



# Northern Link Road Tunnel Project

## Terms of Reference for an Environmental Impact Statement

Under Part 4 of the Queensland *State Development and Public Works  
Organisation Act 1971*

**The Coordinator-General**

April 2008



## PROJECT AND PROCESS INFORMATION

### Project proponent

The proponent for the Northern Link Road Tunnel Project is Brisbane City Council (BCC).

The contact details for the proponent are:

Brisbane City Council  
Major Infrastructure Projects Office  
Level 2, 171 George Street  
BRISBANE QLD 4000  
tel: 1800692333 (freecall)  
[www.northernlinkeis.com.au](http://www.northernlinkeis.com.au)

### Project summary

The Northern Link Road Tunnel ('the project') would link the Western Freeway at Toowong with the Inner City Bypass near Victoria Park in Herston, and in doing so, would provide a link for road based cross-city trips, including freight, from the western suburbs to Australia TradeCoast (North). BCC's own preliminary studies have indicated that existing demand for these trips is significant and is forecast to increase due to population growth and continued economic development.

The project is included in Council's *Long Term Infrastructure Plan, Draft Transport Plan for Brisbane 2006-2016* and *TransApex* initiative as part of its approach to addressing the city's transport needs. Other elements might include strategies for managing travel demand through changes in travel behaviour (with an emphasis on a shift to public transport), and an integrated approach to land use and transport planning.

The *South East Queensland (SEQ) Regional Plan 2005-2026* and the *SEQ Infrastructure Plan and Program 2007 - 2026 (SEQIPP)* anticipate further investigations into the TransApex projects, including Northern Link, by Council. The SEQ Regional Plan recognises the significant role played by Council in transport in the region. The 2006 SEQIPP recognised that if the project is feasible, Northern Link has the potential to ease traffic congestion on the western city corridors of Coronation Drive and Milton Road.

The project proposal is for two parallel tunnels between the Western Freeway and the Inner City Bypass. There could be transition structures constructed to provide connection with the surface road network. The concept design for the project will be developed in conjunction with preparation of the Environmental Impact Statement (EIS) and will determine the form and location of the surface connections. Options for additional connectivity to the arterial road network will also be investigated in the development of the project. The EIS will also consider the project's potential to support public transport, by operating bus services from the western suburbs to the central city and beyond.

The Initial Advice Statement (IAS), prepared by the proponent, provides further information relating to the project. The IAS provides a general indication of the possible project route. Since the draft Terms of Reference (ToR) were released for public comment on 1 December 2007, the proponent has progressed with its preliminary investigations to support the concept development for the Northern Link Road Tunnel. Among the aspects being considered are the range of possible locations for worksites to support the construction of the project, and the areas in which the ventilation outlets could be situated, should a longitudinal ventilation system be proposed. To maintain flexibility in the development of sustainable construction methods and ventilation system design, the study corridor boundary has been extended to include additional land between Mount

Coot-tha Road and the Western Freeway, west of Frederick Street and additional land east of Kelvin Grove Road and north of the Exhibition Line railway. The final configuration of the worksites and ventilation system will be determined during development of the reference project, in conjunction with the impact assessment process and community consultation. The study corridor, being the area subject to primary investigation for the EIS, is shown in **Figure 1**.

Other areas of the city potentially affected by the project (e.g. traffic impacts beyond the study corridor during the construction and operation of the project) will be investigated to a level of detail commensurate with the degree of the project's influence.

## **Relationship with other projects**

In August 2005, the Coordinator-General (CG) recommended that the North-South Bypass Tunnel (NSBT) could proceed subject to the recommendations and conditions in the CG's Report on the EIS for that project. NSBT is currently under construction and is expected to be operational in 2010. In May 2007, the CG recommended that the Airport Link project could proceed subject to the recommendations and conditions in the CG's Report on the EIS for that project. Assessments relating to identification of the preferred bidder for Airport Link are being made, with a preferred bidder expected to be identified in mid 2008, construction anticipated to commence by late 2008, and operation around 2012. In 2007 Council formed the Hale Street Link Alliance to deliver the design and construction of the Hale Street Bridge. The project is currently in detailed design phase and is expected to open for operation by mid 2010. The EIS for the Northern Link Road Tunnel project will assess the potential impacts of both its construction and operation on the NSBT, the Airport Link project and the Hale Street Link in the context of the overall Brisbane transport network.

As far as is practicable, the project EIS will discuss the relationship between the project and the contemporary transport plans, strategies and studies for SEQ.

## **Administrative details for these Terms of Reference**

On 31 October 2007, the CG declared that the project is a 'significant project for which an EIS is required', pursuant to Section 26(1)(a) of the Queensland *State Development and Public Works Organisation Act 1971* (SDPWO Act). Pursuant to this Act, the CG establishes appropriate ToR to guide the proponent through the necessary studies leading to the preparation of a comprehensive EIS for the project.

On 2 November 2007, the proponent referred the project to the Australian Department of Environment, Water, Heritage and the Arts for consideration as to whether the project constitutes a 'controlled action' under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) with respect to potential impact on matters of National Environmental Significance (referral ref: 2007/3824). The delegate of the Minister for the Environment, Water, Heritage and the Arts decided on 30 November 2007 that the project is not a 'controlled action' under the EPBC Act.

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

The first step in the impact assessment process is the development of these ToR for an EIS for the project to satisfy the requirements of the SDPWO Act. The process involved the formulation of draft ToR that were made available for public and Advisory Agency comment. When finalising the ToR the CG considered all properly made submissions. The ToR were then presented to the proponent.

The proponent will prepare an EIS to address the ToR. Once the EIS has been prepared to the satisfaction of the CG, a public notice will appear in relevant newspapers circulating in the district, and state. The notice will state: a description of the project, where copies of the EIS are available for inspection and the close of the submission period.

Arising from this review process, the proponent may be requested to provide a response to the comments received on the EIS and to make any consequential changes to the project to address the comments through a Supplementary EIS Report.

At the completion of the EIS phase, the CG will prepare a report evaluating the EIS and other relevant material, pursuant to s.35 of SDPWO Act. In preparing this report, the CG may determine that the project may not proceed, may proceed without conditions or recommendations, or proceed subject to recommendations and specific conditions of development to manage adverse impacts associated with the project.

With respect to any subsequent development application for a material change of use or requiring impact assessment under the *Integrated Planning Act 1997* (IPA) for the project, the EIS process under Part 4, Division 4 of the SDPWO Act:

- replaces the information and referral stage and the notification stage under the Integrated Development Assessment System (IDAS) of the IPA;
- means that until the development approval applied for has effect, the CG's Report is taken to be the concurrence agency's response under IDAS (i.e. there are no concurrence agencies); and
- provides that properly made submissions received in relation to the EIS are taken to be 'properly made submissions' 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 any development approval;
- that the development approval must be for part only of the development; and
- that the approval must be a 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 the development approval must be refused.

Where another Act (for example *Environmental Protection Act 1994*) requires the preparation of an EIS, or similar statement to address the environmental effects of the project, this EIS can be taken as a statement satisfying those requirements. Where approval is required under another Queensland Act, the CG's Report may recommend to the person who will consider an approval required for the project that:

- approval for the project be refused; or
- stated conditions are imposed on the approval.

Alternatively, the CG's Report may recommend that there are no conditions to be attached to any approval given under another Act.

Where the ToR are addressed for a particular stage of the process under section 32 of the SDPWO Act, the proponent should identify the particular stage and the ToR addressed for that stage.

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

Advertisements inviting public comment on the draft ToR for the project were placed in The Courier Mail newspaper on 1 December 2007 and local newspapers the following week. Notification was also provided on the DIP website.

The submission period closed on 31 January 2007. A total of 26 submissions were received, including one from a State Member of Parliament, 14 from Advisory Agencies, one from the proponent, three from local area interest groups and other organisations and eight from members of the public. Copies of all submissions were sent to the proponent.

All submissions have been reviewed and considered by the CG in finalising the ToR.

The ToR are presented in two broad categories:

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

The CG's contact details for any further enquiries are:

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Infrastructure Development Division

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# CONTENTS

<b>PROJECT AND PROCESS INFORMATION</b> .....	<b>II</b>
Project proponent.....	ii
Project summary .....	ii
Relationship with other projects.....	iii
Administrative details for these Terms of Reference.....	iii
Results of Consultation on these Terms of Reference .....	v
<b>PART A – INFORMATION AND ADVICE ON THE PREPARATION OF THE ENVIRONMENTAL IMPACT STATEMENT (EIS)</b> .....	<b>4</b>
<b>1 INTRODUCTION</b> .....	<b>4</b>
<b>2 EIS OBJECTIVES</b> .....	<b>4</b>
<b>3 EIS PREPARATION GUIDELINES</b> .....	<b>5</b>
<b>4 ADVISORY AGENCY CONSULTATION</b> .....	<b>6</b>
<b>5 GENERAL STYLE AND FORMAT</b> .....	<b>7</b>
<b>6 TERMS OF REFERENCE GLOSSARY</b> .....	<b>7</b>
<b>PART B – SPECIFIC REQUIREMENTS – CONTENTS OF THE EIS</b> .....	<b>9</b>
<b>EXECUTIVE SUMMARY</b> .....	<b>9</b>
<b>GLOSSARY OF TERMS</b> .....	<b>9</b>
<b>1 INTRODUCTION</b> .....	<b>9</b>
1.1 The proponent .....	10
1.2 Purpose of the EIS.....	10
1.3 The EIS process .....	10
1.4 The public consultation process .....	11
<b>2 BACKGROUND AND PROJECT RATIONALE</b> .....	<b>11</b>
2.1 Background.....	12
2.2 Need for the project .....	12
<b>3 PROJECT DESCRIPTION</b> .....	<b>13</b>
3.1 Project development.....	13
3.2 Construction arrangements (including decommissioning of the construction site) .....	13
3.3 Design.....	14
3.4 Other infrastructure requirements - utility services.....	15
3.4.1 Description of existing environment.....	15
3.4.2 Potential impacts and mitigation measures .....	15
3.5 Permits, licences and approvals and planning standards .....	15
3.6 Rehabilitation of construction sites .....	15
<b>4 TRAFFIC AND TRANSPORT</b> .....	<b>16</b>
4.1 Description of existing transport network.....	16
4.2 Transport network performance .....	16
4.3 Description of traffic forecasting methodology .....	16
4.4 Forecast future base traffic conditions (no project) .....	17

4.5	Effects of the project .....	17
4.6	Construction impacts .....	19
4.7	Pedestrian and cyclist issues .....	20
4.7.1	Description of environment .....	20
4.7.2	Potential impacts and mitigation measures .....	20
<b>5</b>	<b>ENVIRONMENTAL VALUES AND MANAGEMENT OF IMPACTS.....</b>	<b>20</b>
5.1	Geomorphology/geology/soils .....	20
5.1.1	Description of existing environment.....	20
5.1.2	Potential impacts and mitigation measures .....	21
5.2	Hydrology.....	22
5.2.1	Description of existing environment.....	22
5.2.2	Potential impacts and mitigation measures .....	24
5.3	Air quality .....	26
5.3.1	Description of existing environment.....	27
5.3.2	Potential impacts and mitigation measures - construction .....	27
5.3.3	Potential impacts and mitigation measures - operation.....	28
5.3.4	Impacts of greenhouse gas emissions .....	29
5.4	Noise and vibration .....	30
5.4.1	Description of existing environment.....	30
5.4.2	Potential impacts and mitigation measures - construction .....	30
5.4.3	Potential Impacts and mitigation measures - operational.....	31
5.5	Flora and fauna.....	31
5.5.1	Description of existing terrestrial environment.....	31
5.5.2	Description of existing aquatic environment.....	32
5.5.3	Potential impacts and mitigation measures .....	32
5.6	Land use and planning .....	33
5.6.1	Description of existing environment.....	33
5.6.2	Potential impacts and mitigation measures .....	34
5.7	Urban design, landscape and visual amenity.....	34
5.7.1	Description of existing environment.....	34
5.7.2	Potential impacts and mitigation measures .....	35
5.8	Cultural heritage .....	35
5.8.1	Description of existing environment.....	35
5.8.2	Potential impacts and mitigation measures .....	36
5.9	Social environment .....	37
5.9.1	Description of existing environment.....	37
5.9.2	Potential impacts and mitigation measures .....	37
5.10	Economic environment .....	38
5.11	Waste management.....	39
5.12	Hazard and risk.....	39
5.12.1	Description of existing environment.....	39

5.12.2 Potential impacts and mitigation measures ..... 40

5.13 Health and Safety ..... 40

5.14 Cumulative Impacts ..... 41

**6 ENVIRONMENTAL MANAGEMENT PLAN ..... 42**

**7 CONCLUSION AND RECOMMENDATIONS ..... 43**

**8 REFERENCES ..... 43**

**9 RECOMMENDED APPENDICES ..... 43**

9.1 Terms of Reference for this EIS ..... 43

9.2 Consultation report ..... 43

9.3 Study team..... 43

9.4 Specialist studies ..... 43



# **PART A – INFORMATION AND ADVICE ON THE PREPARATION OF THE ENVIRONMENTAL IMPACT STATEMENT (EIS)**

## **1 INTRODUCTION**

These Terms of Reference (ToR) for an EIS for the Northern Link Road Tunnel project ('the project') are in accordance with the requirements of the *State Development and Public Works Organisation Act 1971* (SDPWO Act).

These ToR identify those matters that should be addressed in the EIS.

The nature and level of investigations should be relative to the anticipated project benefits and likely extent and severity of impacts. The state government, from which the proponent may require approvals, may request additional information on any matter not adequately dealt with in the EIS. The proponent is required to contact relevant government agencies and peak bodies representing particular areas of interest in the wider community to clarify the required nature and level of investigations.

Reference to any culturally sensitive confidential information should be indicative only. Disclosure of any such information must be negotiated with traditional custodians. Other confidential information supplied by or to the proponent must be clearly identified and placed in discrete attachments to the main report, together with a statement of confidentiality.

An executive summary should be provided in the EIS and be available separately for public information.

## **2 EIS OBJECTIVES**

The objectives of the EIS are:

- to provide the justification of the project;
- to assess alternatives to achieve the project objectives stated in the IAS;
- to identify potential environmental, social and economic impacts and to ensure that any potentially adverse impacts are avoided or mitigated and managed where possible; and
- to identify potential community benefits, including environmental, social and economic benefits.

Potential direct, indirect and cumulative impacts of the project, during both its construction and operation, must be comprehensively identified and examined. For each potential impact identified in this study, strategies to avoid or to mitigate and manage the impact are required. The EIS should be a stand-alone and comprehensive document containing sufficient information to make an informed decision on the potential impacts and on the adequacy of the strategies identified to avoid or manage them. The document should provide:

- For interested bodies and persons:
  - a basis for understanding the project;
  - alternatives for the proposed project reference design;

- the existing environment that it would affect, both on and off the site, and in relation to other major social and engineering infrastructure coordination;
- the impacts that may occur;
- the measures to be taken to mitigate all adverse impacts; and
- possible legislative approvals and delivery mechanisms;
- For groups or persons with rights or interests in land:
  - an indication of project impacts on that land including access and measures to mitigate identified adverse impacts; and
- For the CG and Advisory Agencies, a framework against which to:
  - consider the economic, social and environmental aspects of the project in view of legislative and policy provisions and decide whether the project can proceed or not;
  - set conditions for approval, as appropriate, to seek to achieve economically, socially and environmentally sustainable development; and
  - where necessary, recommend an environmental management and monitoring program.

The proponent must identify and address, as fully as possible, the matters relevant to the project in complying with the statutory requirements for EIS preparation.

### **3 EIS PREPARATION GUIDELINES**

The key principle is that there should be sufficient detail presented in the EIS to enable readers to identify and understand the benefits and to balance those against the impacts of the project on the natural, social, economic and built environment, including existing infrastructure. Readers are likely to include representatives of Commonwealth, state and local governments, special interest groups and the general public. The EIS should contain sufficient information to avoid the need to search out previous or additional reports.

The EIS should state the criteria and assumptions adopted in assessing the project and its impacts, such as compliance with relevant legislation, policies, standards, community acceptance and maximisation of economic, social and environmental benefits and minimisation of risks.

The level of analysis and detail in the EIS should reflect the level of significance of the expected benefits to and impacts on the environment.

The EIS should identify the anticipated life of the project and additional information on options for the on-going management of the project, where reasonable, taking into account the current planning phase of the project.

The EIS should identify reasonable economic and technically achievable measures to ensure that the adverse impacts of the project are limited to acceptable levels and that the benefits are captured.

The EIS should include analysis of any cumulative benefits and impacts on economic, social and environmental values directly caused by the project. The cumulative benefits and impacts of the project must be considered over time and in conjunction with other major projects, approved and known to be proceeding at the time of commencement of operations of the project.

The EIS should state the following about information given in the EIS:

- the source of the information;

- how recent the information is;
- how the reliability of the information was tested; and
- any assumptions and uncertainties in the information.

All uncertainties in the assessment and assumptions made should be clearly stated. Where possible, information provided in the EIS should be clear, logical, objective and concise, so that non-technical persons may easily understand it. Where appropriate, text should be supported by maps and diagrams. Factual information contained in the document should be referenced wherever possible. Where applicable, aerial photography and/or digital information should be presented.

The terms “describe”, “detail” and “discuss” should be taken to include both quantitative and qualitative matters as practicable and meaningful. Similarly, adverse and beneficial effects should be presented in quantitative and/or qualitative terms as appropriate. Within these ToR the term “project” includes all activities and ancillary works undertaken on lands related to the project.

Should the proponent require any information about the project to remain confidential, such information should be made available, where appropriate, for the consideration of the Coordinator-General.

A listing of all Advisory Agencies for the EIS process should be provided in the EIS.

Copies of the prepared EIS should be lodged with the CG for distribution for comment and review during the public review period. In addition, an electronic version of the EIS is to be provided to the CG to be made available through the CG’s web site or through a link to a web site maintained by the Proponent or its consultants.

The final nature and number of EIS copies required to be submitted and made available, should be discussed and agreed with the CG during the EIS process. Copies of the EIS should also be prepared for distribution to relevant libraries and other key Government offices. Documents are to be made available in both CD-ROM and hard copy format, at a cost not exceeding the cost of reproduction.

While every attempt has been made to ensure that these ToR address all of the major issues associated with this project, they are not necessarily exhaustive and should not be interpreted as excluding from consideration matters deemed to be significant or matters currently unforeseen, that emerge as important or significant during scientific studies, from public consultation, or otherwise, during preparation of the EIS.

## **4 ADVISORY AGENCY CONSULTATION**

To facilitate the assessment process, the proponent (Brisbane City Council) should consult with Advisory Agencies and other appropriate stakeholders as required during the EIS process. The purpose of this consultation will be in part to identify legislation, policies and methodologies relevant to the assessment of the proposed project.

Advisory Agencies should include but are not limited to:

Department of Communities (DoC) and Disability Services Queensland (DSQ)

Department of Emergency Services (DES)

Department of Employment and Industrial Relations (DEIR)

Department of Housing (DoH)  
Department of Infrastructure and Planning (DIP)  
Department of Local Government, Sport and Recreation (DLGSR)  
Department of Main Roads (DMR)  
Department of Mines and Energy (DME)  
Department of Natural Resources and Water (NRW)  
Department of the Premier and Cabinet (DPC)  
Department of Primary Industries and Fisheries (DPIF)  
Department of Public Works (DPW)  
Department of Tourism, Regional Development and Industry (DTRDI)  
Environmental Protection Agency (EPA)  
Queensland Health (QH)  
Queensland Police Service (QPS)  
Queensland Rail (QR)  
Queensland Transport (QT)  
Queensland Treasury (Treasury)

## **5 GENERAL STYLE AND FORMAT**

The EIS should be written so that any conclusions reached can be independently assessed. This means that all sources must be appropriately referenced. The EIS should be written in a format matching the ToR or include guidelines, preferably as an appendix, describing how the EIS responds to the ToR. The EIS is to include a draft Outline Environmental Management Plan (EMP) as a framework for addressing potential environmental impacts during both the construction and operational phases of the project.

The EIS should also include appendices containing:

- a copy of the ToR;
- a consultation report that lists the persons and agencies consulted during the EIS; and
- the detailed specialist studies that support the main EIS document.

Maps, diagrams and other illustrative material should be included in the EIS as appropriate.

## **6 TERMS OF REFERENCE GLOSSARY**

The following abbreviations and terms have been used in this document:

CG – The Coordinator-General;

DES – Department of Emergency Services

DIP – Department of Infrastructure and Planning

DMR – Department of Main Roads

NRW – Department of Natural Resources and Water;

DPIF – Department of Primary Industries and Fisheries;

EIS – Environmental Impact Statement;

EMP – Environmental Management Plan;

EPA – Environmental Protection Agency;

EPP – Environmental Protection Policy

EPBC Act – (Commonwealth) *Environment Protection and Biodiversity Conservation Act 1999*;

QT – Queensland Transport;

The project – the Northern Link Road Tunnel project

SDPWO Act – *State Development and Public Works Organisation Act 1971*

**"sensitive place"** means:

- a dwelling, residential allotment, or other residential premises; or
- an educational institution; or
- a medical centre or hospital.

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# **PART B – SPECIFIC REQUIREMENTS – CONTENTS OF THE EIS**

## **EXECUTIVE SUMMARY**

The executive summary should be written as a stand-alone document, able to be reproduced on request for interested parties who may not wish to read the EIS as a whole. Though focused on the key issues, the structure of the executive summary should follow that of the EIS, allowing the reader to obtain a clear understanding of the project, its environmental, social and economic implications and management objectives. Using maps diagrams and photographs where appropriate, the summary should include:

- the title of the project;
- name and contact details of the proponent and the proponent's commitment to effective environmental management;
- a concise statement of the aims and objectives of the project;
- the legal framework, decision-making authorities and involved agencies;
- a discussion of the background to, the need for, and the justification of the project, including the consequences of not proceeding with the project;
- a discussion of the alternative options assessed and the criteria leading to the choice of the project reference design;
- a brief description of the project for each of the pre-construction, construction and operational activities, and the existing environment into which the project will be placed;
- a brief discussion of the relationship between the project and other known major planning studies or projects in the vicinity of the study corridor;
- a summary of relevant, projected population, employment, travel and congestion indicators which will demonstrate the traffic and transport need for the project; and
- an outline of the principal economic, social and environmental benefits and impacts predicted and proposed management strategies and commitments to minimise the significance of potentially adverse impacts.

## **GLOSSARY OF TERMS**

A glossary of technical terms, acronyms and references should be provided.

## **1 INTRODUCTION**

The introduction should clearly explain the function of the EIS, why it has been prepared and what it sets out to achieve. The introduction should define the audience for whom the EIS is intended and contain an overview of the structure of the document.

## 1.1 The proponent

This section is to describe the proponent in terms that are relevant to the proposed project and to outline the experience, the nature and extent of business activities, the environmental record and the environmental policies of the proponent.

## 1.2 Purpose of the EIS

The purpose and role of the EIS are to be outlined, including the EIS's role in providing inputs to the development of concepts and the preliminary design of the project, its purpose in guiding the project to compliance with regulatory requirements, and responding to the ToR. The objectives of the EIS should be to:

- provide public information on the need for and likely effects of the project on the natural, social and economic environment;
- set out acceptable standards and levels of impact (both beneficial and adverse) on environmental values; and
- demonstrate how these impacts can be managed.

The audience should be able to distinguish the EIS as the key environmental document providing information to decision-makers considering approvals for the project.

## 1.3 The EIS process

This section should provide an explanation of the legislative process under which the EIS is being produced, including timing and decisions to be made for relevant stages of the project.

The explanation should include a description of the EIS process in relation to a 'significant project' pursuant to the SDPWO Act, and any other state approvals or permits required as part of the project. 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.

The information in this section is required to ensure:

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

Linkages between state and Commonwealth legislation should be identified, where relevant.

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

The EIS should inform the reader on:

- how to make submissions;
- what form the submission should take; and
- when submissions must be made to gain standing for any appeal process.

## 1.4 The public consultation process

The EIS should report on the consultation program conducted with community members and other stakeholders through the study period. Where possible, the EIS consultation process should be consistent with the Queensland Government's "Engaging Queenslanders" guide. The full details of consultation should be provided in an appendix. Objectives for consultation should include:

- to ensure community members, businesses and organisations in the study corridor and other stakeholders have access to information to allow their informed consideration of the project's potential issues, benefits and impacts;
- to ensure the consultation process enables participation by people and organisations who have an interest (including but not limited to, residents and small businesses likely to be affected by the project) in the study's outcomes;
- to provide regular and transparent communication between the study team and community members and stakeholders, throughout the study;
- to ensure community values, local knowledge and other input are considered in the assessment, design processes and development of mitigation measures;
- to demonstrate how the issues raised by stakeholders and the community generally are addressed; and
- to contribute to the development of a project that addresses community concerns and values, and maximises opportunities for local and regional community benefit.

Consultation commencing as early as possible in the EIS process is encouraged, with feedback provided to participants about outcomes.

The EIS should particularly report on consultation with direct stakeholders having an identifiable interest in the project outcomes. This is to include consultation with the Department of Housing in relation to the planned development or redevelopment of state government departmental housing stock directly affected by the project.

The EIS should report the extent to which the public consultation program satisfied the requirements under the SDPWO Act.

The findings of the consultation program should be included in the EIS including the groups, agencies, and people who have been consulted, the issues they raised and the strategies, or proposed strategies, undertaken or proposed to address concerns or enhance particular benefits of the project.

## 2 BACKGROUND AND PROJECT RATIONALE

This section is to provide the justification for the project, feasible alternatives for the project reference design, and a discussion of the consequences of not proceeding with the project.



## 2.1 Background

The background leading to the project proposal should be provided. It should include general information about the project in the local, regional and strategic context.

## 2.2 Need for the project

The EIS should:

- identify the project objectives, the need and justification for the project within the context of the *South East Queensland Regional Plan*, the *Brisbane City Plan*, the *Integrated Regional Transport Plan*, the *Transport Plan for Brisbane* and the *South East Queensland Infrastructure Plan and Program* which has established an investment plan for transport infrastructure in the region;
- state the objectives that have led to the development of the project; and
- outline the events leading up to the project's formulation and the alternatives considered for the project reference design.

The EIS should also clearly articulate the need for the project as derived from previous investigations and assess the project benefit against alternate options that meet the identified project need and against the 'do nothing' option. In doing this, the EIS should consider at least two feasible alternatives to the project, including:

- one scenario that seeks to optimise non-private motor vehicle modes of transport within the study corridor such as significant enhancements to public transport or active transport (e.g. cycle and pedestrian) or implementation of other strategies aimed at reducing private vehicle usage; and
- one scenario that seeks to optimise surface road transport in the project corridor (without a tunnel), i.e. the maximisation of the utility of the existing road network with limited upgrading.

This assessment process requires detailed examination, incorporating an assessment of strategic project fit based on assessment of economic, environmental and social objectives, as derived through strategic planning objectives.

The EIS should examine existing and projected traffic volumes and, as far as is practicable, include an assessment of the extent to which the development of the project is consistent with contemporary transport plans, strategies and studies for SEQ.

The consequences and assessment of not progressing the project (the 'do nothing' scenario) should also be discussed using balanced decision making criteria, such as multi-criteria analysis, in conjunction with economic analysis of potential project delivery options.

In particular, the sensitivity of modelling assumptions to large changes in global oil availability and oil price vulnerability over the life of the project are to be assessed for the construction and operational phases. This assessment should document assumptions and provide estimates for the impact of fuel price changes on:

- travel behaviour in the study area, including possible modal shift changes to public transport and non-motorised transport.
- traffic volumes using the project; and
- the commercial viability of the project over its life.

### **3 PROJECT DESCRIPTION**

The objective of this section is to describe the project through its lifetime. This information is required to allow assessment of all aspects of the life of the project including all phases of the project through planning, construction, decommissioning of the construction site and long-term operation.

#### **3.1 Project development**

The EIS is to provide a description of the various design options that were assessed in the development of the reference project. These are to include alternative route alignments which address the project objectives stated in the IAS. Design options should be discussed in sufficient detail to enable an understanding of the criteria for the selection of the preferred option in terms of technical, commercial, social and/or environmental aspects.

Relevant illustrations, maps, diagrams and drawings that show the location and context of the assessed options should be provided.

#### **3.2 Construction arrangements (including decommissioning of the construction site)**

The description of construction arrangements for the project should include:

- any expected individual property impacts, including any impacts on native title;
- a preliminary predictive program of activities relating to design, delivery and construction phases of the project. The description should also state the anticipated construction period for the project, including the proposed construction hours;
- an assessment of the potential impacts, if any, of leaving construction equipment (e.g. a tunnel boring machine) in the ground at the completion of the project;
- options for potential construction and equipment storage areas and transport management (including parking arrangements) for the construction workforce;
- traffic and transport management plans for construction-related activities and the approval process for these plans;
- spoil management arrangements including anticipated quantities, re-use options, transport, storage and placement location options (including any additional infrastructure required), and potential haulage routes for transport of spoil to possible placement locations. This should include consideration of the minimisation of environmental and transport impacts, and maximisation of opportunities for beneficial reuse of the material;
- the likely types of vehicles or alternative arrangements to be used for spoil transportation, including numbers of vehicle trips and frequency of trips for each haulage option and route;
- likely scenarios for origin and destination of inputs/supply source and likely transport routes;
- diversion of watercourses, watercourse crossings and arrangements for draining or directing or capturing overland flow during construction.

The EIS should also describe the impact, if any, that construction of the project would have on the public transport network and operations, and how such impacts would be managed.

### 3.3 Design

The description of the project design should include schematic identification of:

- the design criteria applied to tunnels, roads, busways or bus facilities (if any), pathways and bridges;
- the proposed vehicle use and any restrictions that would apply;
- the corridor within which the tunnel and roadway will be located, with the aid of maps and diagrams describing indicative:
  - entry and exit roadways, intersections and interchanges;
  - indicative sections on typical embankments and bridged sections;
  - tunnel lighting;
  - in-tunnel traffic management, including management of peak flows, incidents, the movement of hazardous goods and law enforcement measures;
  - location and type of electronic tolling infrastructure;
  - ventilation and drainage works and outlets;
  - works within and outside of existing road reserves, including ancillary works such as for pedestrian and cycle movements;
  - measures required for emergency access, retrieval of stalled or crashed vehicles, management of smoke or toxic emissions in the event of spillage etc.;
  - locations and areas of other activities, works and temporary or permanent infrastructure; and
  - design parameters including horizontal and vertical alignment, representative road and tunnel cross-sections, predicted traffic volumes / capacity, induced traffic volumes (if any), and anticipated design life.
- road reserve configuration including indicative widths and access requirements along the alignment including the use of existing areas of disturbance for machinery access and future maintenance;
- options for corridor acquisition;
- proposed tunnel management and control, including monitoring of traffic and air quality, monitoring of groundwater seepage into tunnels, and monitoring and control of surface water flow (quantity and quality) into tunnels;
- options for urban design and redevelopment of the worksites;
- options for tenure.

This section should detail, where relevant, how the project addresses Brisbane City Council's planning scheme policy *Crime Prevention through Environmental Design Principles* in its design features.

## **3.4 Other infrastructure requirements - utility services**

### **3.4.1 Description of existing environment**

Describe the existing and any planned utility services that may be affected by the project, including electricity, sewerage, water, gas and telecommunications infrastructure. Owners of the utilities should be identified, together with significant or critical users of the utilities (e.g. health care facilities).

### **3.4.2 Potential impacts and mitigation measures**

This section is to assess the potential impacts of the project on existing and any planned utility services, including the identification of any critical users of the service. Strategies to minimise potential impacts on existing utility services, including required upgrading of infrastructure, should be provided, especially in regard to any users where it is critical to maintain constant service (e.g. health care facilities).

## **3.5 Permits, licences and approvals and planning standards**

This section should identify permits, licences and approvals required for the project. The section should identify the legislation under which the permit, licence or approval is required, including all relevant international conventions, Commonwealth and state legislation, together with the administering authority, and the condition or part of the project that would trigger the need to obtain the permit, licence or approval. Reference should be made to the SDPWO Act and its relationship with the *Integrated Planning Act 1997* and other relevant Queensland laws. A description of the Environmentally Relevant Activities, as defined under the *Environmental Protection Act 1994* (EP Act) and subordinate legislation necessary for each aspect of the project should be given.

This section should outline the project's consistency with existing land uses or long-term policy framework for the tunnel route, particularly in relation to the SEQ Regional Plan; the SEQIPP and with legislation, standards, codes or guidelines available to monitor and control operations on site. It should refer to all relevant planning policies, including National Action Plans and Agreements relating to climate change. This information is required to demonstrate how the project conforms to relevant national, state, regional and local policies for the area.

## **3.6 Rehabilitation of construction sites**

This section should present the strategies and methods for progressive and final rehabilitation of the environment disturbed during construction. Final rehabilitation of the construction sites should be discussed in terms of ongoing land use suitability, potential redevelopment, urban design outcomes, management of any residual contaminated land and any other land management issues. This should include proposals for topsoil stripping, stockpiling and replacement. Minimisation of topsoil storage times, to reduce fertility degradation, should also be discussed if relevant. A description of how the rehabilitation of construction sites will be monitored and maintained should also be provided.

## 4 TRAFFIC AND TRANSPORT

The EIS is to provide an outline of the traffic and transport studies undertaken, to demonstrate the need for the project and to contribute data for other aspects of the impact assessment.

### 4.1 Description of existing transport network

The existing transport network and operations should be described (at a level of detail appropriate for the impact of the project), in terms of:

- the regional, arterial and local road network;
- road traffic composition and movement patterns, including the source and destination of such traffic;
- road capacity, degree of saturation and levels of service;
- public transport services (bus, ferry and rail) – existing service details service patronage (peak, daily) and facilities;
- rail corridors and associated rail infrastructure;
- bicycle and pedestrian infrastructure and modal proportions;
- freight traffic volumes, composition and existing designated freight routes;
- tolling; and
- emergency services vehicle flows.

### 4.2 Transport network performance

The performance of the existing road network should be described in terms of:

- traffic demands (through, local and regional context);
- local access and operational requirements, both for properties and local streets;
- traffic flows, speeds and travel times – peak, daily, composition;
- road capacity (level of service);
- cycle and pedestrian network connectivity;
- interchange and intersection operating level of service (delays and queuing);
- interaction with public transport (including reference to public passenger transport demand, capacity, level of service and mode share); and
- road user safety, (including pedestrian and cycle users).

### 4.3 Description of traffic forecasting methodology

A description of the studies undertaken for the project should be provided, with particular emphasis on:

- broad land use patterns – a description of the population, employment and demographic forecasts used and assumed generation rates, taking into consideration

the most recent public information from the Planning Information and Forecast Unit (Department of Infrastructure and Planning);

- the scope and validity of the transport models used;
- the provision of year forecasts for relevant design years to 2026;
- an analysis of trends in household travel behaviour (by comparison of 1992, 2004 and any available more recent household travel survey data) and assessment of the sustainability as reflected by those trends;
- network improvements – which planned or proposed upgrades have been included in the traffic modelling and for what time;
- an explanation of how and what alternative future scenarios were considered, including tolling effects, vehicle operating costs and changes in mode share to public transport over the period to 2026;
- effects of the project on public and public transport services within or adjacent to the corridor;
- quantification of demand in both the tunnel and greater transport network affected by the project and the cumulative effects of other road infrastructure projects in the vicinity of the study corridor; and
- ability of the modelling approach to predict diversion of traffic and travel change behaviours.

The EIS should seek input from Queensland Transport in the development of the Northern Link traffic forecasting model, particularly with the coding of the future public transport network.

#### **4.4 Forecast future base traffic conditions (no project)**

Future conditions on the road network should be outlined from appropriate models for relevant design years such as the anticipated opening year 2014, and relevant design years up to 2026, without the project in place, in terms of:

- transport and traffic future demand, including forecast traffic volumes and speeds;
- through traffic demands and operational and access requirements;
- network performance within the local and broader network surrounding the project – interchange and intersection operation (e.g. degree of saturation, delays and queues);
- public passenger transport services (including levels of service, and utilisation of bus and rail passenger transport capacity); and
- road user safety assessment including consideration of pedestrian and cycle users.

#### **4.5 Effects of the project**

The effects of the proposed works on the transport network should be investigated for future model years, as follows:

- traffic volumes – changes from the anticipated opening year in 2014, and other relevant years up to 2026 with the project;

- traffic flow and other impacts on major and minor roads (including the Inner City Bypass, Coronation Drive, Milton Road, Kelvin Grove Road, Western Freeway, Centenary Highway and all other feeder and exit roads to the project);
- modifications needed on access and link roads to the project to ensure its effective operation;
- identification of potential impact of any anticipated change in the categories of vehicles using the proposed route (e.g. potential increase in route usage by heavy vehicles);
- identification of broader road network upgrade requirements which would mitigate potential congestion points identified as resulting from construction or operation of the project;
- impacts on access to rail corridors for maintenance and repairs where relevant;
- interchange, intersection and road capacity performance (levels of service);
- car movements – e.g. travel times, vehicle kilometres travelled (VKT), trip diversions, reliability;
- commercial vehicle movements (e.g. travel times, VKT, trip diversions);
- aggregate road network performance – VKT, vehicle hours travelled (VHT), average vehicle speeds;
- identification of impacts as a result of changed traffic vehicle movements on stakeholders, including residents and businesses, both in the study corridor and areas surrounding the corridor;
- impacts on access to properties (including Mt Coot-tha Botanic Gardens and Anzac Park) and existing roads;
- impacts on pedestrian and bicycle movements and infrastructure within the transport system;
- accidents and severity of accidents and incident management (to be considered in consultation with the Queensland Police Service and other relevant agencies);
- bus operations (e.g. existing, committed or approved bus services, travel times and new bus priorities) and infrastructure;
- rail services and infrastructure where relevant;
- emergency service vehicle movements (in consultation with DES and the Queensland Police Service);
- implications of tolling on untolled alternative routes;
- impacts on the Brisbane toll road network.

Traffic changes on the road network to provide for potential local improvements, such as urban regeneration opportunities, traffic management measures, community benefits and public and active transport benefits, (e.g. opportunity for re-allocation of road space or a modified environment for active transportation (bicycle, pedestrian use) should be identified and their implications discussed. Any changes to the traffic network are to consider the range of users, including emergency vehicles accessing hospitals within the catchment and pedestrian and cyclists, particularly in the vicinity of major land uses or public transport facilities (e.g. bus stops, train stations, and busway stations).

The operational interface of the project with the surrounding road network should be described. This should include how the project will operate in terms of enforcement (e.g. speed and heavy vehicle limits) and the proposed interactions of the project traffic operations management with the Brisbane Metropolitan Transport Management Centre.

The EIS should also address any forecast changes in the overall number or length of trips that would result from the provision of increased traffic carrying capacity. The EIS should also address the impacts of the project on existing, committed or approved public transport infrastructure as well as overall public transport system patronage in the area impacted or serviced by the project. The EIS should also address the impacts of the project on the public transport and walking and cycling network in the general area of the Northern Link corridor.

The project has been identified by BCC as a key element of a proposed new Brisbane Northern Urban Corridor, to provide a bypass of the Brisbane CBD for cross-city trips. The identified route is Centenary Highway, Western Freeway, Northern Link Road Tunnel, Inner City Bypass (ICB), Airport Link, East West Arterial and Gateway Motorway. Traffic impacts along this route and at key intersections with it and relevant Busways should be analysed.

The project impacts should also be identified in the context of contemporary transport plans, strategies and studies for SEQ, as far as is practicable.

## 4.6 Construction impacts

The transport implications for both impacts and mitigation measures of construction activities in relation to each anticipated construction stage and, where relevant, post completion, should be described with respect to:

- any pre-construction demolitions;
- construction site traffic generation, operational service requirements and access;
- local and regional traffic flows from temporary and permanent traffic changes, including road and lane closures at construction sites and the specific measures proposed to mitigate these impacts;
- proposed management measures for bus services and operations in the study corridor;
- an assessment of the likely impacts of construction on each of the public transport, road (including, State owned/managed road infrastructure such as connection roads), cycle, walking and rail networks potentially affected by the project, including travel time delays;
- arrangements to ensure safety and operational integrity of the adjacent road network, pedestrian and cycle accessibility and mobility, and access to public transport stops and stations and railway stations and infrastructure during construction including for individuals with a disability;
- police and other emergency services;
- the provision of adequate access to businesses, public facilities, schools, major community facilities (including the Toowong Cemetery and the Former Gona Barracks) in or adjacent to the study corridor, churches, parks and private residences by private vehicle, public transport, bicycle and foot;
- construction workforce parking and other existing public parking;



- effects of construction traffic (including the transport of materials to the project) on the road network or rail/waterway systems if appropriate;
- any existing, committed or approved proposals associated with any Local Growth Management Strategies or other land use plans; and
- impacts on traffic flow, travel times, active travel and public transport, in areas potentially affected by the project.

The EIS should review the success of mitigation measures used in other similar projects and the suitability of adopting such measures or alternative mitigation measures.

## **4.7 Pedestrian and cyclist issues**

### **4.7.1 Description of environment**

Describe the existing and planned future pedestrian and bicycle infrastructure, including usage levels, for pedestrian and bicycle movements and facilities within the study corridor and surrounding major points of origin and destination.

### **4.7.2 Potential impacts and mitigation measures**

This section should describe the potential impacts of the project on existing, committed or approved infrastructure for pedestrian and cyclists and identify opportunities for walking and cycling network improvements. Any key points of conflict between the project and existing, committed or approved pedestrian and cycle connections through the study corridor should be identified. Proposals to mitigate such conflicts should be outlined.

The EIS should identify options to enhance pedestrian and cycling connectivity in the study corridor and in the inner western suburbs adjacent to the study corridor having regard for existing, committed and approved local and regional cycle and pedestrian infrastructure (including the Toowong Cycle and Pedestrian Overpass) and planning objectives for the study corridor. The potential, if any, for cyclists, usage of the tunnel should be outlined.

## **5 ENVIRONMENTAL VALUES AND MANAGEMENT OF IMPACTS**

Detailed descriptions of the existing environment should be provided followed by an assessment of the potential impacts on this environment during the construction and operational phases. The formulation and adoption of environmental protection measures to avoid or mitigate adverse impacts is also required. Baseline information, including from other relevant studies, should be used and referenced where appropriate.

### **5.1 Geomorphology/geology/soils**

#### **5.1.1 Description of existing environment**

This section should provide a description and/or understanding of:

- the topography of the study corridor with contours shown at suitable increments relative to the Australian Height Datum (AHD);

- landforms of the study corridor and surrounding areas, including an analysis of subsurface and slope stability where appropriate;
- significant geological and geomorphological features;
- potentially significant economic mineral, energy or extractive material resources;
- the geology of the wider project area, with particular reference to the physical and chemical properties of surface and sub-surface materials and geological structures likely to be intercepted during construction;
- mapping of any areas within the study corridor listed on the Environmental Management Register or Contaminated Land Register under the EP Act;
- identification of any potentially contaminated sites not on the registers which may need remediation;
- hazards such as geological faults, unstable areas, erosive soils, any potential and actual Acid Sulphate Soils (ASS) etc should be comprehensively identified; and
- the physical and chemical properties of surface and sub-surface materials and geological structures likely to be intercepted during construction.

Soil types in areas likely to be affected by surface works should be described, with reference to the Australian Soil and Land Survey Field Handbook (McDonald et al 1990) and Australian Soil Classification (Isbell 1996).

An overview of data on contaminated lands should also be conducted to identify sites likely to contain contaminated soil including the level and type of contamination and history of notifiable activities under the EP Act undertaken on the land.

### **5.1.2 Potential impacts and mitigation measures**

Assessment of the potential impacts from soils including erosion risk, settlement risk, rehabilitation potential, acid sulphate soils, contaminated land and construction spoil is required along with avoidance strategies or mitigation measures where necessary.

#### **Surface Water**

General measures to be implemented to capture or intercept overland flow, whether for erosion control (via an Environmental Licence) or another reason which may require an authorisation under the *Water Act 2000*, should be described.

Requirements for remediation of any degradation of waterways and surface water flows caused by Acid Sulphate Soils, erosion or other contamination should be identified.

#### **Erosion risk**

Potential erosion effects due to wind and surface water runoff in all working and disturbed areas, especially those resulting from the removal of vegetation, should be identified and estimated with the assessment included in the EIS.

Strategies to prevent or control erosion should be specified. In particular, measures should be outlined to prevent soil loss and so prevent significant degradation of local waterways by suspended solids. This may be addressed in accordance with measures detailed in "Soil Erosion and Sediment Control – Engineering Guidelines for Queensland Construction Sites, 1996". Alternatively, the EIS could address the erosion-related performance requirements within NRW's *Regional Vegetation Management Code for Southeast Queensland Bioregion* (20 November 2006).

Erosion monitoring should also be discussed along with the development of rehabilitation/mitigation measures to effectively prevent or minimise environmental harm from erosion.

### **Settlement risk**

Assessment of the potential for settlement of land above or adjacent to the tunnel, due to tunnel construction and for collapse or slope failure of cuts on approach roads should be undertaken and reported.

### **Acid sulphate soils**

The EIS should assess the potential for intercepting acid sulfate soils and the impact of disturbing acid sulphate soils by excavation, filling, or extracting groundwater. These investigations should be undertaken in accordance with the relevant sections of the SPP 2/02 Guideline and associated technical documents in order to comply with the stated outcomes in “State Planning Policy 2/02: Planning and Managing Development Involving Acid Sulfate Soils”. Such technical documents include:

- *Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils in Queensland*. Ahern CR, Ahern MR and Powell B (1998);
- *Acid Sulfate Soils Laboratory Methods Guidelines in the Queensland Acid Sulfate Soils Technical Manual*. Ahern CR, McElnea AE and Sullivan LA (2004);
- *Soil Management Guidelines in the Queensland Acid Sulfate Soils Technical Manual*. Dear SE, Moore NG, Dobos SK, Watling KM and Ahern CR (2002); and
- *Legislation and Policy Guide in the Queensland Acid Sulfate Soils Technical Manual*. Dear SE, Moore NG, Watling KM, Fahl D and Dobos SK (2004).

Site observation density and sampling procedures for the purposes of assessing any acid sulfate soils is to accord with the “Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils in Queensland, 1998 (Ahern et al.)”.

### **Contaminated land**

Strategies to prevent land contamination, within the meaning of the *Environmental Protection Act 1994*, should be provided. Proposals for preventing, recording, containing and remediating any contaminated land likely to be intercepted by construction works should be outlined in accordance with the requirements of Chapter 7 Part 8 of the EP Act.

A schedule of further investigations and remediation activities recommended for those land parcels where contaminated land (actual and potential) could be affected by the construction activities would form part of the detailed EMP.

## **5.2 Hydrology**

### **5.2.1 Description of existing environment**

#### **Groundwater**

The EIS should review the significance of groundwater in the study corridor and adjacent areas, together with groundwater use that may be affected by the project. The depth and extent of groundwater and flow direction should be identified where possible. All groundwater facilities and resources within the influence of the project should be identified and recorded, with details such as drilling logs, groundwater levels and yields provided.

The review of the significance of groundwater in the study corridor should also include an analysis of the extent of any aquifer with which the project may interfere or from which water may be removed.

The groundwater assessment should take into account the potential to intercept acid sulphate soils, and the findings of the survey for contaminated land sites within or near the study corridor.

The environmental values of the groundwater should be described in terms of:

- values identified in the *Environmental Protection (Water) Policy 1997*;
- sustainability, including both quality and quantity;
- physical integrity, fluvial processes and morphology of groundwater resources; and
- the reliability of recharge areas for the groundwater.

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## Surface water quality

Watercourses affected by the project are to be identified with an outline of the significance of these waters to the catchment system to which they contribute. Included within this identification should be sufficient information for the proponent and NRW to determine whether waterways are identified as 'watercourses' under the *Water Act 2000*.

An assessment is required of existing water quality in surface waters and/or wetlands likely to be affected by the project. If appropriate, the assessment should provide the basis for a long-term monitoring program. The water quality should be described from available information, including seasonal variations or variations with flow, where applicable data are available. A relevant range of physical, chemical and biological parameters should be considered to gauge the potential for environmental harm on any affected watercourse or wetland system.

The environmental values of the waterways of the affected area should be described in terms of:

- values identified in the Environmental Protection (Water) Policy;
- sustainability, including ongoing maintenance of quality; and
- comparability with any Water Resource Plans, South East Queensland Regional Water Quality Management Strategy, Land and Water Management Plans including the Brisbane River Management Plan and other local authority stream management initiatives relevant to the catchment, to the extent any of the above are relevant.

Where known or specified, the water quality objectives associated with environmental values for local catchments and watercourses should be described so that impacts from any proposed releases resulting from construction or operation of the project can be identified, along with measures proposed to mitigate expected impacts.

## Flood potential

Hydraulic modelling of the Brisbane River and the local catchments of the study corridor should be undertaken using the most recent and most accurate flow, terrain and bathymetric data. From this modelling an assessment will be made of the flood potential in the study corridor and particularly in the areas identified as options for tunnel portals.

### 5.2.2 Potential impacts and mitigation measures

#### Groundwater

The EIS is to include an assessment of the potential for environmental impacts to be caused by the project's effect on any existing groundwater regime.

The impact assessment should consider the impacts of the project on groundwater resources; define the extent of the potential area within which groundwater resources are likely to be affected, and the significance of the project to groundwater depletion or recharge. The assessment should take into account the potential impact of the project on any affected groundwater regime including possible alteration of porosity or permeability of any land disturbed. The assessment of these potential impacts should specify any conditions for taking of groundwater. The assessment should also identify any groundwater-dependent ecosystems that may be impacted and the nature of any such impact. Proposed groundwater monitor regimes and any proposed mitigation methods, including the make-up of any reduction in supply from groundwater resources, should be described.

Potential for draw-down of known and potentially contaminated groundwater should be investigated and, if relevant, the identification of measures to manage significant contaminant migration to adjacent and previously uncontaminated sites should be carried out.

### **Surface water quality**

This section is to define the potential impacts of the project on the surface water environment, to outline strategies for protecting water resource environmental values, how nominated quantitative standards and indicators may be achieved, and how the achievement of the objectives may be monitored, audited and managed.

The EIS should describe the potential for environmental impact to be caused by the proposed works to environmental values for surface water as expressed in the Environmental Protection (Water) Policy including at sites where spoil is temporarily stored or permanently placed.

Water management to address surface water quality, quantity, drainage patterns and sediment movements should be outlined. Key water management strategy objectives include:

- measures to avoid or minimise any proposed release, including but not limited to source reduction and water recycling; and
- maintenance of sufficient quantity and quality of surface waters to protect existing beneficial downstream uses of those waters (i.e. the Brisbane River), including:
  - conditions to be attached to water authorisations under the *Water Act 2000*; and
  - identification of any downstream licensees and the impact of the project on these allocations.

The EIS should identify possible sources and impacts of releases from the proposed construction sites and all other sites associated with the project. Possible releases should be characterised in terms of their location and any likely contaminants.

The EIS should describe options for managing and preventing such releases and mitigating and monitoring for any adverse impacts that might result. Options for mitigation and the effectiveness of mitigation measures should be discussed with particular reference to sediment, acidity, salinity and other emissions of a hazardous or toxic nature to human health, flora or fauna.

The EIS should also address the project's potential for providing habitats for disease vectors. Measures to control mosquito and biting midge breeding should be described.

Reference should be made to the Environmental Protection (Water) Policy, *Water Act 2000* and the Australian and New Zealand Environment and Conservation Council (ANZECC) 2000 guidelines.

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## **Flood management**

Based on the modelling of the existing potential for flooding in the study corridor a second round of modelling should be undertaken addressing the “project in place” scenario. The risk of portal flooding should be assessed in design flood events to allow incorporation of this design criterion into the reference design.

The potential impacts of the construction of the project on regional flood levels, appropriate locations for construction sites and workshops and effects on adjoining properties are to be assessed based on this hydraulic modelling. Where potentially significant impacts are identified their avoidance or mitigation is to be achieved through revised design or other appropriate management measure to be identified in the EIS.

Any flood mitigation structures which could potentially hold water, interfere with flow, or from which water would potentially be taken, must be identified. The potential impact of the project on flooding should be assessed to include the effect of these changes on water availability in areas licensed under the *Water Act 2000*, as well as any changes to seasonal water availability.

## **5.3 Air quality**

The objectives of the air quality assessment are to identify the main air quality issues associated with construction and operation of the project, to identify nearby sensitive places and to ascertain the potential for nuisance, amenity and public health impacts associated with emissions of pollutants, including dust, odours, gases and particulates from the project in construction and operation.

Detailed descriptions of the existing environment should be provided including with reference to the environmental values as defined by the *Environmental Protection (Air) Policy 1997* followed by an assessment of the potential impacts on this environment during the construction and operational phases. The formulation and adoption of environmental protection measures to avoid or mitigate adverse impacts is also required. Ambient air quality conditions should be described for any sensitive places such as residential areas near construction sites. Baseline information, including from other relevant studies, should be used and referenced where appropriate.

This section should describe the existing community values for public health and safety that may be affected by the proposal. Populations potentially affected by project-generated air emissions should be identified and described. Particular attention should be paid to those sections of the population, such as children and the elderly, that may be sensitive to air quality factors.

All assessments and monitoring of air quality must be conducted in accordance with relevant EPA guidelines, including the Air Quality Sampling Manual (EPA, 1997, or more recent version), Australian Standards, and any relevant requirements of the EPP (Air) and the National Environmental Protection (Air Toxics) and (Ambient Air Quality) Measures.

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### 5.3.1 Description of existing environment

Description of the existing environment is to include:

- an analysis of local ambient air quality at each of the worksites and possible vent site locations if proposed and locations representative of sensitive places potentially affected by the project, as well as regional air quality conditions. Monitoring data from existing recording stations in Brisbane should be used as appropriate. Where existing data is inadequate to provide a description of the existing environment in the study corridor; further monitoring is required;
- identification of existing, committed and approved areas containing sensitive places;
- description of existing sources of dust, odours, gaseous and particulate emissions influencing air quality within the study area; and
- review of prevailing meteorology and analysis of prevailing wind directions and threshold wind speeds (for dust and particulate generation).

### 5.3.2 Potential impacts and mitigation measures - construction

Environmental impacts of air emissions, including dust, gases, particulates and odours, during construction should be described, including:

- review of project activities likely to emit pollutants, including likely construction activities such as location of route, surface excavations, site compounds, stockpiles, proposed spoil transport routes etc;
- discussion of proximity of construction activities to nearest sensitive places;
- recommended requirements for heavy construction vehicles and machinery emissions; and
- identification of air quality issues associated with the location for site compounds and construction works etc, discussion of the potential for dust, gaseous, particulate and odour emissions from these sources (if any) and the likely risk for nuisance impacts.

The EIS should also:

- identify appropriate locations to monitor air quality, including dust emissions, from all construction sites or associated work sites with the potential to create a dust nuisance. The monitoring locations should be chosen with regard to meteorological conditions, locations containing sensitive places, as well as locations that modelling indicates would be subject to the highest levels of dust should it emitted from the construction or associated work sites;
- propose how the results of the air quality monitoring will be made publicly available (e.g. through publication on the proponent's internet site etc.)
- address the legislative and regulatory requirements relating to emission of pollutants during construction, including, but not limited to, relevant construction air quality goals outlined in *Environmental Protection (Air) Policy*; and
- review any proposed control methods for construction works including during tunnelling, and recommend management measures which could be adopted to prevent or minimise emission of air pollutant impacts on adjacent receivers during these works.



### 5.3.3 Potential impacts and mitigation measures - operation

Operational air quality impacts are likely to be associated with the release of motor vehicle emissions within the project tunnels, and from the ventilation of motor vehicle emissions from the project tunnels. Impacts on air quality in-tunnel and around portals and ventilation outlets during the operation of the project should be assessed in accordance with the National Environmental Protection (Ambient Air Quality) Measure 1998, the National Environmental Protection (Air Toxics) Measure 2004 and the *Environmental Protection (Air) Policy, 1997*.

Reference should also be made to Brisbane City Council's Air Quality Planning Scheme Policy, the Brisbane Air Quality Strategy (2004) and the South East Queensland Regional Air Quality Strategy, where relevant.

For comparison purposes, an assessment of air quality in the 'do nothing' scenario should also be made.

To assess the air quality changes associated with dispersion from ventilation outlets and changes in road traffic volumes, the following tasks should be undertaken:

- preparation of land use and terrain information of the area to enable adequate prediction of air concentrations at ground level;
- review of existing air quality monitoring and meteorological data for the area;
- discussion of existing air quality within the study corridor and the area potentially affected by the project;
- preparation of a 3-dimensional wind field model for the area to support impact assessment requirements;
- estimation of likely future vehicle emissions (based on forecast traffic volumes and flows at both the commencement of operation and during the life of the project and with consideration of potentially different emissions) from project ventilation outlets and surface roads (including surface roads not part of the project) as appropriate to the area of influence;
- computer dispersion modelling of emissions into the study corridor and assessment against relevant air quality criteria and existing ambient air quality including for known planned sensitive places and land uses;
- presentation of the findings of the modelling for the operation of the project. This is to include maps of modelled emissions from project ventilation outlets and their predicted concentrations in different weather conditions, including 'worst-case' conditions, in surrounding areas, as well as assumptions and limitations; and
- ventilation system failure or ineffective operation and its impact on in-tunnel and ventilation outlet air quality;

The assessment should be undertaken by:

- computer-based dispersion modelling of individual roadway emissions to give potential kerb-side concentrations of pollutants for the project and the 'do nothing' scenario;
- computer-based dispersion modelling of emissions from the project ventilation outlets. This should be based on traffic modelling results and take into account the length of the tunnel sections of the project, grade and proposed speeds within the tunnel sections as well as the composition of the traffic predicted to use the tunnel sections.

The modelling should include air quality concentrations at high set buildings if present in the vicinity of a ventilation outlet. Emission estimates should be based on a composite of Australian vehicle fleet emissions as well as using factors derived from World Road Association (PIARC) or equivalent sources to determine the effects of grade and speed; and

- assessment of predicted air quality conditions within the tunnel relative to PIARC standards for in-tunnel air quality including during 'worst-case' scenarios such as where traffic is slowed down or stationary. This assessment should include a discussion on comparable and best practice standards for in-tunnel air quality currently adopted in other countries.

The EIS should include a review of mitigation measures used in comparable projects and the relevance, if any, of such measures to the project. The suitability of air filtration technologies should be identified in terms of their effectiveness, benefits, operational costs and energy requirements. Trends in technology development for motor vehicle emission controls, cleaner fuels and air filtration technologies should also be considered. If air-filtration technologies are found to be not necessary, the EIS should outline how such technology could be retro-fitted if it was found to be necessary in the future.

In undertaking this assessment, the proposed location(s), size and heights of any proposed ventilation outlets should be described. The methodology applied for location and dimension decisions should be detailed as should a discussion of how any impacts on existing, committed or approved future sensitive places was included in the decision-making process. Contingency measures in the case of a breakdown of the ventilation system should be presented.

Locations for air quality monitoring stations for the monitoring of emissions from any proposed ventilation outlets should be investigated. Suggested monitoring locations should be discussed in relation to whether they represent a sensitive place or are located as near as practicable to the location that modelling indicates will be subject to the highest levels for a critical contaminant.

The EIS should propose how the results of the air quality monitoring will be reported.

#### **5.3.4 Impacts of greenhouse gas emissions**

The impacts of the project on greenhouse gas emission levels are to be assessed for the construction and operational phases. This assessment should include the calculation and presentation of changes in volume of greenhouse emissions resulting from the predicted changes in traffic volumes (as per section 4.5), haulage of excavated material from construction and also the greenhouse gas emissions associated with energy used to operate ventilation, lighting, ITS and other electrical equipment used in the operation of the project. The methodology for the assessment should be briefly outlined in this section and should be based on the Commonwealth Department of Climate Change's publication titled *Australian Methodology for the Estimation of Greenhouse Gas emissions and sinks*.

The implications of the project in relation to national, state and local government greenhouse, or climate change strategies should be discussed.

## 5.4 Noise and vibration

### 5.4.1 Description of existing environment

The existing noise environment should be assessed by:

- reviewing available data from any ambient noise monitoring in the study corridor;
- identifying representative existing, committed and approved sensitive places potentially affected by noise or vibration from the project (which may include receptors beyond the study corridor boundary) and monitoring background noise and vibration for these locations;
- conducting additional baseline noise monitoring at other selected locations; and
- describing existing levels of road traffic noise at representative sensitive places by preparing a 3D noise contour model of noise transmission from the road network in the study corridor boundary for the baseline year, year of opening (2014) and the traffic planning horizon (to 2026).

### 5.4.2 Potential impacts and mitigation measures - construction

To assess construction impacts the following should be undertaken:

- Identification and assessment of all noise and vibration sources which may arise from the construction of the project, including noise and vibration generated by tunnelling works, surface construction sites and ancillary activities (e.g. 'lay-down' areas, access roads), particularly in regard to sensitive places;
- The potential environmental impact of noise and vibration at all potentially sensitive places within and around the study corridor, in particular, any sensitive places should be quantified and compared with objectives, standards to be achieved and measurable indicators;
- Assessment should be made of the potential emission of low-frequency noise (noise with components below 200Hz) from major items of equipment and plant. If necessary, measures should be described for reducing the intensity of these components. Reference should be made to the Environmental Protection Agency's draft guideline, *Assessment of Low Frequency Noise*;
- Proposals to prevent, minimise or mitigate these effects, 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 and vibration;
- Identification and assessment of significant noise impacts associated with potential spoil haulage routes and other construction vehicle movements;
- identification of mitigation measures to address construction noise and vibration impacts including operating hours, barriers etc.; and
- Discussion of a noise and vibration monitoring program to be implemented during the construction period, including an identification of possible locations for the placement of noise and vibration monitoring equipment.

This assessment is to be inclusive of noise and vibration impacts to or on critical or sensitive places and the Toowong Cemetery, and determine the ground vibration effects on grave sites and equipment within health care facilities

### **5.4.3 Potential Impacts and mitigation measures - operational**

To assess operational impacts, the EIS should:

- assess the predicted levels of road traffic noise at representative sensitive places, including areas affected by the project but outside the study corridor, by preparing a 3-D noise contour model of noise transmission from all future and existing road sources that form part of the project, including road sections not subject to upgrading or alteration and critical areas such as portals, new surface roadways and connections, feeder roads impacted by the project and ventilation stations and outlets. This is to be prepared for the year of opening (2014) and the traffic planning horizon (2026);
- assess the potential for operational phase vibration and regenerated noise impacts, particularly with respect to sensitive places;
- analyse significant changes in predictions for traffic noise generation;
- assess and document the noise predictions against relevant guidelines and legislation, particularly in relation to representative sensitive places, potentially affected by the project;
- compare predicted noise levels with planning levels stated in the Environmental Protection (Noise) Policy 1997 and Department of Main Roads 'Road Traffic Noise Management: Code of Practice 2000' and relevant Australian Standards; and
- develop likely operational noise and vibration management measures for sensitive places. Reference to the EPA's Guideline: "Noise and Vibration from Blasting" should also be made.

Assessments and monitoring of noise must be conducted in accordance with relevant Environmental Protection Agency guidelines, including the Noise Measurement Manual, Australian Standards and any relevant requirements of the EPP (Noise) and, where relevant, the Department of Main Road's 'Road Traffic Noise Management: Code of Practice 2000'.

## **5.5 Flora and fauna**

### **5.5.1 Description of existing terrestrial environment**

To assess existing terrestrial flora and fauna, the study should:

- identify species, communities and habitat that may be affected by the project including at spoil placement areas, machinery storage areas, ventilation outlet sites and areas affected by on-site earthworks or off-site areas affected by noise, vibration, dust, odour and lighting as well as impacted by changes in water resources and waterways;
- identify and map at a suitable scale, areas that are environmentally sensitive in proximity to the project. Environmentally sensitive areas should also include areas classified as having international, national, state, regional or local biodiversity significance, or flagged as important for their integrated biodiversity values.

Consideration should be given to conservation parks, forest parks, reserves, vegetation corridors linking significant habitat areas and the Mount Coot-tha Botanic Gardens.

- identify regional ecosystems recognised by the EPA as ‘endangered’ or ‘of concern’ or ‘not of concern’, and/or ecosystems listed as ‘presumed extinct’, ‘endangered’ or ‘vulnerable’ under the EPBC Act;
- identify all remnant and assessable non-remnant vegetation that will be cleared, disturbed or otherwise affected by the project;
- describe the existing distribution of terrestrial flora and fauna in terms of location, health and threats, including areas of revegetation projects in the vicinity of the surface works for the project;
- identify species, habitats and communities listed under the EPBC Act, *Nature Conservation Act 1992* or the *Vegetation Management Act 1999* and City Plan that may potentially be impacted by the proposed activities;
- identify ecosystems which provide important ecological functions, such as riparian vegetation, important buffer to a protected area, refuge or important habitat corridor between areas;
- identify floral communities with potential for habitat, landscape or community value in the vicinity of the project surface works; and
- undertake a review of the terrestrial flora and fauna at potential spoil placement sites.

Reference should be made to both the Australian and Queensland Government legislation and policies on threatened species and ecological communities.

### **5.5.2 Description of existing aquatic environment**

Where the project works would intersect with the aquatic environment, the EIS should investigate and assess aquatic flora and fauna by:

- identifying aquatic environments, if any, and potential impacts on those habitats;
- identifying any aquatic flora or fauna listed under the EPBC Act and the *Nature Conservation Act (1992)*, *Fisheries Act (1994)* and City Plan that may potentially be impacted by the proposed activities.

Flora and fauna investigations should include riparian areas, in-stream habitat, and fauna habitat and wildlife corridors.

### **5.5.3 Potential impacts and mitigation measures**

This section is to identify and describe potential impacts of the project on terrestrial and aquatic flora and fauna and provide mitigation measures to minimise or avoid such impacts.

The discussion should cover all likely direct and indirect environmental impacts on flora and fauna species and communities. Strategies for protecting any rare, threatened and vulnerable vegetation communities, species or habitat should be described, including any obligations imposed by state or Commonwealth legislation or City Plan.

Discuss the potential for environmental impact to be caused to the ecological values of the area affected arising from the construction, decommissioning of the construction sites or

operation of the project including clearing, salvaging or removal of vegetation, and the effects on remaining vegetation. Short-term and long-term effects are to be considered with comment on whether the effects are reversible or not.

The potential impact on flora and fauna from any alterations to the surface and ground water environment should be discussed with specific reference to potential impacts on riparian vegetation, wetlands and other sensitive vegetation communities.

The discussion of any impacts on vegetation should include reference to how these meet relevant legislative requirements, including NRW's *Regional Vegetation Management Code for Southeast Queensland Bioregion* (November 2006).

The EIS should also:

- assess the potential impact on flora and fauna that may result from the removal of, vegetation, placement of spoil, release of emissions from any ventilation outlets and storm water run-off;
- identify if any offsets are required by offset policies of State Government Agencies;
- discuss any loss of ecosystem services resulting from construction of the project; and
- develop environmental management measures to minimise potential impacts on terrestrial and aquatic flora and fauna values including revegetation and restoration of habitat post-construction.

## 5.6 Land use and planning

### 5.6.1 Description of existing environment

This section should describe the existing land uses, both within and impacting on the study corridor, and the planning framework of the proposed works. The following issues should be addressed:

- land uses within the study corridor and areas potentially affected by the project;
- the regional patterns of development throughout the study corridor with particular regard to the South-East Queensland Regional Plan;
- various tenures of the study corridor, including registered Native Title claims if any;
- the identification of each land parcel, including the segment/parcel of each affected road reserve and whether these road reserves are State Controlled Roads under the *Transport Infrastructure Act 1994* directly affected by surface works;
- planning designations within and adjacent to the study corridor as per Brisbane City Council's Planning Scheme and associated local plans, policies and land use designations;
- likely future land use by reference to the SEQ Regional Plan and other local and regional planning documents, including the SEQ Regional Infrastructure Plan and Program 2007 – 2026, Integrated Regional Transport Plan for South East Queensland and Transport 2007, draft City Shape Implementation Strategy (Local Growth Management Strategy for Brisbane), City West Taskforce Reports (2005) and Smart Cities: rethinking the city centre (May 2007); and
- requirements for the project under relevant State Planning Policies (SPP).

## 5.6.2 Potential impacts and mitigation measures

This section should identify and discuss potential impacts of the project on existing and likely future land use including:

- on future land uses, having regard to planning instruments, including the development of major centres such as Toowong and Indooroopilly;
- effect of the project on broader land use and settlement patterns in the context of the SEQ Regional Plan, Brisbane City Council's Planning Scheme and associated local plans, policies and land use designations; and
- effect of the project on achieving the desired intent of the SEQ Regional Plan, Brisbane City Council's Planning Scheme, policies under the City Plan and special area designations (such as 'heritage precincts') and emerging urban renewal or future land use opportunities arising through the neighbourhood planning process.

The EIS should address impacts on existing residential, commercial, open space and sensitive place activities in the study corridor that will or are likely to arise from the project's implementation. This assessment should include:

- consideration of necessary land acquisitions, proposed tenure (easements, leases etc.) and land use implications. Consideration of future tenure should include implications for State Land, for example Trust Land (reserves), Unallocated State Land, volumetric leases, volumetric easements, and local roads;
- any Native Title requirements necessary under the *Native Title Act 1993* (Cwth) for land acquisition, construction purposes, or other project activities and impacts;
- identification of specific land use restoration proposals, if any;
- arrangements for property access and associated street closures or widening;
- land use impacts from amenity mitigation measures such as the construction of noise barriers adjacent to residential areas or other areas where sensitive places are located and the effectiveness of construction buffer zones in preventing noise impacts at sensitive places;
- impacts on surrounding land uses and human activities and strategies for the minimisation of such impacts, especially with respect to places of significant value to the community such as the Toowong Cemetery and Mount Coot-tha Botanic Gardens; and
- potential issues involved in proximity and/or co-location of other infrastructure services along the study corridor.

Discussion should also include an assessment of any suggested land use and associated area designation changes that would mitigate the impacts of the project on surrounding land holdings, in particular land uses to compliment the ultimate planning for the transport corridor.

## 5.7 Urban design, landscape and visual amenity

### 5.7.1 Description of existing environment

To evaluate the urban design landscape and visual amenity of the project, the EIS should:

- identify the existing urban landscape and visual context of the study corridor;

- describe the urban design characteristics of the study corridor in terms of the key organising elements, permeability, variety, legibility and robustness;
- describe the visual elements and values of the existing built and natural environment including vegetation protected under Natural Assets and Local Law, particularly in key locations likely to be affected by permanent surface works;
- describe the urban landscape and characteristics of the existing built and natural environment including those characteristics valued or likely to be valued by residents, pedestrians, cyclists and public transport users; and
- develop an urban design, landscape and visual amenity framework (vision, principles, and desired outcomes) for the project as a whole and for key locations, if appropriate.

## 5.7.2 Potential impacts and mitigation measures

To assess the urban landscape and visual outcomes of the project, the study should:

- develop urban landscape and visual concepts, designs and guidelines for any key locations identified, reflecting predicted changes to land use, public amenity, public access and sustainability and place making principles; and
- assess likely visual impacts of the proposed works on the landscape and changes to the landscape.

Mitigation measures for any potential urban landscape and visual impacts should be recommended. The mitigation measures should relate to the urban landscape and visual goals, objectives and design measures for the project. This should consider a range of treatments on visual elements and urban design opportunities, including surface landscaping, portal design, ramp design and location and design of surface structures, including noise and air quality (e.g. ventilation outlets, if proposed) mitigation structures.

Where practicable, consideration of visual elements should also consider design enhancements to improve shade creation, accident prevention and crime prevention.

The issue of lighting impacts, associated with possible night time construction works or with the operational phase (e.g. sun in drivers' eyes, headlights at night, lighting for cyclists and pedestrians etc.) should be identified and mitigated to the extent practicable.

## 5.8 Cultural heritage

### 5.8.1 Description of existing environment

The EIS should describe the existing values for indigenous and non-indigenous cultural heritage areas and objects that may be affected by the project activities. This assessment should be developed in accordance with the *Aboriginal Cultural Heritage Act (2003)*, administered by NRW, and the *Queensland Heritage Act (1992)*, administered by EPA. Reference to the Brisbane City Council Cultural Heritage Manual and City Plan's Heritage Register Planning Scheme Policy is advised.

Relevant cultural heritage surveys should be prepared which identify and describe the location and value of any cultural heritage areas and objects in the study corridor. The surveys should be conducted with the involvement of relevant parties for the study corridor and/or by appropriately qualified cultural heritage practitioners and should include:



- engagement and consultation with Aboriginal parties in regard to Aboriginal Cultural Heritage for the study corridor concerning:
  - areas of significance to each community (including archaeological sites, natural sites, story sites etc);
  - appropriate community involvement in field surveys; and
  - provision of a statement of significance for identified objects or areas located during the survey;
- consideration of any requirements by communities, including Aboriginal parties, relating to confidentiality of site data;
- engagement and consultation with local heritage and historic associations or/and or societies regarding historic development and values in the study corridor;
- identification and consideration of any places listed in the Commonwealth Heritage List, the National Heritage List and/or the Queensland Heritage Register, the Aboriginal Cultural Heritage Register and Database (maintained by NRW), the BCC heritage list; and any existing literature relating to the affected areas within the study corridor; and
- surveys of the proposed area of development to locate and record indigenous and non-indigenous cultural heritage sites, objects and areas of significance.

In determining the significance of any cultural heritage objects or areas located, as a minimum, investigations and consultation should be undertaken in such a manner and detail consistent with statutory responsibilities and duties of care and to assist with the establishment of a Cultural Heritage Management Plan (CHMP) to protect areas and objects of cultural heritage significance.

## **5.8.2 Potential impacts and mitigation measures**

This section is to provide a description of any likely impacts on sites of indigenous and non-indigenous cultural heritage. This should include any impacts on Toowong Cemetery's monumental stonework and grave furniture.

The identification of indigenous cultural heritage impacts is to take place in consultation with relevant Aboriginal parties.

This section should describe the extent to which potential adverse impacts to cultural heritage were considered in any decision on the proposed tunnel alignment and the location of key project structure.

Recommended means of mitigating any negative impacts on indigenous cultural heritage values and enhancing any positive impacts is required.

Recommended means of mitigating any negative impacts on cultural heritage values and enhancing any positive effects is also required.

The management of potential indigenous cultural heritage impacts, if any are identified, must be detailed in a CHMP, which will provide a process for the management of Aboriginal cultural heritage objects and places within the study corridor. The CHMP must be completed prior to commencement of the project works and does not need to be completed in the EIS.

## 5.9 Social environment

### 5.9.1 Description of existing environment

This section is to describe the existing social values that may be affected by the project. The amenity and use of the study corridor should be described.

The existing social environment is to be described by:

- developing and mapping a set of social indicators to describe social conditions in the study corridor;
- identifying the number of properties and their use that are directly affected by the project;
- identify businesses directly affected by the project;
- describing existing social conditions (health, housing, social infrastructure, community values, amenity, connectivity, community safety and access); and
- identifying social infrastructure, including community facilities, in the study corridor.

### 5.9.2 Potential impacts and mitigation measures

The EIS should define and describe the objectives and practical measures for protecting or enhancing social values, describe how social impact management might be achieved, and how the achievement of the objectives should be monitored, audited and managed. This section is to define and describe the potential benefits and impacts of the project on the social environment of the study corridor and other areas that would be affected significantly by the project and propose mitigation measures to optimise the benefits and to avoid or minimise the impacts.

To assess the effects of the project on the social environment, the assessment should:

- identify potential significant impacts and proposed mitigation measures on affected landholders, businesses and communities;
- analyse the existing social data and the results of consultation with the community to identify potential changes to demography, equity, quality of life and community values which may result from the project;
- undertake quantitative and qualitative assessment, including consultation to determine potential social benefits and impacts, including for community members, businesses, council and other stakeholders, within the study corridor and in any wider context discovered during the assessment;
- through community consultation determine places of value to the community or individuals within the project area;
- predict potential social benefits and impacts, including quality of life, amenity, access, connectivity, changes to population diversity, changes to the social environment, employment, equity in local distribution of the community benefits and social impacts;
- review mitigation strategies used in comparable projects and the suitability of adoption of such measures in the project; and

- develop mitigation strategies to optimise community benefits and minimise negative impacts, including development of design, public transport, crime prevention, active transport and urban renewal strategies, where relevant.

## 5.10 Economic environment

This section is to evaluate the costs and benefits of the project on the economic environment including the significance of the project in the local economic context. An evaluation framework to estimate the benefits and costs of the project, during both construction and operational phases, should be established and described. This framework should, as a minimum:

- provide a clear definition of the economic objectives and scope of the project, including the extent of the study area for the purpose of economic assessment;
- set and justify a timeframe for analysis that reflects the economic life of the principal asset;
- identify and justify an appropriate project-specific discount rate;
- identify and examine all costs and benefits of the project. This should include direct user costs and benefits (e.g. tolls, vehicle operating costs taking into consideration both changes to route lengths and travel times, changes to vehicle accident rates, based on scenario testing and safety improvements), environmental effects and indirect costs and benefits to the broader community such as road and public transport network effects, socio-economic effects including employment, and land use changes etc, and environmental effects;
- identify key stakeholders (including, businesses and their employees) residing or operating within the study corridor or those areas outside the study corridor that may be affected by the project and an evaluation of the benefits and costs of the project to these stakeholders; and
- examine the impact of timing of delivery of the project on its commercial viability.

The EIS should describe any strategies to minimise or avoid adverse impacts or enhance positive economic impacts of the project on key stakeholders.

All data used in the economic analysis should be as accurate, current and relevant as possible, with reference made to the data source and its credibility. All efforts should be made to quantify benefits and costs of the project, including social and environmental benefits and costs.

All assumptions underpinning the analysis are to be outlined explicitly, and the sensitivity of the analysis to key parameters is to be established. Consideration should be given to all major transport or other related projects located within the study corridor, or otherwise linked to the project, that have either been approved to proceed to a tender process or are under construction.

Care should be taken to ensure that benefits accounted for are the most appropriate and relevant to the objectives and scope of the project and that double counting does not occur. The analysis should adhere generally to the economic assessment requirements contained in the *Queensland Treasury Project Evaluation Guidelines*.

## 5.11 Waste management

The EIS should identify and describe all sources of waste associated with construction and operation of all aspects of the project. This would include an identification of waste products likely to be generated, an outline of proposed waste management strategies, having regard to the Environmental Protection (Waste) Policy, the principles of waste avoidance, reuse, recycling, treatment and disposal. Proposed on-site storage requirements and treatment processes for wastes, including waste receptors as per ANZECC guidelines, should be indicated.

Where solid or liquid wastes are to be disposed of off-site the following details should be provided:

- typical facilities (locations) to which waste would be sent for disposal;
- target rates for recycling;
- indication of how the transport of the wastes from the site to the disposal facility will be undertaken, particularly regulated wastes; and
- the likely times and days of the week that wastes, including hazardous or dangerous materials, would be transported from the site to the disposal facility.

## 5.12 Hazard and risk

### 5.12.1 Description of existing environment

A hazard and risk analysis, using an all-hazards approach, should be outlined with respect to the construction and operational stages of the project, which:

- addresses the handling, transport, storage and use of hazardous goods by reference to applicable Codes of Practice and Australian Standards;
- identifies hazardous events or activities that may occur during construction or operation of the project. These could include:
  - storage and handling of hazardous goods;
  - transportation of hazardous goods in the tunnel and on the adjoining road network;
  - accidents in the tunnel and on the surrounding road network;
  - inundation/ flooding of the tunnel by water including during construction;
  - fire in the tunnel due to traffic accidents or spillage incidents;
  - spillage or release of contaminants or hazardous or other goods (e.g. gas leak) in the tunnel or on the adjoining roadway;
  - tunnel collapse or subsidence or other construction related major incident;
  - explosions within the tunnel and associated infrastructure; and
  - community action or protest.

The EIS should report on a risk assessment of the above hazards, in order to outline the levels of risk, if possible in terms of consequences and probability arising from potential

hazards, events and situations. The analysis should examine the likelihood of these consequences being experienced, both individually and collectively. The assessment should include the identification of hazardous materials likely to be used in the operation of the project.

### **5.12.2 Potential impacts and mitigation measures**

This section should outline strategies for hazard and risk management during the construction and operational phases to address the issues identified through the hazard and risk analysis, including:

- an analysis of the consequences of each risk identified on safety and environmental damage in the project area including environmental harm;
- an analysis of the consequences of each risk identified on the community within and adjacent to the project area;
- measures proposed to avoid or minimise flooding of the works as well as upstream flood impacts resulting from any changes to drainage patterns. Planning should include reference to “State Planning Policy 1/03, Mitigating the Adverse Impacts of Flood, Bushfire and Landslide”;
- emergency evacuation principles incorporated in the design, particularly in reference to the specific needs of people with a disability or who may experience access problems. These principles are to be developed in consultation with the Department of Emergency Services, the Queensland Police Service and Disability Services Queensland;
- an outline of the emergency disaster and evacuation plans for access and egress for emergency vehicles which are to be developed in consultation with relevant state agencies;
- outline of containment procedures for the spillage of goods and hazardous substances; and
- the adequate provision of hydrant water systems.

The EIS should describe the design features of the project and emergency services arrangements to be employed or installed to reduce the likelihood and severity of hazards, consequences and risks to persons, fauna, environmentally sensitive sites and the community within and adjacent to the project area. In particular, it should describe arrangements to manage potential accidents/incidents in the tunnel and on the road network (considering both initial evacuation as well as longer term community recovery) and include all fire and life safety provisions in the design and incident management procedures proposed. An outline of the emergency management procedures must be developed with the involvement of the relevant state agencies in relation to emergency medical response and transport and first aid matters.

### **5.13 Health and Safety**

A health risk assessment (HRA), should be provided detailing the impacts of the project, both in isolation and in combination with other known existing sources, on public health in the short and long term. It should include:

- estimation of emission rates (including noise and vibration emissions and under normal and abnormal (e.g. emergency) situations);

- estimation of ambient concentrations using dispersion modelling, calibrated and based on existing monitoring data;
- identification of operational phase vibration and regenerated noise impacts in critical shallow tunnel areas; and
- schematic identification of and impact on representative sensitive places and estimation of exposure levels.

This section should describe any further objectives and practical measures for protecting or enhancing health and safety within the community that are not mentioned elsewhere in the EIS.

Any proposed use of recycled water for the project should be assessed for its potential to cause infection by the transmission of bacteria and/or viruses by contact, dispersion of aerosols, and ingestion.

## 5.14 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 quality, water management, cultural heritage, social etc.) 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.

Cumulative impacts should also take into consideration other known infrastructure projects, especially in relevant northern and western suburbs of Brisbane, and especially with respect to the cumulative traffic impacts arising from construction activities of these projects. Currently known or anticipated projects for which cumulative construction impacts with this project might arise include: Airport Link, East-West Arterial Upgrade, Gateway Motorway Upgrade, Northern Busway, Hale Street Bridge, Tank Street Bridge, Northbank. Other projects overlapping in time and/or location with this project might emerge from contemporary transport plans, strategies and studies for SEQ.

The assessment is to include:

- identification of impacts, during construction, on the regional network (including the Gateway Motorway, Inner City Bypass, Western Freeway, Centenary Highway, Ipswich Motorway) the arterial road network (including but not limited to Gympie Arterial, Gympie Road, Stafford Road, Kelvin Grove Road, Frederick Street and Kingsford-Smith Drive) and the local road network;
- through community consultation, identification cumulative impacts of the construction of the projects on the community; and
- identification of any impacts on local and state labour markets with regard to the source of the workforce during the construction period of the project and the currently known or anticipated projects listed above.

The EIS should also consider the potential for other projects in the SEQ Infrastructure Plan and Program to add materially to cumulative impacts with this project.

The methodology to be used to determine the cumulative impacts of the project should be discussed. The methodology should detail the 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.

## 6 ENVIRONMENTAL MANAGEMENT PLAN

A draft Outline Environmental Management Plan (EMP) should be provided outlining the strategies to be adopted to address identified impacts.

The purpose of the draft Outline EMP is to describe generally the project's commitment to environmental management and to provide a framework for the subsequent development of detailed environmental management plans relevant to project implementation and operation.

The draft Outline EMP is an integral part of the EIS and should encapsulate the recommendations from the EIS about environmental management and mitigation measures for the project, which could be adopted to the extent required by a contractor either constructing or operating the project. The draft Outline EMP should include:

- an introduction to the project that includes a concise project description;
- the project's legislative requirements;
- the environmental objectives and mitigation measures for inclusion in the detailed design of the project and for the development of the construction contract documentation;
- the environmental objectives and mitigation strategies for the construction phase;
- the environmental objectives and mitigation strategies for the operational phase including any maintenance principles;
- mitigation and management measures should provide for flexibility in achieving performance-based environmental outcomes consistent with the environmental objectives. These are to be measurable criteria against which the implementation of the actions and the level of achievement of the performance objectives will be measured;
- a construction Traffic Management Plan including contingency plans for traffic diversion;
- a community engagement and communication plan to ensure proactive engagement with stakeholders throughout the construction and operation of the project;
- monitoring, auditing and reporting strategies for the construction and operational aspects of the project;
- responsibilities assigned to a relevant person/organisation; and
- the procedure and reporting framework, including a complaints register for the recording of complaints, a process for responding to complaints, a mechanism for the identification of non-conformances and a system for the implementation of subsequent corrective action is to be outlined.

When information is unavailable during the EIS preparation, this should be described with an indication of how and when the information will be acquired and incorporated into the final EMP.

## **7 CONCLUSION AND RECOMMENDATIONS**

A balanced overview of the project's impact should be provided together with recommendations (based on the studies undertaken and the environmental management plan developed) aimed at ensuring the project contributes to ecologically sustainable development.

## **8 REFERENCES**

References should be presented in a consistent and recognised format.

## **9 RECOMMENDED APPENDICES**

### **9.1 Terms of Reference for this EIS**

A copy of these Terms of Reference should be included in the EIS. Where it is intended to bind appendices in a separate volume from the main body of the EIS, the Terms of Reference at least should be bound with the main body of the EIS for ease of cross-referencing.

### **9.2 Consultation report**

The Consultation Report should summarise the results of the community consultation program, focussing on 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.

A list of all parties consulted should be included, in addition to a description of how 'interested' and/or 'affected persons' and 'affected parties', if relevant were identified.

### **9.3 Study team**

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

### **9.4 Specialist studies**

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