# Airport Link

## Phase 2 – Detailed Feasibility Study

EIS CHAPTER 19

DRAFT OUTLINE ENVIRONMENTAL MANAGEMENT PLANS

- October 2006

# Contents

# 19. Draft Outline Environmental Management Plans

*This chapter addresses Section 6 of the Terms of Reference by:*

- *Outlining the commitment of State Government and Brisbane City Council to environmental management;*
- *Providing draft Environmental Management Plans (EMP) for the construction and operational phases of the Airport Link Project;*
- *Encapsulating the recommended strategies to address environmental impacts identified in the EIS; and*
- *Providing a framework for the subsequent development of detailed environmental management plans relevant to project implementation and operation.*

## 19.1 Project Overview

### 19.1.1 The Airport Link Project

The Airport Link Project is located in the Brisbane City Council Local Government Area and has been proposed jointly by the Queensland Government and the Brisbane City Council to improve the efficiency of Brisbane's road network in the northern suburbs. Tunnels constructed through a variety of methods are to connect the northern end of the North-South Bypass Tunnel, the Inner City Bypass and the local surface road network at Windsor and Bowen Hills to Gympie Road and Stafford Road at Kedron, and to Sandgate Road and the East West Arterial at Clayfield. The tunnel system is to be mechanically ventilated with a longitudinal system, with air from the tunnel being extracted via a ventilation station and released via a high level outlet near each of the southern (Windsor/Bowen Hills), north-western (Kedron) and north-eastern (Clayfield) connections.

Construction of the Airport Link Project has been planned to occur from a principal worksite at Kedron and additional worksites in Windsor east of Lutwyche Road and in Clayfield on either side of Sandgate Road (i.e. Kalinga Park, and south of Toombul shopping centre near Schulz Canal). Construction is likely to take four or more years, including a fit-out period in the range of 12 to 18 months.

More detailed descriptions are provided in Chapter 4 - Project Description.

### 19.1.2 EIS Terms of Reference

The Airport Link Project was declared a significant project requiring an EIS by the Coordinator-General (CoG) pursuant to the *State Development and Public Works Organisation Act 1971* (SDA) in October 2005. Terms of Reference (ToR) for the Airport Link Project, finalised by the Coordinator-General in March 2006 identify matters that should be addressed in the EIS, including the preparation of a draft Outline Environmental Management Plan (EMP). To satisfy this requirement, a draft Outline EMP is provided for the construction phase and the operational phase of the project.

The ToR identify the following items to be addressed by the draft outline EMPs:

- The legislative requirements governing the project;
- Environmental objectives and mitigation measures for inclusion in the detailed design of the project;
- Environmental objectives and mitigation measures for development of the construction contract documentation;
- Environmental objectives and mitigation strategies for the construction phase;
- Environmental objectives and mitigation measures for the operation phase;
- 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 mechanism for the identification of non-conformances and the implementation of the subsequent corrective action is to be outlined.

The ToR suggested that, if possible, mitigation measures should include performance-based outcomes consistent with the objectives. These are to be measurable outcomes against which the implementation of the actions and the level of achievement of the Performance Criteria will be assessed.

To satisfy this requirement of the ToR, the draft Outline EMPs will derive their form and functionality from a platform of environmental objectives and performance criteria for both the construction phase and the operational phase of the Airport Link Project. This performance-based approach to environmental management is intended to deliver a balance between achieving acceptable outcomes for the community and environmental values, and a construction or delivery mode with sufficient flexibility to accommodate specific challenges and to optimise potential efficiencies in construction.

## 19.2 Management Structure

To deliver the Airport Link Project with the least possible impact on local communities and businesses, a rigorous approach to environmental management is required.

To achieve the over-arching objective of sound environmental management, a clear implementation and management structure is required. This section provides a suggested structure, which, regardless of the contractual delivery mechanism adopted for the Airport Link Project, includes the following roles:

- Queensland Government:
  - Represented by the Coordinator-General, is the concurrence agency for applications for assessable development under the *Integrated Planning Act* and *City Plan*;
  - A proponent of the Airport Link Project;
  - Regulates activities under relevant legislation (see attached schedule); and
  - An owner of land in the Airport Link corridor.
- Brisbane City Council:
  - A proponent of the Airport Link Project;
  - Regulates the performance of works according to local laws, including *City Plan*, and delegated State laws under Brisbane City Council jurisdiction;
  - Acts to facilitate the expression of community views; and
  - An owner of land in the Airport Link corridor.
- The Proponent:
  - Administrator of the head agreement or contract to ensure that the contract conditions are met;
  - Liaise with and coordinate relevant agencies within the Queensland Government and Brisbane City Council to provide timely advice to the Contractor for the smooth and efficient delivery of the Airport Link Project;
  - Ensure that prior to commencement of any work the Contractor has obtained all necessary approvals, established and properly briefed community consultative committees and agreed to a schedule of regular meetings with each committee; and

  - Ensure that the Construction Environmental Management Plan and sub-plans are adhered to in the daily works on the construction sites of the Airport Link Project.
- Contractor:
  - Prepares detailed engineering designs, construction environmental management plans, operation environmental management plans including environmental operation and management systems (EOMS);
  - Obtains all necessary approvals, including development approvals, environmental licences, workplace health and safety and all other construction-related approvals;
  - Ensures all designs and construction works are prepared and conducted in accordance with approvals, with the contract, with relevant legislation and regulations, with local laws;
  - Maintains for the duration of the construction phase, open and effective communications, with the communities in the vicinity of each of the Airport Link worksites about the construction program, scale, duration and nature of proposed work, and details of proposed impact mitigation measures; and if relevant
  - Conducts the safe and efficient operation of the Airport Link Project, upon completion of the construction phase, in accordance with approvals, contract conditions, relevant legislation and regulations, and local laws.
- Community Liaison Committees:
  - Provide comments in an advisory role to the Contractor on the draft Construction Environmental Management Plan and draft Operation Environmental Management Plan prepared by the Contractor;
  - Provide advice to the Contractor during the construction phase in relation to mitigating the impacts of construction in the local areas of each committee; and
  - Provide information to the wider community in relation to construction programming, the nature of construction work, and impact mitigation measures.

It is anticipated that the Contractor will implement a certified Quality Assurance (QA) system to ensure the design and environmental requirements are met through detailed Quality Plans. These will be prepared to describe the procedures to follow to meet the relevant design and environmental requirements. The Construction EMP and the Operation EMP will be an integral part of the Quality Plans and on-site operations and will be included in the Quality Plans as a 'special process'. Designating the EMP as a 'special process' has a particular meaning in QA terms, as it draws particular attention to the implementation of the EMP as part of the QA procedures. Implementing the QA Plan and the EMP will be subject to inspection, testing and audits by the Proponent, throughout the project to monitor conformance during the project, not simply at the end.

### 19.2.1 Overall Responsibilities

The following tables provide a summary of the likely responsibilities and accountabilities of various parties who will have active roles in the environmental management of the Airport Link Project. The responsibilities have been divided into the construction (**Table 19-1**) and operation (**Table 19-2**) stages.

## Table 19-1 Project Responsibilities – Construction

| | Project Responsibilities - Construction |
|---|---|
| Queensland Government | ▪ Manage the construction process as a project proponent<br>▪ Provide readily available expertise for the construction project as required.<br>▪ Receive progress reports on performance by the Contractor for the purpose of acknowledging compliance with contract conditions. |
| Brisbane City Council | ▪ Manage the construction process as a project proponent<br>▪ Provide readily available expertise for the construction project as required.<br>▪ Receive progress reports on performance by the Contractor for the purpose of acknowledging compliance with contract conditions. |
| The Proponent (Queensland Government and Brisbane City Council) | ▪ Review the EMP (Construction) submitted by the Contractor;<br>▪ Ensure that requirements of the Conditions of Contract (Environmental Management) and approved EMP (Construction) included in the contract documentation are implemented;<br>▪ Review any revisions to the EMP (Construction) as required;<br>▪ Maintain a current copy of the contract and the EMP (Construction) containing a record of the completion of planned actions, monitoring records and reports, supplied by the Contractor; and<br>▪ Initiate audits of environmental performance. |
| Contractor | ▪ Appoint independent facilitators to convene the community consultative committees, establish the committee terms of reference, facilitate meetings and pro-actively work to ensure efficient but comprehensive communication between the committee and the other parties takes place;<br>▪ Develop EMP (Construction) in accordance with the Conditions of Contract (Environmental Management) for submission to the Proponent;<br>▪ Maintain a master copy of the EMP (Construction) containing a record of the completion of planned actions, monitoring records, and reports which are made available during the audits;<br>▪ Obtain all necessary statutory approvals and licences and ensure that conditions of licences/approvals/permits are met;<br>▪ Provide copies of the EMP (Construction) to the relevant project staff having responsibilities defined in the EMP (Construction);<br>▪ Provide training to all project staff;<br>▪ Maintain a record of all training undertaken by all project staff, detailing the type and purpose of the training;<br>▪ Undertake regular monitoring in relation to environmental management issues and ensure that monitoring results are made available to the Proponent and the community consultative committees;<br>▪ Ensure corrective actions arising from self-assessments and external audits are completed immediately and in accordance with the EMP (Construction);<br>▪ Notify the Proponent and any relevant State agency of any environmental incidents and maintain a record of events relating to the environmental incidents including any remedial action taken;<br>▪ Ensure there is adequate and accurate identification and reporting of any non-conformances and any other environmental issues that may arise during construction;<br>▪ Provide relevant and timely information about construction activities that may have local impacts to the relevant communities and consult with individuals that may be directly impacted upon by construction activities as required to ensure direct project impacts are being managed; and<br>▪ Ensure that environmental protection measures are implemented in accordance with the EMP (Construction). |
| Community Liaison Committees | ▪ Hold independently facilitated meetings at appropriate intervals (which may be monthly during the initial period of local construction) to consider and provide advice about design options, construction activities and views received from the greater communities, and provide information and recommendations to the Contractor;<br>▪ Provide timely comment/feedback on monthly reports, monitoring results and any other data made available by the Contractor in accordance with the contract; and<br>▪ Provide information to the wider community as required. |

- **Table 19-2 Project Responsibilities – Operation**

| | Project Responsibilities - Operation |
|---|---|
| Queensland Government | ▪ On-going administration of relevant statutes, regulations and codes;<br>▪ In an arrangement with the Contractor/Operator, provide emergency services to the Airport Link Project including ambulance, fire fighting, chemical hazards emergency services and policing services; and<br>▪ To the extent required, work with the Brisbane City Council and the Contractor/Operator in managing the daily movement of traffic in the City, particularly along State-controlled roads. |
| Brisbane City Council | ▪ To the extent required, work with the Contractor/Operator in managing the daily movement of traffic in the City, particularly in and around Airport Link. |
| The Proponent (Queensland Government and Brisbane City Council) | ▪ Review the EMP (Operation) prepared by the Contractor;<br>▪ Liaise as required with the Queensland Government, Brisbane City Council and the Contractor/operator to:<br>▪ Ensure traffic management objectives are achieved in the City;<br>▪ Undertake periodic reviews and audits of the Contractor's performance where required by the contract. |
| Contractor (Operator) | ▪ Prepare an EMP (Operation) for the Airport Link Project, consistent with the conditions of any applicable approvals, and contractual requirements;<br>▪ Continuously monitor the environmental and traffic performance of the Airport Link and provide regular reports on performance to the Proponent. In this context, environmental performance includes monitoring in-tunnel air quality and ambient air quality at selected locations, with reporting intervals to be in accordance with the draft Outline EMPs. The Contractor/Operator will provide reports to the Proponent, and if required by legislation, to the relevant regulatory agency(s);<br>▪ Report to the Proponent on incidents of non-compliance, such as exceedances of air quality goals for in-tunnel air quality;<br>▪ Ensure the Airport Link is operated safely and with good environmental management practices at all times; and<br>▪ To the extent required, work with BCC in managing the daily movement of traffic in the City. |
| Community Consultative Committees | ▪ For the first 12 months of operation only:<br>▪ Comment and provide feedback on environmental reports prepared by the Contractor/Operator in a timely manner;<br>▪ Provide other community-based inputs as required. |

### 19.2.2 Environmental Responsibilities

There are a number of general project responsibilities for all entities involved in the Airport Link Project, with respect to the *Environmental Protection Act 1994*. All project staff have a general environmental duty under Section 319 of the Act, and must not carry out any activities that cause, or are likely to cause, environmental harm, unless all reasonable and practical measures are taken to prevent or minimise harm. If project staff, while performing their work, notice that serious or material environmental harm is being caused or threatened by their actions or the actions of someone else, they should then report the matter, under section 320 of the Act.

Additionally, project staff are required to comply with the following items at all times:

- Contractor's environmental policy and Environmental Management System (EMS);
- Relevant legislation, with particular attention to environmental legislation under this EMP;
- EMP requirements for construction and operation;
- Project training requirements; and
- All approvals, including the Coordinator-General's conditions.

### 19.2.3 Training and Awareness

Specific training and awareness requirements are outlined in **Table 19-3** below. Environmental training for on-site staff could be performed during the site-specific safety induction. Any further environmental training should be performed on an ongoing or periodic basis as required.

**Table 19-3 Training and Awareness Requirements**

| | Project Responsibilities – Training and Awareness Requirements |
|---|---|
| Contractor | ■ General environmental duties under the *Environmental Protection Act 1994* and other relevant legislation such as but not limited to:<br>■ *Aboriginal Cultural Heritage Act 2003;*<br>■ *Fisheries Act 1994;*<br>■ *Integrated Planning Act 1997;*<br>■ Specific environmental objectives and mitigation measures;<br>■ General responsibilities in relation to the design of the Airport Link Project;<br>■ Responsibilities under the EMP (Construction) in relation to implementing mitigation measures, monitoring, reporting and implementing corrective actions;<br>■ Responsibilities in the event of an environmental incident;<br>■ The consequences of not implementing mitigation measures or departure from specified operating conditions;<br>■ Internal and external communication processes;<br>■ Community perspectives and expectations;<br>■ Communication protocols; and<br>■ Document control. |

### 19.2.4 Communication

#### Internal Communication

Environmental protection should be achieved through clear and concise internal communications, which will be subject to periodic audits to ensure that the communication structure is performing adequately and all actions are performed and recorded. The audits should also provide for follow-up on specific or corrective actions raised during previous audits to ensure responses are complete.

The internal communication process and structure for formal reporting should be clearly illustrated in the EMP (Construction).

#### External Communication

To ensure clear and unambiguous communication is achieved, only those project staff nominated by the Project Manager should be involved in consultation with external bodies on environmental issues. The Project Manager may invite the Contractor to attend meetings with agencies and the community consultative committees.

External communication responsibilities and training should be detailed in the Contractor's EMP (Construction).

## 19.3 Monitoring, Auditing and Reporting Strategies

### 19.3.1 Reporting

Reporting and documentation including each of the EMPs are intended to be subject to change, and will be amended to incorporate necessary variations. Control of all project reporting for each of the EMPs, Project Quality Plans and any other documents or plans will be the responsibility of the Contractor in accordance with standard Document Control Procedures.

### 19.3.2 Monitoring Responsibilities and Standards

To ensure the mitigation measures are implemented or adhered to, monitoring of each element in the various project stages will be the responsibility of the Contractor. The specific monitoring actions for each environmental element will be finalised in the Construction EMP and the Operation EMP.

The Contractor will be required to undertake the monitoring of the environmental elements specified in the EMP to conform to the Project Quality Plan. Monitoring will be undertaken as a regular scheduled activity as frequently as specified in the EMPs. The EMPs, together with suggested amendments, should be reviewed by The Proponent.

Project staff responsible for any monitoring should ensure that all monitoring is in accordance with the relevant agency guidelines or Australian Standards. All analytical testing performed should use National Association of Testing Authorities (NATA) approved procedures or if this is unavailable, be performed to the best relevant standard.

### 19.3.3 Corrective Actions

The reporting and monitoring will incorporate continual improvement requirements identified through a non-compliance and corrective action procedure. These will be nominated in the Project Quality Plan and the EMPs, and should specify methods for recording and reporting non-conformances and ensuring that corrective actions are implemented to rectify the problem. The non-conformances and corrective actions may trigger a review and modification of practice and should be reflected in amendments to the Project Quality Plan and approved EMP.

### 19.3.4 Complaints & Responses

The environmental management process managed by the Contractor is to include a procedure for receiving and acting upon complaints. Attention to complaints should be carefully managed, prompt and effective, and should form a key part of the environmental reporting mechanism. Responsibility for maintaining the complaints procedure would rest with the Contractor, as a contractual requirement.

While the Construction EMP and Operation EMP would establish the procedure for complaints, basic requirements should include:

- A procedure for receiving and responding to complaints which is acceptable to the Proponent, the Coordinator-General and the Environmental Protection Agency (EPA);
- The Contractor maintaining, during the construction phase, a complaints telephone service operated, during the construction phase, on a 24 hr, 7 days a week basis by staff with authority to stop or amend work orders if required. During the operations phase of the project, the complaints system could be maintained on a ‘earliest opportunity’ or ‘next day’ basis for responses to the complainant;
- A process for registering and handling all complaints received in terms of:
  - Time and date of complaint;
  - The identity of the complainant and the recorder of the complaint;
  - The specific action or activity causing the complaint;
  - Whether environmental compliance requirements are being met;
  - The action taken to address the complaint if necessary;
  - A database for tracking of complaints and actions taken in response;
  - Immediate communication of the complaint to the contractor;

- Details on how the action taken is to be communicated to the complainant and the Proponent and the Contractor;
- Feedback to the complainant and the Proponent, the Coordinator-General as required, and the EPA within a specified time period;
- Any subsequent remedial action required to avoid cause for future complaints if relevant;
- Regular reporting to the Coordinator-General, the EPA and the Proponent on complaints and corrective actions; and
- Monitoring and auditing of the complaint handling system.

## 19.4 Outline EMP

### 19.4.1 Overview

This draft Outline EMP is presented within the EIS, on the understanding that detailed EMPs for construction and operation, as well as relevant sub- plans are to be prepared by the Contractor and reviewed by the Proponent and either the EPA or a State agency exercising its powers under legislation. The detailed EMPs for construction and operation, will need to include, but not be limited to, mitigation measures which address the Environmental Objectives and Performance Criteria of this draft Outline EMP and any conditions imposed either by the Coordinator-General evaluation report or other agencies under other approvals. They will also need to refer to expressed community needs and issues as identified in the EIS and any Supplementary Report as expressed by Community Liaison Groups.

The purpose of the draft Outline EMP is to set out the project commitments to avoid or minimise potential impacts of the project as identified in the EIS, including the identification of environmental aspects to be managed and how environmental values may be protected and enhanced.

Once in place, the EMP (Construction) and the EMP (Operation) will be dynamic documents. Each will be updated to incorporate further information, approval conditions, changes in environmental management procedures in the light of ongoing monitoring results, new techniques, and relevant legislative requirements. Each EMP will be supported by sub-plans. The construction sub-plans are likely to deal with such matters as soil erosion and sedimentation, dust, noise and vibration management, surface water quality, groundwater quality, spoil removal, spoil haulage and deposition, hours of work and work practices on the worksites, safety hazard and risk management, community liaison and communications, among others. The operation sub-plans are likely to deal with such matters as ambient air quality, in-tunnel air quality, waste-water management and disposal, landscape management and maintenance, tunnel traffic management and safety, emergency and risk procedures, community liaison and communications among others.

### 19.4.2 Planning for Ecologically Sustainable Development

The Airport Link Project will pursue the achievement of the following overall objectives for Ecologically Sustainable Development during the design, construction and operational stages:

- Adopt and integrate good management practices for design, construction and operation of all aspects of the Airport Link Project, including:
  - Energy efficiency measures (e.g. power demand management during construction, natural lighting and ventilation in appropriate locations, traffic management to enhance fuel efficiencies);
  - Waste minimisation, management and recycling;
  - Wise use and re-use of natural resources (e.g. air, water including groundwater, rock and other spoil);

  - Avoidance or minimisation and mitigation of impacts on ecological processes and habitat values adjacent to construction works (e.g. Enoggera Creek and Kedron Brook);
  - Avoidance, minimisation and mitigation of impacts on people, cultural values, communities and community facilities, businesses and other employment;
  - Seek to achieve community benefits in vicinity of project worksites (e.g. enhanced accessibility including walking and cycling, maintain environmental values along Enoggera Creek and Kedron Brook);
- Comply with all applicable laws, regulations, standards and guidelines for protection of the environment;
- Adopt the best management means available to prevent or minimise adverse environmental impact;
- Describe monitoring and reporting procedures required to identify impacts on the environment;
- Describe incident response protocols and procedures, including:
  - Lines of authority or responsibility and extent of jurisdiction for categories of incidents,
  - An integrated emergency response arrangement and procedures between the emergency services, Queensland Police, hospitals, tunnel operators and traffic management authorities,
  - An integrated environmental incident management group;
- Provide project employees and Contractors with adequate and contemporary training in safety, hazard and risk management, environmental procedures and social obligations; and
- Support the role and function of Airport Link Local Community Liaison Committees.

### 19.4.3 Implementation

This draft Outline EMP demonstrates how potential impacts can be addressed during the construction and operation stages. The preparation of the specified actions, strategies and recommendations implemented through the draft Outline EMP includes:

- Regulatory requirements expressed in legislation including local laws;
- Recommendations made in the EIS to minimise identified environmental/social impacts;
- Good practice environmental management;
- General content requirements of ISO 14001; and
- Management and responsibility for performance.

An outline of how each draft Outline EMP element is considered and presented is shown in **Table 19-4**.

**Table 19-4 Draft Outline EMP Elements**

| EMP Component | Description | Example |
|---|---|---|
| Environmental Element | The aspect of the environment requiring targeted Environmental Management. | Air Quality - Construction |
| Environmental Objective | A short description of the high level aim of the project with respect to this environmental element | Maintain ambient air quality for properties adjacent to construction worksites |
| Performance Criteria | The performance criteria are results contributing to the overall objectives. If all performance criteria are met, the objective will be achieved. Where possible these criteria should be measurable and monitored to assess level of achievement. | Monitor and manage the incidence of dust deposition, odour and construction vehicle emissions in relation to ambient air quality |
| Mitigation Measures | Mitigation measures may include a wide range of measures such as, but not limited to, changes in work procedures and practices, physical interventions to separate or buffer places from predicted construction impacts or physical relocation of affected parties for agreed periods of time. Such measures must be directed to achieving the Environmental Objectives and Performance Criteria, the statutory requirements, and must be consistent with the conditions of an approval from the Coordinator-General. The mitigation measures may include the mitigation measures contained in the Draft Outline EMPs or may include other measures, provided those other measures achieve the Environmental Objectives and Performance Criteria, the statutory requirements and the conditions of an approval from the Coordinator-General. | Develop a Construction Dust and Odour Environmental Management Plan<br>Establish minimum air quality targets at key locations |
| Reporting -to the Proponent | Purpose and frequency of reporting to demonstrate achievement of the environmental objectives and satisfaction of the performance criteria | As relevant to particular EMP (e.g. reporting on ambient air quality adjacent to worksites, on a quarterly or annual basis) |
| Responsibility | The responsible entity | The Contractor |

## 19.5 Environmental Requirements & Obligations

This draft Outline EMP is devised to ensure that identified environmental impacts relating to Airport Link construction and operation are avoided or minimised. In this regard the draft Outline EMP may refer to environmental legislation, controls, standards and guidelines relevant to impact mitigation and avoidance. The draft Outline EMP and sub-plans also require that, wherever possible, works related to site development meet the environmental expectations of the broader community and the local communities. These expectations are:

- For the broader community reflected in relevant standards and controls; and
- For local communities, those identified in the draft Outline EMPs in addition to relevant standards and controls.

A list of applicable legislation is identified in this section. A range of guidelines and associated standards relevant to construction works and environmental protection are also listed below. The Project Environmental Management representative will hold copies of the listed legislation, guidelines and standards on site.

### 19.5.1 National Strategies & International Conventions

The following national strategies provide high-level guidance and consideration for the design, construction and operation of the proposed Airport Link Project, and the preparation of this draft outline EMP:

- *National Strategy for Ecologically Sustainable Development 1992;*
- *National Strategy for the Conservation of Australia's Biological Diversity 1996;*
- *National Greenhouse Strategy 1998;* and
- *National Environmental Protection (Ambient Air Quality) Measure 1998.*

Relevant international conventions are:

- *The Agreement between the Government of Australia and the Government of the Peoples Republic of China for the Protection of Migratory Birds and their Environment 1986 (CAMBA);*
- *The Agreement between the Government of Japan and the Government of Australia for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment 1974 (JAMBA);*
- *The Ramsar Convention on Wetlands of International Importance 1971;*
- *The Bonn Convention on the Conservation of Migratory Species of Wild Animals 1979;* and
- *The United Nations Convention on Biological Diversity 1992.*

### 19.5.2 Commonwealth Legislation

Commonwealth Legislation that is relevant to the Airport Link Project and the outline EMP includes:

- *Environment Protection and Biodiversity Conservation Act 1999;*
- *Native Title Act 1993;*
- *Australian Heritage Council Act 2003;*
- *Aboriginal and Torres Strait Island Heritage Protection Act 1984;* and
- *Airports Act 1996.*

### 19.5.3 Queensland Legislation

#### Environmental Protection Act 1994

The *Environmental Protection Act 1994* (EP Act) is the umbrella legislation for the regulatory management of the environment in Queensland. The EP Act is based on self-regulation and duty of care that places the responsibility for protection of the environment on all persons during the conduct of all activities.

The Act provides for the licensing of Environmentally Relevant Activities (ERAs) and the granting of development approvals and registration certificates for the operation of the regulated activities. The Act also provides the power to administering authorities to order actions to be taken to improve environmental performance, conduct audits and environmental evaluations of activities, approve environmental management programs and impose penalties or prosecute persons for non-compliance within the requirements of the Act.

This Act is the primary legislative environmental tool in Queensland. The Act also allows for the preparation of Environmental Protection Policies (EPPs). The following EPPs have been proclaimed:

- *Environmental Protection (Water) Policy 1997;*
- *Environmental Protection (Noise) Policy 1997;*
- *Environmental Protection (Air) Policy 1997;* and
- *Environmental Protection (Waste Management) Policy 2000.*

### Other State Legislation

The EIS has been prepared under the provisions of the *State Development and Public Works Organisation Act 1971* (SDPWO Act). Relevant information in the EIS is then used to support applications for permits, licences and approvals as outlined in Chapter 4. In addition to the *Environmental Protection Act 1994*, other major legislation relevant to the Airport Link Project includes:

- *Aboriginal Cultural Heritage Act 2003;*
- *Acquisition of Land Act 1967;*
- *Animal Care and Protection Act 2001;*
- *Coastal Protection and Management Act 1995;*
- *Dangerous Goods Safety Management Act 2001;*
- *Fisheries Act 1994;*
- *Health Regulations under the Health Act;*
- *Integrated Planning Act 1997;*
- *Land Act 1994;*
- *Nature Conservation (Wildlife) Regulation 1994;*
- *Plant Protection (Red Imported Fire Ant) Quarantine Notice 2001;*
- *Queensland Heritage Act 1992;*
- *Soil Conservation Act 1986;*
- *Transport Infrastructure Act 1994;*
- *Vegetation Management Act 1999;*
- *Water Act 2000; and*
- *Workplace Health and Safety Act 1995.*

## 19.5.4 Guidelines, Codes and Best Practice

The standards described in **Table 19-5** apply to monitoring and auditing of performance.

**Table 19-5 Performance Guidelines**

| | |
|---|---|
| **Risk** | AS 4360: 1999 Risk Management |
| **Wastewater** | Water Quality Sampling Manual – For use in Testing for compliance with the *Environmental Protection Act 1994*. Second edition (Department of Environment Heritage 1995) |
| | Standard Methods of the Examination of Water and Wastewater – American Public Health Association (APHA)/Australian Waste Water Association (AWWA) |
| | AS 2031 Selection of Containers and Preservation of Water Samples for Chemical and Microbiological Analysis |
| **Waste** | AS 1216 Classification, Hazard identification and Information Systems for Dangerous Goods |
| | AS 1678 Emergency Procedure Guides – Transport |
| | AS 1940 Storage and Handling of Flammable and Combustible Liquids |
| | AS 3780 The Storage and Handling of Corrosive Substances |
| | AS 2809 Road Tank Vehicles for Dangerous Goods |
| | AS 2931 Selection and Use of Emergency Procedure Guides for Transport of Dangerous Goods |
| | AS 2187 Explosives - Storage, Transport and Use |
| **Soils** | Australian and New Zealand Environment and Conservation Council (ANZECC)/NEPM – Guidelines for the Assessment and Management of Contaminated Sites |
| | Queensland Government Chemical Laboratory – Guidelines for Soil Sampling |
| | Queensland Acid Sulphate Soils Investigation Team (QASSIT) "Sampling and Analysis Procedure for Lowland Acid Sulphate Soils (ASS) in Queensland" dated 1 October 1997. |
| | State Planning Policy 2/02: Planning and managing development involving Acid Sulphate Soils |
| | State Planning Policy 2/02 Guideline: Acid Sulphate Soils |
| | "Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland" (Department of Environment 1998) |
| | Soil Erosion and Sediment Control, Engineers Guidelines for Queensland |
| **Air** | AS 3580 Methods of Sampling and Analysis of Ambient Air |
| | Methods and Guidance for the Modelling and Assessment of Air Pollutants in NSW – DRAFT February 2005 (NSW EPA) |

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|---|---|
| | Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in NSW –August 2001 (NSW EPA) |
| | Queensland Environmental Protection (Air) Policy 1997 |
| **Noise and Vibration** | Queensland Environmental Protection (Noise) Policy 1997 |
| | Queensland EPA Environmental Protection Regulation 1998 |
| | Queensland EPA Noise Management Manual Third Edition March 2000 |
| | Queensland Main Roads – Road Traffic Noise Management: Code of Practice, January 2000 |
| | Queensland Main Roads Standard Specification MRS11.15 Noise Barriers, December 1999 |
| | Queensland Main Roads Standard Specification MRS11.51 Environmental Management, December 1999 |
| | Brisbane City Council – Noise Impact Assessment Planning Scheme Policy |
| | Brisbane City Council Local Law 5 – *Permits and Licences, Part 6 – Blasting* |
| | AS 1055: 1997 Parts 1 & 2 Acoustics – Description and Measurement of Environmental Noise |
| | AS 1259.2 – 1990 Acoustics – Measurement of airborne noise emitted by earth-moving machinery and agricultural tractors – Stationary test condition Part 1: Determination of compliance with limits for exterior noise |
| | AS/NZS 2107:2000 Acoustics-Recommended design sound levels and reverberation times for building interiors |
| | AS 2187.2: 1993 Explosives – Storage Transport and Use Part 2: Use of explosives |
| | AS 2436: 1981 Guide to Noise Control on Construction, Maintenance and Demolition Sites |
| | AS 2670.1: 2001 Evaluation of human exposure to whole-body vibration Part 1: General Requirements |
| | AS 2670.2: 1990 Evaluation of human exposure to whole-body vibration Part 2: Continuous and shock-induced vibration in buildings (1 to 80 Hz) |
| | AS 2702: 1984 Acoustics – Methods for the Measurement of Road Traffic Noise |
| | Australian Design Rule 28/01 |
| | National Road Transport Commission - Stationary Exhaust Noise Test Procedures for In-Service Motor Vehicles |
| | British Standard 7385: Part 1-1990 Evaluation and Measurement for Vibration in Buildings - Guide for measurement of vibrations and evaluation of their effects on buildings |
| **Dangerous Goods** | AS 1216 Classification, Hazard Identification and Information Systems for Dangerous Goods |
| | AS 1678 Emergency Procedure Guides – Transport |
| | AS 1940 Storage and Handling of Flammable and Combustible Liquids |
| | AS 2508 Safe Storage and Handling Information Cards for Hazardous Materials |
| | AS 2809 Road Tank Vehicles for Dangerous Goods |
| | AS 3780 – 1994 The Storage and Handling of Corrosive Substances |
| | AS 2931 Selection and Use of Emergency Procedure Guides for Transport of Dangerous Goods. |
| **Flora & Fauna** | DPI&F Fish Habitat Guideline FHG 002 – “Restoration of Fish Habitats, Guidelines for Marine Areas (1998)” |

### 19.5.5 Approvals, Permit and Licence Requirements

A summary of the approvals, permits and licences that may be required by the Airport Link Project is provided in **Table 19-6**.

## Table 19-6 Summary of Approvals

| Legislation | Authority | Trigger | Response | Timing |
|---|---|---|---|---|
| *Environmental Protection Act 1994* and Regulations;<br>*Integrated Planning Act 1997* | EPA | ERA 7 Chemical storage – including dangerous goods – in containers having a design storage volume greater than $10m^3$ and less than $1000m^3$ | Development approval and registration certificate to be obtained if storage exceeds the design storage volume | Prior to Construction – relevant stage |
| *Environmental Protection Act 1994* | EPA – Contaminated Land Unit | Disposal Permit required where contaminated soil is required to be removed. | Disposal Permit | |
| *Coastal Protection and Management Act 1995*; *Integrated Planning Act 1997* | EPA | Operational work that is tidal work.<br>IPA - Schedule 8, Part 1, Table 4 | Development approval for Operational Work to be obtained | Prior to Construction – relevant stage |
| *Integrated Planning Act 1997*; *Transport Infrastructure Act 1994* | Port of Brisbane Corporation | Material change of use on Strategic Port Land if inconsistent with the land use plan (2) | Development Approval | Prior to Construction – relevant stage |
| *Integrated Planning Act 1997* | DPI (Fisheries) | Operational Works - removal or disturbance of marine plants. | Development Approval | Prior to Construction – relevant stage |
| | Brisbane City Council or Private Certifier | Building works under Schedule 8 Part 1 Table 1 *Integrated Planning Act 1997* | Development approval for building works for sheds at worksites, and tunnel control and ventilation buildings | |
| | Brisbane City Council | Excavation or filling for spoil placement that materially affects premises or their use | Development approval for spoil placement | |
| | Brisbane City Council | Reconfiguration of a lot under Schedule 8 Part 1 Table 3 (4) | Development approval for long term lease of land for tunnel control buildings (3) (4) | |
| | EPA | Material change of use for land on the Environmental Management Register or Contaminated Land Register under Schedule 8 Part 1 Table 2 | Development approval for land on the Environmental Management Register or Contaminated Land Register | |
| | Brisbane City Council | Building works for demolition of character housing in a demolition control precinct or of heritage places. | Development approval for building works for demolition of character housing in a demolition control precinct or of heritage places (4) | |

**Table Notes:** 1) Only if road and tunnel works constitute either a pit or a quarry and the definition of "extracting" in Schedule 9 to the Environmental Protection Regulation.

2) Only if construction spoil is placed at the Strategic Port Land at Port of Brisbane and is inconsistent with the Land Use Plan.

3) If leasehold tenure for 10 years or more is pursued

4) Unless under a community infrastructure designation.

### 19.5.6 Other Legislative Requirements

A summary of other legislative requirements with which the Airport Link Project needs to comply is provided in **Table 19-7**.

**Table 19-7 Summary of Approvals**

| Legislation | Authority | Trigger | Response | Timing |
|---|---|---|---|---|
| *Environmental Protection (Waste Management) Policy and Regulation 2000* | EPA | Various triggers relating to waste tracking | Waste management to comply with relevant provisions | Construction |
| *Environmental Protection Act 1994* | EPA | Potentially contaminated soils require compliance with site management plans prepared in accordance with the EP Act.<br>Section 424 requires a disposal permit for disposal of contaminated land | The construction of the Airport Link Project will need to comply with the conditions applying to the existing site management plans for each of the contaminated sites under which it passes.<br>Disposal permits will be required for any contaminated soil excavated during construction or otherwise to be disposed of | Detailed Design and construction for disposal permit |
| | EPA, DNRMW | Potential Acid Sulphate Soils | Acid Sulphate Soils Management Plan, prepared in accordance with the QASSIT Guidelines | Detailed Design |
| *Aboriginal Cultural Heritage Act 2003* | DNRMW | Preparation of a Cultural Heritage Management Plan | A cultural heritage study is included in the EIS to identify the locality of places of cultural heritage significance.<br>Any works affecting a place of Indigenous cultural heritage significance to be undertaken under the Cultural Heritage Management Plan. | Prior to any excavation, construction or other activity that may cause harm to Aboriginal Cultural Heritage |
| *Queensland Heritage Act 1992 and Integrated Planning Act 1997* | EPA (QHC) | Any development carried out on a registered place is assessable development under the *Integrated Planning Act 1997*. | A development application, for code assessment, will be required. | |
| *Transport Infrastructure Act 1994* | DMR | Works to be undertaken on a State Controlled Road or that have a significant impact on a State Controlled Road | Approval required for tunnel or road works that are on a State Controlled Road or that have a significant impact on a State Controlled Road | |
| *Transport Infrastructure Act 1994* | The Railway Manager | Works that interfere with a railway | Approval required for any works that interfere with a railway | |
| *Land Act 1994* | DNRMW | Road closures | Road closures will be required | |
| *Nature* | EPA | Taking, using, keeping or | Permit to be obtained if | |

| Legislation | Authority | Trigger | Response | Timing |
|---|---|---|---|---|
| *Conservation Act 1992* | | interfering with a protected animal or plant (6) | protected plants are affected by the project. Fauna to be relocated in accordance with a Fauna Relocation Plan. | |
| Approvals under Local Laws | BCC | | | |

**Table Note:** If animals or plants protected under the Nature Conservation Act 1992 (Qld) are identified and required to be relocated/removed during construction.

## 19.6 Draft Outline EMP (Construction)

The environmental elements addressed in this draft Outline Construction EMP are:

- Traffic and Transport
- Geology and Soils
- Hydrogeology and Groundwater Quality
- Surface Water Quality
- Air Quality
- Noise and Vibration
- Flora and Fauna
- Land Use and Planning
- Cultural Heritage
- Social Environment
- Hazard and Risk
- Waste Management

The draft Outline Construction EMP is to incorporate sub-plans that comply with the relevant industry standards for environmental management and must include at least:

- A soil erosion and sedimentation management plan for each worksite and for spoil placement areas;
- A construction stormwater drainage and water quality management plan;
- A construction dust and odour management plan;
- A construction noise and vibration management plan;
- A construction vehicle management plan;
- A construction traffic management plan;
- A construction incident management response plan; and
- Other management plans necessary to achieve the environmental objectives and performance criteria.

| General – Construction | |
|---|---|
| Environmental Objective | Manage construction and worksites in accordance with the Construction EMP and EMP sub-plans. |
| Performance Criteria | ■ Worksites prepared in accordance with designs providing for the management and mitigation of construction impacts.<br>■ Construction works are managed to avoid, or mitigate and manage impacts on the amenity and environmental conditions prevailing in the vicinity of the worksites<br>■ Maintain safe and efficient access near worksites for emergency vehicles.<br>■ Take reasonable measures to minimise potential construction risks to construction workers, to the general public in adjacent areas and to the environment. |
| Mitigation Measures | ■ Hours of work:<br>- Construction activities on or above the surface and which generate excessive levels of noise, vibration, dust or traffic movements should only be undertaken between 6.30am and 6.30pm Mondays to Saturdays and at no time on Sundays or Public Holidays except for special circumstances where the above surface works should be conducted outside these days and hours.<br>- Special circumstances include works on Arterial Roads (to avoid disruption to peak traffic flows), works in railway corridors, spoil haulage, or works involving large prefabricated components such as bridge elements or Tunnel Boring Machines;<br>- Notify local communities of duration and timing of surface works to be conducted outside of usual working hours.<br>■ Construction worksites:<br>- To be designed and constructed to provide for the management and mitigation of construction impacts;<br>- To include construction work sheds established over tunnel shafts or excavations and spoil handling and loading facilities, incorporating acoustic lining, ventilation and dust filtration equipment to achieve environmental objectives and performance criteria for noise and air quality as set out in the EMP;<br>- Spoil handling, storage and loading is to be conducted at all times within enclosures designed and constructed to achieve environmental objectives and performance criteria for noise and air quality as set out in the EMP;<br>- Install and position night lighting, including security lighting, to avoid light spill onto adjoining premises, at intensities not exceeding 8 lux measured at the common boundary;<br>- To include fencing to worksite boundaries to ensure safety for pedestrians and cyclists;<br>- Site access points for pedestrian and vehicular traffic according to the Transport, Access, Parking and Servicing Planning Scheme Policy in City Plan.<br>■ Achieve compliance with the requirements of the *Hazard and Risk Assessment Planning Scheme Policy* in City Plan.<br>■ Construction sites are to be rehabilitated as quickly as reasonable and practicable to manage and mitigate the potential impacts of dust, soil erosion and sedimentation. Surface earthworks must be managed to minimise adverse environmental impacts on waterways and sensitive receptors. |
| Monitoring | Weekly during site preparation and construction start-up. |
| Reporting | Monthly until worksites established and upon completion of construction. |
| Responsibility | Contractor |

| Traffic and Transport – Construction | |
|---|---|
| Environmental Objective | ■ Manage construction traffic and transport issues to minimise potential impacts on the community and the operation of the road network. |
| Performance Criteria | ■ Take reasonable and practicable measures to avoid, or mitigate and manage the potential construction traffic impacts on communities near the worksites, including on local parking. |

| Traffic and Transport – Construction | |
|---|---|
| | ■ Minimise as far as reasonably practicable, potential traffic disruptions to the operation of the road network and the public transport network (bus, rail) due to construction works.<br>■ Maintain safe access near all project work areas for road users, including pedestrians and cyclists. In particular, develop local access strategies in consultation with stakeholder groups to maintain safe, convenient and efficient access to community facilities such as schools, child care facilities, churches, aged care accommodation, health care and shopping facilities.<br>■ Implement traffic management measures near worksites and other project works to avoid conflicts between construction traffic, and pedestrians and cyclists.<br>■ Take reasonable and practicable measures to inform the local and broader communities about the timing and scale of changes to traffic conditions on roads in the vicinity of worksites and construction works.<br>■ Monitor traffic flows near construction works and take corrective action in response to traffic impacts as a consequence of construction works. |
| Mitigation Measures | **Truck routes and construction site access**<br>■ In consultation with Queensland Transport, Department of Main Roads and the Brisbane City Council, develop and implement a Construction Traffic Management Plan to address the following issues:<br>- Use of established truck routes and arterial roads for the haulage of construction materials and spoil;<br>- Where practicable, provide direct access from worksites to arterial roads to minimise truck traffic in local streets;<br>- Avoid haulage tasks during peak traffic periods and during school drop-off and pick-up times in the vicinity of Kedron State High School and Wooloowin State School. Where haulage in peak periods is unavoidable, such activities are to be managed in accordance with specific traffic management sub-plans provided to the relevant agencies and Council in advance.<br>- Control heavy vehicle movements to avoid interference with major events, such as events at RNA Exhibition Ground, and major events at Kedron State High School and the Wooloowin State School;<br>- Investigate the capacity of intersections on haulage routes to minimise impact on intersection operations by heavy vehicles servicing the construction worksites;<br>- Prepare and implement a comprehensive construction traffic management plan to control truck movements to avoid, or mitigate and manage the impacts of heavy vehicle traffic on the road network, except in exceptional circumstances, and after consultation with the local community.<br>Exceptional circumstances will arise when no suitable alternative routes are available for specific construction tasks (e.g. removal of tunnelling machinery, delivery of large construction components such as bridge spans).<br>■ Measures to manage the operation of the construction truck fleet for incorporation in the construction traffic management plan could include:<br>- Real-time monitoring of truck position, speed, route and performance in relation of traffic conditions and schedule requirements;<br>- Management of truck speed and position to avoid queuing on the approaches to the spoil handling and loading facilities;<br>- Management of traffic signals on nominated spoil haulage routes in night-time hours to achieve optimum performance of the truck fleet and to minimise impacts on communities along the routes;<br>- Maintain all vehicles transporting material to and from the construction sites to a high standard with regards noise emissions, exhaust emissions, traffic safety and operational safety;<br>- Ensure all vehicles leaving a construction site pass over or through devices designed and maintained to remove soil and other materials which could contaminate or pollute receiving waters or diminish environmental conditions.<br>**Traffic diversions**<br>■ Prior to commencing construction, analyse traffic conditions, including nearby arterial roads and surrounding roads, to predict the effect of potential traffic |

| Traffic and Transport – Construction | |
|---|---|
| | redistribution as a result of temporary traffic diversions;<br>■ Identify and implement measures to manage traffic flows resulting from predicted changed traffic conditions;<br>■ Notify the local and broader community, including potentially affected businesses and the administrations of community facilities and emergency services, about proposed diversions and provide clear signage of changed traffic conditions arising from construction activities and take other measures to ensure safe traffic movement (e.g. traffic controllers, traffic signal operational changes, dynamic advanced warning using variable message signage, real time monitoring of traffic conditions using closed circuit television (CCTV));<br>■ Monitor traffic flows and review the traffic management measures, to address local traffic issues;<br>■ During daylight hours, whenever possible and practicable, retain at least two lanes of traffic in each direction on Lutwyche Road, Gympie Road, Sandgate Road, the East West Arterial, the NSBT and Inner City Bypass in the vicinity of project works;<br>■ Identify and promote possible alternative arterial routes which have sufficient spare capacity to accommodate non-construction traffic; and<br>■ Maintain access to properties adjoining the project works, wherever practicable, or consult with affected owners and occupants to make alternative arrangements for property access.<br>**Construction Traffic Hazards**<br>■ Provide road geometry and screening of project works to minimise distractions for motorists.<br>**Local Traffic**<br>■ Implement management measures to minimise increase in traffic caused by the project works in local streets as practicable;<br>■ Notify the local community about proposed changes to local traffic access arising from construction activities, and provide clear signage of changed traffic conditions and take other measures to ensure safe traffic movement;<br>■ Prepare and implement an employee parking policy for the construction worksites to manage the impacts on car parking in the vicinity of worksites;<br>**Emergency Vehicles**<br>■ Maintain emergency access to the Royal Brisbane Hospital and Rosemount Hospital, including retaining two lanes of traffic in each direction near the worksites where practicable and avoiding the need to divert ambulances to other routes;<br>**Public Transport**<br>■ Relocate bus stops impacted by the project works and notify users prior to the relocation;<br>■ Implement traffic management measures near construction works to minimise disruption to bus route and timing.<br>**Pedestrians and Cyclists**<br>■ Evaluate demand for pedestrian and cycle movements near the work sites, including liaison with key stakeholders;<br>■ Maintain safe pedestrian and cycle access near construction works (particularly for elderly and children), including to community facilities, such as schools, child care facilities, churches, aged care accommodation, open space, health care and shopping facilities, and particularly:<br>- Between Kedron State High School and Kedron Brook;<br>- Across and along Lutwyche Road in the vicinity of Wooloowin State School and St Andrew's Anglican Church;<br>- Between Stuckey Road and Kalinga Park, Toombul railway station and Toombul shopping centre;<br>- Along Kedron Brook;<br>■ Notify the local community, and in particular, local schools, about changes to pedestrian and cycle access during construction near construction works;<br>■ Provide traffic controls designed for the safe movement of pedestrians and cyclists near the worksites. |
| Monitoring | ■ Monitor traffic flows weekly and monthly against modelled flows, and review the construction traffic management plan. |
| Reporting | ■ Monthly report on local traffic conditions, including any accidents involving |

| Traffic and Transport – Construction | |
|---|---|
| | construction traffic |
| Responsibility | Contractor |

| Geology & Soils – Construction | |
|---|---|
| Environmental Objective | ■ Minimal impacts due to settlement due to tunnelling or soil erosion due to construction.<br>■ Manage and avoid impacts of construction works on the environmental values of Moreton Bay and Ramsar Wetlands.<br>■ Manage the environmental or public health impacts and risks associated with working in potential acid sulphate and/or contaminated soils encountered during earthworks.<br>■ Seek to maximise the recovery of construction spoil for re-use in the project works. |
| Performance Criteria | ■ Take all reasonable and practicable measures to:<br>- Identify the potential for and then avoid or minimise, monitor and manage the impacts of surface settlement caused by construction works;<br>- Manage and mitigate the impacts of spoil removal, haulage and placement at spoil placement sites<br>- Manage and mitigate the risks of soil erosion, impacts from acid sulphate soils, and/or contaminated soils resulting from or encountered during construction works;<br>■ Conduct induction and training for construction staff on procedures for recognizing, remediation and management of contaminated land and spills and leaks of hazardous materials. |
| Mitigation Measures | **Soil Erosion**<br>■ Develop and implement mitigation measures to manage the risk of erosion during construction to minimise:<br>- Potential surface water quality impacts from sediment and contaminants entrained in surface runoff;<br>- Loss of topsoil material during site preparation and from stripping and stockpiling for extended periods;<br>- Erosion due to vegetation clearing and soil disturbance; and<br>- Erosion of exposed vulnerable soils by wind or water action.<br>■ Plan construction works to provide for the progressive and timely stabilisation and rehabilitation of disturbed areas;<br>■ Undertake an erosion risk assessment which identifies flow paths, suitable stockpile locations, soil cover type, and soil stability; and<br>■ Undertake finishing and landscaping requirements for on-going sediment and erosion control around the worksites following construction. |
| | **Settlement**<br>■ Identify and implement management measures to minimise the potential for settlement, including:<br>- Excavation induced settlement;<br>- Drawdown induced settlement; and<br>- Local ground relaxation effects.<br>■ Identify and implement mitigation measures for tunnel face loss, design of tunnel support and liners, stability assessment of portals and the driven tunnel and groundwater modelling of any impact by the tunnel;<br>■ Undertake comprehensive geotechnical assessment to define the subsurface profile and materials along the alignment of the tunnel, including an assessment of stability and groundwater issues;<br>■ Undertake a building condition survey of buildings, structures and heritage landscape features within the ANSETTLE trough footprint where consent of owners is obtained;<br>■ Ensure that where predictive modelling indicates groundwater impacts are likely, construction measures are design and implemented to manage and mitigate those impacts; and<br>■ Monitor and review the settlement management measures from the commencement of construction works. |
| | **Acid Sulphate Soils (ASS)** |

| Geology & Soils – Construction | |
|---|---|
| | ■ Undertake further investigations (in compliance with *Guidelines for Sampling and Analysis of Acid Sulfate Soils in Queensland 1998* (Ahern et al., 1998)); in areas below 5 metres AHD within the vicinity of the Enoggera Creek floodplain and the environs of Kedron Brook/Schulz Canal to determine the extent of PASS.<br>■ Develop and implement an Acid Sulphate Soil Management Plan, to comply with:<br>- Queensland Acid Sulphate Soil Technical Manual Acid Sulphate Soils Laboratory Methods Guidelines (Ahern et al., 2004);<br>- Queensland Acid Sulphate Soil Technical Manual Acid Sulphate Soil Management Guidelines (2002);<br>- State Planning Policy 2/02 – Planning and Managing Development involving Acid Sulphate Soils;<br>- SPP2/02 Guideline: Acid Sulphate Soil. |
| | **Contaminated Land**<br>■ Undertake site history investigations of the study corridor to identify areas of potential soil contamination;<br>■ Undertake a contaminated land investigation and develop a Site Management Plan (SMP) in locations where earthworks may encounter potentially contaminated soils;<br>■ Notify the EPA of any land parcels containing contaminated soil that are not listed on the EMR/CLR.<br>■ Obtain a disposal permit from the EPA Contaminated Land Unit for the removal of contaminated soil, in accordance with the *Environmental Protection* Act 1994.<br>■ If the removal of contaminated soil is required, prepare Site Management Plan and Remediation Action Plan (RAP) for approval from the EPA;<br>■ Develop a Hazardous Materials Register, to include details on:<br>- Storage location;<br>- Storage requirements;<br>- Proper usage;<br>- Handling information; and<br>- Disposal procedures;<br>■ Develop and maintain Material Safety Data Sheets for all materials and chemicals within the Hazardous Materials Register.<br>■ Design chemical and fuel storage areas to comply with Australian Standards including, AS1940: Storage and Handling of Flammable and Combustible Liquids, and AS3780: The Storage and Handling of Corrosive Substances;<br>■ Incorporate spill response procedures and Incident Management Plans in overall site emergency response procedures;<br>■ Ensure spills and leaks are cleaned up and remediated as specified in Incident Management Plans;<br>■ Undertake induction and training for construction staff in relation to the management and remediation of contaminated land;<br>■ Ensure spill response and containment equipment is kept on the worksite in close proximity to storage and handling areas; and<br>■ Adopt and implement applicable guidelines for storage of hazardous materials. |
| Monitoring | **Soil Erosion**<br>■ Monitor sediment and erosion control structures and measures and review the management measures monthly; in wet weather or when using large quantities of water in construction works daily monitoring may be necessary.<br>**Settlement**<br>■ Monitor the effects of settlement (if any) from tunnelling, through surveys and other displacement monitoring; and<br>■ Monitor embankments and structures for compliance with the design specifications.<br>**ASS**<br>■ Monitor for ASS in stockpiles, treatment areas, drainage control measures and areas of ASS disturbance as specified in the ASS Management Plan.<br>■ Conduct validation sampling following remediation or covering of contaminated soil, and achieve sign-off from the EPA by a certified, qualified auditor.<br>**Contaminated Land**<br>■ In the event of handling contaminated soils carry out dust monitoring at adjacent properties to assess levels of dust generation, if any, affecting nearby sensitive |

| Geology & Soils – Construction | |
|---|---|
| | receptors;<br>▪ Carry out formal inspections of stockpiles, work areas and adjacent areas to ensure dust and odour impacts are identified and dealt with. |
| Reporting | Monthly reporting for all aspects, including detailed reporting;<br>Immediate reporting of any incident, spill or release of materials to the environment. |
| Responsibility | Contractor |

| Hydrogeology and Groundwater Quality – Construction | |
|---|---|
| Environmental Objective | ▪ Take all reasonable actions to Groundwater quality will not be diminished from pre-disturbance levels during and after construction.<br>▪ Groundwater levels in the surrounding area as a result of construction activities will be maintained as close as possible to pre-construction levels and managed.<br>▪ Groundwater inflow to the tunnels will be minimised and managed. |
| Performance Criteria | ▪ Collect targeted baseline data prior to construction to establish pre-disturbance groundwater levels.<br>▪ Take all reasonable and practicable measures in construction activities to minimise the impacts on ground water quality from any release of contaminants.<br>▪ Monitor and manage the extent of groundwater level drawdown.<br>▪ Monitor all groundwater usage in the study corridor and minimise any impacts from construction activities. |
| Mitigation Measures | ▪ Undertake targeted baseline monitoring of receiving waters prior to construction to establish a baseline against which to assess any discharges and define the level, if any, of treatment required.<br>▪ Identify and implement management measures to ensure that accident spills are cleaned up and remediated to avoid potential contamination of groundwater seepage.<br>▪ Develop and implement mitigation measures based on results of the groundwater monitoring program. |
| | ▪ Undertake consultation to identify any unregistered water bores in the tunnel alignment and manage any possible effect on such bores by the tunnelling works. |
| Monitoring | **Water Level Drawdown Monitoring**<br>▪ Assess deviations from seasonal baseline groundwater levels and identify/formulate mitigation options.<br>▪ Supplement monitoring program currently undertaken by BCC, which monitors groundwater level drawdown. |
| Reporting | Monthly reporting |
| Responsibility | Contractor |

| Surface Water Quality – Construction | |
|---|---|
| Environmental Objective | During construction, surface water quality in local receiving waters retains its ecological, recreational and aesthetic values. |
| Performance Criteria | ▪ Contaminants, including sediments, that could cause adverse environmental impact to surface waters are not released as a consequence of construction, construction vehicle movements or spoil placement.<br>▪ Surface water flows in Enoggera Creek and Kedron Brook are maintained during construction, and to the extent reasonable and practicable in other drainage systems.<br>▪ Drainage from construction worksites and spoil placement sites is managed to avoid a loss if water quality in local receiving waters.<br>▪ Establish and maintain sufficient baseline data prior to construction to manage surface water quality. |

| Surface Water Quality – Construction | |
|---|---|
| Mitigation Measures | **Tunnel Waters**<br>■ Conduct targeted baseline monitoring of receiving waters for metals and hydrocarbons, prior to construction to establish a baseline to assess any discharges and define the level, if any, of treatment required.<br>■ Design and construct a dedicated groundwater seepage system, ensuring groundwater that has seeped into the tunnel will be diverted away from all other tunnel runoff. |
| | **Stormwater**<br>■ Identify and implement measures for the management of stormwater and drainage from construction worksites, spoil placement sites and storage areas for plant, equipment, fuels, lubricants and other potential contaminants.<br>■ Identify and implement management measures to ensure that spills and leaks are cleaned up and remediated to minimise impacts on surface water.<br>■ Identify and implement management measures to minimise potential surface water quality impacts from sediment and contaminants entrained in surface runoff.<br>■ Provide adequate bunding of spoil placement areas to prevent surface run-off entering nearby stormwater drains without treatment or inundation by flood waters in a 1 in 5 year design flood event;<br>■ Place sediment fencing around areas of concern, such as adjacent waterways, to minimise construction impacts on the waterway. |
| | **Waste water**<br>■ Identify and implement measures for the management of construction wastewater;<br>■ Establish suitably sized sediment basins at the construction worksites for the management of wastewater during construction. |
| | **Groundwater Seepage**<br>■ Identify and implement management measures to avoid potential contamination of surface waters by groundwater seepage from construction activities. |
| Monitoring | Monitor the quality of receiving waters against baseline data. |
| Reporting | ■ Monthly reporting<br>■ Immediate reporting of an incident, spill or other uncontrolled release of contaminants to the environment<br>■ Worksites and spoil placement areas - reporting after a rainfall event exceeding a 2 year ARI |
| Responsibilities | Contractor |

| Air Quality – Construction | |
|---|---|
| Environmental Objective | ■ Ambient air quality is maintained at properties adjacent to worksites and spoil placement sites throughout construction.<br>■ Community concerns and complaints about air quality are addressed quickly and effectively |
| Performance Criteria | ■ Establish targeted baseline data prior to construction for pre-disturbance air quality levels.<br>■ Avoid, or mitigate and manage potential air quality impacts including dust, odour and vehicle emissions from construction, spoil haulage and spoil placement.<br>■ Take reasonable and practicable measures to manage the potential for diminished air quality (dust, odour, plant and vehicle emissions) at properties adjacent to work sites due to construction activities.<br>■ Take corrective action in response to diminished air quality for properties adjacent to construction sites as a consequence of construction works or operation of construction vehicles.<br>■ Report upon the effectiveness of any corrective action taken. |
| Mitigation Measures | **Dust and Odour**<br>■ For each construction worksite required for tunnelling works, except for sites involving 'cut and cover' works:<br>- Erect an enclosed shed equipped with ventilation and dust filtration equipment over the tunnelling shaft;<br>- Maintain the ventilation and dust filtration equipment for the enclosed sheds to achieve acceptable performance |

| Air Quality – Construction | |
|---|---|
| | - Undertake the loading of construction spoil into haulage vehicles within enclosures or the enclosed shed, with the shed doors being closed when meteorological conditions would cause dust from within the shed to impact on adjacent properties.<br>■ For each construction site including spoil placement sites:<br>- Minimise the extent of exposed earth at any time<br>- Use watering or other effective techniques on unsealed areas to minimise wheel-generated or wind-generated dust<br>- Where possible, engage in the progressive rehabilitation of construction sites and spoil placement sites with landscaping.<br>■ Take measures (e.g. rumble bars and wheel wash bays) to ensure dust-creating material (earth or similar material) is not transported from construction sites to roads or other areas in the public domain.<br>■ Ensure all trucks carrying spoil or other loose material are covered, and if necessary, treated (e.g. mist sprays) prior to leaving a construction site.<br>■ Ensure all loose earth and similar material spilled or otherwise deposited within a construction site is cleared and removed from trafficked areas as soon as practicable.<br>■ At construction sites and spoil placement sites, monitor meteorological conditions, particularly wind speed and direction and where necessary take measures to avoid impacts of dust or odour on adjacent properties. Such measures may include:<br>- Modification of construction methods;<br>- Increase in dust suppression measures; or<br>- Cessation of work when no other reasonable or practical measure is available.<br>■ During the first disturbance of potentially odorous soils, implement reasonable and practicable measures to avoid or mitigate and manage impacts of odours on adjacent properties. Such measures may include:<br>- Proceeding slowly to monitor and determine the potential for odour impacts at off-site sensitive receptors;<br>- Conducting works with odorous soils when wind directions are unlikely to affect sensitive receptors;<br>- Covering odorous, excavated soil stockpiled either on a construction site or a spoil placement site to reduce odour impacts. |
| | **Diesel Exhaust Emissions**<br>■ Take measures to manage the movement of construction vehicles entering and leaving construction sites to avoid, or mitigate and manage the potential for vehicle emissions impacting on adjacent properties, except where such residential or sensitive activities front an arterial road to be used for access to or from a construction site. Measures for construction fleet management are to be provided in the construction vehicle management plan and the construction traffic management plan. Such measures may include avoiding or minimising queuing in streets approaching the worksites or adjacent to other sensitive activities;<br>■ Adopt procedures to avoid construction vehicles idling for excessive periods (e.g. more than 5 minutes) if required to queue to enter construction sites;<br>■ For stationary plant and equipment powered by diesel motors, take measures to avoid or mitigate and manage the potential impacts of exhaust emissions on adjacent residential or other sensitive activities. For example, ensure all construction vehicles and stationary plant and equipment powered by diesel motors are fitted with emission control measures, and are regularly maintained to manufacturers' specifications. |
| Monitoring | **Ambient Air Quality**<br>■ Undertake local, daily monitoring of ambient air quality in the vicinity of construction sites for the duration of surface works, or in response to complaints, based on the following parameters:<br>- Total suspended particulates<br>- Particulates (PM 10); and<br>- Dust deposition<br>■ Monitor and manage the incidence of dust deposition and odour and manage construction vehicle emissions in relation to ambient air quality. |
| | **Dust** |

## Air Quality – Construction

- Monitor daily, or more frequently if weather conditions require, construction sites, stockpiles, vehicles and roads leaving construction sites for evidence of dust generation or loose, unstable material with potential for dust. For this requirement, weather conditions requiring more frequent monitoring include strong winds, winds prevailing upon sensitive activities, such that monitoring each hour is required for the duration of the weather conditions.
- Monitor regularly (weekly minimum) by inspection or other effective sampling:
  - The performance of dust filtration systems on construction shed ventilation systems;
  - Dust deposition rates at nearby properties
  - Spillage or deposition of loose material on roads leaving a construction site.
- Monitor performance of mitigation measures in relation to the goals for dust deposition set out in Table 1 below.

**Table 1 – Air Quality Goals (Dust Deposition)**

| Existing dust fallout level ($g/m^2$/month) | Maximum acceptable increase over existing fallout levels ($g/m^2$/month) | |
|---|---|---|
| | Residential | Other* |
| 2 | 2 | 2 |
| 3 | 1 | 2 |
| 4 | 0 | 1 |

**Vehicle Emissions**

- Monitor construction vehicle management with regards to:
  - Queuing in streets other than those in which arrangements have been made for such action in the construction traffic management plan (on-going);
  - Vehicle motors idling for periods exceeding 5 minutes while in queues to access construction sites (on-going)
- Inspect the position of stationary plant and equipment powered by diesel motors to ensure exhaust emissions are directed away from sensitive activities and neighbouring properties (initially on establishment).

Reporting: Monthly. If more than one complaint is received in the preceding week, then weekly for 4 weeks.

Responsibility: Contractor

## Noise and Vibration – Construction

Environmental Objective

- Maintain a reasonable acoustic environment for living, in particular for sleeping, and use of properties along the corridor of construction influence during construction works.
- Significant heritage buildings and other structures are protected from the effects of vibration from tunnelling activities..
- Consultation with concerned property owners and occupants in the corridor of the construction influence is effective and responsive.

Performance Criteria

- Demonstrate through predictive modelling of the proposed construction techniques and monitoring ambient noise and vibration readings prior to construction to establish pre-disturbance levels, the likely levels of noise and vibration due to construction works throughout the construction period.
- Having regard for the goals for noise and vibration during construction, achieve a 'reasonable' noise and vibration environment within the corridor of construction influence, having regard for the scale and duration of construction works, the nature of the terrain through which the construction works are to pass and the character of land use activities;
- Monitor and report regularly on the performance of construction works with regards environmental guidelines for noise and vibration

Mitigation Measures

**Workshed Ventilation Noise**

- Acoustic screening is to be provided for workshed plant and equipment, and any workshed ventilation as required, to achieve a reasonable noise environment.
- Implement measures to ensure workshed ventilation noise does not exceed the goals established in Tables 1 and 2 below.

## Noise and Vibration – Construction

**Construction Noise Goals**

- Limit above-ground construction works to construction hours in accordance with the general construction management provisions relating to hours of work established in this Draft Outline EMP.
- For surface construction works beyond standard construction hours, take reasonable and practical measures to minimise potential impacts to achieve the noise goals established in Tables 1 and 2 below for nearby properties (e.g. provide acoustic screens or barriers).
- Reasonable and practicable measures to achieve the construction noise goals may include, for example:
  - Commence advanced notification of works and undertake on-going consultation with potentially affected property owners and occupants.
  - Establishing temporary noise barriers between construction worksites and sensitive activities (e.g. residential, schools, community facilities).
  - Launching tunnel construction from within an acoustically screened enclosure, except for surface works and cut and cover construction works that are to be mitigated by effective temporary screens.
  - Fitting noise-reduction measures to all plant and equipment engaged in above-ground construction works.
  - With the consent of owners and occupants of potentially-affected premises, undertake off-site mitigation actions such as temporary modifications to nearby buildings or other measures to achieve reasonable environmental conditions.
- Undertake predictive modelling of potential construction noise and vibration impacts having regard to the goals set out in Tables 2a, 2b and 3. The proposed construction methods, the proximity of sensitive places, and where the duration of construction exceeds 2 weeks in a particular locality.
- Where surface construction noise impacts are predicted due to specific construction activities, reasonable and practicable mitigation and management measures must be adopted and notify in advance potentially affected owners and occupants of adjacent properties. If such activities are to occur often during the construction works, then a program for a regular, scheduled occurrence be devised and implemented in consultation with the owners and occupants of nearby properties.
- Prior to the commencement of works, potentially affected property owners and occupants are to be notified as to the scale, extent and duration of construction works, as required by the consultation and communications program.
- Mitigation measures generally are to be designed and implemented to achieve goals for construction noise for acceptable internal living conditions consistent with AS/NZS 2107:2000 and summarised in Table 1 and Table 2.

**Table 1 – Daytime Construction Internal Noise Goals**

| Type of Building Occupancy | Maximum Construction Internal Noise Targets | |
|---|---|---|
| | Steady LAeq(15minute) (dBA) | Non-steady LA10(15minute) |
| Residential buildings | | |
| ▪ Sleeping areas | 45 – near major roads | 55 – near major roads |
| ▪ Living areas | 40 near minor roads | 50 near minor roads |
| Place of worship | 40 – with speech amplification | 50 – with speech amplification |
| Schools | | |
| ▪ Music rooms | 45 | 55 |
| ▪ Teaching areas | 45 | 55 |
| ▪ Libraries | 50 | 60 |
| ▪ Gymnasia | 55 | 65 |
| Commercial buildings | | |
| ▪ Office space | 45 | 55 |
| ▪ Retail space | 50 | 60 |

**Table 2 –Internal Noise Goals to Avoid Sleep Disturbance**

| Criterion | Hours | Goal |
|---|---|---|
| For intermittent construction noise | 6.30pm - 6.30am | ▪ For residences within R1 – R3 categories as described in NIAPSP – 45dBA $L_{A\ max}$<br>▪ For residences within R4 – R6 categories as described in NIAPSP – 50dBA $L_{A\ max}$ |
| For steady construction noise | 6.30pm – 6.30am | ▪ For residences within R1 – R3 categories as described in NIAPSP:<br>35dBA $L_{Aeq\ adj\ (15mins)}$ for temporary noise<br>30dBA $L_{Aeq\ adj\ (15mins)}$ for long-term noise |
| | | ▪ For residences within R4 – R6 categories as described in NIAPSP:<br>40dBA $L_{Aeq\ adj\ (15mins)}$ for temporary noise<br>35dBA $L_{Aeq\ adj\ (15mins)}$ for long-term noise |

**Construction Vibration Goals - Property**

- Develop predictive models for potential property damage as a basis for forward work planning, consultation and negotiations with property owners and occupants.
- Undertake predictive modelling of potential construction vibration levels prior to the commencement of tunnelling or other works likely to cause vibration impacts. Where the goals for construction vibration are set out in Table 3 and Table 4 are predicted to be exceeded, commence advanced consultation with potentially affected property owners and occupants and implement mitigations measures to minimise the impacts.
- Mitigation measures generally are to be designed and implemented to achieve the goals for minimising building damage or disturbance from construction vibration in Table 3 and Table 4.

**Table 3 – Vibration Guide Values – Minimal Risk of Cosmetic Damage**

| Vibration Type | Peak Particle Velocity (mm/sec) | | |
|---|---|---|---|
| | Heritage Listed | Residential | Sensitive Commercial |
| Transient Vibration (e.g. Blasting) | 2 | 10 | 10 |
| Continuous Vibration (e.g. TBM, roadheading, rockhammering) | 2 | 5 | 5 |

**Construction Vibration Goals – Building Contents & Human Comfort**

- For sensitive areas, such as but not limited to residential, hospitals, places of cultural heritage significance, adopt construction techniques which seek to minimise or avoid impacts of vibration or regenerated noise leading to a loss of reasonable environmental conditions.
- For places of cultural heritage significance likely to be impacted by construction vibration, adopt such construction techniques or mitigation measures recommended in any Cultural Heritage Management Plan required in respect of the site or structure.
- Mitigation measures generally are to be designed and implemented to achieve the goals for minimising impacts from construction vibration on sensitive buildings or their contents in Table 4.
- Where predictive modelling indicates the goals in Table 5 may be exceeded, the Contractor is to devise and implement reasonable and practicable measures to mitigate and manage potential impacts on buildings and their contents. The Contractor should also implement advanced notification of construction, the potential impacts and the procedures for addressing any impacts that actually occur.

**Table 4 – Satisfactory Vibration Values – Sensitive Building Contents**

| Equipment Type | Maximum Vibration Levels |
|---|---|
| Precision balances | 0.5 – 2.0 mm/sec |
| Some optical microscopes | 0.5 mm/sec |
| Large computer disk drives<br>Sensitive electronic equipment | 1.0 – 5.0 mm/sec |
| Special circumstances (Rosemount Hospital, Amarina Nursing Home) | 4.0 mm/sec |

- Mitigation measures should be designed and implemented to minimise impacts on human comfort. Construction techniques are to be designed and implemented having regard to the goals established in AS 2670:1990 for vibrations ranging from 8Hz to 80Hz, and summarised in Table 5.

**Table 5 – Goals for Peak Vibration Criteria – Human Comfort – 8Hz to 80Hz**

| Type of Occupancy | Time of Day | RMS Vibration Levels (mm/sec) Low Probability of Reaction | | | |
|---|---|---|---|---|---|
| | | Continuous Vibration (16 hr day, 8 hr night) | | Transient Vibration Excitation (Several occurrences/day) | |
| Critical working areas | Day or Night | 0.14 | 0.4 | 0.14 | 0.4 |
| Residential | Day<br>Night | 0.3 – 0.6<br>0.2 | 0.8 – 1.5<br>0.6 | 4.0 – 13.0<br>0.2 – 3.0 | 13.0 – 36.0<br>6.0 – 8.4 |
| Offices | Day or Night | 0.6 | 1.7 | 8.0 – 18.0 | 24.0 – 52.0 |
| Source: AS 2670:1990 | | | | | |

- Where predictive modelling indicates the goals in Table 4 and Table 5 are likely to be exceeded during construction, the Contractor is to undertake notification of construction to alert property owners and occupants of the likely implications and duration of the construction techniques proposed, and to advise them of the procedures for addressing any impacts that actually occur. The Contractor should also implement advanced notification of construction.
- Where necessary, undertake such off-site mitigation measures as may be necessary to minimise, mitigate or otherwise off-set the impacts of construction vibration on buildings and human comfort (e.g. temporary modifications to premises or equipment sensitive to the predicted range of vibration, offer temporary accommodation or other acceptable measures for people demonstrably sensitive to the predicted range of vibration).
-

Monitoring

**Routine Construction Monitoring**

**Blasting**

- Ground vibration (as peak particle velocity) is to be monitored for every blast and recorded in accordance with AS2187.2-1993 Form B. Airblast should also be monitored if blasting is open to the surface.
- Monitoring location(s) should represent the highest level of ground vibration experienced by both the nearest building structure(s) and the most sensitive building structure(s).
- Sensitive structures include heritage-listed buildings, hospitals, residential buildings, and any other buildings where it is anticipated that standard statutory vibration limits may not provide satisfactory protection due to particular circumstances of building contents, or the condition of the building structure.

**Mechanical Tunnelling**

- Building vibration (as peak particle velocity) should be manually monitored and recorded in accordance with BS7385.1-1990.
- In response to complaints, regenerated noise is to be manually monitored and recorded in accordance with AS1055.
- Monitoring location(s) should represent occupied buildings where the highest levels

| | |
|---|---|
| | of vibration and/or regenerated noise are anticipated.<br><br>**Surface Excavations and Construction**<br>■ Building vibration (as peak particle velocity) will be manually monitored and recorded in accordance with BS7385.1-1990.<br>■ Noise will be manually monitored and recorded in accordance with AS1055.<br>■ For every monitoring occasion, a sample of ambient noise and/or vibration (in the absence of the construction work) will be recorded at a suitable pause in construction activity.<br>■ Monitoring location(s) should represent occupied buildings where the highest levels of noise and/or vibration are anticipated.<br>■ Results of noise and vibration sampling will be included in monthly reporting unless there is a community query about levels, in which case it should be dealt with through the complaints procedures.<br><br>**Construction Ventilation, Materials Handling Systems, Backup Power Generation**<br>■ At each worksite, conduct noise surveys at the most sensitive nearby receptor locations to check compliance with daytime and night-time noise goals.<br>■ Noise surveys are to be performed during commissioning of spoil removal and ventilation systems, and yearly thereafter.<br>■ Noise testing of backup power generation is to be conducted at commissioning.<br>■ Measurements and reporting in accordance with AS1055 at quarterly intervals.<br><br>**Spoil Truck Fleet Noise Monitoring**<br>■ Prior to commencement of spoil haulage operations, and at half-yearly intervals thereafter, conduct testing and reporting (or provide evidence of prior testing) to demonstrate that the spoil haulage fleet conforms to Australian Design Rule 28/01 for engine noise emissions, tested in accordance with the National Road Transport Commission document Stationary Exhaust Noise Test Procedures for In-Service Motor Vehicles<br><br>**Construction Monitoring in Response to Noise/Vibration Complaint**<br>■ The Contractor is to implement measures to receive and respond to complaints about construction noise and vibration made at any time during the construction phase of the project. Such measures may include a complaints management and correction action system developed and incorporated in the Design and Construction EMP. Key requirements for the system include:<br>- On receipt of a complaint, implement a complaint lodgement procedure for tracking and responding to the issue(s) and the complaint;<br>- Identify the relevant construction activity at which the complaint is directed;<br>- As soon as practicable, investigate and measure the level of noise and/or vibration from that activity;<br>- Respond to the complainant as soon as practicable upon completion of the investigation and describe the corrective action taken; and<br>- Report to the Proponent on the complaint, the activity, the corrective action and the response. |
| Reporting | ■ Results of all blast monitoring should be included in monthly reporting unless there is a community query about the blast levels, in which case the results should be made available within a 24 hour period to the Proponent.<br>■ Vibration and regenerated noise sampling should be reported in monthly reporting unless there is a community query about levels, in which case the results specific to the query should be made available within a 24 hour period to the Proponent.<br>■ Summary reporting to be submitted to the Proponent within 24 hours of monitoring.<br>■ Monthly reporting on performance and complaints to be provided to the Proponent |
| Responsibility | Contractor |

| **Flora and Fauna – Construction** | |
|---|---|
| Environmental Objective | ■ Ecological and habitat values in Enoggera Creek and Kedron Brook/Schulz Canal are maintained. |

| Flora and Fauna – Construction | |
|---|---|
| | ▪ Construction impacts on native flora and fauna are minimised and rehabilitated. |
| Performance Criteria | ▪ Implement measures to maintain the ecological and habitat values of Enoggera Creek, Kedron Brook and Schulz Canal during construction.<br>▪ Take reasonable and practicable measures to ensure that native fauna is not harmed as a result of the works.<br>▪ Ensure habitat for native flora removed during construction is restored and vegetation communities rehabilitated to the extent possible and practicable.<br>▪ Rehabilitate and landscape work sites upon completion of construction. |
| Mitigation Measures | ▪ Minimise disturbance to vegetation communities during construction, including identifying and marking vegetation to be retained to minimise loss of habitat;<br>▪ Where riparian vegetation is cleared, stabilise the site and to maintain bed and bank stability if feasible and practicable;<br>▪ Where reasonable and practicable, avoid the root zones of adjacent trees for vehicle access, material storage and the cleaning of plant and equipment;<br>▪ Implement site management procedures to minimise the potential for harming native fauna. Such procedures may include checking site works, such as trenches and culverts, each morning and after periods of inactivity for any fauna trapped or likely to be harmed by construction activities.<br>▪ Where mangrove removal cannot be avoided, site conditions are to be rehabilitated to a condition suitable for the recolonisation of mangroves once construction is completed, as quickly as possible upon completion of the works affecting such areas;<br>▪ Implement measures to rehabilitate and revegetate disturbed areas, as quickly as practicable upon completion of the works, and ensure that areas of revegetation become established and are in a healthy condition. Such measures may include:<br>- Replacing vegetation removed during construction with local native species, unless non-native species are consistent with existing landscaping (e.g. hoop pine in Kalinga Park adjacent to Sandgate Road).<br>- Undertaking a health assessment of the fig trees at Wallace Place Park prior to commencement of construction; water and fertilise the fig trees up to 6 months before tunnel excavation; continue watering the fig trees during and after tunnel excavation for a period of 6 months or until such time as it can be demonstrated they have recovered from the effects of construction. |
| | **Imported Red Fire Ants**<br>▪ Liase with the DPI&F Fire Ant Control Centre and the Brisbane City Council Fire Ant Control Officer during the Design stage of the project, to identify suitable mitigation measures and management options for the management of fire ants during the construction of the project;<br>▪ Implement an inspection, control and disposal system for Fire Ants, approved by the DPI&F Fire Ant Control Centre and the Brisbane City Council Fire Ant Control Officer;<br>▪ Provide awareness training for all site staff in regard to identification of fire ants and nest sites;<br>▪ Maintain regular contact with the Brisbane City Council Fire Ant Control Officer and the DPI&F Fire Ant Control Centre during construction. |
| Monitoring | ▪ Inspect work sites to assess compliance with mitigation measure requirements to minimise the impacts on flora and fauna.<br>▪ Inspect and monitor on a monthly basis, spoil placement sites for the presence of fire ants.<br>▪ Monitor the fig trees at Wallace Place Park for two growing seasons after completion of the tunnel. |
| Reporting | Monthly during site preparation and site rehabilitation |
| Responsibility | Contractor |

| Cultural Heritage – Construction | |
|---|---|
| Environmental Objective | Avoid or minimise disturbance, possible building damage or loss of cultural heritage values for significant cultural heritage sites, places or structures during construction |

| Cultural Heritage – Construction | |
|---|---|
| Performance Criteria | ▪ Undertake all works in accordance with the provisions of cultural heritage management plans<br>▪ Where harm to non-indigenous heritage values cannot be reasonably avoided undertake archival recording of cultural heritage values with the advice of an appropriately qualified heritage consultant.<br>▪ Monitor and manage the effects of potential settlement on places of non-indigenous cultural heritage significance.. |
| Mitigation Measures | **Indigenous Cultural Heritage**<br>▪ In consultation with both the Jagera and Turrbal people, and pursuant to the requirements of the *Aboriginal Cultural Heritage* Act 2003, prepare a Cultural Heritage Management Plan(s).<br>▪ Explore potential for acknowledgment of an area's significance through the erection of signage or public art and through involvement of indigenous people in any ground-breaking ceremonies that might precede construction works; and<br>▪ Undertake work in accordance with the CHMPs. |
| | **Non-Indigenous Cultural Heritage**<br>▪ Conduct building condition surveys on each building of State Heritage significance along the tunnel alignment prior to the commencement of construction works to record present conditions;<br>▪ Conduct detailed structural inspections 6-12 months prior to construction, including all timber framing, stonework, brickwork, etc and sealing of all timber in the stone/brickwork;<br>▪ Prepare site specific Cultural Heritage Management Plans (CHMP) for each place of State significance likely to be affected, based on the building condition surveys, including:<br>- Former Windsor Shire Council Chambers;<br>- Windsor State School;<br>- Windsor War Memorial Park;<br>- Kirkston<br>- Conon;<br>- Wooloowin State School;<br>- Oakwal; and<br>- Boothville or Monte Video.<br>▪ Monitor the construction works around Campbell Street, which may uncover archaeologically significant records of the Campbell's Soap and Candle Factory site. |
| Monitoring | Monitoring of compliance with the measures outlined in the CHMP. |
| Reporting | Indigenous cultural heritage – on completion of surface work, or, in case of intercepting archaeological relics or artefacts of heritage significance, as provided by the CHMP<br>On completion of construction for each site, or as provided by the CHMP |
| Responsibility | Proponent to be responsible for development of a Cultural Heritage Management Plan under the *Aboriginal Cultural Heritage Act, 2003*<br>Contractor to be responsible for Cultural Heritage Management Plan(s) relating to places on the State Heritage Register. |

| Social Environment – Construction | |
|---|---|
| Environmental Objective | Avoid or mitigate and manage construction impacts on social infrastructure. |
| Performance Criteria | ▪ Construction techniques and procedures minimise, mitigate and manage impacts on community life throughout the construction phase.<br>▪ Local and broader communities are notified in advance of construction activities, temporary arrangements, traffic management arrangements and any special construction activities of short duration.<br>▪ Communities have access to a communication and complaints process to address and respond to impacts.<br>**Note:** The social environment includes residential and neighbourhood amenity, connectivity, community health, community diversity, social infrastructure provision and |

| Social Environment – Construction | |
|---|---|
| | safety. |
| Mitigation Measures | **Amenity and Community Life**<br>■ Liaise with key stakeholders to provide and maintain safe and usable pedestrian and cycle connections with existing networks, public open space, (e.g. Kalinga Park, Kedron Brook, Mann Park) community facilities, schools and public transport stations during construction;<br>■ Minimise direct construction impacts on sensitive receptors (e.g. Royal Brisbane Hospital, Rosemount Hospital, Kedron State High School, Wooloowin State School).<br>■ As soon as is practicable after the completion of construction, reinstate community facilities affected by the works, including:<br>- Schulz Canal between Airtrain and Melton Road;<br>- Kalinga Park between Kalinga Street and Sandgate Road,<br>- Kedron Brook between Gympie Road and Brook Street,<br>- Mann Park south of Federation Street;<br>- Pedestrian and cycle paths along Kedron Brook, Schulz Canal and Enoggera Creek<br>- Pedestrian connections across the major arterials (e.g. Lutwyche Road and Gympie Road at Lutwyche, Sandgate Road at Clayfield, Lutwyche Road at Windsor) |
| | **Social Infrastructure**<br>■ Consult with managers of community facilities in neighbourhoods adjacent to worksites to develop effective mitigation strategies and maintain regular communication with these facility managers. |
| | **Complaints and Corrective Actions**<br>■ Develop an effective and responsive system for receiving, handling and responding to complaints received during the construction of project works;<br>■ Ensure complaints are received and responded to on a 24hr per day basis for the duration of the construction phase;<br>■ Provide reporting on complaints received, responses provided, timeliness of responses, and corrective actions taken on a monthly basis;<br>■ Raise community awareness of the complaints systems and procedures through public notifications and website facilities. |
| | **Early Consultation**<br>■ Initiate consultation with owners and occupants of directly affected properties and nearest neighbours to construction activities as soon as practicable after a decision to proceed with the project is taken.<br>■ Conduct consultation and community information strategies in conjunction with Community Consultative Committees.<br>■ Establish Community Consultative Committees to represent nearest neighbours to worksites and community facilities. |
| | **Community Consultation Program**<br>■ Undertake and maintain a comprehensive community information program to inform residents, businesses, community groups and motorists of project activities and potential impacts. Effective and accessible consultation measures are required including maintenance of a 24 hr contact line operated by a person with authority to stop works if goals and agreements with the community are not met.<br>■ Ensure medical facilities, childcare centres, and schools along the alignment have access to construction updates and community education during construction. |
| | **Regional Communication**<br>■ Monitor traffic volumes and traffic congestion affecting the regional population during construction and if necessary adopt travel demand and signal stage management strategies. |
| Monitoring | ■ Evaluate effectiveness of consultation, liaison and mitigation outcomes;<br>■ Survey and report on provision and maintenance of temporary pedestrian, cycle and public transport access in work site neighbourhoods.<br>■ Report Community Liaison Groups' activities and on consultation, liaison and environmental compliance. |
| Reporting | ■ Six monthly; or |

| Social Environment – Construction | |
|---|---|
| | ▪ Immediately in case of a safety incident or written complaint from a neighbour. |
| Responsibility | Contractor |

| Hazard and Risk – Construction | |
|---|---|
| Environmental Objective | Hazardous events during construction are avoided, or managed to minimise risk if they do occur.<br>Construction activities do not impact adversely upon people or properties in the floodplains of Enoggera Creek or Kedron Brook. |
| Performance Criteria | ▪ Maintain a safe environment for construction workers.<br>▪ Minimise potential construction hazards and risks for construction workers, nearby communities and passing motorists.<br>▪ Design and construct the project to avoid adverse impacts on flood levels for an ARI 100 yr storm event in Enoggera Creek and Kedron Brook, upstream of the project works. |
| Mitigation Measures | ▪ Prepare and implement a safety plan for all aspects of construction.<br>▪ Develop and implement safety measures for the construction works including treatment strategies that address inundation, flood, tunnel collapse, fire and chemical hazard, communications, access for emergency services, response coordination and management.<br>▪ Develop emergency response procedures, and implement in the event of accidents and emergencies.<br>▪ Provide fire and life safety measures, including ventilation, smoke extraction and fire fighting systems for the duration of the construction phase.<br>▪ Develop and implement a communication process with the Department of Emergency Services in relation to temporary road closures and disruptions and/or relocation of water mains that will affect hydrants near construction works.<br>▪ Construction works are designed and implemented to achieve avoid impacts on the level of the Q100 flood in Kedron Brook and Enoggera Creek. |
| Monitoring | Daily as part of routine site management procedures, for movement of hazardous goods, safe workplace practices, and regular testing and monitoring of fire and life safety systems. |
| Reporting | Monthly except in case of an incident when reporting should occur immediately on completion of any investigation required to resolve the incident. |
| Responsibility | Contractor |

| Waste Management – Construction | |
|---|---|
| Environmental Objective | All aspects of waste from construction of the project is minimised. |
| Performance Criteria | ▪ Implement waste management principles (Reduce, Re-use, Recycle) and effective and sustainable disposal strategies.<br>▪ Take all reasonable and practicable steps to minimise the impacts of handling and disposal of construction waste.<br>▪ Take all reasonable and practicable measures to reduce waste generated on the construction worksites through reuse and/or recycling. |
| Mitigation Measures | ▪ Prepare and implement waste management procedures to deal with construction waste.<br>▪ Prepare management plans to deal with any potential incident in which waste material with the potential to cause environmental harm, is released to the environment.<br>▪ Report immediately to the relevant authorities any incident where harmful waste material is accidentally released to the environment.<br>▪ In the event of an environmental incident, take such corrective or remedial action as is required to render the area safe and avoid or minimise environmental harm. |
| | ▪ Identify and implement measures for avoiding waste generation and, if avoidance is not reasonable or practicable, reducing waste generation on site. |

| Waste Management – Construction | |
|---|---|
| | ▪ Identify and implement strategies for the re-use of waste products during construction. |
| | **Recycle**<br>▪ Identify and implement recycling strategies for construction<br>▪ Implement training for employees in the waste management plan and recycling opportunities. |
| | **Disposal**<br>▪ Dispose of waste that is unable to be reused or recycled in a certified land fill site; and<br>▪ Ensure the transport of regulated wastes and contaminated soils or other materials is conducted by licensed Contractors for disposal at licensed facilities, in accordance with legislative requirements. |
| | **Waste Transport**<br>▪ Restrict all site works and surface truck movements for transport of waste material to 6.30 am to 6.30 pm, Monday to Saturday; and<br>▪ Ensure the movement of hazardous materials and regulated wastes occurs at non-peak times to minimise the possibility of traffic conflicts and associated risks. |
| | **Hazardous Materials or Dangerous Goods**<br>▪ Undertake storage and transport of materials according to relevant Australian standards.<br>▪ Ensure transport and storage of dangerous goods for construction purposes are in accordance with dangerous goods standards and guidelines.<br>▪ Undertake refuelling and maintenance activities in designated bunded areas to minimise the potential for soil and water contamination to result from these activities. Prepare and implement, if required, spill response measures.<br>▪ Prepare and implement a hazardous goods management plan. |
| | **Contaminated Soil**<br>▪ Obtain approval and a disposal permit by the EPA Contaminated Land Unit for the removal of contaminated soil, in accordance with the *Environmental Protection* Act 1994.<br>▪ Remove contaminated soils in accordance with an EPA approved Remediation Action Plan (RAP).<br>▪ Prepare and implement procedures for the remediation of contaminated soil spills that may occur during transport. |
| | **Acid Sulphate Soils**<br>▪ Implement the management measures identified in the ASS Management Plan. |
| Monitoring | Monitoring in accordance with specific management plan requirements (e.g. ASS Management Plan, Site Management Plan, Surface Water Management Plan, Hazardous Goods Management Plan) |
| Responsibility | Contractor |

## 19.7 Draft Outline EMP (Operation)

Environmental Management Plan Element Strategies describe objectives, performance criteria and identified mitigation measures for the Operational phase. Some of the environmental elements suggest specific monitoring requirements and/or statutory requirements.

The environmental element topics for this **Outline Operational EMP** are:

- Traffic and Transport
- Geology and Soils
- Hydrogeology and Groundwater Quality
- Surface Water Quality
- Air Quality
- Noise and Vibration
- Hazard and Risk

| Traffic and Transport – Operation | |
|---|---|
| Environmental Objective | ▪ In-tunnel traffic flows are managed to achieve stated operational goals for in-tunnel air quality and efficient movement into, through and beyond the tunnel system.<br>▪ Emergency services have easy and direct access to the tunnel systems to attend to incidents, and stage evacuations if necessary. |
| Performance Criteria | ▪ Manage traffic flows to achieve or remain within limits for in-tunnel air quality and to achieve safe and efficient movement of traffic into, through and beyond the tunnel system. |
| Mitigation Measures | ▪ Prepare and implement traffic management measures to support air quality management measures for in-tunnel traffic conditions and traffic flows on the approaches to the tunnel system.<br>▪ Prepare and implement local area traffic management measures to maintain the role and function of surface road network. |
| Monitoring | ▪ Monitor in-tunnel traffic management measures.<br>▪ Monitor local area traffic impacts. |
| Reporting | ▪ For in-tunnel traffic management, three-monthly for first twelve months of operations, then annually for the next two years<br>▪ For local area traffic management, annually for first three years of operation |
| Responsibility | Operator |

| Geology & Soils – Operation | |
|---|---|
| Environmental Objective | Permanent facilities and project property are maintained to avoid any impacts associated with soil erosion, settlement or acid sulphate soils (ASS). |
| Performance Criteria | ▪ Maintain soil and water control devices for long-term surface stability and protection against erosion. |
| Mitigation Measures | ▪ Maintain permanent soil and water control devices for long-term surface stability and protection against erosion by wind or water.<br>▪ Periodically inspect the embankment and structures to monitor settlement in relation to design specifications. |
| Monitoring | ▪ Monitor permanent soil and water control devices installed during construction for evidence of soil erosion and sedimentation, or possible movement of acid leachate from oxidising acid sulphate soils.<br>▪ Surveys and other displacement monitoring will be used to monitor the effects of settlement (if any) from tunnelling; and<br>▪ Monitor to ensure embankments and structures comply with the design specifications. |
| Reporting | Six monthly for 3 years after commencement |
| Responsibility | Operator |

| Hydrogeology and Groundwater Quality – Operation | |
|---|---|
| Environmental Objective | Groundwater levels are monitored and managed to identify any ongoing drawdown in the surrounding area as a result of inflow to the tunnel. |
| Performance Criteria | Minimise the extent of groundwater level drawdown in the surrounding area as a result of inflow to the tunnel. |
| Mitigation Measures | Assess changes to groundwater levels and apply mitigation measures where needed. |
| Monitoring | Monitoring of water levels in key locations for 5 years post-construction. |
| Reporting | Six-monthly, for five years post-construction |
| Responsibility | Operator |

| Surface Water Quality – Operation | |
|---|---|
| Environmental Objective | Surface water quality in surface drainage systems is maintained. |

| Surface Water Quality – Operation | |
|---|---|
| Performance Criteria | Reasonable and practicable measures be taken to avoid or mitigate and manage the potential impacts of groundwater seepage, or the movement of pollutants (e.g. fire retardants, lubricants) in stormwater etc, on surface water systems. |
| Mitigation Measures | ■ Separate stormwater, groundwater and waste water runoff within the stormwater drainage system.<br>■ Manage surface water quality to avoid impacts on Enoggera Creek, Kedron Brook and Schulz Canal.<br>■ Identify and implement management measures to minimise potential surface water quality impacts from sediment and contaminants entrained in surface runoff. |
| | **Tunnel Waters**<br>■ Divert stormwater run-off and wash down waters away from seeping ground water.<br>■ Identify and implement management measures to ensure that accident spills are cleaned up and remediated to avoid potential contamination of groundwater.<br>■ Collect groundwater in a dedicated system for subsequent treatment and disposal to an approved point of release;<br>■ Establish and implement a tunnel water monitoring regime, assess any discharges against baseline receiving water quality, and determine the level of treatment required if any. |
| | **Stormwater**<br>■ Prepare and implement stormwater management measures for the tunnel operation. Such measures may include:<br>- Collecting stormwater from the portals, plus that carried into the tunnel on vehicles, in specially designed grated inlet pits which incorporate flame traps and trash baskets; and<br>- Cleaning litter baskets on a regular basis to prevent litter blocking the underflow sections of the pits or getting through to the pumps in the sumps. |
| | **Waste water**<br>■ Prepare and implement wastewater management measures for the tunnel operation. Such measures may include:<br>- Ensuring that the drainage system switches automatically to wastewater collection system in the event of fire deluge or a ruptured fire main.<br>- Using the drainage system to collect waste water in the event of a spillage, or during the wash-down process; and<br>- Removing wastewater from the collection system for removal by tanker and treatment at a specialised licensed depot. |
| Monitoring | ■ Monitor tunnel water discharge; and<br>■ Inspect erosion and sediment control devices at regular intervals. |
| Reporting | ■ For tunnel waters (groundwater), six-monthly, for five years post-construction<br>■ For other drainage, annually, except in the case of an incident involving the fire-fighting system, then immediately on completion of an investigation into the incident |
| Responsibilities | Operator |

| Air Quality – Operation | |
|---|---|
| Environmental Objective | In-tunnel air quality goals are achieved.<br>Minimise impacts on ambient air quality adjacent to the tunnels. |
| Performance Criteria | ■ In-tunnel air quality achieves nominated goals.<br>■ The ventilation system is designed to be capable of minimising impacts on ambient air quality |

## Air Quality – Operation

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| Mitigation Measures | **In-tunnel Air Quality**<br>■ Take all reasonable design and operation measures to achieve reasonable air quality within the tunnels during operation. Such measures may include, for example:<br>- The operation of exhaust fans;<br>- Controlling the inflow of traffic within the tunnel by engagement of traffic management;<br>- In situations where traffic flows halt, requiring motorists to turn off engines until the incident has been cleared to resume normal traffic operations; or<br>- Any combination of the measures above. |
| | ■ In the event that an incident involving a fire or other release of toxic or hazardous gases occurs in the tunnel system, the in-tunnel air quality is managed by activation of the smoke duct and exhaust system and possibly the deluge fire management system as required. |
| | **Ambient Air Quality**<br>■ In preparation for the operational phase of the project, establish an air quality monitoring station near each ventilation outlet for the tunnel ventilation system as soon as practicable but no less than 12 months before commencement of tunnel operations.<br>■ Design and operate the ventilation system to minimise the impacts on ambient air quality. Design and operational measures include:<br>- Dispersing vitiated air from the tunnel system into the atmosphere via ventilation outlets at least 30 metres in height above the ground level or no less than 10 metres higher than the highest building within 100 metres and existing at commencement of construction, whichever is the higher.<br>- Making provision in the ventilation system design for the possible future fitting of air treatment devices for the purpose of treating oxides of nitrogen or particulate matter.<br>■ Managing land use and building development in the vicinity of the ventilation outlets to avoid adverse impacts on the performance of the ventilation outlets after their construction. |
| Monitoring | **In-tunnel Air Quality**<br>■ Monitor, in real time, in-tunnel air quality for visibility, carbon monoxide and nitrogen dioxide through monitoring devices positioned along the tunnel system and in each of the ventilation outlets in relation to the adopted goals for satisfactory, in-tunnel air quality set out in Table 1;<br>■ Link real-time monitoring results with automatically operated ventilation system including exhaust fans in the tunnel ceiling and ventilation station.<br><br>**Table 1 – In-Tunnel Air Quality Goals**<br>Carbon monoxide (CO): 70 ppm at peak (traffic flows >10kph); 90 ppm in extreme congestion (traffic flows <10kph)<br>Nitrogen dioxide ($NO_2$): 1 ppm (average)<br>Visibility: 0.005 $m^{-1}$<br>Source: PIARC guidelines<br><br>**Ambient Air Quality**<br>■ Establish and maintain at least two monitoring stations near to each ventilation station, with the location of the monitoring station to be agreed by the Contractor with the Proponent and the Environment Protection Agency.<br>■ Monitor ambient air quality in real time and review performance in relation to the adopted goals for ambient air quality set out in Table 2.<br>■ Monitor key public health indicators (mortality, increased hospital admissions for respiratory and related ailments) for 12 months after commencement of operations. |

**Table 2 – Ambient Air Quality Goals**

| Pollutant | Goal | Unit | Measuring Period |
|---|---|---|---|
| Carbon monoxide (CO) | 8<br>10 | ppm<br>mg/m$^3$ | 8 hour* maximum |
| Nitrogen dioxide ($NO_2$) | 0.12<br>246 | ppm<br>µg/m$^3$ | 1 hour maximum |
| | 0.03<br>62 | ppm<br>µg/m$^3$ | annual mean |
| Particulate matter less than 10 µm ($PM_{10}$) | 50<br>50 | µg/m$^3$<br>µg/m$^3$ | 24 hour maximum**<br>annual mean |
| Particulate matter less than 2.5 µm ($PM_{2.5}$) | 25<br>8 | µg/m$^3$<br>µg/m$^3$ | 24 hour maximum<br>annual average |
| Total suspended particulate matter (TSP) | 90 | µg/m$^3$ | annual average |

***One day per year maximum allowable exceedance.

**Five days per year allowable exceedance, not including exceedance in ambient goals due to external events (e.g. dust storms, fires, construction works)

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| Reporting | ■ For in-tunnel air quality:<br>- For the first 12 months of operation report in real time for average hourly monitoring results, via a project website established and operated by the Contractor;<br>- Issue validated reports monthly via the project website;<br>- From thereafter, report quarterly via the project website.<br>■ For ambient air quality:<br>- For the first 12 months of operation, report in real time for average hourly monitoring results, via the project website;<br>- Issue validated reports monthly via the project website;<br>- From thereafter, report quarterly via the project website.<br>■ For public health indicators, report annually in the project's environmental report. |
| Responsibility | Operator |

## Noise & Vibration – Operation

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| Environmental Objective | Minimise potential noise from the operation of ventilation and other plant and equipment, and from road traffic noise for newly exposed properties. |
| Performance Criteria | ■ Noise from the ventilation outlets and operation of plant and equipment in the ventilation station achieves acoustic goals and does not impact adversely on the owners or occupants of nearby properties.<br>■ Relative to operation traffic noise goals, road traffic noise does not impact adversely upon newly-exposed properties and properties fronting roads predicted to experience growth in traffic flows as a consequence of the project. |
| Mitigation Measures | ■ Submit operational noise and vibration management plan to the Proponent and EPA for comment before finalisation.<br>**Ventilation System**<br>■ Use an effective combination of design, siting and management in ventilation system and ventilation outlet operations to meet noise goals and avoid adverse impacts on the owners and occupants of nearby properties<br>■ The ventilation system must be designed and operated to achieve the following goal at the commencement of operation of the project:<br>- The overall A-weighted sound pressure level component from ventilation plant, assessed as an Lamax,adj level with tonality penalty adjustments determined in accordance with AS1055.1, should not exceed the Average Background Noise Level, as defined in AS1055.2 at a noise sensitive location at any time of the day or night.<br>■ In developing mitigation strategies, include consideration of the following: |

| Noise & Vibration – Operation | |
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| | - New buildings as an alternative to dedicated noise barriers and/or mounding on resumed land;<br>- In-tunnel acoustic absorption;<br>- Upgrading acoustical insulation of elevated building facades; and<br>- Additional building resumptions combined with redevelopment.<br>**Traffic Noise**<br>■ Provide traffic noise mitigation for new tunnel portals, ramps and widened surface roads, with particular attention given to:<br>- Road widening involving the resumption of properties;<br>- New elevated ramps; and<br>- Reverberant traffic noise emissions from tunnel portals.<br>■ Design of the project should aim to minimise airborne traffic noise levels. Appropriate goals would be 68 dBA LA10(18hours) for State controlled roads and 63 dBA LA10(18hours) for other roads. However, where road traffic planning noise levels are already exceeded at sensitive locations it may not be reasonable or practicable to achieve compliance with these planning noise levels. In these instances, the "status quo" noise levels should replace the goals (i.e. maintain noise at levels anticipated in 2026, the design year, without the project). |
| Monitoring | **Operational Ventilation Noise**<br>■ Replicate commissioning noise testing within 12 months of commencement of operations, normalise the results to the design duty cycle based on records of the actual operating conditions at the time of testing, and report all results and corrections to the Proponent.<br>■ Monitoring results must be reported on a quarterly basis and must be undertaken in accordance with accredited procedures and must be publicly available.<br>■ In circumstances where the goals are not met, the reporting must also describe the corrective actions to avoid a recurrence and to minimise the impacts of ventilation system noise.<br>**Operational Traffic Noise**<br>■ Replicate baseline traffic noise measurements within 12 months of commencement of operations, normalise the results to the design traffic conditions based on records of traffic flows at the time of monitoring, and report all results and corrections to the Proponent.<br>■ Provide explanation of differences of greater than 3 dBA and what measures will be required to address the exceedance. |
| Reporting | Monthly reporting of baseline noise monitoring results, operational design goals for ventilation and traffic noise, operational duty cycle and traffic projections, and projected levels of ventilation system and traffic noise (with and without mitigation). These monitoring results to be included in the Annual Environmental Report to be issued by the Operator.<br>Compliance report within 12 months of commencement of operations. |
| Responsibility | Operator |

| Hazard and Risk – Operation | |
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| Environmental Objective | Minimise the potential risk for hazardous events. |
| Performance Criteria | ■ Traffic safety, fire safety and emergency response systems are managed and maintained to standards agreed with Queensland Police, Fire and Ambulance services.<br>■ Minimise hazards and risks for Airport Link users and tunnel workers.<br>■ Take reasonable and practicable measures to minimise potential hazards and risks for communities near the portals. |
| Mitigation Measures | **General**<br>■ Establish and maintain a tunnel control centre to monitor and control the safe and effective operation of the tunnel and accommodate provision of utilities for emergency response. |

| Hazard and Risk – Operation | |
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| | **Control of Dangerous Goods Vehicles**<br>▪ Exclude (by regulation) Dangerous Goods vehicles from access to the tunnel. In the event of illegal entry, activate response and notification systems. |
| | **Traffic Management and Control System**<br>▪ Implement Traffic Management and Control System to monitor, control and respond to traffic conditions within the tunnel, to Australian industry standards. |
| | ▪ Implement a Communication System including radio rebroadcast breakthrough, and communications points containing three landline telephone systems (Help, Operation and Maintenance; and Fire Coordination). |
| | ▪ Maintain fire detection and protection equipment including heat and smoke detectors in deluge system and fire extinguishing equipment. |
| | ▪ Develop emergency incident management response procedures in consultation with Emergency Services (Police, Fire, Ambulance). The incident management plan must include 1) simulation exercises prior to operation of the tunnel; 2) provision for routine testing of emergency response systems; and 3) designation of responsibilities in the event of an incident. |
| Monitoring | ▪ Monitor and control the safe and effective operation of the tunnel from the Tunnel Control Centre and report as agreed with the Proponent and Emergency Services. |
| Responsibility | Operator |