3.3.1, 3.3.2
	- proposed staffing arrangements;	3.4.4
	■ how existing seasonal flows will be managed, drawing on baseline or predictive studies, at all stages of the Proposal;	7.1.2.6, 7.1.3.6, 3.2.2
	■ water treatment arrangements for provision for urban supply requirements, including	
	- a description of treatment facilities, associated infrastructure, and treatment methods; and	3.4.2
	- a describe the integration of operations within the catchment;	3.4.2
	■ details of the minimum operating level and likely extraction regime, e.g. when water will be sourced and expected demands versus yield, including likely release timings;	7..1.2.6, 7.1.3.6
	- proposed access points associated with the increased storage;	Figure 3.2
	- infrastructure for recreational purposes; and	3.1.1.4
	- proposed operation of the fishway and/or other fish transfer mechanisms.	3.3.1
	■ describe the proposed system of allocation of water from the Proposal and any proposed high priority allocations to specific urban, rural or industrial users.	5.3.3
3.5.2	**Pipeline and Associated Infrastructure**	
	This section should: ■ detail the urban and irrigation pipeline and associated infrastructure operation and maintenance requirements including inspection and surveillance activities and frequency, the impact on waterways as a result of operation and maintenance activities and safety procedures;	3.3.1
	■ provide details on the operational requirements of the pump stations and balance tanks, including:	
	- management arrangements, including the administration and control of the facility;	3.3

ToR Section	ToR Requirement	EIS Section
	- chemicals and hazardous goods to be utilised;	n/a
	- security, public safety and emergency procedures, including ventilation;	18.7
	- power back-up in emergency and potential impact on local supplies in the area; and	n/a
	- appropriate sound-proofing.	12.5.2
	■ describe the location and design of any new water distribution infrastructure (e.g. pump stations, canals, pipelines etc.), as well as the expected use of any such existing infrastructure; and	Figure 3.5
	■ describe the capacity of any existing water infrastructure to accept additional loadings resulting from any new or increased allocations of water.	3.4.2
3.6	**Infrastructure Requirements**	
	This section should: ■ provide descriptions (with concept and layout plans) of requirements for constructing, upgrading or relocating all infrastructure in the vicinity of the Proposal area; and ■ discuss infrastructure matters such as roads, rail, bridges, tracks and pathways, bore fields, power lines and other cables, wireless technology (e.g. microwave telecommunications), and pipelines for any services (whether underground or above).	13.2.3
3.6.1	**Transport**	
	This section should provide a brief overview of transport requirements for the Proposal. Full details of transport volumes, modes and routes must be provided in accordance with Section 4.9 Transport and Access Arrangements.	3.2.5
3.6.2	**Water Supply and Storage**	
	This section should: ■ critically determine the water resource requirements of the Proposal including the quality and quantity of all water supplied to the site;	3.2.4
	■ describe the proposed and optional sources of water supply(e.g. bores, any surface storages such as dams and weirs, municipal water supply pipelines);	2.3
	■ give estimated rates of supply from each source (average and maximum rates);	2.3
	■ describe any proposed water conservation and management measures;	3.2.5
	■ evaluate factors such as potential on-farm efficiencies, water conservation and re-use strategies;	2.3.1.2, 2.3.2.1
	■ determine the potable water demand for the Proposal, including the temporary demands during the construction period	3.2.4
	■ provide details of any existing town water supply to meet such requirements; and	3.2.5
	■ describe, if relevant, the proposed onsite water storage and treatment process, for use by the site workforce.	3.2.5
3.6.3	**Stormwater Drainage**	
	This section must describe the proposed stormwater drainage system for all components of the Proposal and the proposed disposal arrangements, including any off-site services.	7.2.6

ToR Section	ToR Requirement	EIS Section
3.6.4	**Sewerage**	
	This section should: ■ describe, in general terms, the sewerage infrastructure required by the Proposal; and	3.4.3
	■ assess the capacity of the existing system to accept the effluent, if it is intended that industrial effluent or relatively large amounts of domestic effluent are to be discharged into an existing sewerage system.	n/a
3.6.5	**Water Distribution and Existing Systems**	
	This section should: ■ describe, in general terms, the expected scope of the potential water distribution and treatment systems to be used to distribute water from the proposed Proposal, to provide an understanding of generally how water from the Proposal will be distributed; and	3.1.2, 3.1.3
	■ identify which of these systems are to be assessed under separate processes, and not form part of this EIS process.	1.2
3.6.6	**Energy**	
	This section should: ■ describe all energy requirements, including electricity, natural gas, and/or solid and liquid fuel requirements for the construction and operation of the Proposal;	11.5.3, 11.5.4
	■ locate any easements on the infrastructure plan; and	13.2.2.4
	■ describe energy conservation in the context of any Australian, state and local government policies.	11.5.1
3.6.7	**Telecommunications**	
	This section should: ■ describe any impacts on existing telecommunications infrastructure (such as optical cables, microwave towers, etc.); and	13.2.3
	■ identify the owners of that infrastructure.	13.2.2
3.6.8	**Workforce and Accommodation**	
	This section should: ■ describe the number of personnel to be employed, the skills' base of the required workforce and the likely sources (i.e. local, regional or overseas) for the workforce during the construction and operational phases for each aspect of the Proposal;	3.4.4
	■ provide the estimated number of people to be employed during construction and operations and arrangements for their transport to and from the project areas, including the proposed use of regional or charter air services;	3.4.4
	■ provide estimates according to occupational groupings and variations in the workforce numbers over the duration of the Proposal (e.g. histogram);	3.4.4
	■ show anticipated peaks in worker numbers during the construction period;	15.3.2.1
	■ provide an outline of recruitment schedules and policies for recruitment of workers (addressing recruitment of local and non-local workers);	15.3.2.1
	■ provide an accommodation strategy for the construction workforce that addresses the estimated housing needs of both single and	15.3.1.2

ToR Section	ToR Requirement	EIS Section
	accompanied construction workers, including details of the size, location and management of any temporary worker accommodation that will be required either on-site or off-site;	
	■ include maps as necessary to illustrate the site and should include the location of any proposed construction workers' accommodation on-site or in the vicinity of the Proposal;	Figure 3-6
	■ include details of the operational workforce and how such accommodation is proposed to be supplied.	15.3.1.2
	■ if camp sites are to be used to accommodate the workforce, provide details on the number, location (shown on a map), proximity to the construction site and typical facilities for these sites;	n/a
	■ include data relating to facilities for:	n/a
	- food preparation and storage;	n/a
	- ablution facilities;	n/a
	- vector and vermin control;	n/a
	- fire safety;	n/a
	- dust and noise control in relation to proximity of camp site to the construction area; and	n/a
	- the service personnel required to maintain the camp and the supply of services to each construction camp.	n/a
	■ outline local government approvals required for establishment and operation of such camps.	n/a
3.6.9	**Other Infrastructure**	
	This section should provide a description of any other developments directly related to the Proposal not described in other sections, such as fuel storage areas, equipment hardstand and maintenance areas and technical workshops and laboratories.	
3.6.10	**Rehabilitation**	
	This section should: ■ describe the options, strategies and methods for progressive and final rehabilitation of the environment disturbed by the Proposal;	3.2.1
	■ describe the strategic approach to progressive and final rehabilitation of the construction site;	3.2.1
	■ develop a preferred rehabilitation strategy with a view to minimising the amount of land disturbed at any one time;	3.2.1
	■ show the final topography of any excavations, waste areas and temporary dam sites on maps at a suitable scale;	
	■ provide any proposals to divert waterways during construction, and, if applicable, proposals for the reinstatement of the waterways after construction has ceased;	3.2.5
	■ describe topsoil management strategies, considering suitability, erosion and dispersion potential, transport, storage and replacement of topsoil to disturbed areas; and	4.3.1, 4.3.2.1
	■ provide details of a weed management program for rehabilitated and disturbed areas covering a minimum period of two years following completion of construction.	

ToR Section	ToR Requirement	EIS Section
3.6.11	**Decommissioning**	
	This section should address the practicality of decommissioning and potential decommissioning options of the dam and associated infrastructure at a strategic level to provide an understanding of potential impacts and possible mitigation measures associated with this possible future phase.	3.4.5
4	**Environmental Values and Management of Impacts**	
4.1	**Land**	
	This section should describe the existing environment values for all land areas that may be affected by the Proposal, including areas affected by the pipeline route and any new permanent or temporary facilities constructed for the pipeline and associated dam and pipeline infrastructure.	Figure 1.1
4.1.1	**Topography and Geomorphology**	
4.1.1.1	**Description of Environmental Values**	
	This section should: ■ provide maps locating the Proposal in both regional and local contexts;	1.1
	■ detail the topography of the proposed dam site with contours at suitable increments (at one metre contours for the dam construction site), shown with respect to Australian Height Datum (AHD) and in relation to the FSL and buffer zone for the storage;	4.1.1, 4.4.1, Figure 4.1
	■ include maps which depict the significant features of the locality, which should be accompanied by appropriate commentary describing the significant topographical features. Such features would include any locations subsequently referred to in the EIS (e.g. the nearest noise sensitive locations) that are not included on other maps in section 4.1; and	4.1.1, 4.4.1, Figure 4.1
	■ detail the topography surrounding the Proposal at 1m increments with levels shown with respect to AHD features for watercourse crossings.	4.1.1, 4.4.1
4.1.1.2	**Potential Impacts and Mitigation Measures**	
	This section should: ■ discuss the Proposal in the context of major topographic features and any measures taken to avoid or minimise impact to such (if required);	4.1.2, 4.4.2
	■ address in detail the potential for the Proposal to adversely impact on the stability of landforms within the impoundment area, infrastructure areas and adjacent lands. This must include the stability and potential for erosion of periodically inundated land below FSL and the buffer zone and adjacent catchment areas.	4.1.2, 4.4.2,4.3.2
	■ address the stability and potential for erosion of the watercourse and associated riparian zone downstream of the Proposal, including changes to sediment delivery, transport and deposition; and	4.1.2, 4.4.2,4.3.2
	■ describe the proposed re-contouring and landscaping objectives of the Proposal.	4.1.2, 4.4.2
4.1.2	**Geology and Soils**	
4.1.2.1	**Description of the Environmental Values**	
	The EIS should: ■ provide a description, map at a suitable scale and a series of cross-sections of the geology of the Proposal dam site area, with particular reference to the physical and chemical properties of surface and sub-surface materials and geological structures within the proposed areas of	4.2.1, 4.3.1, Figures 4.2,4.3

ToR Section	ToR Requirement	EIS Section
	disturbance;	
	■ describe the geological properties that may influence ground stability (including seismic activity, if relevant), occupational health and safety, rehabilitation programs, or the quality of wastewater leaving any area disturbed by the Proposal;	4.2.1.2, 4.2.1.3
	■ in locations where the age and type of geology is such that significant fossil specimens (such as of dinosaurs or their tracks) may be uncovered during construction, address the potential for significant finds;	4.2.1.5
	■ map soil profiles at a suitable scale with particular reference to the physical and chemical properties of the soils which would influence erosion potential, dam and storm water run-off quality, rehabilitation and agricultural productivity of the land, including lands within the buffer zone and below the FSL of the dam that may be periodically exposed;	4.2.1, 4.3.1
	■ provide information on soil stability and suitability for construction of Proposal facilities an appraisal of the depth and quality of useable soil must be undertaken;	4.2.1, 4.3.1
	■ describe soils according to the Australian soil and land survey field handbook (McDonald et al, 1990) and Australian soil classification (Isbell, 1996);	4.2.1, 4.3.1
	■ present information according to the standards required in the Planning Guidelines: Identification of Good Quality Agricultural Land (GQAL) (DPI, DHLGP, 1993), and the State Planning Policy 1/92: Development and the Conservation of Agricultural Land;	5.2.4
	■ clearly indicate the area of GQAL that will be inundated, and give an assessment of the potential for land use conflict with GQAL is required with investigations following the procedures set out in the planning guidelines referred to above;	5.2.4
	■ provide soil descriptions which include horizon differentiation and depths, field texture, colour, mottles, drainage, permeability and water holding capacity characteristics, soil structure, erosion hazard rating, pH and electrical conductivity;	4.2.1, 4.3.1
	■ accurately present the location of each borehole. Boreholes must equitably represent the different soil types present;	4.2.1, 4.3.1, Figure 4.5
	■ identify any highly erodible soils, sodic soils, saline sites and sites which are particularly susceptible to becoming saline (including downstream of the Proposal, where applicable);	4.2.1, 4.3.1
	■ provide information on soil stability and suitability to construction of all facilities and infrastructure. The investigation area must include all areas potentially affected by the Proposal including the buffer zone and associated infrastructure corridors.	4.2.1, 4.3.1
4.1.2.2	**Potential Impacts and Mitigation Measures**	
	This section should: ■ consider, if geological conditions are conducive, the possibility that significant fossil specimens (such as of dinosaurs or their tracks) may be uncovered during construction/operations and propose strategies for protecting the specimens and alerting the Queensland Museum to the find;	4.3.2, 4.3.3,4.2.1.5
	■ describe, for all permanent and temporary landforms, possible erosion rates and management techniques;	4.3.2, 4.3.3
	■ for each soil type identified, outline the erosion potential (wind and water) and erosion management techniques;	4.3.2
	■ outline an erosion-monitoring program, including rehabilitation measures for erosion problems identified during monitoring;	4.3.2
	■ develop mitigation strategies to minimise soil loss rates, levels of sediment in rainfall runoff and wind-generated dust concentrations;	4.3.2
	■ include an assessment of likely erosion effects, especially those resulting from the removal of vegetation, both on-site and off-site for all disturbed areas such as:	4.3.2

ToR Section	ToR Requirement	EIS Section
	- the dam site, including buildings;	4.3.2.1
	- along the pipeline route;	4.3.2.2
	- access roads or other transport corridors;	4.3.2.1, 4.3.2.2
	- any waste dumps; and	4.3.2.1, 4.3.2.2
	- dams, banks and creek crossings.	4.3.2.1, 4.3.2.2
	■ specify the methods proposed to prevent or control erosion. These must be developed with regard to preventing soil loss in order to maintain land capability/suitability and preventing significant degradation of local waterways by suspended solids;	4.3.3, 4.3.2
	■ discuss the options for mitigation and the effectiveness of mitigation measures with particular reference to sediment, acidity, salinity, sodicity and other emissions of a hazardous or toxic nature to the river systems;	4.3.3
	■ describe the procedure for topsoil management, considering transport, storage and replacement of topsoil to disturbed areas; and	4.3.3
	■ address the minimisation of topsoil storage times (to reduce fertility degradation).	4.3.3
4.1.3	**Land Contamination**	
4.1.3.1	**Description of Environmental Values**	
	This section should: ■ evaluate areas of potential contamination within the inundation area and buffer zones, including but not limited to, Notifiable Activities as listed in Schedule 2 of the EP Act, historic mine sites etc;	6.1
	■ identify potentially contaminated sites. A preliminary site investigation must be conducted, on the basis that the scope of any preliminary site investigation should be consistent with the assessed level of risk at each site;	6.1
	■ summarise the results of any preliminary site investigations undertaken in the EIS and provide them in detail in an appendix.	n/a
	The EIS should: ■ map any areas listed on the Environmental Management Register or Contaminated Land Register under the EP Act;	Figure 6.1
	■ identify any potentially contaminated sites not on the registers which may need remediation; and	6.1
	■ describe the nature and extent of contamination at each site and a remediation plan and validation sampling.	6.1
4.1.3.2	**Potential Impacts and Mitigation Measures**	
	This section should provide details of any potential impacts from land contamination and proposed mitigation measures. Specifically, this section should: ■ describe the nature and extent of existing or potential contamination at each site and a strategy for further investigation, remediation and validation sampling, if required;	6.2
	■ detail any potential risks to occupational or human health, as a result of any residual contamination levels, to any of the proposed uses of the dam, including recreational, agricultural or human consumption, including potential impacts on water quality;	6.2
	■ address the means of preventing land contamination (within the meaning of the EP Act);	6.2

ToR Section	ToR Requirement	EIS Section
	■ outline methods proposed for preventing, recording, containing and remediating any contaminated land; and	6.2
	■ state intentions concerning the classification (in terms of the Environmental Management Register and the Contaminated Land Register) of land contamination on the land after completion of construction of the Project.	6.2
	The EIS must: ■ describe the possible contamination of land from aspects of the Proposal including waste, reject product, acid generation from exposed sulfidic material and spills at chemical and fuel storage areas;	6.2
	■ address the means of preventing land contamination (within the meaning of the EP Act);	6.2
	■ outline the methods proposed for preventing, recording, containing and remediating any contaminated land;	6.2
	■ state intentions concerning the classification (in terms of the CLR) of land contamination on the land, processing plant site and product storage areas after Proposal completion; and	6.2
	■ address the management of any existing or potentially contaminated land in addition to preventing and managing land contamination resulting from Proposal activities.	6.2
4.1.4	**Land Use and Infrastructure**	
4.1.4.1	**Description of Environmental Values**	
	The EIS must: ■ provide a description of current land tenures and land uses, including native title issues, in the Proposal area, with particular mention of land with special purposes;	5.2.1, 5.2.2
	■ depict the location and owner/custodians of native title in the area and details of native title claims;	5.2.2
	■ provide maps at suitable scales showing existing land uses and tenures, and the Proposal location, for the entire Proposal area and surrounding land that could be affected by the development;	5.2.1, 5.2.2
	■ identify on the maps areas of conservation value in any locality that may be impacted by the Proposal;	
	■ identify and map the location of all existing dwellings, significant structures and the zoning of all affected lands according to the existing (and draft where applicable) local government town planning schemes and strategic plans;	5.2.1, 5..3
	■ describe the land use suitability of the affected area in terms of the physical and economic attributes;	5.2.4
	■ set out soil and landform subclasses assigned to soil mapping units in order to derive land suitability classes;	5.2.4
	■ detail the nature of rural enterprises and the agricultural value of lands affected by the Proposal;	5.2.1, 5.2.4
	■ provide a land suitability map of the proposed and adjacent area, and setting out land suitability and current land uses, e.g. for grazing of native and improved pastures and horticulture;	5.2.1, 5.2.4
	■ show on maps of a suitable scale the location and owner/custodians of all infrastructure tenures including reserves, roads and road reserves, railways and rail reserves and stock routes, covering the affected land;	5.2.2
	■ indicate locations of gas and water pipelines, power lines and any other easements; and	13.2.2
	■ describe the environmental values affected by this infrastructure.	13.2.3

ToR Section	ToR Requirement	EIS Section
4.1.4.2	**Potential Impacts and Mitigations**	
	The Proposal must: ■ be discussed in the context of major topographic features (including influences on stream configuration) and any measures taken to avoid or minimise impact to such;	4.2.1.2
	■ detail the potential for the construction and operation of the Proposal to change existing and potential land uses of the Proposal site and adjacent and downstream areas;	5.3.1
	■ detail post operations land use options including suitability of the area within the FSL and adjacent area (including buffer zone) to be used for agriculture or nature conservation;	5.3.1
	■ describe the factors favouring or limiting the establishment of those options in the context of land use suitability prior to the Proposal and minimising potential liabilities for long-term management;	5.3.1
	■ describe the following:	
	- management of the immediate environs of the Proposal including the buffer zones and/or restrictions on livestock access;	5.3.1
	- individual properties and businesses affected by the Proposal – area and type of land inundated, property facilities affected, access changes to and within the property;	5.3.1
	- the land acquisition strategy resulting from investigations into the land acquisition for the inundated areas;	5.3.1
	- possible effect on town planning objectives and controls, including council zoning and strategic plans;	5.3.1, 5.3.3
	- opportunities for redevelopment around the inundation zone for a range of residential, recreational and other development types;	5.3.1
	- constraints to potential developments and possibilities of rezoning upstream of the inundation zone;	5.3.1
	- possible impacts on, or sterilisation of, identified mineral or energy resources and extractive industry deposits, the amount of sterilisation (if any) of the deposits resulting from the construction and/or operation of the Proposal;	n/a (from Wyaralong)
	- identification of any millable timber or quarry resources within the Proposal area and an assessment of the commercial value of these resources to satisfy the requirements of the Department of Natural Resources and Water;	n/a
	- discussion of potential issues involved in proximity and/or co-location of other infrastructure services, and/or the separation requirements of the dam, including electric power transmission lines and electrified rail lines, or where construction and maintenance machinery is used in the vicinity of other infrastructure corridors;	13.2.4
	- identification of any land units requiring specific management measures;	5.3
	- description of possible impacts on surrounding land uses and human activities, including impacts to GQAL and forestry land (addressing loss of access to land, fragmentation of sites, increase of fire risk and loss of productive land for those purposes) as well as residential and industrial uses, and strategies for minimisation; and	5.3.1
	- proposed measures to minimise impact on GQAL.	5.3.1
	■ provide an assessment of:	
	- the suitability of the pipeline route for co-location of other infrastructure services;	3.1.2, 3.1.3
	- identification of how easement widths and vegetation clearance in sensitive environmental areas have been minimised;	
	- the suitability of any pipeline alignment and the cost of alternatives in terms of corridors preserved by the Department of Main Roads for	3.4

ToR Section	ToR Requirement	EIS Section
	future transport needs;	
	- the potential issues involved in proximity of the water pipeline to electric transmission lines and electrified rail lines, both at crossing points, where lines run parallel, and where construction and maintenance machinery is used in the vicinity of other infrastructure corridors;	3.4
	- discussion of the Proposal construction impacts on continued access to all parts of the properties fringing the Proposal, the effect on property management for stock, cropping and weed control, and the likely impacts on existing road networks (both farm and gazetted roads), including an assessment of any adverse/beneficial impacts on present or potential land use at FSL;	5.3.1
	- discussion of the potential impact on upstream and downstream land uses (including conservation estates) from additional water made available as a consequence of the Proposal; and	5.3.1
	- an assessment of the potential impacts of the Proposal on existing and potential irrigated agriculture and/or industrial developments and the possible conflict between these and other existing land uses.	5.3.3
	■ describe the connection between water quality needs in the proposed storage and post development land use options including suitability of agricultural practices in the catchment of the impoundment;	7.2.4
	■ specifically indicate the restrictions that may be imposed on current land use practices and the method/s for regulating these; and	5.3.1
	■ identify incompatible land uses, whether existing or potential, adjacent to all aspects of the Proposal, including essential and proposed ancillary developments or activities and areas directly or indirectly affected by the construction and operation of these activities and measures to avoid and/or minimise impacts defined.	5.3.1
4.1.5	**Landscape Character and Visual Amenity**	
4.1.5.1	**Description of Environmental Values**	
	This section should: ■ describe the existing character of the landscape that will be affected by the Proposal in general terms;	16.1.2
	■ provide details on any changes that have already been made to the natural landscape since European settlement;	16.1.1.1
	■ provide a detailed description of the existing landscape features, panoramas and views that have, or could be expected to have, value to the community whether of local, regional, state-wide, national or international significance;	16.1.1.2/16.1.1.3
	■ use information in the form of maps, sections, elevations and photographs, particularly where addressing the following issues:	
	- identification of elements within the Proposal and surrounding area that contribute to their image of the town/city as discussed in the any local government strategic plan - city image and townscape objectives and associated maps;	16.1.1, 16.1.2
	- major views, view sheds, existing viewing outlooks, ridgelines and other features contributing to the amenity of the area, including assessment from private residences in the affected area;	16.1.3.3/16.1.3.4
	- focal points, landmarks (built form or topography), gateways associated with Proposal site and immediate surrounding areas, waterways, and other features contributing to the visual quality of the area and the Proposal site;	16.1.2/16.1.1.2
	- character of the local and surrounding areas including character of built form (scale, form, materials and colours) and vegetation (natural and cultural vegetation) directional signage and land use;	16.1.1.3
	- identification of the areas of the Proposal that have the capacity to absorb land use changes without detriment to the existing visual quality and landscape character; and	16.1.4
	■ the value of existing vegetation as a visual screen.	16.1.4

ToR Section	ToR Requirement	EIS Section
4.1.5.2	**Potential Impacts and Mitigations**	
	This section must: ■ analyse and discuss the visual impact of the Proposal on particular panoramas and outlooks, in terms of the extent and significance of the changed skyline as viewed from places of residence, work, and recreation, from road, cycle and walkways, from the air and other known vantage points day and night, during all stages of the Proposal as it relates to the surrounding landscape;	16.1.3.4, 16.2.5
	■ address the visual impacts of the Proposal structures and associated infrastructure, using appropriate simulation;	16.1.3.4, 16.2.5
	■ use sketches, diagrams, computer imaging and photos where possible to portray the near views and far views of the completed structures and their surroundings from visually sensitive locations;	16.1.3.4, 16.2.5
	■ give special consideration is to be given to public roads, public thoroughfares, and places of residence or work, which are within the line-of-sight of the Proposal;	16.1.3.4, 16.2.5
	■ develop a strategy with a view to minimising the amount of land disturbed at any one time;	3.2.1
	■ describe the methods to be used for the Proposal, including re-contouring, topsoil handling and revegetation;	16.2.1
	■ give consideration to the use of threatened plant species during any landscaping and revegetation;	9
	■ where the dam, roads and other infrastructure are to be constructed, give proposals for the management of these structures after the completion of the Proposal;	3.3
	■ provide a contour map of the area (if relevant);	Figure 4-1
	■ describe the final drainage and seepage control systems and any long-term monitoring plans;	n/a
	■ describe the potential impacts of the Proposal on the landscape character of the site and the surrounding area;	16.2.6
	■ make particular mention of any changes to the broad-scale topography and vegetation character of the area, such as due to spoil dumps, excavated voids and broad-scale clearing;	4.1.2
	■ provide detail of all management options to be implemented and how these will mitigate or avoid the identified impacts on the landscape and visual amenity of the affected areas.	16.2.7
	■ provide methods for management of the lighting of the Proposal, during all stages, with particular reference to objectives to be achieved and management methods to be implemented to mitigate or avoid:	16.2.7
	■ the visual impact at night;	16.2.1
	■ night operations/maintenance and effects of lighting on fauna and residents;	16.2.5
	■ the potential impact of increased vehicular traffic; and	18.2, 18.3
	■ changed habitat conditions for nocturnal fauna and associated impacts.	9.5.3
4.2	**Climate**	
	This section must: ■ describe the rainfall patterns (including magnitude and seasonal variability of rainfall), air temperatures, humidity, wind (direction and speed) and any other special factors (e.g. temperature inversions) that may affect air quality within the region of the Proposal;	7.1.2.1, 11.3.2

ToR Section	ToR Requirement	EIS Section
	■ provide an assessment of historic rainfall patterns including geographic distribution within the catchment;	Figure 7-6, 7.1.2.2
	■ discuss extremes of climate (droughts, floods, cyclones, etc) with particular reference to water management at the Proposal site;	7.1.3.2, 7.1.2.2
	■ address the vulnerability of the area to natural or induced hazards, such as floods and bushfires;	7.1.3.3, 7.1.2.2
	■ consider the relative frequency, magnitude and risk of these events;	7.1.2.2
	■ address the potential impacts due to climatic factors in the relevant sections of the EIS;	7.1.1
	■ address the impacts of rainfall on soil erosion in section 4.1;	4.3.2
	■ address the impacts of storm events on the capacity of waste containment systems (e.g. site bunding/stormwater management and tailings dams) in section 4.3 with regard to contamination of waterways and in section 4.4 with regard to the design of waste containment systems; and	7.2.6
	■ address the impacts of wind, rain, humidity and temperature inversions on air quality in section 4.5.	11.4.1
4.3	**Water Resources**	
4.3.1	**Surface Waterways**	
4.3.1.1	**Description of Environmental Values**	
	This section must: ■ describe the existing environment for water resources that may be affected by the Proposal in the context of environmental values as defined in such documents as the EP Act, Environmental Protection (Water) Policy 1997 (EPP (Water)), ANZECC 2000 and the South East Queensland Water Quality Management Strategy;	7.1.1
	■ address impacts on benthic sediments as well as the water column;	10.5.2.1
	■ where a licence or permit will be required under the *Water Act 2000* to take or interfere with the flow of water, this section of the EIS must provide sufficient information for a decision to be made on the application.	1.8.2
	■ similarly, if waterway barrier works need approval under the *Fisheries Act 1994*, this must be addressed;	1.8.2
	■ describe the surface waterways and their quality and quantity in the area affected by the Proposal with an outline of the significance of these waters to the river catchment system in which they occur. The description must include historical and existing quantitative hydrological data and details of existing regulatory structures and other barriers up and downstream of the Proposal site. Details provided must include a description of existing surface drainage patterns, and flows in major streams and wetlands;	7.1.1, 7.2.4
	■ provide details of the likelihood of flooding, history of flooding including extent, levels and frequency, and a description of present and potential water uses downstream of the areas affected by the Proposal. Flood studies must include a range of annual exceedence probabilities for affected waterways, where data permits.	7.1.2.3, 7.1.3.3
	■ provide a description, with photographic evidence, of the geomorphic condition of any watercourses likely to be affected by disturbance or stream diversion. The results of this description must form the basis for the planning and subsequent monitoring of rehabilitation of the watercourses during or after the operation of the Proposal;	4.4.1
	■ include details of the stream bed morphology at the downstream foot of the dam to assess the effect on the passage of fish;	10.5.2.2
	■ provide an assessment of existing water quality in surface waters and wetlands likely to be affected by the Proposal. The basis for this assessment must be a monitoring program, with sampling stations located upstream and downstream of the Proposal;	7.2.4

ToR Section	ToR Requirement	EIS Section
	■ provide a detailed description of the monitoring program, including locations of sampling points, sampling regime, and other elements of the sampling/monitoring design. Complementary stream-flow data may also be obtained from historical records (if available) to aid in interpretation;	7.2.4
	■ describe the water quality, including seasonal variations or variations with flow where applicable.	7.2.4
	■ measure a relevant range of physical, chemical and biological parameters to gauge the environmental harm on any affected creek or wetland system;	7.2.4
	■ describe the watercourses to be crossed by the pipeline showing planned crossing locations on a map and any other waterways or water features, including drainage channels, gullies, flood-prone or low lying land on or adjacent to the Proposal site;	7.1.3.4
	■ provide a discussion of alternative crossing locations in environmentally sensitive areas;	7.1.3.4
	■ describe the environmental values of the surface waterways of the affected area in terms of:	
	- values identified in the EPP (Water);	7.2.2.2
	- sustainability, including both quality and quantity;	7.2.1
	- physical integrity, fluvial processes and morphology of watercourses, including riparian zone vegetation and form;	10.4.1
	- hydrology of floodplains, waterways and groundwater;	7.1.1, 8.2
	- the current operation of any water storage and distribution system on the Severn River, including yield, operating strategy, supply reliability, allocation and use of water supplies;	7.1.2
	- any water resource plans, resource operation plan,land and water management plans relevant to the affected catchment;	7.1.2.4
	- the historical (without current storages in the Severn River catchment) and current flow characteristics including seasonal flow patterns, flow volumes and duration both upstream and downstream of the proposed dam site;	7.1.2
	- the changes in the parameters from pre-regulation (if applicable) to current and proposed post-Proposal conditions, and the corresponding changes that may be anticipated in:	10.5.2.1, 10.5.2.2
	- in-stream and connected wetland morphology and ecology; and	10.5.2.1
	- sediment/nutrient/energy processes in the catchment;	4.4.2
	- in-stream and connected wetland morphology;	10.5.2.1
	- in-stream pools/runs;	10.5.2.1
	- in-stream riffles/rapids;	10.5.2.1
	- off-stream perennial pools (billabongs, ox-bow lakes etc); and	10.5.2.1
	- morphology, physical integrity (including stream bank erosion) and fluvial processes of the riparian zone within the potential impact area of the Proposal.	9.5.2
	- siltation patterns, including seasonal/flow related variation;	10.5.2.1
	- details of current or proposed flow management schemes for the waterway;	7.1.3.9
	- details of the length of stream already impounded and the additional effect of the Proposal; and	7.1.3

ToR Section	ToR Requirement	EIS Section
	- potential sources of water for construction.	3.2.5
	■ discuss the effects of predictable climatic extremes (droughts, floods) upon the structural integrity of the water impoundment structures containing walls, the quality of water contained, and flows and quality of water discharged;	
	Provide details on the following in regard to the construction phase of the Proposal:	
	■ effects of drainage works, placement of fill, clearing or any other alterations to existing topography and landform on the hydrology of the site including any alteration to drainage patterns and the water table and secondary influence on flooding. If levee banks or stream diversionary constructions are proposed, the effects on neighbouring landholders must be considered, and any works requiring permits or licensing in accordance with the Water Act 2000 identified;	7.2.5.1
	■ timing of the construction works relative to likely periods of flooding and proposals to minimise the risk of adversely impacting downstream water quality; and	7.1.3.3, 3.2.5
	■ measures to ensure weeds (including seeds) are not released into the water environment from machinery traversing creek systems or riparian areas.	9.5.2.4
	■ provide an assessment of the existing environment for water quality that may be affected by the Proposal in the context of environmental values as defined in such documents as the EP Act, EPP (Water) and ANZECC 2000. This assessment should emphasise the relationship between surface water flows and downstream water quality and ecosystem function and must consider	7.2.4
	■ the existing surface in terms of physical, chemical and biological characteristics at the Proposal site and upstream and downstream of the site, including consideration of seasonal or flow variations where applicable;	7.2.4
	■ the water quality (historical, current) of the Severn River including areas and tributaries upstream and downstream of the proposed dam site, in comparison with water quality in adjacent catchments must be made (including records of blue-green algal blooms, and identification of long term, seasonal or other trends);	7.2.4
	■ any seasonal variation in water quality parameters (including temperature, dissolved oxygen, chlorophyll, turbidity, total suspended solids, pH, electrical conductivity, metals and nutrient levels, as well as phytoplankton including blue-green algae).	7.2.4
	■ a relevant range of physical, chemical and biological parameters must be included to gauge the impacts on the downstream environment. The water quality objectives for the river must be summarised, with reference to the Queensland Water Quality Guidelines 2006, the EPP Water and the latest ANZECC Guidelines where appropriate. The basis for this assessment must contain a literature review supplemented by a monitoring program, with sampling stations located upstream and downstream of the Proposal site. Complementary stream-flow data must also be obtained from historical records (if available) to aid in interpretation.	7.2.4
4.3.1.2	**Potential Impacts and Mitigation Measures**	
	This section should: ■ assess potential impacts on water resource environmental values identified in the previous section;	
	■ define and describe the objectives and practical measures for protecting or enhancing water resource environmental values, to describe how nominated quantitative standards and indicators may be achieved, and how the achievement of the objectives will be monitored, audited and managed.	7.1.3, 7.2.4
	■ the EIS must describe the possible environmental harm caused by the Proposal to environmental values for water as expressed in the EPP (Water);	7.2.2.2

ToR Section	ToR Requirement	EIS Section
	■ describe water management controls, addressing surface and groundwater quality, quantity, drainage patterns and sediment movements;	7.1.2.4
	■ discuss the beneficial (environmental, production and recreational) use of nearby surface and groundwater, along with the Proposal for the diversion of affected creeks during mining, and the stabilisation of those works;	7.2.6
	■ describe monitoring programs which will assess the effectiveness of management strategies for protecting water quality during the construction, operation and decommissioning of the Proposal;	7.2.4
	■ Key water management strategy objectives include: - protection of the integrity of the aquatic environment;	7.1.2.4
	- protection of important local aquifers and protection of their waters;	7.1.2
	- maintenance of sufficient quantity and quality of surface waters to protect existing beneficial downstream uses of those waters (including maintenance of in-stream biota, in-stream structure and processes and the littoral zone); and	7.1.4.7
	- minimisation of impacts on flooding levels and frequencies both upstream and downstream of the Proposal.	7.1.2.2
	■ conduct a risk assessment for uncontrolled emissions to water due to system or catastrophic failure, implications of such emissions for human health and natural ecosystems, and list strategies to prevent, minimise and contain impact;	7.1.3.3, 7.1.4.3
	■ discuss the potential environmental harm to the flow and the quality of surface waters from all phases of the Proposal, with particular reference to their suitability for the current and potential downstream uses, including the requirements of any affected riparian area, wetland, littoral zone, and any in-stream biological uses and water delivery;	7.2.4
	■ consider the impacts of surface water flow on existing infrastructure;	7.2.4
	■ refer to the EPP (Water) and Water Act 2000, Water Resources (Borders River) Plan 2003;	7.2.2.2
	■ give particular attention to likely impacts on the riparian and aquatic values of Sundown National Park in the context of environmental flows, water quality, aquatic ecology (community ecological and habitat) and aquatic species that are endangered, vulnerable or rare, this assessment must address how changes to the flows in the Severn River could impact on triggers for spawning or breeding;	7.2.3.2
	■ assess the hydrological impacts of the Proposal, particularly with regard to stream diversions, scouring and erosion, and changes to low flow and flooding levels and frequencies both upstream and downstream of the Proposal;	
	■ when flooding levels will be affected, provide modelling of afflux, illustrated with maps;	7.1.2.2
	■ assessment of impacts on the flow and the quality of surface waters and effects on ecosystems must include an assessment of the:	7.2.4
	- likely effects on riparian habitats and off stream wetlands as a result of any temporary diversion of existing water courses;	7.2.3.2
	- impacts of the Proposal on flow regime indicators and stipulate the assumptions made (e.g. release patterns, release capacity, consumptive uses) in reaching this assessment;	7.1.2.7
	- flow regime for downstream environmental flow requirements for ecological health. Reference should be made to the Environmental Flow Objectives (EFO) in the Water Resources (Border Rivers) Plan 2003 and how these objectives are affected by the Proposal. The likelihood of not meeting the EFOs should be discussed and mitigation measures provided to ensure adequate environmental flows are maintained during the life of the dam;	7.1.2.9
	- effect of environmental flow requirements on dam reliability and water availability for consumptive use;	7.1.2.9
	- changes in the reliability of supply to current water entitlement holders downstream and the operation of existing water extraction;	7.1.2.9
	- changes in flow patterns including changes in frequency, volumes and duration and changes in flows reaching estuarine waters, when	7.1.2.9

ToR Section	ToR Requirement	EIS Section
	compared at a meaningful scale with pre-regulation;	
	- current and predicted flows in the system;	7.1.2.9
	- changes in flood regimes, including frequency of floodplain/wetland inundation and duration of inundation;	7.1.2.9
	- evaluation of the impacts of potential environmental flow requirements and water for fishway operational requirements on the yield of the proposed storage and its viability;	7.1.2.9
	- The hydrological impacts of the Proposal should be assessed, particularly with regard to the downstream effect on the confluence of the Severn River with Tenterfield Creek;	7.1.2.9
	- proposals for the reinstatement of creeks, if the diversion of creeks is likely during construction or operations; and	n/a
	- implications of any mitigating strategies on the engineering of the Proposal (e.g. the type of off-take required and outlet works as determined by environmental flow needs) must be reported.	9.5.2.4
	■ discuss quality characteristics appropriate to the downstream and upstream water uses that may be affected. Chemical and physical properties of any waste water at the point of entering natural surface waters must be discussed along with potential impacts to downstream flora and fauna;	7.2.4
	■ provide an assessment of the potential to contaminate surface water resources and measures to prevent, mitigate and remediate. This assessment must include:	
	- surface water quality, quantity, drainage patterns and sediment movements;	7.2.5
	- the beneficial use of surface water;	
	- monitoring programs to assess the effectiveness of management strategies for protecting water quality during the construction, operation and, if applicable, decommissioning of any temporary structures;	7.2.6
	- quality of the water leaving the proposed dam construction site and infrastructure construction sites during construction and operation;	7.2.6
	- quality of water released from the impoundment under proposed operating conditions and seasonal variation (including pollutant concentrations and relevant parameters such as pH, dissolved oxygen, turbidity, metals and suspended solids);	7.2.5
	- quality of water within the impoundment and downstream under proposed operating conditions and seasonal variation (including potential for blue-green algae blooms) and implications for drinking water standards;	7.2.4
	- potential impact of water quality changes on flora and fauna in and around the impoundment and downstream;	7.2.4
	- the effects of depth and holding time of water within the storage, and the effects on downstream water quality under varying scenarios of flow release;	7.1.3.7
	- potential for stratification and 'turn-over' of the storage and implications for water quality management for both water supply and aquatic fauna;	10.5.2.1
	- the likelihood of infestation by water weeds which may have the potential to affect the water quality; and	10.5.2.1, 7.2.6
	- possible sources of water pollution or other changes in water quality including soil erosion, sedimentation, soil leachates, interaction with groundwater, drilling fluids, accidental spills, waste and sewage disposal and likely chemical composition of any leachate from introduced fill on the site.	7.2.5
	■ in relation to water supply and usage, and wastewater disposal, the EIS must discuss anticipated flows of water to and from the Proposal area;	7.1.3.9
	■ the EIS must investigate the effects of predictable climatic extremes (storm events, floods and droughts) on: the capacity of the dams to contain flood waters, the structural integrity of the containing walls; and the quality of water contained, and flows and quality of water	7.1.3.2, 7.1.3.3

ToR Section	ToR Requirement	EIS Section
	discharged;	
	■ the design of all water storage facilities must follow the technical guidelines on site water management; ■ discuss the need or otherwise for licensing of any dams or creek diversions, under the *Water Act 2000*;	7.1.3.1
	■ establish water allocation and water sources in consultation with Department of Natural Resources and Water;	7.1.1.6
	■ use the Queensland Water Quality Guidelines 2006, ANZECC 2000 National Water Quality Management Strategy, Australian Water Quality Guidelines for Fresh and Marine Waters and the EPP (Water) as a reference for evaluating the effects of various levels of contamination; and	7.2.2.2
	■ discuss options for mitigation and the effectiveness of mitigation measures with particular reference to sediment, acidity, salinity and other releases of a hazardous or toxic nature to human health, flora or fauna.	7.2.6
4.3.2	**Groundwater**	
4.3.2.1	**Description of the Environmental Values**	
	■ The EIS must: ■ review the quality, quantity and significance of groundwater in the Proposal area, together with groundwater use in neighbouring areas and describe the existing environment for hydrogeology resources that may be affected by the Proposal in the context of environmental values as defined in such documents as the EP Act, EPP (Water) and ANZECC 2000;	8.2
	■ address the possible significance of the Proposal to groundwater depletion or recharge, or impact on any existing or potential saline water intrusion problem of existing aquifers;	8.3
	■ detail the depth to groundwater, quantity and water quality and users of the groundwater in the vicinity of the Proposal;	8.2
	■ include in the review a survey of existing groundwater supply facilities (bores, wells, or excavations) within the groundwater area impacted by the Proposal. This review is to include details on the:	8.2.3
	- location;	8.2.2
	- pumping parameters;	8.2.2
	- draw down and recharge at normal pumping rates;	8.2.2
	- seasonal variations (if records exist) of groundwater levels;	8.2.2
	- basic water quality of the aquifer;	8.2.2
	- proximity of the groundwater facilities to the Proposal and value of these facilities for rural, industrial and/or domestic use; and	8.2.2
	- a description of the current use of groundwater within the impacted areas.	8.2.2
	■ develop a network of observation points which would satisfactorily monitor groundwater resources both before and after commencement of operations. include reference to:	8.3.2
	- Nature of the aquifer/s	8.3.2
	- geology/stratigraphy - such as alluvium, volcanic, metamorphic;	8.3.2
	- aquifer type - such as confined, unconfined; and	8.3.2
	- depth to and thickness of the aquifers.	8.3.2

ToR Section	ToR Requirement	EIS Section
	- Hydrology of the aquifer/s	8.3.2
	- depth to water level and seasonal changes in levels;	8.3.2
	- groundwater flow directions (defined from water level contours);	8.3.2
	- interaction with surface water;	8.3.2
	- possible sources of recharge; and	8.3.2
	- vulnerability to pollution.	8.3.2
	■ provide sufficient data obtained from the groundwater survey to enable specification of the major ionic species present in the groundwater, pH, electrical conductivity and total dissolved solids.	8.2.4
	■ describe the environmental values of the underground waters of the affected area in terms of:	
	- values identified in the EPP (Water);	8.2.2
	- sustainability, including both quality and quantity; and	8.2.3, 8.2.4
	- physical integrity, fluvial processes and morphology of groundwater resources.	8.2.6.4
4.3.2.2	**Potential Impacts and Mitigation Measures**	
	The EIS must: ■ include an assessment of the potential environmental harm caused by the Proposal to local groundwater resources;	8.3.1
	■ define the extent of the area within which groundwater resources are likely to be affected by the proposed operations and the significance of the Proposal to groundwater depletion or recharge, and propose management options available to monitor and mitigate these effects;	8.3.1
	■ describe the response of the groundwater resource to the progression and finally cessation of the Proposal;	8.3.1
	■ provide an assessment of the potential groundwater impacts in the environs of the Proposal including any alteration to drainage patterns or water table disruption. This assessment must include:	
	- activities that could affect the availability and quality of groundwater resources;	8.3.1.1
	- impacts of vegetation clearing, sedimentation and salinity to local groundwater resources;	8.3.1
	- impacts of the Proposal on the local ground water regime caused by the altered porosity and permeability of any land disturbance	8.3.1
	- identification of groundwater resources proposed to be used by the Proposal, including a description of the quality, quantity, usage rate and required location of those resources;	8.3.1
	- information on the characteristics of target aquifers, including seasonal variability, capacity to provide the required volumes of water at the expected usage rate, recharge potential and profile of existing extraction;	8.3.1
	- assessment of the impacts of the required extraction of groundwater resources and proposed mitigation measures to reduce the impact of the Proposal on groundwater quality including the potential for interconnection between the target and underlying aquifers;	8.3.1
	- the overall impacts of the Proposal (and any additional surface irrigation water) on local groundwater resources;	8.3.1
	- where groundwater is determined to be at risk, options for the prevention or mitigation of such risk;	8.3.2
	- decommissioning of temporary groundwater bores; and	8.3.2

ToR Section	ToR Requirement	EIS Section
	- the need or otherwise for licensing of any groundwater bores under the Water Act 2000.	8.3.2
	■ provide an assessment of the potential to contaminate groundwater resources and measures to prevent, mitigate and remediate such contamination. This assessment must include:	
	- groundwater quality, quantity and drainage patterns ;	8.3.1.2, 8.3.1.3
	- the beneficial use of groundwater;	8.3.1.4
	- monitoring programs to assess the effectiveness of management strategies for protecting water quality during the construction, operation and, if applicable, decommissioning;	8.3.2
	- potential impact of water quality changes on flora and fauna (including stygafauna communities) in and around the impoundment and downstream;	8.3.1.5
	- the effects of depth and holding time of water within the storage;	8.3.1.2
	- possible sources of water pollution or other changes in water quality including soil leachates, interaction with surface water, drilling fluids, accidental spills, waste and sewage disposal and likely chemical composition of any leachate from introduced fill on the site.	6.2
4.4	**Air**	
4.4.1	**Description of the Environmental Values**	
	This section should: ■ describe the existing air environment that may be affected by the Proposal in the context of environmental values as defined by the EP Act and Environmental Protection (Air) Policy 1997 (EPP (Air));	11.2
	■ describe ambient air quality conditions in terms of particulate matter for any sensitive sites (see EPP (Air)) in proximity to the dam and associated infrastructure development areas, including any baseline monitoring results.	11.3.3
4.4.2	**Potential Impacts and Mitigation Measures**	
	This section should: ■ define and describe the objectives and practical measures for protecting or enhancing environmental values for air, to describe how nominated quantitative standards and indicators may be achieved, and how the achievement of the objectives will be monitored, audited and managed;	
	■ state the objectives for air emissions in respect of relevant standards (ambient and ground level concentrations), relevant emission guidelines, and any relevant legislation, and the emissions modelled using a recognised atmospheric dispersion model;	11.3.3, 11.4.3
	■ describe the quality and quantity of air emissions within the Proposal area expected during construction and operational activities;	11.4.1
	■ specifically describe impacts arising from dust generation from construction activities (including extractive industries associated with provision of construction material); especially in areas where construction activities are adjacent to existing road networks or pass in close proximity to residences;	11.4
	■ include any environmental impacts on terrestrial and aquatic animals and avifauna;	11.4
	■ where appropriate, provide the predicted average ground level concentrations in nearby areas;	11.4.4
	■ identify predictions for both normal and the worst case meteorological conditions	
	■ make ground level predictions at any residential, industrial and agricultural developments believed to be sensitive to the effects of predicted	11.4.4

ToR Section	ToR Requirement	EIS Section
	particulate emissions.	
	■ reference the techniques used to obtain the predictions, and explain key assumptions and data sets;	11.4.3
	■ The assessment of the Proposal's impact on air quality must include at least the following matters:	
	- predicted changes to existing air quality from vehicle emissions and dust generation along haulage routes; and	11.4.1, 11.4.2
	- identification of climatic patterns that could affect dust generation and movement.	11.3.2
4.4.2.1	**Greenhouse Gas Emissions and Abatement**	
	This section of the EIS should: ■ provide an inventory of the Proposal's emissions for each relevant greenhouse gas during construction, including material transportation, with total emissions expressed in 'CO2 equivalent' terms;	11.5.3, 11.5.4
	■ provide details on the Proposal's loss of annual greenhouse gas absorption capacity that will result from the clearing of vegetation;	11.5.2
	■ use the Australian Greenhouse Office Factors and Methods Workbook (available via the internet) as a reference source for emission estimates and supplemented by other sources where practicable and appropriate;	11.5.2
	■ compare air quality predictions to the relevant goals in the Environmental Protection (Air) Policy 1998 goals;	11.4.4
	■ provide details of the proposed the features designed to suppress or minimise emissions, including dusts and odours and how these will mitigate measures each identified impact relating to vehicle emission, dust generation and gaseous emissions.	11.4.5
	■ propose and assess greenhouse gas abatement measures. It must include:	
	- a description of the proposed measures (alternatives and preferred) to avoid and/or minimise greenhouse gas emissions directly resulting from construction of the Proposal; and	11.5.3.1, 11.5.4.1
	- an assessment of how the preferred measures minimise emissions.	11.5.3, 11.5.4
4.5	**Waste**	
	This section must complement other sections of part 4 of the EIS by providing technical details of waste treatment and minimisation, with proposed discharge and disposal criteria, while other sections describe how those discharges and disposals would impact on the relevant environmental values. The purpose of this format is to concentrate the technical information on waste management into one section in order to facilitate its transfer into the EM Plan.	17
4.5.1	**Character and Quantities of Waste Material**	17.3
	This section must: ■ provide an inventory of all wastes to be generated by the Proposal during the construction and operational phases of the Proposal;	17.3
	■ provide schematic diagrams, which for the operational phase may be simplified versions of those provided in section 3.3, for each distinct stage of the Proposal (e.g. construction/site preparation, commissioning and operation) indicating the processes to be used and highlighting their associated waste streams (i.e. all waste outputs: solid, liquid and gaseous), including recycling efforts.	17.3
	■ cross-reference the schematic diagrams, or an associated table, with the relevant sections of the EIS where the potential impacts and mitigation measures associated with each waste stream are described;	17.3
	■ having regard for best practice waste management strategies and the Environmental Protection (Waste) Policy, describe the proposals for	17.2

ToR Section	ToR Requirement	EIS Section
	waste avoidance, reuse, recycling, treatment and disposal in the appropriate sub-section below;	
	■ provide information on the variability, composition and generation rates of all waste produced at the Proposal sites;	17.3
	■ detail cleaner production waste management planning, especially as to how these concepts have been applied to preventing or minimising environmental impacts at each stage of the Proposal;	17.2
4.5.2	**Potential Impacts and Mitigation Measures**	
	This section should: ■ define and describe the objectives and practical measures for protecting or enhancing environmental values from impacts by wastes;	17.2
	■ describe how nominated quantitative standards and indicators may be achieved for waste management; and	17.2
	■ describe how the achievement of the objectives will be monitored, audited and managed;	17.3.1
	■ assess the potential impact of all wastes to be generated and provide details of each waste in terms of:	17.3
	- operational handling and fate of all wastes including storage;	17.3
	- methods of disposal (including the need to transport wastes off-site for disposal) proposed to be used for any trade wastes, liquid wastes and solid wastes;	17.3
	- the potential level of impact on environmental values;	Table 17-1
	- proposed discharge/disposal criteria for liquid and solid wastes;	17.2.5
	- measures to ensure stability of the dumps and impoundments must be described;	4.3.3
	- methods to prevent, seepage and contamination of groundwater from stockpiles and/or dumps must be given; and	17.2
	- market demand for recyclable waste (where appropriate) must be addressed.	17.3.2
	■ having regard for the Environmental Protection (Waste) Policy, indicate the results of investigation into the feasibility of using waste minimisation and cleaner technology options during all phases of the Proposal;	17.2
	■ address the EPA has also released draft guidelines covering aspects of waste management under this Environmental Protection (Waste) Policy;	17.1
	■ detail cleaner production waste management planning, especially as to how these concepts have been applied to preventing or minimising environmental impacts at each stage of the Proposal;	17.2
	■ identify the proposed location and suitability of any existing or proposed landfill to receive solid waste from construction and operational phases of the Proposal;	17.2.5
	■ identify and document methods to be employed to prevent leachate from sites where solid waste has been deposited, including physical, impermeable barriers that are established as part of any waste disposal site; and	17.2.5
	■ provide a description of the origin, quality and quantity of wastewater and any immiscible liquid waste originating from the Proposal.	17.3
	The EIS may need to consider the following: ■ groundwater from excavations;	17.3.2
	■ drainage (i.e. run-off plus any seepage or leakage);	17.3.2

ToR Section	ToR Requirement	EIS Section
	■ seepage from other waste storages;	17.2.5
	■ domestic sewage treatment - disposal of liquid effluent and sludge; and	17.3.2
	■ water supply treatment plant - disposal of wastes.	n/a
4.6	**Noise and Vibration**	
4.6.1	**Description of Environmental Values**	
	This section should: ■ describe the existing environment values that may be affected by noise and vibration from the Proposal;	12.3.2
	■ if the proposed activity could adversely impact on the noise environment, undertake baseline monitoring at a selection of sensitive sites affected by the Proposal, including sites adjacent to the pipeline route, pump stations and balance tanks;	12.2.2
	■ provide long-term measured background noise levels that take into account seasonal variations;	12.2.2
	■ identify the locations of sensitive sites on a map at a suitable scale;	12.2.1
	■ describe the results of any baseline monitoring of noise and vibration in the proposed vicinity of the Proposal must be described.	12.2.2
	■ gather sufficient data to provide a baseline for later studies;	12.2.2
	■ monitor the daily variation of background noise levels at nearby sensitive sites and report in the EIS, giving particular regard to detailing variations at different periods of the night.	12.2.2, Appendix F
	■ provide comment on any current activities near the Proposal area that may cause a background level of ground vibration (for example: major roads, quarrying activities, etc.).	12.2.2.1, 12.2.2.2
4.6.2	**Potential Impacts and Mitigation Measures**	
	This section should: ■ define and describe the objectives and practical measures for protecting or enhancing environmental values from impacts by noise and vibration;	12.3
	■ describe how nominated quantitative standards and indicators may be achieved for noise and vibration management; and	12.5
	■ describe how the achievement of the objectives will be monitored, audited and managed.	12.5
	■ include in the assessment of noise impacts matters raised in the document "The health effects of environmental noise – other than hearing loss published by the enHealth Council, 2004" (or later editions), ISNB 0 642 82304 9.	12.3.4
	■ submit information, including mapped noise contours from a suitable acoustic model, based on the proposed generation of noise;	12.4.1.4
	■ quantify the potential environmental harm of noise and vibration at all potentially sensitive places, in particular, any place of work or residence in terms of objectives, standards and indicators to be achieved;	12.4.1.4, 12.4.1.5
	■ given particular consideration to emissions of low-frequency noise; that is, noise with components below 200Hz.	12.4
	■ include in the assessment environmental impacts on terrestrial and aquatic animals and avifauna, particularly migratory species;	12.4.7
	■ provide proposed measures for the minimisation or elimination of impacts, including details and illustrations of any screening, lining, enclosing or bunding;	12.5

ToR Section	ToR Requirement	EIS Section
	■ provide a discussion of timing schedules for construction and operations with respect to minimising environmental nuisance and harm from noise;	12.4.1.1, 12.5.1
	■ assess the potential impacts (including compliance with relevant legislation) of blasting required for construction of the dam wall or other infrastructure construction, including potential buffers to minimise or eliminate these effects;	12.4.4
	■ address off-site noise and vibration impacts that could arise due to increased road or rail transportation directly resulting from the Proposal.	12.4.5
4.7	**Nature Conservation**	
4.7.1	**Sensitive Environmental Areas**	
4.7.1.1	**Description of Environmental Values**	
	This section should: ■ describe the existing environment values for nature conservation that may be affected by the Proposal;	9.3.1
	■ describe the environmental values of nature conservation for the affected area in terms of:	
	- integrity of ecological processes, including but not limited to habitats of rare and threatened species;	9.3.3.1
	- conservation of resources;	9.3.3.1
	- biological diversity, including but not limited to habitats of rare and threatened species;	9.3.3.1
	- integrity of landscapes and places including, but not limited to wilderness and similar natural places; and	9.3.3.1
	- aquatic and terrestrial ecosystems.	9.3.3.1
9.3.3.1	■ describe the flora and fauna communities which are rare or threatened, environmentally sensitive localities including waterways, riparian zone, and littoral zone, rainforest remnants, old growth indigenous forests, wilderness and habitat corridors.	9.3.3.1
	■ The description should: ■ include a plant species list, a vegetation map at appropriate scale and an assessment of the significance of native vegetation, from a local and regional and state perspective;	9.3.3.1
	■ indicate any areas of state or regional significance identified in an approved biodiversity planning assessment (BPA) produced by the EPA (e.g. see the draft Regional Nature Conservation Strategy for SE Qld 2001-2006);	9.3.3.1
	■ include areas within, and those linked by, the State Wildlife Corridor that would be intersected by the inundation area of the dam;	9.4.2.5
	■ be undertaken to the extent necessary for the subsequent assessment of impacts on wildlife that uses the corridor.	9.5.2.1
	The EIS must: ■ identify issues relevant to sensitive areas, or areas, which may have, low resilience to environmental change;	9.3.3.1
	■ assess the capacity of the environment to assimilate disturbances and describe the Proposal proximity to any biologically sensitive areas. Areas regarded as sensitive with respect to flora and fauna have one or more of the following features (and which must be identified, mapped, avoided or effects minimised):	9.3.3.2
	- important habitats of species listed under the NC Act and/or EPBC Act as presumed extinct, endangered, vulnerable or rare;	9.3.3.1
	- regional ecosystems listed as 'endangered' or 'of concern' or ‘not of concern’ under State legislation, and/or ecosystems listed as	9.3.3.1

ToR Section	ToR Requirement	EIS Section
	presumed extinct, endangered or vulnerable under the EPBC Act;	
	- good representative examples of remnant regional ecosystems or regional ecosystems which are poorly represented in protected areas;	9.3.3.1
	- sites listed under international treaties such as Ramsar wetlands and World Heritage areas;	9.2.1
	- sites containing near threatened or bio-regionally significant species or essential, viable habitat for near threatened or bio-regionally significant species;	9.4.2.2
	- sites in, or adjacent to, areas containing important resting, feeding or breeding sites for migratory species of conservation concern listed under the Convention of Migratory Species of Wild Animals, and/or bilateral agreements between Australia and Japan (Japan-Australia Migratory Bird Agreement, JAMBA) and between Australia and China (China-Australia Migratory Bird Agreement, CAMBA);	9.4.2.1
	- sites containing common species which represent a distributional limit and are of scientific value or which contains feeding, breeding, resting areas for populations of species of special cultural significance (e.g.. echidna, koala and platypus);	9.4.2.1, 9.4.2.2
	- sites containing high biodiversity that are of a suitable size or with connectivity to corridors/protected areas to ensure survival in the longer term; such land may contain:	9.4.2.5
	- natural vegetation in good condition or other habitat in good condition (e.g. wetlands); and/or	
	- degraded vegetation or other habitats that still supports high levels of biodiversity or acts as an important corridor for maintaining high levels of biodiversity in the area;	9.3.3.1, 9.3.3.2
	- a site containing other special ecological values, for example, high habitat diversity and areas of high endemism;	9.3.3.1, 9.3.3.2
	- ecosystems which provide important ecological functions such as: wetlands of national, state and regional significance; riparian vegetation; important buffer to a protected area or important habitat corridor between areas;	9.3.3.1, 9.3.3.2
	- sites of palaeontologic significance such as fossil sites;	n/a
	- sites of geomorphological significance, such as lava tubes or karst;	n/a
	- protected areas which have been proclaimed under the NC Act or are under consideration for proclamation; and/ or	9.4.2.2
	- areas of major interest, or critical habitat declared under the NC Act or high nature conservation value areas or areas vulnerable to land degradation under the VM Act;	9.3.3.1
	■ make reference to both State and Commonwealth endangered species legislation and the proximity of the area to any World Heritage property;	9.2.1, 9.2.2
	■ reference the VM Act and the findings of any regional vegetation management plan;	9.5.2.4
	■ identify key flora and fauna indicators for future ongoing monitoring;	9.5.1
	■ conduct surveys of flora and fauna throughout the year to reflect seasonal variation in communities and to identify migratory species.	9.5.2.4, Table 9-21
	■ provide a full description of the survey methodology, including locations of sampling points, survey techniques, and sampling regime.	9.3.3.2
4.1.7.2	**Potential Impacts and Mitigation Measures**	
	This section should: ■ define and describe the objectives and practical measures for protecting or enhancing nature conservation values;	9.5.1
	■ describe how nominated quantitative standards and indicators may be achieved for nature conservation management; and	9.5.1

ToR Section	ToR Requirement	EIS Section
	■ describe how the achievement of the objectives will be monitored, audited and managed.	19
	The EIS should: ■ address any actions of the Proposal or likely impacts that require an authority under the NC Act, and/or would be assessable development for the purposes of the VM Act;	9.5.2.1
	■ cover all likely direct and indirect environmental harm due to the Proposal on flora and fauna particularly sensitive areas;	9.5.2.1
	■ address terrestrial and aquatic (freshwater) environments;	9.3
	■ include human impacts and the control of any domestic animals introduced to the area;	9.4.2.4
	■ describe strategies for protecting World Heritage Property and any rare or threatened species, and discuss any obligations imposed by state or Commonwealth legislation or policy or international treaty obligations;	9.5.2.1
	■ describe strategies for collecting and preserving any significant fossils;	4.2.1.5
	■ consider short-term and long-term effects with comment on whether the impacts are reversible or irreversible;	9.5.1
	■ discuss management strategies for both terrestrial and aquatic flora and fauna in the main body of the EIS and provide in a working form in a Management Plan as part of the overall EM Plan for the Proposal;	9.5.2.4
	■ discuss the potential for the proposal to cause fragmentation of remnant ecological communities and mitigation measures to maintain connectivity between these communities.	9.5.2.4
	■ outline the significance of clearing each species listed under the NCA according to the impact on local, regional and State populations;	Table 9-19
	■ discuss the practicality of relocating each speciesin the context of suitable habitat and soil profile requirements, using examples of relocation success elsewhere, where available;	9.5.2.4
	■ provide a description of any proposed relocation site/s, including the rationale for choosing the preferred site/s;	9.5.2.4
	■ outline the proponent's commitment to ongoing management and maintenance of any relocated populations;	9.5.2.4
	■ for those species unable to be practically relocated, provide information about alternative mitigation measures;	9.5.2.4
	■ consider the possibility of seed collection to regenerate the species elsewhere within suitable ecological communities, establishing voluntary nature conservation agreements with neighbouring landowners to secure regrowth areas and ensure regeneration to remnant status, or other measures to offset the loss of species and communities;	9.5.3.9
	■ clearly state the proposed role of the proponent in managing the offset areas;	9.5.2.4
	■ provide a full description of options for compensatory habitat measures and offsets, particularly within the region;	9.5.2.4
	■ describe how any compensatory habitat package or offsets developed for loss of terrestrial and aquatic flora and fauna habitats because of the Proposal relates to the species, populations or communities affected;	9.5.2.4
	■ provide the rationale for the selection of the compensatory habitat and/or offset package over other options; and	9.5.2.4
	■ describe the overall environmental difference (net loss/gain) that will occur in the extent, quality, ecological integrity and security of environmental values in the area/region due to the environmental gains from these packages compared to the loss (both short and long term and whether the impacts are reversible or irreversible) of environmental values;	9.5.2.4
	■ refer to the code requirements of the VM Act where relevant;	9.2.2

ToR Section	ToR Requirement	EIS Section
	■ describe any departure from no net loss of ecological values;	9.5
	■ where offset measures are proposed to address an identified impact, include:	9.5.2.4
	■ a description and an assessment of the expected or predicted effectiveness of the mitigation measures, including the timing of measures;	9.5.2.4
	■ any statutory or policy basis for the mitigation measures;	9.5.2.4
	■ the cost of the mitigation measures;	
	■ the name of the agency responsible for endorsing or approving each mitigation measure or monitoring program; and	9.5.2.4
	■ a consolidated list of mitigation measures proposed to be undertaken to prevent, minimise or compensate for the impacts of the action. [An environmental management plan that sets out the framework for continuing management, mitigation and monitoring programs for the relevant impacts of the action and the establishment of the proposed offsets, including any provisions for independent environmental auditing must be detailed in section 5.] Details of all relevant impacts of the Proposal on matters of national environmental significance must be discussed in appendix A3.	9.5.2.4
4.7.2	**Terrestrial Flora and Fauna**	
4.7.2.1	**Description of Environmental Values**	
	This section should: ■ provide vegetation mapping for all relevant Proposal sites including inundation areas, downstream riparian vegetation, quarry material site/s, construction site/s, pump stations, pipeline corridors, easements and adjacent areas;	9.3.3.1
	■ describe the terrestrial vegetation communities within these affected areas at an appropriate scale (i.e. 1:10,000) with mapping produced from aerial photographs and ground truthing, showing the following:	9.3.3.1
	- location and extent of vegetation types using the EPA's regional ecosystem type descriptions in accordance with the Regional Ecosystem Description Database [REDD] available at the EPA's website;	9.3.3.1
	- location of vegetation types of conservation significance based on EPA's regional ecosystem types and occurrence of species listed as protected plants under the Nature Conservation (Wildlife) Regulation 1994 and subsequent amendments, as well as areas subject to the VM Act;	9.3.3.1
	- the current extent (bioregional and catchment) of protected vegetation types of conservation significance within the protected area estate (national parks, conservation parks, resource reserves, nature refuges);	9.3.1
	- any plant communities of cultural, commercial or recreational significance must be identified; and	9.3.3.1
	- location and abundance of any exotic or weed species.	9.3.3.2, Table 9-12
	■ survey, within each defined (standard system) vegetation community, a minimum of three sites (numbers must be discussed with the EPA) for plant species in both summer and winter as follows:	9.3.3.2
	- site data must be recorded in a form compatible with the Queensland Herbarium CORVEG database.	9.3.3.2
	- the minimum site size must be 10 by 50 metres;	9.3.3.2
	- a complete list of species present at each site must be recorded;	9.3.3.2

ToR Section	ToR Requirement	EIS Section
	- the relative abundance of plant species present must be recorded;	9.3.3.2
	- any plant species of conservation, cultural, commercial or recreational significance must be identified; and	9.3.3.2
	- specimens of species listed as protected plants under the Nature Conservation (Wildlife) Regulation 1994, other than common species, are to be submitted to the Queensland Herbarium for identification and entry into the HERBRECS database.	9.3.3.2
	■ highlight sensitive or important vegetation types, including any riparian vegetation and natural grasslands, and their value as habitat for fauna and conservation of specific rare floral and faunal assemblages or community types;	9.3.3.1
	■ address the existence of rare or threatened species;	9.3.3.1
	■ include in the surveys species structure, assemblage, diversity and abundance;	9.3.3.2
	■ review the published information regarding the assessment of the significance of the vegetation to conservation, recreation, scientific, educational and historical interests;	
	■ describe any special landscape values of any natural vegetation communities;	9.3.3.1
	■ show the location of any horticultural crops in the vicinity of the site;	5.2.4, 16.1.1.2, 16.1.1.3
	■ show on a map at an appropriate scale, the extent of occurrence of important local and regional pest plants (weeds), particularly declared plants under the *Land Protection (Land and Stock Route Management) Act 2002*;	n/a
	■ provide a weed management strategy;	9.5.2.4
	■ use existing information on plant species instead of new survey work, provided that the data is derived from surveys is consistent with the above methodology;	9.3.3.1
	■ specify the methodology used for flora surveys in the appendices to the EIS;	Appendix F
	■ describe the terrestrial and riparian fauna occurring in the areas affected by the Proposal, noting the broad distribution patterns in relation to vegetation, topography and substrate. The description of the fauna present or likely to be present in the area must include:	9.4
	- species diversity (i.e. a species list) and abundance of animals, including amphibians, birds, reptiles, mammals and bats;	Table 9-14
	- any species that are poorly known but suspected of being rare or threatened;	Table 9-14
	- habitat requirements and sensitivity to changes; including movement corridors and barriers to movement;	9.4.2.5
	- the location and estimated population of any rare, threatened or otherwise noteworthy species/communities in the study area, including discussion of range, habitat, breeding, recruitment, feeding and movement requirements, and current level of protection (e.g. any requirements of protected area management plans);	Figure 9-16
	- use of the area by migratory birds, nomadic birds, and other terrestrial fauna; and	Table 9-14
	- the location and estimated population of feral or pest animals.	Figure 9-17
	■ indicate how well any affected communities are represented and protected elsewhere in the province where the Proposal occurs.	9.5.3
4.7.2.2	**Potential Impacts and Mitigation Measures**	
	This section should: ■ describe the nature and extent of impacts to flora and fauna species that will result from direct disturbances to terrestrial habitats, including the	9.5.1, 9.5.2, 9.5.3

ToR Section	ToR Requirement	EIS Section
	clearing and inundation of vegetation communities associated with the dam and pipeline infrastructure construction and operation;	
	■ provide an assessment of the long-term impacts on these communities with particular emphasis on the disruption to wildlife movements between areas of known and or protected biological diversity;	Table 9-19
	■ describe the potential environmental harm to the ecological values of the area arising from the construction, and operation of the Proposal including clearing, salvaging or removal of vegetation, and discuss the indirect effects on remaining vegetation;	9.5.1, 9.5.2, 9.5.3
	■ describe the proposals to minimise the impacts on vegetation and address the conservation, such as by relocation, of protected plants and retaining vegetation in the dam footprint until water levels warrant its removal;	Table 9-19
	■ provide an assessment of the impacts of placing the inundation area within the State Wildlife Corridor that links Girraween National Park with Sundown National Park to the south west and large areas of State Forest to the north west;	9.5.1, 9.5.2, 9.5.2.1
	■ discuss the potential environmental harm on flora and fauna due to any alterations to the local surface and ground water environment with specific reference to environmental impacts on riparian vegetation or other sensitive vegetation communities;	9.5.1, 9.5.2, 9.5.3
	■ describe measures to mitigate the environmental harm to habitat or the inhibition of normal movement, propagation or feeding patterns, and change to food chains;	9.5.2, 9.5.3
	■ discuss the potential for fauna to be trapped in open trenches during construction of the pipeline and how this can be reduced;	Table 9-20
	■ discuss the provision of buffer zones and movement corridors, and strategies to minimise environmental harm on migratory and nomadic animals;	9.5.2.2
	■ discuss the proposed weed management strategies required for containing existing weed species (e.g.. parthenium and other declared plants) and ensuring no new declared plants are introduced to the area***,*** *i*n accordance with the *Land and Protection (Pest and Stock Route Management) Act 2002* and relevant local plans and strategies***;***	9.5.2.4
	■ address pest animal management strategies and practices;	9.5.3.9
	■ develop strategies to ensure that the Proposal does not contribute to increased encroachment of a feral animal species;	9.5.3.9
	■ make reference to the local government authority's pest management plan when determining control strategies;	9.5.3.9
	■ Rehabilitation of disturbed areas must incorporate, where appropriate, provision of nest hollows and ground litter.	9.5.3.9
4.7.3	**Aquatic Flora and Fauna**	
4.7.3.1	**Description of Environmental Values**	
	If no recent biota surveys/studies have been conducted in and downstream of the Proposal area, the aquatic flora and fauna occurring in the areas affected by the Proposal must be described from studies undertaken, noting the patterns and distribution in the waterways and/or associated aquatic environments. This section should: ■ provide a description of the habitats and flora compositions (using maps) potentially impacted by the Proposal, including distribution of pool and riffle formations; presence of snags, overhanging vegetation, aquatic macrophytes, sand and gravel bars; sediment type; river profile (bank width and depth);	10.2
	■ include the habitat requirements and the sensitivity of aquatic flora species to changes in flow regime, water levels and water quality in the Proposal areas;	10.4.4
	■ discuss the flora present or likely to be present at any time during the year, including, but not be limited to, the following habitats:	10.3.1, 10.4.1,

ToR Section	ToR Requirement	EIS Section
		10.4.2
	- in-stream pools/runs;	10.3.1, 10.4.1, 10.4.2
	- in-stream riffles/rapids;	10.3.1, 10.4.1, 10.4.2
	- off-stream perennial pools (billabongs, ox-bow lakes etc); and	10.3.1, 10.4.1, 10.4.2
	- off-stream ephemeral pools.	10.3.1, 10.4.1, 10.4.2
	■ describe the aquatic vegetation in the area affected by the Proposal, noting:	10.3.1, 10.4.1, 10.4.2
	- the extent and location of rooted aquatic vegetation communities;	10.3.1, 10.4.1, 10.4.2
	- the presence and current extent of free-floating aquatic vegetation;	10.3.1, 10.4.1, 10.4.2
	- the presence of any rare, threatened or otherwise noteworthy aquatic species or communities downstream of the site of the Proposal or within watercourses which will be inundated;	10.3.1, 10.4.1, 10.4.2
	- the presence of any introduced significant local and regional weed species ;and	10.3.1, 10.4.1, 10.4.2
	- the significance of aquatic vegetation to native fauna.	“10.3.1, 10.4.1, 10.4.2
	■ describe the habitat requirements and the sensitivity of aquatic flora species to changes in flow regime, water levels and water quality in the Proposal areas;	10.4.1, 10.4.2, 10.4.4
	■ discuss special requirements of aquatic plant species or communities, including exotic species, related to management of the impoundment or flow regime downstream of the Proposal site;	10.4.2
	■ present a description of the known extent of introduced invasive species in the Severn River system;	10.4.2
	■ discuss the impact of existing impoundments and downstream flow regime on the natural aquatic flora;	10.4.1, 7.1.1
	■ make reference to relevant studies on the Severn River and other similar catchments to estimate the natural state;	10.4.1
	■ show the location of significant local and regional weed species in the vicinity of the Proposal site;	10.4.2, 10.4.4
	■ specifically address the extent of occurrence of rare or threatened species;	10.3
	■ review the published information regarding the assessment of the significance of the vegetation to conservation, recreation, scientific, educational and historical interests;	10.3
	■ describe the aquatic fauna occurring in the areas affected by the Proposal noting the patterns and distribution in the waterways;	10.3.2, 10.4.3

ToR Section	ToR Requirement	EIS Section
	■ describe the habitat requirements and the sensitivity of aquatic fauna species to changes in flow regime, water levels and water quality in the Proposal areas;	10.4.1, 10.4.3, 10.4.4
	■ discuss how well any affected communities are represented and protected elsewhere, and the migratory patterns of aquatic fauna species in the study area;	10.3.2, 10.4.3
	■ include in the assessment of the fauna present or likely to be present:	-
	- diversity and abundance (where feasible and practicable) of animals, including fish, reptiles, aquatic mammals, macro invertebrates, and amphibians occurring in the waterways within the Proposal areas (movement requirements must be considered and their seasonal variations);	10.3.2, 10.4.3
	- any rare or threatened species and their habitat;	10.3.2, 10.4.1, 10.4.3, 10.4.4
	- habitat requirements and sensitivity to changes, including movement corridors and barriers to movement;	10.4.4
	- a description of the conditions necessary for migration of potentially affected species including minimum flows, seasonal conditions, stream characteristics and migratory behaviour;	10.3.2, 10.4.1, 10.4.3, 10.4.4
	- a description of the capacity of artificial devices (e.g., fish ladders) to emulate natural conditions and support and sustain successful migration (this should include a review of the success of existing similar structures used elsewhere);	10.4.1
	- commercial and recreational fish species which are present within the waterways; and	10.4.3
	- introduced significant local and regional pest species.	10.4.3
4.7.3.2	**Potential Impacts and Mitigation Measures:**	-
	This section should: ■ provide an assessment of potential impacts on aquatic flora impacted by the Proposal including:	-
	- changes to flow regime downstream based on the proposed flow regime and resultant changes to habitat (pools, riffles, bank stability, connections to wetlands, etc) and consequential floristic changes, including the effect of changes in salinity, sediment, nutrients, etc;	10.5.1, 10.5.2
	- effects of increased level in the impoundment and projected impacts of variations in the level of the impoundment on aquatic and riparian habitat (e.g. pools, riffles) and flora, particularly in creeks flowing into the impoundment;	10.5.1, 10.5.2
	- effects of changes to flow regimes on spawning and breeding of animals both within the inundation area and downstream, including the Sundown National Park;	10.5.1, 10.5.2
	- potential for regeneration around the Proposal;	10.5.1, 10.5.2
	- the importance of the habitat types at the Proposal site in the context of the river system and the proportion of comparable habitat elsewhere in the system;	10.4.1, 10.5.1, 10.5.2
	- effect of floristic changes on the aquatic fauna habitat and food supply both within any impoundment and downstream to marine areas;	10.5.2.2
	- the impact of proposed in-stream structures including water off takes, dam infrastructure, changed transport infrastructure and fish transfer devices;	10.5, 10.5.1.1, 10.5.2.1
	- the potential for, and mitigation measures to prevent, the creation of new mosquito and biting midge breeding sites (including during construction e.g. in quarries and borrow pits);	10.5.1.2

ToR Section	ToR Requirement	EIS Section
	- proposed stream diversions, causeway construction and crossing facilities, stockpiled material and other impediments that would restrict free movement of fish and measures to avoid impacts upon fish spawning periods;	10.5.1
	- impacts of barriers to interbreeding opportunities between populations;	10.5.2.3
	- an assessment of the potential for the incidence of blue-green algae outbreaks as a result of the Proposal must be detailed, along with potential mitigation and management measures;	7.2.4
	- identification of the conservation importance of identified populations at the regional, state and national levels; and	10.5.2.4
	- determination of the potential for the introduction of or facilitation of exotic, non-indigenous and noxious plants and animals.	10.5.2
	■ assess the sensitivity of habitats and their species composition to all foreseen direct and indirect effects, including potential disturbances and changes resulting from the proposed works, e.g. changes in water quality and the potential changes to species populations including faunal species movement requirements (including any seasonal changes to those requirements);	10.5.1, 10.5.2
	■ giving specific attention to rare or threatened species, describe strategies for protecting these species, and discuss any obligations imposed by State and Australian government threatened species legislation or policy;	10.5.2.4
	■ assess impacts during construction and operation of the Proposal in the context of both short and long term durations;	10.5.1, 10.5.2
	■ describe measures to mitigate the impact on habitat or the inhibition of normal movement, propagation or feeding patterns, and change to food chains;	10.5.1.2, 10.5.2.3
	■ discuss any provision for buffer zones and movement corridors, or special provisions for migratory, nomadic and aquatic animals;	10.5.1.2, 10.5.2.3
	■ consider and discuss the cumulative impacts from existing disturbances and the proposed disturbance to the aquatic ecosystem and the ability of the ecosystem to absorb the additional impact of the Proposal;	10.5.2.5
	■ consider and discuss the cumulative impacts from targeted development arising from the provision of water through the Proposal on aquatic fauna, habitat and fisheries;	10.5.2.5
	■ provide sufficient baseline data at the Proposal site and up and downstream of the site to determine changes.	10.3, 10.4
4.8	**Cultural Heritage**	
4.8.1	**Description of Environmental Values**	
	This section should: ■ describe the existing cultural heritage values that may be affected by the Proposal;	15.3.2
	■ describe the environmental values of the cultural landscapes of the affected area in terms of the physical and cultural integrity of the landforms	15.3.2
	■ describe the cultural heritage study undertaken, highlighting indigenous and non-indigenous cultural heritage sites and places, and their values;	15.2.1
	Any such study must be conducted by an appropriately qualified cultural heritage practitioner and must include the following: ■ liaison with relevant indigenous community/communities concerning:	15.3.1
	- places of significance to that community (including archaeological sites, natural sites, story sites etc;	15.3.1
	- appropriate community involvement in field surveys;	15.3.1

ToR Section	ToR Requirement	EIS Section
	■ any requirements by communities and /or informants relating to confidentiality of site data must be highlighted. Non-indigenous communities may also have relevant information;	15.3.1
	■ a systematic survey of the proposed development area, including all associated infrastructure and easements to locate and record indigenous and non-indigenous cultural heritage places;	15.3.1
	■ significant assessment of any cultural heritage sites/places located;	15.3.1
	■ the impact of the proposed development on cultural heritage values; and	15.3.1
	■ a report of work done which includes background research, relevant environmental data and methodology, as well as results of field surveys, significance assessment and recommendations.	15.3.1
4.8.2	**Potential Impacts and Mitigation Measures:**	
	■ This section should: ■ define and describe the objectives and practical measures for protecting or enhancing cultural heritage environmental values;	15.3.3.1
	■ describe how nominated quantitative standards and indicators may be achieved for cultural heritage management, and how the achievement of the objectives will be monitored, audited and managed;	15.3.3.1
	■ The environmental harm to cultural heritage values in the vicinity of the Proposal must be managed under a cultural heritage management plan (CHMP) developed specifically for the Proposal. The CHMP will:	15.3.3.1, 15.2.3
	- provide a process for the management of cultural heritage places both identified and sub-surface at the Proposal sites;	15.3.3.1
	- be based on information contained in archaeological and/or anthropological reports on the survey area and cultural reports and/or information from affiliated traditional owners.	15.3.3.1
	■ address and include the following:	
	- a process for including Aboriginal people associated with the development areas in protection and management of indigenous cultural heritage;	15.2
	- processes for mitigation, management and protection of identified cultural heritage places and material in the Proposal areas, including associated infrastructure developments, both during the construction and operational phases of the Proposal;	15.2.3, 15.3.3
	- provisions for the management of the accidental discovery of cultural material, including burials;	15.2.3, 15.3.3
	- the monitoring of foundation excavations and other associated earthwork activities for possible sub-surface cultural material;	15.2.3, 15.3.3
	- cultural awareness training or programs for Proposal staff; and	15.2.3, 15.3.3
	- a conflict resolution process.	
	The development of the CHMP must be negotiated with the lead agency, the Department of Natural Resources and Water. Any collection of artefact material as part of a mitigation strategy will need to be done by an appropriately qualified cultural heritage practitioner holding a permit under provisions of the *Aboriginal Cultural Heritage Act 2003*.	15.2.3

ToR Section	ToR Requirement	EIS Section
4.9	**Transport**	
4.9.1	**Transport Methods and Routes**	
	■ This section should: ■ describe arrangements for the transport of plant, equipment, products, wastes and personnel during both the construction and operational phases of the Proposal;	13.1.3
	■ address the use of existing facilities and all requirements for the construction, upgrading or relocation of any transport related infrastructure;	13.1.2.3
	■ provide information on road transportation requirements on public roads for both construction and operations phases, including:	13.4.4.1, 13.1.4.2
	- the volume, composition (types and quantities), origin and destination of goods to be moved including construction materials;	Table 13-4, 13-8
	- the volume of traffic generated by workforce personnel, visitors and service vehicles;	Table 13-6, 13-7
	- method of movement (including vehicle types and number of vehicles likely to be used);	Table 13-2
	- anticipated times at which movements may occur;	Table 13-3, 13-6, 13-7
	- details of vehicle traffic and transport of heavy and oversize indivisible loads (including types and composition); and	13.1.4.2
	- the proposed transport routes.	13.1.3
4.9.2	**Potential Impacts and Mitigation Measures**	
	The EIS should: ■ provide sufficient information to make an independent assessment of how the state-controlled and local government road networks will be affected by the Proposal;	13.1.3
	■ provide sufficient information to enable an independent assessment of how the rail network (including infrastructure) will be affected;	13.2.2.2
	■ detail, in both cases the impact on stakeholders along all transport routes and how any impacts will be managed;	13.1.2
	■ include a detailed analysis of the impact of construction and operational traffic generated by the Proposal with particular concern for impacts on road infrastructure, road users and road safety;	13.1.4.1
	■ consider the potential impacts of haulage of construction inputs, such as pipe and other materials, on public roads and consider impact mitigation costs when choosing the mode of haulage (road vs. rail);	13.1.4, 13.2.2.2
	■ if haulage is undertaken by road, address impacts in a Transport/Traffic Management Plan as part of the Environmental Management Plan;	13.1.6
	■ assess potential impacts and propose mitigation measures, if necessary, for the following:	13.1.6
	- road safety issues arising from any need for diversion of traffic during construction of the Proposal, especially laying pipeline in or near road reserves;	13.1.6
	- need for increased road maintenance and upgrading; and	13.1.6
	- environmental values of any new roads or road realignments not covered elsewhere in the EIS.	-
	■ identify impacts on the state-controlled and local government road networks and to indicate clearly the corrective measures necessary to	

ToR Section	ToR Requirement	EIS Section
	address adverse road impacts and the costs involved. This will require the proponent to compare the traffic situation and road conditions with, and without, the Proposal. In assessing road impacts of the Proposal, the proponent should use the Department of Main Roads "Guidelines for Assessing Road Impacts of Development (2006)", which is available at www.mainroads.qld.gov.au > Inside Main Roads > Publications > Road Related.	13.1.2.1
	■ prepare information about the impacts and proposed measures for dealing with those impacts by the proponent in close consultation with the local district office of the Department of Main Roads;	
	■ provide details of the impact of the Proposal on any current or proposed rail infrastructure;	13.2.2.2
	■ provide information on product spill contingency plans and the adequacy of equipment and facilities to deal with possible spills for the transport nodes of the Proposal.	18.3.3.1
	■ indicate whether there is a need to update the plans based on increase in frequency of traffic and volumes to be transported.	13.1.4, 13.1.5
	■ consider additional water transport issues, including the potential of the Proposal to impact on recreational craft in the river.	13.1.2.5, 13.1.5
4.10	**Social Environment**	
4.10.1	**Description of Environmental Values**	
	This section should: ■ describe the existing social values that may be affected by the Proposal;	15.2.5
	■ describe the social amenity and use of the Proposal area and adjacent areas for rural, agricultural, forestry, fishing, recreational, industrial, educational or residential purposes. Consideration must be given to:	
	- community infrastructure and services, access and mobility;	15.2.3, 15.2.4
	- population and demographics of the affected community;	15.2.1
	- local community values, vitality and lifestyles;	15.2.5
	- recreational, cultural, leisure and sporting facilities and activities in relation to the affected area;	15.2.4.4
	- health and educational facilities;	15.2.4.3
	- on-farm activities near the proposed activities;	15.2.6.1
	- number of properties directly affected by the Proposal; and	15.3.1.1
	- number of families directly affected by the Proposal, this must include not only property owners but also families of workers either living on the property or workers where the property is their primary employment.	15.3.1.3
	■ describe the social values for the affected area in terms of the integrity of social conditions, including amenity and liveability, harmony and well being, sense of community, access to recreation, and access to social and community services and infrastructure; Social, economic and cultural values are not as easily separated as physical and ecological values. Therefore it may be necessary for some material in this section to be cross-referenced with section 4.9 Cultural Heritage and section 4.11 Economy.	15.2.5, 15.2.4, 15.2.6
4.10.2	**Potential Impacts and Mitigation Measures**	
	This section should:	

ToR Section	ToR Requirement	EIS Section
	■ define and describe the objectives and practical measures for protecting or enhancing social values;	15.3
	■ describe how nominated quantitative standards and indicators may be achieved for social impacts management, and how the achievement of the objectives will be monitored, audited and managed;	15.3
	■ consider, in the social impact assessment, the information gathered in the community consultation program and the analysis of the existing socio-economic environment, and describe the Proposal's impact, both beneficial and adverse, on the local community;	15.3.5, 15.3.1, 15.3.3
	■ analyse and discuss the impacts of the Proposal on local and regional residents, community services and recreational activities for all stages of the development;	15.3.3, 15.3.5.4
	■ describe the nature and extent of the community consultation program and a summary of the results incorporated in the EIS;	Appendix D
	■ include sufficient data to enable state authorities, such as Queensland Health and Education Queensland, to plan for the continuing provision of public services in the region of the Proposal. Proponents of proposals that are likely to result in a significant increase in population of an area must consult the relevant management units of the state authorities, and summarise the results of the consultations in the EIS. The summary must discuss how the impacts of population increase on public services, particularly health and education, would be mitigated.	15.3.1.3
	■ describe the likely response of affected communities and identify possible beneficial and adverse impacts (both immediate and cumulative);	15.3.1, 15.3.5
	■ consider impacts both at the regional and local level;	15.3
	■ taking into account the relevant demographic, social, cultural and economic profiles, provide an assessment of impacts on:	
	- local residents, current land uses and existing lifestyles and enterprises, including land acquisition and relocation issues and property valuation and marketability, community services and recreational activities;	15.3.1, 15.3.3, 15.3.4.5
	- local and state labour markets, with regard to the source of the workforce. This information is to be presented according to occupational groupings of the workforce. In relation to the source of the workforce, information is required as to whether the proponent, and/or contractors, is likely to employ locally or through other means and whether there are initiatives for local employment opportunities;	15.3.2
	- construction and operational workforces and associated contractors on housing demand, community services and community cohesion. The capability of the existing housing stock, including rental accommodation, to meet any additional demands created by the Proposal is to be discussed;	15.3.2, 15.3.1.2
	- any new skills and training to be introduced in relation to the Proposal. Adequate provision must be made for apprenticeship and worker training schemes. If possible, the occupational skill groups required and potential skill shortages anticipated must be indicated; and	15.3.2
	- service revenue and work from the Proposal (e.g. provisioning, catering and site maintenance) would be likely to flow to existing communities in the area of the Proposal, particularly if a fly-in, fly-out workforce is proposed.	15.3.3
	■ discuss the potential environmental harm on the amenity of adjacent areas used for cropping, grazing, forestry, recreation, industry, education, aesthetics, or scientific or residential purposes;	15.3.5
	■ describe the implications of the Proposal for future developments in the local area including constraints on surrounding land uses;	15.3.1
	■ analyse and describe the educational impacts of the proposed development, particularly in regard to:	
	- primary, secondary and tertiary educational sectors;	15.3.3
	- improved appreciation of conservation areas; and	15.2.5
	- environmental education for the general public.	15.2.5

ToR Section	ToR Requirement	EIS Section
	■ for identified impacts to social values, suggest mitigation and enhancement strategies and facilitate initial negotiations towards acceptance of these strategies; and	15.3.5
	■ recommend practical monitoring regimes.	15.3
4.11	**Economic Environment**	
4.11.1	**Description of Environmental Values**	
	■ This section should: ■ describe the existing economic environment that may be affected by the Proposal;	15.2
	■ describe the character and basis of the local and regional economies including:	15.2.6
	- economic viability (including economic base and economic activity, future economic opportunities, current local and regional economic trends, in particular drought and rural downturn etc);	15.2.6
	- current property values; and	15.2.2
	- historical descriptions of large-scale developments and their effects in the region.	15.2.6.3
	■ include, in the economic impact statement estimates of the opportunity cost of the Proposal and the value of ecosystem services provided by natural or modified ecosystems to be disturbed or removed during development.	-
4.11.2	**Potential Impacts and Mitigations**	
	■ This section should: ■ define and describe the objectives and practical measures for protecting or enhancing economic values, to describe how nominated quantitative standards and indicators may be achieved for economic management, and how the achievement of the objectives will be monitored, audited and managed;	
	■ present an economic analysis, including a cost-benefit analysis, from national, state, regional and local perspectives as appropriate to the scale of the Proposal;	15.4.2, 15.4.5
	■ describe the general economic benefits from the Proposal;	15.4.3, 15.4.4
	■ consider in the analysis, at a level of detail appropriate to the scale of the Proposal:	
	- the significance of this Proposal on the local and regional economic context;	15.4.2
	- the long and short-term beneficial (e.g.. job creation) and adverse (e.g.. competition with local small business) impacts that are likely to result from the development;	15.4.3.1
	- the potential, if any, for direct equity investment in the Proposal by local businesses or communities;	1.3
	- the cost to all levels of government of any additional infrastructure provision;	n/a
	- implications for future development in the locality (including constraints on surrounding land uses and existing industry);	15.4.4
	- the economic impacts of the Proposal on individuals, businesses, industries or communities, including proposed measures to mitigate any negative impact. Particular attention should be given to the extent and economic importance of any primary industries that occur within the area directly affected by the Proposal and identify any sites that may be impacted upon by the Proposal. This description should include the local and regional industrial water users, their current average volume requirements for water the use and purpose of the water used;	15.4.3, 15.4.4

ToR Section	ToR Requirement	EIS Section
	- the potential economic impact of any major hazard identified in section 4.13;	18.2
	- the distributional effects of the Proposal including proposals to mitigate any negative impact on disadvantaged groups;	15.3
	- the value of lost opportunities or gained opportunities for other economic activities anticipated in the future; and	15.4.4
	- impacts on local property values.	15.3.1
	■ discuss consideration of the impacts of the Proposal in relation to energy self-sufficiency, security of supply and balance of payments benefits;	15.4
	■ direct attention to the long and short-term effects of the Proposal on the land-use of the surrounding area and existing industries, regional income and employment and the state economy;	5.3
	■ refer the scope of any studies to the government for input before undertaking the studies.	-
	■ for identified impacts to economic values, suggest mitigation and enhancement strategies and facilitate initial negotiations towards acceptance of these strategies; and	15.4
	■ recommend practical monitoring regimes.	-
4.12	**Hazard and Risk**	
4.12.1	**Hazard and Risk Assessment**	
	This section should: ■ describe the potential hazards and risk that may be associated with the Proposal;	18.2, 18.3
	■ present an analysis conducted into the potential impacts of both natural and induced emergency situations and counter disaster and rescue procedures as a result of the Proposal on sensitive areas and resources such as forests, water reserves, State and local Government controlled roads, places of residence and work, and recreational areas;	18.2, 18.3
	■ undertake a preliminary risk assessment for all components of the Proposal (dam wall, quarries, clearing, downstream flooding) as part of the EIS process in accordance with appropriate parts of AS/NZS Risk Management Standard 4360:1999;	18.2, 18.3
	■ defines and describes the objectives and practical measures for protecting people and places from hazards and risk;	18.4, 18.5
	■ describe how nominated quantitative standards and indicators may be achieved for hazard and risk management, and how the achievement of the objectives will be monitored, audited and managed;	18.4, 18.5
	■ detail the environmental values likely to be affected by any hazardous materials and actions incorporated in the Proposal; and	18.2, 18.3
	■ detail the degree and sensitivity of risk.	18.2, 18.3.4, 18.3.6
4.12.2	**Risk Management Plans**	
	■ The proponent must develop an integrated risk management plan for the whole of the life of the Proposal including construction and operation phases;	18.5.2
	■ The plan must include a preliminary hazard analysis (PHA), conducted in accordance with appropriate guidelines for hazard analysis (e.g. HAZOP Guidelines, NSW Department of Urban Affairs and Planning (DUAP));	18.3.4, 18.3.6
	■ The assessment must outline the implications for and the impact on the surrounding land uses, and must involve consultation with Department of Emergency Services, Queensland Fire and Rescue Authority, and Queensland Ambulance Service;	18.3.4

ToR Section	ToR Requirement	EIS Section
	■ The preliminary hazard analysis must incorporate:	18.3.4
	- all relevant majors hazards both technological and natural;	18.3.4
	- the possible frequency of potential hazards, accidents, spillages and abnormal events occurring;	18.3.4
	- indication of cumulative risk levels to surrounding land uses;	18.3.4
	- life of any identified hazards;	18.3.4
	- description of processes, type of the machinery and equipment used;	18.3.4
	- potential wildlife hazards such as crocodiles, snakes, and disease vectors; and	18.3.4
	- public liability of the State for private infrastructure and visitors on public land.	18.3.4
	■ The plan must include the following components:	18.5
	- operational hazard analysis;	18.5
	- regular hazard audits;	18.5
	- fire safety, emergency;	18.5
	- response plans;	18.5
	- qualitative risk assessment; and	18.3
	- construction safety.	18.3
	■ where relevant, each of these components must be prepared in accordance with the relevant NSW DUAP Hazardous Industry Planning Advisory Paper (HIPAP).	18.2, 18.3
4.13	**Cumulative Impacts**	
	This section should: ■ provide clear and concise information on the overall impacts of the Proposal, and to discuss the interrelationship of these impacts, in addition to the discussion of cumulative impacts which feature in the relevant sections;	
	■ discuss the cumulative impacts as they relate to particular issues (e.g. air, water, cultural heritage, social, noise);	19.2.5
	■ consider these impacts over time or in combination with other impacts because of the scale, intensity, duration or frequency of the impacts;	19.2.4
	■ address, in particular, the requirements of any relevant State Planning Policies, EPPs, National Environmental Protection Measures and any relevant Integrated Catchment Management Plans;	19.1
	■ discuss the methodology to be used to determine the cumulative impacts of the Proposal;	19.1
	■ detail, in the methodology, the scope or range of variables to be considered including, where applicable, relevant baseline or other criteria upon which the incremental aspects of the Proposal must be assessed.	19.1
4.14	**Cross-Reference with the Terms of Reference**	
	This section should provide a cross reference of the findings of the relevant sections of the EIS, where the potential impacts and mitigation	Appendix A

ToR Section	ToR Requirement	EIS Section
	measures associated with the Proposal are described, with the corresponding sections of the ToR.	
5	**Environmental Management Plan**	
	The environmental management plan (EM Plan) must be developed from the mitigation measures detailed in part 4 of the EIS. Its purpose is to set out the proponents' commitments to environmental management that is, how environmental values will be protected and enhanced. The general contents of the EM Plan must comprise: ■ the proponents' commitments to acceptable levels of environmental performance, including environmental objectives, i.e. levels of expected environmental harm, performance standards and associated measurable indicators, performance monitoring and reporting;	19.2.1
	■ impact prevention or mitigation actions to implement the commitments;	19.2.1
	■ corrective actions to rectify any deviation from performance standards; and	19.2.9
	■ the description of and timeframes for implementation of compensatory habitat measures and offsets developed for loss of flora and fauna habitats.	19.3.7, 19.3.8
6	**References**	
	This section should ensure that all references consulted should be presented in the EIS in a recognised format.	21
7	**Recommended Appendices**	
A1.	Final Terms of Reference for this EIS	A
A2.	Development Approvals	B
A3.	Potential Impacts on Matters of National Environmental Significance	C
A4.	Study Team	E
A5.	Consultation Report	D
A6.	Specialist Studies	Supporting Technical Documents
A7.	Research	F
A8	List of Proponent Commitments	G

Appendix B Statutory Permits and Development Approvals

Approvals/ Permit Requirements	Legislation	Approving Authority	Approval Triggers
Referral to the Department of the Environment, Water, Heritage and the Arts	*Environment Protection and Biodiversity Conservation Act 1999*	DEW	Referral to the Department of the Environment, Water, Heritage and the Arts (DEW). It has been identified that the project is likely to be a controlled action, therefore requiring Commonwealth approval. Under a bilateral agreement, the DEW will asses the project through the 'State Significant Project' EIS process under the SDPWOA.
Declaration of as a State Significant Project Environmental Impact Statement (EIS)	*State Development and Public Works Organisation Act 1971*	Coordinator General	The project has been declared a State Significant Project, therefore an EIS is required to be prepared, and approved by the Coordinator General. Importantly, all IPA approvals are still required to be obtained.
Water Entitlement Licence	*Integrated Planning Act 1997* *Water Act 2000*	DNRW Chief Executive	Evidence of an allocation or entitlement to the 'resource' (water) is required to ensure that appropriate entitlement or authority is in place prior to 'taking or interfering' with water under the Water Act 2000. This entitlement is essentially 'owner's consent' for State resources (i.e. water), and must be obtained prior to the submission of any IPA development applications associated with the Emu Swamp Dam Approvals.
Resource Operations Plan Licence	*Water Act 2000*	DNRW Chief Executive	Resource Operations Licence represents the licence to operate the water infrastructure.
Failure Impact Assessment	*Water Act 2000*	DNRW Chief Executive	Works for construction of the dam
Operational Works – Referable Dam	*Integrated Planning Act 1997* *Water Act 2000*	DNRW	This approval is required for the construction of a referable dam
Operational Works – Constructing or raising a Waterway Barrier	*Integrated Planning Act 1997* *Water Act 2000*	DPIF	Required when constructing or raising a barrier across a waterway.
Operational Works – Taking or Interfering with water	*Integrated Planning Act 1997* *Water Act 2000*	NRW	Required for all work in a watercourse
Operational Works – Clearing of Remnant Vegetation	*Integrated Planning Act 1997* *Vegetation Management Act 1999* *Land Act 1994*	NRW	Vegetation Clearing is exempt from assessment under the VMA and IPA as per Section 74 of the VM Act. An application for clearing native vegetation in a road reserve under the *Land Act 1994* will be required.

Approvals/ Permit Requirements	Legislation	Approving Authority	Approval Triggers
Development application Material Change of Use (MCU) for the following Environmentally Relevant Activities ■ ERA 7 – Chemical Storage ■ ERA 11 - Petroleum Storage ■ ERA 19 – Dredging Material ■ ERA 20 – Extracting Rock or other material ■ ERA 22 – Screening Materials ■ ERA 62 – Concrete Batching ■ ERA 84 – Regulated Waste Storage	*Integrated Planning Act 1997* *Environmental Protection Act 1994*	EPA	An Allocation of Quarry Material and resource entitlement would need to be obtained prior to the submission of this application.
Registration Certificate to conduct ERAs			Registration Certificates are required to be obtained by the person(s) proposing to undertake the ERA(s). This is submitted in conjunction with the ERA applications.
Resource Entitlement	*Land Act 1994* *Integrated Planning Act 1997*	DNRW	A Resource Entitlement is essentially 'owner's consent' for State resources must be obtained for works that are proposed to be undertaken on Unallocated State land. This entitlement must be obtained prior to the submission of any IPA development applications.
Allocation of Quarry Material	*Integrated Planning Act 1997* *Water Act 2000*	DNRW	Evidence of an allocation or entitlement to the 'resource' (quarry material) is required to ensure that appropriate entitlement or authority is in place prior to the taking of material from the bed or banks of a watercourse or lake. This entitlement is essentially 'owner's consent' for State resources (i.e. quarry material), and must be obtained prior to the submission of any IPA development applications associated with the removal of this material.
Riverine Protection Permit	*Water Act 2000*	DNRW	A watercourse is defined as a river, creek or stream in which water flows permanently or intermittently, and includes the bed and banks and any other element of a river, creek or stream confining or containing water. A Riverine Protection Permit to will be required if the construction work proposes to destroy vegetation, excavate or place fill in a watercourse, lake or spring.
Ancillary Works Encroachment Approval	*Transport Infrastructure Act 1994*	DMR	A permit to undertake works in a State-Controlled Road
Approval to interfere with a railway	*Transport Infrastructure Act 1994*	QR	A permit to undertake works in a Railway

Approvals/ Permit Requirements	Legislation	Approving Authority	Approval Triggers
Approval to disturb, harm or destroy any species listed	*Nature Conservation Act 1992*	QPWS	A Permit will be required to distrurb, harm or destroy listed species.
Material Change of Use – Extractive Industry	*Integrated Planning Act 1997*	SSC	Required if an extractive industry is proposed outside of the Community Infrastructure Designation.
Permit under Local Law No. 12 Blasting Operations Local Law	*Local Government Act 1994*	SSC	Required for blasting for quarrying purposes
Permit under Local Law No. 14 Control of Nuisances Local Law	*Local Government Act 1994*	SSC	Permit required where activity would be unlawful under the local law
Permit under Local Law No. 17 Roads Local Law	*Local Government Act 1994*	SSC	Permit required to alter or improve a road (local government alterations are exempt)

Appendix C Matters of National Environmental Significance

1. Introduction

1.1 Background

The Emu Swamp dam site is located on the Severn River between Fletcher Road and Emu Swamp Road in Stanthorpe Shire. The dam site is 5 km north of Ballandean and 15 km southwest of Stanthorpe.

Stanthorpe Shire Council (SSC) is the Proponent of the Project. SSC undertakes and delivers a wide range of business and municipal activities and services to service and support the community of the Stanthorpe Shire

There are two dam options being considered for the Project.

- Urban Water Supply Dam; and
- Combined Urban and Irrigation Dam.

The Emu Swamp Dam Project has four major components. These are:

- Emu Swamp Dam;
- Stalling Lane Access Road;
- Urban Pipeline; and
- Irrigation Pipeline.

The Urban Water Supply Dam has a storage capacity of 5,000 ML. The FSL is 734.5 m AHD with an associated inundation area of 110 ha. The proposed water entitlement licence is 1,500 ML/year as provided in the *Water Resource (Border Rivers) Plan* (WRP) (DNRW 2003). The proposed dam and pipeline is sized to deliver 750 ML/year and the average annual yield will be 696 ML.

The Combined Urban and Irrigation Dam has a storage capacity of 10,500 ML. The FSL is 738 m AHD with an associated inundation area of 196 ha. The proposed water entitlement licence for the Urban component is 1,500 ML/year. The proposed water entitlement licence for the Irrigation component is 1,740 ML/year as provided in the WRP and the draft *Border Rivers Resource Operations Plan* (ROP). This dam option can deliver an average 696 ML/year of urban water plus 1,384 ML/year of irrigation water.

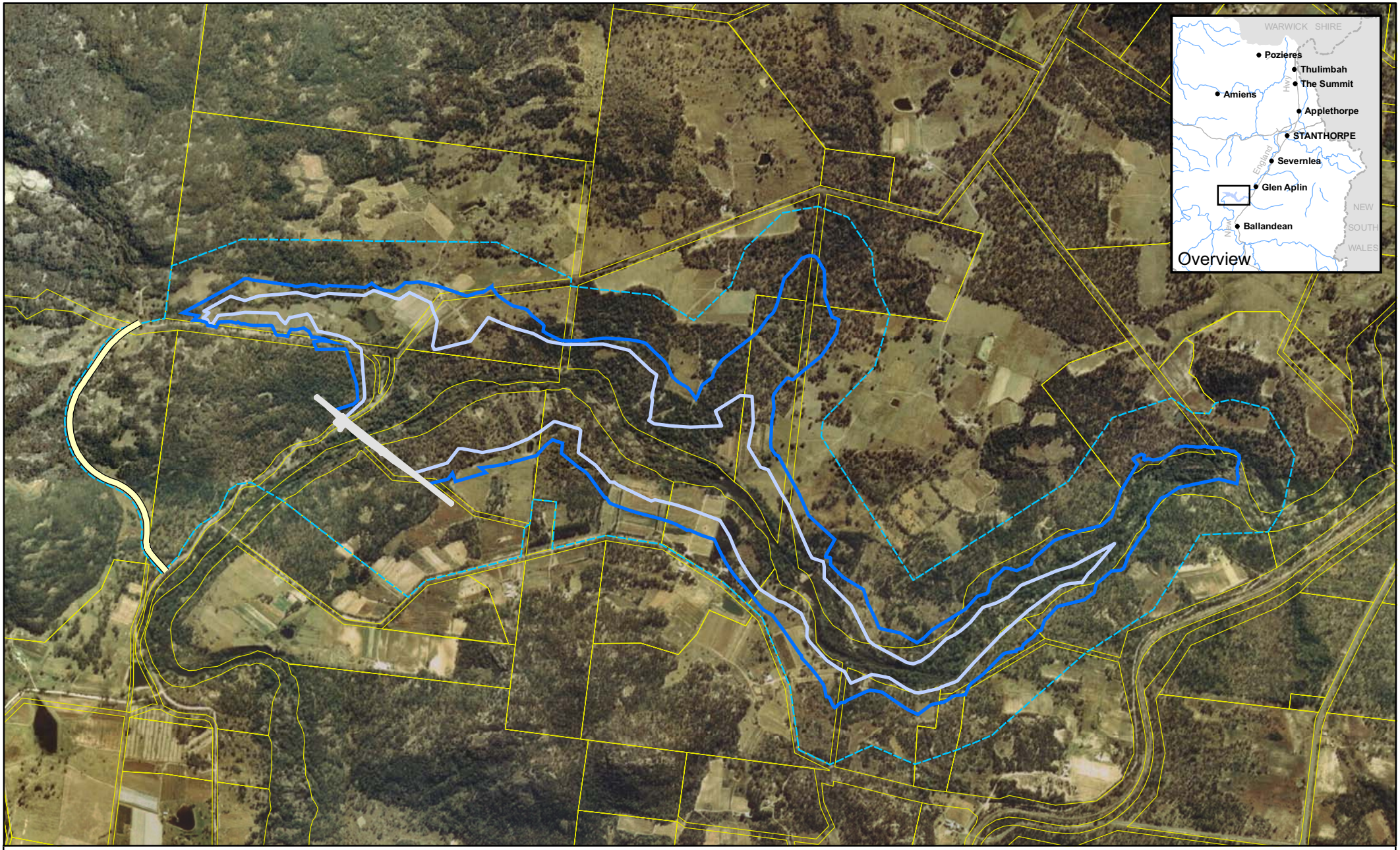
The proposed inundation areas for both dam options are presented in **Figure 1**. A buffer area of approximately 200 m is proposed surrounding the dam to protect the water quality within the dam and also to maintain ecological connectivity within the region.

The inundation area for the proposed dam will result in the closure of Emu Swamp Road. As a result of this closure Stalling Lane will no longer be accessible from Emu Swamp Road. Stalling Lane currently provides access to two properties. To maintain this access, the Stalling Lane Access is proposed to be constructed from Fletcher Road to the western end of Stalling Lane. The location of the Stalling Lane Access is presented in

.

A 23 km pipeline (the Urban Pipeline) would connect the dam to the Mt Marlay water treatment plant near Stanthorpe. The internal diameter of the Urban Pipeline will vary from 250 to 375 mm. The Urban Pipeline will be buried to a depth of approximately 1 m (with at least 600 mm depth of cover) with the potential disturbance expected to be up 5 m in width. The Urban Pipeline route is presented in **Figure 2**.

An irrigation pipeline network of approximately 102 km (the Irrigation Pipeline) would connect the dam to a number of irrigators throughout Stanthorpe Shire. The Irrigation Pipeline will be constructed from flexible pipe materials like high-density polyethylene (HDPE) and polyvinyl chloride (PVC) and will range in size from 40 mm to 300 mm diameter. The inundation area Stalling Lane Access, Urban and Irrigation Pipeline are considered the Project area. The Project area is presented in **Figure 2.**



SHIRE OF STANTHORPE

Legend

- Full Supply Level 734.5m AHD
- Full Supply Level 738m AHD
- Buffer Area
- Dam Wall
- Stalling Lane Access
- Cadastre

N W E S

0 100 200 400 600 800

Metres

Scale - 1:20,000 (at A4)

Projection: Map Grid of Australia Zone 56

EMU SWAMP DAM EIS

Emu Swamp Dam Site

Figure 1
Inundation Areas and Buffer Area

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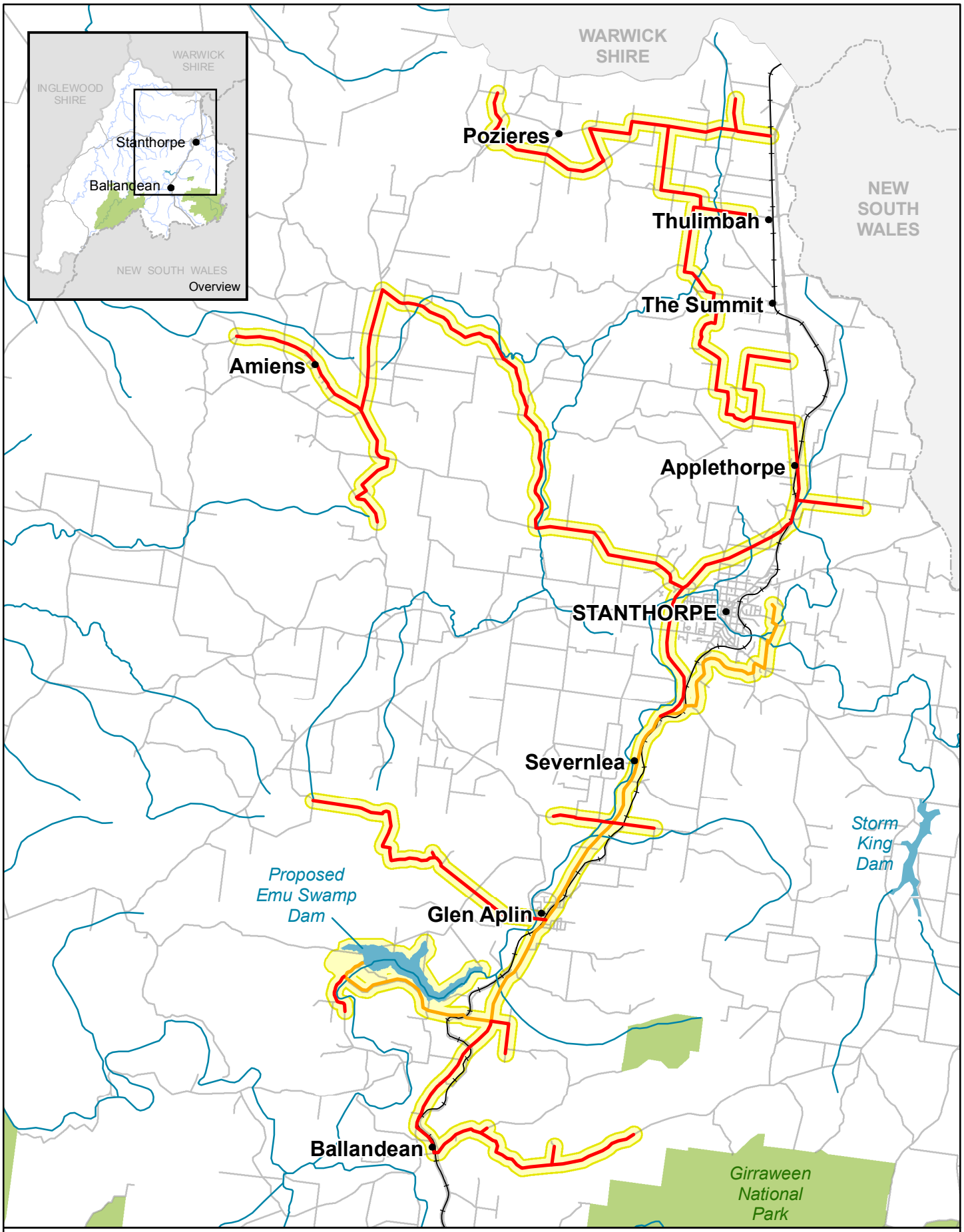

SHIRE OF STANTHORPE

Legend

- Urban Pipeline
- Irrigation Pipeline
- Inundation Area
- Project Area

N W E S

0 0.5 1 2 3 4 5 6

Kilometres

Scale - 1:150,000 (at A4)

Projection: Map Grid of Australia Zone 56

EMU SWAMP DAM EIS

Project Area

Figure 2 Proposed Emu Swamp Dam, Urban Pipeline and Irrigation Pipeline

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1.2 Statutory Context - Commonwealth Legislation

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) prescribes the Commonwealth's role in environmental assessment, biodiversity conservation and the management of protected areas. Under the environmental provisions of the EPBC Act, actions that are likely to have a significant impact on a matter of National Environmental Significance (NES) are identified as "controlled actions" and cannot be undertaken without approval under the EPBC Act.

The Project was referred to the Department of Environment, Water, Heritage and the Arts (DEW) in December 2006. SSC nominated the Project as a "controlled action" under Section 75 of the EPBC Act on the basis of its potential impact on listed threatened species and ecological communities. The DEW determined the Project is a controlled action and therefore the Project will require approval under Part 9 of the EPBC Act before it can proceed.

The matters of NES to be specifically addressed under the requirements of the EPBC Act are the Project's impact and mitigation measures relating to the species and communities listed under the EPBC Act, including but not limited to those specified in the EIS Terms of Reference as listed below:

- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland – critically endangered;
- *Acacia pubifolia* – vulnerable;
- *Babingtonia granitica* – vulnerable;
- *Boronia granitica* – endangered;
- *Cadellia pentastylis* – vulnerable;
- *Callistemon pungens* – vulnerable;
- *Digitaria porrecta* – endangered;
- *Goodenia macbarronii* – vulnerable;
- *Homoranthus montanus* – vulnerable;
- Squatter Pigeon (*Geophaps scripta scripta*) – vulnerable;
- Swift Parrot (*Lathamus discolor*) – endangered;
- Black-throated Finch (*Poephila cincta cincta*) – endangered;
- Regent Honeyeater (*Xanthomyza phrygia*) – endangered;
- Spotted-tail Quoll (*Dasyurus maculatus maculatus*) – endangered; and
- Brush-tailed Rock-wallaby (*Petrogale penicillata*) – vulnerable.

1.3 Information Requested

In accordance with the Terms of Reference for the Project, the stand alone assessment of impacts on matters of NES is required to include the following:

- Description of the Affected Environment Relevant to the Matters Protected. It is important that the current status of the matters protected under the EPBC Act be described in sufficient detail, to inform the analysis of the Project's impact on these matters. For listed threatened species, the description of the environment should include:
  i. the species' current distribution;
  ii. relevant information about the ecology of the species (habitat, feeding and breeding behaviour etc);
  iii. information about any populations of the species or habitat for the species in the area affected by the proposed action;
  iv. current pressures on the species, especially those in the area to be affected by the proposal; and
  v. relevant controls or planning regimes already in place.
- Assessment of Relevant Impacts and Mitigation Measures. In this section, the impacts and potential impacts on the matters protected should be described, and the possible mitigation measures for each impact need to be analysed. If alternative ways of taking the action have been identified, the relative impacts of these alternatives should also be considered. When effective mitigation measures are not available, the discussion should be broadened to include compensatory measures to offset unavoidable impacts.
- Potential Significant Impacts on Matters of NES. The following potential impacts may need to be addressed in the EIS:
  i. lead to long term decrease in the size of a population;
  ii. reduce the area of occupancy of the species;
  iii. fragment an existing population into two or more populations;
  iv. adversely affect habitat critical to the survival of the species;
  v. disrupt the breeding cycle of a population;
  vi. modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;
  vii. result in invasive species that are harmful to the species becoming established;
  viii. introduce disease that may cause the species to decline;
  ix. interfere with the recovery of the species or ecological community; or
  x. consistency with any recovery plan.

2. Description of the Existing Environment

2.1 Study Methodology

2.1.1 Terrestrial Flora Methodology (3D Environmental 2007)

Desktop Literature Review

A search of relevant databases provided background information regarding the presence and distribution of flora species known from the Project area and the broader region. This included searches of the Commonwealth EPBC Online Protected Matters Search Tool, the Queensland Herbarium's HERBRECS database and the Queensland Environmental Protection Agency's (EPA) WildNet database. Regional Ecosystem (RE) mapping sourced from the Queensland Department of Natural Resources and Water (DNRW) provided the basis for vegetation community assessment, and site data extracts sourced from the Queensland Herbarium's HERBRECS and CORVEG databases provided a basis for assessment of flora species distributions. Previous mapping exercises were also reviewed, as well as biodiversity/conservation assessments, recovery plans and published ecological research completed by government agencies and private organisations over relevant sections of the Project area.

Aerial Photograph Analysis and Site Location

A stereoscopic assessment of April 1999 1:40, 000 scale aerial colour aerial photographs, the most recent available, allowed the establishment of preliminary vegetation line work and polygon attribution, completed in reference to the available regional ecosystem (RE) mapping. This provided a preliminary understanding of the limitations of the current certified RE mapping. Historical aerial photographs (1989) were utilised in the Project as an aid to understanding site history, and to assist in the classification of non-remnant or regrowth vegetation.

A suite of survey sites were chosen from aerial photograph analysis to ensure that the field survey:

a) targeted a representative range of habitats within the Project area;

b) sampled those communities that were useful for providing reference conditions for disturbed communities (best type examples); and

c) directed detailed sampling towards those communities that could not be adequately categorised through aerial photograph interpretation (API), or were considered critical to a range of Endangered, Vulnerable or Rare (EVR) flora species.

Further sites were added opportunistically during the field survey to provide a more complete data coverage and to verify the mapping units. A summary of the survey locations for individual Project components is provided in **Table 1**.

Table 1 Vegetation Survey Effort

Project Area	Survey Effort	Number of Locations
Inundation Area	Secondary	15
	Quaternary	33
Stalling Lane Access	Secondary	3
	Quaternary	7
Urban Pipeline	Quaternary	42
Irrigation Pipeline	Quaternary	168

Field Survey Technique

Field survey methods followed Queensland Herbarium standards (Neldner *et al* 2005) using a combination of formalised secondary, tertiary and quaternary level sampling procedures, as well as informal site observations. Field proformas from Neldner *et al* (2005) were modified to suit sampling requirements specific to this Project and

to incorporate data on vegetation condition, fauna habitat features and landscape function. The core field information recorded included site location, tenure, air photo and site photo references, landform and geological features, and vegetation community structure. Complete species lists were compiled wherever these were considered appropriate. Canopy height was meticulously measured at all sample locations using a clinometer and linear regression table, and canopy cover was recorded in secondary sites using measured crown intercept transects. A Garmin GPS 60 (Geographic Positioning System) was used to accurately record map coordinates for the site locations (GDA94).

Secondary sites consisted of a standard 50 m x 10 m plot located along the contour. Attempts were made to avoid sampling on vegetation community boundaries, which was difficult in some of the linear vegetation communities. Bitterlich measurements to measure basal area were completed at all sites except in linear communities where the method proved inappropriate. Full species lists for all strata were established during the secondary sampling procedure wherein the 500 m^2 plot was intensively sampled, followed by a detailed search of the vicinity to record additional species. While the vicinity search was broadly defined by the extent of the basal area sweep, it was in all cases confined to the target community. The abundance of all species within the plot was recorded by stem counts and a visually assessed ranking of cover abundance using the Braun-Blanquet scale.

Tertiary sites were completed in a similar fashion to the secondary procedure, except that non-woody species were not recorded. Several sites recorded at tertiary level comprised a full species list in a search area established via a radial sweep of the Bitterlich device. Survey to quaternary level was completed on sites where access permission was granted, and comprised a description of the floristic structure, composition, and the associated landform. Wherever a vegetation community was considered to be potential critical habitat for an EVR species, the search area was broadened and a more extensive species list was established from the extended search area. Flora species were also recorded on walking traverses, again with particular attention to locating EVR and regionally significant taxa.

Botanical voucher specimens were collected throughout the field survey to verify site floristics and to enable identification of those species that were taxonomically problematic. All material was pressed, labelled, and cross referenced, and of sufficient size and quantity to be incorporated into the Queensland Herbarium collection, if required. Expert advice on identification of problematic species was provided by Queensland Herbarium Advisory Services and a regional flora expert. Site/species field data was entered into an Excel spreadsheet, enabling analysis of flora values within vegetation communities and REs.

The field survey of the inundation area was completed in two phases enabling a thorough assessment of vegetation communities and individual species. An initial survey was completed in December 2006, during which the bulk of the vegetation communities were sampled and floristic data gathered. A secondary winter survey was completed in June 2007. This allowed an assessment of seasonal floristic variation and allowed targeted searches for winter flowering (or emerging) species. Winter survey methods included secondary sampling of standard 50x10m plots in representative REs in conjunction with a thorough floristic search of a 1 ha area in the site locality. Numerous meander searches were also undertaken through a range of ecosystems.

Single phases of survey were completed for the Urban Pipeline (December 2006), the Stalling Lane Access (June 2007), and the Irrigation Pipeline (July 2007). These surveys were directed at identifying constraints and as such, were focused on the identification of EVR flora species, vegetation communities (including REs) with special conservation significance, and declared weed species. Comprehensive species lists were not compiled for these portions of the Project although potentially significant species were collected and voucher specimens submitted for verification to the Queensland Herbarium. Due to the proximity of the Stalling Lane Access to the dam inundation area, and the inclusion of a number of detailed secondary survey locations in the road survey effort, floristic data collected during this survey has been incorporated into the overall species lists.

Classification of Land and Vegetation

A vegetation type is defined as a unit of structurally and floristically similar vegetation, whilst a land type is defined as a unit of structurally and floristically similar vegetation on a similar geology (Stanton and Morgan 1977, Sattler

and Williams 1998). Land types in this exercise are referred to as 'vegetation communities' and are consistently referred to as such throughout this document. Vegetation communities are classified herein according to a primary geological subdivision and a vegetation type. These codes may be complemented by an appended code indicating particular structural attributes (e.g. a vine forest sub-canopy), or an indicator of vegetation condition.

Vegetation communities are often amalgamated to form REs, and these communities may retain autonomy through classification as a regional ecosystem sub-unit. REs are comprised of a three-part code of which the primary subdivision is the bioregional zone, followed by geology or land zone, with vegetation being the final subdivision in the classification. RE's are assessed on a state wide basis for conservation significance, as regulated by Queensland's Vegetation Management Act 1999 (VMA). Vegetation structure is classified according to the system of Specht (1970) as modified by Neldner *et al* (2005), (refer **Table 2**). This classification has been applied consistently to vegetation throughout the field survey and broader flora baseline study.

- **Table 2 Structural formation classes qualified by height for non-rainforest vegetation: Neldner *et al* (2005) modified from Specht (1970)**

Projective Foliage Cover	**70-100%**	**30-70%**	**10-30%**	**<10%**
Approximate Crown Cover%	80 - 100%	50 - 80%	20 - 50%	< 20%
Crown separation	closed or dense	mid-dense	Sparse	very sparse
Growth Form	**Structural Formation Classes (qualified by height)**			
Trees > 30 m	tall closed-forest (TCF)	tall open-forest (TCF)	tall woodland (TW)	tall open-woodland (TOW)
Trees 10 – 30 m	closed-forest (CF)	open-forest (OF)	woodland (W)	open-woodland (OW)
Trees < 10 m	low closed-forest (LCF)	low open-forest (LOF)	low woodland (LW)	low open-woodland (LOW)
Shrubs 2 – 8 m	closed-scrub (CSC)	open-scrub (OSC)	tall shrubland (TS)	tall open-shrubland (TOS)
Shrubs 1 – 2 m	closed-heath (CHT)	open-heath (OHT)	shrubland (S)	open-shrubland (OS)
Shrubs <1 m	-	Dwarf open-heath (DOHT)	dwarf shrubland (DS)	dwarf open-shrubland (DOS)
Succulent shrub	-	-	succulent shrubland (SS)	dwarf succulent shrubland (DSS)
Hummock grasses	-	-	hummock grassland (HG)	open hummock grassland (OHG)
Tussock grasses	closed-tussock grassland (CTG)	tussock grassland (TG)	open tussock grassland (OTG)	sparse-tussock grassland (STG)
Herbs	closed-herbland (CH)	Herbland (H)	open-herbland (OH)	sparse-herbland (SH)
Forbs	closed-forbland (CFB)	Forbland (FB)	open-forbland (OFB)	sparse-forbland (SFB)
Sedges	closed-sedgeland (CV)	Sedgeland (V)	open-sedgeland (OV I)	-

As a general rule applied in this Project and consistent with standard herbarium methods, a vegetation polygon is classified as non-remnant if its total width is less than 15 m, and the vegetation polygon is less than 1 ha in size and isolated from remnant vegetation communities.

Mapping Scale

For vegetation survey, Neldner *et al* (1995) recommend a minimum of half the sampling density required by the Food and Agricultural Organisation of the United Nations (FAO 1979) for soil survey. This equates to a minimum of two sites per km2 for 1:25 000 scale mapping, and 12.5 sites/km2 for 1:10, 000 scale mapping. As such, a proposed dam inundation area of 2.5 km^2 (excluding the pipeline easement) requires 31 sites for 1:10,000 scale mapping, assuming total cover of remnant vegetation. With cleared horticultural lands comprising 28% of the project area, site data requirements for 1:10,000 scale mapping in the project area are reduced significantly. With 48 sites sampled within the inundation area, the collected site information exceeds data requirements for 1:10,000 scale mapping. Highly detailed delineation of vegetation communities is constrained, however, by the spatial resolution of the available 1:40,000 scale aerial photographs used for the study.

Digital Processing and Accuracy

The marked aerial photographs were scanned at a resolution of 300 dpi. Each photo was then registered within ArcMap using the geo-registration extension against the digital cadastral database (DCDB). Upon completion of photo registration, the identified boundaries were captured as line work. Final editing was performed when all of the boundaries had been captured, prior to generation of polygons in ARC/INFO format.

The accuracy for the 1:40,000 scale aerial photography is equivalent to 1 mm on the photograph being equal to 40,000 mm on the ground. All aerial photograph line-work was between 1 – 2 mm on the aerial photography generating an accuracy of 40 to 80 m. The RMS error obtained during photo registration varies depending on the underlying terrain. In general, the RMS error for the 1:40,000 scale aerial photographs is in the range of 40 to 80 m, with variation due mainly to the underlying terrain - steeper terrain produces greater radial distortion on each photograph.

Shire wide spot imagery supplied by the SSC was utilised as a supplementary control for air photo registration on the Irrigation Pipeline. Spatial inconsistencies in the DCDB and Spot Imagery Spatial inconsistencies in the DCDB and Spot Imagery, which were used as a primary means of spatial registration, introduced an additional source of error into the spatial processing. As such, the vegetation line-work generated in the Irrigation Pipeline exercise is useful for identification of constraints and preliminary environmental planning. The accuracy of floristic collection points and survey locations is within the range of 4-8m, determined by GPS.

Flora Assessment Methods

The site selection method targeted samples of representative habitats throughout the Project area for vegetation mapping purposes and also allowed assessment of the vascular flora of the project area. Structural and floristic data was entered onto proformas and transferred into Excel format within a site by species framework. The dataset included a range of fields relevant to the site e.g. location, condition status, community type, RE and VMA status. Data relevant to individual species, such as collection number, conservation status, exotic status, bioregional endemicity, disjunction, and distribution limit was assigned as determined by the literature review.

The resultant dataset provided a detailed flora list for the survey and allowed identification and mapping of a range of flora values, including taxa of state significance and other priority species and their habitats. Lists derived from the HERBRECS and WildNet databases and information contained within published and unpublished literature for the area were also assessed to assist in predictive analysis of species distributions. Interpretation of raw data assists in the assessment of spatial distribution of known records of EVR flora and in identification of their habitat. Data output also assists in the development of a flora species checklist. Nomenclature follows Bostock and Holland (2007).

2.1.2 Terrestrial Fauna Methodology (BAAM 2007)

Prior to the field survey, public databases were searched in order to provide background information regarding terrestrial vertebrate fauna species known from the region and local area. This included searches of the Commonwealth's EPBC Online Protected Matters Search Tool, the EPA's WildNet database, Birds Australia's bird database, and the Queensland Museum's fauna database for the Project area and surrounds. Information gained from this phase of the Project was used to:

- Ensure that survey methods were designed to detect species of significance known from the region; and
- Determine which species are most likely to occur if suitable habitat was located within the Project area. Those species that are known from recent, nearby records are considered more likely to occur if suitable habitat is located.

In addition, all other relevant information relating to the project, Project area and the survey was reviewed, where available. This included aerial photography, mapping of vegetation, geology, land zones and topography, and all relevant planning documentation/mapping administered by SSC and the Queensland Government.

Two fauna surveys were conducted were completed for the inundation area and Stalling Lane access road: a summer survey from 19th to 23rd December 2006 and an autumn/winter survey from 26th May to 1st June 2007.

Habitat assessment of the proposed Urban Pipeline was undertaken concurrently with summer survey in December 2006. Habitat assessment of the proposed Irrigation Pipeline was undertaken from the 9th to 11th July 2006.

- **Table 3 Description of Systematic Survey Sites in Inundation Area**

Site	Description
1	Open woodland with a low canopy dominated by half-bark box trees (e.g. *Eucalyptus melliodora*) and slightly more abundant stringybarks (e.g. *E. blakelyi*). *Callitris endlicheri* is also common as a low- to mid-canopy species. The shrub layer is relatively open, consisting predominantly of J*acksonia scoparia* and some *Callitris* recruitment. The ground layer consists of native tussock grasses interspaced by deep leaf litter. Fallen timber is common, and the site is characterized by emergent granite rock
2	Open woodland, essentially the same vegetation community as Site 1, though structurally different. The canopy is relatively similar, with a low open structure consisting of *E. melliodora*, *E. youmanii*, *E. blakelyi* and *E. prava*. However, Site 2 includes several *E. bridgesiana* with mallee type growth. Most significantly, the shrub layer is dominated by *Leptospermum brachyandra* which forms thick dense stands up to three metres tall. Under these dense shrubs the ground cover is reduced to leaf debris, though in areas where the shrubs are less dense the ground cover is dominated by tussock grasses. Fallen timber is abundant and of a variety of sizes. Granite rocks, including some large exfoliating slabs, emerge from the ground in places. The site includes a small dam with open water. The dam edges, though somewhat disturbed by cattle and feral pigs, contain *Myriophyllum* waterweed
3	Non-remnant vegetation. The canopy is absent due to historical clearing activities. The low, but very dense, shrub layer consists of regrowth canopy species including *E. youmanii*, *E. prava*, *Angophora subvelutina* and some *Callitris endlicheri*. These species were probably dominant in the canopy prior to clearing. Some shrub species, including Acacia species and *J. scoparia*, are also common. The site differs from the other systematic survey sites by its comparative lack of fallen timber, fewer emergent granite rocks and the domination of the ground cover by thick, relatively tall blady grass *Imperata cylindrica*
4	*Eucalyptus melliodora*, *E. youmani*i, *E. blakelyi* and *E. prava* woodland. The canopy consists of similar species to sites 1 and 2 but is taller, with greater foliage providing increased shelter and foraging resources. No, or very few, *Callitris* trees are present either as a midcanopy species or in the understorey. However, *J. scoparia* is quite common and forms the bulk of the relatively sparse shrub layer. The ground cover consists of tussock grasses interspersed with abundant fallen timber and leaf litter. On the higher portions of the site, granite outcrops are abundant as both large boulder piles embedded into the surface and open flat exfoliating slabs. The site is close by the Severn River, where the eucalypt canopy is replaced on the river banks by low dense *Melaleuca alternifolia*. Water within the river at this location was restricted to a series of small pools

In order to represent each of the basic vegetation/habitat types area four systematic survey sites were established within, or immediately adjacent to, the proposed inundation area. The systematic survey sites are briefly described in **Table 3** in terms of vegetation and structure. The specific survey techniques employed during the summer terrestrial vertebrate fauna survey are presented in **Table 4**.

Table 4 Fauna Survey Techniques for Summer and Autumn/Winter Surveys

Survey Technique	Summer Survey	Autumn/Winter Survey
Box traps	Over four nights 20 Elliot type 'A' traps and 2 cage traps were deployed at each of four systematic survey sites. Traps were placed on the ground 5-8 m apart using a variety of baits (rolled oats, peanut butter, oil and vanilla +/- salami). Trap placement was influenced by vegetation diversity, the size and shape of the vegetation patches and by naturally occurring features such as logs, rock outcrops, tree bases and clumping vegetation. These traps were cleared early morning and reset in late afternoon in accordance with animal ethics requirements.	For the targeted surveys for the Spotted-tailed Quoll *Dasyurus maculatus maculates*, one cage trap was deployed at each of eight trap sites over three nights. Traps were placed on the ground and baited with chicken and sardines. Trap placement was influenced by vegetation diversity, the size and shape of the vegetation patches and by naturally occurring features such as logs, rock outcrops, tree bases and clumping vegetation. These traps were cleared early morning and reset in late afternoon in accordance with animal ethics requirements.
Diurnal searches	Active diurnal searches were undertaken at each of four trapping sites. This involved intensive investigation of ground layer (under logs, rocks and leaf litter), low vegetation (under bark and in tree stumps) and rock crevices for all amphibians, reptiles, bats and animal signs (e.g. scats, owl pellets, orts (bird feeding remnants), remains and tracks). Searches were conducted in conjunction with the morning bird censuses and trap clearing activities, as well as during the warmer parts of the day when reptile activity was likely to be at its peak, totalling approximately 1 hr/site/day.	
Diurnal Bird Censuses	Birds were surveyed at each of four trapping sites using a timed transect technique. Each site was surveyed for approximately 30 minutes in the morning and afternoon by pausing at each fifth ground trap for six minutes. Birds were identified from either direct observation or their calls. Additional bird records were collected during random meander searches of other habitats or areas that were considered suitable for cryptic or rare species, as well as during other survey elements and opportunistically.	
Pitfall traps	At each of four trapping sites, four pitfall traps (20 or 10 litre containers, depending on substrate) were buried flush to the ground surface and connected by a 20 m drift fence. These traps were open for four nights and were cleared early morning and reset in late afternoon in accordance with animal ethics requirements.	Not undertaken
Nocturnal Surveys	A combination of high-powered spotlights and head torches were used to sample nocturnal mammals (flying, arboreal and terrestrial), birds (owls and nightjars), reptiles and frogs across the Project area. During the spotlighting sessions, species specific detection was assisted by the use of call playback surveys undertaken for nocturnal birds and nocturnal mammals using recordings. An ANABAT II ultrasonic bat call detection unit and associated ZCAIM interface module were also used to capture the calls of insectivorous bat species. The use of the ZCAIM unit allows the ANABAT II detector to be left unattended throughout the night, thereby ensuring that peak activity periods for bats are recorded each night. Harp traps were also used where suitable flight paths were identified.	
Targeted Searches	During the survey period, special effort was made to detect the presence of species of special conservation significance obtained from the database searches, with particular focus on reptiles, *Hoplocephalus stephensii* and *Underwoodisaurus sphyrurus*, and the micro-bat *Nyctophilus timoriensis*.	

2.1.3 Field Survey Methods (Aquatic Ecology Methodology)

An aquatic ecology survey was undertaken by in late spring 2006 and early autumn 2007. Ten sites were sampled as part of the survey and the location and description of the sites is presented in **Table 5**. Each site was selected based on the general geographic spread required, an aerial reconnaissance of the system above Nundubbermere Falls and ground survey of historic rapid assessment sites.

- **Table 5 Field Survey Sites**

Site Number	Location	Description
1	Severn River near Glen Aplin (Thorndale Rd)	Upstream of dam. Deep natural pool
2	Severn River, within Campbell's Weir	Within proposed dam area. Weir pool.
3	Severn River, below Campbell's Weir	Within proposed dam area. Shallow. Downstream of existing weir.
4	Severn River near Stalling Lane	Dam wall footprint. Shallow, natural.
5	Severn River near Somme Lane	Downstream of dam; upstream of Accommodation Creek. Shallow.
6	Severn River near Somme Lane	Downstream of dam; upstream of Accommodation Creek. Deep weir pool
7	Severn River on Bents Road ("second crossing")	Downstream of dam; downstream of Accommodation Creek. Shallow
8	Severn River at Bents Weir	Downstream of dam; downstream of Accommodation Creek. Deep weir pool
9	Accommodation Creek on Sundown Road	Reference tributary – shallow
10	Bald Rock Ck on Anderson Road	Reference tributary – deep (upstream end of weir pool)

Assessments at each site included:

- aquatic habitat;
- water quality;
- aquatic plants;
- macroinvertebrates; and
- fish.

The methodology for each is described below.

Aquatic Habitat

Aquatic habitat was assessed using "State of the Rivers" (SOR) survey protocols and field sheets (Anderson 1993), particularly sheets 4, 5, 9 and 10. These were supplemented by detailed notes entered on field data sheets. Photographs were taken of all sites in upstream and downstream directions and to capture significant features.

Water Quality

Spot water quality data were collected at each site using a YSI 611 multi-parameter datalogger fitted with sensors to record depth, temperature, pH, dissolved oxygen, conductivity and turbidity. Standard laboratory calibration was undertaken prior to surveys and field calibration was undertaken several times during the surveys. It was not possible to keep the time of sample collection the same. The probe was deployed in the deepest water and spot measurements were made at 0.5 m depth intervals, if possible. In shallow water the probe was walked out to a central position. Care was taken to minimise disturbance to the substrate prior to sampling though some disturbance was unavoidable.

The datalogger was also deployed at selected sites to record overnight water quality. The logger was set to record each parameter at 15-minute intervals. The datalogger was suspended from a log / tree within the river or located along the edge. The sensors sat at approximately 25cm depth. Overnight deployment as opposed to 24 hr deployment means that the daytime peaks in temperature or other parameters are generally not recorded while night-time minima are.

Results presented in tables in this report are overnight ranges from logged data unless a time is noted, in which case this refers to the time of day at which surface spot data were collected.

Aquatic Plants

Aquatic plants were initially assessed using State of the Rivers methodology, in particular Sheet 9. This assessment covers submerged, floating and emergent vegetation separately and describes each in terms of total cover and percentage of exotic and native species. At many sites, substrates could not be thoroughly assessed due to the highly tannin stained nature of the water. Combined with the latter point, as the region shows a limited submerged macrophyte community, the assessments were reduced to descriptions of visible components. Identifications were based on Stephens and Dowling (2002) and Sainty and Jacobs (1994).

Macroinvertebrates

The sampling approach aimed to clearly separate the available habitats. Five surber samples were collected from the edge at deep sites and from shallow habitat at riffle or glide sites where the edge was often an undercut. AusRivAS dip net sampling methods were not preferred because it is qualitative and unreplicated.

Dip net samples were also collected independently from macrophytes, tree root or undercut habitats when present. When habitat was abundant, dip net sampling was restricted to approximately 20 seconds. When habitat was limited the full area may be sampled in less than 20 seconds. No benthic samples were collected from deep water because the uneven and mainly rocky substrate does not suit any known sampling apparatus.

All samples were wholly preserved in isopropyl alcohol and returned to the laboratory for sorting. Macroinvertebrates were sorted by staff in the EM/Hydrobiology laboratory. The subsampling technique of Wrona *et al* (1982) was employed for larger samples. The fauna from sorted samples was identified and counted by staff of Applied Freshwater Science. Identification was to the level used by DNR in AusRivAS, meaning family for insects except Chironomidae which was taken to sub-family and higher levels for other groups such as micro-crustacea, oligochaetes, molluscs, nematodes and acarina.

Fish

Fish were sampled using equipment and methods to accord with those used in the northern Murray Darling region by David Moffat (DNRW pers. comm. 2000). Additional gear included a back pack electrofisher. Fishing gear included:

- Four 2 m drop x 15 m gill nets, each comprised of 3 x 5 m panels (one each of 3, 4 and 5 inch nylon monofilament mesh randomly arranged within the net), with floating head-line and sinking foot-line.
- Two 19mm and 25mm gill nets were also used in March 2007.
- 10 x collapsible baitfish traps each baited with cat biscuits.
- Backpack electrofisher.

Fyke and seine nets could not be used because of the substrate was often uneven boulders in shallow areas or the water was too deep in pools.

The method of fishing is described below:

- gear was set over a length of river of approximately 100 m.
- gear was set to fish as independently as possible (that is, one net did not channel fish into another).

- gill nets were generally set oblique to the river bank.
- bait fish traps were set from the bank and adjacent to cover (vegetation, snags etc) when present.

All gear was set to fish overnight, a soak time of between 14 and 18 hrs. All gill nets were set at least 15 m apart, up to a maximum distance of 25 m. The exception to this was in small pools where nets had to be separated by a smaller distance or fewer nets were placed due to restricted space. Small shallow pools (< 0.5m depth) were not sampled with gill nets. These areas were often most effectively sampled with the electrofisher and bait traps.

All fish caught were counted, measured (fork length) and wounds, lesions and deformities were recorded if present. Native fish were released alive wherever possible. Introduced fish were euthenased. Identifications were based on Allen (1989), McDowall (1996) and Allen, Midgely and Allen (2002). Where identification was difficult in the field, one or two specimens were retained for identification in the laboratory.

Any fish, prawns or crayfish caught in the bait traps were identified and the number of each species was recorded. Catches from each trap were recorded separately.

The electrofisher used was a Smith Root LR24 model backpack electrofisher with a net sewn into the anode pole. The voltage, frequency and waveform settings used on the electrofisher were adjusted to achieve the best response from the fish and crustaceans at the time of sampling, but were typically set to standard pulse waveform of 30Hz frequency at 600 volts.

Ten replicate passes were made through the range of habitats over a timed duration (50 sec each).

Fishing was conducted under General Fisheries Permit number 55850.

2.2 Results

2.2.1 Desktop Analysis

Desktop analysis revealed the potential occurrence of EPBC listed flora and fauna species in the Project area. As the database contains no site records (and is based solely on species distributions) it is generally considered as unreliable indication of actual threatened species values. The online EPBC Protected Matters report identified five nationally endangered and thirteen nationally vulnerable flora species with the potential to occur, or with habitat likely within the inundation area and six nationally endangered and eight nationally vulnerable fauna species. An expanded search to incorporate the broader Project area, including all associated infrastructure, identifies an additional endangered species and two vulnerable species.

The EPA Wildnet search over the Project area identified 594 terrestrial flora species. Six EPBC listed species were recorded with one being nationally endangered and five listed as nationally vulnerable.

The species that were listed in the searches, their conservation status under the EPBC Act, their preferred habitat and likelihood of occurrence are discussed in **Table 7** (Flora) and **Table 8**Table 9 Migratory Fauna recorded from the Project AreaError! Reference source not found. (Fauna). Assessment of the likely occurrence of each species is based on a comparison of the species preferred habitat against the habitat present within the Project area and whether the species has been recorded in the area.

A search of the Commonwealth EPBC Online Protected Matters database also indicated that the 'Critically endangered' vegetation community described as 'White Box (*E. albens*), Yellow Box (*E. melliodora*), Blakely's Red Gum (*E. blakelyi*) Grassy Woodland and derived Native Grassland' is present in the vicinity of the Project area (DEH 2006). Box – Gum Grassy Woodlands and Derived Grasslands are characterised by a species-rich understorey of native tussock grasses, herbs and scattered shrubs, and the dominance, or prior dominance, of White Box, Yellow Box or Blakely's Red Gum trees (DEH 2006).

This ecological community has an extensive distribution along the western slopes and tablelands of the Great Dividing Range, from southern Queensland through NSW to central Victoria (Beadle 1981 in DEH 2006). In

Queensland, it occurs in the Brigalow Belt South, New England Tableland and South-eastern Queensland bioregions (Environment Australia 2000). In the New England Tableland bioregion, it is recognised as a primary component of REs 13.3.1, 13.11.8, 13.12.8 and 13.12.9, and may also be a component of REs 13.3.4, 13.11.3 and 13.11.4 (DEH 2006). Analysis of the RE mapping for the Project area indicates that the ecological community is represented in components of RE 13.3.1, and dominant proportions of REs 13.12.8 and 13.12.9.

2.2.2 Field Surveys

Terrestrial Flora

Six EPBC listed plant species were actually recorded from the Project Area; *Acacia, pubiflora Boronia repanda, Melaleuca williamsii, Goodenia macbarronii, Eucalyptus mckieana, Grevillea scortechinii subsp. scortechini*. This includes all records from the baseline survey and inclusion of relevant HERBRECS records. These species and their conservation status are listed in **Table 6** below.

Table 6 EPBC Listed Flora Species recorded in the Project Area

Species	Common Name	Status
Acacia pubifolia	No common name	Vulnerable
Boronia repanda	Repand Boronia	Endangered
Eucalyptus mckieana	McKie's Stringybark	Vulnerable
Goodenia macbarronii	No Common Name	Vulnerable
Grevillea scortechinii subsp. scortechinii	NSW subsp. Referred to as Backwater Grevillea	Vulnerable
Melaleuca williamsii (syn. Callistemon pungens)	No common name	Vulnerable

Terrestrial Fauna

Fauna surveys completed in Summer (December 2006) and Autumn/Winter (2007) recorded a total of 187 species of terrestrial vertebrates from the Project area. Fauna species which are listed under the EPBC Act are known to be found within the Project area. **Table 8** lists the EPBC listed fauna considered potential occurrences in the Project area that have been identified from searches of the Queensland Museum, Birds Australia and EPBC Act Protected Matters databases and observed from the field surveys. The table also provides an assessment of the likely occurrence of each species with the Project area based on the known habitat preferences of each species, observations of the habitat type present within the Project area and any recorded species observations within the Project area.

Of the 14 EPBC listed fauna species included in **Table 8** as potentially occurring within the Project area, three are considered to be known inhabitants of the Project area, four are considered possible inhabitants of the Project area and seven are considered unlikely to utilise habitats within the Project area.

The three inhabitants of the Project areas are the Spotted-Tail Quoll (*Dasyurus maculates maculates*), Large-eared Pied Bat (*Chalinolobus dwyeri*) and Granite Belt Thick-tailed Gecko (*Underwoodisaurus sphyrurus*).

The four species which are considered possible inhabitants of the Project areas include: Brush-tailed Rock-wallaby (*Petrogale penicillata*), Eastern (Greater) Long-eared Bat (*Nyctophilus timoriensis* (southeastern mainland population)), Regent Honeyeater (*Xanthomyza Phrygia*) and Swift Parrot (*Lathamus discolour*).

The remaining species are generally unlikely to occur due to lack of suitable habitat, poor habitat quality or because the Project area is beyond the known distribution of the species.

Aquatic Flora and Fauna

There were no listed aquatic flora species found during the surveys conducted as part of this Project.

In general the macroinvertebrate fauna appeared reasonably diverse and abundant, with representatives of all the major taxonomic groups but with perhaps a somewhat low representation of dipteran (true flies) and odonatan (dragon flies) taxa, the former possibly because of the generally coarse substrate and the latter possibly because of the cold climate as this order is much better represented in warmer areas. Culicids (mosquitoes) were not captured.

The EIS sampling captured the same suite of fish on both occasions (five native species and one exotic). The species captured overall were:

- Eel-tailed catfish (reasonable numbers in weirs and natural pools);
- four species of native carp gudgeon (at times highly abundant on the edges of pools or sluggish water habitats);
- the three species on translocated native predators (Murray cod – uncommon and found in weir pools; Silver perch and Yellowbelly - uncommon but often large specimens found in weir pools); and
- introduced Mosquito fish (widespread and at times abundant).

Only four individual turtles were captured during the surveys; two long-necked turtles (*Chelodina longicollis*) and two Bell's turtle (*Elseya belli*). The former are regarded as common and widespread, whereas the latter is a rare species of restricted known distribution. It was captured in Bald Rock Creek but further downstream than the only known record in the region, and in the Severn River near Somme Lane, downstream from the proposed dam site. *Emydura macquarii*, the Murray River Turtle, would also be expected to occur in the region.

2.2.3 Likelihood of Occurrence of EPBC listed Flora

The likelihood of occurrence of EPBC listed flora is assessed in detail in **Table 7** below. Impact assessments for species not recorded and unlikely to occur is provided in **Appendix A.** Locations of EVR Flora species recorded in the Project area is presented in **Figure 3, Figure 4** and **Figure 5**.

Table 7 Likelihood of Occurrence of EPBC Listed Flora Species

Species	Common Name	EPBC Status *	Habitat	Likelihood of Occurrence			
				Inundation Area	Stalling Lane Access	Urban Pipeline	Irrigation Pipeline
Acacia pubifolia	Velvet Wattle	V	Potential habitat in 13.12.2 & 13.12.5. Known from Ballandean, Wybera, Wallangarra and Fletcher districts. Known from remnant vegetation near Stalling Lane and non-remnant roadside vegegtation along Fletcher Rd.	Suitable habitat; Previously recorded immediately to west of inundation area; No survey record; General habitat possible.	Suitable habitat; Not previously recorded; Recorded on survey with 13 individuals within a 1 000m^2 search area in RE 13.12.6; Essential habitat known (H).	Suitable habitat; Previously recorded by 1 HERBRECS record from Fletcher Road within pipeline corridor; No survey record; General habitat known (M).	Sup-optimal habitat; Not previously recorded with closest record approx. 2 km west of end of Sector 13; No survey records; Absence suspected (H).
Acacia ruppii	Rupps Wattle	E	Potential habitat 13.12.2, 13.12.9. HERBRECS search results indicate this species is restricted to Girraween N.P. Also known from NSW Nth Coast;	Suitable habitat; Not previously recorded; No survey records; Absence suspected.	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).	Sup-optimal habitat; Not previously recorded; No survey records; Absence suspected (H).	Sup-optimal habitat; Not previously recorded; No survey records; Absence suspected (H).
Almaleea cambagei	no common name	V	Known from Torrington State Conservation Area on the New England Tablelands, with a few populations potentially occurring in the adjacent agricultural lands (DECC 2007). While the species is reported from Girraween NP in Queensland (DECC 2007) there are no records listed in Bostock & Holland (2007) or in HERBRECS.	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected.	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).
Babingtonia granitica	no common name	V	Known from heath 13.12.6 where it occurs in shallow peaty soils formed in the crevices of granite outcrops dominated by heath (Bean 1997 in Donatui 2006). Three known populations at Ballandean, Doctors Ck near Lyra, & Girraween NP (Donatui 2006).	Suitable habitat; Not previously recorded; No survey record; Essential habitat-possible (L).	Suitable habitat; Known from a HERBRECS record to the north of Stalling Lane (13.12.5/13.12.6); No survey record; Essential habitat-possible (L).	Sup-optimal habitat; Not previously recorded; No survey records; Absence suspected (H).	Sup-optimal habitat; Not previously recorded; No survey records; Absence suspected (H).

Species	Common Name	EPBC Status *	Habitat	Likelihood of Occurrence			
				Inundation Area	Stalling Lane Access	Urban Pipeline	Irrigation Pipeline
Boronia granitica	Granite Boronia	E	Known from Girraween NP, Amiens area (Harslett Rd, Mt Hutton Rd & Sonego Rds), near The Summit and Paschendale districts in regional ecosystems 13.12.2-13.12.6 in shrubby woodland, open forest and heath (Donatui 2006). In NSW from Torrington, Severn River Nature Reserve, the Barbs near Pindari Dam, Kings Plains National Park and Howell (Hunter et al. 1998).	Suitable habitat; Not previously recorded; No survey record; Absence suspected (H).	Suitable habitat; Previously recorded immediately to the north of the proposed Stalling Lane Access; No survey record; Essential Habitat-Possible (H).	Sub-optimal habitat; Not previously recorded; No survey records; Absence suspected (H).	Sub-optimal habitat; Not previously recorded; No survey records; Absence suspected (H).
Boronia repanda	Repand Boronia	E	Endemic to Stanthorpe Plateau with known national distribution restricted to scattered populations around Cottonvale, Thulimbah, Amiens and Passchendaele and a recently located record to the east of Stanthorpe on the border w ith New South Wales (Donatui 2006). Occurs in regional ecosystems 13.12.2-13.12.6 in shrubby woodland, open forest and heath (Donatui 2006) & in non-remnant.	Suitable habitat; Not previously recorded; No survey record; Absence suspected (H).	Suitable habitat; Not previously recorded; No survey record; Absence suspected (H).	Suitable habitat; Not previously recorded; No survey record; Absence suspected (H).	Suitable habitat; Previously recorded from a number of HERBRECS records on Pfunders Road and Posieres Road within proposed pipeline corridor in disturbed roadside vegetation with the vulnerable *Grevillea scortechinii subsp. scorthechinii*; No survey records; Essential habitat possible (H).
Cadellia pentastylis	Ooline	V	In Qld from RE 13.11.7 vine thicket on metamorphics in Sundown NP. In NSW west from near Tenterfield and north from Terry Hie Hie from vine thickets and woodlands. (Harden 2002).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).
Caladenia atroclavia	no common name	E	Known to occur in Eucalyptus campanulata open forest on igneous rocks (RE 13.12.1).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).

Species	Common Name	EPBC Status *	Habitat	Likelihood of Occurrence			
				Inundation Area	Stalling Lane Access	Urban Pipeline	Irrigation Pipeline
Cryptostylis hunteriana	Leafless tongue Orchid	V	Known from Wide Bay and Moreton districts extending into NSW from Gibraltar Range NP south into Victoria. A mostly coastal species but can be found in a range of habitats including dry sclerophyll forests, heaths, dunes, riparian (stream-side) areas, swampy forests, swampy areas and wetlands areas. Difficult to detect flowering between December and February yet generally found growing on sandy or stony clay soils, often in sandstone areas.	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).
Digitaria porrecta	no common name	E	All HERBRECS records from western parts of Darling Downs in grasslands.	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).
Diuris sheaffiana Listed in Qld Flora as *Diuris tricolor* (Bostock & Holland 2007)	Painted Diuris	V	In Qld known to be widespread in Moreton and Darling Downs districts in eucalypt open forest (Stanley & Ross 1989). Potential habitat in RE 13.3.1, 13.12.2, 13.12.9, and 13.12.5, 13.3.1. No records in Project area. Grows in sclerophyll forest among grass (Harden 2002). In NSW known to be sporadically distributed on the western slopes, from south of Narrandera to the far north of NSW (DECC 2007).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).

Species	Common Name	EPBC Status *	Habitat	Likelihood of Occurrence			
				Inundation Area	Stalling Lane Access	Urban Pipeline	Irrigation Pipeline
Eucalyptus mckieana	McKie's Stringybark	V	Main distribution is in NSW where it is geographically restricted to the drier western side of the New England Tablelands of NSW, from Torrington to Bendemeer (DECC 2007) and between Inverell and Guyra in the Retreat, Tenterden, Gilgai areas and recorded in Kings Plain National Park (Hunter et al. 1998). Qld populations represents northern limit of geographical distribution where it restricted to a few collections in the Fletcher area in RE 13.12.2.	Suitable habitat; Not previously recorded in inundation area however known to be restricted to Fletcher area; No survey records; General habitat known (M).	Suitable habitat; Not previously recorded; No survey records; Absence suspected (H).	Suitable habitat; Previously recorded in in Fletcher area in RE 13.12.2 400m W of Rhumbalara Railway crossing of Fletcher Lane. Qld population poorly known and restricted to Fletcher area; No survey records; General habitat known (H).	Suitable habitat; Not previously recorded; No survey records; General habitat known (M).
Eucalyptus scoparia	Wallangarra White Gum	V	Known from mountain tops and upland granite pavements. Occurs in RE 13.12.3 which is wholly confined to Girraween NP. Single record from Mt Ferguson near Amiens.	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).	Unsuitable habitat; Single record from Mt Ferguson approx. 1km Sth of Goldfields Rd in Sector 13. No survey records; Absence suspected (H).
Grevillea scortechinii subsp. scortechinii	NSW subsp. refereed to as 'Backwater Grevillea'	V	In Qld endemic to Stanthorpe Plateau, known from several populations between Stanthorpe and Dalveen in non-remnant roadsides with potential habitat in RE's 13.3.1, 13.12.1, 13.12.2, 13.12.6, 13.12.8, 13.12.9. (Donatiu 2006).	Suitable habitat; Not previously recorded; No survey records; Absence suspected (H).	Suitable habitat; Not previously recorded; No survey records; Absence suspected (H).	Suitable habitat; Not previously recorded; No survey records; Absence suspected (H).	Suitable habitat; Known populations on margins of Posieres Rd and Prfunders Rd; Survey records Posieres Rd; Essential habitat known (H).
Goodenia macbarronii	Narrow Goodenia	V	Known from the western slopes of the Great Dividing Range in NSW, south from the Guyra and Inverell districts and also in north-eastern Victoria and the Darling Downs in Queensland (DECC 2007). Recorded from Stalling Lane on rock pavements of 13.12.6 (Donatiu 2006).	Suitable habitat; Known from vicinity of dam impact area (Fletcher area on pavement seepage slopes) with potential to occur on R2 rock pavements (RE 13.12.6) and those associated with R1 (13.3.1) along the Severn River. No survey records; Essential habitat possible (M).	Suitable habitat; Known from R2 rock pavements (RE 13.12.6) No survey records; Essential habitat possible (M).	Sub-optimal habitat; Not previously recorded; No survey records; Absence suspected (M).	Suitable habitat; Not previously recorded; No survey records; Essential habitat possible (M).

Species	Common Name	EPBC Status *	Habitat	Likelihood of Occurrence			
				Inundation Area	Stalling Lane Access	Urban Pipeline	Irrigation Pipeline
Homoranthus montanus	Mountain Mouse Bush	V	Known from Stanthorpe Plateau from Mt Jibbinbar (Sundown) and Stalling Lane (Fletcher) in RE's 13.11.1, 13.12.5, 13.12.6 (Donatiu 2006).	Suitable habitat; Previously recorded to north of inundation area; No survey records; Essential habitat possible (RE 13.12.5, 13.12.6) (L).	Suitable habitat; Previously recorded to north of Stalling Lane; No survey records; Essential habitat possible (RE 13.12.5, 13.12.6) (L).	Sub-optimal habitat; Previously recorded on Fletcher Rd roadside; No survey records (area recovering from burn at time of survey); Absence suspected (H).	Sub-optimal habitat; Not previously recorded; No survey records; Absence suspected (H).
Lepidium hyssopifolium	Basalt Peppercress	E	Not recorded in Qld (Bostock and Holland 2007). In NSW a rare speceis known from Bathurst district and near Qld border (Harden 2002).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).
Macrozamia occidua	no common name	V	A rare species, occurring in a few small stands in Sundown National Park, in dry eucalypt woodlands on skeletal soils on slopes (RBGS 2004).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).

Species	Common Name	EPBC Status *	Habitat	Likelihood of Occurrence			
				Inundation Area	Stalling Lane Access	Urban Pipeline	Irrigation Pipeline
Melaleuca williamsii (syn. Callistemon pungens)	no common name	V	Known from Qld in Girraween NP, Severn River Fletcher, in Stanthorpe area and extending to NSW from Oxley Wild Rivers NP near Armidale, Howell, Mount Balala, Guyra, Mann River Nature Reserve and New England National Park. (Hunter et al. 1998). Donatiu (2006) refers to habitat in RE 13.3.4-13.3.5 in riparian areas along rocky watercourses or sandy creek beds.	Known habitat; Previously recorded in close proximity to inundation area (downstream from proposed dam wall). Donatiu (2006) reports estimations of over 150 individual plants; Survey recorded numerous populations known within riparian situations of Severn River in 13.3.1x and in 13.3.1, with scattered occurences in 13.12.6 on margins of 13.3.1x. Surveys suggest populations of >1000; Essential habitat known (H).	Suitable habitat; Previously recorded in close proximity; Survey recorded single population of 4 individuals in RE 13.3.1 (A1ax) on drainage line; Essential habitat known (H).	Sup-optimal habitat; Not previously recorded; Survey records in non-remnant; Essential habitat known (H).	Sup-optimal habitat; Not previously recorded; 3 populations recorded on survey; Essential habitat known (H) in 13.3.1 and non-remnant.
Phebalium glandulosum subsp. eglandulosum	no common name	V	Known from 3 disjunct populations extending from Stanthorpe south Glen Innes (Donatui 2006). Population of 20 individuals known from Paschendale area (Donatiu 2006). In NSW known from heath amongst granite outcrops in the Torrington district (Harden 2002).	Suitable habitat; Previously recorded to north/west of inundation area in elevated granitic hills; No survey records; Essential habitat possible (L).	Suitable habitat; Previously recorded to north of Stalling Lane in elevated granitic hills; No survey records; Essential habitat possible (M).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).
Phebalium whitei	no common name	V	Confined to the Darling Downs Pastoral District, Qld, from Lyra to Girraween National Park in the Stanthorpe district (BRI collection records; Wilson 1970) (DEWR 2007). Two small populations known from Girraween National Park over about 10 ha with about 1000 plants in total (BRI Rare and Threatened Plant database 2001 in DEWR 2007)). Occurs in Bald Rock Creek and Girraween NP near Wallangarra (Stanley & Ross 1983).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).

Species	Common Name	EPBC Status *	Habitat	Likelihood of Occurrence			
				Inundation Area	Stalling Lane Access	Urban Pipeline	Irrigation Pipeline
Pultenaea foliolosa (ex. P. stuartiana)	no common name	V	In Qld known from 20 collections in Darling Downs distruct with a single 1044 low precision record from Eukey area near Stanthorpe. Habitat details unavailable but potentially eucalyptus woodland 13.12.2, 13.12.5. In NSW known from dry sclerophyll forest to woodland, on a variety of well-drained substrates (Harden 2002) and from Torrington area (Hunter et al. 1998).	Potential habitat; Not previously recorded; No survey records; Absence suspected (H).	Potential habitat; Not previously recorded; No survey records; Absence suspected (H).	Sub-optimal habitat; Not previously recorded; No survey records; Absence suspected (H).	Potential habitat; Not previously recorded; No survey records; Absence suspected (H).
Tylophora woollsi	no common name	E	Known from Eucalyptus andrewsii, E. youmanii woodland on igneous rocks 13.12.2. Single HERBRECS record from Girraween NP. In NSW known from wet sclerophyll forest and rainforest in the Clouds Creek area near Nymboida and in sclerophyll forest and is conserved within Bald Rock and Gibraltar Range NP's (Harden 2002).	Suitable habitat; Not previously recorded; No survey records; Absence suspected (H).	Suitable habitat; Not previously recorded; No survey records; Absence suspected (H).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).

* EPBC Status E – Endangered, V- Vulnerable

2.2.4 Likelihood of occurrence of EPBC listed Fauna

The likelihood of occurrence of EPBC listed fauna species is considered in **Table 8** below. Only species listed as Present or Possible are considered in further detail in this report. The location of the EVR fauna species recorded in the inundation area is presented in **Figure 6**.

- **Table 8 Likelihood of occurrence of EPBC Listed Fauna Species**

Species	Common Name	Status*	Habitat	Likelihood of Occurrence
Cyclopsitta diophthalma coxeni	Coxen's Fig-Parrot	E	It lives in subtropical rainforest, dry rainforest, littoral rainforest, riparian corridors in woodland, open woodland, and agricultural and urban areas with fig trees (Garnett and Crowley 2000).	Unlikely. There are two WildNet records for this species in the general area. There are no details available for these records. WildNet records are not necessarily substantiated nor are the records vetted. There is no suitable habitat for this species in the Project area. It is not considered to be present.
Geophaps scripta scripta	Squatter Pigeon (southern)	V	Occurs in open dry sclerophyll woodland with grassy understorey, nearly always near permanent water. Birds may occasionally feed in sown grasslands and pastures.	Unlikely. There are no database records for the Project site or its immediate surrounds. It is comparatively easy to observe when present and its occurrence is considered very doubtful. The species is likely to be locally extinct in the inundation area and immediate surrounds. It may still occur within the area encompassing the Urban and Irrigation Pipeline
Lathamus discolor	Swift Parrot	E	Swift Parrots occur in woodlands, riparian vegetation and remnant patches of mature eucalypts in agricultural areas, though they prefer dry sclerophyll forest (Higgins 1999; NPWS 2003).	Possible. There are no database records for this species for the Project area. The EPBC Online Protected Matters Search Tool states that this 'species or species habitat may occur within area'. It is considered likely that the species will occur at some future stage or has been overlooked previously.
Macronectes giganteus	Southern Giant-Petrel	E	A marine species.	Unlikely. This is a seabird. It occurs only as a vagrant. There is a single Queensland Museum record from northwest of Stanthorpe in 1970. There is no suitable habitat and the species is not expected to occur.
Poephila cincta cincta	Black-throated Finch (southern)	E	Occur in dry open grassy woodlands and forests with seeding grasses and freestanding water. In south-eastern Queensland Black-throated Finches have been recorded from dry open forest on ridges, grassy hillsides and mountain flats (Higgins et al 2006).	Unlikely. There are no database records for the Project area. The EPBC Online Protected Matters Search Tool states that this 'species or species habitat likely to occur within area'. The species is now possibly extinct in New South Wales and there were only six Atlas of Australian Bird records in southern Queensland for the period 1977 to 1981 and none for the Atlas of Australian Birds 2 (1998 – present) (Higgins et al 2006)..

Species	Common Name	Status*	Habitat	Likelihood of Occurrence
Rostratula australis	Australian Painted Snipe	V	Occurs in terrestrial shallow wetlands, both ephemeral and permanent, usually freshwater but occasionally brackish. They also use inundated grasslands, saltmarsh, dams, rice crops, sewage farms and bore drains. The species feeds on vegetation, seeds and invertebrates, including crustaceans and molluscs (Marchant and Higgins 1993).	Unlikely. There are no database records for this species in the Project area. The EPBC Online Protected Matters Search Tool states that this 'species or species habitat may occur within area'. Currently the section of the Severn River within the inundation area provides very little habitat for this species. What potential habitat is present is due to the construction of weirs. The Project is likely to create, rather than reduce, suitable habitat. There is no suitable habitat within the proposed pipeline corridor but the species could occur elsewhere in the Project area.
Xanthomyza phrygia	Regent Honeyeater	E	Although occasionally found in agricultural land with only partial tree cover or in city parks and gardens, the Regent Honeyeater occurs mainly in dry boxironbark eucalypt woodland and dry sclerophyll forest (Higgins et al. 2001).	Possible. There are two WildNet records for the Project area, though no location details or dates are known. There is also one Birds Australia record from Sundown National Park. The species possibly occurs in the inundation area and immediate surrounds at times, though it is most likely to just move through the area due to a lack of favoured food trees. It is unlikely to regularly occur within the pipeline corridors but may occur regularly elsewhere in the Project area.
Underwoodisaurus sphyrurus	Granite Belt Thick-tailed Gecko	V	Occurs in rocky hills with dry open eucalypt forest or woodland, typically with boulders and exfoliating rock (NPWS 2003)	Present. One individual was recorded during a targeted search during the summer survey.
Chalinolobus dwyeri	Large-eared Pied Bat	V	The Large-eared Pied Bat is rarely captured and consequently poorly known. Little is known of its roosting requirements, although it has been recorded roosting in disused mine tunnels, rock overhangs, caves and abundant Fairy Martin Hirundo ariel nests (Dwyer 1966; Eyre et al. 1997; Schulz 1998; Thompson 2002). The habitat requirements for the species are poorly understood. Most records from New South Wales are from dry and wet sclerophyll forest including Callitris forests, tall open eucalypt forests with a dry understorey, subalpine woodland, and sandstone outcrop country (Duncan et al. 1999). In south-eastern Queensland the species seems to be more associated with higher altitude moist forests and adjacent rainforest (Eyre et al. 1997).	Present. The Large-eared Pied Bat was recorded by Anabat at a trapping site during the summer survey. It was not listed for the area in either the EPA's WildNet or Queensland Museum's databases.

Species	Common Name	Status*	Habitat	Likelihood of Occurrence
Dasyurus maculates maculatus	Spotted-Tail Quoll	E	They shelter in rock caves and hollow logs or trees, with basking sites usually nearby (Menkhorst and Knight 2001).	Spotted by landholder. There is a Queensland Museum record from Ballandean and, despite the lack of WildNet records, the species almost certainly occurs in the inundation area and immediate surrounds, at least sporadically. It was reported as occurring by a landholder. Although the majority of the pipeline corridors is not suitable, this species may traverse the areas at times.
Nyctophilus timoriensis (southeastern mainland population)	Eastern (Greater) Long-eared Bat	V	Occurs in dry forest and woodland, mallee, and other arid and semi-arid habitats. It roosts in tree hollows or under bark (NPWS 2003). It is a little known species that is rarely caught (Churchill 1998).	Possible. There are no database records for the Project site or its immediate surrounds. The EPBC Online Protected Matters Search Tool states that the "species or species habitat may occur within area". However, because this species is so little known it is difficult to assess the likelihood or otherwise of its possible occurrence in the Project area.
Petrogale penicillata	Brush-tailed Rock-wallaby	V	This species inhabits rock piles and cliff lines in vegetation ranging from rainforest to dry sclerophyll forests (Short and Milkovits 1990).	Possible. There is one Queensland Museum record from approximately 56 km northeast of Stanthorpe. There are no WildNet records. There is no suitable habitat within the inundation area or the pipeline corridors. The species may be present in the Project area.
Potorous tridactylus tridactylus	Long-nosed Potoroo (SE mainland)	V	The Long-nosed Potoroo has been recorded in a variety of habitat types including disturbed subtropical and warm-temperature rainforests, tall open forests with a moist understorey, woodland with tussock grass, open forest with shrubby understorey, and heathlands.	Unlikely. There are no database records for the Project area. The EPBC Online Protected Matters Search Tool states that the "species or species habitat may occur within area". It is not considered to be present due to a lack of suitable habitat.
Pteropus poliocephalus	Grey-headed Flying-fox	V	Commonly within dense vegetation close to water, primarily rainforest patches, stands of Melaleuca, mangroves or riparian vegetation.	Unlikely. There are no database records for the Project area. The EPBC Online Protected Matters Search Tool states that the "species or species habitat may occur within area". It is not considered to be present.
Elseya belli	Bell's Turtle	V	It has been found in shallow to deep pools only in upper reaches or small tributaries of rivers in granite country	Present. Murray cod is an introduced species in the Project area. It was not commonly and was found in weir pools
Maccullochella peelii peelii	Murray Cod	V	Preferred habitat is pools with abundant cover such as logs, boulders, undercut banks and overhanging vegetation. Adults show high site fidelity, often returning to specific logs.	Present. It was captured in Bald Rock Creek but further downstream than the only known record in the region, and in the Severn River near Somme Lane, downstream from the proposed dam site.

* EPBC Status E – Endangered, V- Vulnerable

Migratory Species

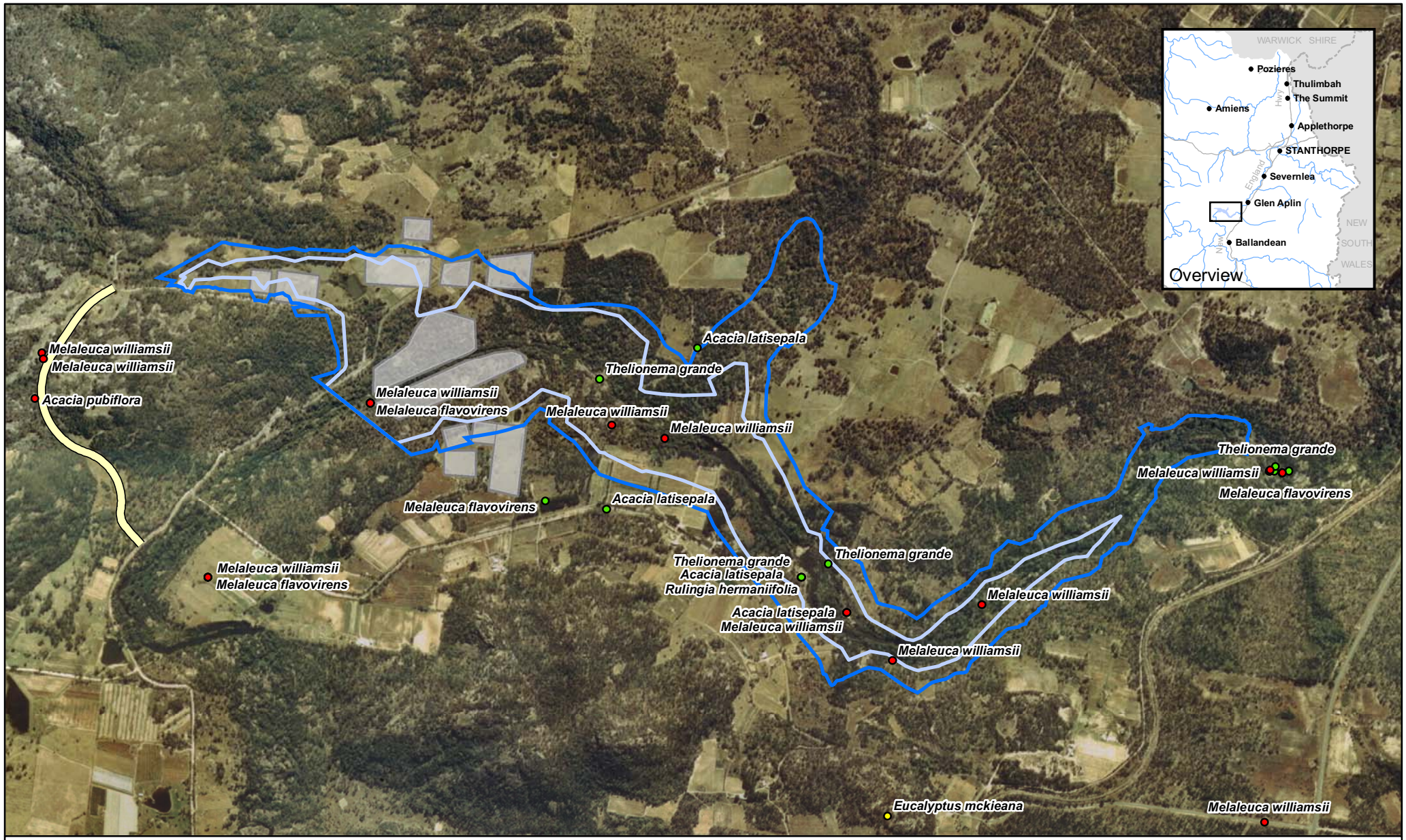
Migratory species that are protected under the Japan–Australia Migratory Bird Agreement (JAMBA) and China-Australia Migratory Bird Agreement (CAMBA) are listed under the schedules of the EPBC Act.

Table 9 lists the migratory and other Commonwealth significant species (other than vulnerable or endangered species) known from the Project area that have been identified from searches of the Queensland Museum, Birds of Australia and EPBC Act Protected Matters databases and observed from the field surveys. The table also provides an assessment of the likely occurrence of each species within the Project area. This list includes:

- wetland species covered by migratory provisions of the EPBC Act comprising species listed under CAMBA and/or JAMBA;
- terrestrial species covered by migratory provisions of the EPBC Act; and
- species covered by marine provisions of the EPBC Act.

Table 9 Migratory Fauna recorded from the Project Area

Species	Common Name
Ardea alba	Great Egret
Haliaetus leucogaster	White-bellied sea-eagle
Apus pacificus	Fork-tailed Swift
Galliago hardwickii	Latham's Snipe
Monarcha melanoptis	Black-faced Monarch
Rhipidura rufifrons	Rufous Fantail
Merops ornatus	Rainbow Bee-eater



Legend

- Full Supply Level 734.5m AHD
- Full Supply Level 738m AHD
- Construction Site Facilities
- Stalling Lane Access

EVR Records

- Vulnerable EPBC - NCA
- Vulnerable EPBC
- Rare - NCA

N W E S

0 100 200 400 600 800

Metres

Scale - 1:20,000 (at A4)

Projection: Map Grid of Australia Zone 56

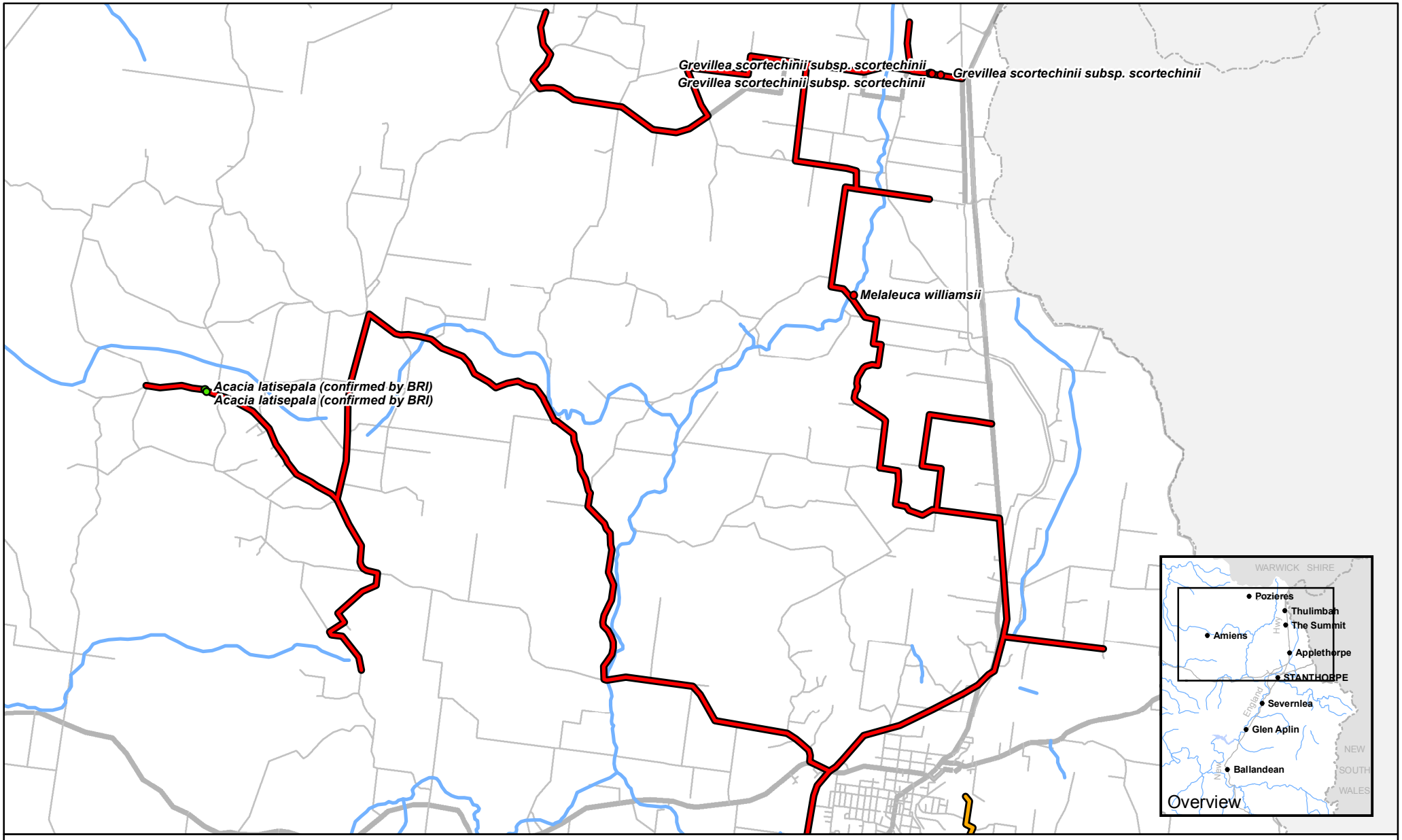
EMU SWAMP DAM EIS

Emu Swamp Dam Site

Figure 3

EVR Records in the Inundation Area

I:\QENV2\Projects\QE06454\Spatial\Arc_MXD\Figures\MNES\071221_EVR_in_Inundation_Area_fig3.mxd Produced: 21/12/2007



SHIRE OF STANTHORPE

Legend

- Urban Pipeline
- Irrigation Pipeline

EVR Records

- Vulnerable EPBC - NCA
- Vulnerable EPBC
- Rare - NCA

N W E S

0 0.5 1 2 3 4

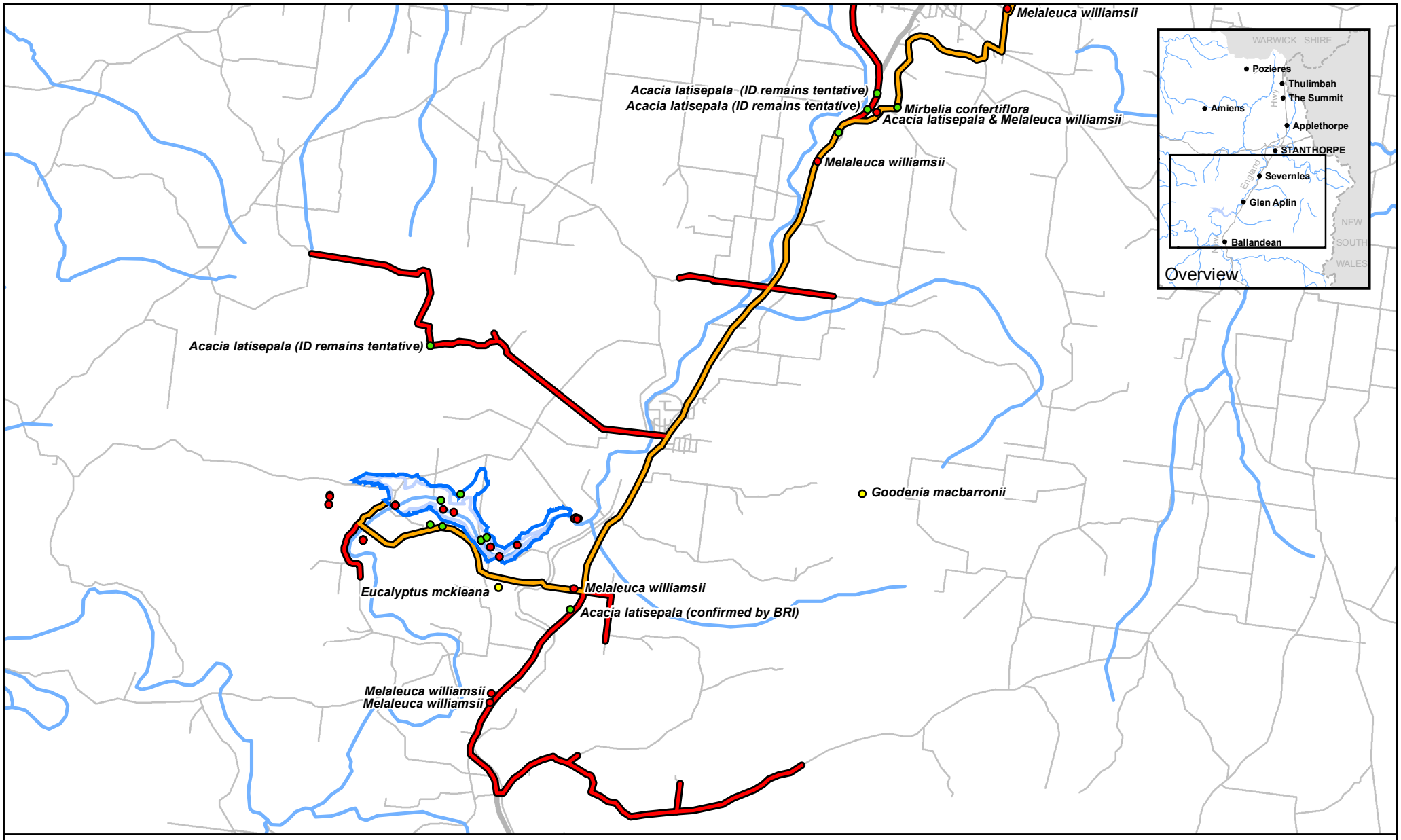
Kilometers
Scale - 1:100,000 (at A4)
Projection: Map Grid of Australia Zone 56

EMU SWAMP DAM EIS

Emu Swamp Dam Site

Figure 4 EVR Records in the Urban Pipeline and Irrigation Pipeline (North)

I:\QENV2\Projects\QE06454\SpatialArc_MXD\Figures\MNES\071220_EVR_North_fig4.mxd Produced: 21/12/2007



SHIRE OF STANTHORPE

Legend

- Urban Pipeline
- Irrigation Pipeline
- Full Supply Level 734.5m AHD
- Full Supply Level 738m AHD

EVR Records

- Vulnerable EPBC - NCA
- Vulnerable EPBC
- Rare - NCA

N W E S

0 0.5 1 2 3 4

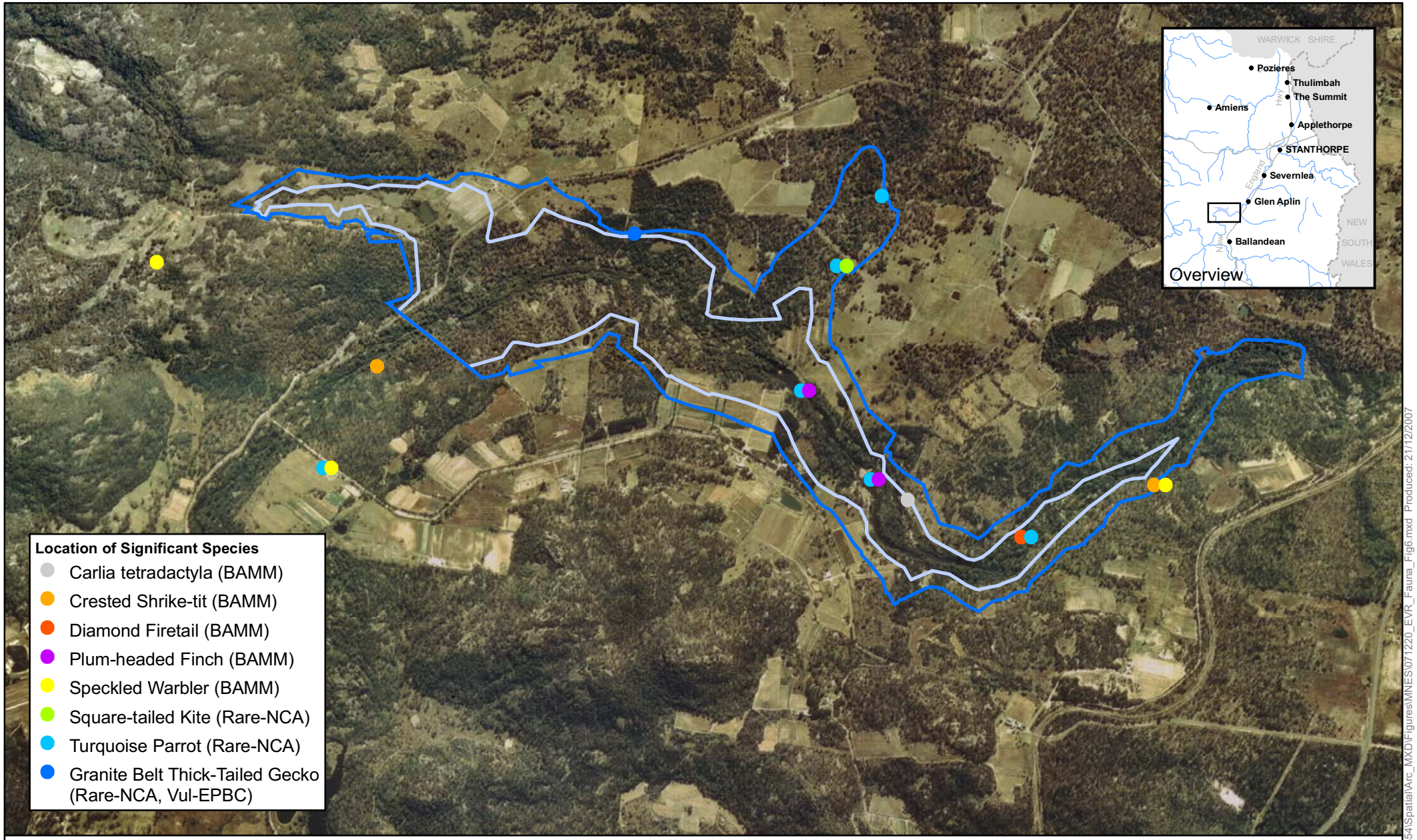
Kilometers
Scale - 1:100,000 (at A4)
Projection: Map Grid of Australia Zone 56

EMU SWAMP DAM EIS

Project Area

Figure 5 EVR Records in the Urban Pipeline and Irrigation Pipeline (South)

I:\QENV2\Projects\QE06454\SpatialArc_MXD\Figures\MNES\071220_EVR_South_fig5.mxd Produced: 21/12/2007



SHIRE OF STANTHORPE

Legend

Full Supply Level 734.5m AHD

Full Supply Level 738m AHD

N W E S

0 100 200 400 600 800

Metres

Scale - 1:20,000 (at A4)

Projection: Map Grid of Australia Zone 56

EMU SWAMP DAM EIS

Emu Swamp Dam Site

Figure 6

Location of EVR Fauna Records

I:\QENV2\Projects\QE06454\Spatial\Arc_MXD\Figures\MNES\071220_EVR_Fauna_Fig6.mxd Produced: 21/12/2007

3. Description of the Affected Environment

3.1 Introduction

This section details the current status of the matters protected under the EPBC Act in detail. For listed threatened species and communities, the description of the affected environment includes the following:

- a discussion of the species' current distribution;
- relevant information about the ecology of the species (habitat, feeding and breeding behaviour etc);
- information about any populations of the species or habitat for the species in the area affected by the proposed action; and
- a discussion of current pressures on the species, especially those in the area to be affected by the proposal.

3.2 Status of listed threatened species and ecological communities known from the Project area

3.2.1 White Box/Yellow Box/Blakely's Red Gum Grassy Woodland

Status: Critically Endangered

Current Distribution

Box-Gum Woodland is found on relatively fertile soils on the tablelands and western slopes of NSW, extending from an altitude of approximately 170 m on the lower slopes up to 1200 m on the northern tablelands. The community occurs within the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands and South Western Slopes Bioregions.

Box-Gum Woodland containing White Box trees are most common on undulating areas of the western slopes while woodland containing Blakely's Red Gum and Yellow Box trees are more common in the grassy woodlands on the tablelands.

Ecology

This is an open grassy woodland characterised by the presence or prior occurrence of White Box (*Eucalyptus albens*), Yellow Box (*Eucalyptus melliodora*) or Blakely's Red Gum (*Eucalyptus blakelyi*). It has a ground layer of native tussock grasses and herbs, and a sparse, scattered shrub layer.

In some locations however, these characteristic tree species may now be absent from the tree layer as a result of recent clearing or thinning and, at these locations, only other tree species may be present.

Populations within the area affected by the proposed action

75.7 ha of 'Critically Endangered' woodland as per the EPBC Act will be affected by inundation if a FSL of 738 m AHD is considered, with an additional 1.66 ha potentially affected by construction of associated infrastructure. A 734.5m FSL will impact 40 ha, with an additional 0.5 ha affected by construction of associated infrastructure.

Current pressures on the community

Box-Gum Woodland was once widespread. However, the lower fertile footslopes and flats that support these woodlands were also the areas generally preferred for cropping, pasture and infrastructure development. As a consequence Box-Gum Woodland is now severely reduced in area, remnants tend to be highly isolated and fragmented and remnants with a full range of flora and fauna species are very rare.

For example, in the Holbrook area, woodlands have been reduced to less than 7% of the pre-European extant. In the NSW South West Slopes less than 4% remains and in the Central Lachlan Region, less than 1% remains.

Although large areas of NSW still contain the large trees that make up the backbone of the Box-Gum Woodland community, there is very little regeneration of trees.

Should this situation continue vast areas now occupied by box and gum trees will be devoid of trees in 50 or 100 years. Salinity, insect induced dieback and other factors also seriously threaten large areas of Box-Gum woodlands.

Additionally ongoing clearing threaten Box-Gum Woodland community in some regions.

3.2.2 *Melaleuca williamsii* (syn *Callistemon pungens*)

Status: EPBC Vulnerable

Current Distribution

Known from Queensland in Girraween National Park, Severn River Fletcher, in Stanthorpe area and extending to NSW from Oxley Wild Rivers NP near Armidale, Howell, Mount Balala, Guyra, Mann River Nature Reserve and New England National Park. (Hunter et al. 1998). Donatiu (2006) refers to habitat in RE 13.3.4-13.3.5 in riparian areas along rocky watercourses or sandy creek beds.

Ecology

Melaleuca williamsii is a shrub or small tree between 2–5 m high with branches rigid; new growth silvery. Grows in or near rocky watercourses, usually in sandy creek beds on granite or sometimes on basalt.

Populations within the area affected by the proposed action

The species has been recorded on the Project area in several locations, both during the survey and previous to it. The species has been recorded at the following locations:

- Inundation Area – previously recorded in close proximity to inundation areas (downstream from proposed dam wall and approximately 150 individual plants). Survey recorded numerous populations within 13.3.1x, 13.3.1 and 13.12.6 and suggest populations of >1000 individuals;
- Stalling Lane Access – Previously recorded in close proximity and survey recorded a single population of 4 individuals in 13.3.1 on a drainage line;
- Urban Pipeline – survey records in non-remnant areas;
- Irrigation Pipeline – 3 populations recorded on survey.

Current pressures on the species

Presumably threatened by clearing and grazing of riparian zones within its fairly limited distribution.

3.2.3 Grevillea scortechinii subsp. *scortechinii*

Status: EPBC Vulnerable

Current Distribution

In Queensland endemic to Stanthorpe Plateau, known from several populations between Stanthorpe and Dalveen in non-remnant roadsides with potential habitat in REs 13.3.1, 13.12.1, 13.12.2, 13.12.6, 13.12.8, 13.12.9. (Donatiu 2006).

Ecology

Backwater Grevillea is a low spreading shrub, which is usually a groundcover but sometimes is a shrub up to 1.5 m high. Its leaves are stiff and leathery with sharply-toothed edges and its flowers are black and green. Restricted to granite country on the New England Tablelands, including granitic outcrops, slabs and slopes (DECC 2005a). The

plant flowers from spring to autumn and grows in shrubby sclerophyll woodland, on granitic slabs and slopes in sandy loam soils (Department of Environment and Climate Change 2005a).

Populations within the area affected by the proposed action

The species has been located within the Irrigation Pipeline area. The survey recorded the species on Pozieres Road and it has been previously recorded on the margins of Pozieres and Pfunders Roads.

Current pressures on the species

- Plants have also been observed to be grazed by cattle.
- Clearing and fragmentation of shrubby woodland and heath habitat for agriculture and rural subdivision.
- Roadworks
- Frequent fires
- Blackberry invasion
- Disturbance by feral pigs
- High risk of local population extinction through catastrophic events such as fire, due to the scattered distribution of small populations of the taxon (DECC 2005a).

3.2.4 Eucalyptus mckieana

Status: Vulnerable

Current Distribution

Main distribution is in New South Wales where it is geographically restricted to the drier western side of the New England Tablelands of New South Wales, from Torrington to Bendemeer (DECC 2007) and between Inverell and Guyra in the Retreat, Tenterden, Gilgai areas and recorded in Kings Plain National Park (Hunter *et al* 1998). Queensland populations represents northern limit of geographical distribution

Ecology

Eucalyptus mckieana is found in grassy open forest or woodland on poor sandy loams, most commonly on gently sloping or flat sites (DECC 2005d). Flowers are white, with a flowering period of March to May. It is a medium sized tree about 25 m tall with red-brown stringy or fibrous bark extending to the ends of the branches (DECC 2005d).

Populations within the area affected by the proposed action

The species was not located at all during the survey location however it had been recorded prior to this. It has been recorded at the following locations:

- Inundation Area – not previously recorded in inundation area however known to be restricted to Fletcher Road area; and
- Urban Pipeline – Previously recorded in Fletcher Road in RE 13.12.2 400 m west of Rhumbalara Railway crossing of Fletcher Road.

Current pressures on the species

- Clearing and fragmentation of habitat for agriculture and development, including clearing for fence lines.
- Grazing by domestic stock.
- Destruction of trees and disturbance of habitat by timber-harvesting activities.
- Collection of firewood.
- Rural subdivision (DECC 2005d).

3.2.5 Boronia repanda

Status: Endangered

Current Distribution

Endemic to Stanthorpe Plateau with known national distribution restricted to scattered populations around Cottonvale, Thulimbah, Amiens and Passchendaele and a recently located record to the east of Stanthorpe on the border with New South Wales. Occurs in regional ecosystems 13.12.2-13.12.6 in shrubby woodland, open forest and heath (Donatui 2006) and in non-remnant.

Ecology

Boronia repanda, is an erect or weak, much-branched shrub to 1.5 m high with pale to bright pink (or occasionally white) flowers (Stanley & Ross 1983). This species grows in sandy soil among granite outcrops within dry sclerophyll forest and heathland. Flowers have been recorded from July to Nov. (mainly in spring) (Stanley & Ross 1983). Fruit are hairy, surrounded by the persistent corolla, and borne on the plant during spring to summer (Steenbeeke 1998) or in October.-November. (Duretto 1999b).

Populations within the area affected by the proposed action

The species has been previously recorded within the Irrigation Pipeline area at Pfunders Road and Posieres Road within proposed pipeline corridor in disturbed roadside vegetation. One landholder reported that *Boronia repanda* occurs within the inundation area of the proposed dam. Detailed flora survey for the EIS did not identify this species as occurring in this area.

Current pressures on the species

Due to its intrinsic habitat specificity, *Boronia repanda* may have always had a restricted distribution, confined to heathy vegetation associated with large expanses of granite outcropping on the mid-elevation, dry western side of the New England Batholith. However, populations of *B. repanda* may have declined since European settlement of the area as a result of grazing by stock and feral goats, inappropriate fire regimes, mineral exploration, mining, quarrying and bushrock collection (NSW National Parks and Wildlife Services 2002).

3.2.6 Acacia pubiflora

Status: NCA Vulnerable

Current Distribution

Potential habitat in 13.12.2 & 13.12.5. Known from Ballandean, Wybera, Wallangarra and Fletcher districts. Known from remnant vegetation near Stalling Lane and non-remnant roadside vegetation along Fletcher Road.

Ecology

Erect or spreading tree or shrub 3–8 m high; bark finely fissured, dark grey; branchlets angled towards apices, white-velvety. The species flowers in September.

Populations within the area affected by the proposed action

The survey located the species at the Stalling Lane Access area where 13 individuals were recorded. In addition to this, the species has been previously located within the Project Area at the following locations:

- Inundation Area – previously recorded immediately west of the inundation area; and
- Urban Pipeline – one HERBRECS record from Fletcher Road within the pipeline corridor.

3.2.7 Goodenia macbarronii

Status: Vulnerable

Current Distribution

Known from the western slopes of the Great Dividing Range in New South Wales, south from the Guyra and Inverell districts and also in north-eastern Victoria and the Darling Downs in Queensland (DECC 2007).

Ecology

Narrow Goodenia is an annual or short-lived perennial herb to 30 cm tall. Its leaves, at the base of the plant, are fleshy and slightly toothed, to 11 cm long by 5 mm wide. Flowers chiefly from October to March and is described as a short-lived annual herb. The species is an annual which appears seasonally and opportunistically in ephemerally damp or wet sites and is often common at sites after good winter-rainfall periods (DECC 2005f). Often found in sites with some form of recent disturbance, such as depressions and clearings made by grading and excavation along roadsides, open grazing land and paddocks inundated by weed species and areas previously cleared and grazed by cattle (DECC 2005f).

Populations within the area affected by the proposed action

The species was not recorded during the current survey however it has been previously recorded in the following locations on the Project Area:

- Inundation Area – Fletcher Road area on pavement seepage slopes; and
- Stalling Lane Access – Known from R2 rock pavements (RE13.12.6).

Current pressures on the species

- Stock grazing, pugging and trampling and pig rooting may damage the swampy habitat of the species.
- The species grows in disturbed sites such as table-drains and along roadsides and is susceptible to road grading, vehicle disturbance and grazing along roadside stock routes.
- Large localised colonies can appear opportunistically after rains in areas of water-collection and in damp soils, and are thus vulnerable to seasonal conditions.
- Competition from exotic weed species is also a threat, particularly competition from other seasonally opportunistic species (DECC 2005f).

3.2.8 Murray Cod (*Maccullochella peelii peelii*)

Status: Vulnerable

Current Distribution

Murray Cod were originally present throughout the Murray Darling Basin, except in the upper reaches of upland zone tributaries (MDBC 2007). This fish is endemic to Australia, occurring in freshwaters of the Murray-Darling River drainage in Queensland, New South Wales, Victoria and South Australia.

Ecology

Preferred habitat is pools with abundant cover such as logs, boulders, undercut banks and overhanging vegetation. Adults show high site fidelity, often returning to specific logs. They are a popular angling fish and have been stocked in many areas, including outside its original distribution. Spawning occurs in spring – summer and is triggered by increasing temperature, day length and possibly flow. Males guard the eggs which are laid on hard substrates, often inside hollow logs. The larvae drift downstream and a reverse movement by older fish occurs in late winter – spring and appears triggered by flow and or temperature.

Populations within the area affected by the proposed action

This species does not occur naturally in the Severn River system. Fsh-stocking has sustained Murray Cod in the Severn River since the mid 1900s.

Current pressures on the species

Numbers of cod in the Murray Darling basin have been significantly reduced compared to estimates of pre-European abundance, primarily as a result of over-fishing (originally commercial, but also recreational), habitat change (siltation and the removal of snags and standing dead trees to allow river navigation) barriers to movement, competition from introduced species and river regulation, particularly alteration of flooding regimes and the timing of flows with respect to temperature increases.

3.2.9 Bell's Turtle (*Elseya belli*)

Status: Vulnerable

Current Distribution

Until relatively recently, this species was known only from the headwaters of the Namoi and Gwydir Rivers, west of Armidale NSW, at elevations between 700 and 800 m (Cogger *et al*. 1993; Cann 1998). Localities in the two catchments are separated narrowly by the Nandewar Ra. Known localities include the Macdonald River. (also known as Muluerindie Creek) west of Uralla and Roumalla Creek near Kingston (Cogger *et al* 1993).

Wilson (2005) noted that the species is restricted to Bald Rock Creek, and furthermore that the Bald Rock population may be endemic.

The western boundary of the distribution coincides with where the rivers leave the escarpment before meeting the Darling River (Cann 1998).

Ecology

Occurs in the upper reaches and smaller tributaries of major rivers flowing through granitic bedrock (Cogger *et al* 1993; Cann 1998). This species prefers narrow stretches of river, 30 to 40 m wide, with pools up to 3 m deep. The riverbed is typically sandy and rocky, with small beds of weed (Cann 1998).

Typically, much of the land surrounding the rivers in which this species is known to occur is used for grazing sheep and cattle. Some riparian vegetation remains in the form of numerous Eucalypts and introduced willows (Cann 1998). Plant material such as fine aquatic weeds, stems of plants up to 30 mm long and terrestrial leaves form the bulk of the diet. Invertebrates are also taken, including crayfish (*Carex* sp.) and aquatic insects. All turtles examined had consumed large amounts of sediment (Cann 1998).

Faecal analysis indicates that turtles may be scavengers, or that some feed indiscriminately due to an eye disability appearing as cloudiness or cataracts.

Populations within the area affected by the proposed action

In the EIS survey, an individual was recorded in Bald Rock Creek and one in the weir pool at Somme Lane, downstream from the dam site. This is the first record from the Severn River.

As Darren Fiedler of the Queensland EPA has been monitoring the species over a few years but has not found it in the Severn River, the capture at Somme Lane probably represents an itinerant, rather than being indicative of a resident population. Little is known about the species but it appears to favour upland pools and to be a scavenging omnivore. It also appears to be rare in the system and may prefer more upland habitats.

Current pressures on the species

- Pollution and sedimentation of river habitat.
- Trampling and damage to river banks and riverside vegetation by grazing stock.
- Changes to natural stream flows through removal of water for irrigation.
- Predation of nests by foxes.

3.2.10 Granite Belt Thick-tailed Gecko (*Underwoodisaurus sphyrurus)*

Status: Vulnerable.

Current Distribution

This species is restricted to the cool highland Granite Belt of New England, New South Wales, and the Stanthorpe district of southern Queensland (Wilson and Swan 2003).

Ecology

The Granite Belt Thick-tailed Gecko is nocturnal and terrestrial, sheltering during the day under rocks and fallen timber and foraging over open areas at night (NPWS 2003; Wilson 2005). It occurs in rocky hills with dry open eucalypt forest or woodland, typically with boulders and exfoliating rock (NPWS 2003).

Populations within the area affected by the proposed action

The species is known from one Queensland Museum record from near Stanthorpe and four EPA WildNet records, exact locations unknown, from the general Project area. One individual was found within the inundation area during field surveys in December. The size of any local population is unknown.

Current pressures on the species

The Granite Belt Thick-tailed Gecko is threatened by clearing and fragmentation of habitat, removal of bush rock and fallen timber, too-frequent fire events, grazing and trampling of habitat by livestock and feral animals, and predation by cats and foxes (NPWS 2003).

3.2.11 Spotted-tailed Quoll (south-east mainland) (*Dasyurus maculatus maculates)*

Status: Endangered.

Current Distribution

The sub-species was formally distributed from Bundaberg in the north and Chinchilla in the west in Queensland and extended south to Victoria, South Australia and Tasmania (Maxwell et al 1996). However the species has undergone a range contraction in Queensland and is now rare in most areas throughout its range. Remaining populations are concentrated around the Blackall/Conondale Ranges, southern Darling Downs, Main Range, Lamington Plateau and McPherson/Border Ranges (Menkhorst and Knight 2001).

Ecology

Spotted-tailed Quolls are solitary animals, except during mating, and are predominantly nocturnal and partly arboreal. They shelter in rock caves and hollow logs or trees, with basking sites usually nearby (Menkhorst and Knight 2001).

Males occupy overlapping territories while females appear to maintain exclusive territories (Körtner et al 2004). The species feeds on a variety of prey including small and medium-sized mammals, birds, large arthropods, carrion and food scraps. They do, however, seem to have a preference for mammals (Belcher 1995; Jones and Barmuta

1998, 2000). Spotted-tailed Quolls occur in a wide variety of habitats including rainforests, wet and dry sclerophyll forests, coastal heath, scrub and sometimes Red Gum forests along inland rivers. They are found from sea-level to sub-alpine regions (Menkhorst and Knight 2001).

Populations within the area affected by the proposed action

There is a Queensland Museum record from Ballandean and, despite the lack of WildNet records, the species almost certainly occurs in the Project Area, at least sporadically.

Current pressures on the species

Spotted-tailed Quolls are threatened by habitat loss and fragmentation, which has in particular been severe in south-eastern Queensland (Maxwell et al 1996). Other threats include competition with foxes and feral cats, predation by foxes and dogs, death by ingestion of 1080 or strychnine intended for wild dogs and illegal shooting (Maxwell et al 1996; NPWS 2003).

3.2.12 Large-eared Pied Bat (*Chalinolobus dwyeri*)

Status: Vulnerable.

Current Distribution

The species occurs south from the Blackdown Tableland in Queensland to near Wollongong, New South Wales. It extends inland to Carnarvon National Park, Queensland.

Ecology

The Large-eared Pied Bat is rarely captured and consequently poorly known. Little is known of its roosting requirements, although it has been recorded roosting in disused mine tunnels, rock overhangs, caves and abundant Fairy Martin Hirundo ariel nests (Dwyer 1966; Eyre et al 1997; Schulz 1998; Thompson 2002).

The habitat requirements for the species are poorly understood. Most records from New South Wales are from dry and wet sclerophyll forest including Callitris forests, tall open eucalypt forests with a dry understorey, sub-alpine woodland, and sandstone outcrop country (Duncan et al 1999).

In south-eastern Queensland the species seems to be more associated with higher altitude moist forests and adjacent rainforest (Eyre et al 1997).

Populations within the area affected by the proposed action

The Large-eared Pied Bat was recorded by Anabat at a trapping site during the summer survey. It was not listed for the area in either the EPA's WildNet or Queensland Museum's databases. It is not possible to estimate the local population based on Anabat records from a single night.

Current pressures on the species

Due to poor ecological knowledge of this species, an assessment of threats is difficult. Several roosts have been destroyed, including the type locality at Copeton (Dwyer 1966) by flooding from the Copeton Dam (Hall and Richards 1998).

Other possible threats include the loss and fragmentation of habitat, too-frequent burning of foraging habitat, damage to roost and maternity sites by mining operations, disturbance of roost and maternity sites by recreational caving, use of pesticides, and predation by feral animals (Duncan et al 1999; NPWS 2003).

3.3 Status of listed species which may occur in the Project area

3.3.1 Australian Painted Snipe (*Rostratula australis)*

Status: Vulnerable

Current Distribution

Australian Painted Snipes have been considered a subspecies of Rostratula benghalensis, a species found in sub-Saharan Africa and Asia (Marchant and Higgins 1993). Recently, the Australian birds have been considered by some to be a full species, in which case R. benghalensis does not occur in Australia (Garnett and Crowley 2000). They are patchily distributed throughout Australia, with most records being in the south east. Records are erratic, the species being absent from areas in some years and common in others.

Ecology

The Australian Painted Snipe is a secretive, cryptic, crepuscular species that occurs in terrestrial shallow wetlands, both ephemeral and permanent, usually freshwater but occasionally brackish. They also use inundated grasslands, saltmarsh, dams, rice crops, sewage farms and bore drains. The species feeds on vegetation, seeds and invertebrates, including crustaceans and molluscs (Marchant and Higgins 1993).

Populations within the area affected by the proposed action

There are no database records for this species in the Project area. Currently the section of the Severn River within the inundation area provides very little habitat for this species. What potential habitat is present is due to the construction of weirs. Should the species occur the Project is likely to create, rather than reduce, suitable habitat.

Current pressures on the species

The Australian Painted Snipe is threatened by drainage of wetlands, diversion of water from rivers, clearance of wetland vegetation, and overgrazing (Garnett and Crowley 2000).

3.3.2 Squatter Pigeon (southern) (*Geophaps scripta scripta)*

Status: Vulnerable.

Current Distribution

This species was found from Cape York Peninsula in Queensland south to the Dubbo region in New South Wales. There have been no official records in New South Wales since the 1970s and the species has declined greatly in southern Queensland (Higgins and Davies 1996; NPWS 2003).

Ecology

Squatter Pigeons are terrestrial, foraging and breeding on the ground. The species occurs in open dry sclerophyll woodland with grassy understorey, nearly always near permanent water. Birds may occasionally feed in sown grasslands and pastures. Squatter Pigeons eat mainly seeds, including those of exotic pasture plants, and some insects (Crome and Shields 1992; Higgins and Davies 1996).

Populations within the area affected by the proposed action

There are no database records for the Project site or its immediate surrounds. It is comparatively easy to observe when present and its occurrence is considered very doubtful. The species is likely to be locally extinct in the inundation area and immediate surrounds.

Current pressures on the species

Much of the original habitat in Queensland has been replaced with pasture for livestock (Higgins and Davies 1996). Threats to existing populations include clearing and fragmentation of habitat, overgrazing by livestock and feral

herbivores, trampling of nests by livestock and feral animals, predation by cats and foxes, and illegal shooting (NPWS 2003).

3.3.3 Swift Parrot (*Lathamus discolour*)

Status: Endangered.

Current Distribution

This species breeds in Tasmania during spring and summer, dispersing widely across south-eastern Australia during winter (NPWS 2003). Movements on the mainland are little understood and the species is considered nomadic and irruptive, moving in response to food resources (Higgins 1999). It is infrequently, though possibly annually, recorded in south-eastern Queensland.

Ecology

The Swift Parrot is a lorikeet-like species that is typically gregarious. It is often noisy and conspicuous and often associates with lorikeets and honeyeaters at food resources. It feeds mainly on nectar, mostly from eucalypts. Swift Parrots occur in woodlands, riparian vegetation and remnant patches of mature eucalypts in agricultural areas, though they prefer dry sclerophyll forest (Higgins 1999; NPWS 2003).

Populations within the area affected by the proposed action

There are no database records for this species for the Project Area. The Swift Parrot is much sought after by birdwatchers, many of whom submit records to Birds Australia and/or WildNet. It is also a target species for annual winter surveys, which include southern Queensland. Consequently, the lack of records probably reflects a genuine current absence from the Project area.

This species is dependent on flowering eucalypts and its occurrence in Queensland is often as a result of a failure or reduction in flowering in southern woodlands and forests during winter. It is possible that Swift Parrots will become dependent on the Project area in the future due to either blossom failure or the loss of southern habitats.

Current pressures on the species

The Swift Parrot is threatened by clearing of suitable habitat, loss of nest hollows due to forestry practices, competition for nest hollows with introduced Common Starlings Sturnus vulgaris, land degradation that leads to dieback of eucalypts, and lack of regeneration of food tree species (Garnett and Crowley 2000; NPWS 2003).

3.3.4 Regent Honeyeater (*Xanthomyza phrygia*)

Status: Endangered.

Current Distribution

The Regent Honeyeater is endemic to south-eastern mainland Australia. This species occurs mostly on the inland slopes of the Great Dividing Range and formerly ranged from Wilmington, South Australia to near Rockhampton in Queensland. It is now probably extinct in South Australia, is vagrant to western Victoria, and occurs north only to Pomona in Queensland (Higgins et al 2001).

Numbers fluctuate greatly, both spatially and temporally, and movements outside of the breeding season are little known (Garnett and Crowley 2000).

Ecology

Although occasionally found in agricultural land with only partial tree cover or in city parks and gardens, the Regent Honeyeater occurs mainly in dry box-ironbark eucalypt woodland and dry sclerophyll forest (Higgins et al. 2001). Within the box-ironbark eucalypt associations they prefer the wettest, most fertile sites (Garnett and Crowley 2000).

Diet is mainly nectar and insects (including exudates such as lerp and honeydew) and, occasionally, fruit. Foraging is mainly carried out in the foliage and flowers of the upper canopy of trees, though they sometimes feed in the understorey and, rarely, on the ground. Nectar is taken mainly from eucalypts and mistletoes (Higgins et al 2001). Regent Honeyeaters glean for lerp and hawk for insects and, when nectar is scarce, may spend up to 90% of their foraging time feeding on lerp, honeydew and insects (Oliver 2000).

Populations within the area affected by the proposed action

There are two WildNet records for the general Project area, though no location details or dates are known. There is also one Birds Australia record from Sundown National Park in 2002. The species possibly occurs in the Project site at times, though it is most likely to just move through the area due to a lack of favoured food trees. The Project is not expected to have any deleterious effects on any individuals that may pass through or over-winter in the area.

Current pressures on the species

Breeding success rate is relatively high compared to other Australian honeyeater species and reproductive success is not considered responsible for the species' decline (Geering and French 1998; Oliver et al. 1998). About 75% of the Regent Honeyeater's habitat has been cleared, particularly the most favoured communities (Garnett and Crowley 2000).

The species is threatened by continuing degradation of habitat and the loss of large mature trees that provide nectar and nesting sites. Clearing and fragmentation also favour more aggressive species such as Noisy Miner. Increased populations of predators such as Pied Currawong have resulted in increased predation of eggs and nestlings and grazing by livestock inhibits tree and shrub regeneration (NPWS 2003).

3.3.5 Black-throated Finch (southern) (*Poephila cincta cincta)*

Status: Endangered.

Current Distribution

This species formerly occurred from far north Queensland south to the Northern Tablelands of New South Wales and as far west as Cunnamulla, Queensland (Higgins et al 2006).

Ecology

Black-throated Finches occur as pairs or in small flocks, though several hundreds may congregate around waterholes. This species often associates with other finch species. They occur in dry open grassy woodlands and forests with seeding grasses and free-standing water. In south-eastern Queensland Black-throated Finches have been recorded from dry open forest on ridges, grassy hillsides and mountain flats (Higgins et al 2006).

Populations within the area affected by the proposed action

There are no database records for the Project Area. The species is now possibly extinct in New South Wales and there were only six Atlas of Australian Bird records in southern Queensland for the period 1977 to 1981 and none for the Atlas of Australian Birds 2 (1998 – present) (Higgins et al. 2006). This species is probably locally extinct and possibly regionally extinct.

Current pressures on the species

The Black-throated Finch is threatened by loss and fragmentation of habitat, heavy grazing and trampling of habitat by livestock, grazing by rabbits, too-frequent fires, and illegal trapping (Garnett and Crowley 2000; NPWS 2003).

3.3.6 Brush-tailed Rock-Wallaby (*Petrogale penicillata)*

Status: Vulnerable.

Current Distribution

The species occurs along the Great Dividing Range from about 100 km north-west of Brisbane to northern Victoria. Populations once abundant in mountainous country have declined seriously in the south and west of its range, but it remains locally common in northern New South Wales and southern Queensland (Short and Milkovits1990).

Ecology

This species inhabits rock piles and cliff lines in vegetation ranging from rainforest to dry sclerophyll forests (Short and Milkovits 1990). It is increasingly restricted to isolated cliffs in parts of its former range and can be found in loose piles of large boulders consisting of a maze of subterranean holes, passageways; cliffs (usually over 15 m high), ledges, caves and some ledges covered by overhangs and isolated rock stacks (Short 1982). These areas may be refuge sites, reducing competition and predation. The animals shelter in the rocky outcrops during the day and venture out to forage on grasses, forbs and at times seeds and fruit during the evening (Short 1989).

Populations within the area affected by the proposed action

There is one Queensland Museum record from approximately 56 km north-east of Stanthorpe. It is not expected within the inundation area due to the lack of habitat.

Current pressures on the species

Threatening processes include competition for food with introduced herbivores, predation by dogs and cats, habitat degradation through weed invasion and inappropriate fire regimes and clearing for agriculture. Migration rates between colonies are low and this affects colony recovery (Short and Milkovits 1990).

3.3.7 Long-nosed Potoroo (southeast mainland) (*Potorous tridactylus tridactylus)*

Status: Vulnerable

Current Distribution

The Long-nosed Potoroo is restricted to the coastal regions of eastern Australia, from Tasmania and south-western Victoria to south-eastern Queensland. Its distribution generally corresponds with areas that receive more than 760 mm a year (Seebeck 1981). The species is now extinct from South Australia and many populations within Victoria are now geographically isolated (Maxwell et al 1996).

Ecology

Long-nosed Potoroos are predominantly solitary, though males and females may share shelter sites. Shelter and refuge during the day is taken in shallow depressions that are covered by thick tussock grass or vegetation (Amos 1983; Bennett 1993). The species feeds predominantly on hypogeal (underground) fungi, but also consumes fruit, seeds and arthropods when fungi are scarce. Long-nosed Potoroos have historically been considered to be predominantly nocturnal, but recent studies have found they can be active during the day. Females occupy smaller home ranges than males (2.9 ha vs 4 ha) and while overlap occurs between the sexes, little overlap occurs between individuals of the same sex (Long 2001).

The Long-nosed Potoroo has been recorded in a variety of habitat types including disturbed subtropical and warm-temperature rainforests, tall open forests with a moist understorey, woodland with tussock grass, open forest with shrubby understorey, and heathlands. Although the vegetation type used by this species varies, they are generally captured in areas where there is a dense ground cover and are reluctant to move from dense undergrowth (Heinsohn 1968; Seebeck 1981; Menkhorst and Beardsell 1982; Amos 1983; Bennett 1993).

Populations within the area affected by the proposed action

There are no database records for the Project area and the species is not known from the nearby sections of the New England Tableland in New South Wales (NPWS 2003). It is not considered to be present.

Current pressures on the species

The species is threatened by habitat loss, habitat alteration by grazing, replacement of native ground cover with introduced pasture grasses, inappropriate fire regimes and predation by foxes, cats and dogs (Maxwell et al 1996; NPWS 2002).

3.3.8 Greater Long-eared Bat (south-eastern) (*Nyctophilus timoriensis)*

Status: NCA not listed; EPBC Vulnerable

Current Distribution

This species occurs across southern Australia, including Tasmania, but avoids coastal regions on the south-eastern mainland (NPWS 2003).

Ecology

The Greater Long-eared Bat is a medium-sized species that occurs in dry forest and woodland, mallee, and other arid and semi-arid habitats. It roosts in tree hollows or under bark (NPWS 2003). It is a little known species that is rarely caught (Churchill 1998).

Populations within the area affected by the proposed action

There are no database records for the Project site or its immediate surrounds. Because this species is so little known it is difficult to assess the likelihood or otherwise of its possible occurrence in the Project Area.

Current pressures on the species

The Greater Long-eared Bat is threatened by loss and fragmentation of habitat, loss of mature hollow-bearing trees, and the use of pesticides (NPWS 2003).

3.3.9 Grey-headed Flying-Fox (*Pteropus poliocephalus)*

Status: NCA not listed; EPBC Vulnerable.

Current Distribution

Regular or frequently used camps have been located between Rockhampton in Queensland south to around Mallacoota in East Gippsland, Victoria. Less consistent records extend the south range of the species to Warrnambool, Victoria (Duncan et al 1999). They are generally recorded between the coast and the western slopes of the Great Dividing Range. Recent surveys have failed to locate camps or regular records of this species from the Rockhampton Area or north of Hervey Bay, Queensland. Furthermore, despite one regular camp now in Melbourne (Menkhorst 1995), the southern range of the species has also appeared to have considerably retracted (Duncan et al 1999).

Ecology

Two habitat characteristics are important for Grey-headed Flying-foxes, foraging resources and roosting sites. As the species is a canopy-feeding frugivore and nectarivore, they utilise vegetation including rainforests, open eucalypt forests, woodlands, Melaleuca swamps and Banksia woodlands. Roosting occurs in are variety of

vegetation including rainforest, Melaleuca, mangroves and riparian vegetation (Nelson 1965), but colonies may use exotic vegetation in urban areas (Birt et al 1998).

Roosts are commonly within dense vegetation close to water, primarily rainforest patches, stands of Melaleuca, mangroves or riparian vegetation. The species congregates in large camps of up to 200,000 individuals from early until late summer, with the number of bats within a camp being influenced by the availability of blossom in the surrounding area. Adults normally disperse during the winter and can migrate up to 750 km as individuals or small groups, with the young forming winter camps (Churchill 1998).

Populations within the area affected by the proposed action

No camps or individuals were located in the Project site. There are no database records for the Project area. It is not considered to be present.

Current pressures on the species

Grey-headed Flying-foxes are the subject to several threatening processes, the most severe being the loss of habitat. It has been suggested that this habitat loss resulted in a 50% decline in the population by the 1930s (Duncan et al 1999). The loss of habitats, particularly important habitat such as reliable winter resources along the east coast, has continued to lead to population decline. The species will forage within commercial fruit farms, sometimes significantly reducing their yield. This has resulted in direct culling or the destruction of camps by harassment. Other threatening processes include accumulation of lethal levels of lead (in urban areas) (Hariono et al 1993), electrocution on overhead powerlines, which kills disproportionately high numbers of lactating females (Duncan et al 1999), and conversion of old-growth forests and woodlands to young, even-aged stands due to too-frequent burning (NPWS 2002).

4. Assessment of Relevant Impacts and Mitigation Measures

4.1 Introduction

This section describes the potential impacts on matters of NES and the possible mitigation measures for each impact. When effective mitigation measures are not available, the discussion has been broadened to include compensatory measures to offset unavoidable impacts.

In some cases impacts may be relevant to more than one matter protected, such as the assemblage of rainforest plants considered potential occurrences in the Project area. In such cases the impacts have been addressed together, clearly stating the relevance of the impact to the different matters protected.

4.2 Vegetation and Habitat Loss

The majority of the area to be permanently inundated at the proposed FSL will be cleared of vegetation. Clearing will be undertaken from the current FSL to just below the proposed FSL. Where vegetation is not cleared it is assumed (for the purposes of this assessment) that it will be lost as a result of permanent inundation, although this may not necessarily be the case.

The field survey confirmed the presence of 'Endangered' RE's and nationally significant vegetation communities in both the inundation area and related infrastructure corridors. Analysis of spatial data indicates that:

- The Urban Water Supply Project (FSL 734.5 m AHD) will impact will impact 40 ha of 'Critically Endangered' woodland as per the EPBC Act with an additional 0.5 ha affected by construction of associated infrastructure. This corresponds to impact 58 ha of 'Endangered' RE's, 3.2 ha of an 'Of Concern' RE, with an additional 1.7 ha of 'Endangered' and 0.1ha to 'Of Concern' RE's will be associated with construction of of associated infrastructure.
- The Combined Urban and Irrigation Project (FSL 738 m AHD) will impact will impact 75.7 ha of 'Critically Endangered' woodland as per the EPBC Act with an additional 1.66 ha affected by construction of associated infrastructure. This corresponds to 101.5 ha of 'Endangered' RE's and 6.2 ha of an 'Of Concern' RE will be impacted during inundation. An additional 2.2 ha of 'Endangered' RE's and 0.1ha of an 'Of Concern' RE will be affected by construction of associated infrastructure

4.3 Assessment of Impacts on threatened species and ecological communities known from the Project area

4.3.1 White Box/Yellow Box/Blakely's Red Gum Grassy Woodland

Impacts

Approximately 75.7 ha of White Box (Eucalyptus albens), Yellow Box (E. melliodora), Blakely's Red Gum (E. blakelyi) Grassy Woodland and Derived Native Grasslands woodland will be affected by inundation if a Full Supply Level (FSL) of 738 m AHD is considered, with an additional 1.66 ha potentially affected by construction of associated infrastructure. At 734.5m FSL will impact 40 ha, with an additional 0.5 ha affected by construction of associated infrastructure.

Mitigation

A compensatory habitat strategy is to be developed for the Project. The objectives of the strategy will be threefold;

(a) the strategy will seek to comply with the requirements of the Queensland *Vegetation Management Act 1999* and associated Codes and Policies;

(b) the strategy will seek to comply with Draft Policy Statement: Use of environmental offsets under the Environment Protection and Biodiversity Conservation Act 1999 and

(c) the strategy will aim to provide tangible conservation benefits at the local and regional scale, with an emphasis on threatened species conservation.

The compensatory habitat strategy is likely to involve a combination of the following options:

- securing advanced regrowth (near remnant) vegetation within and outside Stanthorpe Shire which is representative of the RE's/EC's and essential habitat to be cleared for the Project. The properties will be either be purchased by Council or secured via registered covenant. In both cases the properties would be actively managed until such time as they reach remnant status;
- securing RE's/EC's of equivalent conservation status to those to be cleared for the Project within and outside Stanthorpe Shire and managing these areas until such time as they meet remnant status;
- strategic purchase of key land parcels which have been identified as key linkages or habitats for EVR taxa at the local, sub-regional or regional scale; and
- revegetation and rehabilitation of existing cleared areas of land within the Project area, with a view to re-instating pre-clearing vegetation types.

Likelihood of Community Decline

There will be a reduction in the overall extent of this ecological community in the short term. In the long term, it is intended that no net loss in area of the will be achieved through development and implementation of an appropriate compensatory habitat strategy which will ultimately conserve areas of this EC which are currently unprotected or in the early-late stages of regrowth and not protected by legislation.

4.3.2 *Melaleuca williamsii* (syn *Callistemon pungens*)

Impacts

The Callistemon genus has recently been revised (see Craven 2006) with the conversion of Callistemon to Melaleuca accepted in Queensland (Bostock and Holland 2007). The new Melaleuca key is as yet unpublished, however it is understood that accurate identification relies on flowering material (Bean pers. comm. 2006, Harden 2002, Stanley and Ross 1986). It should therefore be noted that the identification of these taxa throughout the Emu Swamp baseline flora surveys is based on non-flowering material. Non-flowering specimens provided for identification to the Queensland Herbarium advisory services were identified as *Melaleuca* sp. On this basis, all records remain unconfirmed and have been tentavively placed under *M. williamsii* or *M. flavovirens* based on field characteristics as a precautionary approach. Surveys timed for the flowering period of October-November will be required if confirmation of the identity of these taxa throughout the Project area is to be achieved. It should also be noted that *Melaleuca williamsii* is referred to as *Callistemon pungens* in the EPBC Act.

The population of *Melaleuca williamsii* within the inundation area represents one of the largest known stands on the Stanthorpe Plateau in comparison to those reported by Donatiu (2006). Inundation will effectively divide the population into two disjunct occurrences, as well as have a potential impact on occurrences immediately downstream from the dam wall.

Significant impact to essential habitat and populations of this species is expected as a result of inundation. Emu Swamp Road realignment population located approximately 20-30 m west of the proposed alignment. Impacts to 3 populations on irrigation pipeline is possible. The potential impacts can be minimised through sensitive design and pre and post construction mitigation and management measures.

Mitigation Strategies

The mitigation approach for this species involves a combination of actions including translocation or propagated stock and development of management and monitoring programs. The overarching objective is to ensure no net loss of individuals from the Project area. The following mitigation strategy is proposed for *Melaleuca williamsii*:

- Pre-construction survey of inundation area to more accurately determine populations;
- Flagging of individual specimens for potential propagation and/or translocation;
- Establishment of areas of suitable compensatory habitat (RE13.12.6, RE13.3.1x1) (refer to **Section 5**);
- Population surveys within areas of compensatory habitat and consideration given to species introduction into suitable locations;
- Devise and implement a species specific management plan;
- Control of exotic species (fauna and flora) within areas of established compensatory habitat will be essential to avoid habitat degradation and potential loss of species;
- the propagation potential of the species will be reviewed during a formal propagation trial. The objective will be to establish a substantial *ex situ* population of the species derived from parent populations currently known from the Project Area. Ultimately it is envisaged that the *ex situ* population will be of a similar number of individuals to the entire population known from the Project area, however, the propagation trial should be restricted to the minimum number of individuals to demonstrate success;
- preliminary analysis indicates that substantial patches of preferred habitat occur downstream of the impact area. A formal review of the suitability of these sites for translocation purposes will be completed, with an assessment of biotic and abiotic characters used to select proposed translocation sites;
- a Translocation Plan will be developed which directs conservation efforts for this species at the local level. It will identify translocation sites, specify methods for propagation and translocation and provide a framework for ongoing management;
- monitoring programs will be developed for in situ, ex situ and translocated populations to determine population size, health and reproductive status; and
- management plans will be developed for all populations of this species within the impact areas.

Likelihood of species decline

The combination of actions listed above is considered likely to ensure that the species does not decline at the local, regional or national scale.

4.3.3 Grevillea scortechinii subsp. *scortechinii*

Impacts

Major direct and residual impact to essential habitat and populations of this species is possible in a section of the Urban Pipeline, dependant on sensitive design and pre and post construction mitigation and management measures.

Mitigation Strategies

The mitigation approach for this species involves a combination of actions including avoidance of impact (by amending pipeline alignment as required), translocation or propagated stock and development of management and monitoring programs. The overarching objective is to ensure no net loss of individuals from the Project Area. The following mitigation strategy is proposed:

- Pre-construction survey to more accurately determine populations and amendment of pipeline alignment to avoid this species where possible;

- Flagging of individual specimens for potential propagation and/or translocation where impacts can not be avoided;
- If unavoidable and significant impacts on this species are incurred, a Translocation Plan will be developed which directs conservation efforts for this species at the local level. It will identify translocation sites, specify methods for propagation and translocation and provide a framework for ongoing management.

Likelihood of species decline

The combination of actions listed above is considered likely to ensure that the species does not decline at the local, regional or national scale.

4.3.4 Eucalytpus mckieana

Impacts

There are potential impacts associated with urban corridor in proximity of Rhumbalara Railway crossing on Fletcher Road, although this will need verification at the detailed design stage.

Mitigation Strategies

The mitigation approach for this species involves a combination of actions including translocation or propagated stock and development of management and monitoring programs. The overarching objective is to ensure no net loss of individuals from the Project Area. The following mitigation strategy is proposed:

- Pre-construction survey pipeline alignment to more accurately determine populations and amendment of pipeline alignment to avoid this species where possible;
- Flagging of individual specimens for potential propagation and/or translocation where impacts can not be avoided;
- If unavoidable and significant impacts on this species are incurred, a Translocation Plan will be developed which directs conservation efforts for this species at the local level. It will identify translocation sites, specify methods for propagation and translocation and provide a framework for ongoing management.

Likelihood of species decline

The combination of actions listed above is considered likely to ensure that the species does not decline at the local, regional or national scale.

4.3.5 Boronia repanda

Impacts on population size and area of occupancy

There is the potential for major direct and residual impact to essential habitat and populations of this species is possible as a result of Irrigation Pipeline. Impact assessment dependant on additional survey to inform sensitive design and pre and post construction mitigation and management measures.

Mitigation Strategies

The mitigation approach for this species involves a combination of actions including avoidance of individual specimens (via alteration to pipeline alignment) translocation or propagated stock and development of management and monitoring programs. The overarching objective is to ensure no net loss of individuals from the Project area. The following mitigation strategy is proposed:

- Pre-construction survey of pipeline alignment to more accurately determine populations and amendment of pipeline alignment to avoid this species where possible;

- Flagging of individual specimens for potential propagation and/or translocation where impacts can not be avoided;
- If unavoidable and significant impacts on this species are incurred, a Translocation Plan will be developed which directs conservation efforts for this species at the local level. It will identify translocation sites, specify methods for propagation and translocation and provide a framework for ongoing management.

Likelihood of species decline

The combination of actions listed above is considered likely to ensure that the species does not decline at the local, regional or national scale.

4.3.6 Acacia pubiflora

Impacts on population size and area of occupancy

Impact to essential habitat and populations of this species associated with proposed Stalling Lane Access expected.

Mitigation Strategies

The mitigation approach for this species involves a combination of actions including translocation or propagated stock and development of management and monitoring programs. The overarching objective is to ensure no net loss of individuals from the Project area. The following mitigation strategy is proposed:

- Pre-construction survey of inundation area to more accurately determine populations and amendment of pipeline alignment to avoid this species where possible;
- Flagging of individual specimens for potential propagation and/or translocation where impacts can not be avoided;
- If unavoidable and significant impacts on this species are incurred, a Translocation Plan will be developed which directs conservation efforts for this species at the local level. It will identify translocation sites, specify methods for propagation and translocation and provide a framework for ongoing management.

Likelihood of species decline

The combination of actions listed above is considered likely to ensure that the species does not decline at the local, regional or national scale.

4.3.7 Murray Cod (*Maccullochella peelii peelii*)

Impacts on population size and area of occupancy

Physical disturbance to aquatic habitat will occur within the footprint of the dam wall and works buffer area; with respect to downstream works such as the entry to the fish transfer device and the flow release point, and in upstream areas associated with quarrying and filter sand excavation. The river will be routed around right abutment works for about three months then diverted through a conduit while all other works are completed over a 7 – 8 month period. The area to be disturbed is primarily shallow glide or pool with some riffle. During EIS inspections macrophyte cover in the area was low and large fish were not encountered nor are they expected except in periods of substantial flow. The disturbance will cover approximately 200 m of river and stream bed, mostly upstream of the wall or in its footprint so this area will be permanently changed in any case. The loss of aquatic flora and fauna through direct physical disturbance is assessed as minor and temporary, with most affected areas being later affected by inundation.

The works include temporary stream diversions and the construction of coffer dams and temporary ponds to trap runoff water. These structures may, and in some cases will, block fish movement at least temporarily.

Mitigation Strategies

No specific management strategies proposed. The Severn River population is not a natural population of this species.

Likelihood of Species Decline

As this species is actively stocked into the Severn River system, it is unlikely to decline as a result of the proposed dam.

4.3.8 Bell's Turtle (*Elseya belli*)

Impacts

The impact of the dam is not likely to be significant given the very low probability of occurrence in the area and the higher probability that the area is not used for nesting. Of probably greater potential impact is the introduction of large predatory fish that would likely prey on hatchlings. As with other turtles, the major current impacts are probably related to predation of eggs by goannas and feral animals (foxes and pigs) or damage to nest banks by cattle (Young, in Young 2001).

Mitigation Strategies

No specific management strategies proposed. General mitigation strategies which may benefit this species include the following:

- Further research into the distribution and abundance of the species in the vicinity of the proposed dam to ascertain whether the single record represented an itinerant individual or a resident animal;
- Investigation of the need for further investment in infrastructure which permits free movement of turtles upstream and downstream of the dam.

Likelihood of Species Decline

It has been assumed that the individual recorded during baseline surveys represents an itinerant individual and that a resident population is not present. As stated above, the impact of the dam is not likely to be significant given the very low probability of occurrence in the area and the higher probability that the area is not used for nesting.

4.3.9 Granite Belt Thick-tailed Gecko (*Underwoodisaurus sphyrurus*)

Impacts

The Granite Belt Thick-tailed Gecko is nocturnal and terrestrial, sheltering during the day under rocks and fallen timber and foraging over open areas at night. It occurs in rocky hills with dry open eucalypt forest or woodland, typically with boulders and exfoliating rock. There are some database records for the general Project area and one individual was located within the inundation area during this study's field investigations. The number of individuals within the inundation area is unknown but the quantity of suitable habitat suggests a small local population.

There is little suitable habitat for this species in the inundation area, with most suitable habitat above the FSL. No long-term decrease in any local population is expected within the Project Area. The actual area of occupancy of the species will be unaffected in the long-term.

Population scale movement will be unaffected in the long-term and fragmentation is therefore unlikely. Significant disruptions to breeding cycles are also therefore unlikely. Any impacts involving important habitat (whether or not it can be considered 'critical' habitat) will be minor and short-term.

Any impacts on any local populations or individuals will be minor and short-term, particularly following the implementation of a pest and weed management plan, as is required under State legislation to control and prevent the establishment of invasive species (and associated diseases) as a result of the Project.

Mitigation strategies

- Offset required or restoration of comparable habitat in local area.
- Fauna spotter/catcher during clearing.

Likelihood of species decline

No habitat modified, destroyed, removed, isolated or decreased by the Project will result in species decline.

4.3.10 Spotted-tailed Quoll (south-east mainland) (*Dasyurus maculatus maculates*)

This species was not recorded within or nearby the Project Area, despite a specific trapping effort, nor were any traces of the species located. Nonetheless, a population of this species is considered likely to be present within or around the Project Area. At the very least the species is expected to move through the Project Area at times. If present, the species will be indirectly impacted during dam construction by the clearing and inundation of habitat for prey species and associated feral predator species, and their subsequent dispersal into adjacent areas more likely to support Spotted-tailed Quoll. Any such impacts on any local population will be minor and short-term, particularly following the implementation of a pest and weed management plan, as is required under State legislation. Furthermore, any potential for dam operation to indirectly impact regional movement and dispersal of the species will be minimal given the proposed dimensions of the dam, ensuring that any such impacts on any local population will be minor and short-term.

Impacts

Any impact on the population will be minor and short term. The actual area of occupancy of the species will be largely unaffected in the long-term.

Population scale movement will be unaffected in the long-term and fragmentation is therefore unlikely. Significant disruptions to breeding cycles are also therefore unlikely. Any impacts involving important habitat (whether or not it can be considered 'critical' habitat) will be minor and short-term.

Any impacts on any local populations or individuals will be minor and short-term, particularly following the implementation of a pest and weed management plan, as is required under State legislation to control and prevent the establishment of invasive species (and associated diseases) as a result of the Project.

Mitigation strategies

- Offset required or restoration of comparable habitat in local area.
- Feral predator control (management plan).
- Signage on roads and speed limits for construction vehicles.

Likelihood of species decline

Any impacts involving important habitat (whether or not it can be considered 'critical' habitat) will be minor and short-term and the species is not expected to decline.

4.3.11 Large-eared Pied Bat (*Chalinolobus dwyeri*)

Impacts

The Large-eared Pied Bat is rarely captured and consequently poorly known. Little is known of its roosting requirements, although it has been recorded roosting in disused mine tunnels, rock overhangs, caves and abundant Fairy Martin Hirundo ariel nests The habitat requirements for the species are poorly understood. Most records from New South Wales are from dry and wet sclerophyll forest including Callitris forests, tall open eucalypt forests with a dry understorey, sub-alpine woodland, and sandstone outcrop country. In south-eastern Queensland the species seems to be more associated with higher altitude moist forests and adjacent rainforest. There are no database records for the species for the general Project Area. It was recorded by Anabat during this study's field surveys.

Any impacts on any local population will be minor and short-term (regardless of whether or not the population may be considered important). The actual area of occupancy of the species will be unaffected in the long-term.

No population (whether or not it can be considered important) of this highly mobile species will be fragmented due to the Project. No habitat considered critical to the survival of the species is present in the Project Area. Population scale movement will be unaffected in the long-term and no known breeding sites will be lost. As such, significant disruptions to breeding cycles are unlikely.

Any impacts on any local populations or individuals will be minor and short-term, particularly following the implementation of a pest and weed management plan, as is required under State legislation to control and prevent the establishment of invasive species (and associated diseases) as a result of the Project.

Mitigation strategies

- Offset required or restoration of comparable habitat in local area.
- Fauna spotter/catcher will also be present during clearing

Likelihood of species decline

No habitat modified, destroyed, removed, isolated or decreased by the Project will result in species decline.

4.4 Assessment of Impacts on species which may occur

4.4.1 Grey-headed Flying-Fox (*Pteropus poliocephalus*)

Grey-headed Flying-foxes have not been recorded in the area. The species is a canopy-feeding frugivore and nectarivore, utilising a variety of habitats including rainforests, open eucalypt forests, woodlands, *Melaleuca* swamps and *Banksia* woodlands. The loss of potential food trees will occur during dam construction and operation but this will be offset by the rehabilitation or restoration of comparable habitat in the local area, ensuring that any such impacts on any possible local population will be minor and short-term.

Impacts

Any impacts on any possible local population will be minor and short-term (regardless of whether or not the population may be considered important). The actual area of occupancy of the species will be unaffected.

No population (whether or not it can be considered important) of this highly mobile species will be fragmented due to the Project. No habitat considered critical to the survival of the species is present in the Project Area. No camps of the species were recorded within the Project Area and there will be no disruptions to any breeding cycle of any population (whether or not the population can be considered important).

Any impacts on any possible local populations or individuals will be minor and short-term, particularly following the implementation of a pest and weed management plan, as is required under State legislation to control and prevent the establishment of invasive species (and associated diseases) as a result of the Project.

Mitigation strategies

Offset or restoration of comparable habitat in local area.

Likelihood of species decline

No habitat modified, destroyed, removed, isolated or decreased by the Project will result in species decline.

4.4.2 Australian Painted Snipe (*Rostratula australis*)

There are no database records for the general Project area and the species was not recorded during from the Project Area during the recent field investigations. It is a secretive, cryptic, crepuscular species that occurs in terrestrial shallow wetlands, both ephemeral and permanent, including inundated grasslands, saltmarsh, dams, rice crops, sewage farms and bore drains. The species is patchily distributed throughout Australia, with most records being in the southeast. Records are erratic, the species being absent from areas in some years and common in others. Breeding occurs mainly in the Murray-Darling region, though is also recorded in other parts of Queensland, New South Wales and South Australia. The Australian Painted Snipe is threatened by drainage of wetlands, diversion of water from rivers, clearance of wetland vegetation, and overgrazing.

As this species inhabits wetland areas, the Project may result in an overall positive impact in the long term via an increase in these habitats due to dam construction and subsequent inundation, and habitat enhancement through the revegetation of dam edges, the exclusion of cattle to prevent destruction of aquatic plants and the muddying of water, and the formal control of feral predators and competitive exotic plant and fish species through the implementation of a pest and weed management plan.

Impacts

There is very little suitable habitat for this species in the inundation area. Habitat creation and enhancement activities noted above may result in an increase of suitable habitat for this species. Therefore no long-term decrease in any local population is expected within the Project Area. The actual area of occupancy of the species will be unaffected in the long-term.

No population (whether or not it can be considered important) of this highly mobile species will be fragmented due to the Project. No habitat critical to the survival of the species is present in the Project Area. Most breeding occurs in the Murray-Darling region. Overall, population scale movement will be unaffected in the long-term and significant disruptions to breeding cycles are therefore unlikely.

Any impacts on any local populations or individuals will be minor and short-term, particularly following the implementation of a pest and weed management plan, as is required under State legislation to control and prevent the establishment of invasive species (and associated diseases) as a result of the Project.

Mitigation strategies

- Revegetation of dam edges and exclusion of livestock.
- Feral predator control (management plan).

Likelihood of species decline

No habitat modified, destroyed, removed, isolated or decreased by the Project will result in species decline. It is likely that the species may even benefit from the proposed inundation.

4.4.3 Squatter Pigeon (southern) (*Geophaps scripta scripta*)

Squatter Pigeons are terrestrial, foraging and breeding on the ground. The species occurs in open dry sclerophyll woodland with grassy understorey, nearly always near permanent water. Birds may occasionally feed in sown grasslands and pastures. Squatter Pigeons eat mainly seeds, including those of exotic pasture plants, and some insects. There have been no official records in New South Wales since the 1970s and the species has declined greatly in southern Queensland (Higgins and Davies 1996; NPWS 2003). There are no database records and it is not considered to be present.

Impacts

There is some suitable habitat for this species in the inundation area. Any loss of habitat will be replaced by offsetting or rehabilitation of existing habitat. Therefore no long-term decrease in any local population is expected. The actual area of occupancy of the species will be unaffected in the long-term.

No population (whether or not it can be considered important) of this species will be fragmented due to the Project. No habitat critical to the survival of the species is present in the Project Area. Overall, population scale movement will be unaffected in the long-term and significant disruptions to breeding cycles are therefore unlikely.

Any impacts on any possible local populations or individuals will be minor and short-term, particularly following the implementation of a pest and weed management plan, as is required under State legislation to control and prevent the establishment of invasive species (and associated diseases) as a result of the Project.

Mitigation strategies

- Offset required or restoration of comparable habitat in local area.
- Feral predator control (management plan).

Likelihood of species decline

No habitat modified, destroyed, removed, isolated or decreased by the Project will result in species decline.

4.4.4 Swift Parrot (*Lathamus discolour*)

While not detected during the present surveys, this species is a sporadic, winter-visitor to southern Queensland that could occur within the Project Area from time to time outside of its breeding seasons whilst roaming widely for flowering eucalypts. If present, the species will be directly impacted by the loss of potential food trees due to clearing and inundation during dam construction. However, the available food resources in the immediate locality are not favoured species and any losses of habitat will be offset by the rehabilitation or restoration of comparable habitat in the local area.

Impacts

No long-term decrease in the size of any local populations is expected. Any loss of feeding resources within the Project Area will be temporary and would represent a very minor reduction in the area of occupancy for the species.

Any localised impacts in non-breeding areas for such a wide-ranging species are very unlikely to result in population fragmentation. The Project Area is not considered to be critical habitat for foraging, and any localised impacts in such non-breeding areas are unlikely to result in a significant impact to the species in isolation.

The Project Area is not part of a recognized breeding area for this species (Swift Parrots breed in Tasmania). Rather, it represents a potential area of visitation for food resources outside of the breeding seasons. As such, the Project is not considered to have the potential to disrupt the breeding cycle of a population of this species.

Rehabilitation or restoration of habitat will include regular monitoring and treatment of weed infestation to ensure any harmful invasive species do not become established. Furthermore, any potential predation of these species by feral animal species is not expected to increase as a result of the Project due to the implementation of a pest and weed management plan, as is required under State legislation.

The use of seed or seedlings of local provenance during habitat rehabilitation and restoration activities will limit any possible introduction of disease.

Mitigation strategies

Offset required or restoration of comparable habitat in local area.

Likelihood of species decline

Although the cumulative area of food resources across the species' range may be considered critical habitat for foraging, any localised impacts in non-breeding areas are unlikely to result in a significant impact to the species in isolation.

4.4.5 Regent Honeyeater (*Xanthomyza Phrygia*)

While not detected during the present surveys, this species is a sporadic, winter-visitor to southern Queensland that could occur within the Project Area from time to time outside of its breeding seasons whilst roaming widely for flowering eucalypts. If present, the species will be directly impacted by the loss of potential food trees due to clearing and inundation during dam construction. However, the available food resources in the immediate locality are not favoured species and any losses of habitat will be offset by the rehabilitation or restoration of comparable habitat in the local area.

Impacts

No long-term decrease in the size of any local populations is expected. Any loss of feeding resources within the Project Area will be temporary and would represent a very minor reduction in the area of occupancy for the species.

Any localised impacts in non-breeding areas for such a wide-ranging species are very unlikely to result in population fragmentation. The Project Area is not considered to be critical habitat for foraging, and any localised impacts in such non-breeding areas are unlikely to result in a significant impact to the species in isolation.

The Project Area is not part of a recognised breeding area for this species. Rather, it represents a potential area of visitation for food resources outside of the breeding seasons. As such, the Project is not considered to have the potential to disrupt the breeding cycle of a population of this species.

Rehabilitation or restoration of habitat will include regular monitoring and treatment of weed infestation to ensure any harmful invasive species do not become established. Furthermore, any potential predation of these species by feral animal species is not expected to increase as a result of the Project due to the implementation of a pest and weed management plan, as is required under State legislation.

The use of seed or seedlings of local provenance during habitat rehabilitation and restoration activities will limit any possible introduction of disease.

Mitigation strategies

Offset required or restoration of comparable habitat in local area.

Likelihood of species decline

Although the cumulative area of food resources across the species' range may be considered critical habitat for foraging, any localised impacts in non-breeding areas are unlikely to result in a significant impact to the species in isolation.

4.4.6 Black-throated Finch (southern) (*Poephila cincta cincta*)

Black-throated Finches occur as pairs or in small flocks, though several hundreds may congregate around waterholes. This species often associates with other finch species. They occur in dry open grassy woodlands and forests with seeding grasses and free-standing water. There are no database records for the Project area. The species is now possibly extinct in New South Wales and there were only six Atlas of Australian Bird records in southern Queensland for the period 1977 to 1981 and none for the Atlas of Australian Birds 2 (1998 – present) (Higgins et al 2006). This species is probably locally extinct and possibly regionally extinct.

Impacts

There is some suitable habitat for this species in the inundation area. Any loss of habitat will be replaced by offsetting or rehabilitation of existing habitat. Therefore no long-term decrease in any possible local population is expected. The actual area of occupancy of the species will be unaffected in the long-term.

No population (whether or not it can be considered important) of this species will be fragmented due to the Project. No habitat critical to the survival of the species is present in the Project Area. Overall, population scale movement will be unaffected in the long-term and significant disruptions to breeding cycles are therefore unlikely.

Any impacts on any possible local populations or individuals will be minor and short-term, particularly following the implementation of a pest and weed management plan, as is required under State legislation to control and prevent the establishment of invasive species (and associated diseases) as a result of the Project.

Mitigation strategies

None

Likelihood of species decline

No habitat modified, destroyed, removed, isolated or decreased by the Project will result in species decline.

4.4.7 Brush-tailed Rock-Wallaby (*Petrogale penicillata*)

This species inhabits rock piles and cliff lines, in vegetation ranging from rainforest to dry sclerophyll forest. Such habitat for the species does not occur within the Project Area. While regional movement and dispersal of the species has the potential to be indirectly impacted by dam operation, the lack of database records for the proposed inundation area and surrounds indicates that this has a very low likelihood of occurrence.

Impacts

Due to lack of suitable habitat within the Project Area, no long-term decrease in any local population (whether or not it can be considered an important population) is expected. The actual area of occupancy of the species will be unaffected in the long-term.

No habitat critical to the survival of the species is present in the Project Area. Population scale movement will be unaffected in the long-term and fragmentation population and significant disruptions to breeding are therefore unlikely.

Any impacts on any local populations or individuals will be minor and short-term, particularly following the implementation of a pest and weed management plan, as is required under State legislation to control and prevent the establishment of invasive species (and associated diseases) as a result of the Project.

Mitigation strategies

None.

Likelihood of species decline

No habitat modified, destroyed, removed, isolated or decreased by the Project will result in species decline.

4.4.8 Long-nosed Potoroo (South East mainland) (*Potorous tridactylus tridactylus*)

Long-nosed Potoroos shelter during the day in shallow depressions that are covered by thick tussock grass or vegetation. The species feeds predominantly on hypogeal fungi, but also consumes fruit, seeds and arthropods when fungi are scarce. The species has been recorded in a variety of habitat types including disturbed subtropical and warm-temperature rainforests, tall open forests with a moist understorey, woodland with tussock grass, open forest with shrubby understorey, and heathlands. Although the vegetation type used by this species varies, they are generally captured in areas where there is a dense ground cover and are reluctant to move from dense undergrowth. There are no database records for the general area and it is not expected to occur.

Impacts

No long-term decrease in any possible local population (whether or not it can be considered an important population) is expected. The actual area of occupancy of the species will be unaffected in the long-term.

No habitat critical to the survival of the species is present in the Project Area. Population scale movement will be unaffected in the long-term and fragmentation population and significant disruptions to breeding are therefore unlikely.

Any impacts on any local populations or individuals will be minor and short-term, particularly following the implementation of a pest and weed management plan, as is required under State legislation to control and prevent the establishment of invasive species (and associated diseases) as a result of the Project.

Mitigation strategies

None

Likelihood of species decline

No habitat modified, destroyed, removed, isolated or decreased by the Project will result in species decline.

4.4.9 Greater Long-eared Bat (south-eastern) (*Nyctophilus timoriensis*)

This rare bat has been reported roosting in caves, mineshaft entrances, tunnels and culverts. Very little is known of the biology of this species; it is thought to be insectivorous and has been found in dry *Eucalyptus* forests and woodlands to the east and west of the Great Dividing Range. The species is threatened by clearing of forest near cliffs, old mines and caves and disturbance to roosting and nesting sites. There are no database records for the general Project area and the species was not recorded during this study's field surveys. Potentially, Large-eared Pied Bats may visit vegetation within the Project Area.

Impacts

Any potential for dam construction and operation to indirectly impact the species via a loss of prey species by clearing and inundation of foraging habitat will be offset by the rehabilitation or restoration of comparable habitat in the local area, ensuring that any such impacts on any possible local population will be minor and short-term. The actual area of occupancy of the species will be unaffected in the long-term.

No population of this highly mobile species will be fragmented due to the Project. No habitat considered critical to the survival of the species is present in the Project Area. Population scale movement will be unaffected in the long-term and no known breeding sites will be lost. As such, significant disruptions to breeding cycles are unlikely.

Any impacts on any local populations or individuals will be minor and short-term, particularly following the implementation of a pest and weed management plan, as is required under State legislation to control and prevent the establishment of invasive species (and associated diseases) as a result of the Project.

Mitigation strategies

- Offset required or restoration of comparable habitat in local area.
- Fauna spotter/catcher will also be present during clearing

Likelihood of species decline

No habitat modified, destroyed, removed, isolated or decreased by the Project will result in species decline.

4.5 Assessment of Impacts on Migratory Species

4.5.1 Introduction

This section lists the significant impact criteria against which the proposal is to be assessed, reviews the occurrence of important habitat and ecologically significance of populations across the Project area.

4.5.2 Significant Impact Criteria

An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:

- substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species;
- result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species; or
- seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

4.5.3 Occurrence of Important Habitat in the Project Area

An area of 'important habitat' for a migratory species is:

a) habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species; and/or

b) habitat that is of critical importance to the species at particular life-cycle stages; and/or

c) habitat utilised by a migratory species which is at the limit of the species range; and/or

d) habitat within an area where the species is declining.

Listed migratory species cover a broad range of species with different life cycles and population sizes. Therefore, what is an 'ecologically significant proportion' of the population varies with the species (each circumstance will

need to be evaluated). Some factors that should be considered include the species' population status, genetic distinctiveness and species specific behavioural patterns (for example, site fidelity and dispersal rates).

'Population', in relation to migratory species, means the entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries including Australia.

4.5.4 Impact Assessment

This section will address the likelihood that the Project will have a significant impact on a migratory species by addressing each of the three measures.

1. Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species.

There is little evidence to suggest that the Project Area supports 'important habitat' for migratory species. Given their migratory habits, the ephemeral nature of food and habitat resources, and the extent of habitat across their range, it is likely that the existing resources within the Project Area would be utilised infrequently and on a transitory basis only. Furthermore, for those species inhabiting wetland areas and known or considered likely to occur within the Project Area, the Project will result in an overall positive impact in the long term via an increase in these habitats due to dam construction and subsequent inundation, and habitat enhancement through the revegetation of dam edges, the exclusion of cattle to prevent destruction of aquatic plants and the muddying of water, and the formal control of feral predators and competitive exotic plant and fish species through the implementation of a pest and weed management plan. This includes ***Great Egret, White-bellied Sea-eagle, Latham's Snipe*** and ***Painted Snipe.***

White-bellied Sea-eagle would also benefit from retention of large trees, both live and dead, for nesting. The possible stocking of the impoundment with fish, though not recommended, would also benefit this species.

Those remaining species for which specific potential impacts need to be considered are discussed separately hereunder.

Fork-tailed Swift and White-throated Needletail

These species are predicted to occur. Both are aerial species for which the Project Area will not represent 'important habitat' and no impacts are expected due to dam construction or operation as these species forage over a wide variety of land use, including human infrastructure and large waterbodies.

Rainbow Bee-eater

Rainbow Bee-eater is a very common, widespread species in southern Queensland. Consequently, the Project Area will not represent 'important habitat' for the bird and any potential impacts during dam construction, such as loss of breeding substrate and loss of prey species due to clearing and inundation, will be insignificant.

Black-faced Monarch, Rufous Fantail and Satin Flycatcher

Should these species occur they have the potential to be directly impacted by the loss of riparian habitat suitable for foraging, resting during migration and/or breeding. Any such impacts involving habitat (whether or not it can be considered 'important' habitat) will in part be mitigated by the rehabilitation or restoration of habitat surrounding the impoundment, resulting in an insignificant impact on these species overall.

2. Result in invasive species that are harmful to the migratory species becoming established in an area of important habitat for the migratory species.

As noted above, the Project Area is not considered to be an area of 'important habitat' for migratory birds, whether they are wetland or terrestrial species. The local area has a history of forest clearing and habitat modification,

which has benefited a number of feral and invasive flora and fauna species. The proponent will implement a weed and feral animal control program for the Project in accordance with any local and/or State government pest or weed management plans that will contribute to the overall enhancement of habitat for migratory species.

3. Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

There is no evidence to suggest that the Project Area supports an 'ecologically significant proportion of a population' of any of the migratory birds known or considered likely to occur. Furthermore, for those species inhabiting wetland areas, the Project will result in an overall positive impact in the long term via an increase in these habitats due to dam construction and subsequent inundation, and habitat enhancement through the revegetation of dam edges, the exclusion of cattle to prevent destruction of aquatic plants and the muddying of water, and the formal control of feral predators and competitive exotic plant and fish species through the implementation of a pest and weed management plan. This includes Great Egret, White-bellied Sea-Eagle, Latham's Snipe and Painted Snipe. It should also be noted that Latham's Snipe breeds in the northern hemisphere.

5. Compensatory Habitat

A compensatory habitat strategy is to be developed for the Project. The objectives of the strategy will be threefold;

a) the strategy will seek to comply with the requirements of the Queensland *Vegetation Management Act 1999* and associated Codes and Policies;

b) the strategy will seek to comply with Draft Policy Statement: Use of environmental offsets under the Environment Protection and Biodiversity Conservation Act 1999 and

c) the strategy will aim to provide tangible conservation benefits at the local and citywide scale, with an emphasis on threatened species conservation.

The Project will require the clearing of mapped remnant vegetation. In order to comply with the Regional vegetation Management Code (RVMC) for the Brigalow Belt and New England Tablelands Bioregion, the applicant will be required to maintain the current extent of 'Endangered' and 'Of Concern' RE's (Performance Requirement [PR] S7), Threshold RE's (PRS9), riparian (watercourse) RE's (PRS3) and Essential Habitat (PRS8).

"Maintain the current extent" is defined as follows in the RVMC:

a) not clearing; or

b) ensuring the regional ecosystem structure and function are maintained; or

c) providing an offset in accordance with the policy in force at the date the application was properly made for vegetation management offsets administered by the Department of Natural Resources and Water.

Not clearing is not a viable option for this Project and it is difficult to satisfy clause (b) whilst clearing remnant vegetation. As such, the proponent has opted to provide an offset in accordance with the NRW Policy for Vegetation Offsets (the Offset Policy) released in 2007.

The applicant will enter into a deed of agreement with the DNRW to provide vegetation offset strategy within 12 months of lodging the vegetation clearing application. DNRW allow 12 months to develop an offset agreement for those Projects that are considered critical public infrastructure.

The offset strategy will form the basis of the compensatory habitat strategy for the Project and will seek to comply with the performance criteria set out in the Offset Policy. The compensatory habitat strategy is likely to involve a combination of the following options:

- securing advanced regrowth (near remnant) vegetation within and outside the Shire which is representative of the RE s and essential habitat to be cleared for the Project. The properties will be either be purchased by SSC or secured via registered covenant. In both cases the properties would be actively managed until such time as they reach remnant status;
- securing RE s of equivalent conservation status to those to be cleared for the Project within and outside Stanthorpe Shire and managing these areas until such time as they meet remnant status;
- strategic purchase of key land parcels which have been identified as key linkages or habitats for EVR taxa at the local, sub-regional or regional scale; and
- revegetation and rehabilitation of existing cleared areas of land within the Project area, with a view to reinstating pre-clearing vegetation types.

6. Conclusion

The combined strategies put forward in this document, which include the propagation and translocation of threatened plants, management of retained habitats (and populations contained therein) and provision of areas of compensatory habitat, are considered adequate to mitigate the adverse impacts of the proposed action on matters of national significance.

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Appendix A

Species Name	EPBC Status	Occurrence & Distribution	Inundation Area	Stalling Lane Access	Urban Pipeline	Irrigation Pipeline	Potential for Impacts
Babingtonia granitica (no common name)	V	Known from heath 13.12.6 where it occurs in shallow peaty soils formed in the crevices of granite outcrops dominated by heath (Bean 1997 in Donatui 2006). Three known populations at Ballandean, Doctors Ck near Lyra, & Girraween NP (Donatui 2006).	Suitable habitat; Not previously recorded; No survey record; Essential habitat-possible (L).	Suitable habitat; Known from a HERBRECS record to the north of Stalling Lane (13.12.5/13.12.6); No survey record; Essential habitat-possible (L).	Sup-optimal habitat; Not previously recorded; No survey records; Absence suspected (H).	Sup-optimal habitat; Not previously recorded; No survey records; Absence suspected (H).	None expected
Boronia granitica (Granite Boronia)	E	Known from Girraween NP, Amiens area (Harslett Rd, Mt Hutton Rd & Sonego Rds), near The Summit and Paschendale districts in regional ecosystems 13.12.2-13.12.6 in shrubby woodland, open forest and heath (Donatui 2006). In NSW from Torrington, Severn River Nature Reserve, the Barbs near Pindari Dam, Kings Plains National Park and Howell (Hunter et al 1998).	Suitable habitat; Not previously recorded; No survey record; Absence suspected (H).	Suitable habitat; Previously recorded immediately to the north of the proposedStalling Lane Access; No survey record; Essential Habitat-Possible (H).	Sub-optimal habitat; Not previously recorded; No survey records; Absence suspected (H).	Sub-optimal habitat; Not previously recorded; No survey records; Absence suspected (H).	None expected

Species Name	EPBC Status	Occurrence & Distribution	Inundation Area	Stalling Lane Access	Urban Pipeline	Irrigation Pipeline	Potential for Impacts
Goodenia macbarronii (Narrow Goodenia)	V	Known from the western slopes of the Great Dividing Range in NSW, south from the Guyra and Inverell districts and also in north-eastern Victoria and the Darling Downs in Queensland (DECC 2007). Recorded from Stalling Lane on rock pavements of 13.12.6 (Donatiu 2006).	Suitable habitat; Known from vicinity of dam impact area (Fletcher area on pavement seepage slopes) with potential to occur on R2 rock pavements (RE 13.12.6) and those associated with R1 (13.3.1) along the Severn River. No survey records; Essential habitat possible (M).	Suitable habitat; Known from R2 rock pavements (RE 13.12.6) ; No survey records; Essential habitat possible (M).	Sub-optimal habitat; Not previously recorded; No survey records; Absence suspected (M).	Suitable habitat; Not previously recorded; No survey records; Essential habitat possible (M).	Moderate. Potential for impacts associated with dam.
Homoranthus montanus (Mountain Mouse Bush)	V	Known from Stanthorpe Plateau from Mt Jibbinbar (Sundown) and Stalling Lane (Fletcher) in REs 13.11.1, 13.12.5, 13.12.6 (Donatiu 2006).	Suitable habitat; Previously recorded to north of inundation area; No survey records; Essential habitat possible (RE 13.12.5, 13.12.6) (L).	Suitable habitat; Previously recorded to north of Stalling Lane; No survey records; Essential habitat possible (RE 13.12.5, 13.12.6) (L).	Sub-optimal habitat; Previously recorded on Fletcher Rd roadside; No survey records (area recovering from burn at time of survey); Absence suspected (H).	Sub-optimal habitat; Not previously recorded; No survey records; Absence suspected (H).	None expected

Species Name	EPBC Status	Occurrence & Distribution	Inundation Area	Stalling Lane Access	Urban Pipeline	Irrigation Pipeline	Potential for Impacts
Phebalium glandulosum subsp. *glandulosum* (no common name)	V	Known from 3 disjunct populations extending from Stanthorpe south Glen Innes (Donatui 2006). Population of 20 individuals known from Paschendale area (Donatiu 2006). In NSW known from heath amongst granite outcrops in the Torrington district (Harden 2002).	Suitable habitat; Previously recorded to north/west of inundation area in elevated granitic hills; No survey records; Essential habitat possible (L).	Suitable habitat; Previously recorded to north of Stalling Lane in elevated granitic hills; No survey records; Essential habitat possible (M).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).	Unsuitable habitat; Not previously recorded; No survey records; Absence suspected (H).	None expected

Appendix D Consultation Report

D. Community Consultation Report

D.1 Introduction

This report outlines consultation undertaken for the Emu Swamp Dam EIS between March and November 2007. It includes:

- an overview of the consultation approach and a description of consultation activities undertaken;
- analysis of stakeholders and participation; and
- a summary of consultation outcomes.

The report also includes consultation measures proposed to satisfy the requirements of the *State Development and Public Works Organisation Act 1971* (SDPWO Act) in relation to the preparation of the Terms of Reference and the public exhibition of the EIS.

D.1.1 Approach and Objectives

The consultation objectives for the EIS include the:

- provision of information to community members and key stakeholders on the Emu Swamp Dam proposal and the EIS;
- satisfaction of the statutory requirements of the State Development and Public Works Organisation Act 1971;
- invitation for community and stakeholder review and comment of the draft Terms of References for the EIS; and
- attainment of input and feedback on the EIS from key stakeholders and Queensland Government agencies;
- provision of opportunities for stakeholders to identify issues, benefits and impacts which may occur as a result of the project, and suggest possible mitigation strategies; and
- provision of information to stakeholders and community members to enable their review of the EIS, and invitation to provide written comment.

D.1.2 Stakeholders

Potentially 'affected' and 'interested persons' were identified through a range of consultation activities (refer to **Section D.2**. A range of stakeholders were consulted during the preparation of the EIS including:

- Stanthorpe Shire Council (SSC) elected representatives and officers;
- State government representatives, including Queensland Health,
- property owners directly affected by the proposed development;
- community organisations, including local environmental groups;
- economic development organisations, including Granite Belt Wine and Tourism Association;
- social service providers, including YMCA, Community Development Services Inc, BEST employment services;
- local residents and businesses, including representatives from agricultural industry, real estate agencies; and
- the broader Stanthorpe community.

Stakeholders which were likely to have an interest in the Project were identified through a number of means, including:

- review of existing community organisations within the Stanthorpe Shire, such as local environmental groups, industry representatives (i.e. irrigators, agriculture, horticulture), and economic development organisations;
- analysis of community facilities and community service providers, serving the Stanthorpe Shire, including health, employment and sporting facilities;
- contact through the project information line, email and written correspondence; and
- directly affected property owners.

D.2 Consultation Activities

A range of consultation activities have been undertaken for this EIS. An overview of these activities is provided below.

D.2.1 Draft Terms of Reference

Consultation on the draft Terms of Reference (ToR) was undertaken from 2 April 2007 to 8 May 2007. Notifications about the draft ToR were placed in local, state and national newspapers including information on where the draft ToR could be viewed and inviting community members, organisation and agencies to make written submissions to the Coordinator-General.

Notifications were placed in the following newspapers:

- The Weekend Australian, 31 March 2007;
- The Courier Mail, 31 March 2007; and
- The Stanthorpe Border Post, 3 April 2007.

The draft ToR was available on the Department of Infrastructure website and at the SSC offices, 61 Marsh Street, Stanthorpe.

Written submissions on the draft ToR were received from individuals, community organisations and State Government agencies. A total of 15 submissions were received on the Draft ToR, including 11 responses from State Government agencies and two from community organisations and two from private individuals. The content of all submissions was reviewed and considered by the Coordinator-General in preparing the final ToR for the EIS.

D.2.2 Project Fact Sheets

Two project fact sheets were prepared by SSC and distributed within the Stanthorpe community to provide information on the project. The Fact Sheets were distributed through SSC offices, the Stanthorpe library and the SSC website.

Fact Sheet 1 was distributed in August 2006. It provided an overview of the Project need, the progress of the proposal, project information (i.e. dam size), status of current water supplies in Stanthorpe Shire, and potential recreational opportunities provided by the dam.

Fact Sheet 2 was distributed in May 2007. It provided an update on the progress of investigations, including information regarding the conduct of flood, flora and fauna, geotechnical and topographic surveys, the implications of the project status as a ‘Significant Project’ under the SDPWO Act, environmental management priorities, and the decision-making process.

D.2.3 Community Inquiries

A Community Management System was established to support the consultation process. Information was received and recorded from telephone conversations, email, letters and stakeholder meetings.

More than 170 correspondence entries have been recorded using the Community Management System, including from individuals, property owners, local Indigenous groups, community organisations such as the Stanthorpe Blue Water Fishing and Restocking Association and Stanthorpe Field Naturalists, and local wineries.

D.2.4 Website Information

Information on the project was available on the SSC website (www.stanthorpe.qld.gov.au), including:

- Information on the EIS progress;
- Stanthorpe Shire Council's key objectives for the project; and
- Fact Sheets 1 and 2.

D.2.5 Stakeholder Meetings

Meetings were held with various stakeholder interests groups, including SSC representatives, State Government agencies, property owners and community organisations to identify specific issues and impacts of the Project for each stakeholder, and to identify possible mitigation measures. Information obtained from stakeholder meetings informed the assessments for this EIS.

D.2.5.1 Government Agencies

Meetings/briefings were conducted with the following Government agencies.

- Environmental Protection Agency (EPA);
- Department of Natural Resources and Water (DNRW);
- Department of Primary Industries and Fisheries (DPIF);
- Department of Main Roads (DMR);
- Department of State Development;
- Department of Infrastructure;
- Department of Local Government, Planning, Sport and Recreation;
- Queensland Health;
- Department of Emergency Services;
- Department of Housing; and
- Department of Communities.

A series of meetings have been held with DNRW to discuss the potential impact of the project on the hydrology of the Severn River. The meetings established the operating conditions for the dam to protect rights of water licence holders and the environment downstream of the proposed dam.

A meeting was held with DNRW on 9 October 2007 to discuss potential offset strategies for endangered vegetation communities. It was agreed that it would not be possible to agree a formalised offset strategy before submission of the EIS. Council SSC have agreed to formalise a compensatory habitat package in response to the clearing and inundation of native vegetation within 12 months of the project being approved.

A series of meetings have been held with EPA to discuss the scope of the Project and the potential impacts on terrestrial and aquatic ecology. EPA has raised a number of issues that needed to be addressed as part of the EIS.

A series of meetings have been held with the Department of Primary Industries and Fisheries (DPIF) to discuss the need for a fish transfer device on the proposed dam. A site inspection and aerial flyover with DPIF occurred on 9 October 2007 to inspect the condition and hydrology of the Severn River. This inspection provided background to ongoing discussions on the need for, and type of fish transfer device to be built as part of the Project.

A meeting was held with DMR in Warwick on 8 October 2007 to outline the potential impacts on the road network during construction and to discuss the issues pertaining to location of the urban and irrigation pipelines within the road reserve.

D.2.5.2 Stakeholder Groups

Potentially 'interested' and 'affected' stakeholder groups were identified from discussions consultation activities described above. Meetings were conducted with the following key stakeholder groups:

- SSC Elected Representatives;
- SSC officers, including economic development, planning and engineering;
- Queensland Health (Stanthorpe Community Health Services);
- YMCA;
- Representatives of agricultural industry;
- Steps Community Development Services;
- Granite Borders Landcare Committee;
- the endorsed Aboriginal Parties;
- Granite Belt Wine and Tourism Association; and
- Cec Mann & Co Real Estate Agents.

D.2.5.3 Meetings with Landowners

Potentially 'affected' landowners were identified as those in the inundation area/pipeline routes or landowners with water licences located downstream of the proposed dam site.

Consultation with landowners directly affected by the proposed dam was undertaken during two rounds of meetings. The first round of meetings was conducted between July and August 2006 and involved individually meeting with 20 landowners. The aim of the meetings was to provide landowners an opportunity to meet with members of the project team, to learn more about the project and to identify any concerns or issues for consideration.

A second round of landowner meetings was conducted by SSC in November 2007, to further delineate the key issues for consideration. Individual meetings were held with 11 landholders in the inundation area and with 15 downstream water licence holders.

Meetings will continue to be held with landowners as the Project is developed.

D.3 Key Issues Raised

This section provides summary of the key issues identified in consultation undertaken during the preparation of the EIS. It includes key issues identified from written submissions, emails and phone calls to the project information line, and meetings with key stakeholders, including landowners, government agencies, community organisations and social service providers.

Issues identified through consultation were noted in the Communication Management System. The outcomes of the community consultation informed the assessment of potential benefits and impacts for this EIS, and the identification of mitigation measures.

Commonly raised issues included:

- property impacts, including land acquisition process and compensation;
- need for reliable and secure water supply;
- employment and training opportunities provided by the dam, including during the construction phase, and through improved business opportunities following construction; and
- location of Emu Swamp Dam, Urban and Irrigation Pipelines and extent of the inundation area.

Specific issues identified during consultation area summarised in **Table D-1**. The issues relating to the Project (including the potential social and environmental impacts) have been addressed throughout the EIS. Issues that are not directly related to the Project (eg existing management of water licences) were noted and have been recorded.

Table D-1 Key Issues Raised in Consultation

Topic	Key Issues Identified
Reliability and security of water supply	■ Concern about future water security implications for the local community if the dam does not go ahead; ■ A lack of water is stopping businesses in Stanthorpe from going forward and a reliable water supply is important for the future growth and investment in Stanthorpe; ■ Water entitlement implications for existing water harvesting licence holders in the inundation area, as well as downstream licence holders; ■ Certainty of access considerations for competing water uses (i.e. urban versus irrigators), particularly when the dam's water reserves are low (i.e. during drought); and ■ Concern with the way DNRW manages the water licence regime and the inequity in the system.
Impacts on Property	■ Impact of the land acquisition process on property owners directly affected by the project and level of compensation payable, including for relocation of housing and other buildings, relocation of pump sites during dam's filling time, valuing natural amenity; ■ Location of pipeline, project infrastructure, and buffer and extent of encroachment onto private landholding; ■ Negotiation of easements for encroachment of dam infrastructure onto private property and impacts of restricted access; ■ Impact to property during future flood events; ■ Costs associated with installation of fencing to exclude cattle from dam site – who pays; ■ Impact on access to the dam site once the dam is constructed; and ■ Impact on zoning of land in the "dam catchment area" and ability of private landholders to subdivide adjacent land after the construction of the dam.
Environmental Impacts	■ Potential impact of reduced downstream water flows on extraction levels at downstream water holes; ■ Impact of construction of proposed dam on environmental flows; ■ Environmental impacts associated with chemical run-off from agricultural activities in the catchment; ■ Impacts on the local environment and visual amenity for nearby residents

Topic	Key Issues Identified
	including those adjacent to the dam and associated infrastructure (i.e. pipeline); ■ Impact of vegetation clearing on rare flora and fauna species located within the inundation area and along the pipeline corridor (i.e. rare orchids, koalas); ■ Clearing of vegetation adjacent to road corridors for the pipeline resulting in loss of habitat and vegetation corridors required for the movement of native animals; ■ Potential to have wildlife buffer zone around dam; ■ Impacts of construction noise on adjacent landholders and nearby urban localities; and ■ Impact on local climate and temperatures from introduction of a large water body.
Heritage Impacts	■ Impact on aboriginal cultural heritage from proposed dam inundation.
Employment and Training	■ Benefit to local workforce and economy if employees for the construction of the dam are sourced locally; ■ The dam is an important catalyst for triggering employment demand; ■ Lack of employment opportunities is the biggest reason for decreasing number of young people in the area; ■ Planning should include TAFE and Council in the early identification of required skills and ensuring that people are ready to take up employment opportunities; and ■ Impact on local community from the timing of the dam's workforce population influx and the potential cumulative impacts on seasonal population fluctuations for the local fruit harvest.
Transport and Access	■ Impact on local traffic access, including access to Emu Swamp Road and Stalling Lane; ■ Realignment of existing roads and impacts of altering property access points; ■ Consideration of the implications of relocating property access on ability of residents to evacuate the area during a bushfire; and ■ Potential loss of access during flood conditions.
Economic Impacts	■ Potential impact on local businesses due to the location of the pipeline infrastructure; ■ Impact on ability of local services providers (e.g. health) to meet the needs of an increased local population during the dam construction on a fixed budget; ■ Economic impact from interruption to development of land for agriculture due to uncertainty regarding the extent of the inundation area; ■ Impacts on future economic growth and diversification of the business and agricultural sectors from an increase in the availability of local water supplies; and ■ Impact on future economic development opportunities and implications for the local economy if the dam does not go ahead.
Impacts to local farming and agriculture	■ Impact on local wine and agricultural industries from reduction in productive land available for wine and agriculture production from acquisition for the dam; ■ Impact on current farming practices and productivity in local agricultural community if restrictions are placed farming practices (i.e. use of chemicals and fertilisers) to reduce/prevent run-off; and ■ Opportunity for value adding to agricultural industries from an increase in the availability of local water supplies.
Alternatives to the dam	■ EIS needs a full exploration of the alternatives to the proposed dam, and the economic viability of alternatives; and ■ Should explore opportunities for effluent water recycling and rainwater tanks as

Topic	Key Issues Identified
	alternatives.
Benefits and Impacts on Local Community	■ Opportunity to enhance the region's attractions for tree-changers seeking to relocate to the Shire; and ■ Potential for utilisation of the dam as a recreational facility, creating the opportunity for introduction of water sports to the local community.
Impact on social infrastructure	■ Potential impact on local emergency and health services from the need for additional supplies and support staff during the dam's construction; ■ Impact on local schooling institutions if there is a potential influx of students during construction of the dam; ■ Impact on ability of local services providers (e.g. health) to meet the needs of an increased local population during the dam construction; and ■ Impact on ability of local fire management authority to respond to a fire event with insufficient water reserves.
Housing and Accommodation	■ Ability for local accommodation providers to accommodate employees during construction of the dam, especially during the seasonal population influx for fruit picking and during peak tourist season; ■ Impact on affordable rental housing options and emergency housing, particularly for low income earners, if there is an increase in demand from construction workers; and ■ Potential to attract larger tourist accommodation providers (i.e. tourist resorts), if a reliable water supply is provided.

The following additional issues were raised in relation to the irrigation supply option.

- broader implications for security of supply to the regional fruit and vegetable markets if dam proposal fails;
- equity of access to available water supply, particularly when the dam's water reserves are low (i.e competing demands of urban users and irrigators during drought conditions);
- larger dam should be kept for future urban supply rather than increasing water for irrigators;
- affordability of water supply for irrigators and irrigators willingness to pay;
- increased viability of farming operations from more secure water supply; and
- opportunity for value adding to agricultural industries from an increase in the availability of local water supplies.

D.3.1 Ongoing Consultation

The Emu Swamp Dam EIS consultation is on-going and will continue during the display of the EIS. Ongoing consultation will include notification of the draft EIS for public review, and invitation to individuals, community organisations and government agencies to provide written comments on the EIS.

Submissions received on the EIS will be reviewed and a Supplementary Report prepared, if required.

Appendix E Project Study Team Qualifications and Experience

Role	Key Personnel	Qualifications	Experience	Company
Project Director	Lex Appelgren	B Eng (Civil); M Eng Sc (Env); GDM; FIEAust	30 years experience in multi-discipline and water supply projects	SKM
Project Manager	Niall Carey	B Eng (Chem); M Env Eng;	3 years experience in environmental impact assessments	SKM
Construction	Martin Schmausser	BE (Civil) MIEAust	30 years experience in construction projects	Thiess
Topography, Geology, Soils and Geomorphology	Kavita Prasad	B App Sc (Geoscience)	1 year in mining and exploration geology	SKM
	Graham Tuck	B Sc (Aust Env Studies)	8 years experience in soil and land assessment survey	GT Environmental Services
Land Use	Gavin Elphinstone	B of URP (Hons)	15 yrs experience in statutory planning, coastal management and impact assessment	SKM
	Mark Dekker	B Env Planning	Statutory town planning	SKM
Land Contamination	Rowan Turner	B.Sc. (Resource and Env. Sc.)	6 years experience in contaminated land investigation and assessment.	SKM
Surface Water Resources	Sarah Gosling	B Eng (Env) MIEAust CPEng	5 years experience in surface water resources assessment and management	SKM
	Scott Abbey	B Eng (Civil); MIEAust	20 years experience in water resources assessment and management	SKM
	Dr Adam Cohen	B App Sc; PG Dip; PhD	13 years in ecological impact assessment	SKM
	Paul Lutz	B.Sc (Env)	5 years in water quality	SKM
Groundwater Resources	Andrew Hovey	B Sc (Hons) Geol/Chem	6 years in hydrogeological impact assessment	SKM
	Kavita Prasad	B App Sc (Geoscience)	1 year in mining and exploration geology	SKM
Terrestrial Ecology	Terry Reis	B Sc Hons	25 years of field experience and 10 years of terrestrial fauna assessments	BAAM
	David Stanton	B Sc Hons MEIANZ	15 years resource mapping and assessment including 10 years in terrestrial flora classification	3D Environmental
	Jason Richard	B App Sc, M Wld Mgt; MEIANZ, MESA, CEnvP	11 years in ecological surveys, impact assessment	SKM
Aquatic Ecology	Lee Benson	B Sc (Marine Biology, Zoology) (Hons) PhD	Over 20 years in aquatic ecology impact assessments	Ecology Management
Air quality and Greenhouse	Niall Carey	B Eng (Chem); M Env Eng	4 years in air quality studies and greenhouse issues	SKM
Noise and Vibration	Jackson Yu	BE (ENV) MSC (ENV Eng)	10 years in acoustics, noise, vibration and air quality	SKM

Role	Key Personnel	Qualifications	Experience	Company
Transport and Roads	Dana Geaboc	B Eng (Transportation)	16 years experience in transportation engineering	SKM
Infrastructure	Anthony Bianco	BSc (Hons 1)	11 years in environmental impact assessment	SKM
Socio-economic	Nicole Sommerville	A Dip Blt Env (Arch); B Planning (Hons 1); Grad Cert (Legal St)	12 years experience in planning, including social and environmental planning	SKM
	Matt Strain	B Ec; M Int'l Business	10 years experience in economics	SKM
Cultural Heritage	Ben Gall	BA	Cultural heritage assessments	Archaeo
	Ann Wallin	BA and PostGrad Dip (Archaeology)	Cultural heritage surveys and CHMP development	Archaeo
Visual Amenity	John Llewellyn	B. Sc. (Architecture); M Env Planning; Cert Horticulture	20 years experience in planning, impact assessment and environmental management.	SKM
	Mark Dekker	B Env Planning	Statutory town planning	SKM
Waste Management	Heath Morgan	B E Hons B. Sc	10 years experience in impact assessment and waste management	SKM
Hazard, Safety and Risk	Anthony Bianco	BSc (Hons 1)	11 years in environmental impact assessment	SKM
Community Engagement	Chris Loveday	BE (Civil)	25 years experience in local government infrastructure works	SSC
	Rose Coburn	B URP M Env Mgt	5 years experience in urban and regional planning and 6 years in environmental management	SSC
	Samantha Palmer	B App Sc (Env Mgt)	9 years experience in environmental management	SSC
GIS	Kym McNamara	B Surv (GIS)	8 years experience in GIS	SKM

Appendix F Supporting Information

F.1 Land Contamination

F.1.1 EPA EMR Search Results

Yap, Tammy (SKM)

From: Debbie Lewis [Debbie.Lewis@epa.qld.gov.au]
Sent: Monday, 20 August 2007 4:49 PM
To: Yap, Tammy (SKM)
Subject: EMM4020.rtf

Level 16, 288 Edward St • Brisbane, Queensland • GPO Box 2771 • QLD 4001 •AUSTRALIA
Telephone (07) 32251827 • Facsimile (07) 3247 3278 • www.env.qld.gov.au/environment/business/contaminated

REPRINT - 20/08/2007

Queensland Government
Environmental Protection Agency
Queensland Parks and Wildlife Service

SEARCH RESPONSE

ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Jennifer Kerkin/Tammy Yap [QE06454.04]
PO Box 246
Spring Hill QLD 4004

Transaction ID: 968984 EMR Site Id: 20 August 2007
Cheque Number:
Client Reference: 9022481

This response relates to a search request received for the site:
Lot: 1 Plan: RP31766
null HALLS LANE
THE SUMMIT

EMR RESULT

The above site is NOT included on the Environmental Management Register.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

Note: Searches maybe conducted online through the State Government Website www.smartservice.qld.gov.au or Citec Confirm www.confirm.com.au.

If you have any queries in relation to this search please phone (07) 3227 7370.

Lindi Bowen
Registrar, Contaminated Land Unit

Yap, Tammy (SKM)

From: Debbie Lewis [Debbie.Lewis@epa.qld.gov.au]
Sent: Monday, 20 August 2007 4:23 PM
To: Yap, Tammy (SKM)
Subject: EMM4020.rtf

Level 16, 288 Edward St • Brisbane, Queensland • GPO Box 2771 • QLD 4001 •AUSTRALIA
Telephone (07) 32251827 • Facsimile (07) 3247 3278 • www.env.qld.gov.au/environment/business/contaminated

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Environmental Protection Agency
Queensland Parks and Wildlife Service

SEARCH RESPONSE

ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Jennifer Kerkin/Tammy-Sieu Yap [QE06454.04]
PO Box 246
Spring Hill QLD 4004

Transaction ID: 968938 EMR Site Id: 20 August 2007
Cheque Number:
Client Reference: 9022303

This response relates to a search request received for the site:
Lot: 2 Plan: RP904551
376 FLETCHER ROAD
FLETCHER

EMR RESULT

The above site is NOT included on the Environmental Management Register.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

Note: Searches maybe conducted online through the State Government Website www.smartservice.qld.gov.au or Citec Confirm www.confirm.com.au.

If you have any queries in relation to this search please phone (07) 3227 7370.

Lindi Bowen
Registrar, Contaminated Land Unit

Yap, Tammy (SKM)

From: Debbie Lewis [Debbie.Lewis@epa.qld.gov.au]
Sent: Monday, 20 August 2007 4:24 PM
To: Yap, Tammy (SKM)
Subject: EMM4020.rtf

Level 16, 288 Edward St • Brisbane, Queensland • GPO Box 2771 • QLD 4001 •AUSTRALIA
Telephone (07) 32251827 • Facsimile (07) 3247 3278 • www.env.qld.gov.au/environment/business/contaminated

REPRINT - 20/08/2007

Queensland Government
Environmental Protection Agency
Queensland Parks and Wildlife Service

SEARCH RESPONSE

ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Jennifer Kerkin/Tammy-Sieu Yap [QE06454.04]
PO Box 246
Spring Hill QLD 4004

Transaction ID: 968939 EMR Site Id: 20 August 2007
Cheque Number:
Client Reference: 9022303

This response relates to a search request received for the site:
Lot: 1 Plan: RP904551
null FLETCHER ROAD
FLETCHER

EMR RESULT

The above site is NOT included on the Environmental Management Register.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

Note: Searches maybe conducted online through the State Government Website www.smartservice.qld.gov.au or Citec Confirm www.confirm.com.au.

If you have any queries in relation to this search please phone (07) 3227 7370.

Lindi Bowen
Registrar, Contaminated Land Unit

Yap, Tammy (SKM)

From: Debbie Lewis [Debbie.Lewis@epa.qld.gov.au]
Sent: Monday, 20 August 2007 4:39 PM
To: Yap, Tammy (SKM)
Subject: EMM4020.rtf

Level 16, 288 Edward St • Brisbane, Queensland • GPO Box 2771 • QLD 4001 •AUSTRALIA
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Queensland Parks and Wildlife Service

SEARCH RESPONSE

ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Jennifer Kerkin/Tammy-Sieu Yap [QE06454.04]
PO Box 246
Spring Hill QLD 4004

Transaction ID: 968951 EMR Site Id: 20 August 2007
Cheque Number:
Client Reference: 9022303

This response relates to a search request received for the site:
Lot: 4674 Plan: PH512
null SOMME LANE
SOMME

EMR RESULT

The above site is NOT included on the Environmental Management Register.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

Note: Searches maybe conducted online through the State Government Website www.smartservice.qld.gov.au or Citec Confirm www.confirm.com.au.

If you have any queries in relation to this search please phone (07) 3227 7370.

Lindi Bowen
Registrar, Contaminated Land Unit

Yap, Tammy (SKM)

From: Debbie Lewis [Debbie.Lewis@epa.qld.gov.au]
Sent: Monday, 20 August 2007 4:42 PM
To: Yap, Tammy (SKM)
Subject: EMM4020.rtf

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SEARCH RESPONSE

ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Jennifer Kerkin/Tammy-Sieu Yap [QE06454.04]
PO Box 246
Spring Hill QLD 4004

Transaction ID: 968955 EMR Site Id: 20 August 2007
Cheque Number:
Client Reference: 9022303

This response relates to a search request received for the site:
Lot: 438 Plan: BNT1235
null EMU SWAMP ROAD
GLEN APLIN

EMR RESULT

The above site is NOT included on the Environmental Management Register.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

Note: Searches maybe conducted online through the State Government Website www.smartservice.qld.gov.au or Citec Confirm www.confirm.com.au.

If you have any queries in relation to this search please phone (07) 3227 7370.

Lindi Bowen
Registrar, Contaminated Land Unit

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www.epa.qld.gov.au/ecoaccess/contaminated_land/

SEARCH RESPONSE
ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Rowan Turner
3 Corsica St
Moorooka QLD 4105

Transaction ID: 973618 EMR Site Id: 8453 31 August 2007
Client Reference: 9065398
Cheque Number:

This response relates to a search request received for the site:
Lot: 290 Plan: RP12383

EMR RESULT

The above site IS included on the Environmental Management Register.
Lot: 290 Plan: RP12383
Address: NEW ENGLAND HIGHWAY
GLEN APLIN 4381

The site has been subject to the following Notifiable Activity pursuant to section 374 of the *Environmental Protection Act 1994.*
SERVICE STATIONS - operating a commercial service station.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

Note: Searches maybe conducted online through the State Government Website www.smartservice.qld.gov.au or Citec Confirm www.confirm.com.au.

If you have any queries in relation to this search please phone (07) 3227 7370.

Lindi Bowen
Registrar, Contaminated Land Unit

Yap, Tammy (SKM)

From: Debbie Lewis [Debbie.Lewis@epa.qld.gov.au]
Sent: Monday, 20 August 2007 4:42 PM
To: Yap, Tammy (SKM)
Subject: EMM4020.rtf

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SEARCH RESPONSE

ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Jennifer Kerkin/Tammy-Sieu Yap [QE06454.04]
PO Box 246
Spring Hill QLD 4004

Transaction ID: 968954 EMR Site Id: 20 August 2007
Cheque Number:
Client Reference: 9022303

This response relates to a search request received for the site:
Lot: 152 Plan: BNT574
null MASCADRI LANE
GLEN APLIN

EMR RESULT

The above site is NOT included on the Environmental Management Register.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

Note: Searches maybe conducted online through the State Government Website www.smartservice.qld.gov.au or Citec Confirm www.confirm.com.au.

If you have any queries in relation to this search please phone (07) 3227 7370.

Lindi Bowen
Registrar, Contaminated Land Unit

Yap, Tammy (SKM)

From: Debbie Lewis [Debbie.Lewis@epa.qld.gov.au]
Sent: Monday, 20 August 2007 4:33 PM
To: Yap, Tammy (SKM)
Subject: EMM4020.rtf

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SEARCH RESPONSE

ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Jennifer Kerkin/Tammy-Sieu Yap [QE06454.04]
PO Box 246
Spring Hill QLD 4004

Transaction ID: 968949 EMR Site Id: 20 August 2007
Cheque Number:
Client Reference: 9022303

This response relates to a search request received for the site:
Lot: 132 Plan: SP183767
365 EMU SWAMP ROAD
NUNDUBBERMERE

EMR RESULT

The above site is NOT included on the Environmental Management Register.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

Note: Searches maybe conducted online through the State Government Website www.smartservice.qld.gov.au or Citec Confirm www.confirm.com.au.

If you have any queries in relation to this search please phone (07) 3227 7370.

Lindi Bowen
Registrar, Contaminated Land Unit

Yap, Tammy (SKM)

From: Debbie Lewis [Debbie.Lewis@epa.qld.gov.au]
Sent: Monday, 20 August 2007 4:38 PM
To: Yap, Tammy (SKM)
Subject: EMM4020.rtf

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SEARCH RESPONSE

ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Jennifer Kerkin/Tammy-Sieu Yap [QE06454.04]
PO Box 246
Spring Hill QLD 4004

Transaction ID: 968950 EMR Site Id: 20 August 2007
Cheque Number:
Client Reference: 9022303

This response relates to a search request received for the site:
Lot: 131 Plan: SP183767
366 EMU SWAMP ROAD
NUNDUBBERMERE

EMR RESULT

The above site is NOT included on the Environmental Management Register.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

Note: Searches maybe conducted online through the State Government Website www.smartservice.qld.gov.au or Citec Confirm www.confirm.com.au.

If you have any queries in relation to this search please phone (07) 3227 7370.

Lindi Bowen
Registrar, Contaminated Land Unit

Yap, Tammy (SKM)

From: Debbie Lewis [Debbie.Lewis@epa.qld.gov.au]
Sent: Monday, 20 August 2007 4:41 PM
To: Yap, Tammy (SKM)
Subject: EMM4020.rtf

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SEARCH RESPONSE

ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Jennifer Kerkin/Tammy-Sieu Yap [QE06454.04]
PO Box 246
Spring Hill QLD 4004

Transaction ID: 968953 EMR Site Id: 20 August 2007
Cheque Number:
Client Reference: 9022303

This response relates to a search request received for the site:
Lot: 101 Plan: BNT728
91 MASCADRI LANE
GLEN APLIN

EMR RESULT

The above site is NOT included on the Environmental Management Register.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

Note: Searches maybe conducted online through the State Government Website www.smartservice.qld.gov.au or Citec Confirm www.confirm.com.au.

If you have any queries in relation to this search please phone (07) 3227 7370.

Lindi Bowen
Registrar, Contaminated Land Unit

Yap, Tammy (SKM)

From: Debbie Lewis [Debbie.Lewis@epa.qld.gov.au]
Sent: Monday, 20 August 2007 4:43 PM
To: Yap, Tammy (SKM)
Subject: EMM4020.rtf

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SEARCH RESPONSE

ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Jennifer Kerkin/Tammy-Sieu Yap [QE06454.04]
PO Box 246
Spring Hill QLD 4004

Transaction ID: 968956 EMR Site Id: 20 August 2007
Cheque Number:
Client Reference: 9022303

This response relates to a search request received for the site:
Lot: 95 Plan: BNT4
259 EMU SWAMP ROAD
GLEN APLIN

EMR RESULT

The above site is NOT included on the Environmental Management Register.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

Note: Searches maybe conducted online through the State Government Website www.smartservice.qld.gov.au or Citec Confirm www.confirm.com.au.

If you have any queries in relation to this search please phone (07) 3227 7370.

Lindi Bowen
Registrar, Contaminated Land Unit

Yap, Tammy (SKM)

From: Debbie Lewis [Debbie.Lewis@epa.qld.gov.au]
Sent: Monday, 20 August 2007 4:26 PM
To: Yap, Tammy (SKM)
Subject: EMM4020.rtf

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SEARCH RESPONSE

ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Jennifer Kerkin/Tammy-Sieu Yap [QE06454.04]
PO Box 246
Spring Hill QLD 4004

Transaction ID: 968942 EMR Site Id: 20 August 2007
Cheque Number:
Client Reference: 9022303

This response relates to a search request received for the site:
Lot: 89 Plan: RP902806
null FLETCHER ROAD
BALLANDEAN

EMR RESULT

The above site is NOT included on the Environmental Management Register.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

Note: Searches maybe conducted online through the State Government Website www.smartservice.qld.gov.au or Citec Confirm www.confirm.com.au.

If you have any queries in relation to this search please phone (07) 3227 7370.

Lindi Bowen
Registrar, Contaminated Land Unit

Yap, Tammy (SKM)

From: Debbie Lewis [Debbie.Lewis@epa.qld.gov.au]
Sent: Monday, 20 August 2007 4:40 PM
To: Yap, Tammy (SKM)
Subject: EMM4020.rtf

Level 16, 288 Edward St • Brisbane, Queensland • GPO Box 2771 • QLD 4001 •AUSTRALIA
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SEARCH RESPONSE

ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Jennifer Kerkin/Tammy-Sieu Yap [QE06454.04]
PO Box 246
Spring Hill QLD 4004

Transaction ID: 968952 EMR Site Id: 20 August 2007
Cheque Number:
Client Reference: 9022303

This response relates to a search request received for the site:
Lot: 87 Plan: BNT288
249 SUTTON LANE
GLEN APLIN

EMR RESULT

The above site is NOT included on the Environmental Management Register.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

Note: Searches maybe conducted online through the State Government Website www.smartservice.qld.gov.au or Citec Confirm www.confirm.com.au.

If you have any queries in relation to this search please phone (07) 3227 7370.

Lindi Bowen
Registrar, Contaminated Land Unit

Yap, Tammy (SKM)

From: Debbie Lewis [Debbie.Lewis@epa.qld.gov.au]
Sent: Monday, 20 August 2007 4:45 PM
To: Yap, Tammy (SKM)
Subject: EMM4020.rtf

Level 16, 288 Edward St • Brisbane, Queensland • GPO Box 2771 • QLD 4001 •AUSTRALIA
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SEARCH RESPONSE

ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Jennifer Kerkin/Tammy Yap [QE06454.04]
PO Box 246
Spring Hill QLD 4004

Transaction ID: 968979 EMR Site Id: 20 August 2007
Cheque Number:
Client Reference: 9022481

This response relates to a search request received for the site:
Lot: 42 Plan: BNT215
null LOCK STREET
STANTHORPE

EMR RESULT

The above site is NOT included on the Environmental Management Register.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

Note: Searches maybe conducted online through the State Government Website www.smartservice.qld.gov.au or Citec Confirm www.confirm.com.au.

If you have any queries in relation to this search please phone (07) 3227 7370.

Lindi Bowen
Registrar, Contaminated Land Unit

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www.epa.qld.gov.au/ecoaccess/contaminated_land/

SEARCH RESPONSE
ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Rowan Turner
3 Corsica St
Moorooka QLD 4105

Transaction ID: 973617 EMR Site Id: 8386 31 August 2007
Client Reference: 9065398
Cheque Number:

This response relates to a search request received for the site:
Lot: 5 Plan: BNT1243

EMR RESULT

The above site IS included on the Environmental Management Register.
Lot: 5 Plan: BNT1243
Address: NEW ENGLAND HIGHWAY
BALLANDEAN 4382

The site has been subject to the following Notifiable Activity pursuant to section 374 of the *Environmental Protection Act 1994.*
SERVICE STATIONS - operating a commercial service station.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

Note: Searches maybe conducted online through the State Government Website www.smartservice.qld.gov.au or Citec Confirm www.confirm.com.au.

If you have any queries in relation to this search please phone (07) 3227 7370.

Lindi Bowen
Registrar, Contaminated Land Unit

Yap, Tammy (SKM)

From: Debbie Lewis [Debbie.Lewis@epa.qld.gov.au]
Sent: Monday, 20 August 2007 4:44 PM
To: Yap, Tammy (SKM)
Subject: EMM4020.rtf

Level 16, 288 Edward St • Brisbane, Queensland • GPO Box 2771 • QLD 4001 •AUSTRALIA
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SEARCH RESPONSE

ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Jennifer Kerkin/Tammy Yap [QE06454.04]
PO Box 246
Spring Hill QLD 4004

Transaction ID: 968978 EMR Site Id: 20 August 2007
Cheque Number:
Client Reference: 9022481

This response relates to a search request received for the site:
Lot: 4 Plan: RP41874
8 DIAMONDVALE ROAD
STANTHORPE

EMR RESULT

The above site is NOT included on the Environmental Management Register.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

Note: Searches maybe conducted online through the State Government Website www.smartservice.qld.gov.au or Citec Confirm www.confirm.com.au.

If you have any queries in relation to this search please phone (07) 3227 7370.

Lindi Bowen
Registrar, Contaminated Land Unit

Queensland Government
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SEARCH RESPONSE
ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Rowan Turner
3 Corsica St
Moorooka QLD 4105

Transaction ID: 973620 EMR Site Id: 23907 31 August 2007
Client Reference: 9065398
Cheque Number:

This response relates to a search request received for the site:
Lot: 3 Plan: SP106347

EMR RESULT

The above site IS included on the Environmental Management Register.
The site you have searched has been subdivided from the following site, which is included on the EMR. Subdivided new parcels will remain on the EMR unless it can be shown that they are not located near the contaminating activity.

Lot: 1 Plan: RP175761
Address: NEW ENGLAND HIGHWAY
SEVERNLEA 4352

The site has been subject to the following Notifiable Activity pursuant to section 374 of the *Environmental Protection Act 1994.*
SERVICE STATIONS - operating a commercial service station.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

Note: Searches maybe conducted online through the State Government Website www.smartservice.qld.gov.au or Citec Confirm www.confirm.com.au.

If you have any queries in relation to this search please phone (07) 3227 7370.

Lindi Bowen
Registrar, Contaminated Land Unit

Yap, Tammy (SKM)

From: Debbie Lewis [Debbie.Lewis@epa.qld.gov.au]
Sent: Monday, 20 August 2007 4:30 PM
To: Yap, Tammy (SKM)
Subject: EMM4020.rtf

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SEARCH RESPONSE

ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Jennifer Kerkin/Tammy-Sieu Yap [QE06454.04]
PO Box 246
Spring Hill QLD 4004

Transaction ID: 968945 EMR Site Id: 20 August 2007
Cheque Number:
Client Reference: 9022303

This response relates to a search request received for the site:
Lot: 2 Plan: SP145917
175 SUTTON LANE
BALLANDEAN

EMR RESULT

The above site is NOT included on the Environmental Management Register.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

Note: Searches maybe conducted online through the State Government Website www.smartservice.qld.gov.au or Citec Confirm www.confirm.com.au.

If you have any queries in relation to this search please phone (07) 3227 7370.

Lindi Bowen
Registrar, Contaminated Land Unit

Yap, Tammy (SKM)

From: Debbie Lewis [Debbie.Lewis@epa.qld.gov.au]
Sent: Monday, 20 August 2007 4:46 PM
To: Yap, Tammy (SKM)
Subject: EMM4020.rtf

Level 16, 288 Edward St • Brisbane, Queensland • GPO Box 2771 • QLD 4001 •AUSTRALIA
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SEARCH RESPONSE

ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Jennifer Kerkin/Tammy Yap [QE06454.04]
PO Box 246
Spring Hill QLD 4004

Transaction ID: 968980 EMR Site Id: 20 August 2007
Cheque Number:
Client Reference: 9022481

This response relates to a search request received for the site:
Lot: 2 Plan: SP145251
null LOCK STREET
STANTHORPE

EMR RESULT

The above site is NOT included on the Environmental Management Register.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

Note: Searches maybe conducted online through the State Government Website www.smartservice.qld.gov.au or Citec Confirm www.confirm.com.au.

If you have any queries in relation to this search please phone (07) 3227 7370.

Lindi Bowen
Registrar, Contaminated Land Unit

Yap, Tammy (SKM)

From: Debbie Lewis [Debbie.Lewis@epa.qld.gov.au]
Sent: Monday, 20 August 2007 4:48 PM
To: Yap, Tammy (SKM)
Subject: EMM4020.rtf

Level 16, 288 Edward St • Brisbane, Queensland • GPO Box 2771 • QLD 4001 •AUSTRALIA
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SEARCH RESPONSE

ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Jennifer Kerkin/Tammy Yap [QE06454.04]
PO Box 246
Spring Hill QLD 4004

Transaction ID: 968982 EMR Site Id: 20 August 2007
Cheque Number:
Client Reference: 9022481

This response relates to a search request received for the site:
Lot: 2 Plan: RP896231
107 MATTHEWS LANE
THE SUMMIT

EMR RESULT

The above site is NOT included on the Environmental Management Register.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

Note: Searches maybe conducted online through the State Government Website www.smartservice.qld.gov.au or Citec Confirm www.confirm.com.au.

If you have any queries in relation to this search please phone (07) 3227 7370.

Lindi Bowen
Registrar, Contaminated Land Unit

Yap, Tammy (SKM)

From: Debbie Lewis [Debbie.Lewis@epa.qld.gov.au]
Sent: Monday, 20 August 2007 4:47 PM
To: Yap, Tammy (SKM)
Subject: EMM4020.rtf

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SEARCH RESPONSE

ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Jennifer Kerkin/Tammy Yap [QE06454.04]
PO Box 246
Spring Hill QLD 4004

Transaction ID: 968981 EMR Site Id: 20 August 2007
Cheque Number:
Client Reference: 9022481

This response relates to a search request received for the site:
Lot: 2 Plan: RP162655
268 WINKLER ROAD
NUNDUBBERMERE

EMR RESULT

The above site is NOT included on the Environmental Management Register.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

Note: Searches maybe conducted online through the State Government Website www.smartservice.qld.gov.au or Citec Confirm www.confirm.com.au.

If you have any queries in relation to this search please phone (07) 3227 7370.

Lindi Bowen
Registrar, Contaminated Land Unit

Yap, Tammy (SKM)

From: Debbie Lewis [Debbie.Lewis@epa.qld.gov.au]
Sent: Monday, 20 August 2007 4:29 PM
To: Yap, Tammy (SKM)
Subject: EMM4020.rtf

Level 16, 288 Edward St • Brisbane, Queensland • GPO Box 2771 • QLD 4001 •AUSTRALIA
Telephone (07) 32251827 • Facsimile (07) 3247 3278 • www.env.qld.gov.au/environment/business/contaminated

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SEARCH RESPONSE

ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Jennifer Kerkin/Tammy-Sieu Yap [QE06454.04]
PO Box 246
Spring Hill QLD 4004

Transaction ID: 968944 EMR Site Id: 20 August 2007
Cheque Number:
Client Reference: 9022303

This response relates to a search request received for the site:
Lot: 2 Plan: RP122990
3 SUTTON LANE
BALLANDEAN

EMR RESULT

The above site is NOT included on the Environmental Management Register.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

Note: Searches maybe conducted online through the State Government Website www.smartservice.qld.gov.au or Citec Confirm www.confirm.com.au.

If you have any queries in relation to this search please phone (07) 3227 7370.

Lindi Bowen
Registrar, Contaminated Land Unit

Yap, Tammy (SKM)

From: Debbie Lewis [Debbie.Lewis@epa.qld.gov.au]
Sent: Monday, 20 August 2007 4:31 PM
To: Yap, Tammy (SKM)
Subject: EMM4020.rtf

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SEARCH RESPONSE

ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Jennifer Kerkin/Tammy-Sieu Yap [QE06454.04]
PO Box 246
Spring Hill QLD 4004

Transaction ID: 968947 EMR Site Id: 20 August 2007
Cheque Number:
Client Reference: 9022303

This response relates to a search request received for the site:
Lot: 2 Plan: RP63905
147 EMU SWAMP ROAD
GLEN APLIN

EMR RESULT

The above site is NOT included on the Environmental Management Register.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

Note: Searches maybe conducted online through the State Government Website www.smartservice.qld.gov.au or Citec Confirm www.confirm.com.au.

If you have any queries in relation to this search please phone (07) 3227 7370.

Lindi Bowen
Registrar, Contaminated Land Unit

Yap, Tammy (SKM)

From: Debbie Lewis [Debbie.Lewis@epa.qld.gov.au]
Sent: Monday, 20 August 2007 4:50 PM
To: Yap, Tammy (SKM)
Subject: EMM4020.rtf

Level 16, 288 Edward St • Brisbane, Queensland • GPO Box 2771 • QLD 4001 •AUSTRALIA
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SEARCH RESPONSE

ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Jennifer Kerkin/Tammy Yap [QE06454.04]
PO Box 246
Spring Hill QLD 4004

Transaction ID: 968985 EMR Site Id: 20 August 2007
Cheque Number:
Client Reference: 9022481

This response relates to a search request received for the site:
Lot: 2 Plan: RP59328
178 CHURCH ROAD
THE SUMMIT

EMR RESULT

The above site is NOT included on the Environmental Management Register.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

Note: Searches maybe conducted online through the State Government Website www.smartservice.qld.gov.au or Citec Confirm www.confirm.com.au.

If you have any queries in relation to this search please phone (07) 3227 7370.

Lindi Bowen
Registrar, Contaminated Land Unit

Yap, Tammy (SKM)

From: Debbie Lewis [Debbie.Lewis@epa.qld.gov.au]
Sent: Monday, 20 August 2007 4:19 PM
To: Yap, Tammy (SKM)
Subject: EMM4020.rtf

Level 16, 288 Edward St • Brisbane, Queensland • GPO Box 2771 • QLD 4001 •AUSTRALIA
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SEARCH RESPONSE

ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Jennifer Kerkin/Tammy-Sieu Yap [QE06454.04]
PO Box 246
Spring Hill QLD 4004

Transaction ID: 968935 EMR Site Id: 20 August 2007
Cheque Number:
Client Reference: 9022303

This response relates to a search request received for the site:
Lot: 2 Plan: RP55215
null FLETCHER ROAD
FLETCHER

EMR RESULT

The above site is NOT included on the Environmental Management Register.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

Note: Searches maybe conducted online through the State Government Website www.smartservice.qld.gov.au or Citec Confirm www.confirm.com.au.

If you have any queries in relation to this search please phone (07) 3227 7370.

Lindi Bowen
Registrar, Contaminated Land Unit

Yap, Tammy (SKM)

From: Debbie Lewis [Debbie.Lewis@epa.qld.gov.au]
Sent: Monday, 20 August 2007 4:48 PM
To: Yap, Tammy (SKM)
Subject: EMM4020.rtf

Level 16, 288 Edward St • Brisbane, Queensland • GPO Box 2771 • QLD 4001 •AUSTRALIA
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SEARCH RESPONSE

ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Jennifer Kerkin/Tammy Yap [QE06454.04]
PO Box 246
Spring Hill QLD 4004

Transaction ID: 968983 EMR Site Id: 20 August 2007
Cheque Number:
Client Reference: 9022481

This response relates to a search request received for the site:
Lot: 2 Plan: RP31768
94 ROGERS ROAD
APPLETHORPE

EMR RESULT

The above site is NOT included on the Environmental Management Register.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

Note: Searches maybe conducted online through the State Government Website www.smartservice.qld.gov.au or Citec Confirm www.confirm.com.au.

If you have any queries in relation to this search please phone (07) 3227 7370.

Lindi Bowen
Registrar, Contaminated Land Unit

Yap, Tammy (SKM)

From: Debbie Lewis [Debbie.Lewis@epa.qld.gov.au]
Sent: Monday, 20 August 2007 4:25 PM
To: Yap, Tammy (SKM)
Subject: EMM4020.rtf

Level 16, 288 Edward St • Brisbane, Queensland • GPO Box 2771 • QLD 4001 •AUSTRALIA
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SEARCH RESPONSE

ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Jennifer Kerkin/Tammy-Sieu Yap [QE06454.04]
PO Box 246
Spring Hill QLD 4004

Transaction ID: 968940 EMR Site Id: 20 August 2007
Cheque Number:
Client Reference: 9022303

This response relates to a search request received for the site:
Lot: 2 Plan: RP12336
308 FLETCHER ROAD
FLETCHER

EMR RESULT

The above site is NOT included on the Environmental Management Register.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

Note: Searches maybe conducted online through the State Government Website www.smartservice.qld.gov.au or Citec Confirm www.confirm.com.au.

If you have any queries in relation to this search please phone (07) 3227 7370.

Lindi Bowen
Registrar, Contaminated Land Unit

Yap, Tammy (SKM)

From: Debbie Lewis [Debbie.Lewis@epa.qld.gov.au]
Sent: Monday, 20 August 2007 4:28 PM
To: Yap, Tammy (SKM)
Subject: EMM4020.rtf

Level 16, 288 Edward St • Brisbane, Queensland • GPO Box 2771 • QLD 4001 •AUSTRALIA
Telephone (07) 32251827 • Facsimile (07) 3247 3278 • www.env.qld.gov.au/environment/business/contaminated

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SEARCH RESPONSE

ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Jennifer Kerkin/Tammy-Sieu Yap [QE06454.04]
PO Box 246
Spring Hill QLD 4004

Transaction ID: 968943 EMR Site Id: 20 August 2007
Cheque Number:
Client Reference: 9022303

This response relates to a search request received for the site:
Lot: 1 Plan: RP902806
168 FLETCHER ROAD
BALLANDEAN

EMR RESULT

The above site is NOT included on the Environmental Management Register.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

Note: Searches maybe conducted online through the State Government Website www.smartservice.qld.gov.au or Citec Confirm www.confirm.com.au.

If you have any queries in relation to this search please phone (07) 3227 7370.

Lindi Bowen
Registrar, Contaminated Land Unit

Queensland Government
Environmental Protection Agency
Queensland Parks and Wildlife Service

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Telephone (07) 32251827 • Facsimile (07) 3247 3278 •
www.epa.qld.gov.au/ecoaccess/contaminated_land/

SEARCH RESPONSE
ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Rowan Turner
3 Corsica St
Moorooka QLD 4105

Transaction ID: 973619 EMR Site Id: 8414 31 August 2007
Client Reference: 9065398
Cheque Number:

This response relates to a search request received for the site:
Lot: 1 Plan: RP131052

EMR RESULT

The above site IS included on the Environmental Management Register.
Lot: 1 Plan: RP131052
Address: NEW ENGLAND HIGHWAY
SEVERNLEA 4352

The site has been subject to the following Notifiable Activity pursuant to section 374 of the *Environmental Protection Act 1994.*
SERVICE STATIONS - operating a commercial service station.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

Note: Searches maybe conducted online through the State Government Website www.smartservice.qld.gov.au or Citec Confirm www.confirm.com.au.

If you have any queries in relation to this search please phone (07) 3227 7370.

Lindi Bowen
Registrar, Contaminated Land Unit

Yap, Tammy (SKM)

From: Debbie Lewis [Debbie.Lewis@epa.qld.gov.au]
Sent: Monday, 20 August 2007 4:32 PM
To: Yap, Tammy (SKM)
Subject: EMM4020.rtf

Level 16, 288 Edward St • Brisbane, Queensland • GPO Box 2771 • QLD 4001 •AUSTRALIA
Telephone (07) 32251827 • Facsimile (07) 3247 3278 • www.env.qld.gov.au/environment/business/contaminated

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SEARCH RESPONSE

ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Jennifer Kerkin/Tammy-Sieu Yap [QE06454.04]
PO Box 246
Spring Hill QLD 4004

Transaction ID: 968948 EMR Site Id: 20 August 2007
Cheque Number:
Client Reference: 9022303

This response relates to a search request received for the site:
Lot: 1 Plan: RP63905
161 EMU SWAMP ROAD
GLEN APLIN

EMR RESULT

The above site is NOT included on the Environmental Management Register.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

Note: Searches maybe conducted online through the State Government Website www.smartservice.qld.gov.au or Citec Confirm www.confirm.com.au.

If you have any queries in relation to this search please phone (07) 3227 7370.

Lindi Bowen
Registrar, Contaminated Land Unit

Yap, Tammy (SKM)

From: Debbie Lewis [Debbie.Lewis@epa.qld.gov.au]
Sent: Monday, 20 August 2007 4:20 PM
To: Yap, Tammy (SKM)
Subject: EMM4020.rtf

Level 16, 288 Edward St • Brisbane, Queensland • GPO Box 2771 • QLD 4001 •AUSTRALIA
Telephone (07) 32251827 • Facsimile (07) 3247 3278 • www.env.qld.gov.au/environment/business/contaminated

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SEARCH RESPONSE

ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Jennifer Kerkin/Tammy-Sieu Yap [QE06454.04]
PO Box 246
Spring Hill QLD 4004

Transaction ID: 968936 EMR Site Id: 20 August 2007
Cheque Number:
Client Reference: 9022303

This response relates to a search request received for the site:
Lot: 1 Plan: RP55215
389 FLETCHER ROAD
FLETCHER

EMR RESULT

The above site is NOT included on the Environmental Management Register.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

Note: Searches maybe conducted online through the State Government Website www.smartservice.qld.gov.au or Citec Confirm www.confirm.com.au.

If you have any queries in relation to this search please phone (07) 3227 7370.

Lindi Bowen
Registrar, Contaminated Land Unit

Yap, Tammy (SKM)

From: Debbie Lewis [Debbie.Lewis@epa.qld.gov.au]
Sent: Monday, 20 August 2007 4:20 PM
To: Yap, Tammy (SKM)
Subject: EMM4020.rtf

Level 16, 288 Edward St • Brisbane, Queensland • GPO Box 2771 • QLD 4001 •AUSTRALIA
Telephone (07) 32251827 • Facsimile (07) 3247 3278 • www.env.qld.gov.au/environment/business/contaminated

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SEARCH RESPONSE

ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Jennifer Kerkin/Tammy-Sieu Yap [QE06454.04]
PO Box 246
Spring Hill QLD 4004

Transaction ID: 968936 EMR Site Id: 20 August 2007
Cheque Number:
Client Reference: 9022303

This response relates to a search request received for the site:
Lot: 1 Plan: RP55215
389 FLETCHER ROAD
FLETCHER

EMR RESULT

The above site is NOT included on the Environmental Management Register.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

Note: Searches maybe conducted online through the State Government Website www.smartservice.qld.gov.au or Citec Confirm www.confirm.com.au.

If you have any queries in relation to this search please phone (07) 3227 7370.

Lindi Bowen
Registrar, Contaminated Land Unit

Yap, Tammy (SKM)

From: Debbie Lewis [Debbie.Lewis@epa.qld.gov.au]
Sent: Monday, 20 August 2007 4:30 PM
To: Yap, Tammy (SKM)
Subject: EMM4020.rtf

Level 16, 288 Edward St • Brisbane, Queensland • GPO Box 2771 • QLD 4001 •AUSTRALIA
Telephone (07) 32251827 • Facsimile (07) 3247 3278 • www.env.qld.gov.au/environment/business/contaminated

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Queensland Parks and Wildlife Service

SEARCH RESPONSE

ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Jennifer Kerkin/Tammy-Sieu Yap [QE06454.04]
PO Box 246
Spring Hill QLD 4004

Transaction ID: 968946 EMR Site Id: 20 August 2007
Cheque Number:
Client Reference: 9022303

This response relates to a search request received for the site:
Lot: 1 Plan: RP49661
null MASCADRI LANE
GLEN APLIN

EMR RESULT

The above site is NOT included on the Environmental Management Register.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

Note: Searches maybe conducted online through the State Government Website www.smartservice.qld.gov.au or Citec Confirm www.confirm.com.au.

If you have any queries in relation to this search please phone (07) 3227 7370.

Lindi Bowen
Registrar, Contaminated Land Unit

Yap, Tammy (SKM)

From: Debbie Lewis [Debbie.Lewis@epa.qld.gov.au]
Sent: Monday, 20 August 2007 4:26 PM
To: Yap, Tammy (SKM)
Subject: EMM4020.rtf

Level 16, 288 Edward St • Brisbane, Queensland • GPO Box 2771 • QLD 4001 •AUSTRALIA
Telephone (07) 32251827 • Facsimile (07) 3247 3278 • www.env.qld.gov.au/environment/business/contaminated

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Queensland Parks and Wildlife Service

SEARCH RESPONSE

ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Jennifer Kerkin/Tammy-Sieu Yap [QE06454.04]
PO Box 246
Spring Hill QLD 4004

Transaction ID: 968941 EMR Site Id: 20 August 2007
Cheque Number:
Client Reference: 9022303

This response relates to a search request received for the site:
Lot: 7 Plan: RP222897
null FLETCHER ROAD
BALLANDEAN

EMR RESULT

The above site is NOT included on the Environmental Management Register.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

Note: Searches maybe conducted online through the State Government Website www.smartservice.qld.gov.au or Citec Confirm www.confirm.com.au.

If you have any queries in relation to this search please phone (07) 3227 7370.

Lindi Bowen
Registrar, Contaminated Land Unit

QLD ENVIRONMENTAL PROTECTION AGENCY

ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Transaction ID: 973500 EMR Site Id: 55911 31 August 2007
This response relates to a search request received for the site:
Lot: 218 Plan: SP122460

EMR RESULT

The above site IS included on the Environmental Management Register.
Lot: 218 Plan: SP122460
Address: SEVERNLEA
SEVERNLEA 4352

The site has been subject to contamination from a hazardous contaminant as follows:
HAZARDOUS CONTAMINANT - This site has been subject to a hazardous contaminant.
Refer to the summary given below.
Possible high arsenic levels along rail corridor.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

Note: Searches maybe conducted online through the State Government Website www.smartservice.qld.gov.au or Citec Confirm www.confirm.com.au.

If you have any queries in relation to this search please phone (07) 3227 7370.

Lindi Bowen
Registrar, Contaminated Land Unit

C2 Logo

QLD ENVIRONMENTAL PROTECTION AGENCY

ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Transaction ID: 973501 EMR Site Id: 55906 31 August 2007
This response relates to a search request received for the site:
Lot: 212 Plan: SP122455

EMR RESULT

The above site IS included on the Environmental Management Register.
Lot: 212 Plan: SP122455
Address: APPLETHORPE
APPLETHORPE 4378

The site has been subject to contamination from a hazardous contaminant as follows:
HAZARDOUS CONTAMINANT - This site has been subject to a hazardous contaminant.
Refer to the summary given below.
Possible high arsenic levels along rail corridor.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

Note: Searches maybe conducted online through the State Government Website www.smartservice.qld.gov.au or Citec Confirm www.confirm.com.au.

If you have any queries in relation to this search please phone (07) 3227 7370.

Lindi Bowen
Registrar, Contaminated Land Unit

C2 Logo

QLD ENVIRONMENTAL PROTECTION AGENCY

ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Transaction ID: 973498 EMR Site Id: 55913 31 August 2007
This response relates to a search request received for the site:
Lot: 221 Plan: SP122463

EMR RESULT

The above site IS included on the Environmental Management Register.
Lot: 221 Plan: SP122463
Address: GLEN APLIN
GLEN APLIN 4381

The site has been subject to contamination from a hazardous contaminant as follows:
HAZARDOUS CONTAMINANT - This site has been subject to a hazardous contaminant.
Refer to the summary given below.
Possible high arsenic levels along rail corridor.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

Note: Searches maybe conducted online through the State Government Website www.smartservice.qld.gov.au or Citec Confirm www.confirm.com.au.

If you have any queries in relation to this search please phone (07) 3227 7370.

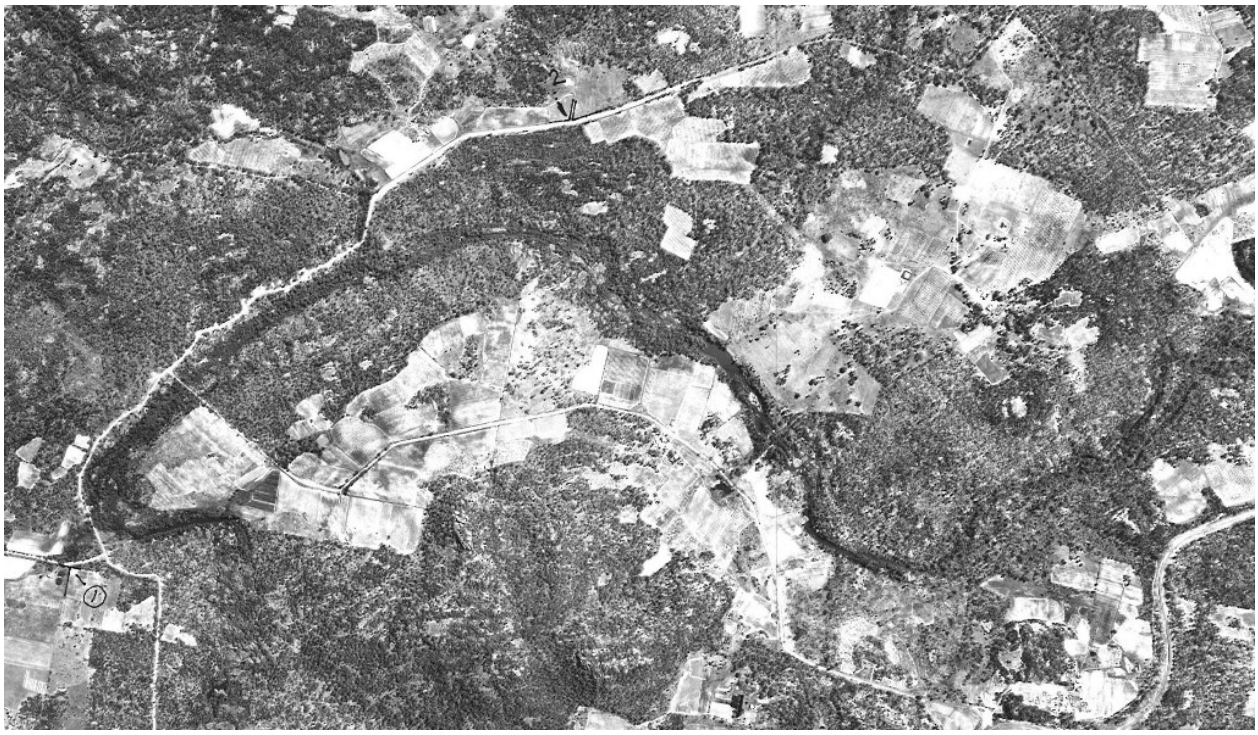
Lindi Bowen
Registrar, Contaminated Land Unit

C2 Logo

F.1.2 Historical Aerial Photographs

- **Figure F.6.2-1 Historical Aerial Photograph from 1956**

- **Figure F.6.2-2 Historical Aerial Photograph from 1972**



- **Figure F.6.2-3 Historical Aerial Photograph from 1989**

- **Figure F.6.2-3 Historical Aerial Photograph from 1999**

F.2 Terrestrial Ecology

F.2.1 Terrestrial Flora Methodology (3D Environmental 2007)

Desktop Literature Review

A search of relevant databases provided background information regarding the presence and distribution of flora species known from the study area and the broader region. This included searches of the Commonwealth EPBC Online Protected Matters Search Tool, the Queensland Herbarium's HERBRECS database and the Queensland Environmental Protection Agency's (EPA) WildNet database. Regional Ecosystem (RE) mapping sourced from the Queensland Department of Natural Resources and Water (DNRW) provided the basis for vegetation community assessment, and site data extracts sourced from the Queensland Herbarium's HERBRECS and CORVEG databases provided a basis for assessment of flora species distributions. Previous mapping exercises were also reviewed, as well as biodiversity/conservation assessments, recovery plans and published ecological research completed by government agencies and private organisations over relevant sections of the study area.

Aerial Photograph Analysis and Site Location

A stereoscopic assessment of April 1999 1:40 000 scale aerial colour aerial photographs, the most recent available, allowed the establishment of preliminary vegetation line work and polygon attribution, completed in reference to the available regional ecosystem (RE) mapping. This provided a preliminary understanding of the limitations of the current certified RE mapping. Historical aerial photographs (1989) were utilised in the study as an aid to understanding site history, and to assist in the classification of non-remnant or regrowth vegetation.

A suite of survey sites were chosen from aerial photograph analysis to ensure that the field survey:

a) targeted a representative range of habitats within the study area;

b) sampled those communities that were useful for providing reference conditions for disturbed communities (best type examples); and

c) directed detailed sampling towards those communities that could not be adequately categorised through aerial photograph interpretation (API), or were considered critical to a range of Endangered, Vulnerable or Rare (EVR) flora species.

Further sites were added opportunistically during the field survey to provide a more complete data coverage and to verify the mapping units. A summary of the survey locations for individual study components is provided in **Table F.2.1-1**.

Table F.2.1-1 Vegetation Survey Effort

Project Area	Survey Effort	Number of Locations
Inundation Area	Secondary	15
	Quaternary	33
Stalling Lane Access	Secondary	3
	Quaternary	7
Urban Pipeline	Quaternary	42
Irrigation Pipeline	Quaternary	168

Field Survey Technique

Field survey methods followed Queensland Herbarium standards (Neldner *et al* 2005) using a combination of formalised secondary, tertiary and quaternary level sampling procedures, as well as informal site observations. Field proformas from Neldner *et al* (2005) were modified to suit sampling requirements specific to this study and to incorporate data on vegetation condition, fauna habitat features and landscape function. The core field information recorded included site location, tenure, air photo and site photo references, landform and geological features, and

vegetation community structure. Complete species lists were compiled wherever these were considered appropriate. Canopy height was meticulously measured at all sample locations using a clinometer and linear regression table, and canopy cover was recorded in secondary sites using measured crown intercept transects. A Garmin GPS 60 (Geographic Positioning System) was used to accurately record map coordinates for the site locations (GDA94).

Secondary sites consisted of a standard 50 m x 10 m plot located along the contour. Attempts were made to avoid sampling on vegetation community boundaries, which was difficult in some of the linear vegetation communities. Bitterlich measurements to measure basal area were completed at all sites except in linear communities where the method proved inappropriate. Full species lists for all strata were established during the secondary sampling procedure wherein the 500 m^2 plot was intensively sampled, followed by a detailed search of the vicinity to record additional species. While the vicinity search was broadly defined by the extent of the basal area sweep, it was in all cases confined to the target community. The abundance of all species within the plot was recorded by stem counts and a visually assessed ranking of cover abundance using the Braun-Blanquet scale.

Tertiary sites were completed in a similar fashion to the secondary procedure, except that non-woody species were not recorded. Several sites recorded at tertiary level comprised a full species list in a search area established via a radial sweep of the Bitterlich device. Survey to quaternary level was completed on sites where access permission was granted, and comprised a description of the floristic structure, composition, and the associated landform. Wherever a vegetation community was considered to be potential critical habitat for an EVR species, the search area was broadened and a more extensive species list was established from the extended search area. Flora species were also recorded on walking traverses, again with particular attention to locating EVR and regionally significant taxa.

Botanical voucher specimens were collected throughout the field survey to verify site floristics and to enable identification of those species that were taxonomically problematic. All material was pressed, labelled, and cross referenced, and of sufficient size and quantity to be incorporated into the

Queensland Herbarium collection, if required. Expert advice on identification of problematic species was provided by Queensland Herbarium Advisory Services and a regional flora expert. Site/species field data was entered into an Excel spreadsheet, enabling analysis of flora values within vegetation communities and REs.

The field survey of the inundation area was completed in two phases enabling a thorough assessment of vegetation communities and individual species. An initial survey was completed in December 2006, during which the bulk of the vegetation communities were sampled and floristic data gathered. A secondary winter survey was completed in June 2007. This allowed an assessment of seasonal floristic variation and allowed targeted searches for winter flowering (or emerging) species. Winter survey methods included secondary sampling of standard 50x10m plots in representative REs in conjunction with a thorough floristic search of a 1 ha area in the site locality. Numerous meander searches were also undertaken through a range of ecosystems.

Single phases of survey were completed for the Urban Pipeline (December 2006), the Stalling Lane Access (June 2007), and the Irrigation Pipeline (July 2007). These surveys were directed at identifying constraints and as such, were focused on the identification of EVR flora species, vegetation communities (including REs) with special conservation significance, and declared weed species. Comprehensive species lists were not compiled for these portions of the study although potentially significant species were collected and voucher specimens submitted for verification to the Queensland Herbarium. Due to the proximity of the road re-alignment survey area to the dam inundation area, and the inclusion of a number of detailed secondary survey locations in the road survey effort, floristic data collected during this survey has been incorporated into the overall species lists.

Classification of Land and Vegetation

A vegetation type is defined as a unit of structurally and floristically similar vegetation, whilst a land type is defined as a unit of structurally and floristically similar vegetation on a similar geology (Stanton and Morgan 1977, Sattler and Williams 1998). Land types in this exercise are referred to as ‘vegetation communities’ and are consistently

referred to as such throughout this document. Vegetation communities are classified herein according to a primary geological subdivision and a vegetation type. These codes may be complemented by an appended code indicating particular structural attributes (e.g. a vine forest sub-canopy), or an indicator of vegetation condition.

Vegetation communities are often amalgamated to form REs, and these communities may retain autonomy through classification as a regional ecosystem sub-unit. REs are comprised of a three-part code of which the primary subdivision is the bioregional zone, followed by geology or land zone, with vegetation being the final subdivision in the classification. RE's are assessed on a state wide basis for conservation significance, as regulated by Queensland's Vegetation Management Act 1999 (VMA). Vegetation structure is classified according to the system of Specht (1970) as modified by Neldner *et al* (2005), (refer **Table F.2.1-2**). This classification has been applied consistently to vegetation throughout the field survey and broader flora baseline study.

- **Table F.2.1-2 Structural formation classes qualified by height for non-rainforest vegetation: Neldner et al. (2005) modified from Specht (1970)**

Projective Foliage Cover	**70-100%**	**30-70%**	**10-30%**	**<10%**
Approximate Crown Cover%	80 - 100%	50 - 80%	20 - 50%	< 20%
Crown separation	closed or dense	mid-dense	Sparse	very sparse
Growth Form	**Structural Formation Classes (qualified by height)**			
Trees > 30 m	tall closed-forest (TCF)	tall open-forest (TCF)	tall woodland (TW)	tall open-woodland (TOW)
Trees 10 – 30 m	closed-forest (CF)	open-forest (OF)	woodland (W)	open-woodland (OW)
Trees < 10 m	low closed-forest (LCF)	low open-forest (LOF)	low woodland (LW)	low open-woodland (LOW)
Shrubs 2 – 8 m	closed-scrub (CSC)	open-scrub (OSC)	tall shrubland (TS)	tall open-shrubland (TOS)
Shrubs 1 – 2 m	closed-heath (CHT)	open-heath (OHT)	shrubland (S)	open-shrubland (OS)
Shrubs <1 m	-	Dwarf open-heath (DOHT)	dwarf shrubland (DS)	dwarf open-shrubland (DOS)
Succulent shrub	-	-	succulent shrubland (SS)	dwarf succulent shrubland (DSS)
Hummock grasses	-	-	hummock grassland (HG)	open hummock grassland (OHG)
Tussock grasses	closed-tussock grassland (CTG)	tussock grassland (TG)	open tussock grassland (OTG)	sparse-tussock grassland (STG)
Herbs	closed-herbland (CH)	Herbland (H)	open-herbland (OH)	sparse-herbland (SH)
Forbs	closed-forbland (CFB)	Forbland (FB)	open-forbland (OFB)	sparse-forbland (SFB)
Sedges	closed-sedgeland (CV)	Sedgeland (V)	open-sedgeland (OV I)	-

As a general rule applied in this study and consistent with standard herbarium methods, a vegetation polygon is classified as non-remnant if its total width is less than 15 m, and the vegetation polygon is less than 1 hectare (ha) in size and isolated from remnant vegetation communities.

Mapping Scale

For vegetation survey, Neldner *et al* (1995) recommend a minimum of half the sampling density required by the Food and Agricultural Organisation of the United Nations (FAO 1979) for soil survey. This equates to a minimum

of two sites per km2 for 1:25 000 scale mapping, and 12.5 sites/km2 for 1:10 000 scale mapping. As such, a proposed dam inundation area of 2.5 km^2 (excluding the pipeline easement) requires 31 sites for 1:10,000 scale mapping, assuming total cover of remnant vegetation. With cleared horticultural lands comprising 28% of the project area, site data requirements for 1:10,000 scale mapping in the project area are reduced significantly. With 48 sites sampled within the inundation area, the collected site information exceeds data requirements for 1:10,000 scale mapping. Highly detailed delineation of vegetation communities is constrained, however, by the spatial resolution of the available 1:40,000 scale aerial photographs used for the study.

Digital Processing and Accuracy

The marked aerial photographs were scanned at a resolution of 300 dpi. Each photo was then registered within ArcMap using the geo-registration extension against the digital cadastral database (DCDB). Upon completion of photo registration, the identified boundaries were captured as line work. Final editing was performed when all of the boundaries had been captured, prior to generation of polygons in ARC/INFO format.

The accuracy for the 1:40,000 scale aerial photography is equivalent to 1 mm on the photograph being equal to 40,000 mm on the ground. All aerial photograph line-work was between 1 – 2 mm on the aerial photography generating an accuracy of 40 to 80 m. The RMS error obtained during photo registration varies depending on the underlying terrain. In general, the RMS error for the 1:40,000 scale aerial photographs is in the range of 40 to 80 m, with variation due mainly to the underlying terrain - steeper terrain produces greater radial distortion on each photograph.

Shire wide spot imagery supplied by the SSC was utilised as a supplementary control for air photo registration on the Irrigation Pipeline. Spatial inconsistencies in the DCDB and Spot Imagery Spatial inconsistencies in the DCDB and Spot Imagery, which were used as a primary means of spatial registration, introduced an additional source of error into the spatial processing. As such, the vegetation line-work generated in the INW exercise is useful for identification of constraints and preliminary environmental planning. The accuracy of floristic collection points and survey locations is within the range of 4-8m, determined by GPS.

Flora Assessment Methods

The site selection method targeted samples of representative habitats throughout the study area for vegetation mapping purposes and also allowed assessment of the vascular flora of the project area. Structural and floristic data was entered onto proformas and transferred into Excel format within a site by species framework. The dataset included a range of fields relevant to the site e.g. location, condition status, community type, RE and VMA status. Data relevant to individual species, such as collection number, conservation status, exotic status, bioregional endemicity, disjunction, and distribution limit was assigned as determined by the literature review.

The resultant dataset provided a detailed flora list for the survey and allowed identification and mapping of a range of flora values, including taxa of state significance and other priority species and their habitats. Lists derived from the HERBRECS and WildNet databases and information contained within published and unpublished literature for the area were also assessed to assist in predictive analysis of species distributions. Interpretation of raw data assists in the assessment of spatial distribution of known records of Endangered, Vulnerable and Rare (EVR) flora and in identification of their habitat. Data output also assists in the development of a flora species checklist. Nomenclature follows Bostock and Holland (2007).

F.2.2 Terrestrial Fauna Methodology (BAAM 2007)

Prior to the field survey, public databases were searched in order to provide background information regarding terrestrial vertebrate fauna species known from the region and local area. This included searches of the Commonwealth's EPBC Online Protected Matters Search Tool, the EPA's WildNet database, Birds Australia's bird database, and the Queensland Museum's fauna database for the study area and surrounds. Information gained from this phase of the study was used to:

- Ensure that survey methods were designed to detect species of significance known from the region; and
- Determine which species are most likely to occur if suitable habitat was located within the study area. Those species that are known from recent, nearby records are considered more likely to occur if suitable habitat is located.

In addition, all other relevant information relating to the project, study area and the survey was reviewed, where available. This included aerial photography, mapping of vegetation, geology, land zones and topography, and all relevant planning documentation/mapping administered by Council and the Queensland Government.

Two fauna surveys were conducted were completed for the inundation area: a summer survey from 19th to 23rd December 2006 and an autumn/winter survey from 26th May to 1st June 2007.

Habitat assessment of the proposed urban pipeline was undertaken concurrently with summer survey in December 2006. Habitat assessment of the proposed irrigation pipeline was undertaken from the 9th to 11th July 2006.

Table F.2.2-1 Description of Systematic Survey Sites in Inundation Area

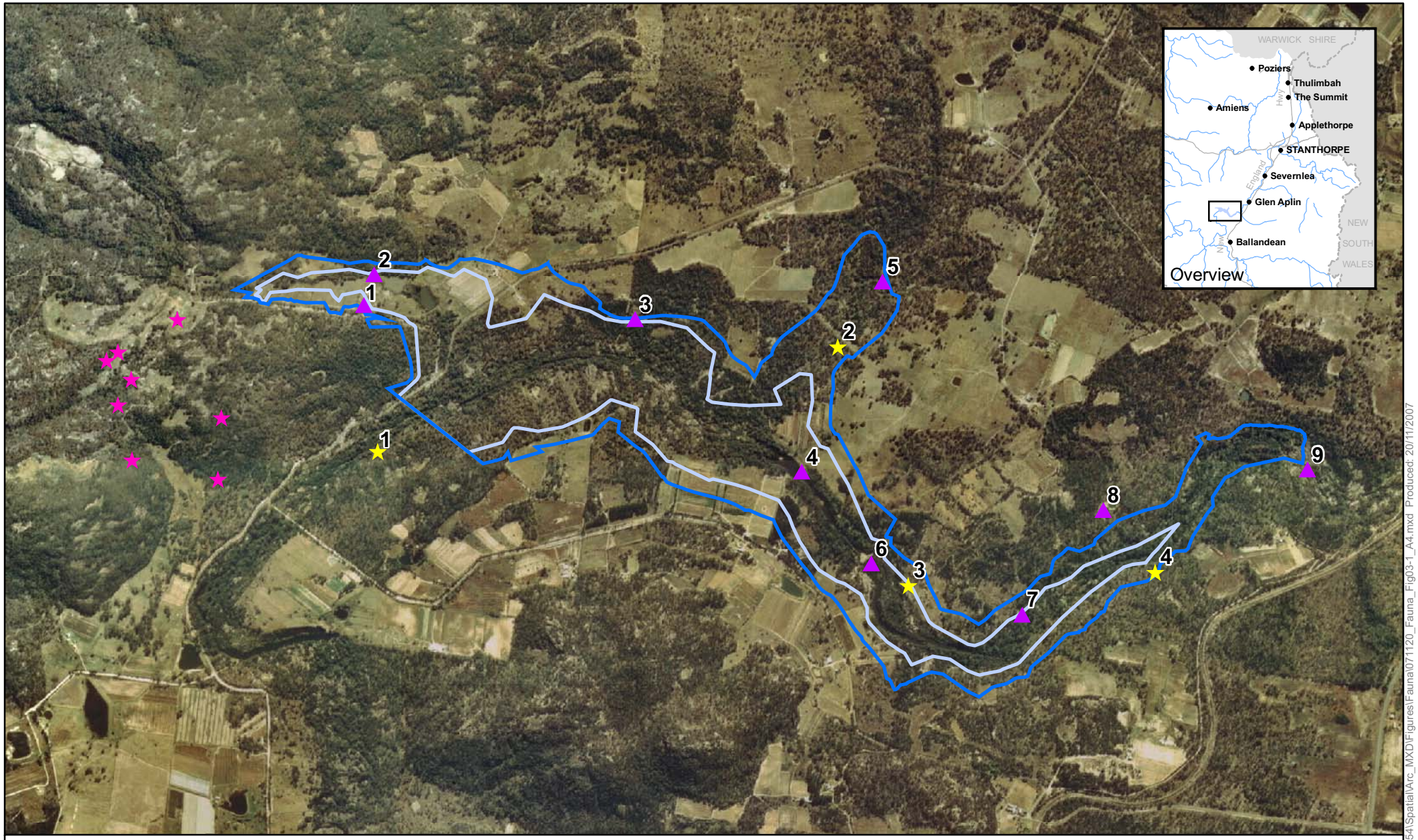
Site	Description
1	Open woodland with a low canopy dominated by half-bark box trees (e.g. *Eucalyptus melliodora*) and slightly more abundant stringybarks (e.g. *E. blakelyi*). *Callitris endlicheri* is also common as a low- to mid-canopy species. The shrub layer is relatively open, consisting predominantly of J*acksonia scoparia* and some *Callitris* recruitment. The ground layer consists of native tussock grasses interspaced by deep leaf litter. Fallen timber is common, and the site is characterized by emergent granite rock
2	Open woodland, essentially the same vegetation community as Site 1, though structurally different. The canopy is relatively similar, with a low open structure consisting of *E. melliodora*, *E. youmanii*, *E. blakelyi* and *E. prava*. However, Site 2 includes several *E. bridgesiana* with mallee type growth. Most significantly, the shrub layer is dominated by *Leptospermum brachyandra* which forms thick dense stands up to three metres tall. Under these dense shrubs the ground cover is reduced to leaf debris, though in areas where the shrubs are less dense the ground cover is dominated by tussock grasses. Fallen timber is abundant and of a variety of sizes. Granite rocks, including some large exfoliating slabs, emerge from the ground in places. The site includes a small dam with open water. The dam edges, though somewhat disturbed by cattle and feral pigs, contain *Myriophyllum* waterweed
3	Non-remnant vegetation. The canopy is absent due to historical clearing activities. The low, but very dense, shrub layer consists of regrowth canopy species including *E. youmanii*, *E. prava*, *Angophora subvelutina* and some *Callitris endlicheri*. These species were probably dominant in the canopy prior to clearing. Some shrub species, including Acacia species and *J. scoparia*, are also common. The site differs from the other systematic survey sites by its comparative lack of fallen timber, fewer emergent granite rocks and the domination of the ground cover by thick, relatively tall blady grass *Imperata cylindrica*
4	*Eucalyptus melliodora*, *E. youmani*i, *E. blakelyi* and *E. prava* woodland. The canopy consists of similar species to sites 1 and 2 but is taller, with greater foliage providing increased shelter and foraging resources. No, or very few, *Callitris* trees are present either as a midcanopy species or in the understorey. However, *J. scoparia* is quite common and forms the bulk of the relatively sparse shrub layer. The ground cover consists of tussock grasses interspersed with abundant fallen timber and leaf litter. On the higher portions of the site, granite outcrops are abundant as both large boulder piles embedded into the surface and open flat exfoliating slabs. The site is close by the Severn River, where the eucalypt canopy is replaced on the river banks by low dense *Melaleuca alternifolia*. Water within the river at this location was restricted to a series of small pools

In order to represent each of the basic vegetation/habitat types area four systematic survey sites were established within, or immediately adjacent to, the proposed inundation area. The systematic survey sites are briefly described in **Table F.2.2-1** in terms of vegetation and structure. The locations of the systematic survey sites are indicated on **Figure F.2.2.2 1**.

The specific survey techniques employed during the summer terrestrial vertebrate fauna survey are presented in **Table F.2.2-2**.

Table F.2.2-2 Fauna Survey Techniques for Summer and Autumn/Winter Surveys

Survey Technique	Summer Survey	Autumn/Winter Survey
Box traps	Over four nights 20 Elliot type 'A' traps and 2 cage traps were deployed at each of four systematic survey sites. Traps were placed on the ground 5-8 m apart using a variety of baits (rolled oats, peanut butter, oil and vanilla +/- salami). Trap placement was influenced by vegetation diversity, the size and shape of the vegetation patches and by naturally occurring features such as logs, rock outcrops, tree bases and clumping vegetation. These traps were cleared early morning and reset in late afternoon in accordance with animal ethics requirements.	For the targeted surveys for the Spotted-tailed Quoll *Dasyurus maculatus maculates*, one cage trap was deployed at each of eight trap sites over three nights. Traps were placed on the ground and baited with chicken and sardines. Trap placement was influenced by vegetation diversity, the size and shape of the vegetation patches and by naturally occurring features such as logs, rock outcrops, tree bases and clumping vegetation. These traps were cleared early morning and reset in late afternoon in accordance with animal ethics requirements.
Diurnal searches	Active diurnal searches were undertaken at each of four trapping sites. This involved intensive investigation of ground layer (under logs, rocks and leaf litter), low vegetation (under bark and in tree stumps) and rock crevices for all amphibians, reptiles, bats and animal signs (e.g. scats, owl pellets, orts (bird feeding remnants), remains and tracks). Searches were conducted in conjunction with the morning bird censuses and trap clearing activities, as well as during the warmer parts of the day when reptile activity was likely to be at its peak, totalling approximately 1 hr/site/day.	
Diurnal Bird Censuses	Birds were surveyed at each of four trapping sites using a timed transect technique. Each site was surveyed for approximately 30 minutes in the morning and afternoon by pausing at each fifth ground trap for six minutes. Birds were identified from either direct observation or their calls. Additional bird records were collected during random meander searches of other habitats or areas that were considered suitable for cryptic or rare species, as well as during other survey elements and opportunistically.	
Pitfall traps	At each of four trapping sites, four pitfall traps (20 or 10 litre containers, depending on substrate) were buried flush to the ground surface and connected by a 20 m drift fence. These traps were open for four nights and were cleared early morning and reset in late afternoon in accordance with animal ethics requirements.	Not undertaken
Nocturnal Surveys	A combination of high-powered spotlights and head torches were used to sample nocturnal mammals (flying, arboreal and terrestrial), birds (owls and nightjars), reptiles and frogs across the study area. During the spotlighting sessions, species specific detection was assisted by the use of call playback surveys undertaken for nocturnal birds and nocturnal mammals using recordings. An ANABAT II ultrasonic bat call detection unit and associated ZCAIM interface module were also used to capture the calls of insectivorous bat species. The use of the ZCAIM unit allows the ANABAT II detector to be left unattended throughout the night, thereby ensuring that peak activity periods for bats are recorded each night. Harp traps were also used where suitable flight paths were identified.	
Targeted Searches	During the survey period, special effort was made to detect the presence of species of special conservation significance obtained from the database searches, with particular focus on reptiles, *Hoplocephalus stephensii* and *Underwoodisaurus sphyrurus*, and the micro-bat *Nyctophilus timoriensis*. The location of each target site is shown on Figure F.2.2.2 1.	


WARWICK SHIRE
Poziers
Thulimbah
The Summit
Amiens
Applethorpe
STANTHORPE
Severnlea
Glen Aplin
Ballandean
NEW SOUTH WALES
Overview
Legend
Target Survey Site
Systematic Survey Site
Location of Cage Traps
Full Supply Level 738m AHD
Full Supply Level 734.5m AHD
N
W
E
S
0 100 200 400 600 800
Metres
Scale - 1:20,000 (at A4)
Projection: Map Grid of Australia Zone 56
EMU SWAMP DAM EIS
Emu Swamp Dam Site
Figure 3.1 Systematic Fauna Survey and Target Sites
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F.3 Aquatic Ecology

F.3.1 Aquatic Ecology EIS Survey Site Descriptions (Ecology Management 2007)

Site 1: Severn River upstream Glen Aplin

This site was on Thorndale Road immediately upstream of Council gravel reserve 147. The site consisted of two pools, joined at times of flow by a short section of riffle / run approximately 1-2m wide. A rough vehicle track crossed the river between the pools. Evidence of fossicking was present in the dry and well vegetated river bed between the pools. The downstream pool was bordered by the gravel reserve on the right bank and an orchard on the left. This pool was about 50m in width and length and reached over 3m deep when sampled in November 2006. The gravel reserve was will treed with eucalypt woodland but impacted by a number of vehicle tracks. The riparian zone included melaleuca, *Leptospermum* and some *Callistemon* and *Callitrus*. The left bank was steep and incised with sparse vegetation. The upstream pool was bordered on the right bank by cleared land containing accommodation cottages or horticultural crops. A band of intact riparian zone and woodland about 50m wide fringed the crops. An irrigation pump (2") serviced the crops. The left bank was a partially cleared flood terrace up to 30m wide. The river was a series of boulder / bedrock pools with a very uneven bottom and at baseflow level varied between 8 and 15m wide. Bars of gravel and coarse sand were common, particularly between the pools and on the left bank.

There were few snags of any size but significant amounts of leaf litter accumulated in patches.

Fringing aquatic plants were diverse and, in patches, abundant, including *Typha domingensis, Eleocharis* sp., *Phragmites australis, Juncus usitatus, Juncus* spp. *Persicaria* sp. (*attenuata*?) and *Ludwidgia peploides*. The only floating macrophyte noted was *Azolla fuliculoides* while *Myriophyllum aquaticus* dominated the submerged environment. Filamentous alga grew strongly on submerged boulders and the stems of aquatic plants.

Site 1: Glen Aplin downstream pool

Site 1: Glen Aplin upstream pool

Site 2: Severn River at Campbell's Weir.

This site is within the inundation area and adjoins a small area of irrigated grapes. The water surface was generally about 30m wide but more like 60m at the weir. The weir is a Besser block construction about 2.5m high and was built atop a bedrock race. It had a slow leak to downstream. The weir pool was nearly 1km long. The banks generally dropped sharply to the water over a distance of about 1.5m. The edge was mainly soil with occasional bedrock and boulder. The left bank was cleared for about 60m near the pump then to within 10-15m for another 50m. It was then natural in both directions consisting of wattles, sparse eucalypts and short tea tree that sometimes reached 5m over the water. . The right bank was essentially natural and consisted of a thin band of tea tree over sedges which quickly merged with eucalypt woodland. A few willow and blackberry patches were also present on the left bank. Some undercutting was observed just above the water line.

The water was dark and tannin stained. A large patch of *Typha* lined the right bank near the weir wall; a small patch of *Eleocharis* sat on an island in the centre near the wall, *Ludgwidgia* occurred in several small patches as did *Potomogeton tricarinatus* and *Azolla fuliculoides*. Earlier aerial reconnaissance showed this pool completely covered with *Azolla*. Filamentous algae grew strongly on shallow bedrock. *Myriophyllum*, with stems covered in filamentous algae, was very common in November but not so in April. Large woody debris was common. The site has been stocked and is fished by the local fishing club.

Site 2: Campbell's Weir upstream

Site 3: Severn River below Campbell's Weir

This site is within the inundation area approximately 200m downstream from Campbell's Weir. The river varies from 5 – 8m wide and has a boulder / bedrock base with coarse gravel in patches. Depth rarely exceeded 0.5m. The banks were near vertical for 1-2m and the adjoining landscape was flat to the north (right bank) and gently rising on the left bank. A number of backwaters existed on the left bank and these contained significant amounts of *Typha*. Large sedges and grasses lined the waterway and overhung the banks. The canopy was closed overhead, consisting of tea tree, *Leptospermum*, wattle, eucalypt and belah. Large amounts of fallen timber existed in the riparian zone and some had entered the river.

Small amounts of *Lemna* and *Ludwidgia* were observed and filamentous algal growth was limited.

Site 3: Severn River below Campbell's Weir

Site 3: Campbell's shallow

Site 4: Severn River at Stalling Lane

The downstream end of this site was marked by the dam axis geotechnical drilling causeway. The site consisted of a shallow pool about 80m long up to a bedrock race where Stalling Creek entered from the western side. A small weir (<1m maximum height) sat atop the race and below another long shallow pool. In flow, both of the pools would constitute glide habitat. Maximum depth of the sampled pool reached 1.3m but this was very uncommon. Maximum width reached approximately 15m. The channel shape was rectangular, with the sides almost vertical to approximately 2m in height. These banks were covered in maiden hair fern, moss, tree roots and some sedges. Undercutting was common but slight and vegetation overhang of the water was common. The substrate was primarily smooth bedrock or boulders with angular sides, creating an uneven and varied bottom. Coarse sand was common in the main channel with finer sand on the edges. Small branches and leaf litter piles were common and filamentous algae covered much of the shallow rock and wood surfaces.

The left bank was a floodway generally about 25m wide and the right was about 50m wide and bordered by Emu Swamp Road. Physical form and vegetation was similar on both banks and consisted of irregular flood channels which were thickly vegetated with sedges (*Carex, Lomandra* and *Gahnia*) under a canopy of tea tree, *Leptospermum*, *Callistemon* and *Acacia*. Eucalypts were sparse and generally set back.

No macrophytes grew in the channel and the river was not flowing during either sampling event. *Alathyria* shells were common in March.

Site 4: Severn River at Stalling Lane

Site 5: Severn River near Somme Lane (Shallow)

This site was at the upstream end of the Site 6 weir pool and immediately below another small (1.5m) weir. It appears that the Site 6 pool would inundate the area when full. The line of *Juncus*, indicating the waterline, was about 1.5m above the water level when sampled. Above the weir pool pump the river was a series of disconnected small pools. The river had a bedrock (angular), boulder and cobble base with some gravel and sand. Fine sediment levels were high and the water was dark. Width of the base channel was about 5m then rose sharply for about 1.5m to, on the left bank, a broad alluvial floodplain with various channels and a backwater pool that contained *Phragmites, Potamogeton tricarinatus, Eleocharis* and *Myriophyllum. Typha* occurred in patches on the right bank. The left bank vegetation was tea tree over clumps of sedge and had recently been damaged by fire. The right bank vegetation was also dominated by tea tree but with eucalypts a short distance from the water and Juncus making up the bulk of the understorey.

Depth during sampling was generally less than 30cm. An oily scum was observed on the surface on both sampling occasions and in April, after the water level had dropped, the bed was colonised by various terrestrial grasses along with *Persicaria* and *Juncus*. Filamentous algae grew strongly on the bedrock at this time and tea tree litter patches were at times significant. *Alathyria* shells were common along the edge.

Site 5: Severn River near Somme Lane (shallow)

Site 6: Severn River near Somme Lane (Deep)

This weir pool is about 800m long, has a wall 3.5m high and a capacity of 36ML. Width in November was up to 30m. The substrate was steep sloping bedrock or gravel/coarse sand. The right bank sloped steeply from the water to a thick band of *Typha* covering 90% of the length of the bank. Behind the *Typha* were tea tree and eucalypts with a sedge understorey. The left bank was 40% *Typha*, slightly more *Juncus*, occasional tea trees and eucalypts and some of the latter were dead. The left bank was an alluvial floodplain area that had been partly excavated to increase the storage volume of the weir. There were very few logs in the water and no floating or rooted macrophytes. When sampled in November, the water level was about 0.5m below the *Typha* and 1 -1.5m from the *Juncus*. The water level fell 20cm overnight as a result of pumping. When sampled in April 2007 the water level had dropped about 1.5m so that the site consisted of three separate pools and catfish nests were exposed. A fine black sludge was common under the surface gravel. The exposed substrate had been colonised by *Persicaria* which had seeded. The *Typha* has also seeded and senesced. *Alathyria* shells were common on the rocky edge.

Site 6. Severn River near Somme Lane (Deep)

Site 6 Severn River near Somme Lane (Deep)

Site 7: Severn River at Second Crossing

This site is downstream of the confluence of Severn River and Accommodation Creek. The site sampled was below a causeway which had two separate box culverts to pass flow. The upstream side of each culvert was largely blocked with branches and leaves but flow still passed, and passed over the causeway. Upstream of the causeway the river was about 20m wide and constituted a cobble run habitat. Flow downstream started as two steep channels of cobble and small boulder below the culverts. Small cascades and rapids separated shallow flowing run habitat. The channels combined approximately 30m downstream of the causeway and the channel was then generally less than 5m wide and 0.5m deep. The substrate was mainly cobble / boulder with coarse sand and gravel. A few strands of *Ludwidgia* were noted and *Juncus usitatus* and *Persicaria* colonised the wetted edges. Very little filamentous alga was present and branch or leaf litter patches were also sparse.

The surrounding vegetation was mainly Belah with an understorey of wattles, leptospermum and callistemon over a ground cover of sedges and grasses. The riparian zone was intact and broad. Downstream areas of the stream were fully covered by overhead vegetation. The riffles were flowing well in November 2006 but not at all in April 2007.

Site 7: Severn River at Second Crossing

Site 7: Severn River at Second Crossing

Site 8: Severn River at Bent's Weir

The upstream end of this weir pool reached to within a few hundred metres of site 7. The weir itself is at least 3m high and backs up over a few kilometres. The channel was generally 30 – 40m wide and spit into three at the upper end though they rejoined a few hundred metres upstream. The right bank was a flat, sedge/grass floodplain with a few eucalypts and belah. Some near the water has drowned. The very edge was a thick row of sedges. The banks were near vertical for about 0.5m on the right bank to more like 1.5m on the left. The left bank riparian zone was then a steep grassy slope with occasional eucalypts and wattles. It had an access track and an informal camping area. Beyond the access track was natural woodland except in the area cleared to provide access. A small patch of *Typha* occurred on the left bank upstream from an irrigation pump but this was the only macrophyte noted on either sampling occasion. The smooth bedrock at the upstream extent of the left bank had a thin cover of filamentous algae.

Large woody debris was common and the water was darkly tannin stained.

Site 8: Severn River at Bent's Weir

Site 9: Accommodation Creek on Sundown Rd

This site is approximately 1km upstream from the gauging station. The stream was braided, covering a total width of approximately 60m, with the main flowing channel being 1 – 2m wide in the riffles and up to 5m wide in the glides. While only one channel was flowing when sampled in November, another two would commence to flow with a slight rise in water level. The substrate was alluvium, mainly sand and cobble with occasional bedrock. The channel sides were steep, often rising 2m from the stream bed. Depth in the glides in November was generally <0.5m but reached 1m in places. In riffles it was often a smear over the rocks and reached 15cm.

Vegetation covered the full width of the braided channel and consisted of Belah with some *Leptospermum* and tea tree over *Gahnia* and grasses with *Juncus* and *Cyperus* near the water's edge. Several dead standing eucalypts were observed. Beyond the channel itself the vegetation on the right bank was cleared for cattle grazing. The left bank was more intact except for the odd paddock and a new fence line that had been cleared for a width of approximately 15m to the top bank of the channel. In stream vegetation was limited to a few *Triglochin* in the glides, a small patch of water cress in a riffle and occasional strands of *Ludwidgia*. The water was clear despite unfettered access by cattle and a graded track through the creek. When sampled in April the site was not flowing and consisted of shallow pools with significantly greater cattle pugging.

Site 9: Accommodation Creek on Sundown Rd

Site 9: Accommodation Creek on Sundown Rd

Site 10: Bald Rock Creek on Anderson Road.

This site is accessed through the Sirromet property and the upstream end is marked by a causeway that accesses Day's Rd. This causeway has no culvert or pipe. Day's Road runs approximately 10m from the right bank for the length of the site. In between the vegetation was mainly wattle and eucalypts with a grassy understorey. The left bank was maintained as a grassy verge with a few mature eucalypts. An unsealed farm road then separated the verge from the grape vines. The grass abutting the water was long and trailed. Giant reed was common on both banks. A few strands of *Ludwidgia* were observed along with small areas of *Persicaria*. The substrate was gravel / coarse sand with occasional bedrock boulders. The site is a weir pool up to 15m wide and several hundred metres long. When sampled, it rarely exceeded 1m in depth. Twigs and leaves were common on the bottom but large wood was rare. By April the water level had dropped such that the width was generally <8m. Local fishers have captured cod in this pool and historically, though not recently, River Blackfish.

Site 10: Bald Rock Creek on Anderson Road.

F.3.2 Field Survey Methods (Ecology Management 2007)

Assessments at each site included:

- aquatic habitat;
- water quality;
- aquatic plants;
- macroinvertebrates; and
- fish.

The methodology for each is described below.

Aquatic Habitat

Aquatic habitat was assessed using "State of the Rivers" (SOR) survey protocols and field sheets (Anderson 1993), particularly sheets 4, 5, 9 and 10. These were supplemented by detailed notes entered on field data sheets. Photographs were taken of all sites in upstream and downstream directions and to capture significant features.

Water Quality

Spot water quality data were collected at each site using a YSI 611 multi-parameter datalogger fitted with sensors to record depth, temperature, pH, dissolved oxygen, conductivity and turbidity. Standard laboratory calibration was undertaken prior to surveys and field calibration was undertaken several times during the surveys. It was not possible to keep the time of sample collection the same. The probe was deployed in the deepest water and spot measurements were made at 0.5 m depth intervals, if possible. In shallow water the probe was walked out to a central position. Care was taken to minimise disturbance to the substrate prior to sampling though some disturbance was unavoidable.

The datalogger was also deployed at selected sites to record overnight water quality. The logger was set to record each parameter at 15-minute intervals. The datalogger was suspended from a log / tree within the river or located along the edge. The sensors sat at approximately 25cm depth. Overnight deployment as opposed to 24hr deployment means that the daytime peaks in temperature or other parameters are generally not recorded while night-time minima are.

Results presented in tables in this report are overnight ranges from logged data unless a time is noted in which case this refers to the time of day at which surface spot data were collected.

Aquatic Plants

Aquatic plants were initially assessed using State of the Rivers methodology, in particular Sheet 9. This assessment covers submerged, floating and emergent vegetation separately and describes each in terms of total cover and percentage of exotic and native species. At many sites, substrates could not be thoroughly assessed due to the highly tannin stained nature of the water. Combined with the latter point, as the region shows a limited submerged macrophyte community, the assessments were reduced to descriptions of visible components. Identifications were based on Stephens and Dowling (2002) and Sainty and Jacobs (1994)

Macroinvertebrates

The sampling approach aimed to clearly separate the available habitats. Five surber samples were collected from the edge at deep sites and from shallow habitat at riffle or glide sites where the edge was often an undercut. AusRivAS dip net sampling methods were not preferred because it is qualitative and unreplicated.

Dip net samples were also collected independently from macrophytes, tree root or undercut habitats when present. When habitat was abundant, dip net sampling was restricted to approximately 20 seconds. When habitat was limited

the full area may be sampled in less than 20 seconds. No benthic samples were collected from deep water because the uneven and mainly rocky substrate does not suit any known sampling apparatus.

All samples were wholly preserved in isopropyl alcohol and returned to the laboratory for sorting. Macroinvertebrates were sorted by staff in the EM/Hydrobiology laboratory. The subsampling technique of Wrona *et al* (1982) was employed for larger samples. The fauna from sorted samples was identified and counted by staff of Applied Freshwater Science. Identification was to the level used by DNR in AusRivAS, meaning family for insects except Chironomidae which was taken to sub-family and higher levels for other groups such as micro-crustacea, oligochaetes, molluscs, nematodes and acarina.

Fish

Fish were sampled using equipment and methods to accord with those used in the northern Murray Darling region by David Moffat (DNRW pers. comm. 2000). Additional gear included a back pack electrofisher. Fishing gear included:

- Four 2 m drop x 15 m gill nets, each comprised of 3 x 5 m panels (one each of 3, 4 and 5 inch nylon monofilament mesh randomly arranged within the net), with floating head-line and sinking foot-line.
- Two 19mm and 25mm gill nets were also used in March 2007
- 10 x collapsible baitfish traps each baited with cat biscuits.
- Backpack electrofisher

Fyke and seine nets could not be used because of the substrate was often uneven boulders in shallow areas or the water was too deep in pools.

The method of fishing is described below:

- gear was set over a length of river of approximately 100 m.
- gear was set to fish as independently as possible (that is, one net did not channel fish into another).
- gill nets were generally set oblique to the river bank.
- bait fish traps were set from the bank and adjacent to cover (vegetation, snags etc) when present.

All gear was set to fish overnight, a soak time of between 14 and 18 hrs. All gill nets were set at least 15 m apart, up to a maximum distance of 25 m. The exception to this was in small pools where nets had to be separated by a smaller distance or fewer nets were placed due to restricted space. Small shallow pools (< 0.5m depth) were not sampled with gill nets. These areas were often most effectively sampled with the electrofisher and bait traps.

All fish caught were counted, measured (fork length) and wounds, lesions and deformities were recorded if present. Native fish were released alive wherever possible. Introduced fish were euthenased. Identifications were based on Allen (1989), McDowall (1996) and Allen, Midgely and Allen (2002). Where identification was difficult in the field, one or two specimens were retained for identification in the laboratory.

Any fish, prawns or crayfish caught in the bait traps were identified and the number of each species was recorded. Catches from each trap were recorded separately.

The electrofisher used was a Smith Root LR24 model backpack electrofisher with a net sewn into the anode pole. The voltage, frequency and waveform settings used on the electrofisher were adjusted to achieve the best response from the fish and crustaceans at the time of sampling, but were typically set to standard pulse waveform of 30Hz frequency at 600 volts.

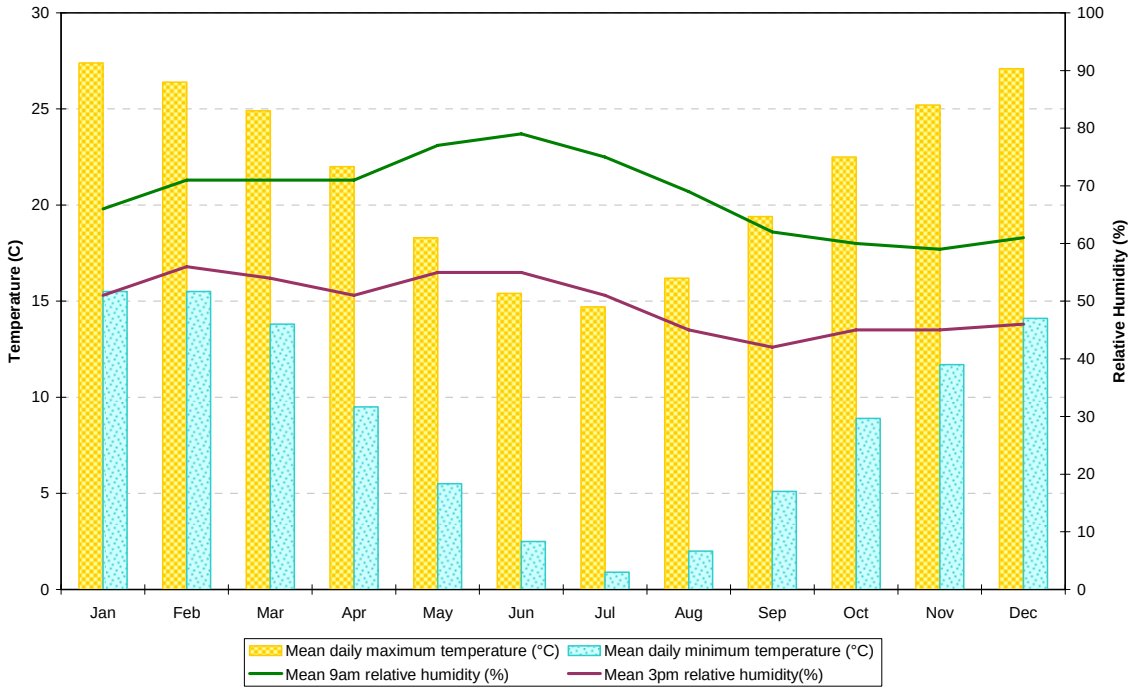
Ten replicate passes were made through the range of habitats over a timed duration (50 sec each).

Fishing was conducted under General Fisheries Permit number 55850.

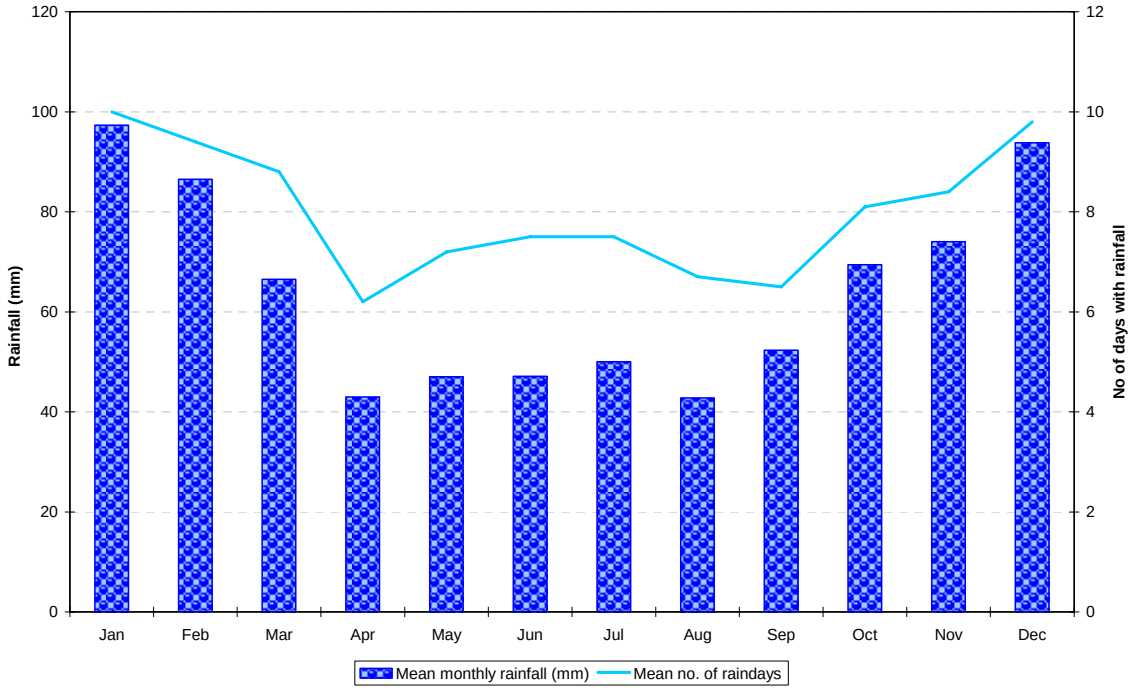
F.4 Air Quality and Greenhouse Gases

F.4.1 Graphs of Climatic Data

- **Figure F.11.1-1 Mean daily temperature and relative humidity recorded at Stanthorpe (BoM)**

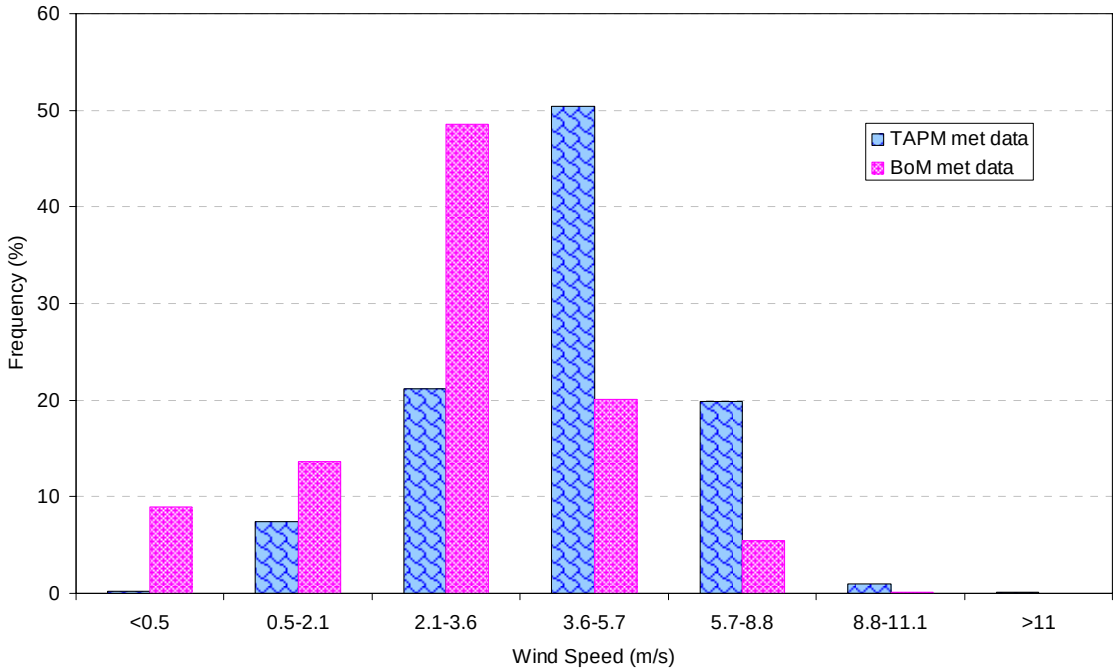


- **Figure F.11.1-2 Monthly rainfall and number of rain days recorded at Stanthorpe (BoM)**

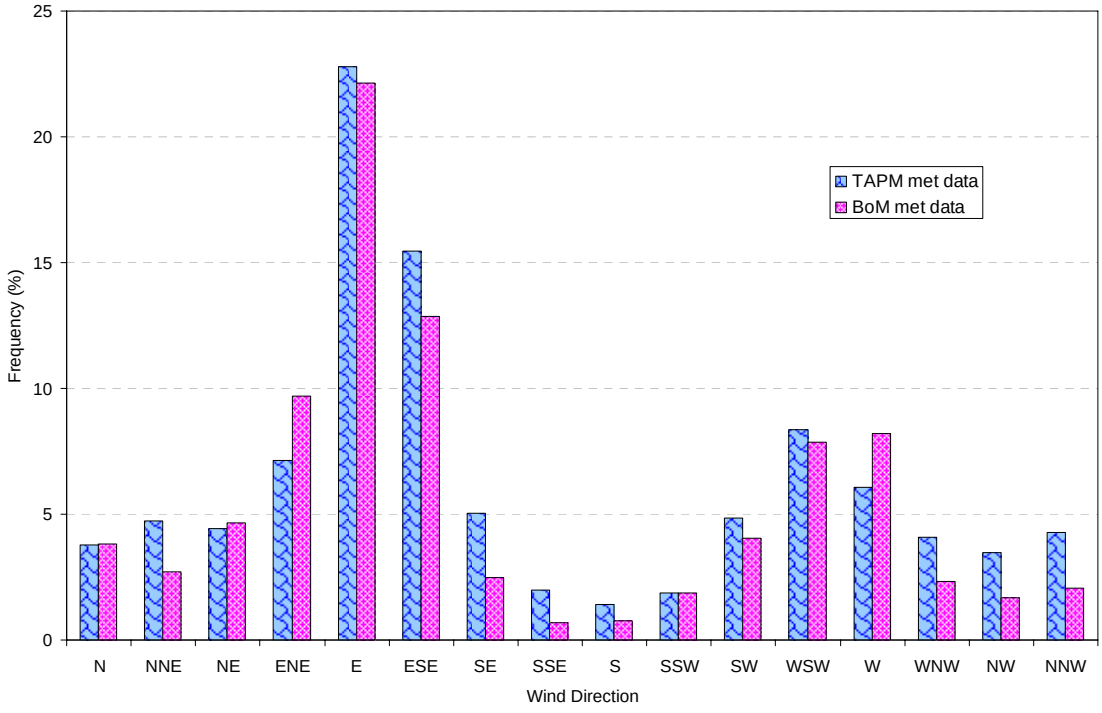


F.4.2 Comparison of TAPM and BoM meteorological data

- **Figure F.11.2-1 Frequency of wind speed for TAPM and BoM meteorological data**



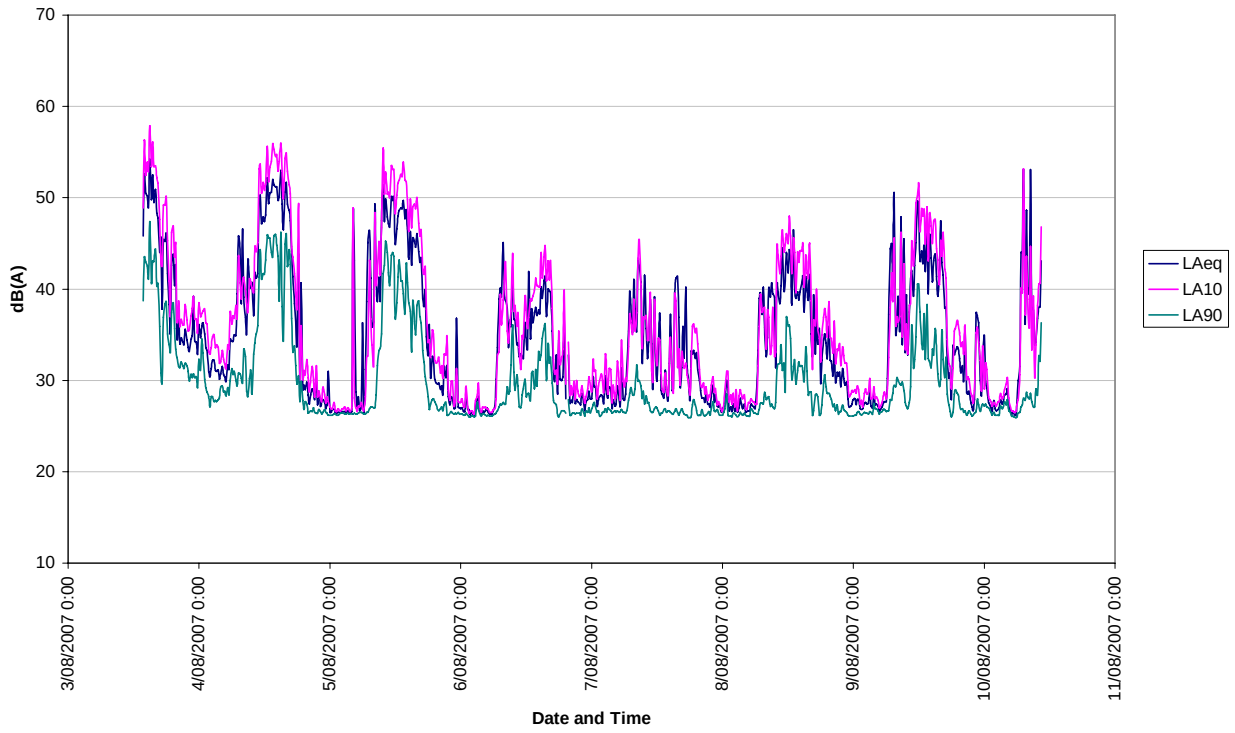
- **Figure F.11.2-2 Frequency of wind speed for TAPM and BoM meteorological data**



F.5 Noise and Vibration

F.5.1 Ambient Noise Monitoring Results

- **Figure F.12.1-1 Noise Monitoring Results for 376 Fletcher Road**



- **Figure F.12.1-2 Noise Monitoring Results for 147 Emu Swamp Rd**

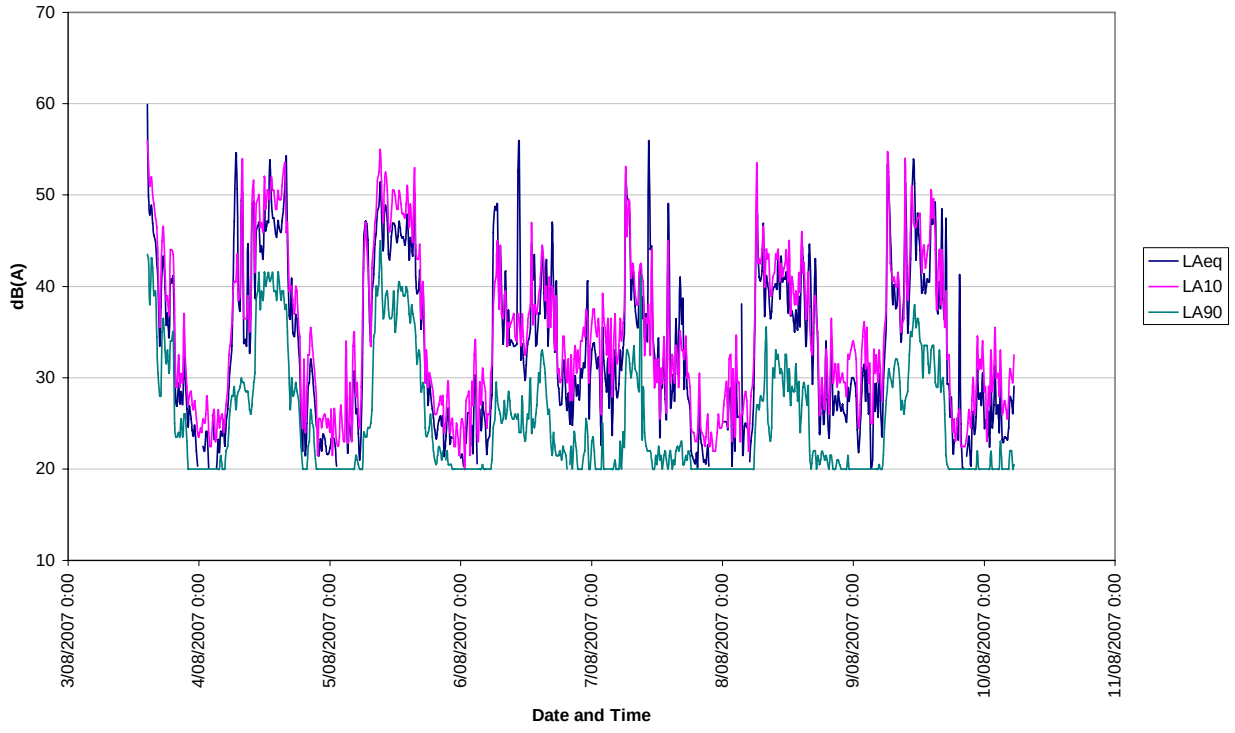
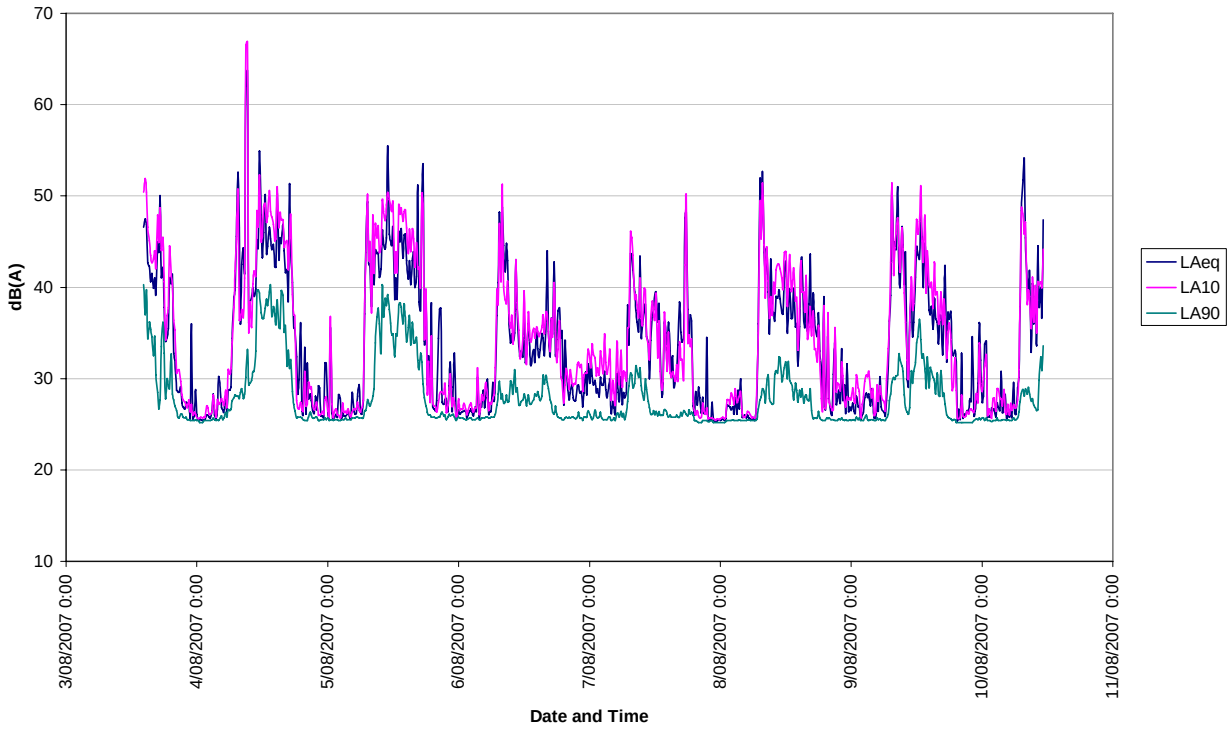


Figure F.12.1-3 Noise Monitoring Results for 246 Emu Swamp Rd



F.6 Transport and Infrastructure

F.6.1 Construction Generated Traffic Summary

Road	Section	Construction Scenario	Vehicle Type	veh/day																																																													
				Month 1				Month 2				Month 3				Month 4				Month 5				Month 6				Month 7				Month 8				Month 9				Month 10				Month 11				Month 12				Month 13				Month 14				Month 15				Month 16			
				W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16	W17	W18	W19	W20	W21	W22	W23	W24	W25	W26	W27	W28	W29	W30	W31	W32	W33	W34	W35	W36	W37	W38	W39	W40	W41	W42	W43	W44	W45	W46	W47	W48	W49	W50	W51	W52	W53	W54	W55	W56	W57	W58	W59	W60	W61	W62	W63	W64
New England Highway	North of Amiens Road (North)	Urban dam and pipeline	Light	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Heavy	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	20	20	20	20	0	0	0	0	0	0	0	0
		Urban and irrigation dam and pipeline	Light	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Heavy	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
	Between Amiens Road (North) and Ellwood Road	Urban dam and pipeline	Light	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Heavy	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	20	20	20	20	0	0	0	0	0	0	0	0
		Urban and irrigation dam and pipeline	Light	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Heavy	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	22	22	22	22	22	22	22	22
	Between Ellwood Road and Aerodrome Road	Urban dam and pipeline	Light	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Heavy	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	20	20	20	20	0	0	0	0	0	0	0	0
		Urban and irrigation dam and pipeline	Light	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Heavy	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
	Between Aerodrome Road and Stanthorpe - Texas Road	Urban dam and pipeline	Light	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Heavy	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	0	0	0	0	0	0	0	0
		Urban and irrigation dam and pipeline	Light	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Heavy	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
	Between Stanthorpe - Texas Road and Back Creek Road	Urban dam and pipeline	Light	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	334	334	334	334	334	334	334	334	334	334	334	334	334	334	334	334	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	0	0	0	0	0	0	0	0
			Heavy	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	0	0	0	0	0	0	0	0
		Urban and irrigation dam and pipeline	Light	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	334	334	334	334	334	334	334	334	334	334	334	334	334	334	334	334	334	334	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190
			Heavy	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
	Between Back Creek Road and Fletcher Road	Urban dam and pipeline	Light	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	334	334	334	334	334	334	334	334	334	334	334	334	334	334	334	334	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	0	0	0	0	0	0	0	0
			Heavy	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	0	0	0	0	0	0	0	0
		Urban and irrigation dam and pipeline	Light	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	334	334	334	334	334	334	334	334	334	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190
			Heavy	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	30	30	30	30	30	30	30	30	30	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
Fletcher Road	Between New England Highway and the construction site	Urban dam and pipeline	Light	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	334	334	334	334	334	334	334	334	334	334	334	334	334	334	334	334	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	0	0	0	0	0	0	0	0
			Heavy	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	0	0	0	0	0	0	0	0
		Urban and irrigation dam and pipeline	Light	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	334	334	334	334	334	334	334	334	334	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190
			Heavy	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	30	30	30	30	30	30	30	30	30	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
Back Creek Road	Between New England Highway and the construction site	Urban dam and pipeline	Light	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	0	0	0	0	0	0	0	0	0	0	0	0
			Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	0	0	0	0	0	0	0	0	0	0	0	0
		Urban and irrigation dam and pipeline	Light	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	144	144	144	144	144	144	144	144	144	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	8	8	8	8	8	8	8	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aerodrome Road	Between New England Highway and the construction site	Urban dam and pipeline	Light	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Urban and irrigation dam and pipeline	Light	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	144	144	144	144	144	144	144	144	144	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	8	8	8	8	8	8	8	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ellwood Road, Church Road, Goodwill Road (South of	Between New England Highway and the construction site	Urban dam and pipeline	Light	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Urban and irrigation dam and pipeline	Light	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	44	44	44	44	44	44	44	44	44	0	0	0	0	0	0	0	0
			Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amiens Road (North), Goodwill Road (North of the	Between New England Highway and the construction site	Urban dam and pipeline	Light	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Urban and irrigation dam and pipeline	Light	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0
			Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	8	8	8	8	8	8	8	8	0	0	0	0	0	0	0	0
Stanthorpe - Texas Road	Between New England Highway and Amiens Road (South)	Urban dam and pipeline	Light	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Urban and irrigation dam and pipeline	Light	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	144	144	144	144	144	144	144	144
			Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	8	8	8	8	8	8	8
Amiens Road (South), Cannon Creek Road	Between Stanthorpe - Texas Road and the construction site	Urban dam and pipeline	Light	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Urban and irrigation dam and pipeline	Light	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	144	144	144	144	144	144	144	144
			Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	8	8	8	8	8	8	8

F.6.2 SIDRA Analysis

SIDRA INTERSECTION

Movement Summary

New England Highway/Fletcher Road

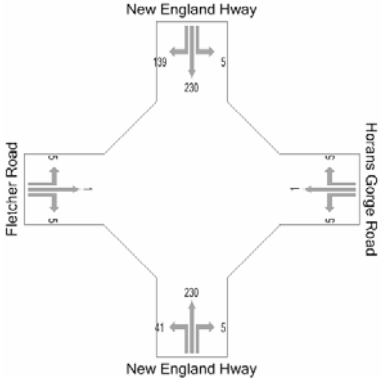
AM Peak (with the construction flows)

Two-way stop

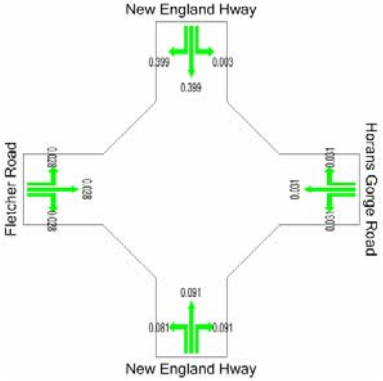
Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
New England Hway South Approach										
1	L	43	4.7	0.081	12.8	LOS B	0	0.00	0.75	63.3
2	T	242	14.0	0.091	2.3	LOS A	11	0.36	0.00	87.8
3	R	5	16.7	0.091	16.8	LOS C	11	0.63	0.79	56.8
Approach		**291**	**12.7**	**0.091**	**4.1**	**LOS A**	**11**	**0.32**	**0.13**	**83.3**
Horans Gorge Road										
4	L	5	16.7	0.031	17.8	LOS C	1	0.55	0.79	48.3
5	T	1	50.0	0.031	16.8	LOS C	1	0.55	1.00	41.9
6	R	5	16.7	0.031	17.6	LOS C	1	0.55	0.85	48.5
Approach		**14**	**21.4**	**0.031**	**17.6**	**LOS C**	**1**	**0.55**	**0.85**	**47.6**
New England Hway North Approach										
7	L	5	16.7	0.003	12.8	LOS B	0	0.00	0.75	63.3
8	T	242	14.0	0.399	6.7	LOS A	48	0.75	0.00	77.8
9	R	146	6.1	0.399	19.6	LOS C	48	0.75	0.94	52.9
Approach		**395**	**11.1**	**0.399**	**11.6**	**LOS B**	**48**	**0.74**	**0.36**	**67.7**
Fletcher Road										
10	L	5	16.7	0.028	17.0	LOS C	1	0.53	0.79	49.1
11	T	1	50.0	0.028	15.9	LOS C	1	0.53	1.00	42.6
12	R	5	16.7	0.028	16.7	LOS C	1	0.53	0.83	49.2
Approach		**14**	**21.4**	**0.028**	**16.7**	**LOS C**	**1**	**0.53**	**0.84**	**48.3**
All Vehicles		**714**	**12.2**	**0.399**	**8.8**	**Not Applicable**	**48**	**0.56**	**0.29**	**72.2**

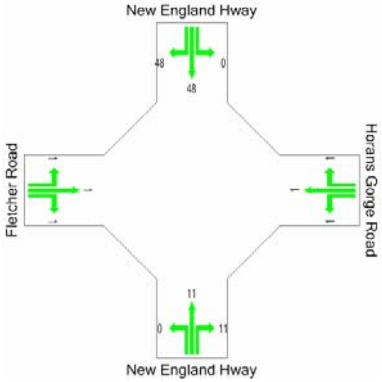
Input Volumes



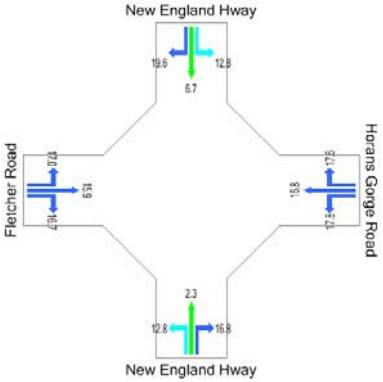
Degree of Saturation



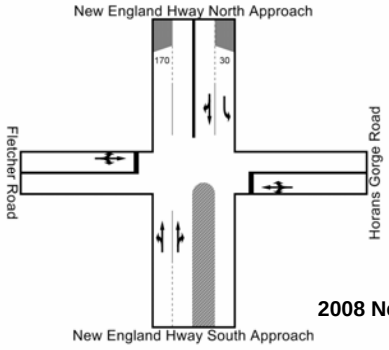
Queue Distance (m)



Control Delay



Geometry



2008 New England Highway /Fletcher Road
AM Peak (With Construction Flows)
Emu Swamp Dam EIS

SIDRA INTERSECTION

Movement Summary

New England Highway/Fletcher Road

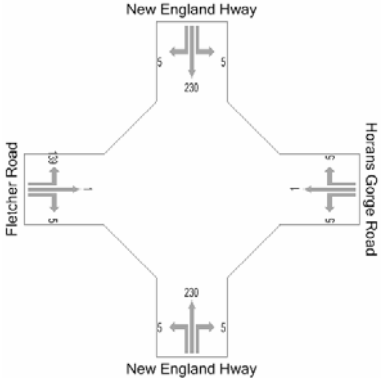
PM Peak (with construction flows)

Two-way stop

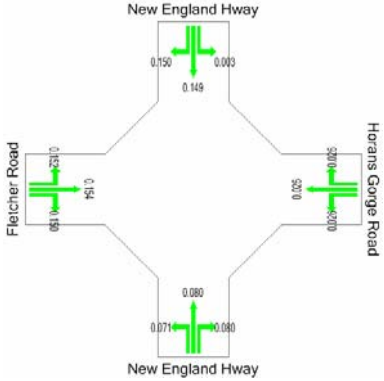
Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
New England Hway South Approach										
1	L	5	16.7	0.071	12.8	LOS B	0	0.00	0.75	63.3
2	T	242	14.0	0.080	1.9	LOS A	10	0.31	0.00	89.4
3	R	5	16.7	0.080	16.7	LOS C	10	0.62	0.79	56.9
Approach		**254**	**14.2**	**0.080**	**2.5**	**LOS A**	**10**	**0.31**	**0.04**	**87.9**
Horans Gorge Road										
4	L	5	16.7	0.026	16.3	LOS C	1	0.51	0.80	49.6
5	T	1	50.0	0.026	15.3	LOS C	1	0.51	0.96	43.1
6	R	5	16.7	0.026	16.1	LOS C	1	0.51	0.86	49.7
Approach		**14**	**21.4**	**0.026**	**16.1**	**LOS C**	**1**	**0.51**	**0.85**	**48.8**
New England Hway North Approach										
7	L	5	16.7	0.003	12.8	LOS B	0	0.00	0.75	63.3
8	T	242	14.0	0.149	5.7	LOS A	22	0.75	0.00	77.7
9	R	5	16.7	0.150	18.6	LOS C	22	0.75	0.87	54.2
Approach		**254**	**14.2**	**0.149**	**6.2**	**LOS A**	**22**	**0.73**	**0.04**	**76.8**
Fletcher Road										
10	L	146	6.1	0.152	13.4	LOS B	6	0.39	0.88	52.1
11	T	1	50.0	0.154	12.3	LOS B	6	0.39	1.00	45.6
12	R	5	16.7	0.150	13.1	LOS B	6	0.39	0.95	52.3
Approach		**155**	**7.1**	**0.152**	**13.4**	**LOS B**	**6**	**0.39**	**0.88**	**52.0**
All Vehicles		**677**	**12.7**	**0.154**	**6.7**	**Not Applicable**	**22**	**0.49**	**0.25**	**71.7**

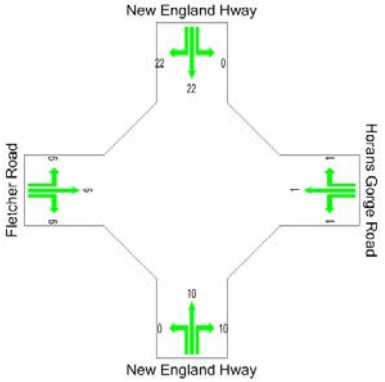
Input Flows



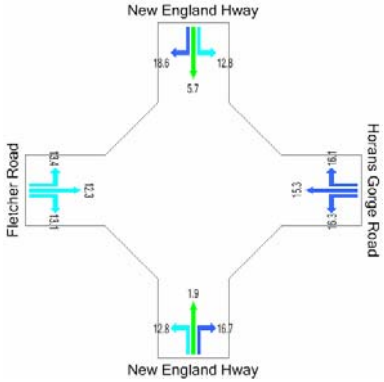
Degree of Saturation



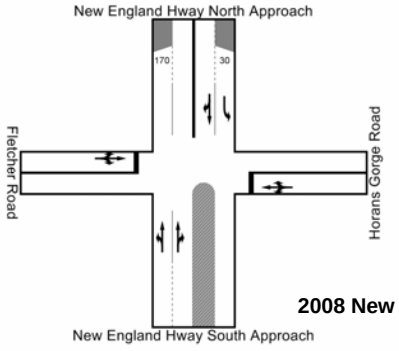
Queue Distance (m)



Control Delay



Geometry



2008 New England Highway /Fletcher Road
PM Peak (With Construction)
Emu Swamp Dam EIS

SIDRA INTERSECTION

Movement Summary

New England Highway/Fletcher Road

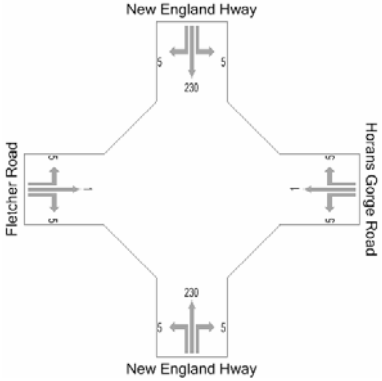
AM Peak (Without Construction)

Two-way stop

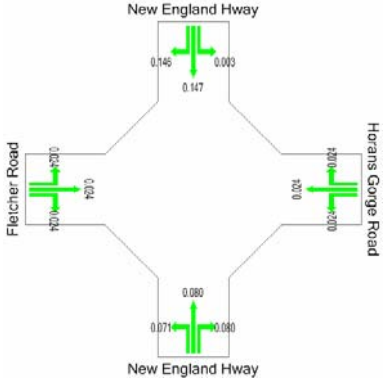
Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
New England Hway South Approach										
1	L	5	16.7	0.071	12.8	LOS B	0	0.00	0.75	63.3
2	T	242	14.0	0.080	1.9	LOS A	10	0.31	0.00	89.4
3	R	5	16.7	0.080	16.7	LOS C	10	0.62	0.79	56.9
Approach		**254**	**14.2**	**0.080**	**2.5**	**LOS A**	**10**	**0.31**	**0.04**	**87.9**
Horans Gorge Road										
4	L	5	16.7	0.024	15.8	LOS C	1	0.50	0.80	50.0
5	T	1	50.0	0.024	14.8	LOS B	1	0.50	0.96	43.5
6	R	5	16.7	0.024	15.6	LOS C	1	0.50	0.84	50.2
Approach		**14**	**21.4**	**0.024**	**15.5**	**LOS C**	**1**	**0.50**	**0.84**	**49.2**
New England Hway North Approach										
7	L	5	16.7	0.003	12.8	LOS B	0	0.00	0.75	63.3
8	T	242	14.0	0.147	4.2	LOS A	20	0.67	0.00	79.5
9	R	5	16.7	0.146	17.1	LOS C	20	0.67	0.82	56.3
Approach		**254**	**14.2**	**0.147**	**4.7**	**LOS A**	**20**	**0.66**	**0.04**	**78.6**
Fletcher Road										
10	L	5	16.7	0.024	15.8	LOS C	1	0.49	0.80	50.0
11	T	1	50.0	0.024	14.8	LOS B	1	0.49	0.96	43.5
12	R	5	16.7	0.024	15.5	LOS C	1	0.49	0.84	50.2
Approach		**14**	**21.4**	**0.024**	**15.5**	**LOS C**	**1**	**0.49**	**0.84**	**49.3**
All Vehicles		**536**	**14.6**	**0.147**	**4.3**	**Not Applicable**	**20**	**0.48**	**0.08**	**80.2**

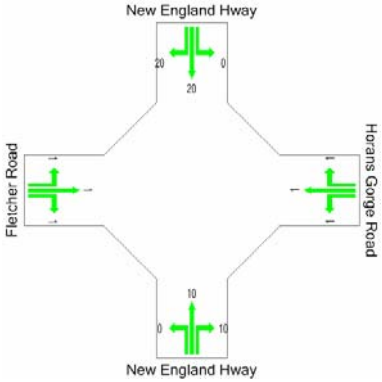
Input Volumes



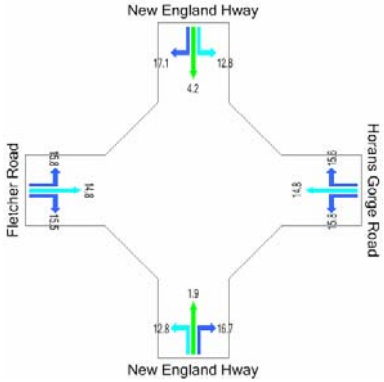
Degree of Saturation



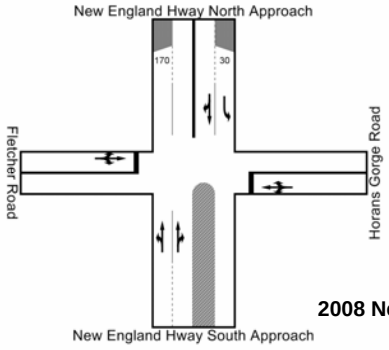
Queue Distance (m)



Control Delay



Geometry



2008 New England Highway /Fletcher Road
AM Peak (Without Construction)
Emu Swamp Dam EIS

SIDRA INTERSECTION

Movement Summary

New England Highway/Fletcher Road

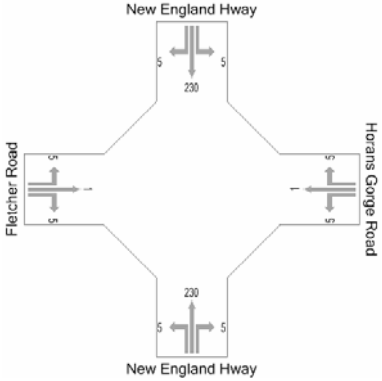
PM Peak (Without Construction)

Two-way stop

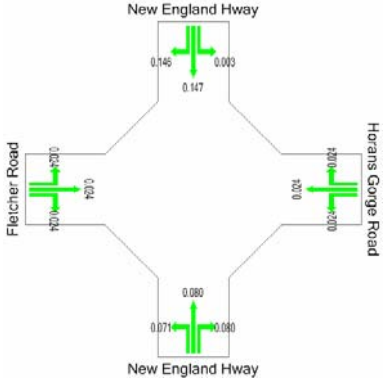
Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
New England Hway South Approach										
1	L	5	16.7	0.071	12.8	LOS B	0	0.00	0.75	63.3
2	T	242	14.0	0.080	1.9	LOS A	10	0.31	0.00	89.4
3	R	5	16.7	0.080	16.7	LOS C	10	0.62	0.79	56.9
Approach		**254**	**14.2**	**0.080**	**2.5**	**LOS A**	**10**	**0.31**	**0.04**	**87.9**
Horans Gorge Road										
4	L	5	16.7	0.024	15.8	LOS C	1	0.50	0.80	50.0
5	T	1	50.0	0.024	14.8	LOS B	1	0.50	0.96	43.5
6	R	5	16.7	0.024	15.6	LOS C	1	0.50	0.84	50.2
Approach		**14**	**21.4**	**0.024**	**15.5**	**LOS C**	**1**	**0.50**	**0.84**	**49.2**
New England Hway North Approach										
7	L	5	16.7	0.003	12.8	LOS B	0	0.00	0.75	63.3
8	T	242	14.0	0.147	4.2	LOS A	20	0.67	0.00	79.5
9	R	5	16.7	0.146	17.1	LOS C	20	0.67	0.82	56.3
Approach		**254**	**14.2**	**0.147**	**4.7**	**LOS A**	**20**	**0.66**	**0.04**	**78.6**
Fletcher Road										
10	L	5	16.7	0.024	15.8	LOS C	1	0.49	0.80	50.0
11	T	1	50.0	0.024	14.8	LOS B	1	0.49	0.96	43.5
12	R	5	16.7	0.024	15.5	LOS C	1	0.49	0.84	50.2
Approach		**14**	**21.4**	**0.024**	**15.5**	**LOS C**	**1**	**0.49**	**0.84**	**49.3**
All Vehicles		**536**	**14.6**	**0.147**	**4.3**	**Not Applicable**	**20**	**0.48**	**0.08**	**80.2**

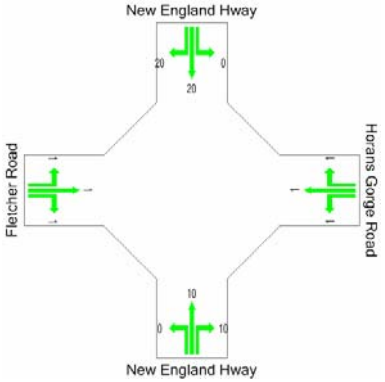
Input Flows



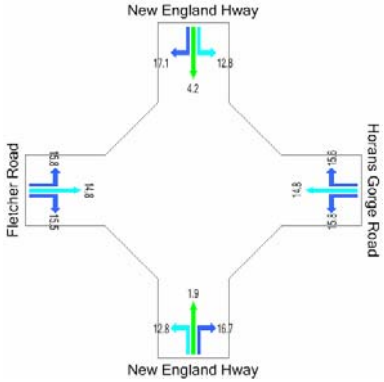
Degree of Saturation



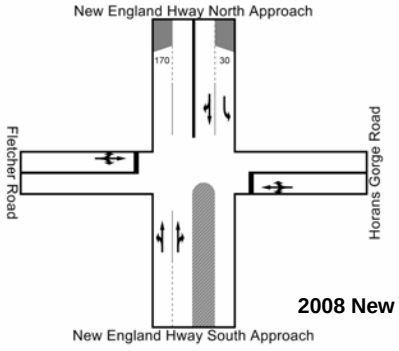
Queue Distance (m)



Control Delay



Geometry



2008 New England Highway /Fletcher Road
PM Peak (Without Construction)
Emu Swamp Dam EIS

Appendix G Proponent Commitments

General

1.1 The Proponent will undertake the design of the dam and the development of operational arrangements in accordance with the *Water Resource (Border Rivers) Plan 2003*.

1.2 The Proponent will continue to implement programs to reduce water use in Stanthorpe Shire including:

- implementation of the Leakage Management Program;
- demand reduction in accordance with the Stanthorpe Shire Council Drought Management Plan; and
- support to programs for installation of rainwater tanks and efficient plumbing devices.

1.3 Obtain all necessary approvals for the Project as outlined in Appendix B of the EIS.

1.4 The Proponent will construct Emu Swamp Dam in accordance with the Environmental Management System developed for the Project.

Section 4 - Topography, Geology, Soils and Geomorphology

4.1 Rehabilitation of the site following construction will be undertaken using soils capable of supporting vegetation communities suitable to the local environment. The disturbed land will be rehabilitated to a condition that is self – sustaining or to a condition where the maintenance needs are consistent with the post construction land use

4.2 A topsoil management plan will be developed for the clay borrow area to assist with re-establishment of the area.

4.3 Erosion and sediment control plans will be developed and implemented as part of construction EMPs for any vegetation clearing and/or soil disturbance as part of the construction activities

4.4 The Engineering Guidelines for Queensland for Soil Erosion and Sediment Control (IEAust 1996) will be applied.

4.5 The final quarry excavation will be shaped with a maximum slope of 06H:1V to eliminate unsafe surfaces.

Section 5 – Land Use

6.1 Construction activities and the sourcing of most materials for the dam wall conducted within properties acquired for the dam.

6.2 The Proponent will remove all site infrastructure including landscaping, to ensure the site is compatible in the long term with the surrounding land uses following completion of construction works.

6.3 Maintain access to properties affected by the construction of the pipeline through temporary alternative arrangements.

Section 6 – Land Contamination

5.1 Prepare an Environmental Management Plan contain procedures for the correct disposal of any potentially contaminated soil.

5.1 In the event of a large spill, site will be investigated managed and remediated in accordance with the requirements of the *Environment Protection Act 1994* and the draft guidelines from the EPA

5.3 Standard procedures for the storage, handling, disposal and spill response for potentially hazardous waste materials will follow the Emergency Management Plan.

5.4 Chemical storage will comply with Australian Standards and Material Safety Data Sheets (MSDS) requirements. MSDS for products kept on site will be readily available to employees and contractors.

Section 7 – Surface Water Resources and Water Quality

7.1 Construct a gauging station upstream of the proposed dam before construction commences.

7.2 Construct and operate the dam in accordance with the final *Border Rivers Resource Operations Plan,* to satisfy both the Environmental Flow Objectives (EFOs) and Water Allocation Security Objectives (WASOs).

7.3 Design and construct all proposed drainage structures associated with the dam including those necessary for supporting facilities such as access roads to the appropriate design standards. All designs will incorporate an appropriate level of flood immunity, minimisation of impacts to upstream landholders and mitigation of the impacts of velocity and scour.

7.4 Design and Construct the RCC Wall and spillway in accordance with the standards set out in the Australian National Committee on Large Dams (ANCOLD) guidelines.

7.5 Construct temporary water storages in construction area and treat and reuse of construction water onsite to reduce the impact on other regional water sources.

7.6 Develop and implement site specific water quality guidelines in a construction EMP

7.7 Develop and implement erosion and sediment control plans to protect the water quality in the dam and downstream of any construction areas.

7.8 Oil containment booms and oil spill recovery equipment will be available. Emergency response plans will be developed to manage any incidents

7.9 During construction undertake a routine water quality monitoring program (every second month program with four (4) event based occasions per year) upstream and downstream of the construction works, measuring a range of physico-chemical parameters and bacterial analysis as appropriate.

7.10 Fixed site water quality loggers will be installed at the outlet pipe which is connected to the Urban Pipeline. The approach would involve the installation of telemetry capability for real-time monitoring to ensure that water sourced by the Mt Marlay Water Treatment Plant is of a satisfactory quality.

7.11 Undertake a routine (quarterly) water quality monitoring program in the dam for the first 3 years of operation for the following parameters

7.12 Develop and implement a baseline monitoring programs for pesticide and herbicide use in drinking water catchments. Monitoring should be implemented in order to ensure that there are no cumulative effects caused by the dam. If exceedance values, listed in the ANZECC guidelines, are reached then targeted monitoring upstream should be conducted in order to locate the source

7.13 Controlled burning/slashing and removal of the grass vegetation to ensure water quality in the lake is maintained the Proponent will.

Section 8 – Groundwater

8.1 Ongoing groundwater monitoring will be undertaken in the immediate vicinity of the dam wall as part of any geotechnical requirements for the Project.

Section 9 – Terrestrial Ecology

9.1 Develop and implement a suitable vegetation management offset strategy to meet the regulatory requirements of Queensland's Policy for Vegetation Management Offsets (DNRW 2007). The VMOs should consider the establishment (or restoration) of habitat connectivity in fragmented vegetation on the impoundment margins.

9.2 Establish and maintain a buffer area of approximately 200m surrounding the Emu Swamp Dam, revegetating cleared area to link remnant patches and maintain ecological connectivity.

9.3 During detailed design phase of Stalling Lane Access, survey the area and identify the key floristic and ecological constraints and design the road to avoid these, where possible.

9.4 Develop and implement specific Species Management Plans for individual EVR flora species affected by the Project.

9.5 Develop and implement specific Species Management Plans for individual fauna species of conservation significance affected by the Project.

9.6 Where individual species can be avoided and retained, then suitable buffers should be erected around each species or population to avoid incidental damage by factors such as machinery movement, soil dumping, windrowed vegetation, and by potential sediment/erosion events.

9.7 Develop and implement a Construction management Plan and confine construction impacts to the predefined impact areas.

9.8 Areas to be cleared will be clearly marked by tape, pegs and other means and will conform to the limits on design drawings.

9.9 Ensure fauna spotter/catchers are present during clearing operations.

9.10 Develop and implement a specific Weed Management Plan (WMP) for areas within the buffer area surrounding the dam, the Stalling Lane Access and Urban and Irrigation Pipeline routes. The WMP will be completed in accordance with the *Land Protection (Pest and Stock Route) Management Act 2002*.

9.11 Develop an Animal Pest Species Management Plan in accordance with SSC's *Pest Management Plan 2005 – 2009*.

9.12 Ensure the exclusion of cattle and control of feral predators around dam edges.

9.13 Monitor downstream of the proposed dam and at suitable reference sites (yet to be identified) to detect any residual impacts that changes in hydrological regime may have on significant species. Particularly relevant are the impacts that any changes to hydrological regime may have on populations of *Melaleuca williamsii*, *M. flavovirens*, and the regionally significant *M*. sp. (Severn River) downstream from the dam wall.

Section 10 – Aquatic Ecology

10.1 Undertake further monitoring of the present distribution and abundance of those endemic species that are currently impacted and develop a management plan to repopulate areas of remaining suitable habitat. Detailed design of the dam will allow for retrofitting of a fish transfer device if monitoring indicates that a fish transfer device would be beneficial for the endemic dish species.

10.2 Undertake further monitoring to determine the distribution and abundance of Bell's Turtle to determine the need for further investment in infrastructure which permits free movement of turtles upstream and downstream of the dam.

10.3 During construction, ensure temporary pondages, including sediment traps or areas of uneven ground, are drained frequently to prevent mosquitoes breeding

10.4 The potential to engineer more appropriate environmental flows for the Severn River downstream of the dam while maintaining compliance with the Water Resource (Border Rivers) Plan 2006 will be investigated.

Section 11 – Air Quality and Greenhouse

11.1 The risk of impacting on local air quality will be managed as set out in the EMPs

11.2 Dust deposition monitoring will be carried out in the vicinity of sensitive receptors adjacent to the construction site throughout the duration of construction.

11.3 Any dust complaint will be actively investigated expeditiously and the complainant will be consulted on the outcomes and proposed future actions.

11.4 The Proponent will review annual energy use during operation of the dam to assist with ongoing management of energy efficiency.

Section 12 – Noise and Vibration

12.1 The ambient noise goal of 55 dB(A) in the Environmental Protection (Noise) Policy 1997.has been adopted for daytime (6am to 6pm) and evening (6pm to 10pm) periods. For construction works at night between 10pm and 6am, an ambient noise goal of 52 dB(A) has been adopted to minimise the potential for sleep disturbance impacts.

12.2 A Noise and Vibration Environmental Management Plan will be developed to minimise the noise levels emitted from the construction site.

12.3 Environmental noise compliance monitoring will be conducted on at the nearest sensitive receivers

- at the commencement of construction activities;
- in response to a noise complaint; and
- where a review of upcoming construction schedule indicates a high likelihood for impact.

12.4 As part of the Construction Communication Program a system of complaint reporting, investigation and response will be initiated allowing the local community the opportunity to provide feedback on noise and other environmental issues.

Section 13 – Transport and Infrastructure

13.1 Develop a Traffic Management Plan to manage the safety and performance of motorists and during construction. This plan will be developed in consultation with the relevant authorities and local community stakeholders.

13.2 Operate a bus service for the construction work force between the construction site and Stanthorpe to reduce construction traffic.

13.3 As part of the Construction Communication Program a system of complaint reporting, investigation and response will be initiated allowing the local community the opportunity to provide feedback on traffic and safety issues.

13.4 Use established truck routes and arterial roads for the haulage of construction materials in order to minimise truck traffic on local roads. Construction materials will not be brought to site at night to minimise amenity impacts.

13.5 Any roads damaged by haul trucks during construction will be repaired post-construction.

13.6 Infrastructure to be relocated within existing infrastructure corridors, such as road reserves so that disturbance to land and vegetation is minimised.

13.7 All infrastructure works will be carried out under an Environmental Management Plan to be drafted by relevant authority that will address issues such as vegetation management, erosion control, noise and other relevant potential impacts.

Section 14 – Hazard Safety and Risk

14.1 During construction the Proponent will implement safety standards and occupational health standards that provide a basis for effective management of employee and public health and safety.

14.2 The Proponent will provide first aid and emergency rescue facilities and equipment during all phases of the Project. The Proponent will ensure that appropriately trained personnel will be on site throughout the life of the project to provide first aid and respond to on-site emergencies as required.

14.3 MSDS information will be obtained and communicated to all site personnel involved in the storage, handling, use and disposal of hazardous substances and materials.

14.4 The Proponent will liaise with local State Emergency Services and local paramedic and hospital services with respect to planning for Emergency response.

14.5 The Proponent will complete a Failure Impact Assessment Study according to ANCOLD guidelines.

14.6 Safety management systems will be developed for all operations in line with current guidelines as published by ANCOLD.

14.7 Emergency planning will be implemented in line with Queensland and Australian Emergency Planning Guidelines Codes of Practice.

14.8 Emergency Plan detailing each potential hazardous scenario on the site, including evacuation plans and emergency response will be documented prior to dam commissioning.

14.9 An updated Operations and Maintenance manual will be prepared for the dam.

Section 15 – Waste Management

15.1 The Proponent will develop a waste management plan for the site which will include monitoring and auditing.

15.2 The amount of wastes generated will be reduced where possible.

15.3 Wastes (other than natural earth, soil or rocks) will be collected in suitable skips or bins.

15.4 Reusing or recycling waste at an appropriate facility will be done where feasible.

15.5 Wastes will be disposed at an appropriate licensed landfill.

15.6 A licensed waste contractor will be used to transport wastes off site.

15.7 Any hazardous materials used on site will be recorded in a Hazardous Materials Register.

15.8 A waste management procedure will be developed, incorporating an approved waste tracking system for those wastes requiring tracking.

Section 16 – Socio Economic

16.1 During the approvals and construction phase of the Project the Proponent will continue ongoing communication with the local community and stakeholders regarding such things as the Project approval process, timelines, key Project milestones, regular construction updates, advice on blasting, transport issues and the results of EMP monitoring .

16.2 The Proponent will provide a complaints response system including promotion and provision of phone contact with construction management staff during hours of construction, and a follow up procedure which notifies complainants within 24 hours of the intended response to the issue raised.

Section 17 – Cultural Heritage

17.1 The Proponent will prepare a Cultural Heritage Management Plan (CHMP) and meet the duty of care standards set by the *Aboriginal Cultural Heritage Act 2003.*

17.2 The Proponent will continue to engage with endorsed Aboriginal parties to develop the CHMP in order to manage the Aboriginal cultural heritage of the area in a culturally appropriate fashion in the context of the proposed development.

17.3 In order to minimise the risk of accidental damage to Aboriginal cultural heritage features the Proponent will incorporate cultural heritage awareness into worker induction programs.

17.4 Undertake a systematic assessment of the Severn River Mining Precinct to ensure that the type and extent of any surviving archaeological material is researched, investigated, recorded and mitigated (if required).

17.5 Develop a Heritage Management Plan (HMP) for the entire Project area outlining a suitable strategy to protect sites and place of cultural heritage significance (completed prior to the construction phase of the Project commencing).

Section 18 – Visual Amenity

18.1 Manage of night lighting to ensure lights are focussed on the affected construction areas and to limit extraneous light where necessary.

18.2 Protect and native vegetation within the construction area with particular emphasis on conserving vegetation downstream of the dam wall to act as a visual screen.

Appendix H Data Disclosure

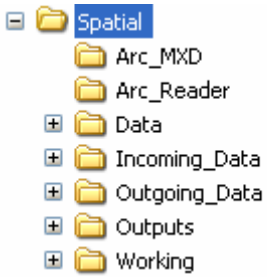
Spatial Data Management Process

File and data Structure

This document sets out guidelines for all Spatial Data Management Projects, to ensure consistency and a standard file format and data structure between projects. All folder and filenames will use the _ as a space character.

Folder Structure:

The root Spatial folder is to contain the following folders (see example below). This standard folder structure can be found on *Z:\Templates\Spatial Data Management* – with example folders and file names (to be deleted on project commencement).

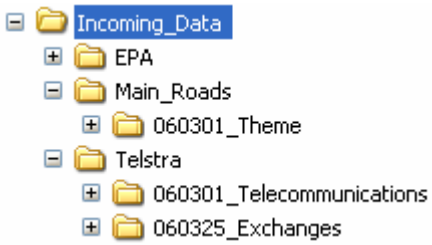


Arc MXD will contain all ArcGIS map documents (Naming conventions to follow)

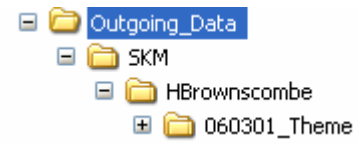
Arc Reader will contain all ArcGIS published documents.

Data folder is the main data repository, where all project relevant spatial data is to be held. This folder will contain numerous sub-folders, each named by the theme of data they contain (i.e. Cadastre, Regional Ecosystems, Roads etc. See example below). Only the most current and complete dataset is to reside in this folder.

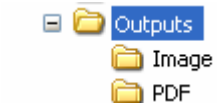
Incoming Data is where all received data is to be stored ***in its original format***. Incoming data is to be filed by Custodian (i.e. Telstra, Main Roads, Energex), then within a folder named with date received and data theme (i.e. 060302_Telecommunications). There may, for some custodians, be several sub folders for different themed data, received on different dates. See example on next page. Relevant emails with data custodian details etc. are to be copied into the Incoming Data folder for reference.



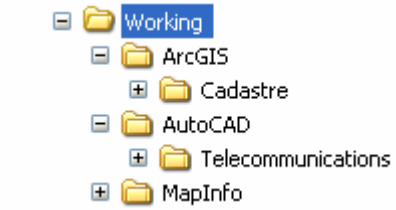
Outgoing Data is to follow the same format as the Incoming Data folder. The Outgoing folder will contain a sub-folder with the organisation (i.e. Main Roads, SKM (for internal)), then the person (i.e. HBrownscombe) that is receiving the data, and then a folder name with the date distributed and data theme (i.e. 060302_BoreLocations). This folder will then contain a copy of the outgoing data/zip file, and a copy of the email sent out.



Outputs will contain all outputs produced from GIS software. The folder is to contain two sub folders, PDF (for all adobe files) and Image (for all JPEG, TIFF or similar files). This folder is to only contain the most current and up-to-date PDF/JPEG. All superseded files are to be placed in the relevant superseded folder.

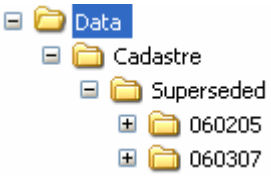


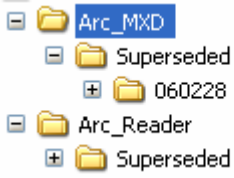
Working is where all data manipulation is to be carried out. This folder will contain sub-folders for each software product, in which the data is to be stored in its relevant theme. The final product (most current) is then to be transferred to the relevant **Data** folder. This folder is to be purged regularly of working data in order to reduce the folder size and file numbers.

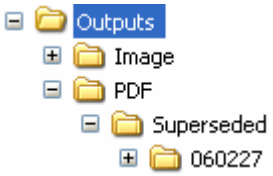


Superseded Data:

Superseded data is to be stored on the project drive, within the relevant data folder. A Superseded folder is to be created, and the data contained within a sub-folder named with the date the data was superseded. The same process applies for all Arc MXD, Arc Reader and Outputs folders (as shown below).







File Name Convention:

File name convention is again to be standard across all data management projects, and the naming convention for the files in each of the folders is as follows.

Arc MXD – All ArcGIS MXD's are to be named as to the theme of data they contain, preceded by the creation date (i.e. 060302_RegionalEcosystems.mxd, 060508_Cadastral_Aerial.mxd).

Arc Reader – The Arc Reader published document is to have the same file name as the relevant MXD from which it was created (i.e. 060302_RegionalEcosystems.pmf, 060508_Cadastral_Aerial.pmf).

Data – All data files are to be named by the theme of the data, suffixed by the datum/projection of the data. Names are to be short and simple, but indicative of the theme of the data. (i.e. Cadastre_MGA56, Cadastre_GDA94_LL, Cadastre_PMD).

Incoming Data – The incoming data is to be stored in the original file format/name as received.

Outgoing Data – Outgoing data should be in the format of a zip file. The file should be named with the distribution date, the name of the receiver, and the dataset name (i.e. 060302_HBrownscombe_RegionalEcosystems.zip)

Outputs – All PDF and JPEGs should be named with the same name as the MXD from which it was created.

Working – As this is a working folder the file name convention is not as strict. File names however should preferably be indicative of the data/process performed to aide any future persons who may have to investigate/revisit the data.

Superseded Data- The data/outputs data will retain the same file name as it was originally created with, the data will be stored (as outlined above) in a folder named with the date the data was superseded.

General Data Management Guidelines:

- Pathing for Arc MXD's should always be relative to ensure easy data retrieval from archive
- All correspondence is to be placed on the project drive (from Outlook) at the close of the project. As mention above, data supply emails should be copied into the relevant Incoming Data folder.
- Local Projection file/s to be stored on the project drive, and copied to the Spatial Z Drive
- Underscore (_) is to be used in all folder and file naming as a character representation for a space.
- Metadata Guidelines to be addressed in a separate document.
- For all data, MXD's, PMF's, and PDF's, only the most current and complete version is to reside in the root directory, to ensure no ambiguity as to the version currently in use.