



**Queensland  
Government**

**The Coordinator-General**

**TRAVESTON CROSSING DAM PROJECT  
STAGE 1  
Mary River, Queensland**

**TERMS OF REFERENCE  
FOR AN  
ENVIRONMENTAL IMPACT STATEMENT**

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

**The Coordinator-General**

**August 2007**

## PREAMBLE

### Project Background

Queensland Water Infrastructure Pty Ltd (QWI) is proposing the development of Traveston Crossing Dam, part of a suite of proposed new bulk water supply infrastructure to meet expected additional water demands of the South East Queensland (SEQ) region.

The Traveston Crossing Dam site is located on the Mary River in SEQ at approximately adopted middle thread distance (AMTD) 207.6 kilometres (km) which is approximately 27 km upstream of Gympie. It is recognised that the detailed description of the Project may change during the Environmental Impact Statement (EIS) process, due to consideration of concept and detailed design, and assessment of environmental impacts and mitigation measures, including social impacts. The current Project description is detailed below, but may need to be refined during the EIS.

The dam has a proposed Full Supply Level (FSL) of EL 71.0 m Australian Height Datum (AHD) for Stage 1 and EL 79.5 metres (m) AHD for Stage 2. At these FSL's, the dam will provide storage capacities of approximately 153,700 megalitres (ML) and 570,000 ML respectively. At FSL the inundation area will cover approximately 3,000 hectares (ha) in Stage 1 and increase to approximately 7,135ha in Stage 2. The main channel of the Mary River will be inundated for a length of approximately 36.5 km at Stage 1 and 50.7 km at Stage 2. The Traveston Crossing Dam is considered suitable for a Roller Compacted Concrete (RCC) Dam with a wall height of approximately 59 m. A fishway structure will be incorporated into the dam design.

The Proponent proposes to construct the dam in two stages, with the first stage to be complete by 2011. The second stage, should it be determined as needed in the future, may be complete by 2035. The EIS will be conducted for Stage 1 only. Consideration of Stage 2 will be subject to a separate approvals process.

Modifications to the following infrastructure are also included under the scope of “the Project”:

- sections of the Bruce Highway, Gympie-Brooloo Road, Kenilworth-Skyring Creek Road and many roads joining these in the Project area (the length of the Bruce Highway impacted by Stage 1 is approximately 4.5 km. The length of new road required to replace it (beyond Stage 2 inundation) will be approximately 11.94 km;
- local government infrastructure; and
- power transmission/distribution<sup>1</sup> infrastructure.

The proposed dam inundation area is situated within three local government areas: Noosa, Maroochy and Cooloola Shires. The majority of the inundation area, including the dam wall and the majority of the aforementioned infrastructure, is situated in the Cooloola Shire, other than the most eastern extent, which is in the Noosa Shire and the north-eastern corner which is in the Maroochy Shire.

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<sup>1</sup> Energex (2.01)

Operational activities will include periodic maintenance of the dam structure, associated infrastructure and ongoing monitoring along with flow management strategies that ensure compliance with the Mary Basin Water Resource Plan (WRP).

On 18 September 2006, QWI lodged an Initial Advice Statement with the Coordinator-General for the Traveston Crossing Dam Project – Stage 1. Information made available to the public by the Proponent in late October 2006, and to the Commonwealth in mid-November 2006, was based on more refined information as the design progressed. An addendum has been included with the IAS to identify such information.

## Project Proponent

QWI is the proponent for the proposed Traveston Crossing Dam. QWI was established by the Queensland Government in July 2006 as the entity responsible for developing specific new water infrastructure, including Traveston Crossing Dam on the Mary River and the proposed Wyaralong Dam on Teviot Brook, SEQ.

The name and address of the proponent is:

Queensland Water Infrastructure Pty Ltd (ABN: 18119634427)  
Level 8, 119 Charlotte St  
Brisbane Queensland 4000  
(PO Box 15940 City East 4002)  
Telephone: (07) 3406 7100  
Facsimile: (07)34067292  
Web page: [www.qldwi.com.au](http://www.qldwi.com.au)

## Administrative Procedures for these Terms of Reference

The Traveston Crossing Dam Project - Stage 1 (involving the construction and operation of a new dam on the Mary River at approximately 207 km AMTD, to an expected full supply level of 71 m AHD, in the Cooloola, Maroochy and Noosa Local Government areas) was declared to be a 'significant project' by the Coordinator-General (CG) pursuant to Section 26(1)(a) of the *State Development and Public Works Organisation Act* (SDPWO Act) on 20 October 2006, which requires QWI to prepare an EIS under the provisions of this Act.

On 29 November 2006, the Federal Minister for the Department of the Environment and Water Resources (DEW) decided that the Project constitutes a 'controlled action' under the *Environment Protection and Biodiversity Conservation Act 1999 (Cth)* (EPBC Act) due to the likely potential impacts on matters of national environmental significance. The controlling provisions under the EPBC Act are:

- Sections 12 and 15A (World Heritage);
- Sections 16 and 17B<sup>2</sup> (Ramsar Wetlands);
- Sections 18 and 18A (Listed threatened species and communities);
- Sections 20 and 20A (Listed Migratory Species).

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<sup>2</sup> DEW (17.01)

The Australian Government has accredited the EIS process to be conducted under the SDPWO Act under the Bilateral Agreement between the Australian and Queensland Governments. The Project will require approval from the Federal Minister under Part 9 of the EPBC Act before it can proceed.

The term EIS refers to the assessment processes of the Australian and Queensland Governments and these Terms of Reference (ToR) should be interpreted as satisfying the requirements of all relevant Commonwealth and State statutes for this Project.

The Coordinator-General (CG) will coordinate the impact assessment process for this Project.

Representatives of Federal, State and Local Government and other relevant authorities have been invited to act as advisory agencies for the EIS process and have been invited to comment on the draft ToR, along with interested members of the public.

In finalising the ToR, the CG will have regard to all comments received about the draft ToR. The final ToR will then be provided to QWI.

QWI will prepare a draft EIS to address the ToR. Once the EIS has been prepared to the satisfaction of the CG, a public notice is advertised in relevant newspapers circulating in the district, the State and nationally. 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. QWI will be required to prepare a Supplementary Report to the EIS to address specific matters raised in submissions on the EIS.

At the completion of the EIS, the CG will prepare a report evaluating the EIS and other related material, pursuant to s 35 of SDPWO Act.

The CG's Report will be publicly notified and a copy provided to the Federal Minister to enable his assessment under Part 9 of the EPBC Act to commence.

For any development approvals required under the IPA the CG's Report may state for the assessment manager one or more of the following:

- 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 Report must state for the assessment manager –

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

### **Results of Consultation on these Terms of Reference**

The draft Environmental Impact Statement (EIS) Terms of Reference (ToR) for the Project was made available for public and agency review on 9 December 2006.

Advertisements were placed in the *Weekend Australian*, *Courier-Mail*, *Gympie Times* and *Sunshine Coast Daily* on Saturday 9 December 2006, the *Koori Mail* on Wednesday 20<sup>th</sup> December 2006, as well as *The Mary Valley Voice* on Wednesday 31<sup>st</sup> January 2007. These advertisements invited public comment on the draft ToR for the Project. A similar notice was placed on the Department of Infrastructure's internet site, along with an electronic version of the draft ToR.

Hard copies of the ToR were also available for viewing from the following locations: Kandanga One Stop Shop; Cooloola Shire Council; Imbil Library; Gympie Library; Noosa Shire Council Chambers; Noosa Shire Council Library; Maroochy Shire Council (Nambour Customer Service Centre); Coolool Beach Library; Nambour Library; Maroochy Library; Maroochy Shire Council (Mobile Library); and Sunshine Coast State Development Centre.

The period for receipt of submissions for comments on the EIS draft ToR closed on 19 February 2007. A total of 262 submissions on the draft ToR were received, comprising of thirty (30) from Organisation and Community groups, two hundred and thirteen (213) from members of the public, and eighteen (18) from Advisory Agencies. Copies of the submissions were forwarded to the proponent, Queensland Water Infrastructure Pty Ltd (QWI). Additionally, QWI made a formal submission on the draft ToR.

The content of all submissions has been reviewed and considered by the Coordinator-General in finalising the ToR for the EIS for the Project. **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:

No.	Date	Advisory Agency	Abbrev
1	13/12/06	Department of Housing	DH
2	8/01/07	ENERGEX Limited	ENER
3	8/12/06	Department of Education, Training and the Arts	DETA
4	18/01/07	Noosa Shire Council	Noosa SC
5	12/01/07	Department of Main Roads	DMR
6	22/01/07	Maroochy Shire Council	Maroochy SC
7	22/01/07	Cooloola Shire Council	Cooloola SC
8	19/01/07	Department of Tourism, Fair Trading and Wine Industry Development	TFTWID
9	23/01/07	Department of Communities	DoC
10	22/01/07	Department of Employment and Industrial Relations	DEIR
11	22/01/07	Environment Protection Agency	EPA
12	18/01/07	Queensland Transport	QT
13	22/01/07	Department of Primary Industries and Fisheries	PIF
14	12/01/07	Department of Emergency Services	DES
15	22/01/07	Department of Natural Resources and Water	NRW
16		Department of State Development	DSD
17	25/01/07 17/05/07	Department of Environment and Water Resources	DEW
18	12/03/07	Queensland Health	QH
19		Department of Infrastructure #	DoI

Note: # - The Department of Infrastructure did not provide a formal written submission but identified issues for the CG to have regard to in finalising the ToR.

The thirty Organisations that lodged submissions on the Draft Terms of Reference are listed below, however the names of the individuals who lodged a submission have not been provided.

A total of 213 submissions were received from individuals on the Draft Terms of Reference. A total of 173 issues were identified in the submissions from Organisations and Individuals. Amendments to the draft ToR, which have arisen from recommendations made in submissions from organisations and individuals, are referenced in this document as footnotes, specific to the issue raised.

<b>Date</b>	<b>Organisation</b>
19/02/07	Australian Conservation Foundation
19/02/07	Burnett Mary Regional Group
16/02/07	Community Futures Taskforce
	Engineers Heritage Australia – Queensland
2/01/07	Fraser Island Defenders Organisation
	Griffith University
16/02/07	Gympie & District Landcare Group Inc
19/02/07	Gympie District Beef Liaison Group Inc
15/02/07	IUCN Asia Regional Protected Areas Programme
12/02/07	Kenilworth Catholic Community
	Macquarie University
16/02/07	Mary River Catchment Coordination Association Inc
11/02/07	Mary River Riparian Landholders Group
14/02/07	Noosa Parks Association Inc
19/02/07	North Brisbane Branch Queensland Greens Inc
16/02/07	Queensland Water Infrastructure Pty Ltd
18/02/07	Save the Mary River Coordinating Group
	Save the Mary River Coordinating Group
15/02/07	Save the Valleys/Conondale Range Committee
18/02/07	Sisters of Mary
16/02/07	Sunshine Coast Environment Council
13/02/07	The Conondale Range Committee
12/02/07	The wildlife Preservation Society of Queensland
16/02/07	Tiaro & District Landcare Group Inc
19/02/07	Traditional Owner Working Group
19/02/07	Traveston Residents Association
16/02/07	Widebay Burnett Conservation Council Inc
23/02/07	Queensland Farmers' Federation
19/02/07	Tiaro & District Chamber of Commerce
26/02/07	Queensland Dairyfarmers' Organisation

This ToR is presented in two broad categories:

- Part A – Information and advice on the preparation of the EIS.
- Part B – Specific requirements – Content of the EIS.

The Coordinator-General's contact details for any further enquiries will be:

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## ABBREVIATIONS

The following abbreviations have been used in this document:

AHD	Australian Height Datum
ACH Act	<i>Aboriginal Cultural Heritage Act 2003</i>
AMTD	Adopted Middle Thread Distance <sup>3</sup>
BPA	Biodiversity Planning Assessment
CAMBA	China-Australia Migratory Bird Agreement
CHIMS	Cultural Heritage Investigation and Management Strategy
CHMP	Cultural Heritage Management Plan
CLR	Contaminated Land Register
CG	The Coordinator General of the State of Queensland
DEW	Commonwealth Department of the Environment and Water Resources (formerly Department of Environment and Heritage)
DMR	Department of Main Roads
DNRW	Department of Natural Resources and Water
DPIF	Department of Primary Industries and Fisheries
DSDT	Department of State Development and Trade
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EMR	Environmental Management Register
EP Act	<i>Environmental Protection Act 1994 (Qld)</i>
EPA	Environmental Protection Agency
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Cth)</i>
EPP Air	<i>Environmental Protection (Air) Policy 1997</i>
EPP Noise	<i>Environmental Protection (Noise) Policy 1997</i>
EPP Waste	<i>Environmental Protection (Waste Management) Policy 2000</i>
EPP Water	<i>Environmental Protection (Water) Policy 1997</i>
EPR Waste	<i>Environmental Protection (Waste Management) Regulation 2000</i>
ERA	Environmentally Relevant Activity
ESD	Ecologically Sustainable Development
FSL	Full Supply Level
GQAL	Good Quality Agricultural Land
HAT	Highest Astronomical Tide
IAS	Initial Advice Statement
IDAS	Integrated Development Assessment System
ILUA	Indigenous Land Use Agreement

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<sup>3</sup> EPA (11.01)

IPA	<i>Integrated Planning Act 1997 (Qld)</i>
JAMBA	Japan-Australia Migratory Bird Agreement
NCA	<i>Nature Conservation Act 1992</i>
NEPM	<i>National Environment Protection (Assessment of Site Contamination) Measure 1999<sup>4</sup></i>
PHA	Preliminary Hazard Assessment
QH	Queensland Herbarium
QH Act	<i>Queensland Heritage Act 1992</i>
QHC	Queensland Heritage Council
QWI	Queensland Water Infrastructure Pty Ltd
RE	Regional Ecosystem
REDD	Regional Ecosystem Description Database
SEQ	Southeast Queensland
SDPWO Act	<i>State Development and Public Works Organisation Act 1971(Qld)</i>
ToR	Terms of Reference
VMA	<i>Vegetation Management Act 1999</i>
WRP	Water Resource Plan

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<sup>4</sup> Dol (19.17)

## Part A: INFORMATION AND ADVICE ON PREPARATION OF THE EIS

### 1. Introduction

These ToR is for an EIS for the Traveston Crossing Dam Project – Stage 1. The ToR has been prepared in accordance with the requirements of Sections 29 and 30 of the SDPWO Act.

The objective of the ToR is to identify those matters that should be addressed in the EIS for the Project described in the IAS which was declared to be a significant project by the CG and notified in the Queensland Government Gazette No.69 of 3 November 2006.

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 arrangements 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 separable document that can be made available to the public.

### 2. EIS Objectives

The objective of the EIS is to ensure that all potential environmental<sup>5</sup>, social and economic impacts of the Project are identified and assessed and, where possible, how adverse impacts would be avoided. Direct, indirect and cumulative impacts must be fully examined and addressed to the extent reasonably practicable. The Project, including selection of the site, should be based on sound environmental protection and management criteria.

The EIS should be a self-contained and comprehensive document that provides sufficient information for an informed decision on the potential impacts of the Project and the management measures employed to mitigate residual impacts. The EIS documentation should provide:

- For interested persons and bodies: a basis for understanding the Project, prudent and feasible alternatives, affected environmental values, impacts that may occur and measures to be taken to mitigate adverse impacts.
- For groups or persons with rights or interests in the land: an outline of the effects of the Project on that land including access arrangements.
- For government agencies: a framework for decision-makers to assess the environmental aspects of the Project with respect to legislative and policy provisions and based on that

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Definition of ‘**environment**’ includes--

- (a) ecosystems and their constituent parts, including people and communities; and
- (b) all natural and physical resources; and
- (c) the qualities and characteristics of locations, places and areas, however large or small, that contribute to their biological diversity and integrity, intrinsic or attributed scientific value or interest, amenity, harmony and sense of community; and
- (d) the social, economic, aesthetic and cultural conditions that affect, or are affected by, things mentioned in paragraphs (a) to (c).

*(State Development and Public Works Organisation Act 1971)*

<sup>5</sup> DoC (9.01)

information to make an informed decision on whether the Project should proceed or not and if so, on what conditions, if any.

- For the Federal Minister for the Environment and Heritage: information to determine the extent of potential impacts of the Project on matters of national environmental significance, in particular the controlling provisions under the EPBC Act:
  - Sections 12 and 15A (World Heritage);
  - Sections 16 and 17B (Ramsar Wetlands);
  - Sections 18 and 18A (Listed threatened species and communities);
  - Sections 20 and 20A (Listed Migratory Species).
- For the proponent: a mechanism by which the potential environmental impacts of the Project are identified and understood. Information to support the development of management measures including an Environmental Management Plan, to mitigate the adverse effects of residual environmental impacts of the development.

Completion of the EIS does not mean that the Project will necessarily be approved.

### **3. General EIS Guidelines**

The EIS is to provide stakeholders with sufficient information to understand the type and nature of the Project, the potential environmental, social and economic impacts and the measures proposed by the proponent to mitigate all adverse residual impacts on the natural, built and social environment. It should be recognised that Federal, State and Local Governments, special interest groups and the general public will have an interest in the EIS.

All phases of the Project should be described in the EIS including pre-construction, construction and operation, decommissioning of redundant infrastructure, and rehabilitation of disturbed lands. The practicality of decommissioning of the Dam should be addressed at a strategic level to provide an understanding of potential impacts and possible mitigation measures associated with this possible future phase. Direct, indirect and cumulative impacts should be identified and assessed with respect to the environmental values of the Project area. Cumulative impacts include impacts accumulating over time and impacts exacerbated by intensity or scale or frequency or duration both at the site and remote to the site.

Specifically, the EIS should provide:

- An executive summary of the potential environmental impacts of the Project.
- An overview of the proponent and its existing operations.
- Definitions of any technical terms that may not be familiar to the general reader.<sup>6</sup>
- A description of the proposal's objectives and rationale, as well as its relationship to strategic policies and plans.
- A description of the entire Project, including associated infrastructure requirements.
- A description of feasible alternatives capable of substantially meeting the proposal's objectives.
- An outline of the various approvals required for the Project to proceed.

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<sup>6</sup> Dol (19.12)

- Descriptions of the existing environment, particularly where this is relevant to the assessment of impacts.
- Measures for mitigating impacts (avoiding, minimising, and managing) and monitoring any<sup>7</sup> residual impacts.
- Rigorous assessment of the residual risks of environmental impacts arising from the Project and relevant alternatives on environmental, social and economic values, relative to the ‘no project’ scenario. The extent of baseline and predictive studies should be commensurate to risks. Assessments should address direct and indirect, combined, short and long term, beneficial and adverse impacts, as well as cumulative impacts in combination with other known activities. An estimation of the reliability of predictions should also be provided.
- Consideration should be given to undertaking baseline and predictive studies to address all controlling provisions triggered by the proposal.
- A description of stakeholder consultation undertaken.
- Responses to issues raised during public and stakeholder consultation.

The main report needs to be supported by appendices containing relevant data, technical reports and other sources of the EIS analysis. The EIS will therefore consist of the main report together with appendices.

In preparing the EIS, the approach to be adopted requires that:

- Predictions of environmental impacts are based on scientifically supported studies.
- The EIS is to present all technical data, sources of authority and other information used to assess impacts.
- The methods used to undertake the specialist studies are outlined, together with the relevant assumptions and professional or scientific judgments.
- The scientific reliability of investigations and predictions is indicated, including the estimated degree of certainty or if possible, statistical confidence wherever appropriate.
- Proposed measures to mitigate and manage identified issues are described.
- Residual impacts that are not quantifiable are described qualitatively, in as much detail as reasonably practicable.

The assessment of all environmental impacts needs to encompass both potential impacts on and uncertain risks to the environment. The level of investigation of potential impacts or particular risks needs to be proportionate to both the severity of the potential consequences of possible events and the likelihood of those events occurring.

Specific types of relevant impacts requiring investigation are set out in Part B. However, the EIS will need to address other issues or aspects that may emerge during the investigations and preparation of the EIS. Ultimately, it is QWI’s responsibility to ensure that adequate studies are undertaken and reported.

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<sup>7</sup> EPA (11.02)

## 4. Stakeholder Consultation

The proponent should undertake a comprehensive and inclusive program of consultation with government agencies and key stakeholders, including Traditional Owners and other<sup>8</sup> interested parties. The consultation program should provide stakeholders with the opportunity to obtain information about the Project being examined by this EIS, to raise issues and express their concerns and to receive feedback on how the proponent intends to address the issues and mitigate all adverse impacts of the Project. Consultation with the advisory agencies should be the principal forum for identifying legislation, policies, regulations and guidelines relevant to the Project and EIS process.

Appropriate communication processes, possibly including information bulletins and discussion papers, should be used to disseminate information about the Project to a wider audience and to inform stakeholders of the proponent's progress in the EIS process, in particular on specific issues.

The proponent is encouraged to provide opportunities for the general public to obtain information about, and comment on, the Project through such forums as road shows or public information sessions.

As part of this EIS process consultation will also be undertaken to better understand the social impacts of the proposed Project and opportunities for mitigation of those impacts (refer Section 3.11).

<sup>9</sup>The Community Futures Taskforce and its work are independent of the EIS process. However, elements of the Task Force work program and related stakeholder consultation will be used by the proponent, QWI, to inform the EIS.

For further information on the Community Futures Taskforce, please refer to: [www.communityfutures.qld.gov.au](http://www.communityfutures.qld.gov.au)

The EIS will need to consider relevant issues and outcomes of the Community Futures Taskforce process, including identified mitigation strategies.

## 5. General EIS format

The EIS should explain how the EIS responds to the ToR.

The EIS documentation is to include appendices containing:

- A copy of the final ToR.
- A list of persons, interest groups and agencies consulted during the EIS.
- A list of advisory agencies consulted with an appropriate contact.
- The names of, and work done by, all personnel involved in the preparation of the EIS.

Maps, diagrams and other illustrative material should be included in the EIS to assist in the interpretation of the information.

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<sup>8</sup> DoC (9.04)

<sup>9</sup> PS (13, 96, 104)



The proponent should consider including a separate chapter/section in the EIS in which the controlling provisions of the *EPBC Act* are addressed in one place. This could be achieved by copying relevant information from the body of the EIS and with it constructing a stand-alone section addressing matters of relevance under the *EPBC Act*.

All technical reports (e.g. sub-consultant reports) undertaken for the purposes of the EIS should be made available to the reviewing Agencies and the public if requested (except where confidentiality provisions may apply).<sup>10</sup>

The EIS should be produced on A4 size paper capable of being photocopied, with maps and diagrams on A4 or A3 size. The EIS document should not contain watermarks across the body of the text. The EIS should also be provided on CD-ROM/DVD.

Two separate CD-ROM/DVD copies should be provided:

1. CD-ROM/DVD copies resolution equivalent to the printed document for distribution to stakeholders; and
2. CD-ROM/DVD copies for placement on the internet:

Copies should be in Adobe® PDF format for placement on the internet. All compression must be down-sampled to 72 dpi. PDF documents should be no larger than 1 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 1 MB file size.

The final nature and number of EIS copies required to be submitted and made available, should be discussed and agreed with the CG Project Manager in the early stages of the EIS process.

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<sup>10</sup> EPA (11.03) PS (114)

## **Part B: SPECIFIC REQUIREMENTS – CONTENTS OF THE EIS**

The EIS report should include the following sections but need not be limited to these sections or inferred structure.

### **Executive Summary**

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

The structure of the Executive Summary should generally follow that of the EIS but focus on key issues to enable the reader to obtain a clear understanding of the Project and its potential adverse and beneficial environmental, social and economic impacts and the management measures to be implemented by the proponent to mitigate all residual impacts.

The Executive Summary must include:

- The title of the Project.
- Name and contact details of the proponent, and a discussion of previous projects undertaken by the proponent and their commitment to effective environmental management.
- A concise statement of the aims and objectives of the Project.
- The legal framework, decision-making authorities and advisory agencies.
- An outline of the background to and need for the Project, including the consequences of not proceeding with the Project.
- An outline of the alternative options considered and reasons for the selection of the proposed development option.
- A brief description of the Project (pre-construction, construction and operational activities) and the existing environment, utilising visual aids where appropriate.
- An outline of the principal environmental impacts predicted and the proposed environmental management strategies (including waste minimisation and management) and commitments to minimise the significance of these impacts.

### **Glossary of Terms**

A glossary of technical terms and acronyms should be provided.

# 1. Introduction

The introduction should clearly explain the purpose of the EIS, to whom it is directed and contain an overview of the structure of the document.

## 1.1 PROJECT PROPONENTS

This section should describe the experience of the Project proponent, including nature and extent of business activities, experience and qualifications, and environmental record including the proponent's environmental policy.

This section should detail any proceedings, 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 or the applicant for any permit under an environmental law for the Project.<sup>11</sup>

## 1.2 PROJECT DESCRIPTION

This section should provide a brief description of the key elements of the Project, including any major associated infrastructure requirements to the Project development.

## 1.3 PROJECT RATIONALE

This section should set out what the Project aims to achieve. It should describe the current status of the Project and outline the relationship of the Project to other developments or actions to which it may relate.

### 1.3.1 *Need for the Project*<sup>12</sup>

The EIS should describe the justification for the Project in a Local, Regional, State and National context. This section should describe:

- The status of the Project in a Local, Regional, State and National context.
- The context of the Project within the overall SEQ Water Strategy.
- Estimates of future water supply needs including consideration of:
  - Population, employment, economic production, and quality of life changes
  - Dam yields based on hydrologic studies
  - Security of supply including consideration of climate variability and climate change
  - Level of service considerations
  - Demand reduction opportunities
- A summary of the strategic, economic and environmental implications of the proposal.
- Economic and social benefits, including employment and spin-off business development.
- Increased demands on natural resources.

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<sup>11</sup> PS (9)

<sup>12</sup> PS (110, 115, 116)

- Identification of customers (industrial, non-industrial and domestic) and potential customers for the water.
- The Project's technical feasibility and commercial viability including potential customers and target markets, immediate and long-term implications for the water transmission network.

### **1.3.2 Costs and Benefits of the Project**

This section should summarise:

- The estimated capital and operating costs of the Project;<sup>13</sup>
- The economic costs and benefits to industry and the wider community, including directly affected enterprises. Analysis should be conducted at local, regional, state and national levels.
- Regional social impacts including, but not limited to,<sup>14</sup> community disruption, related land use changes, employment, skills development and any workforce accommodation issues.

## **1.4 ALTERNATIVES TO THE PROJECT<sup>15</sup>**

This section should describe feasible alternatives to and within the proposed Project, including the option of taking no action, i.e. of not building the dam. Alternatives should be discussed in sufficient detail to enable an understanding of reasons for preferring certain options and courses of action and rejecting others. Reasons for selecting preferred options should be delineated in terms of technical, commercial, social and natural environment aspects. In particular, discussion of reasonably practicable alternatives to the Project should include:

- Alternatives to surface water supply, including:
  - Recycling;
  - Groundwater;
  - Desalination; and
  - New pipelines forming a water grid between storages.
- Alternative forms of reasonably practicable surface water supply, both with the same catchment and in other catchments, including:
  - Other dam sites for bulk water storage
  - Other sites for water harvesting
- Alternative locations considered should be identified, aided by maps and diagrams. The location options, including the clearly identified preferred location should be shown on topographical maps at a suitable scale.
- The rationale for selection of the preferred location and reasons other options were rejected.
- How the principles of Ecologically Sustainable Development (ESD) and sustainable development should be included.

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<sup>13</sup> PS (36, 131,132,133,134,135)

<sup>14</sup> DoC (9.05)

<sup>15</sup> Noosa (4.05), Maroochy (6.01), PS (12, 115, 116)

## **1.5 THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS**

### **1.5.1 Methodology of the EIS**

This section should provide an outline of the State and Australian Government approvals process including the environmental impact assessment process and any associated licence or permit application processes. It should include information on the relevant stages of the approvals process, statutory and public consultation requirements and any interdependencies that exist between the approvals sought.

### **1.5.2 Objectives of the EIS**

This section should provide a statement of the objectives of the environmental impact assessment process, detail how the relevant legislation should be addressed and highlight the EIS as the key environmental document for providing advice to decision makers considering approvals for the Project. It should be highlighted that the purpose of the EIS is to:

- Provide public information on the need for, and likely effects of the Project;
- 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.

The relationship of other Project environmental management planning documentation, conditions, approvals and environmental authorities should be discussed in relation to the EIS.

### **1.5.3 Submissions**

Interested and affected persons should be made aware of how submissions on the EIS will be addressed and taken into account in the decision-making process. The EIS should inform the reader on:

- How to make submissions;
- What form the submissions should take; and
- When submissions must be made to gain standing for any appeal process.

## **1.6 PUBLIC CONSULTATION PROCESS**

This section should outline the public consultation process that has taken place during EIS preparation and the results of such consultation. It should outline any further opportunities for public input on the draft EIS report.

The public consultation program should provide opportunities to encourage and facilitate active community involvement and education through appropriate consultation mechanisms such as community information sessions, interest group meetings, production of regular summary information and updates, and other consultation mechanisms.

The public consultation process should identify issues of concern to community members and interest groups.

In particular, the EIS should describe:

- The proponent's program for communicating and consulting with the public and stakeholder groups during the course of the EIS preparation and include the information provided and the methods for engaging with local stakeholders in the assessment of social and economic impacts.
- The outcomes of consultation undertaken as part of specific impact studies, the issues and suggestions of stakeholders or members of the public (by theme and source, rather than individually) and the response made by the proponent in the context of either the EIS studies or the refined proposal.
- An outline of a program for community consultation and communications during construction and operation of the project, including means for the local community to engage with QWI management and the dam operator to address and respond to potential community concerns, participation in ongoing monitoring of environmental impacts, and means for the community to participate in the continuous improvement of the Environmental Management Framework.

## **1.7 PROJECT APPROVALS**

### ***1.7.1 Relevant Legislation and Policy Requirements***

The EIS should identify all relevant legislation, policies and strategies, as well as assess their specific implications and requirements for the Project and impact assessment. Reference should be made to the SDPWO Act, including its relationship with the Integrated Planning Act (IPA), and other relevant Queensland laws. A description of any Environmentally Relevant Activities (ERAs) necessary for each aspect of the Project should also be given.

Any requirements of the Commonwealth EPBC Act, including the results of a Referral, should also be included.

Provide a list of the approvals required for the Project and the expected program for approval of applications.

The proponent will need to identify and address other strategies, subordinate legislation and related management or planning processes that may be relevant to the assessment of the Project.

### ***1.7.2 Planning Processes and Standards***

This section should identify all relevant State, regional and local planning policies, planning controls, local laws and plans and discuss how the Project complies with these. This section should outline the Project's consistency with existing land uses or long-term policy frameworks and compliance with legislation, standards and codes. Guidelines available to define monitoring and the control of operations on site should also be identified and the rationale for the selected guidelines proposed to be used during the project should be explained.

The EIS should describe the Project's compatibility with the National Greenhouse Strategy, Government Ecologically Sustainable Development policy, Queensland Energy Policy, National Strategy on Conservation of Australia's Biological Diversity and any other relevant Policy.<sup>16</sup>

Provide a list of the approvals required for the Project and the expected program for approval of applications.

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<sup>16</sup> PS (115)

## 2. Description of the Project

This section should describe the Project and its components including how it would be constructed and operated. The practicality of decommissioning of the Dam should be addressed at a strategic level to provide an understanding of potential impacts and possible mitigation measures associated with this possible future phase. Details should include:

- Design parameters for aspects of the Project that may potentially impact on, but not limited to, listed threatened species and ecological communities, listed migratory species, Ramsar Wetlands, the Fraser Island World Heritage Area, Great Sandy Marine Park, Great Sandy Conservation Park, Dugong protection areas and Fish Habitat areas.<sup>17</sup>
- A program covering activities relating to design, construction, commissioning and first operating activities.

The overall Project duration and expected timing should be provided.

The estimated number of people to be employed during the whole construction Project and where those construction personnel will be accommodated should be documented.<sup>18</sup>

### 2.1 LOCATION

This section should describe the regional and local context of the Project and associated infrastructure and illustrated on maps at suitable scales. Real property descriptions of the Project site should be provided. Maps should show the precise location of the Project area, and in particular:

- the location and boundaries of land tenures, in place or proposed, to which the Project area is or will be subject;
- the location and boundaries of the Project footprint; and
- the location of any proposed buffers surrounding the working areas (for construction) and around the expected FSL of the storage.

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

The following information should be provided for all components of the Project:

- distances to boundaries of land resumptions;
- slopes and elevations;
- site drainage and erosion controls;
- proposals for rehabilitation; and
- access arrangements, daily traffic generated, and internal roads.

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<sup>17</sup> EPA (11.06)

<sup>18</sup> DoI (19.14)



The process and criteria used for the selection of the specific water storage Project site and infrastructure construction and relocation design should be described. The full extent of land that is required for infrastructure associated with the storages should be documented. The process of acquisition and/or resumption of land should be outlined. The method, by which ownership, control or owners' consent is to be acquired, should be presented.

## **2.2 DESCRIPTION OF THE WATER STORAGE CONSTRUCTION AND OPERATION**

The following information should be provided and be supported by detailed plans where appropriate.

### **2.2.1 Basis of Design<sup>19</sup>**

This section should include:

- a description of the design process and key inputs;
- a description of how local weather characteristics, natural disasters and extreme weather conditions (refer Section 3.1) were taken into account in the design; and
- The dam safety accreditation process.

### **2.2.2 Barrier/Embankment Structures**

The following should be provided through text and design plans:

- maximum (final) crest height and spillway height;
- length and width of crest;
- excavation for footings and wall construction;
- estimated headwater/tailwater difference at different flows;
- frequency of spill;
- spillway design, construction materials and finish (e.g. stepped spillway, smooth spillway slope with trowelled/brushed concrete finish),<sup>20</sup>
- capacity and maximum depth;
- average depth;
- estimated water yields (with appropriate allowances for environmental requirements, seepage and evaporation<sup>21</sup>);
- general design of outlet works including capacity and offtake level(s);
- details of any dissipaters at the downstream foot of the barrier;

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<sup>19</sup> PS (117)

<sup>20</sup> PIF (13.12)

<sup>21</sup> PS (55)

- details on the effectiveness of the proposed fishway and other fish transfer mechanisms, drawing on examples used on other dams or similar proposals; and
- any additional water impoundment or control structures that may be constructed as part of the overall Project.

### **2.2.3 Site Details including Inundation Area**

The following details should be provided:

- a description of the stream bed at the downstream foot of the barrier including AHD levels (e.g. presence of any deep pools, riffles etc);
- a description of the stream bed upstream of the barrier including AHD levels<sup>22</sup> (e.g. presence of natural features likely to be impacted);
- inundation area for a range of water levels;
- areas inundated (including estimated depth profiles, e.g. at FSL) and the frequency of inundation, including plan with tenure details and current land use;
- length of stream (and tributaries) inundated (taking account of varying supply levels); and
- the extent of the buffer zone around the inundation area.

### **2.2.4 Pre-Storage<sup>23</sup> Activities**

A description of the pre-construction activities should be set out in this section, including:

- Upgrading of roads, railways and other infrastructure.
- Clearing and relocation of fauna or flora species in accordance with identified management strategies<sup>24</sup>.
- Site decontamination processes.
- Removal of existing infrastructure and waste.
- Resource recovery.<sup>25</sup>

### **2.2.5 Construction Activities and Infrastructure**

The following details on construction of the Project should be provided:

- Location and site establishment requirements for construction facilities;<sup>26</sup>
- general 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;

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<sup>22</sup> PIF (13.13)

<sup>23</sup> PS (118)

<sup>24</sup> PS (86)

<sup>25</sup> PS (118)

<sup>26</sup> PS (118)

- size and source of construction workforce and construction camp requirements and location (if proposed);
- works needed within the impoundment including tree clearing (by manual methods and by inundation), blasting, excavation, dredging and transport infrastructure works;
- works downstream including erosion protection;
- any necessary works associated with but not directly related to the impoundment such as relocation of transport infrastructure, powerlines etc;
- 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;
- licensing/permit requirements for the construction works including sewage treatment, concrete batching, extractive industry, etc;
- 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 (including effluent disposal and any licensing required); and
- the number and type of vehicles, machinery and equipment used for excavation, construction and operation.

Determination of Potable and Non-Potable water demand during the construction period should be determined. Details should be provided of any existing or proposed water supply, including recycled water options,<sup>27</sup> to meet such requirements. If water storage and treatment is proposed on site, for use by the site workforce, then this should be described.

### **2.2.6 Proposed Water Storage Operation**

Full details on the proposed on-going management of the dam, inundation area and buffer zone should be provided including:

- arrangements for operation of the works, e.g. flow releases (environmental, irrigation etc, operation of gates (if relevant)), the achievement of targeted water quality criteria,<sup>28</sup> the anticipated pattern of inundation, operation of outlet works including details of operation and administration, including proposals for remote operation, and proposed staffing arrangements, etc;
- consideration should be given to how existing seasonal flows will be managed, drawing on baseline or predictive studies, at all stages of the Project;

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<sup>27</sup> DoI (19.03)

<sup>28</sup> PIF (13.17)

- water treatment arrangements for provision for urban supply requirements. This should include a description of treatment facilities, associated infrastructure, and treatment methods. This should also describe the integration of operations within the catchment;
- licensing/permit requirements;
- details of the operational workforce numbers and personnel type;
- details of the maximum drawdown level and likely extraction regime, e.g. when water will be sourced and expected demands versus yield, including likely release timings and the management of water below the expected minimum drawdown levels (dead storage)<sup>29</sup>;
- proposed access points associated with the increased storage;
- identify probable areas of public access, and areas where access may be restricted or excluded;<sup>30</sup>
- infrastructure for recreational purposes;
- relocation of existing infrastructure;
- proposed operation of the fishway and/or other fish transfer mechanisms; and
- construction of additional infrastructure required for operation.

This section should provide details on the timing of the construction of the Project including planning, impact assessment, construction, monitoring, EMP, etc, anticipated establishment and ongoing costs and the Project life. Costs should include monitoring and environmental mitigation/management costs.

This section should describe the proposed system of allocation of water from the Project, with particular reference to the Mary Basin WRP and any proposed high priority allocations to specific urban, rural or industrial users. The location and design of any new water distribution infrastructure (e.g. pump stations, canals, pipelines etc.) should 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 should also be described.

### **2.2.7 Rehabilitation**

This section should describe the options, strategies and methods for progressive and final rehabilitation of the environment disturbed by the Project. The strategic approach to progressive and final rehabilitation of the construction site should be described. A preferred rehabilitation strategy should 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 site should 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, should be provided. A description of topsoil management should consider suitability, erosion and dispersion potential, transport, storage and replacement of topsoil to disturbed areas.

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<sup>29</sup> EPA (11.07)

<sup>30</sup> PS (85)

### **2.2.8 Decommissioning**

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

### **2.2.9 Workforce and Accommodation**

This section should provide details on the employment requirements and skills base of the required workforce for both the construction and operations phases of the Project, including:

- size and source of construction and operations workforce.
- deployment strategies proposed for the workforce over the construction period.
- employment opportunities relating to the dam construction including details of the required professional, skilled and semi-skilled labour requirements of the Project.
- information regarding the occupational groupings required for the workforce.
- new skills and training to be introduced in relation to the Project.

Information should be provided on the accommodation requirements for the workforce, and if applicable, their family members.

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.
- Indoor air quality.
- Dust and noise control in relation to proximity of camp site to the construction area.

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

## **2.3 ASSOCIATED INFRASTRUCTURE REQUIREMENTS**

This section should provide descriptions, with concept and layout plans, of potential requirements for constructing, upgrading or relocating impacted infrastructure in the vicinity of the Project area. The matters to be considered include such infrastructure as roads, bridges, tracks and pathways, any associated water supply infrastructure, bore fields, power lines and other cables and wireless technology (e.g. microwave telecommunications). Private, local government and community owned infrastructure, including buildings and significant structures should be identified.

### **2.3.1 Transport**

This section should provide a brief overview of transport requirements. Full details of transport volumes and routes should be provided in accordance with Section 3.9 Traffic, Transport and Access Arrangements.

### **2.3.2 Energy**

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

### **2.3.3 Telecommunications**

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

Telecommunications requirements for the Project should also be noted.

### **2.3.4 Water Supply/Storage**

The EIS should provide information on water usage by the Project, including the quality and quantity of all water to be used. In particular, the proposed and optional sources of water supply should be described (e.g. bores, mine water, any surface storages such as dams, weirs, watercourses, recycled water<sup>31</sup> and municipal water supply pipelines, etc).

Determination of potable water demand should be made for the Project, including the temporary demands during the construction period. Details should be provided of any existing town water supply to be used to meet such requirements. If water storage and/or treatment are proposed on site, for use by the site workforce, then this should be described. This description should include the management practices to maintain the quality of the water, including the source of the water, transportation, water treatment processes, and microbiological and chemical testing program.

### **2.3.5 Water Distribution and Treatment Systems**

The 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 Project, to provide an understanding of generally how water from the proposed Project will be distributed. It is noted however, that consideration, assessment and approval for these systems will be sought under appropriate separate processes.

Assessment of impacts on matters of National Environmental Significance should include the consequential impact of infrastructure required to treat and transport water to the connection point with the SEQ Water Grid's Northern Interconnector Pipeline<sup>32</sup>.

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<sup>31</sup> DoI (19.04)

<sup>32</sup> DEW (17.04)

### **2.3.6 Sewerage**

This section should describe, in general terms, the sewerage infrastructure required by the Project. Should on-site sewage treatment be proposed for the construction and operation phases, the size, capacity and treatment process for such a plant should be described sufficiently to assess the potential impacts on the receiving environment.<sup>33</sup>

### **2.3.7 Stormwater**

A description should be provided of any proposed stormwater drainage systems and the proposed disposal arrangements, including any off-site services.

### **2.3.8 Other infrastructure**

A description should be provided of any other developments directly related to the Project not described in other sections, such as:

- townships or residential developments;
- fuel storage areas;
- equipment hardstand and maintenance areas; and
- technical workshops and laboratories (including water treatment requirements).

## **2.4 WASTE MANAGEMENT**

This section should provide a brief overview of the waste management requirements of the Project. Full details of the waste volumes, characteristics and management strategies should be provided in accordance with the requirements of Section 3.7 Waste.

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<sup>33</sup> PS (114)

### 3. Environmental Values & Management of Impacts

This section should address all elements of the environment, (such as land, water, nature conservation, cultural and natural heritage, social and economic, air, noise, waste, transport and traffic and hazards and risk) in a way that is comprehensive and clear.

The EIS should assess the impacts of pre-construction, construction and operation, decommissioning of redundant infrastructure, and rehabilitation of disturbed lands. The practicality of decommissioning of the Dam should be addressed at a strategic level to provide an understanding of potential impacts and possible mitigation measures associated with this possible future phase. The impacts associated with potential ongoing maintenance, access and servicing resulting from the development and any other facilities required for the Project should also be assessed.

Assessment of impacts on matters of National Environmental Significance should include the consequential impact of infrastructure required to treat and transport water to the connection point with SEQ Water Grid's Northern Interconnector Pipeline<sup>34</sup>.

The functions of this section are to:

- Describe existing environmental values of the area that may be affected by the proposal.
- Describe potential adverse and beneficial impacts of the proposal on the identified environmental values.
- Present environmental protection objectives and the standards and measurable indicators to be achieved.
- Examine viable strategies for managing impacts.

Environmental protection objectives may be derived from legislative and planning requirements which apply to the proposal, including Commonwealth strategies, State planning policies, local authority strategic plans, environmental protection policies under the *Environmental Protection Act 1994*, and any catchment management plans prepared by Regional Natural Resource Management Bodies, local water boards, catchment management bodies and<sup>35</sup> land care groups. Special attention should be given to those mitigation strategies designed to protect the values of any sensitive areas and any identified ecosystems of high conservation value affected by the proposal.

In addition to issues raised in the following sections, the following issues relating to the controlling provisions under the *EPBC Act* should be addressed when assessing potential impacts on matters of National Environmental Significance:

#### **Impact on a listed threatened species or ecological community:**

Potential impacts vary depending on whether the species or ecological community is extinct in the wild, critically endangered, endangered or vulnerable but are generally as follows:

- lead to long term decrease in the size of a population or a long term adverse affect on an ecological community,
- reduce the area of occupancy of the species or extent of occurrence of the ecological community,
- fragment an existing population or ecological community,
- adversely affect habitat critical to the survival of the species or ecological community,
- disrupt the breeding cycle of a population,
- modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline,
- modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for the ecological community's survival,

<sup>34</sup> DEW (17.04)

<sup>35</sup> PIF (13.20)



- result in invasive species that are harmful to the species or ecological community becoming established,
- interfere with the recovery of the species or ecological community, or
- consistency with any recovery plan.

**Impact on a listed migratory species:**

- loss or modification of habitat important for migratory species (including fragmentation, altered land use, fire regimes, altered nutrient cycle etc);
- introduction of invasive species; and
- disruption to lifecycle (breeding, feeding, migration, roosting etc).

**Impact on a Wetland of National Importance:**

- Areas of wetland being destroyed or substantially modified;
- A substantial and measurable change in the hydrological regime of the wetland, for example, a substantial change in volume, timing, duration and frequency of ground and surface water flows to and within the wetland;
- The habitat or lifecycle of native species, including invertebrate fauna and fish species, dependent upon the wetland being seriously affected;
- A substantial and measurable change in the water quality of the wetland – for example a, substantial change in the level of salinity, pollutants or nutrients in the wetland, or water temperature which may adversely impact on biodiversity, ecological integrity, social amenity or human health; or
- An invasive species that is harmful to the ecological character of the wetland being established (or an existing invasive species being spread) in the wetland.

**Impact on a World Heritage Area:**

- One or more of the World Heritage values to be lost;
- On or more of the world heritage values to be degraded or damaged; or
- One or more of the World Heritage values to be notable altered, modified, obscured or diminished.

The mitigation measures, monitoring programs, etc., identified in this section of the EIS should be addressed in the development of Environmental Management Plans for the Project (see Section 4).

### **3.1 NATURAL DISASTERS AND EXTREME WEATHER CONDITIONS**

This section should describe historic weather patterns in the Project area and seasonal conditions (e.g., cyclones, thunderstorms, floods and storms) that may influence timing and/or construction methods and how this would be managed. The vulnerability of the area to natural or induced hazards, such as floods, bush fires and earthquakes should also be addressed. Details should be provided of earthquake fault lines or past earthquake activity in the vicinity of the Project area and the implications for the Project. Assessment of the potential for any induced changes to the local climate, including changes in frost frequency, fog and low cloud.<sup>36</sup>

This section should include a discussion on how weather would be monitored to minimise the risk of adverse impacts to the Project area during the construction period.

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<sup>36</sup> PS (77, 141)

## 3.2 LAND

This section should detail the existing land environment for all areas associated with the Project, including areas affected by associated infrastructure relocation or construction.

This section should also describe the potential for the construction and operation of the Project to change existing and potential land uses of the Project sites and adjacent areas.

### 3.2.1 Land Use and Infrastructure

#### Description of Environmental Values

The EIS should identify the following, with the aid of maps:

- Land tenure and owner/custodian (unless excluded for privacy reasons)(including reserves, tenure of special interest such as protected areas and forest reserves, roads and road reserves, bridges, railways and rail reserves, and stock routes).
- Land use (urban, residential, industrial, roads,<sup>37</sup> agricultural, forestry, recreational, mining including mining and petroleum exploration tenures, mining leases, mining claims, mineral development licenses and extractive industry permits).
- When examining tenure, the location of historical mining areas should be shown on maps. This may be used to identify former mining zones or historical workings where slumping or other problems might occur in the future.
- The nature of rural enterprises and the agricultural value of lands affected by the Project.
- Areas covered by applications for native title determination or native title determinations, including traditional and contemporary uses of land and water by Aboriginal people. A description of Native Title Representative Bodies (NTRB) boundaries should be provided.
- Project location including FSL, buffer zone and infrastructure corridors, should be provided for the entire Project area and surrounding land that could be affected by the development.
- Areas of conservation value in any locality that may be impacted by the proposal, including but not limited to, the Great Sandy Strait Ramsar Wetland, The Fraser Island World Heritage Area and habitat relevant to listed threatened species and ecological communities and listed migratory species.
- The location of all existing dwellings, significant structures and the zoning of all affected lands according to the existing Noosa, Maroochy and Cooloola Shire Council town planning schemes and strategic plans.
- Land classified as GQAL in the DNRWs land classification system is to be shown in accordance with the GQAL planning guide.
- Information on any known occurrences of economic mineralisation, gas and oil fields and extractive resources within the Project area.
- Location of gas and water pipelines, power lines, telecommunication cables, roads, railways, bridges, airports, airstrips, helipads and any other infrastructure that may be impacted by the construction or operation of the Project, including downstream infrastructure<sup>38</sup>.

#### Potential Impacts and Mitigation Measures

The potential for the construction and operation of the Project to change existing and potential land uses of the proposal site and adjacent areas should be detailed. Post operations land use options should 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

<sup>37</sup> DMR (5.01)

<sup>38</sup> Cooloola SC (7.14), PS (80)

or limiting the establishment of those options should be given in the context of land use suitability prior to the Project and minimising potential liabilities for long-term management.

A description of the following should be included:

- Management of the immediate environs of the Project including the buffer zones and/or restrictions on livestock access.
- Individual properties and businesses affected by the Project – 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;
- The strategy and progress in relation to making of Native Title agreements, including NTRBs, consultant selection, traditional owner involvement and related statutory processes.
- Impacts on any areas of high conservation value, including National Parks, World Heritage Areas, the Great Sandy Strait Ramsar Wetland, habitat relevant to listed threatened species and ecological communities, listed migratory species or other areas designated to be of high conservation value (including impacts on accessibility);
- 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 dam<sup>39</sup>;
- 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 Project;
- Identification of any millable timber or quarry resources within the Project area and an assessment of the commercial value of these resources to satisfy the requirements of the DPIF<sup>40</sup> and DNRW respectively<sup>41</sup>;
- Discussion of potential issues involved in proximity and/or collocations 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 Good Quality Agricultural Land (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.

In addition, the following information should be presented:

- identification and discussion of any land use impacts associated with the construction of the Project (e.g. impacts on land use, agricultural production, loss of infrastructure, need for relocation and resumption should be discussed);
- discussion of the Project construction impacts on continued access to all parts of the properties fringing the storage, 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;

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<sup>39</sup> PIF (13.21)

<sup>40</sup> PIF (13.01), NRW (15.03)

<sup>41</sup> PIF (13.22), NRW (15.03)

- discussion of the potential impacts (positive and negative) on upstream and downstream infrastructure (including operation of the infrastructure) of the Project, including but not limited to water treatment and waste treatment systems, bridges, residential, commercial and industrial facilities;<sup>42</sup>
- discussion of the potential impact on upstream and downstream land uses from additional water made available as a consequence of the Project;
- an assessment of the potential impacts of the Project on existing and potential irrigated agriculture and/or industrial developments and the possible conflict between agricultural and other uses; and
- an assessment of the opportunity for reuse and/or recycling of infrastructure (residences, construction materials, buildings, etc) to be inundated or removed as part of the Project.<sup>43</sup>

With regard to primary industries, the impact of the Project on agriculture, both cropping and grazing, and GQAL (as per State Planning Policy 1/92) in the inundation area should be described.

In relation to agricultural land use, this section should describe the connection between water quality needs in the proposed storage and agricultural practices in the catchment of the impoundment. Restrictions that may be imposed on current land use practices should be specifically indicated and the method/s for regulating these should be stated.

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

### **3.2.2 Topography and Geomorphology**

#### Description of Environmental Values

Maps should be provided locating the Project and its environs in both regional and local contexts. The topography of the proposed dam site, and sites of associated infrastructure, should be detailed with contours at suitable increments (desirably at 1m 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 landscape should be included on the maps. Commentary on the maps should be provided highlighting the significant topographical and geomorphologic features.

In areas, where acid sulphate soils may be disturbed, and for major watercourse crossings, surrounding topography should be detailed at 1m increments with levels shown with respect to AHD.

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<sup>42</sup> Cooloola SC (7.14), PS (80)

<sup>43</sup> PS (168)

## Potential Impacts and Mitigation Measures

- The Project should 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, if required.
- The objectives to be used for the Project in re-contouring, consolidation, rehabilitation, fencing, monitoring and landscaping should be described. Consideration should be given to the use of threatened plant species during any landscaping and re-vegetation.
- Proposals should be provided on diversion of waterways during construction or operations, and, if applicable, for the reinstatement of the waterways.
- The final drainage and seepage control systems and any long-term monitoring plans should be described, inclusive of impacts to groundwater.

### **3.2.3 Geology and Soils**

#### Description of Environmental Values

The EIS should provide a description and maps of the geology of the Project areas, with particular reference to the physical and chemical properties of surface and sub-surface materials and geological structures within the proposed areas of disturbance, which may influence occupational health, the quality of water being stored at the site or impacts on infrastructure. Geological properties that may influence: ground stability (including seismic activity, geological faults and associated geological hazards); rehabilitation programs; or the quality of wastewater leaving any area disturbed by the proposal should be described.

Soils within the Project area should be described and mapped at a suitable scale, with particular reference to the physical and chemical properties of the soils which would influence erosion potential, 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. Information should also be provided on soil stability and suitability for construction of all Project facilities.

Soil should be mapped at a suitable scale and described according to the *Australian Soil and Land Survey Field Handbook (Gunn et al 1988 and McDonald et al, 1990)* using the *Australian Soil Classification (Isbell, 1996)*. An appraisal of the depth and quality of useable soil should be undertaken. Information should be presented according to the standards required in the *Planning Guidelines: The Identification of Good Quality Agricultural Land (DPI, DHLGP, 1993)*, which supports *State Planning Policy 1/92: Development and the Conservation of Agricultural Land*. The area of GQAL that will be inundated should 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 will be accurately presented, and boreholes will equitably represent the different soil types present. Any highly erodible soils, saline sites and sites which are particularly susceptible to becoming saline (including downstream of the Project, where applicable) should be especially identified. Information should also be provided on soil stability and suitability to construction of all facilities and infrastructure. The investigation area should include all areas potentially affected by the Project including the buffer zone and associated infrastructure corridors.

## Potential Impacts and Mitigation Measures

This section should provide details of any potential impacts to the land resources and proposed mitigation measures, including:

- The effects of permeability of soil and rock underlying the inundation areas should be assessed for their impacts on water loss from the storage (and possible addition to groundwater aquifers) and the consequent suitability of the site.<sup>44</sup>
- The availability, location<sup>45</sup> and suitability of rock, clay, sand and gravel for use as construction materials.
- The environmental consequences of the excavation and removal of soils from borrow pits/quarries.
- Measures to ensure that soil erosion does not accelerate within or downstream of the Project area.
- Influence of time of year of construction on the impact on soils.
- Management measures for acid sulphate soils that may be encountered in association with the Project should be consistent with the guidelines that support *State Planning Policy 2/02 – Planning and Managing Development Involving Acid Sulfate Soils Version 2 (DLGP and DNRM, August 2002)* and *Soil Management Guidelines Version 3.8, DNRM November 2002 (Dear et al, 2002)*.
- Assessment of likely erosion effects of all Projects aspects, both on and off the project site;
- Details of erosion control measures and criteria used to assess methods that would minimise or alleviate erosion and sedimentation over the various permanent and temporary landforms. For each soil type identified, erosion potential and erosion management techniques should be outlined. Erosion monitoring should be discussed along with the development of rehabilitation/mitigation measures to achieve acceptable soil loss rates.
- A description of topsoil management should consider transport, storage and replacement of topsoil to disturbed areas. The minimisation of topsoil storage times (to reduce fertility degradation) should also be addressed. Erosion and sediment control should be described with a Soils Erosion and Sediment Control Plan included in the EMP.

The potential for the Project to adversely impact on the stability of landforms within the impoundment area, infrastructure areas and adjacent lands should be addressed in detail. This should 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 Project should be addressed, including changes to sediment delivery, transport and deposition.

### **3.2.4 Land Contamination<sup>46</sup>**

#### Description of Environmental Values

Areas of potential contamination within the inundation area or buffer zones, including but not limited to, Notifiable Activities as listed in Schedule 2 of the EP Act,<sup>47</sup> historic mine sites etc, should be evaluated. Should potentially contaminated sites be identified, a preliminary site investigation should 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 the preliminary site investigation should be summarised in the EIS and provided in detail in an appendix.

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<sup>44</sup> EPA (11.13)

<sup>45</sup> EPA (11.12)

<sup>46</sup> DoI (19.17) PS (114)

<sup>47</sup> DoI (19.07)

A framework for conducting preliminary site investigations is available in the EPA's *Draft guidelines for the assessment and management of contaminated land in Queensland* (EPA, 1998) (EPA Draft Guidelines) and the *National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPM)*, however the scope of any preliminary site investigations undertaken as part of the EIS should be consistent with the assessed level of risk at each site.

If the results of the preliminary site investigation indicate potential or actual contamination, a schedule of investigations to be progressively undertaken in accordance with the stages outlined in Appendix 5 of the EPA Draft Guidelines (EPA, 1998) should be developed as part of the EIS. Should the Project be approved and advanced to the construction phase, this schedule is to be implemented and the site demonstrated to be suitable for its intended use, prior to inundation.

In short, the following information should be provided as part of the EIS:

- mapping of any areas listed on the Environmental Management Register (EMR) or Contaminated Land Register (CLR) under the EP Act;
- identification of any potentially contaminated sites not on the registers which may need further investigation, remediation and validation, or specific management strategies, including any areas of potential unexploded ordnance; and
- a schedule of further investigations, remediation and validation, or specific management strategies in accordance with the EPA Draft guidelines and NEPM recommended for those land parcels where soil contamination may have an impact on construction activities and/or inundation.

#### 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.

### 3.3 NATURE CONSERVATION

This section should detail the existing nature conservation values of the Project area, and how these have changed over time. The environmental values of nature conservation for the affected area should be described in terms of:

- integrity of ecological processes, including habitats of rare and threatened species;
- conservation of resources;
- biological diversity, including habitats of rare and threatened species;
- integrity of landscapes and places including wilderness and similar natural places; and
- aquatic and terrestrial ecosystems.

A discussion should be presented on the nature conservation values of the areas likely to be affected by the Project. The flora and fauna communities which are rare or threatened, environmentally sensitive localities including, but not limited to,<sup>48</sup> the marine environment, waterways, riparian zone, and littoral zone, rainforest remnants, old growth indigenous forests, wilderness and habitat corridors should be described. 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. The description should 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).

Reference should be made to both State and Commonwealth legislation and policies on threatened species and ecological communities.

All surveys undertaken should be in accordance with recognised best practice, including consideration of advice from the EPA, and should include consideration of seasonality, potential for occurrence of significant species, rarity of species and the sensitivity of the species to disturbance.

This section should also discuss all likely direct and indirect environmental impacts on flora and fauna in both terrestrial and aquatic environments in sensitive areas.

The EIS should demonstrate how the Project (including all associated infrastructure requirements such as access tracks) would comply with the following hierarchy:

1. Avoiding impact on environmental values.
2. Implement management action to reduce impacts on environmental values to acceptable levels.
3. Remediation of impacts on environmental values through rehabilitation and restoration.
4. Measures to be taken to replace or offset the loss of environmental values where avoidance, management and remediation of impacts cannot be achieved.
5. Explanation of why measures 1 to 4 above would not apply in areas where loss of environmental values would occur.<sup>49</sup>

The boundaries (including appropriate buffer zones) of the areas impacted by the Project within or adjacent to an endangered ecological community, including firm details of footprint width

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<sup>48</sup> DoI (19.01)

<sup>49</sup> EPA (11.15), PS (164)



should be discussed. Where the Project area would impact upon a threatened community, the discussion should include reasons for the preferred alignment and the viability of alternatives.

This section should include an assessment of the risk of any potential flora and fauna pathogen transfer between and within water catchments, and identify mitigation and management measures.

### 3.3.1 Sensitive Environmental Areas

#### Description of Environmental Values

The EIS should identify areas that are environmentally sensitive in proximity to the Project. Environmentally sensitive areas should also include areas classified as having national, state, regional or local biodiversity significance, or flagged as important for their integrated biodiversity values.

The matters of National Environmental Significance (NES) to be specifically addressed under the requirements of the *EPBC Act* are, but should not be limited to:

- Sections 12 and 15A (World Heritage)
  - Fraser Island World Heritage Area – consideration should be given to impacts on physical quality, water quality and habitat as a result of changed hydrology and water quality as a result of the proposal. Migratory species dependent on this habitat are also likely to be affected.
- Section 18 and 18A (listed threatened species and ecological communities)
  - *Endangered*
    - Coxen's Fig Parrot (*Cyclopsitta diophthalma coxeni*)
    - Southern Barred Frog (*Mixophyes iterates*)
    - Spotted-tailed Quoll (*SE mainland population*)
    - Mary River Cod (*Maccullochella peelii mariensis*)
    - Mary River Tortoise (*Elusor macrurus*)
    - *Plectranthus torrenticola*
    - *Triunia robusta*
  - *Vulnerable*
    - Red Goshawk (*Erythroriorchis radiatus*)
    - Black-breasted Button Quail (*Turnix melanogaster*)
    - Grey-headed Flying-fox (*Pteropus poliocephalus*)
    - Australian Lungfish (*Neoceratodus forsteri*)
    - Green Turtle (*Chelonian mydas*)
    - Hairy-joint Grass (*Arthaxon hispidus*)
    - Three-leaved Bosistoa (*Bosistoa transversa*)
    - Ball nut (*Floydia praelta*)
    - *Fontainea rostrata*
    - Small fruited Queensland Nut (*Macadamia ternifolia*)
    - Southern Penda (*Xanthostemon oppositifolius*)
- Sections 16 and 17B (Ramsar Wetlands)
  - Great Sandy Strait Ramsar Wetland - consideration should be given to impacts on physical quality, water quality and habitat as a result of changed hydrology and water quality as a result of the proposal. Migratory species dependent on this habitat are also likely to be affected.

- Sections 20 and 20A (Listed Migratory Species)
  - Coxen's Fig Parrot (*Cyclopsitta diophthalma coxeni*)
  - Green Turtle (*Chelonian mydas*)
  - Dugong (*Dugong dugong*)
  - Eastern Curlew (*Numenius madagascariensis*)
  - Grey-tailed Tattler (*Heteroscelus brevipes*)
  - Lesser Sand Plover (*Charadrius mongolus*)
  - Terek Sandpiper (*Xenus cinereus*)
  - Whimbrel (*Numenius phaeopus*)
  - Bar-tailed Godwit (*Limosa lapponica*)
  - Greenshank (*Tringa nebularia*)
  - Grey Plover (*Pluvialis squatarola*)

The proximity of the Project elements to any of these areas should be identified and mapped. Areas which would be regarded as sensitive with regard to flora and fauna have one or more of the following features:

- Important habitats of species listed under the *Nature Conservation Act 1992* and/or EPBC Act as presumed extinct, endangered, vulnerable or rare.
- Regional ecosystems (Res) classified in the Regional Ecosystem Description Database (REDD) as recognised<sup>50</sup> by the EPA as 'endangered' or 'of concern' or 'not of concern' but where permits are no longer granted due to being at threshold levels, and/or ecosystems listed as presumed extinct, endangered or vulnerable under the EPBC Act.
- Ecosystems which provide important ecological functions such as riparian vegetation, important buffer to a protected area, important habitat, or important habitat corridors between areas.
- Protected areas which have been proclaimed under the *Nature Conservation Act 1992* or are under consideration for proclamation.

### Potential Impacts and Mitigation Measures

This section should discuss the following:

- The impact of the proposal on species, communities and habitats of local, regional or national significance as identified above including EPBC Act listed threatened species and communities.
- Proposals to mitigate such impacts (e.g. timing of works, minimise width of disturbance, proposed rehabilitation of in-stream and floodplain disturbances).
- Planned rehabilitation of sensitive communities and any relevant previous experience or experiments rehabilitating these communities.
- Proposals to support environmental values within the catchment (e.g. wildlife corridors and access to habitat).

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<sup>50</sup> DoI (19.08)

### 3.3.2 *Terrestrial Flora*

#### Description of Environmental Values

The terrestrial vegetation communities within the affected areas should be described at an appropriate scale (generally 1:10,000 or at a reasonable alternative scale based on level of complexity of vegetation in particular areas<sup>51</sup>) with mapping produced from aerial photographs and ground truthing, showing the following:

- location and extent of vegetation types including recognised regional ecosystem type descriptions;
- indicate any areas of state or regional significance;
- location of vegetation types of conservation significance;
- Vegetation map unit descriptions should also discuss their relationship to regional ecosystems. Sensitive or important vegetation types should be highlighted and their value as habitat for fauna and conservation of specific rare floral and faunal assemblages or community types discussed.
- the current extent (bioregional and catchment) of protected vegetation types of conservation significance within the protected areas (e.g. national parks, conservation parks, resource reserves, nature refuges etc);
- any plant communities of cultural, commercial or recreational significance should be identified; and
- the distribution and abundance of exotic and weed species described

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 assessment should also include the significance of native vegetation (including re-growth and restored areas in addition to remnant vegetation), from a local, regional, state and national perspective.

For each significant natural vegetation community likely to be impacted by the Project, vegetation surveys should be undertaken at an appropriate number of sites, allowing for seasonal factors, as follows:

- All data requirements of the Queensland Herbarium CORVEG database should be collected.
- Appropriate minimum site sizes should be selected, observing recognised sampling approaches and to provide an adequate sample of surveyed communities.
- A complete list of species present at each site should be recorded.
- The relative abundance and community structure of plant species present should be recorded.
- Any plant species of conservation, cultural, commercial or recreational significance should be identified.
- Vegetation mapping and data should be submitted to the Queensland Herbarium to assist the updating of the CORVEG database.

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<sup>51</sup> PS (122)

- 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.

The existence of rare or threatened species should be specifically addressed under sensitive areas, and the location of any horticultural crops in the vicinity of the Project facilities should be shown.

Details of any riparian vegetation and native grasslands, and their value for fauna habitat and conservation of specific rare floral and faunal assemblages or community types, from both a local and regional perspective, should be provided. Any special landscape values of any natural vegetation communities should be described.

Existing information on plant species may be used instead of new survey work provided that the data are derived from surveys consistent with the above methodology and describe existing conditions. Methodology used for flora surveys should be specified in the appendices to the report. Any existing information should be revised and comments provided on whether the areas are degraded, cleared or affected in ways that would affect their environmental value.

The occurrence of pest plants (weeds), particularly declared plants under the *Land Protection (Land and Stock Route Management) Act 2002* should be shown on a map at an appropriate scale.<sup>52</sup>

#### Potential Impacts and Mitigation Measures

This section should discuss all foreseen direct and indirect effects on terrestrial flora and the potential level of environmental impact identified. Action plans for protecting rare or threatened species and vegetation types identified as having high conservation value should be described, and any obligations imposed by State or Commonwealth biodiversity protection legislation or policy should be discussed.

Construction and operation of the Project involving clearing, salvaging or removal of vegetation should be described, and indirect impacts on vegetation not cleared should be discussed. Impacts during construction and operation of the Project should be assessed. Short term and long term durations should be considered. Specific reference should be made to impacts on riparian vegetation around the water storage and downstream and native grasslands or other sensitive vegetation communities.

Measures to mitigate the impacts of the Project on vegetation types identified as having high conservation values, listed species and sensitive habitat or the inhibition of propagation should be described.

Weed and pest control strategies for areas impacted by the Project should be developed for both the<sup>53</sup> construction and operation phases.

With regard to the Project area this section should include:

- the significance of impacts at a local, catchment, bioregional, State or National levels, i.e. addressing species diversity, as appropriate;

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<sup>52</sup> PIF (13.26)

<sup>53</sup> PIF (13.26)

- a discussion of the ability of identified stands of vegetation to withstand any increased pressure resulting from the proposal and identify measures proposed to mitigate impacts.
- a description of the methods to ensure rapid rehabilitation of disturbed areas following construction including the species chosen for revegetation which should be consistent with the surrounding associations. Details of any post construction monitoring programs and what benchmarks would be used for review of monitoring should be included.
- Proposals to mitigate impacts on habitat or vegetation. Any mitigation measures identifying potential offsets should identify potential offset areas, such as required by the ‘Offset Policy’ *Vegetation Management Act 1999*.<sup>54</sup>
- a description of methods of minimising the potential for the introduction and/or spread of weeds or plant disease, including:
  - Identification of the origin of construction materials, machinery and equipment.
  - The need for vehicle and machinery wash-down and any other hygiene protocols.
  - Staff/operator education programs.
  - determination of the potential for the introduction of or facilitation of exotic, non-indigenous and noxious plants.
- impact on any plants of potential or recognised environmental or economic significance; and
- a weed management plan to be included in the EMP, to be developed in consultation with local government environmental officers, to cover construction, rehabilitation and operation periods.

### **3.3.3 Terrestrial Fauna**

#### Description of Environmental Values

The terrestrial and riparian fauna occurring in the areas affected by the Project should be described, noting the broad distribution patterns in relation to vegetation, topography and substrate. Wildlife corridors and habitat along the proposed route should be identified and mapped.

The description of the fauna present or likely to be present in the area should include:

- Species diversity (i.e. species lists in relation to habitat types) 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 existence of feral or exotic animals.
- Existence 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 and Threatened Species Recovery Plans).
- Use of the area by migratory birds, nomadic birds and terrestrial fauna.

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<sup>54</sup> NRW (15.04)

The EIS should contain results from surveys for species listed as threatened or migratory under the EPBC Act. Surveys should be conducted at the appropriate time of day and year when the species are known to be present on the site, so that identification and location of these species is optimal.

Methodology used for fauna surveys should be specified in the appendices to the report.

The EIS should indicate how well any affected communities are represented and protected elsewhere in the sub-region where the Project occurs. Relevant site data should be provided to the Qld EPA in a format compatible with EPA WildNet database.

### Potential Impacts and Mitigation Measures

This section should discuss all foreseen direct and indirect effects on terrestrial fauna. Strategies for protecting rare or threatened species should be described, and any obligations imposed by State or Commonwealth endangered species legislation or policy should be discussed.

Impacts during construction and operation of the Project should be assessed. Short term and long term durations should be considered. Measures to mitigate the impact on habitat or the inhibition of normal movement, propagation or feeding patterns, and change to food chains should be described, including potential impacts on adjacent land uses.<sup>55</sup> Any provision for buffer zones and movement corridors, or special provisions for migratory, nomadic and aquatic animals should be discussed.

With regard to terrestrial and riparian fauna, the assessment of potential impact should consider:

- Impacts the proposal may have on terrestrial fauna, relevant wildlife habitat and other fauna conservation values, including:
  - direct (or short term) and indirect (or long term) impacts due to loss of range/habitat, food supply, nest sites, breeding/recruiting potential or movement corridors;
  - cumulative effects of direct and indirect impacts;
  - impacts on rare and threatened or otherwise noteworthy animal species;
  - threatening processes leading to progressive loss; and
  - identification of the conservation importance of identified populations at the regional, State and National levels.
- Measures to minimise wildlife capture and mortality during construction and operation;
- Details of the methodologies that would be used to avoid injuries to livestock and native fauna as a result of the Projects construction and operational works, and if accidental injuries should occur the methodologies to assess and handle injuries;
- Methods for minimising the introduction of feral animals, and other exotic fauna; and
- Effects of the Project during construction and operation (e.g. disposal of construction wastes, quarries, borrow pits, areas of inundation, downstream and upstream habitats) on <sup>56</sup>biting insect species of pest and health significance, including measures to prevent increases in these species.

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<sup>55</sup> PIF (13.27)

<sup>56</sup> DoI (19.09), PS (171)

### **3.3.4 Aquatic Flora**

#### Description of Environmental Values

The aquatic flora occurring in the areas potentially affected by the Project, including Ramsar wetlands and World Heritage Areas, should be described noting the patterns and distribution in the waterways.

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 Project areas should be described. The discussion of the flora present or likely to be present at any time during the year should include the following habitats:

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

The aquatic vegetation in the area affected by the Project should 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 Project or within watercourses which will be inundated;
- the presence of any declared pest plants; and
- the significance of aquatic vegetation to native fauna.

Special requirements of aquatic plant species or communities, including exotic species, related to management of the impoundment or flow regime downstream of the Project site should be discussed. The impact of existing impoundments and downstream flow regime on the natural aquatic flora should be discussed. Reference should be made to relevant studies on the Mary River (including information collected as part of the Mary Basin WRP) and other similar catchments to estimate the natural state.

Details of any riparian vegetation, and the value for fauna habitat and conservation of specific rare floral and faunal assemblages or community types, from both a local and regional perspective, should be provided. Any special landscape values of any natural vegetation communities should be described.

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

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 Project areas should be described. A description of the known extent of exotic species and diseases in the Mary River system should be presented.

The existence of rare or threatened species should 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.

### Potential Impacts and Mitigation Measures

This section should discuss all foreseen direct and indirect effects on aquatic flora. Strategies for protecting rare or threatened species should be described, and any obligations imposed by State or Commonwealth<sup>57</sup> legislation or policy should be discussed.

Impacts during construction and operation of the Project should be assessed. Short term and long term durations should be considered. Measures to mitigate the impacts of the Project on habitat or the inhibition of propagation should be described.

An assessment of the potential for the incidence of blue-green algae outbreaks as a result of the Project should be detailed, along with potential mitigation and management measures.

The assessment of potential impacts on aquatic and downstream riparian flora should consider:

- 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;
- potential for regeneration around the Project;
- effect of floristic changes on the aquatic fauna habitat and food supply both within any impoundment and downstream to marine areas;
- impacts of barriers to interbreeding opportunities between populations;
- 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.

This section should also include:

- Potential for, and mitigation measures to prevent, the creation of new mosquito and biting midge breeding sites during construction and operation (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.
- Measures to avoid impacts upon fish spawning periods.
- All approvals<sup>58</sup>/authorities required by the Project associated with activities in waterways (e.g. approvals<sup>59</sup> under the *Fisheries Act 1994* to construct temporary or permanent waterway barriers).

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<sup>57</sup> PIF (13.28)

<sup>58</sup> PIF (13.01)

<sup>59</sup> PIF (13.01)



- Determination of the potential for the introduction or increased translocation of exotic or noxious aquatic flora.<sup>60</sup>

### **3.3.5 Aquatic Fauna**

#### Description of Environmental Values

The aquatic fauna occurring in the areas affected by the Project should 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 Project areas should be described. The discussion of the fauna present or likely to be present at any time during the year should include:

- diversity and abundance (where feasible and practicable) of animals, including fish, reptiles, aquatic mammals, macro invertebrates, and amphibians;
- 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;
- commercial fish species which are present within the waterways; and
- other fish species and aquatic invertebrates occurring in the waterways within the Project areas (movement requirements should be considered).

A description of feral and exotic aquatic fauna species in the Mary River system should be described. There should be a discussion of the migratory patterns of aquatic fauna species in the study area and a discussion of the sensitivity of aquatic fauna species to changes in flow regime, water levels and water quality in the Project area.

This section should indicate how well any affected communities are represented and protected elsewhere.

With regard to fish habitats that could be impacted by the Project, the following information should be provided:

- description and maps of representative fish habitats 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);
- description and mapping of declared Fish Habitat Areas;<sup>61</sup>
- water quality influences;
- discussion of disturbance (past or current) to the fish habitats;

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<sup>60</sup> PIF (13.16), PS (4)

<sup>61</sup> PIF (13.22)

- discussion of the sensitivity of fish habitats to disturbance, including potential disturbances and changes resulting from the proposed works, e.g. changes in water quality (including in regard to changes in water level and flow regimes);
- a description of fish and crustacean species (recreational, commercial and other), including distribution, diversity, some population descriptors, e.g. size-class, and relative abundances;
- a determination of fish habitat requirements and usage, including life cycle, breeding requirements, seasonal or flow related variations in those requirements;
- existing and potential changes in fish populations;
- fish movement requirements (including any seasonal changes to those requirements); and
- a description of recreational and commercial fisheries.

### Potential Impacts and Mitigation Measures

This section should discuss all foreseen direct and indirect effects on aquatic (fresh and marine) fauna. Strategies for protecting rare or threatened species should be described, and any obligations imposed by State and Australian Government threatened species legislation or policy should be discussed.

Impacts during construction and operation of the Project should be assessed. Short term and long term durations should be considered. Measures to mitigate the impact on habitat or the inhibition of normal movement, propagation or feeding patterns, and change to food chains should be described. Any provision for buffer zones and movement corridors, or special provisions for migratory, nomadic and aquatic animals should be discussed. This section should include discussion of the potential impacts of the Project on commercial fish species. Details of mitigation strategies, including access for species to a fish transfer device, should be provided.

With regard to aquatic fauna, the assessment of potential impacts should consider:

- the impact of proposed in-stream structures including water offtakes, dam infrastructure, changed transport infrastructure and fish transfer devices;
- effects of changes to flow regime downstream, including the effect of changes in water quality, salinity, habitat structure (e.g. number of riffles) and flora;
- effects of increased level in the impoundment and projected variations in the level of the impoundment on aquatic fauna, particularly in creeks flowing into the impoundment;
- fauna to be considered include fish,<sup>62</sup> turtles, dugong, tortoise, platypus, invertebrates, and non-commercial threatened species as well as species important for recreation and commercial fisheries;
- effects on rare and threatened or otherwise noteworthy animal species, including listed threatened and listed migratory species and their habitat.
- proposed stream diversions, causeway construction and crossing facilities, stockpiled material and other impediments that would restrict free movement of fish; and
- measures to avoid impact upon fish spawning periods.

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<sup>62</sup> PIF (13.31)

- all approvals/authorities required by the Project associated with activities in waterways (e.g. approvals<sup>63</sup> under the *Fisheries Act 1994* to construct temporary or permanent waterway barriers).

An assessment of the potential impacts of the proposal on aquatic faunal communities at the site and up and downstream of the site (including estuarine and near coastal aquatic communities of the Great Sandy Straits region), should be made. Consideration should be given to:

- impacts on reproduction;
- impacts on different life stages;
- impacts on movement up and downstream and between the waterway and floodplain including from changes in cues (water temperature, flow patterns, etc) and from barriers;
- impacts on access to and availability of different habitats;
- impacts on population and community structure;
- impacts on status;
- impact on fish and other aquatic fauna movement upstream and downstream of the impoundment including the pre-project movement in the Mary River, taking into account any existing or<sup>64</sup> proposed transfer devices and the likely effectiveness of proposed approaches;
- effect of floristic changes on the aquatic fauna habitat and food supply both within the impoundment and downstream to marine areas;
- the significance and impact of any feral animals on the local ecosystems (terrestrial and aquatic) affected by the development (upstream, surrounding catchment and associated impact areas, inundation areas, downstream);
- identification of the conservation significance of identified populations at the regional, State and National levels;
- a conservation strategy, with particular reference to species of conservation significance and those expected to be most significantly impacted by the Project;
- determination of the potential for the introduction or increased translocation of exotic or noxious aquatic fauna;
- determination of the potential impacts on commercial and recreational fisheries, addressing issues such as access, changes to stocks (species, population numbers and structure, recruitment to fishery), potential for fish kills etc;
- measures to prevent harm to turtles due to flow releases; and
- Potential for, and mitigation measures to prevent, the creation of new mosquito and biting midge breeding sites during construction (e.g. in quarries and borrow pits).

The importance of the fish habitat at the Project site in the context of the Mary River system should be discussed and if possible, comparable habitat elsewhere in the system should be identified.

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<sup>63</sup> PIF (13.01)

<sup>64</sup> PIF (13.32)

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 Project should be presented. Consideration of the cumulative impacts from targeted development arising from the provision of water through the Project on aquatic fauna, habitat and fisheries should be presented. Sufficient baseline data at the Project site and up and downstream of the site should be provided to determine changes:

- which may take place in the physical make up of the river (including flow patterns; silt transport and deposition; bed and bank profiles and materials etc);
- to fish habitat which may take place (including: water quality parameters; composition and extent of riparian vegetation and littoral habitat; composition and extent of aquatic macrophytes; description of floodplain habitat (such as wetlands, floodplain waterbodies); extent of snags; description of pool and riffle features); and
- which may take place in the aquatic faunal communities.

### **3.4 LANDSCAPE CHARACTER AND VISUAL AMENITY**

#### Description of Environmental Values

This section should describe in general terms the existing character of the landscape that will be affected by the proposal and should also contain a description of the general impression of the landscape that would be obtained while travelling through and around it.

This section should also describe existing landscape features, panoramas and views that have, or could be expected to have, value to the community. Information in the form of maps and photographs should be used, particularly where addressing the following issues:

- 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 and along major roads;
- focal points, landmarks (built form or topography), gateways associated with the Project site and immediate surrounding areas, waterways, and other features contributing to the visual quality of the area and the Project site; and
- character of the local and surrounding areas including character and vegetation (natural and cultural vegetation) directional signage and land use.

#### Potential Impacts and Mitigation Measures

Describe the potential beneficial and adverse impacts of the Project on landscape character and visual qualities of the site and the surrounding area. Particular mention should be made of any changes to the broad-scale topography and vegetation character of the area, such as broad-scale clearing, the open water body and the realignment of the Bruce Highway and other roads.

Details should be provided of measures to be undertaken to mitigate or avoid the identified impacts.

### 3.5 WATER RESOURCES AND WATER QUALITY

#### 3.5.1 Water Resources - Hydrology

##### Description of Environmental Values

This section should describe the existing environment for water resources that may be affected by the Project in the context of environmental values as defined in such documents as EP Act, *EPP Water*, ANZECC Guidelines 2000, and Queensland Water Quality Guidelines 2006 (EPA).<sup>65</sup>

This section should describe:

- an assessment of historic rainfall patterns including geographic distribution within the catchment;
- existing surface drainage patterns, flows, history of flooding including extent, levels and frequency and present water uses;
- an assessment of the relationship between rainfall and stream flows in the catchment;
- environmental values of the surface waterways of the affected area in terms of:
  - Values identified in the *Environmental Protection (Water) Policy*.
  - 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.
  - Any Water Resource Plans, Land and Water Management Plans relevant to the affected catchment.
- a location plan, including the location of Highest Astronomical Tide (HAT) in the Mary River Catchment and including the distance from the Project;
- any other waterways or water features, including drainage channels, gullies, flood-prone or low lying land on or adjacent to the Project site, including a map;
- the surface waters and water bodies at the site and at catchment scale (indicating location of the proposed works). The description should include historical and existing quantitative hydrological data and details of existing regulatory structures and other barriers up and downstream of the proposed Project site;
- the current operation of the water storage and distribution system on the Mary River Catchment, including yield, operating strategy, supply reliability, allocation and use of water supplies;
- the existing surface drainage patterns, flows in major streams, including an assessment of Probable Maximum Flood (PMF),<sup>66</sup> and discussion of the likelihood of flooding, history of flooding including extent, levels and frequency should be provided. Flood studies should include a range of annual exceedence probabilities for the Mary River;
- the historical (without current storages in the Mary River catchment) and current flow characteristics including seasonal flow patterns, flow volumes and duration both upstream and downstream of the proposed dam site using relevant indicators such as those included in Section 4 of the Mary Basin WRP;

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<sup>65</sup> DoI (19.15) PS (64)

<sup>66</sup> PS (10)

- the changes in the parameters from pre-regulation (if applicable) to current and proposed post-Project conditions, and the corresponding changes that may be anticipated in:
  - in-stream and connected wetland morphology and ecology;
  - sediment/nutrient/energy processes in the catchment;
  - Fraser Island World Heritage Area morphology and ecology; and
  - estuarine/ Great Sandy Straits region morphology and ecology;
- siltation patterns, including seasonal/flow related variation;
- details of current or proposed flow management schemes for the waterway; and
- details of the length of stream already impounded and the additional effect of the proposal; and
- potential sources of water for construction.

The above investigations should also take into account the effects of any other existing or approved developments and simultaneous proposals on the Mary River.<sup>67</sup>

With regard to sediment/stream morphology, the following features of the Mary River system should be described including the changes to these features due to the current level of development of water resources:

- in-stream and connected wetland morphology;
- in-stream pools/runs;
- in-stream riffles/rapids;
- off-stream perennial pools (billabongs, ox-bow lakes etc);
- values identified in the *Environmental Protection (Water) Policy 1997* (EPP Water)
- morphology, physical integrity (including streambank erosion) and fluvial processes of the riparian zone within the potential impact area of the Project;
- sediment/nutrient/energy processes in the catchment; and
- any estuarine/marine features in the Great Sandy Straits region and Fraser Island World Heritage Area that may be affected by the change in the flow regime. For example, sediment supply to the coast, extent and significance of estuarine areas, etc.

### Potential Impacts and Mitigation Measures

This section should report on the impacts of the proposed Project and resultant water extraction on the reaches of the Mary River, tributaries, floodplain wetlands and downstream estuarine/coastal waters, including the lower estuary of the Mary River and Great Sandy Strait potentially<sup>68</sup> impacted by the proposal. This includes both environmental impacts (in-stream and relevant riparian and wetland areas) as well as existing water entitlement holders.

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<sup>67</sup> PS (124)

<sup>68</sup> EPA (11.18)

The methods and assumptions used to derive future rainfall patterns and predicted possible flows should be explained and justified, including comment on climate variability and the effect of evaporation and seepage processes.<sup>69</sup>

Determination of the effects of the proposal on sediment transport and deposition and potential resulting erosion/scouring and changes in deposition downstream should be provided.

This section should make reference to effects on in-stream and estuarine/coastal processes of the Great Sandy Straits region including:

- existing impacts from any existing or approved developments<sup>70</sup> in the region (e.g. Mary River Barrage) and potential impacts from other proposed infrastructure;
- environmental flows in accordance with the Mary Basin WRP;
- consideration of the potential impacts on navigation/access for boats;<sup>71</sup> and
- potential impacts on Ramsar wetlands, Fraser Island World Heritage Area, coastal wetlands, marine species and communities and estuarine processes in the region particularly in terms of changes to flows, siltation patterns, effects on fish habitats (feeding and breeding) and fish migration.

This section should also discuss:

- the potential impacts on water flow and the quality of surface waters, with particular reference to their suitability for the current and potential downstream uses, including in-stream biological uses and water delivery;
- Quality characteristics appropriate to the downstream water uses, including potable use;
- With regard to water impoundment structures, the results of an investigation of the effects of predictable climatic extremes (droughts, floods) upon the structural integrity of the containing walls; and
- the quality of water contained, and flows and quality of water discharged, should be provided.

With regard to water flows, the following should be provided:

- a discussion of impacts of the Project on flow regime indicators (in accordance with the Mary Basin WRP) and stipulation of the assumptions made (e.g. release patterns, release capacity, consumptive uses) in reaching this assessment;
- flow regime for downstream environmental flow requirements for ecological sustainability (determined in reference to the Mary Basin WRP);
- a demonstration of the requirements of the Mary Basin WRP have been achieved, and that appropriate regard for that requirement has been taken in assessments;<sup>72</sup>
- the 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 within the Mary Valley basin<sup>73</sup> and the operation of existing water extraction;

<sup>69</sup> Noosa SC (4.04), PS (1, 7, 22, 130)

<sup>70</sup> PS (124)

<sup>71</sup> PS (162)

<sup>72</sup> Noosa SC (4.03), PS (105, 107)

<sup>73</sup> PIF (13.35)

- 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 extent, levels, frequency and duration, of waterways, flood plains and wetlands;<sup>74</sup>
- The expected behaviour of the area of inundation under all flows including floods (extent, levels, frequency and duration), under the Project's proposed operating regime;<sup>75</sup>
- 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; and
- implications of any mitigating strategies on the engineering of the Project (e.g. the type of off-take required and outlet works as determined by environmental flow needs) should be reported.

In relation to the construction phase of the project, the following should be considered:

- The 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 should be considered, and any works requiring permits or licensing in accordance with the *Water Act 2000* identified.
- Proposed drainage structures for all aspects of the Project, including supporting facilities such as access roads.
- Timing of the construction works relative to likely periods of flooding and proposals to minimise the risk of adversely impacting downstream water quality.
- Measures to ensure weeds, including seeds, are not released into the water environment including from machinery traversing creek systems or riparian areas.

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<sup>74</sup> Cooloola SC (7.19), PIF (13.34), PS (73)

<sup>75</sup> Cooloola SC (7.19), PIF (13.34), PS (73)



### **3.5.2 Water Resources - Hydrogeology**

#### Description of Environmental Values

This section should describe the existing environment for hydrogeology resources that may be affected by the Project in the context of environmental values as defined in such documents as the EP Act, EPP Water, ANZECC Guidelines 2000, and Queensland Water Quality Guidelines 2006 (EPA)<sup>76</sup>. This section should review the quality, quantity and significance of groundwater at the Project site, together with groundwater use in adjacent areas.

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

This section should include reference to:

- nature of the aquifers;
- geology/stratigraphy, e.g. alluvium, volcanic, metamorphic etc;
- aquifer type, e.g. confined, unconfined etc;
- depth to and thickness of the aquifer;
- hydrology of the aquifers:
- 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;
- vulnerability to pollution;
- basic water quality of the aquifer;
- proximity of the groundwater facilities to the Project and value of these facilities for rural, industrial and/or domestic use; and
- A description of the current use of groundwater for irrigated agriculture should be described.

#### Potential Impacts and Mitigation Measures

This section should include an assessment of the potential groundwater impacts in the environs of the Project and alteration to drainage patterns including water table disruption, including:

- Activities which could affect the availability and quality of groundwater resources should be discussed;

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<sup>76</sup> PS (64)

- The impacts of vegetation clearing, sedimentation and salinity to local groundwater resources should be discussed, including any potential changes to the water table and the impact of those changes<sup>77</sup>;
- The overall impacts of the Project (and any additional surface irrigation water) on local groundwater resources should be discussed;
- The extent of the area within which groundwater resources are likely to be affected by the proposed operations, and proposed management options to monitor and mitigate these effects;
- Where groundwater is determined to be at risk, options for the prevention or mitigation of such risk should be fully described, including the potential impact on groundwater reliant vegetation communities and soil salinity<sup>78</sup>;
- Identification of groundwater resources proposed to be used by the Project, 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 Project on groundwater quality including the potential for interconnection between the target and underlying aquifers;
- Decommissioning of temporary groundwater bores; and
- The need or otherwise for licensing of any groundwater bores under the *Water Act 2000* should be discussed.

In relation to studies conducted to support planning for the Project, methods used and all information obtained should be reported.

### **3.5.3 Water Quality**

#### Description of Environmental Values

This section should describe the existing environment for water quality that may be affected by the Project in the context of environmental values as defined in such documents as the EP Act, EPP Water, ANZECC Guidelines 2000, and Queensland Water Quality Guidelines 2006 (EPA)<sup>79</sup>.

This section should describe:

- Existing surface and ground water quality in terms of physical, chemical and biological characteristics at the Project site and upstream and downstream of the site, including consideration of seasonal or flow variations where applicable.
- the water quality (historical, current) of the Mary River including areas and tributaries upstream and downstream of the proposed dam site, in comparison with water quality in adjacent catchments should be made (including records of blue-green algal blooms, and identification of long term, seasonal or other trends);

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<sup>77</sup> NRW (15.05)

<sup>78</sup> PS (81,82)

<sup>79</sup> DoI (19.10) PS (64)

- 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 should be included to gauge the impacts on the downstream environment. The water quality objectives for the Mary River should be summarised, with reference to the Mary Basin WRP, the EP Act, EPP Water, ANZECC Guidelines 2000 and the Queensland Water Quality Guidelines<sup>80</sup> where appropriate.

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

For surface flows, emphasis should be on the relationship between surface water flows and downstream water quality and ecosystem function.

### Potential Impacts and Mitigation Measures

This section should assess potential impacts on water quality environmental values identified above. It should also define and describe the objectives and practical measures for protecting water quality environmental values both in construction and operational phases (separately), to describe how nominated quantitative standards and indicators may be achieved, and how the achievement of the objectives would be monitored, audited and managed. The requirements of the EPP Water and other relevant Government legislation and policies should be discussed.

Matters to be addressed should include:

- Surface and groundwater quality, quantity, drainage patterns and sediment movements;
- The beneficial use of both surface water and groundwater;
- 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 Project area and specific construction sites during the construction phase of the Project<sup>81</sup>;
- Identify all measures to protect water quality during operation, including any proposed buffer zones and the studies undertaken to determine the appropriate width and size of such buffer zones, and the land use management practices required to achieve water quality objectives;<sup>82</sup>
- quality of water within the impoundment, being released from the impoundment and downstream under projected operating conditions and seasonal variation (including pollutant concentrations and relevant parameters such as pH, dissolved oxygen, turbidity, metals, suspended solids and temperature<sup>83</sup>). This should include a consideration of any changes in water quality as the dam fills initially after construction and as the dam level varies during operation<sup>84</sup>;

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<sup>78</sup> DoI (19.10)

<sup>81</sup> PIF (13.36), DoI (19.05)

<sup>82</sup> NRW (15.07)

<sup>83</sup> EPA (11.19)

<sup>84</sup> PIF (13.36), DoI (19.05)

- assess the potential impact for blue-green algae blooms and salt water encroachment into the lower reaches of the Mary river<sup>85</sup>, within the impoundment and downstream under projected operating conditions;<sup>86</sup>
- assess the quality of water in the impoundment and downstream for the implications for drinking water standards;<sup>87</sup>
- potential impact of water quality changes on flora and fauna in and around the impoundment and downstream, including impact on fish movement, particularly in the early years after construction<sup>88</sup>;
- 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.

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<sup>85</sup> PS (3, 35)

<sup>86</sup> EPA (11.19)

<sup>87</sup> EPA (11.19)

<sup>88</sup> DoI (19.05)

## **3.6 AIR ENVIRONMENT**

### **3.6.1 Description of Environmental Values**

This section should describe the existing air environment, which may be affected by the proposal in the context of environmental values as defined by the EP Act and *Environmental Protection (Air) Policy 1997*.

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

### **3.6.2 Potential Impacts and Mitigation Measures**

The following air quality issues should be considered:

- Describe the source, components and <sup>89</sup>quality of air emissions within the Project area expected during construction and operational activities.
- Impacts of dust generation from construction activities (including extractive industries associated with provision of construction material), especially in areas where construction activities are adjacent existing road networks or pass in close proximity to residences.
- Identification of climatic patterns that could affect dust generation and movement.
- This should also include environmental impact on terrestrial and aquatic animals and avifauna.
- Predicted changes to existing air quality from vehicle emissions and dust generation along haulage routes.
- Impacts on air quality from gaseous emissions including greenhouse gas emissions and ozone depleting substances.
- Amelioration or mitigation measures for each identified impact relating to vehicle emission, dust generation and gaseous emissions should be proposed.
- An assessment of the type and volume of greenhouse gases emitted by the Project during construction and operation and the measures taken to reduce emissions in line with national and state abatement policies and guidelines.

## **3.7 WASTE**

### **3.7.1 Waste Generation**

The EIS should identify and describe all sources of waste associated with construction, operation and decommissioning of all aspects of the Project, using schematic diagrams for each distinct phase. This section should describe all activities including:

- Chemical and mechanical processes conducted on the construction sites/camps (e.g. chemical storage, sewage treatment, power generation, fuel burning, mechanical workshop, diesel storage).
- The amount and characteristics of solid and liquid waste (including groundwater from excavations, run-off from roads, plant areas, chemical storage areas and workshops) produced on-site by the Project.
- Any waste treatment process involved, including site drainage and erosion controls.

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<sup>89</sup> PS (126)

- Selection criteria, and show on the map likely run off/stormwater discharge points.
- Hazardous materials to be stored and/or used on-site, including their Material Safety Data Sheets and environmental toxicity data and biodegradability for raw materials and final products.
- Descriptions should also include (using maps and plans as appropriate):
  - Generation points.
  - Storage methods and facilities.
  - Quantities.
  - Disposal arrangements.
  - Recycling/reuse arrangements.

The EIS should provide details of any waste water output including:

- Volume estimates of industrial and domestic effluent that would be produced at each Project site.
- Quality of effluent produced.
- Any mobile sewerage facilities to be used.
- The proposed method of disposal and extent of use of local government facilities (i.e. Council Sewerage works).

### **3.7.2 Waste Management**

Having regard for best practice waste management strategies, the *Environmental Protection (Waste Management) Policy 2000* (EPP Waste) and the *Environmental Protection (Waste Management) Regulation 2000* (EPR Waste), the proposals for waste avoidance, reuse, recycling, treatment and disposal should be described.

This section should discuss waste management strategies, including reduction, reuse, recycling, storage, transport and disposal of waste, including measures to minimise attraction of vermin, insects and pests.

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

- operational handling and fate of all wastes including storage;
- on-site treatment methods proposed for the wastes;
- 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;
- measures to ensure stability of the waste storage areas and impoundments;
- methods to prevent, seepage and contamination of groundwater from stockpiles and/or storage areas and impoundments;
- market demand for recyclable waste (where appropriate); and
- decommissioning of the construction site.

The EIS should address waste minimisation techniques and processes proposed and the market demand for recyclable waste (where appropriate).

### **3.8 NOISE AND VIBRATION**

#### **3.8.1 Description of Environmental Values**

This section should describe the existing noise and vibration environment, which may be affected by the proposal in the context of environmental values as defined by the EP Act and *Environmental Protection (Noise) Policy 1997* (EPP Noise).

Sensitive noise receptors within and adjacent to the Project area should be mapped and typical background noise levels discussed. The potential sensitivity of such receptors should be discussed and performance indicators and standards should be nominated for each affected receptor. Current background levels for noise should be surveyed or reported.

#### **3.8.2 Potential Impacts and Mitigation Measures**

The following analysis of noise impacts should be assembled:

- The levels of noise generated during construction of the all aspects of the Project and ancillary activities (e.g. access roads, camp sites) and operations should be assessed against current typical background levels.
- The potential environmental impact of noise and vibration at all potentially sensitive places, in particular, any places of work, residence, recreation, or worship, should be quantified and compared with objectives, standards to be achieved and measurable indicators.
- This should also include environmental impact on terrestrial and aquatic animals and avifauna.
- Proposals to minimise or eliminate these effects should be provided, including details of any screening, lining, enclosing or bunding of facilities, or timing schedules for construction and operations that would minimise environmental harm and environmental nuisance from noise.
- Assessment should 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.

### **3.9 TRANSPORT AND ACCESS ARRANGEMENTS**

#### **3.9.1 Transport Methods and Routes**

The EIS should describe the current existing road network and intersections of the surrounding region specifying current traffic volumes, notably on the Bruce highway, Gympie-Brooloo Road, Kenilworth-Skyring Creek Road, Tuchekeoi Road and associated access points.

The EIS should describe the proposed road network, access points and intersections of the surrounding region specifying expected traffic volumes.<sup>90</sup>

The EIS should discuss transport methods and routes for delivering construction and operational equipment and materials, other necessary goods and consumables, wastes,<sup>91</sup> and workforce transportation. Information should include:

- Volumes, tonnage, and composition of construction inputs.
- Hazardous or dangerous material that may be transported.

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<sup>90</sup> DMR (5.02)

<sup>91</sup> PS (157)

- Modes of transport (e.g. sea, rail, road) and the type of vehicles most likely to be used for transport.
- Number and type of workforce traffic and service vehicles.
- Number of trips generated (both light and heavy vehicles).
- Origin and destination of inputs and transport routes proposed (with the use of maps).
- Existing traffic volumes on the proposed transport routes.
- Details of over-dimension, excess mass loads or any hazardous goods.
- Timing and duration of transport.

The EIS should clearly and fully describe transport information for all stages of the Project including:

- All requirements for the construction, upgrading or re-location of any transport-related infrastructure, including any need for increased road maintenance.
- Any new access requirements to State-controlled or local government roads.
- Sufficient details to allow the Department of Main Roads (DMR), Queensland Transport and Local Council's to ascertain compliance with legislative and design requirements.

### **3.9.2 Potential Transport Impacts and Mitigation Measures**

Assessment of impacts for the entire area impacted by the Project, during both construction and operational phases of the Project,<sup>92</sup> should discuss the following:

- The likely impacts and mitigation strategies of new roads or road realignments that are required as a result of the Project, including impacts on all stakeholders along the routes, the delivery of emergency services,<sup>93</sup> and how these should be managed;
- The likely impacts and mitigation strategies of changed<sup>94</sup> traffic on local and regional road networks (with appropriate directional distributions), with reference to:
  - Traffic volume.
  - Travel times.<sup>95</sup>
  - Vehicle size and types, including heavy vehicle access.
  - Usage rates.
  - Road safety issues, including safe access to construction sites and the potential impacts of dust (e.g. consideration of the need for turning lanes, improved sight lines, waiting areas, off-road parking locations).
  - Reduced efficiency of traffic flows or intersections along key routes, especially during construction.
  - Additional wear/reduced life of pavements requiring additional or accelerated rehabilitation and maintenance if any.
  - Social, amenity, environmental or cultural heritage impacts of transport not covered in other sections.
  - The proposed traffic management arrangements and plans, especially within rural residential areas and steps to be taken to prevent public access to construction access ways not provided on public roads.
- Specific issues related to construction phase activities, including:
  - Site depot location and access.
  - Construction traffic on local road networks, daily movement patterns and emergency access, especially in rural residential areas.
  - Methods to be adopted to avoid obstruction to other road uses during construction.

<sup>92</sup> QT (12.03)

<sup>93</sup> DES (14.01)

<sup>94</sup> Cooloola SC (7.15)

<sup>95</sup> Cooloola SC (7.15)



- The likely impact of increased traffic on rail haulage systems (if any).
- Environmental issues relating to transport (e.g. weed management, vegetation clearing in road reserves, dust control and erosion protection) are adequately assessed and ways to ameliorate any adverse impacts are outlined.
- The impacts of construction with regard to seasonal considerations such as potential for road impacts during wet weather.

Findings of studies, assessments and implementation strategies should be incorporated into a Road-use Management Plan (RMP) in Section 4 Environmental Management Plans.<sup>96</sup>

Reference should be made to any relationship between Project road works and works proposed in the current Road Implementation Program(s) of DMR. Road infrastructure impacts should be described and assessed in accordance with Main Road's *Guidelines for Assessment of Road Impacts of Development (April 2006)*.<sup>97</sup> Reference should be made to other DMR planning documents.

### 3.10 CULTURAL HERITAGE

#### 3.10.1 Description of Environmental Values

The EIS should describe the existing environment values for cultural heritage that may be affected by the Project activities.

A cultural heritage survey (as part of the CHMP process or otherwise) should be undertaken to describe Indigenous and non-Indigenous cultural heritage sites and places, and their values, and include:

- Consultation with:
  - The Register of the National Estate.
  - The EPA regarding the Queensland Heritage Register and other information regarding places of potential non-indigenous cultural heritage significance.
  - The Department of Natural Resources<sup>98</sup> and Water regarding the Indigenous Site Database.
  - Any local Government heritage register.
  - Any existing literature relating to the affected areas.
- Liaison with representatives of relevant indigenous community/communities concerning:
  - Places of significance (including archaeological sites, natural sites, story sites etc), and appropriate involvement in field surveys.
  - Any requirements by communities and/or informants relating to selection of consultants and confidentiality of site data. Non-indigenous communities may also have relevant information.
  - Significance assessment of any cultural heritage sites/places located.
- Liaison with relevant community groups/organisations (e.g. local historical societies) concerning:
  - Places of non-Indigenous cultural heritage significance.
  - Opinion regarding significance of any cultural heritage places located or identified.
- Locations of culturally significant sites likely to be impacted by the Project construction, including:

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<sup>96</sup> DMR (5.03)

<sup>97</sup> DMR (5.04)

<sup>98</sup> DoI (19.02)

- Stone artefact scatters.
- Culturally significant flora and fauna, objects and areas of cultural value<sup>99</sup>.
- Buildings or places of cultural, historical or archaeological significance (such as Kandanga Cemetery).
- Archaeological sites, natural sites, story sites etc.
- A constraints analysis of the proposed development area to identify and record indigenous and non-indigenous cultural heritage places;
- When examining tenure, the location of mining areas with historical significance should be shown on maps.
- A report of work done which includes background research, relevant environmental data and methodology, as well as results of field surveys, significance assessment and conclusions and management recommendations (having due regard for any confidentiality requirements specified by community representatives).

As a minimum, investigations and consultation should be undertaken in such manner and detail to satisfy statutory responsibilities and duties of care, including those under the *Queensland Heritage Act 1992*, the *Aboriginal Cultural Heritage Act 2003* and the *Commonwealth Aboriginal and Torres Strait Islander Heritage Protection Act 1984*, to protect areas and objects of cultural heritage significance.

### **3.10.2 Potential Impacts and Mitigation Measures**

The Proponent should provide an assessment of any likely effects on sites of non-Indigenous or Indigenous cultural heritage values, including but not limited to the following:

- Description of the significance of artefacts, items or places of conservation or cultural heritage value likely to be affected by the proposal and their values at a local, regional and national level.
- Recommended means of mitigating any negative impacts on cultural heritage values and enhancing any positive impacts.
- Negotiations with Queensland Heritage Council (QHC) and the Qld EPA regarding management of places of historic heritage significance, taking account also of community interests and concerns.
- Documented management strategies in accordance with the outcomes of negotiations with QHC, EPA and community.

The management of aboriginal cultural heritage impacts should be detailed in either a native title agreement with Aboriginal parties or in a Cultural Heritage Management Plan (CHMP), with the native title agreement or plan to be developed in a form that complies with the provisions of Part 7 of the *Aboriginal Cultural Heritage Act 2003*, thereby meeting the cultural heritage duty of care.

The agreement or plan must provide a process for the conduct of comprehensive cultural heritage investigations and the identification of Aboriginal cultural heritage objects, areas and values in the proposed Project area. It is also to provide a process for the management of those objects, areas and values identified in the proposed Project area.

The agreement or plan should include the following:

- A process for including Aboriginal communities or Aboriginal Parties in the identification, management and protection of Aboriginal cultural heritage in the Project area;
- A process for undertaking a comprehensive and systematic cultural heritage assessment of the Project area;

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<sup>99</sup> DoC (9.12)

- Processes for the mitigation, management and protection of identified cultural heritage objects and areas in the Project area, and in any areas to be affected by development of any associated infrastructure, both during construction and operational phases of the Project;
- Provision for the management of the accidental discovery of cultural material, including burials, in the Project area;
- Processes for determining any requirements for monitoring of the Project during construction, and measures by which any monitoring program is to be implemented;
- Cultural heritage induction and awareness programs for Project staff, sub-contractors and staff, consultants and agents of the Project;
- A conflict resolution process.

The development of the agreement or plan is to be negotiated with all relevant stakeholder representatives, subject to any confidentiality specified by the Aboriginal community, registered native title applicants, and/or Aboriginal Parties as appropriate.

As a minimum, impact assessment, management and protection strategies should satisfy statutory responsibilities and duties of care, including those under the *Queensland Heritage Act 1992*, the *Aboriginal Cultural Heritage Act 2003* and the *Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (Cth)*.

### 3.11 SOCIAL AND ECONOMIC ENVIRONMENT

<sup>100</sup>This section of the EIS will:

- Describe and address the social values that may be affected by the proposal, define and describe the potential impacts of the project on the social environment and propose mitigation strategies to minimise or avoid such impacts and enhance positive impacts;
- Describe and address the local and regional economies, evaluate the overall impact of the project on the economic environment and to propose mitigation strategies to minimise or avoid such impacts and to enhance positive impacts; and
- Recommend practical mitigation strategies and include details of appropriate complaints response mechanisms.

A Social Impact Assessment should be undertaken by an experienced practitioner. The Social Impact Assessment should adhere to standard and internationally recognised social impact assessment principles and guidelines and will be a significant source of information in the identification of social issues and development of mitigation strategies.

The Community Futures Task Force and its work program are independent of the EIS process. However, elements of the Task Force work program and related stakeholder consultation will be used to inform the EIS.

For further information on the Community Futures Taskforce, please refer to: [www.communityfutures.qld.gov.au](http://www.communityfutures.qld.gov.au)

This section of the EIS will need to consider relevant issues and outcomes of the Community Futures Taskforce process, including identified mitigation strategies.

#### 3.11.1 Description of Social and Economic Environment Values

##### **Social**

This section should describe 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, recreation, industrial, educational or residential purposes should be described. In the development of this community profile, consideration should be given to:

- rural properties, farms, croplands and grazing areas;
- community infrastructure and services, access and mobility;
- population, demographics and family structure 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 status and sensitive groups;
- health and educational facilities;

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<sup>100</sup> PS (13, 96, 104)

- local government and public facilities;
- on farm activities near the proposed activities;
- current property values;
- number of properties directly affected by the Project; and
- number of families directly affected by the Project, this should include not only property owners but also families of workers either living on the property or workers where the property is their primary employment; and
- Aboriginal people's traditional and contemporary uses of the land affected by the Project.

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.

### ***Economic***

The character and basis of the local and regional economies should be addressed including:

- description of the local economy, within regional, state and national context;
- economic contribution of existing enterprises (e.g. farms, tourist activity, local business, etc) and, existing future economic opportunities;
- current local and regional economic trends, in particular drought, 'rural downturn', employment and unemployment etc;
- the existing housing market, particularly rental accommodation, which may be required for, and available to the Project workforce – construction and operation; and
- historical descriptions of large scale resource developments and their effects in the region.

With particular regard to industry, including but not limited to, tourism, manufacturing, small business and service industries<sup>101</sup>:

- describe the extent and economic importance of any industries which occur within the area directly affected by the Project;
- any established plans and policies for the development of industry;<sup>102</sup>
- describe sites which may be impacted upon by the Project;
- describe the local and regional industrial water users and current average volume requirements for water in the catchment; and
- outline the use and purpose of the water used.

With particular regard to primary industries:

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<sup>101</sup> TFTWID (8.03)

<sup>102</sup> TFTWID (8.03)

- describe the extent and economic importance of primary industries undertaken within the catchment which may be impacted upon by the Project;
- describe the local and regional primary industry water users and current average volume requirements for water;
- outline the use and purpose of the water used;
- describe the extent and economic importance of any mining and quarry operations within the impact area which may be impacted upon by the Project; and
- describe any other identified economic mineral or quarry deposits which may be impacted upon by the Project.

### **3.11.2 Potential Impacts and Mitigation Measures**

#### **Social**

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

The social impact assessment of the Project should consider the information gathered in the community consultation program and the analysis of the existing socio-economic environment, and describe the Project's impact, both beneficial and adverse, on the local community. The impacts of the Project 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 assessment of impacts should describe the likely response of affected communities and identify possible beneficial and adverse impacts (both immediate and cumulative). These impacts should be considered both at the regional and local level.

The EIS, through various assessments, should address the following matters:

- impacts on affected landholders and communities - e.g. property values and local authority rates
- impacts on current land uses (e.g. existing agricultural & grazing uses, etc) and existing lifestyles and enterprises;
- impacts on Aboriginal people's traditional and contemporary uses of the land;<sup>103</sup>
- impacts on demographic, social, cultural and economic profiles;
- impacts on labour markets, with regard to the source of the workforce, including the potential impact on the local labour market with regard to the availability of labour for local industry<sup>104</sup>;

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<sup>103</sup> DoC (9.15)

- impacts of construction 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 Project construction is to be discussed;
- impact of the Project on public health and safety of adjacent communities, including such impacts as noise, dust, waste, transport, biting insects, water borne diseases<sup>105</sup> and other hazards, including stress impacts<sup>106</sup>;
- intrusion;
- community severance;
- impacts on recreation and tourism, including changes to visitor numbers, access patterns and visitor activities<sup>107</sup>;
- impacts on existing local resident values and aspirations; and
- impacts on places of value to the community or individuals (e.g. Kandanga Cemetery).

In particular, with regards to the workforce impacts, the following should be addressed:

- estimates should be provided of:
  - a) construction workforce - i.e. the number of workers to be employed on-site during the construction activities, including the number of sub-contractors and an outline of the recruitment schedule and policies for the recruitment of workers
  - b) commissioning and operational phase workforce - i.e. the number of workers to be employed on-site during any commissioning and operational activities.
- With respect to accommodation of workers, the EIS should, if relevant, provide:
  - an estimate of the number of additional employees that may be housed in the existing facilities;
  - an estimate of the number of new workers who may be accompanied by dependents;
  - a description of the existing facilities, and the circumstances of workers currently occupying the accommodation (i.e. single or accompanied);
  - the spare capacity of the existing facilities and their suitability for housing the new workforce;
  - details of the tenure of the existing facilities;
  - the size of the private rental market in the catchment area, including caravan parks, backpacker hostels, hotel and motel accommodation;

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<sup>104</sup> Cooloola SC (7.18), PIF (13.42), PS (172)

<sup>105</sup> PS (4)

<sup>106</sup> DoC (9.16)

<sup>107</sup> DoI (19.11)

- the current vacancy rate of rental accommodation, including an assessment of seasonal fluctuations;
- the availability and median cost of housing for purchase in the catchment area;
- any identified constraints and opportunities for new housing construction in the catchment area, including the capacity of the local land development and housing construction industries to provide new housing; and
- impact of the Project workforce on local human services (e.g. education and health facilities), and local community and social recreational environments.

For the construction and operational phases of the Project, the following should be discussed/described:

- the effects of the Project on local residents, including land acquisition and relocation issues and property valuation and marketability, community services and recreational activities;
- the potential mechanisms for local communities and businesses to meet contracts for services and supplies for the construction, rehabilitation and operation phases of the Project;
- strategies for local residents including members of Indigenous communities interested in employment opportunities, which would identify skills required for the Project and initiate appropriate recruitment and training programs;
- the potential environmental impacts on the amenity of adjacent areas used for rural pursuits;
- the implications of the proposal for future developments in the local area including introduced constraints on surrounding land uses, and opportunities that would be created by the Project<sup>108</sup>; and
- strategies responding to Government Policy relating to:
  - The level of training provided for construction contracts on Queensland Government building and construction contracts - *The State Government Building and Construction Contracts Structured Training Policy (the 10% Policy)*.
  - Indigenous employment opportunities - *Indigenous Employment Policy for Queensland Government Building and Civil Construction Projects (the 20% Policy)*.
  - The use of locally sourced goods and services – *Department of State Development, Trade and Innovation Local Industry Policy*.

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<sup>108</sup> TFTWID (8.03)



## ***Economic***

An economic analysis, including a cost-benefit analysis, should be presented from National, State, regional and local perspectives as appropriate to the scale of Project, and the general economic benefits from the Project should be described.

The economic analysis component of the EIS should consider:

- the significance of this Project on the local and regional economic context;
- 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;
- the value of lost opportunities or gained opportunities for other economic activities anticipated in the future; and
- impacts on local property values.

Direct and indirect impact of the Project on the regional, state and national economies in terms of direct and indirect effects on employment, income, supply of goods and services and production.

For identified impacts to social and economic values, suggest mitigation and enhancement strategies<sup>109</sup>. Practical monitoring regimes should also be recommended.

## **3.12 HAZARD AND RISK**

### ***3.12.1 Hazard Analysis***

This section of the EIS should describe the potential hazards and risks that may be associated with the Project. A preliminary hazard analysis should be conducted for the Project. The preliminary hazard analysis should incorporate all known hazards, which may include:

- Possible frequency of potential hazards, accidents, spillages and abnormal events occurring during all stages of the Project.
- Indication of cumulative risk levels to surrounding land uses.
- Identification of all hazardous substance to be used, stored, processed or produced and the rate of usage.
- Potential wildlife hazards such as snakes and disease vectors.
- An overview of the objectives and management principles to be adopted for the preparation of a detailed emergency plan (including emergency response and recovery/cleanup procedures) in consultation with the relevant emergency services.
- An outline of the public liability of the State for private infrastructure and visitors on public land.

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<sup>109</sup> Cooloola SC (7.22)

### **3.12.2 Risk Assessment**

- A preliminary risk assessment for all components of the Project (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*.
- The EIS should deal comprehensively with on-site risks. External risks to the Project should also be considered. External risks from natural hazards could be determined on the basis of *AS/NZS Risk Management Standard 4360:1999*.
- The study should assess risks during the construction, operational and decommissioning phases associated with the Project. These risks should be assessed in quantitative terms where possible.
- Possible hazards, accidents, and abnormal events that may arise for the Project, both during construction and in operation should be described, including:
  - Accidental release of hazardous goods or other materials.
  - Explosions and fires associated with incidents arising from the Project activities.
  - Seismic stability of the Project area.
  - Vulnerability of the Project area to flooding, bushfire, and landslip.
- Analysis of the consequences of each of these events on safety and environmental damage in the Project area should be conducted, including:
  - Injuries and death to workers and to the public.
  - Direct harm to the environment as a result of project hazards.
- The analysis should examine the likelihood of these consequences being experienced, both individually and collectively.
- Quantitative levels of risks and risk contours should be presented from the above analysis.
- Details should be provided on the safeguards that would be employed or installed to reduce the likelihood and severity of hazards, consequences and risks to persons, fauna and environmentally sensitive sites within and adjacent to the Project area. The information should include the reduced level of risk that would be experienced with these safeguards in place.
- A comparison of assessed and mitigated risks with acceptable risk criteria for land uses adjacent to the Project area should be presented.

### **3.12.3 Emergency Management Plan**

An outline of the proposed emergency management procedures is to be provided for the range of situations identified in the above risk assessment as providing measurable risks.

The following should also be presented:

- Contingency plans to deal with hydrocarbon (e.g. diesel, lubricating oils) oil spills during construction, operation and maintenance of the project.
- Contingency plans to account for natural disasters such as storms, floods and fires during the construction, operation and maintenance phases.
- Emergency planning and response procedures that have been determined in consultation with State and regional emergency service providers.
- Plans for involvement of the relevant State agencies (such as the Queensland Ambulance Service) in relation to emergency medical response and transport and first aid matters.

### 3.13 CUMULATIVE IMPACTS

The purpose of this section is to provide clear and concise information on the overall impacts of the Project, 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 should 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, the Mary Basin WRP and any relevant Integrated Catchment Management Plans should be addressed.

In assessing the cumulative impacts of the Project, the proportion and length of the Mary River that is currently impounded (at FSL) and the resulting changes to those figures from other projects (e.g. raising of Borumba Dam) should be determined. The methodology to be used to determine the cumulative impacts of the Project should be discussed. The methodology should 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 Project should be assessed.

An assessment of the cumulative impacts across all relevant issues on local Governments should be undertaken, including the sustainability of ongoing local Government arrangements.<sup>110</sup>

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<sup>110</sup> Cooloola SC (7.16)

## 4. Environmental Management Plans

This section of the EIS should present draft environmental management plans (EMPs) developed for the Project. Separate EMPs should individually address the discrete Project elements. The EMPs should be developed from and be consistent with the preceding information in the EIS.

An EMP should provide life-of-proposal control actions in accordance with agreed performance criteria for specified acceptable levels of environmental harm. In addition, EMPs should identify:

- Potential impacts on environmental values;
- Mitigation strategies;
- Relevant monitoring;
- Appropriate indicators and performance criteria;
- Reporting requirements; and
- Appropriate corrective actions, should an undesirable impact or unforeseen level of impact occur.

The aims of an EMP are to provide:

- Commitments by the Proponents to practical and achievable strategies and design standards (performance specifications) for the management of the Project to ensure that environmental requirements are specified and complied with;
- An integrated plan for comprehensive monitoring and control of impacts;
- Local, State and Commonwealth authorities, stakeholders and the Proponents with a common focus for approvals conditions and compliance with policies and conditions; and
- The community with evidence that the environmental management of the Project is acceptable.

The recommended structure of each element of the EMP is:

<b>Element/issue:</b>	Aspect of construction or operation to be managed (as it affects environmental values).
<b>Operational Policy:</b>	The operational policy or management objective that applies to the element.
<b>Performance Criteria:</b>	Measurable performance criteria (outcomes) for each element of the operation.
<b>Implementation Strategy:</b>	The strategies, tasks or action program (to nominated operational design standards) that would be implemented to achieve the performance criteria.
<b>Monitoring:</b>	The monitoring requirements to measure actual performance (i.e. specified limits to pre-selected indicators of change).
<b>Auditing:</b>	The auditing requirements to demonstrate implementation of agreed construction and operation environmental management strategies and compliance with agreed performance criteria.
<b>Reporting:</b>	Format, timing and responsibility for reporting and auditing of monitoring results.

**Corrective Action:** The action (options) to be implemented in case a performance requirement is not reached and the person(s) responsible for action (including staff authority and responsibility management structure).

An EMP should commit to manage, enhance or protect identified environmental values. The commitments should contain the following components for performance criteria and implementation strategies:

- Environmental protection objectives for enhancing or protecting each relevant value;
- Indicators to be measured to demonstrate the extent to which the environmental protection objective is achieved;
- Environmental protection standards (a numerical target or value for the indicator), which defines the achievement of the objective; and
- An action program to ensure the environmental protection commitments are achieved and implemented. This will include strategies in relation to:
  - a. Continuous improvement;
  - b. Environmental auditing;
  - c. Monitoring;
  - d. Reporting;
  - e. Staff training; and
  - f. A decommissioning program for land proposed to be disturbed under each relevant aspect of the proposal.

The EMP should also include a mechanism to receive complaints from the community and stakeholders, and a process to demonstrate that these complaints have been appropriately considered and any required mitigation measures implemented within a timely fashion, and that these actions have been communicated to the complainant<sup>111</sup>.

## 5. Conclusions and Recommendations

The EIS should make conclusions and recommendations with respect to the proposal, based on the studies presented, the Environmental Management Plans and conformity of the proposal with legislative and policy requirements.

## 6. References

All references used in the preparation of the EIS should be presented in a recognised format such as the Harvard standard (refer to the Style Guide, Australian Government Publishing service).

## 7. Recommended Appendices

### 7.1 FINAL TERMS OF REFERENCE

The finalised Terms of Reference should be included as an Appendix to the EIS.

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<sup>111</sup> DoC (9.11)

## **7.2 DEVELOPMENT APPROVALS**

A list of the development approvals required by the Project should be provided.

## **7.3 CONSULTATION REPORT**

A list of advisory agencies should be provided in a summary Consultation Report, which should also list the Commonwealth, State and Local government agencies consulted, and the individuals and groups of stakeholders consulted. A summary of the issues raised by these groups, and the means by which the issues have been addressed, should be provided in the text of the EIS.

The EIS should 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 should include the methodology used in the community consultation program, including criteria for identifying stakeholders and the communication methods used.

Within the bounds of any confidentiality agreements between the parties, the EIS should include a summary report on consultation to date with the registered native title claimants, Native Title Representative Body and relevant Indigenous Corporations and Indigenous community representatives within the proposed project site.<sup>112</sup>

Information about identifying affected parties (as defined by the EPBC Act) and interested and/or affected persons (as defined by the EP Act) should be included.

## **7.4 STUDY TEAM**

The qualifications and experience of the study team and specialist sub-consultants should be provided.

## **7.5 TECHNICAL DATA AND BASELINE STUDIES**

Relevant supporting data and information generated from specialist studies undertaken as part of the EIS are to be included as appendices. These may include:

- Geology;
- Soil survey and land suitability studies;
- Land use and land capability studies;
- Waterway hydrology and groundwater;
- Flora and fauna studies;
- Air pollution, noise and vibration;
- Transport and traffic studies;
- Economic and Social studies and/or cost-benefit analyses; and
- Hazard and risk studies.

## **7.6 LIST OF PROPONENT COMMITMENTS**

A list of all commitments made by the Proponents in the EIS should be provided, together with a reference to the relevant section in the EIS.

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<sup>112</sup> DoC (9.19)