

**CROSSRIVERRAIL**

**Environmental Impact Statement**

**Draft Outline Environmental  
Management Plan**

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*Volume 2*



**Queensland  
Government**

# CROSS RIVER RAIL

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# 1. Draft Outline Environmental Management Plan

## 1.1 Introduction

This Draft Outline Environmental Management Plan (Draft Outline EMP) documents the Proponent's approach to environmental management for the design, construction and commissioning for the Project.

The EMP is a requirement of Part B Section 8 of the Terms of Reference (ToR) and has been prepared as a stand-alone document.

The Draft Outline EMP establishes the approach to environmental management by:

- establishing the environmental design requirements for the Project;
- establishing the environmental outcomes and performance criteria for the Project;
- identifying potential mitigation measures to achieve the environmental outcomes and performance criteria, recognising that other mitigation measures may also be available; and
- establishing a monitoring and reporting regime to demonstrate achievement of the environmental outcomes.

The Draft Outline EMP establishes performance criteria, including goals, to achieve the environmental outcomes. Exceedance of the criteria and the goals triggers a requirement for mitigation measures to be developed in consultation with affected entities. This approach is designed to facilitate tailored mitigation measures that allow project delivery while maintaining a reasonable amenity for affected entities.

The approach to environmental management for the Project includes the engagement of an independent environmental monitor and a community relations officer for the construction and commissioning phases of the Project.

## 1.2 The Proponent

The State of Queensland, represented by the Department of Transport and Main Roads (TMR), is the Proponent for the Project.

The EMPs for construction and commissioning of the Project will be prepared by the Proponent in accordance with the Coordinator-General's conditions and the Draft Outline EMP.

## 1.3 Project Phases

The State of Queensland, represented by the Department of Transport and Main Roads (TMR), is the Proponent for the Project.

The EMPs for construction and commissioning of the Project will be prepared by the Proponent in accordance with the Coordinator-General's conditions and the Draft Outline EMP.

### 1.3.1 Design Phase

The design phase entails the preparation of detailed designs for the construction, commissioning and operation of the Project and may run progressively and in parallel with the construction phase.

### 1.3.2 Construction Phase

The construction phase is expected to last approximately 5 years. Construction may occur in stages and would entail some key elements including:

- Station box construction – approximately 15-18 months at each station location;
- Assembly of tunnel boring machines – approximately 3 months;

- Bored tunnel construction – approximately 1-1.5 years;
- Mined tunnel – approximately 6-12 months; and
- Civil, structural, mechanical and electrical fit-out of stations – approximately 1-2 years.

### 1.3.3 Commissioning phase

The commissioning phase will involve a programme of testing and verification, prior to operations. During this time, all of the elements of the Project will be tested individually, as coordinated systems and as an overall project wide system. Testing will also work through the functionality, operation and integration with the existing systems and procedures of key stakeholders including the Rail Infrastructure Manager, the Department of Transport and Main Roads (TMR) and the Queensland Fire and Emergency Services.

As this is a new part of an existing railway network, mechanical and electrical equipment, fire and life safety systems and rail operating systems will need to be integrated into the existing network and tested for functionality and safety.

Commissioning may overlap with the end of the construction phase and the start of the operational phase. For instance, elements of some stations may be commissioned after the rest of the project has become operational. Commissioning is expected to take approximately 4-6 months after completion of the fit-out.

### 1.3.4 Operation Phase

The operation phase of the Project commences upon the completion of commissioning and acceptance of the Project by the Queensland Government. The project will be operated as part of the existing railway network, under the control of the Rail Infrastructure Manager.

## 1.4 Draft Outline EMP Overview

### 1.4.1 Objectives of the EMP

The objectives of this Draft Outline EMP and subsequent Construction EMP and Commissioning EMP are to:

- avoid, or minimise and manage environmental impacts of the Project;
- achieve a reasonable level of environmental amenity for properties adjacent to the Project;
- allow the Project to be delivered in a timely and efficient manner;
- provide for monitoring, reporting and corrective actions if required, in relation to environmental impacts arising from project delivery and commissioning; and
- identify entities responsible for the achievement of the environmental outcomes consistent with the Coordinator-General's imposed conditions.

### 1.4.2 Approach to Environmental Management

This Draft Outline EMP provides a framework for a comprehensive, integrated approach to environmental management in the design, construction and commissioning phases of the Project. The approach is aimed at facilitating the timely and efficient construction and commissioning of the Project while maintaining a reasonable environmental amenity in the locality, free of unscheduled disruptions to daily patterns of activity.

The Draft Outline EMP includes:

- **Environmental design requirements** – requirements with which the Project must comply in its design to achieve particular environmental outcomes. The environmental design requirements are intended to resolve operations-related impacts and many of the construction related impacts.
  - Environmental design requirements must be incorporated in detailed design; and
  - The Project must be implemented in accordance with the detailed design.

- **Construction Environmental Management Plan** – establishes the environmental outcomes to be achieved during construction, together with related performance criteria and possible mitigation measures, monitoring and reporting requirements, and complaints and corrective actions requirements.
- **Commissioning Environmental Management Plan** – establishes the environmental outcomes to be achieved by the Project during its commissioning phase, supported by performance criteria to demonstrate achievement of the outcomes.

The approach for the environmental design requirements and the environmental management plans for the construction and for the commissioning phases is outlined in Figure 1.1.

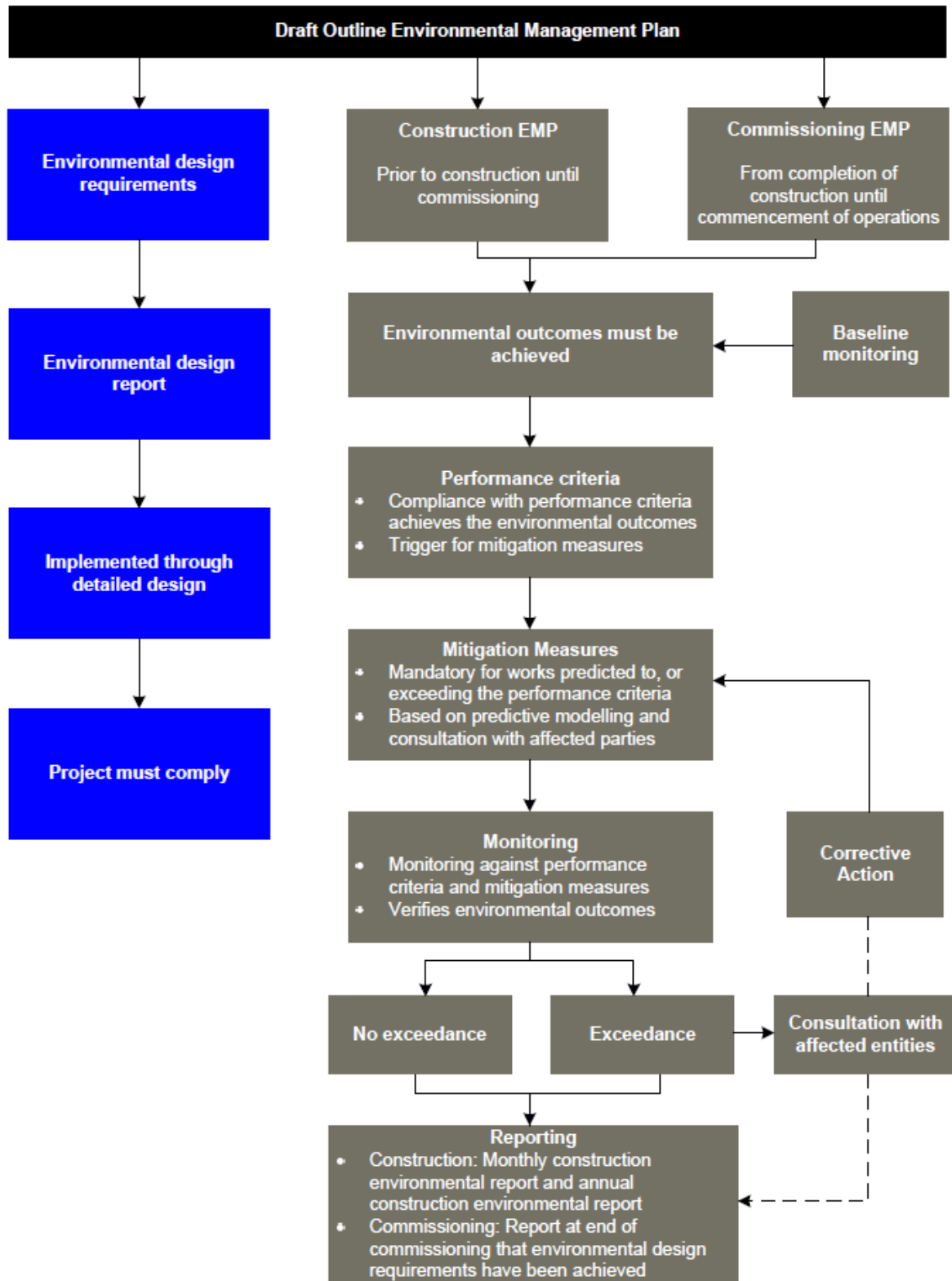


Figure 1.1 Project environmental management framework - implementation

The approach to environmental management for the Project is based on the following principles:

1. Environmental outcomes must be achieved through the Project design, and throughout the construction and commissioning phases:
  - environmental outcomes for detailed design must be achieved through satisfying the environmental design requirements; and
  - environmental outcomes for the construction and commissioning phases may be achieved by meeting the performance criteria or by implementation of mitigation measures agreed with affected entities or a combination of both.
2. Performance criteria must achieve the environmental outcomes:
  - to the extent practicable, performance criteria must be measurable and must achieve the environmental outcomes when implemented; and
  - where appropriate, performance criteria may be qualitative, or may be based on applicable goals and standards.
3. Mitigation measures must achieve the environmental outcomes. Mitigation measures are required where predictive modelling indicates that the environmental outcomes would not be achieved. Mitigation measures must:
  - be developed to address predicted exceedances of the performance criteria;
  - be developed in consultation with affected entities, where mitigation measures at the source will not achieve the environmental outcome. Such measures must be entered in an environmental management register maintained by the environmental monitor;
  - be monitored for implementation and achievement of the environmental outcome.

The mitigation measures entered in the environmental management register will remain confidential between the Proponent, the affected entities and the Environmental Monitor. The Environmental Monitor will track the success of the mitigation measures, and may recommend to the Proponent and an affected entity, the application of measures in general terms found to be effective in similar circumstances.

4. Monitoring is undertaken to measure achievement of the environmental outcome. The monitoring results will inform the need for corrective actions where the environmental outcome is not achieved.
5. Corrective actions are developed and implemented where monitoring indicates that the environmental outcome has not been achieved.
6. An effective and responsive complaints system is established and maintained during construction and commissioning, with oversight by the environmental monitor and the community relations monitor.
7. Environmental reporting procedures are established to demonstrate achievement or otherwise of the environmental outcomes.

### **1.4.3 Structure of the Draft Outline EMP**

The components of the Construction and Commissioning EMPs are outlined in Table 1.1. The EMPs are expected to broadly follow this format which is adapted from the Environmental Management Framework in Figure 1.1.



Table 1.1 Components of Draft Outline Construction and Commissioning EMPs

EMP component	Description	Effect
Environmental element	Aspect of Project implementation to be managed as it affects environmental values.	Must be addressed.
Environmental outcome(s)	Required outcomes of the Project for an environmental element.	Must be achieved.
Performance criteria	<p>Measurable goals or indicators of the environmental outcome for an environmental element.</p> <p>The environmental outcomes will be achieved when monitoring indicates performance within the measurable goals.</p>	<p>Mandatory – if no mitigation measures.</p> <p>When the performance criteria cannot be achieved, they serve as triggers for mitigation measures to be implemented.</p>
Mitigation measures	<p>Mitigation measures are either:</p> <ul style="list-style-type: none"> <li>measures to satisfy the performance criteria (and in turn achieve the environmental outcomes); or</li> <li>actions agreed in consultation with affected entities to achieve the environmental outcome for the element.</li> </ul> <p>The mitigation measures provided in the Draft Outline EMP are advisory only and it is expected that additional or different mitigation measures can be applied.</p>	<p>The mitigation measures to achieve the environmental outcome must be developed in response to:</p> <ul style="list-style-type: none"> <li>the predicted scale, intensity and duration of Project impacts</li> <li>consultation with affected entities.</li> </ul> <p>The final mitigation measures agreed with affected entities must be entered into the environmental management register of mitigation measures to be maintained by the Environmental Monitor before relevant works can commence. Once agreed and registered, the mitigation measures become binding on the Proponent.</p>
Monitoring	<p>Monitoring is to determine:</p> <ul style="list-style-type: none"> <li>satisfaction of the performance criteria; or</li> <li>implementation and effectiveness of mitigation measures.</li> </ul> <p>A monitoring programme must be designed and included in the EMP prior to the commencement of construction or commissioning.</p>	<p>Mandatory</p> <p>Monitoring will be conducted by independent, suitably accredited and qualified personnel.</p>
Reporting	Purpose and frequency of reporting to demonstrate achievement of the environmental outcomes and satisfaction of the performance criteria.	Mandatory
Corrective actions	Actions to be developed and implemented in response to an exceedance of the relevant goal or performance criteria, or failure to implement a mitigation measure.	Mandatory

### 1.4.4 Management Plans

Prior to commencement of construction, the Proponent will establish key management plans and procedures. These plans must be consistent with this Draft Outline EMP and the Coordinator-General's conditions. These plans are likely to include one or more of the following specific management plans:

- Construction Worksite Management Plan
- Workplace Health and Safety Management Plan
- Stakeholder Engagement Plan
- Construction Traffic Management Plan (CTMP)
- Construction Vehicle Management Plan
- Water Quality Monitoring Plan
- Erosion and Sediment Control Plan
- Spoil Placement Management Plan
- Noise and Vibration Management Plan
- Air Quality Management Plan
- Settlement Management Plan
- Non-Indigenous Cultural Heritage Management Plan
- Indigenous Cultural Heritage Management Plan
- Vegetation Management Plan
- Fauna Management Plan (if required)
- Waste Management Plan
- Acid Sulphate Soils Management Plan (if required).

These plans need to address the relevant requirements of the sub-plans included in this Draft Outline EMP.

### 1.4.5 Relation to other environmental documents

#### **Coordinator-General's conditions**

Any conditions imposed by the Coordinator-General will prevail over the EMP, to the extent of any inconsistency.

#### **Environmental management system**

The Proponent, or its contractors, will develop and implement an environmental management system to provide the day-to-day systems support to achieve the environmental outcomes established in the EMP. The environmental management system must be consistent with the EMP and the Coordinator-General's conditions. In the hierarchy of environmental documents, the EMP will prevail over the environmental management system.

#### **Queensland Rail Mayne Yard Environmental Management Plan**

Queensland Rail has a site specific Environmental Management Plan for all activities conducted in Mayne Yard. The Queensland Rail Environmental Management Plan will be considered in preparing the Construction EMP for works in Mayne Yard conditions.

## 1.5 Implementation

### 1.5.1 Roles and Responsibilities

The Proponent is responsible for compliance with the Coordinator-General's conditions and with the EMP.

The environmental management structure is shown in Figure 1.2, and roles in environmental management outlined in Table 1.2.

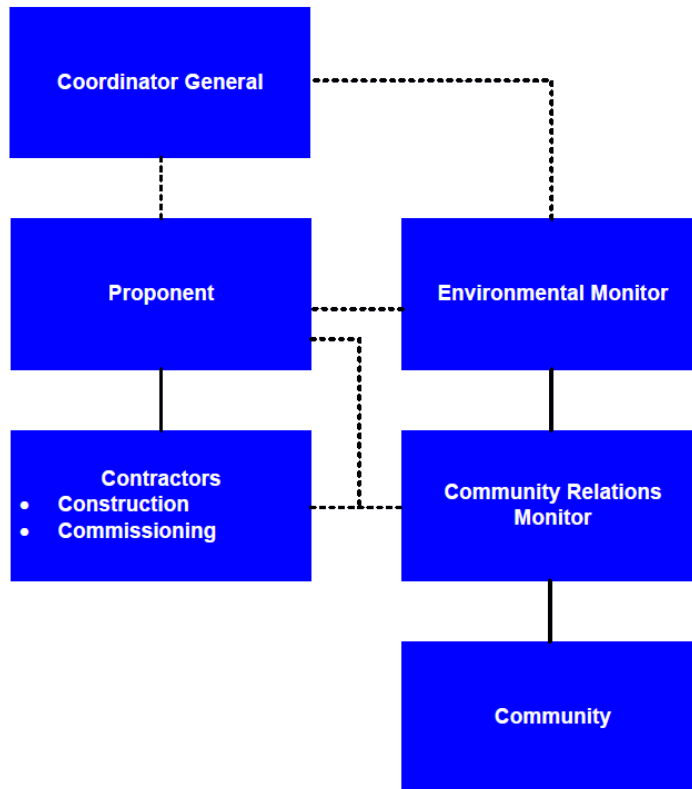


Figure 1.2 Environmental management structure

Table 1.2 Roles in environmental management

Entity	Role and responsibilities
Coordinator-General	<ul style="list-style-type: none"> <li>Administers the <i>State Development and Public Works Organisation Act 1971</i></li> </ul>
Proponent	<ul style="list-style-type: none"> <li>Responsible for the design, construction, commissioning and operation of the Project</li> <li>Entity responsible for implementing the Coordinator-General's conditions, and the EMP</li> </ul>
Rail Infrastructure Manager	<ul style="list-style-type: none"> <li>Rail transport operator under the <i>Transport (Rail Safety) Act 2010 (Qld)</i></li> <li>The Rail Infrastructure Manager is generally responsible for the following: <ul style="list-style-type: none"> <li>managing railways;</li> <li>controlling rolling stock;</li> <li>providing rail transport services , including passenger services;</li> <li>services for operating or maintaining infrastructure;</li> <li>establishing, constructing, maintaining, operating and arranging for provision of transport infrastructure and other rail infrastructure; and</li> <li>using or managing its land in ways that benefit the State or the community.</li> </ul> </li> </ul>
The State	<ul style="list-style-type: none"> <li>Owner of land affected by the Project</li> </ul>
Brisbane City Council (BCC)	<ul style="list-style-type: none"> <li>Interests in land, local roads and other urban infrastructure, and natural assets</li> <li>Provides input to urban design measures, EMP and worksite rehabilitation</li> </ul>
Environmental Monitor	<ul style="list-style-type: none"> <li>An independent entity engaged by the Proponent to <ul style="list-style-type: none"> <li>monitor compliance with the Coordinator-General's conditions during the construction and commissioning of the Project;</li> <li>review the EMP and endorse the EMP as complying with the Coordinator-General's conditions; and</li> <li>provide advice to the Proponent, and on request to the Coordinator- General, about compliance with the Coordinator-General's conditions</li> </ul> </li> </ul>
Community Relations Monitor	<ul style="list-style-type: none"> <li>An independent entity engaged by the Proponent to: <ul style="list-style-type: none"> <li>monitor community relations during the construction and commissioning of the Project; and</li> <li>facilitate community advisory groups and liaison between affected entities and the Proponent or its contractors.</li> </ul> </li> </ul>
Community Advisory Groups	<ul style="list-style-type: none"> <li>Provide advice to the Proponent as required on the detailed design and the locality-based EMP sub-plans for construction and commissioning of the Project</li> <li>Provide advice to the Proponent during the construction phase in relation to identifying and mitigating the impacts of construction in the locality for each worksite</li> </ul>

The likely responsibilities and accountabilities of various parties who have roles in environmental management of the Project are provided in Table 1.3. For each party, likely responsibilities are identified for the design, construction and commissioning phases.

Table 1.3 Project responsibilities

## Project responsibilities

### Proponent – design and construction

- Manage the detailed design process, which may run progressively and in parallel with the construction programme, to ensure compliance with the Coordinator-General's conditions and the environmental design requirements, in order to achieve the environmental outcomes.
- Prepare the Construction EMP to comply with the Coordinator-General's conditions and to achieve the environmental outcomes established in this Draft Outline EMP. The Construction EMP must be endorsed by the Environmental Monitor as meeting the Coordinator-General's conditions, and be submitted to the Coordinator General prior to the commencement of works, including demolition and early works.
- Manage the design and construction process to ensure compliance with statutory approvals, environmental design requirements, EMPs and relevant legislation. At the project office and at each project worksite, maintain:
  - a current copy of the Construction EMP containing a record of all revisions and updates, the completion of planned actions, monitoring records, and reports which are made available.
  - a schedule of all necessary approvals, including development approvals, environmental licenses, workplace health and safety and all other construction-related approvals necessary to undertake the works.
- Establish and maintain an environmental management register of construction mitigation measures agreed with affected entities.
- Ensure that registered construction mitigation measures are implemented in accordance with the Construction EMP.
- Undertake regular monitoring (as detailed in Section 1.11 (Construction) and 1.12 (Commissioning)) in relation to environmental performance criteria and registered mitigation measures to ensure the environmental outcomes are being achieved. Validated monitoring results must be reported each month on the project website and in the monthly environmental reports for the duration of the construction and commissioning phases.
- Ensure there is adequate and accurate identification and reporting of any exceedances of quantitative performance criteria, failure to achieve qualitative performance criteria, and failure to implement mitigation measures during construction.
- Ensure actions arising from exceedances are agreed as soon as possible and in accordance with the Construction EMP. Exceedances will be resolved in consultation with and with the agreement of affected entities. Agreed actions as a result of exceedances will be reported in the monthly environmental report.
- Establish and maintain open and effective communications with people living or working near the Project worksites, people relying on the public transport or road transport network likely to be affected by project construction traffic, and relevant stakeholders affected by the Project works about:
  - the construction programme;
  - the intended scale, duration and nature of proposed work; and
  - details of proposed impact mitigation measures and monitoring of impacts, for the duration of the construction phase.
- Establish and maintain a project website during design, construction and commissioning for the purpose of informing people about project activities.
- Establish and maintain a process for receiving, recording and responding to complaints about construction issues.
- Ensure the Project is carried out in accordance with relevant environmental legislation, policies and guidelines.
- Ensure all site personnel are inducted and are aware of their environmental responsibilities and obligations as identified in Appendix C.
- Appoint an independent, suitably skilled and qualified entity as the Environmental Monitor for the Project
- Establish one or more community advisory groups and appoint an independent, suitably skilled entity as the Community Relations Monitor for the Project.

## Project responsibilities

### Proponent – commissioning

- Prepare the Commissioning EMP to address the commissioning activities in relation to the commissioning environmental outcomes established in this EMP. The Commissioning EMP will be prepared by the Proponent and endorsed by the Environmental Monitor and submitted to the Coordinator-General prior to the commencement of commissioning activities.
- Monitor the environmental performance of the Project during the commissioning activities and provide quarterly environmental reports to the Environmental Monitor and annual environmental reports to the Coordinator-General. Monitoring must address the environmental outcomes and the proposed operating environmental procedures, policies and codes of practice for the railway and the stations.
- Ensure mitigation measures are implemented prior to the acceptance of the Project as being complete.
- Establish and maintain open and effective communications with people living or working near the Project, people relying on the public transport or road transport network likely to be affected by project commissioning activities, and relevant stakeholders about:
  - the programme of commissioning activities; and
  - the likely impacts, intended scale, duration and nature of commissioning activities.
- Establish and maintain a process for receiving, recording and responding to verified complaints about commissioning issues.
- Ensure that the Rail Infrastructure Manager is consulted and provided with sufficient information to operate the Project.
- Ensure the safe and efficient commissioning of the Project in accordance with legislation and regulations, and good environmental management practices.

### Queensland Government (regulator and stakeholder) – design, construction and commissioning

- Administer relevant statutes in relation to the Project.
- Review and comment as required by the Coordinator-General on the detailed design, the Construction EMP and the Commissioning EMP for compliance with conditions within their respective jurisdictions.
- Undertake periodic reviews of the Proponent's performance where required by imposed conditions or conditions of approval, or separately by the Coordinator-General.

### BCC – design, construction and commissioning

- Liaise with the Proponent about:
  - Project design issues as they affect or potentially affect land use planning intentions;
  - traffic management and pedestrian management during the construction phase, particularly in relation to worksites; and
  - the relocation of public utilities.
- Carry out responsibilities in relation to delegated administration of permitting assessment and management of local law requirements, where applicable.
- Liaise with the Proponent on relevant matters, such as urban design measures, local management plans and traffic management.

### Environmental Monitor – design, construction

- Maintain a current copy of the register of environmental approvals, authorities or permits necessary to implement the Project. The register must include an inventory of conditions placed upon all such approvals.
- Maintain a current copy of the register of the environmental design requirements together with verification advice as to the achievement of the environmental outcomes. Note any design modifications required to achieve the environmental outcomes.
- Maintain a current copy of the approved Construction EMP including any sub-plans, progressive updates as detailed design and construction advances.
- Maintain a current copy of the register of environmental mitigation measures through which the environmental outcomes will be achieved during construction.

### Project responsibilities

- Provide input in developing, agreeing and adopting reasonable and practicable mitigation measures for predicted or recorded exceedances of performance criteria.
- Monitor the Proponent's performance in complying with the Coordinator-General's conditions.
- Ensure the implementation of the environmental monitoring requirements established in the EMP. Each month examine the monitoring results, correlate the validated data with the environmental reports and note any exceedances of the performance criteria and departures from the agreed mitigation measures.
- When requested, attend scheduled meetings of community advisory groups as an independent, non-participatory observer.
- Provide the Proponent with monthly reports on environmental issues emerging from the contractor's performance in relation to the conditions, the EMP, complaints and monitoring.
- Provide the Coordinator-General with a twelve-monthly report on environmental management and compliance with the Coordinator-General's conditions.

### Environmental Monitor – commissioning

- Maintain a current copy of the Commissioning EMP including any progressive updates and records of modifications to the Project design or operating procedures.
- Ensure the implementation of the environmental monitoring programme established in the EMP. Each month examine the monitoring results, correlate the validated data with the environmental reports and note any exceedances of the performance criteria and departures from the agreed mitigation measures.
- Provide the Proponent with monthly reports on environmental issues emerging from the commissioning activities in relation to the conditions, the EMP, complaints, monitoring and community relations.
- Provide the Coordinator-General with a Commissioning environmental report at the end of the commissioning phase.

### Community Relations Monitor – design, construction and commissioning

- Chair each of the Community Advisory Groups, or where appropriate appoint a delegate to chair the Community Advisory Groups.
- Communicate with the Proponent with regard to community consultation strategies.
- Disseminate project information to the community and affected residences, as per the community consultation strategy, including works programme, works description, property matters (dilapidation surveys).
- Point of contact for the community for complaints and project information.
- Inform the Environmental Monitor and Proponent as soon as practicable of community concerns about project implementation and commissioning.
- Inform affected entities about complaints procedures and the resolution of complaints and corrective actions as necessary.
- Prepare monthly reports to the Proponent, with copies to the Environmental Monitor and available on the Project website, about community relations, summary of complaints and their resolution, emerging issues, forward activities and issues.
- Maintain copy of the EMP, communications strategy, mitigation measures and complaints.
- To the extent reasonable and practicable, resolve community complaints not resolved by the Proponent's complaints process.
- Facilitate discussions between the Proponent and affected entities about mitigation measures as required by either the Proponent or affected entity.
- Under the patronage of the Proponent, form community advisory groups for each locality likely to experience impacts during the construction of the Project.

### Community Relations Monitor – design, construction and commissioning

- Participate in scheduled meetings to consider and provide feedback to the Proponent about detailed design matters referred to the community advisory group for comment, construction planning and construction activities, and views received from the wider community.

## Project responsibilities

- Provide timely comments in an advisory role to the Proponent on the Construction EMP for the Project.
- Provide advice to the Proponent during the construction phase in relation to identifying and mitigating the impacts of construction in the locality for each group.
- For the commissioning phase only, review the environmental reports prepared by the Proponent and provide feedback.

Note: Community feedback throughout operation of the Project will be sought through existing procedures followed by the Rail Infrastructure Manager and TMR Community Feedback.

All Project personnel will be required to comply with the following items at all times:

- The Coordinator-General's conditions;
- The EMP for the phase of the Project in hand at the time;
- Relevant legislation; and
- The Proponent's environmental policies and systems.

### 1.5.1.1 Induction and Training

The general environmental duty is stated in the Environmental Protection Act as being "a Person must not carry out any activity that causes, or is likely to cause, environmental harm unless the person takes all reasonable and practicable measures to prevent or minimise the harm".

The *Aboriginal Cultural Heritage Act 2003* states that "a person who carries out an activity must take all reasonable and practicable measures to ensure the activity does not harm Aboriginal cultural heritage".

To assist with fulfilling these duties, and achieving compliance with applicable requirements, a training plan is to be developed, identifying requirements for each role within the Project and will include environmental and cultural heritage awareness training.

All staff, sub-contractors and visitors to construction worksites will be required to attend induction training that covers off the site wide controls as well as site specific and work specific risks and mitigation measures. At a minimum, environmental inductions should include training in the following procedures:

- Environmental legislative requirements;
- Requirements of other agencies e.g. Rail Infrastructure Manager;
- Heritage awareness;
- Potential items of archaeological significance and stop work procedures in the event of a find;
- Items and areas of Aboriginal cultural heritage and stop work procedures in the event of a find;
- Tree and vegetation protection measures;
- Noise and vibration management measures;
- Air quality and dust management measures;
- Areas of known or potential ground contamination and signs of likely contaminants;
- Signs of acid sulphate soils; and
- Erosion and sediment controls on the site and maintenance requirements.

Environmental requirements to be discussed and communicated in the site induction include general duties under environmental legislation and contractual requirements, including responsibilities in relation to the design of the Project, as well as specific environmental objectives and mitigation measures established in this Draft Outline EMP, and subsequent Construction EMP and Commissioning EMP.

A training register will be maintained to record training attendance and currency of training for each staff, contractor and visitor.



## 1.5.2 EMP Approval Process Overview

The Proponent will prepare, or cause to be prepared, an EMP for both the construction phase and commissioning phase. The Proponent will ensure compliance with the environmental design requirements through the detailed design process.

### Environmental design requirements

The detailed design process will be likely to progress in stages and in advance of works packages although this may run concurrently with some construction activities. The Proponent must provide the Environmental Monitor and the Coordinator-General with a schedule of design packages and the intended programme for providing such design packages.

The Proponent must ensure the detailed design would achieve the environmental design requirements and must provide verification reports on the 'as constructed' outcomes through the design, construction and commissioning phases to the Environmental Monitor and the Coordinator-General.

### Construction EMP

Construction will likely progress in stages, according to discrete packages of work. At least 20 business days prior to the commencement of any works, including early works and demolition, the Proponent must provide the Environmental Monitor, the Community Relations Monitor and the Coordinator-General, with the intended programme and construction method statement for the relevant works package. The construction method statement must be sufficient to inform a person about the nature, duration, scale and intensity of work for each works package.

The Construction EMP must:

- Be generally consistent with this Draft Outline EMP;
- Be prepared by the Proponent prior to the commencement of any works, including demolition and early works;
- Be endorsed by the Environmental Monitor as complying with the Coordinator-General's conditions;
- Be provided to the Coordinator-General, along with evidence of the environmental monitor's endorsement, at least 20 business days prior to the commencement of relevant works;
- Achieve the environmental outcomes and adopt the performance criteria in respect of those outcomes;
- Provide for mitigation measures to be developed in response to predicted or monitored exceedances of the goals for the performance criteria;
- Provide for monitoring of the performance criteria or mitigation measures agreed with affected entities, and corrective action where required;
- Establish a system for people to make, and the Proponent to receive and respond to complaints about the Project delivery; and
- Establish reporting procedures including a schedule for reporting, the establishment of a Project website and community inquiry 'hot line'.

The Construction EMP, including any sub-plans, may be developed in stages, commensurate with and in advance of progress in construction. Where the Construction EMP is to be developed progressively, the Proponent must provide the Environmental Monitor, the Community Relations Monitor and the Coordinator-General, with the proposed schedule for updating and further development of the Construction EMP in step with the programme of works.

### Commissioning EMP

Commissioning of the Project is likely to progress through a number of stages of commissioning activities. At least 10 business days prior to the commencement of any relevant commissioning activities, the Proponent is to provide the Environmental Monitor, the Community Relations Monitor and the Coordinator-General with a programme of commissioning activities and a commissioning

method statement. The commissioning method statement must be sufficient to inform a person about the nature, duration, scale and intensity of activities for each stage of commissioning.

The Commissioning EMP, including any sub-plans, may be developed in stages, commensurate with and in advance of progress in commissioning. Where the Commissioning EMP is to be developed progressively, the Proponent must provide the Environmental Monitor, the Community Relations Monitor and the Coordinator-General, with the proposed schedule for updating and further development of the Commissioning EMP in step with the commissioning programme.

At least 10 business days prior to the commencement of commissioning, and acting on advice from the Environmental Monitor and the Community Relations Monitor, the Proponent must report to the Coordinator-General that the Commissioning EMP is suitable for managing the impacts of the proposed commissioning activity, and complies with the conditions.

At least 10 business days prior to the commencement of a new commissioning stage, and acting on advice from the Environmental Monitor and the Community Relations Monitor, the Proponent must report to the Coordinator-General in relation to the corresponding revision of the Commissioning EMP as to its compliance with the Coordinator-General's conditions and general consistency with this EMP.

### 1.5.3 Monitoring, Correction Actions, and Reporting

#### Monitoring

The Proponent will be responsible for monitoring each environmental element and area-specific environmental requirements throughout the Project phases. Monitoring must address performance in relation to the environmental outcomes and the performance criteria, and implementation of the registered mitigation measures needed to achieve the environmental outcomes.

The specific monitoring actions for each environmental element will be finalised in the Construction EMP and the Commissioning EMP, but must address monitoring requirements identified in this EMP and the conditions of approval.

During the construction phase, monitoring to be undertaken consistent with Sections 1.11 and 1.12 and must include, as a minimum:

- Collection, measurement and analysis of specified data at the locations and frequencies required by the construction EMP according to recognised and accepted scientific methods by suitably qualified people;
- Daily environmental site inspections at each worksite, including visual inspections of environmental control measures and environmental impacts of construction activities; and
- Targeted monitoring of key parameters in response to an incident or failure to comply with the Coordinator-General's conditions or the construction EMP.

All monitoring equipment is to be calibrated regularly and the results of the calibrations recorded. All monitoring and sampling undertaken is to be in accordance with applicable guidelines or Australian Standards. All analytical testing performed is to be undertaken in accordance with National Association of Testing Authorities (NATA) approved procedures or if this is unavailable, be performed to the most relevant standard. New technologies or materials may be used provided standards and outcomes are equal to or exceed current recognised standards.

#### Corrective actions

Corrective actions must be taken where monitoring or reasonable complaints indicate the environmental outcomes are not achieved in relation to particular works, or where agreed mitigation measures have not been implemented. Where corrective actions become necessary, the Environmental Monitor must be informed and the related works must cease until the corrective actions have been developed and implemented.

In consultation with the Environmental Monitor, the Proponent must develop corrective actions to achieve the environmental outcomes. Such corrective actions must be developed in consultation also

with stakeholders and affected entities. Corrective actions must be designed and implemented to ensure no recurrence of the incident, exceedance, failure to implement agreed mitigation measures or failure to achieve the environmental outcome for any other reason.

Corrective actions must be initiated as soon as practicable after it becomes evident, through monitoring or complaints, that the environmental outcomes for the relevant works are not being achieved.

The Environmental Monitor must maintain a register of corrective actions and report upon their implementation in the Monthly Environmental Report.

Where environmental harm has occurred, the Proponent must advise and consult as soon as practicable with the Chief Executive, Department of Environment and Heritage Protection.

### **Reporting**

A mechanism for reporting on monitoring and compliance must be established in the Construction EMP. The Proponent will be responsible for the preparation and publication of reports described in Table 1.4 or as otherwise required by the Coordinator-General's conditions.

Table 1.4 Reporting requirements

## Report and Scope

### Monthly Environmental Design Report

During detailed design, the Proponent must submit to the Environmental Monitor a monthly Environmental Design Report which verifies that the design is in accordance with the Environmental Design Requirements.

A copy of the Monthly Environmental Design Report must be posted on the Project website for the duration of the construction phase.

### Monthly Construction Environment Report

Prior to the commencement of construction works, the Proponent must establish and maintain a dedicated project website.

The Monthly Environmental Report must include:

- a statement on the achievement of environmental outcomes, and an assessment of outcomes in relation to the performance criteria and implementation of registered mitigation measures required by the Construction EMP;
- a summary of daily site environmental inspections;
- a schedule of all validated monitoring results. Validated monitoring results must be produced for the preceding month's monitoring programme;
- a summary of any non-compliances with the Coordinator-General's conditions and the EMP;
- responses to environmental incidents and non-compliances, including corrective actions, responsibility and timing;
- all other matters pertaining to environmental performance during construction or commissioning; and
- the monthly community relations report.

A copy of the Monthly Environmental Report must be submitted to the Environmental Monitor and posted on the Project website for the duration of the construction phase.

### Commissioning Environment Report

A Commissioning Environmental report will be produced at the end of the commissioning phase. The Commissioning Report will include:

- a statement on the achievement of the environmental design requirements, and an assessment of achievement of the environmental outcomes in relation to the performance criteria and implementation of registered mitigation measures required by the Commissioning EMP;
- a summary of site environmental inspections;
- a schedule of all validated monitoring results. Validated monitoring results must be produced for the monitoring programme;
- a summary of any non-compliances with the Coordinator-General's conditions and the EMP;
- responses to environmental incidents and non-compliances, including corrective actions, responsibility and timing;
- all other matters pertaining to environmental performance during commissioning; and
- any matters to inform the community relations report.

A copy of the Commissioning Report must be submitted to the Environmental Monitor and posted on the Project website.

## Report and Scope

### Monthly Community Relations Report

The Proponent must prepare a Monthly Community Relations Report for the duration of construction and commissioning including:

- a summary of daily community interactions (i.e. face to face, phone, website);
- responses to community issues raised, including recommendations for corrective actions, responsibility and timing;
- reporting of recorded complaints, responses and corrective actions;
- a schedule of emerging community relations issues and how they are being resolved; and
- all other matters pertaining to community relations during construction.

A copy of the Monthly Community Relations Report must be

- submitted to the Environmental Monitor and the Community Relations Monitor for inclusion in the Monthly Environmental Report (construction); and
- posted on the Project website for the duration of the construction phase.

### Construction Incidents and Non-Compliance Report

#### Interim report

In addition to any statutory requirements, within two days of an environmental incident or a non-compliance with the Coordinator-General's conditions being detected, an interim report providing details of the incident or non-compliance and initial response is to be prepared by the Proponent and provided to the Environmental Monitor and the Coordinator-General.

#### Comprehensive report

Within 14 days of the interim report, or as part of the next monthly environmental report, whichever is sooner, a comprehensive report must be prepared by the Proponent and be posted on the Project website for the duration of the construction phase. The comprehensive report must include:

- details of the incident or non-compliance including its cause;
- response to the incident or non-compliance;
- corrective actions taken and responsibility;
- timing of the corrective actions; and
- any revisions of the Construction EMP to reduce the potential for the incident re-occurring.

### Annual Environmental Report

The Annual Environmental Report must be prepared by an independent, suitably qualified person (for example the Environmental Monitor) and submitted to the Coordinator-General no later than 31 July in any year during the construction phase, must address the previous 12 months activities (1 July to 30 June), and must be posted on the Project website for the duration of the construction phase.

The Annual Environmental Report must include:

- an evaluation of environmental management in relation to achievement of the environmental outcomes, satisfaction of the performance criteria or where not satisfied, implementation of mitigation measures. The evaluation must extend to a high-level assessment of the effectiveness of mitigation measures for particular environmental elements and localities;
- an overview and evaluation of the implementation of the complaints handling and response process and procedure. The evaluation, in part, must refer to the number of complaints and the significance of the issues raised in complaints, together with closing out complaints to the satisfaction of the complainants;
- an overview and evaluation of the environmental record achieved during the reporting period. The environmental record must address, in part, the number and significance of environmental incidents and non-compliances with the Coordinator-General's conditions and the EMP;

## Report and Scope

- an evaluation of the effectiveness of the community information and engagement system for the Project. The evaluation must include, in part, the system for advance warning of construction works and the availability of relevant, comprehensible information about the programme of works and the nature, scale and intensity of works packages;
- an overview of key issues and significant recurring issues for community relations. The overview must include an analysis of each issue to identify any common cause, successful mitigation measures and opportunities to resolve and close out such issues; and
- identification of aspects for improvement in environmental management and community relations, and proposed actions to achieve such improvements.

### 1.5.4 Document Control

A register must be retained on site of all licenses, permits, approvals and any other agreements pertaining to the construction works.

Project documents, including the monthly and annual environmental reports and incident reports, are to be maintained by the Proponent and are to be made available for inspection on request by an agency with regulatory responsibilities for aspects of Project delivery. All monthly and annual environmental reports and incident reports must be kept for a minimum of at least five years after completion of construction or otherwise in accordance with applicable legislation or the regulator's requirements.

A procedure for managing revisions is to be established to ensure that all Project personnel have ready access to the latest revision of the EMP at all times. The current version of the Construction EMP and the Commissioning EMP is to be available on the Project website at all times.

### 1.5.5 Communications

#### Internal communications

Environmental management should be supported with clear and concise internal communications systems extending through the Proponent's organisation to the workforce 'on the ground'.

The internal communications system must be established and implemented to ensure that all Project personnel are informed about the environmental outcomes for each phase of the Project and the importance of achieving them.

The internal communication system will be implemented as part of the Proponent's environmental management system.

#### External communications

To ensure clear communication, only Project personnel nominated and approved by the Proponent should be involved in consultation with external bodies on environmental issues.

External communication responsibilities, training and processes should be established in the Construction EMP and should align with the community and stakeholder engagement principles outlined in Section 1.6.

## 1.6 Community and Stakeholder Engagement Principles

### 1.6.1 Community Engagement Outcomes

The Proponent is to implement engagement procedures through which stakeholders and the community can obtain information, discuss and provide feedback on the Project, construction activities and environmental management measures.

Community and stakeholder engagement on the Project is to achieve the following outcomes:

- Local communities, residents and businesses likely to be directly affected by construction works for the Project are aware of the nature, timing and predicted effects of the works in advance of their commencement, and are aware of the procedures for making complaints about the construction works related to the Project;
- Public transport and road users, including pedestrians and cyclists are aware of construction works and the predicted effects on road and rail network operations in advance of their commencement, and are aware of the procedures for making complaints about construction works related to the Project;
- Opportunities for ongoing consultation with local communities likely to be directly affected by construction works, as well as the wider community such as public transport users and road users, including pedestrians and cyclists, are provided throughout the construction phase;
- Communities have access to an effective and responsive communication and complaints process to address and respond to community issues;
- Consultation with the community and stakeholders is commenced well in advance of the commencement of construction works and, in some circumstances, commences with the design of mitigation measures during detailed design. Such consultation is to be conducted in detail sufficient to address specific construction impacts and mitigation requirements; and
- Consultation with affected entities about possible mitigation measures is conducted in confidence.

### 1.6.2 Engagement Process and Procedures

Community and stakeholder engagement during construction is to include:

- Development and implementation of a community and stakeholder engagement plan;
- Establishment and operation of community advisory groups;
- Direct consultation with people whose property is predicted to be directly affected by construction activities, as well as with key stakeholders; and
- A complaints management procedure.

During the operation phase of the Project, community engagement, communications and complaints management are to be undertaken in accordance with the operator's customer feedback processes.

#### **Community and stakeholder engagement plan**

A community and stakeholder engagement plan is to be developed and implemented by the Proponent to ensure community and stakeholders are informed in a timely manner about construction activities. This plan is to be provided to the Coordinator-General prior to commencement of construction works.

Community and stakeholder engagement during the construction phase must include:

- Early establishment and maintenance of a comprehensive and accessible community information service including:
  - toll-free telephone service with 24 hour, seven days a week servicing;
  - project website and email service;
  - regular newsletters;
  - regular advertisements in local newspapers; and
  - scheduled information sessions or open days.

- Availability of information through the Project website generally and in response to specific enquiries about environmental performance;
- Early and on-going engagement with owners and occupants of premises adjacent or close to the proposed works about the scale, duration, location, potential effects and mitigation measures;
- Early notification to owners and occupants of 'sensitive receivers' that are predicted to be affected by construction works in terms of their scale, duration, location and potential effects;
- Establishment of community advisory groups; and
- Where required, procedures to respond to complaints, issues or incidents, such as face-to-face meetings and on-going communications with affected entities and a documented process for issues resolution.

### **Community advisory groups**

Community advisory groups are to be convened by the Proponent prior to commencement of construction works and as soon as practicable after a decision to proceed with the Project is taken. Such groups will meet regularly until completion of the commissioning phase and will have the purpose of providing timely, open advice and representation of community issues and concerns arising from the Project.

The community advisory groups would:

- Be kept informed and provide feedback to the Proponent about construction plans and programmes;
- Provide community feedback to the Proponent, the Community Relations Monitor and Environmental Monitor about concerns with the Project's construction; and
- Provide feedback to the Proponent, the Community Relations Monitor and the Environmental Monitor in relation to construction issues as required.

The Community Relations Monitor or their delegate will facilitate and chair the community advisory group meetings, and will provide administrative support for their conduct. The Community Relations Monitor will also coordinate the provision of technical advice from the Proponent's project team in response to written queries at a scheduled meeting.

The Environmental Monitor may attend community advisory group meetings, as required, as an independent observer, for the purpose of monitoring community interests and concerns, if any, about the implementation of the community engagement plan and the construction programme.

The Proponent must keep the Coordinator-General informed of the views and issues raised in meetings of the community advisory groups by providing endorsed copies of minutes and other meeting records as required.

For the commissioning phase of the Project, feedback must also be sought from the community advisory groups in relation to proposed commissioning activities and outcomes.

### **Direct landowner and stakeholder consultation**

Early and on-going consultation must be undertaken throughout the detailed design and construction phase, with directly affected landowners and managers of community facilities in neighbourhoods adjacent to worksites and other construction works or above the main alignment. The purpose of such consultation is to provide updates on construction activities including advance notice of works which might be intrusive, identify likely impacts, and develop effective mitigation strategies.

### **Complaints and responses**

The Construction EMP must include a procedure for receiving, registering and responding to complaints. Complaints must be managed promptly and effectively, and form a key part of the environmental reporting mechanism. Basic requirements for the complaints process include:

- A procedure for receiving complaints on a 24 hour, seven days a week basis, during the construction phase;



- A procedure for registering and responding to complaints;
- A mechanism for notifying the community of the complaints procedure and how it may be accessed;
- A process for registering and handling complaints received, including a database for tracking of complaints and actions taken in response. The database must include:
  - the time and date each complaint is received;
  - details of the complainant and the recorder of the complaint;
  - the specific activity causing the complaint including the place, time and date;
  - the entity responsible for addressing the complaint;
  - the action taken to address the complaint, if necessary;
  - feedback given to the complainant;
  - time and date on which the complaint was addressed and closed out;
  - immediate communication of the complaint to the nominated representative of the Proponent;
  - details on how the action taken by the Proponent was communicated to the complainant, the Community Relations Monitor and the Environmental Monitor and other relevant regulatory authorities; and
  - any subsequent remedial action required to avoid cause for future complaints if relevant.

A procedure for escalating and resolving verified complaints consistent with the relevant legislation<sup>1</sup>;

- Regular reporting via the monthly environmental report, to the community of complaints and corrective actions maintaining appropriate confidentiality; and
- Monitoring and auditing of the complaint handling system.

Complaints during operation will be incorporated into the operator's customer feedback procedures.

## 1.7 Environmental Legislation, Planning and Approvals

The Project EMS and detailed EMPs should include a procedure for reviewing and updating a register of legislation, guidelines and standards applicable to the Project at least every 6 months.

See Appendix B for detail on environmental legislation, policies and guidelines that may currently be applicable.

## 1.8 Environmental Design Requirements

The environmental outcomes for the Project, in its operational phase, are intended to be achieved largely through addressing environmental design requirements in detailed design. Standard operating protocols and procedures will control the daily operations of the rail network.

Table 1.5 outlines the range of environmental design requirements that respond to environmental and community issues identified in the Request for Project Change Report. These requirements seek to avoid, minimise or mitigate community and environmental impacts of Project implementation.

The environmental design requirements are in addition to the requirements of technical design standards and existing government policy, and relate to such matters as identified in the Request for Project Change Report.

Table 1.5 Environmental design requirements

Element	Environmental design requirements
Transport	<ul style="list-style-type: none"> <li>Emergency access and evacuation for each station and the tunnel is designed in consultation with the Emergency Service Authorities.</li> <li>Station plazas and forecourts are of a sufficient size and dimension to avoid peak pedestrian flows spilling onto adjacent carriageways. Where the overflow of pedestrians onto carriageways cannot be avoided, local traffic management measures addressing such circumstances must be designed and implemented prior to the commencement of Project operations.</li> <li>Pedestrian and cycle pathways in the vicinity of stations are designed in accordance with Rail Infrastructure Manager's and TMR's design, guidelines, standards and requirements.</li> <li>The design of driveways and roadworks for the Project will take into consideration the potential for conflicts between construction traffic and cyclists and pedestrians.</li> <li>New footpaths, pedestrian walkways and pedestrian road crossings in the vicinity of stations are designed, in consultation with BCC and emergency services authorities, to allow safe and efficient pedestrian movement during peak periods and, where applicable, major events at the Brisbane Cricket Ground (Woolloongabba Station), Lang Park (Roma Street Station) and the RNA Showgrounds (Exhibition Station).</li> <li>The Project design provides for pedestrian connectivity between the Princess Alexandra Hospital (PA Hospital), Boggo Road Busway Station and Park Road Railway Station, and incorporates appropriate crime prevention through environmental design (CPTED) principles and <i>Disability Discrimination Act 1992</i> (DDA) compliant vertical transport facilities.</li> <li>The Project design provides for pedestrian connectivity between Princess Alexandra Hospital (PA Hospital), Boggo Road Busway Station and Park Road Railway Station.</li> </ul>
Air Quality	<ul style="list-style-type: none"> <li>Ventilation outlets from underground stations are designed and sited so as not to cause an increase in air temperature or concentrations of ambient air contaminants that exceed air quality objectives at nearby sensitive receivers or at ground level where the public could be present.</li> <li>The Project is designed so that it does not cause the air quality objectives specified in Table 1 to be exceeded.</li> <li>Ventilation system outlets are designed and sited so as not to cause an increase at sensitive locations of more than one degree Celsius in air temperature.</li> <li>The ventilation outlets are designed to avoid discharging directly into an air intake either for the Project ventilation system, or for any other ventilation or air conditioning system.</li> </ul>

Element	Environmental design requirements																							
	<p><b>Table 1: Ambient air quality outcomes</b></p> <table border="1"> <thead> <tr> <th style="background-color: #003366; color: white;">Pollutant</th> <th style="background-color: #003366; color: white;">Air Quality Objective</th> <th style="background-color: #003366; color: white;">Average Period</th> </tr> </thead> <tbody> <tr> <td>Total Suspended Particulates (TSP)</td> <td>90µg/m<sup>3</sup></td> <td>Annual</td> </tr> <tr> <td rowspan="2">Particulates as PM<sub>10</sub> (&lt;10 µm)</td> <td>50µg/m<sup>3</sup></td> <td>24 hours</td> </tr> <tr> <td>25µg/m<sup>3</sup></td> <td>Annual</td> </tr> </tbody> </table> <p><i>Source: Environmental Protection (Air) Policy</i></p>	Pollutant	Air Quality Objective	Average Period	Total Suspended Particulates (TSP)	90µg/m <sup>3</sup>	Annual	Particulates as PM <sub>10</sub> (<10 µm)	50µg/m <sup>3</sup>	24 hours	25µg/m <sup>3</sup>	Annual												
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Noise and Vibration	<ul style="list-style-type: none"> <li>Where practicable, the Project achieves the following noise criteria for railway surface track airborne noise emissions:                             <ul style="list-style-type: none"> <li>65 dBA, evaluated as the 24 hour average equivalent continuous A-weighted sound pressure level; and</li> <li>87 dBA, evaluated as a Single Event Maximum sound pressure level.</li> </ul> </li> <li>Where practicable the Project is designed to achieve the goals for ground-borne noise provided in Table 2 and for vibration provided in Table 3.</li> <li>Ventilation systems, mechanical plant, and electricity feeder stations at or near stations are designed and sited to operate within the noise goals outlined in Table 4.</li> </ul> <p><b>Table 2: Ground-borne noise design criteria (rail operation)</b></p> <table border="1"> <thead> <tr> <th style="background-color: #003366; color: white;">Receiver</th> <th style="background-color: #003366; color: white;">Time of day</th> <th style="background-color: #003366; color: white;">Internal noise design criteria (dBA)</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Residential</td> <td>07:00 – 22:00</td> <td>40</td> </tr> <tr> <td>22:00 – 07:00</td> <td>35</td> </tr> <tr> <td>Schools, educational institutions, places of worship</td> <td>When in use</td> <td>40 to 45</td> </tr> <tr> <td>Retail areas</td> <td>When in use</td> <td>50 to 55</td> </tr> <tr> <td>General office areas</td> <td>When in use</td> <td>45</td> </tr> <tr> <td>Private offices and conference rooms</td> <td>When in use</td> <td>40</td> </tr> <tr> <td>Theatres</td> <td>When in use</td> <td>35</td> </tr> </tbody> </table> <p><b>Table 3: Ground-borne vibration design criteria (rail operation)</b></p>	Receiver	Time of day	Internal noise design criteria (dBA)	Residential	07:00 – 22:00	40	22:00 – 07:00	35	Schools, educational institutions, places of worship	When in use	40 to 45	Retail areas	When in use	50 to 55	General office areas	When in use	45	Private offices and conference rooms	When in use	40	Theatres	When in use	35
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Element	Environmental design requirements			
	<b>Receiver</b>	<b>Period</b>	<b>Vibration goal (vibration velocity)</b>	
	Residential	Day / night	106 dBV (0.2mm/s)	
	Commercial and community facilities (including schools and places of worship)	When in use	112 dBV (0.4mm/s)	
	Industrial	When in use	118 dBV (0.8mm/s)	
	Sensitive equipment within medical or research facilities	When in use	82 dBV (0.013 mm/s)	
	<b>Table 4: Mechanical plant noise goals (operations)</b>			
	<b>Receiver</b>	<b>Time of day</b>	<b>Background (b/g) noise creep</b>	<b>Acoustic quality objectives</b>
			<b>dBA LA<sub>90</sub> (1hour)</b>	<b>dBA LA<sub>eq</sub> (1hour)</b>
	Residential (for outdoors)	07:00 – 22:00	b/g +0	-
		22:00 – 07:00	b/g +0	50
	Residential (for indoors)	07:00 – 22:00	-	35
		22:00 – 07:00	-	30
	Library and educational institution (for indoors)	When in use	-	35
	Commercial and retail activity (for indoors)	When in use	-	45
Settlement	<ul style="list-style-type: none"> <li>Detailed design of the alignment and underground stations will be informed by a detailed settlement analysis, based on a hydrogeological and geological modelling</li> <li>The settlement analysis will indicate the predicted horizontal and vertical extent of settlement for the Project works and the time period over which such settlement would occur.</li> </ul>			
Hydrology (groundwater, surface water, and flood management)	<ul style="list-style-type: none"> <li>A hydrogeological model will be developed during detailed design and before construction of relevant sections to determine ground conditions along the tunnel section.</li> <li>Further borehole investigations, groundwater monitoring and permeability testing at the station locations and along the tunnel alignment to identify and characterise any major transmissive features and better constrain the local hydrogeological model for detailed design.</li> <li>Review available bore construction records and target aquifers to determine the suitability of monitoring bores installed during the geotechnical investigations for ongoing groundwater monitoring for construction and commissioning. Following this review, additional bores may be proposed to address gaps identified in the groundwater monitoring network.</li> <li>Identify through surveys and consultation, water bores in the area potentially affected by groundwater drawdown and implement measures to mitigate potential effects on identified bores.</li> <li>In the event a new 'groundwater feature' (e.g. areas of high groundwater flow/ yield) is identified along the Project alignment, further detailed groundwater monitoring would be undertaken to characterise the feature and identify potential impacts to the environment. Additional management measures would be developed, where required.</li> <li>Develop and implement design measures and construction methods to minimise groundwater inflows in to the construction area.</li> <li>The Project design provides for the capture of groundwater seepage, should it enter the underground structures, and the subsequent treatment of such groundwater prior to its</li> </ul>			

Element	Environmental design requirements
	<p>release to an approved discharge point.</p> <ul style="list-style-type: none"> <li>• Where the project design anticipates groundwater entering underground structures, the design provides: <ul style="list-style-type: none"> <li>– measures to minimise settlement due to project-induced drawdown;</li> <li>– measures to ensure structural integrity and Project operational safety; and</li> <li>– measures to minimise the risk of exposing acid sulphate soils to air or the chance for oxidation.</li> </ul> </li> <li>• The Project design achieves the water quality objectives for the Brisbane River referred to in the Environmental Protection (Water) Policy 2009 for any water, including groundwater, released from Project infrastructure to surface waters.</li> <li>• Erosion and sediment control design for the project would be consistent with MRTS52.</li> <li>• The Project design is based on current flooding information. The Project design provides flood immunity to the tunnel infrastructure and underground stations in a 1 in 10,000 year annual exceedance probability (AEP) regional flood event, and a 1 in 100 AEP overland flow event.</li> <li>• The Project design will not cause property damage from flood impacts to third parties for events up to and including the 1 in 100 AEP flood event.</li> <li>• Project works in Mayne Yard must be designed on the basis of detailed flood modelling.</li> </ul>
Cultural heritage	<ul style="list-style-type: none"> <li>• The Project design reflects and minimises the impact on the cultural and historical significance of places where surface works occur, and where reasonable and practicable, avoids or minimises the direct impact on heritage values of such places.</li> <li>• In developing the Project design, the Proponent would provide opportunities for acknowledgment of a locality's historical significance or cultural significance to Aboriginal people through input to: <ul style="list-style-type: none"> <li>– place naming;</li> <li>– interpretative signage and other landmarks; and</li> <li>– the themes for public art.</li> </ul> </li> <li>• In developing the Project design, the Proponent would provide opportunities for architectural design sympathetic to the cultural heritage landscape and streetscape.</li> </ul>
Climate change and sustainability	<ul style="list-style-type: none"> <li>• Project ventilation systems are designed to minimise energy consumption while achieving acceptable air quality outcomes in both the ambient environment and the Project stations and tunnel system.</li> <li>• The Project is designed to be adaptable to conditions that may arise as a result of climate change, including accommodating the predicted 1.0 m sea level rise scenario in 2100 (upper range).</li> <li>• Sustainability initiatives, particularly in relation to energy consumptions and savings throughout the Project lifecycle are incorporated in detailed design and tracked via a Sustainability Tool (e.g. ISCA's rating tool) through to Project implementation.</li> <li>• In design and construction, devise and implement a process for optimising energy efficiency in construction planning and delivery (e.g. component sourcing and transportation, spoil and materials handling – no double handling, programming to avoid re-work or redundant work).</li> <li>• In operations, energy efficient design that meets the performance criteria of all Project plant and equipment would be included in the design specification.</li> </ul>
Land use and tenure	<ul style="list-style-type: none"> <li>• Minimise the 'footprint' of the Project during both construction and operations to reduce impacts on existing land uses through design refinement.</li> <li>• The Project design seeks to optimise land use and transport integration<sup>1</sup> with: <ul style="list-style-type: none"> <li>– PA Hospital, Boggo Road Busway Station, Park Road Railway Station and Boggo Road Urban Village;</li> <li>– Woolloongabba Priority Development Area (PDA);</li> <li>– Albert Street;</li> <li>– Roma Street; and</li> <li>– Bowen Hills PDA.</li> </ul> </li> <li>• The Project is to be designed in consultation with: <ul style="list-style-type: none"> <li>– Rail Infrastructure Manager in relation to use of Railway land required for project worksites; and</li> </ul> </li> </ul>

<sup>1</sup> Land use and transport integration is optimised when the transport demands of land development projects are addressed and served by proximity to and safe and convenient access to station entrances

Element	Environmental design requirements
	<ul style="list-style-type: none"> <li>- Proponents for urban development projects at Boggo Road Urban Village, Woolloongabba PDA, Albert Street and Roma Street redevelopment and Royal National Agricultural and Industrial Association of Queensland (RNA) redevelopment.</li> <li>• The Project design minimises the loss of public open space in Victoria Park for the temporary bicycle path diversion during construction.</li> </ul>
Visual amenity and lighting	<ul style="list-style-type: none"> <li>• The Project design seeks to minimise the visual impact of the above-ground infrastructure with regards to its scale, height and bulk. Specific urban design and visual impact studies are required to inform detailed design for: <ul style="list-style-type: none"> <li>- the station ventilation outlets and intake structures;</li> <li>- the above-ground electricity feeder stations;</li> <li>- the portals and transition structures; and</li> <li>- noise barriers and other impact mitigation devices or structures.</li> </ul> </li> <li>• Where required, noise barriers are designed to reduce the visual impacts to surrounding properties and roadways by: <ul style="list-style-type: none"> <li>- incorporating urban design treatments and landscape elements such as massed plantings;</li> <li>- using clear or transparent materials to maintain existing expansive views beyond the rail corridor, subject to security and maintenance considerations being evaluated; and</li> <li>- avoiding the use of highly reflective materials and materials that support graffiti.</li> </ul> </li> <li>• Landscaping, urban design and public art treatments sympathetic to heritage landscape and streetscape values are incorporated into the design of Project works at stations and thoroughfares accessing stations.</li> <li>• Revegetation of worksites is to be designed and constructed with consideration of TMR specification MRTS16 Landscape and Revegetation.</li> </ul>
Social environment	<ul style="list-style-type: none"> <li>• The design of stations and public spaces developed as part of the Project stations incorporate CPTED principles to maximise commuter safety.</li> </ul>
Nature conservation	<ul style="list-style-type: none"> <li>• Where possible, avoid or minimise the loss of vegetation and the siting of construction worksite infrastructure within the drip zone of large mature trees.</li> <li>• Prepare a lighting plan for implementation in the construction phase to minimise the impact of lighting on the surrounding habitat.</li> <li>• Prepare a Project pest and weed management plan addressing both plant and animal pests for implementation in the construction phase.</li> </ul>
Waste	<ul style="list-style-type: none"> <li>• The Project is designed to minimise waste generation and maximise the reuse and recycling of waste materials generated by the Project during its construction and operation.</li> <li>• Opportunities are investigated during the detailed design phase for the use of recycled materials, including for Project infrastructure produced from concrete, road base, asphalt and other construction materials.</li> <li>• An asbestos audit is to be undertaken by a licensed asbestos contractor, where buildings or structures are to be partially or fully demolished, including a review of applicable registers, prior to commencing demolition.</li> <li>• During detailed design, the feasibility of re-using material excavated from the Project is investigated.</li> </ul>

## 1.9 EMP (Construction)

The environmental outcomes and performance criteria for each environmental element relevant to the construction phase of the Project are provided below. Mitigation measures to achieve the environmental outcomes are also recommended. Specific monitoring requirements and statutory requirements are also outlined for some environmental elements.

EMP sub-plans to address the elements listed below may be required to manage specific impacts at a worksite based on predictive modelling and construction monitoring to achieve the environmental outcome. The requirement for a sub-plan will be determined by the Environmental Monitor and developed by the Proponent during the design phase, having regard to the potential for construction impacts beyond a reasonable environmental amenity.

Table 1.6 Element 1 - General

Element 1		General – Construction																								
Environmental outcomes		<ul style="list-style-type: none"> <li>Construction activities, where practicable, avoid impacts of the Project on the community.</li> <li>Construction activities minimise consumption of energy, potable water supplies and non-renewable resources.</li> </ul>																								
Performance criteria		<ul style="list-style-type: none"> <li>Construction activities are only undertaken within the hours of work set out in the construction hours (Table 5).</li> <li>Construction worksites are planned, prepared and maintained in accordance with the Construction EMP.</li> <li>Construction works are planned and managed to avoid, or minimise and manage impacts on amenity, buildings and property near to worksites.</li> <li>Construction activities are planned and managed to maintain public safety near worksites and along haulage routes.</li> <li>Construction worksites are rehabilitated as soon as practicable following completion of the works in accordance with rehabilitation plans.</li> </ul>																								
		<p><b>Table 5: Construction hours</b></p> <table border="1"> <thead> <tr> <th>Worksite</th> <th>Surface works – standard hours</th> <th>Extended work hours</th> <th>Managed works</th> <th>Spoil haulage and materials / equipment delivery</th> </tr> </thead> <tbody> <tr> <td>Southern Portal</td> <td>Monday to Saturday 6.30am – 6.30pm</td> <td>For approved rail possession – 80 hrs continuous work.  6:30pm – 10:00pm Monday to Friday</td> <td>24 hours, 7 days</td> <td>24 hours, 7 days</td> </tr> <tr> <td>Boggo Road Station</td> <td>Monday to Saturday 6.30am – 6.30pm</td> <td>For approved rail possession – 80 hrs continuous work.  6:30pm – 10:00pm Monday to Friday</td> <td>24 hours, 7 days</td> <td>Monday to Friday: 6.30am – 7.30am, 9.00am – 2.30pm, 4.30pm – 6.30pm  Saturday: 6.30am – 6.30pm</td> </tr> <tr> <td>Dutton Park Station (track connection)</td> <td>Monday to Saturday 6.30am – 6.30pm</td> <td>For approved rail possession – 80 hrs continuous work</td> <td>n/a</td> <td>24 hours, 7 days, except for:  Monday to Friday: 7.00am – 9.00am, 4.30pm – 6.30pm</td> </tr> </tbody> </table>					Worksite	Surface works – standard hours	Extended work hours	Managed works	Spoil haulage and materials / equipment delivery	Southern Portal	Monday to Saturday 6.30am – 6.30pm	For approved rail possession – 80 hrs continuous work.  6:30pm – 10:00pm Monday to Friday	24 hours, 7 days	24 hours, 7 days	Boggo Road Station	Monday to Saturday 6.30am – 6.30pm	For approved rail possession – 80 hrs continuous work.  6:30pm – 10:00pm Monday to Friday	24 hours, 7 days	Monday to Friday: 6.30am – 7.30am, 9.00am – 2.30pm, 4.30pm – 6.30pm  Saturday: 6.30am – 6.30pm	Dutton Park Station (track connection)	Monday to Saturday 6.30am – 6.30pm	For approved rail possession – 80 hrs continuous work	n/a	24 hours, 7 days, except for:  Monday to Friday: 7.00am – 9.00am, 4.30pm – 6.30pm
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**Element 1 General – Construction**

Worksite	Surface works – standard hours	Extended work hours	Managed works	Spoil haulage and materials / equipment delivery
Woolloongabba Station	Monday to Saturday 6.30am – 6.30pm	6:30pm – 10:00pm Monday to Friday	24 hours, 7 days	24 hours, 7 days, except for: Monday to Friday: 7.00am – 9.00am, 4.30pm – 6.30pm
Albert Street Station	Monday to Saturday 6.30am – 6.30pm	6:30pm – 10:00pm Monday to Friday	24 hours, 7 days	Monday to Friday: 6.30am – 10.00pm Saturday: 6.30am – 6.30 pm
Roma Street Station	Monday to Saturday 6.30am – 6.30pm	6:30pm – 10:00pm Monday to Friday	24 hours, 7 days	Monday to Friday: 6.30am – 7.30am, 9.00am – 4.30pm, 6.30pm –10.00pm Saturday: 6.30am - 6.30pm
Northern portal	Monday to Saturday 6.30am – 6.30pm	For approved rail possession – 80 hrs continuous work. 6:30pm – 10:00pm Monday to Friday	24 hours, 7 days	Monday to Friday: 6.30am – 6.30pm Saturday: 6.30am – 6.30pm
Exhibition Station	Monday to Saturday 6.30am – 6.30pm	-	24 hours, 7 days	Monday to Saturday 6.30am – 6.30pm
Mayne Yard	Monday to Saturday 6.30am – 6.30pm	-	24 hours, 7 days	24 hours, 7 days

**Surface works – standard hours**

- Surface works must be conducted during standard hours and must achieve the environmental outcomes.
- Surface works may be conducted outside standard hours in the following circumstances:
  - emergency works to avoid the loss of life, damage to property, or to prevent environmental harm;
  - surface works are conducted as managed works or extended hours works.

**Extended hours work**

- Extended hours work may be carried out as per Table 5 only under the following circumstances:
  - The extended hours relate to a discrete package of work, or a specified work activity (e.g. material delivery, concrete pours, tying reinforcing steel, site set-up, piling) for which there is a defined programme and completion date;
  - A site specific EMP sub-plan has been prepared to address the extended hours work, the predicted impacts and related mitigation measures, and a site management contact number through which complaints could be made. The site specific EMP sub-plan must provide measures to achieve the environmental outcomes and must be endorsed by the Environmental Monitor and submitted to the Coordinator-General prior to the commencement of the works; and
  - Near neighbours and stakeholders are consulted about the proposed works package, its potential impacts, the proposed mitigation and management measures, the monitoring programme and complaints procedure prior to the EMP sub-plan being submitted to the Coordinator-General.
- In considering the notification, and imposing any requirements that may be appropriate, the Proponent must have regard for the:
  - matters raised in consultation with sensitive receivers about the potential impacts of the works;
  - management methods for achieving the environmental outcomes;
  - duration, scale and intensity of the works; and
  - advice of the Environmental Monitor and Community Relations Monitor.



Element 1	General – Construction
	<ul style="list-style-type: none"> <li>• The works during extended hours must be monitored for compliance with the Coordinator-General's conditions and the Construction EMP.               <ul style="list-style-type: none"> <li>– Where monitoring detects non-compliance with the requirements of the Coordinator-General's conditions or the EMP, the extended hours work must cease immediately, once the worksite has been made safe and not recommence until a revised work method is demonstrated to achieve the environmental outcomes for nearby neighbours.</li> </ul> </li> </ul>
Managed works	<ul style="list-style-type: none"> <li>• Managed works are works where monitoring indicates the environmental outcomes are being achieved and are conducted generally in accordance with the program of works about which the community has been consulted.</li> </ul>
Construction EMP	<ul style="list-style-type: none"> <li>• A Construction EMP must be prepared, or updated, at least 20 business days before the commencement of works at the relevant construction worksite. The Construction EMP must include a construction schedule identifying the commencement and completion of each programmed suite of activities, sufficient to inform the Environmental Monitor, the Community Relations Monitor and the Coordinator-General of the nature and timing of the intended works.</li> <li>• The Construction EMP must be endorsed by the Environmental Monitor as being consistent with the Coordinator-General's conditions. The CEMP may be submitted separately and updated progressively for each construction worksite.</li> </ul>
Mitigation measures	<ul style="list-style-type: none"> <li>• Measures which may be implemented at construction worksites to minimise construction impacts, include:               <ul style="list-style-type: none"> <li>– Work sheds are provided over deep excavations and station shafts where predictive modelling indicates exceedances of the performance criteria for noise or dust. Such sheds may include acoustic lining, ventilation and dust filtration to achieve environmental outcomes for noise and air quality set out in this Draft Outline Construction EMP;</li> <li>– Spoil and materials handling, storage and loading occur within ventilated acoustic enclosures or work sheds, which are designed and constructed to achieve environmental outcomes for noise and air quality as set out in this Draft Outline Construction EMP;</li> <li>– Night lighting, including security lighting, which is designed, installed and positioned to avoid light spill onto residential properties at intensities exceeding 8 lux, measured at the boundary of the residential property; and</li> <li>– Solid (but not see-through) fencing to work area boundaries to ensure safety for pedestrians and cyclists and minimise distractions for motorists. These may also be used to provide noise attenuation.</li> </ul> </li> <li>• An area of land within Victoria Park currently accommodating a BCC temporary staging facility would be required for temporary construction activities. This would require the removal and potential relocation of this facility prior to construction. Consultation with BCC would be required to manage this impact.</li> <li>• Prior to the commencement of works predicted to cause cosmetic damage due to settlement by ground borne vibrations, conduct building condition surveys in consultation with affected entities, the Environmental Monitor and the Community Relations Monitor.</li> <li>• Where damage to property occurs as a consequence of construction works, the damage is to be repaired by the Proponent as soon as practicable and without cost to the property owner. Repairs are to be undertaken in consultation with the property owners and occupants and must return the premises at least to the condition existing prior to the commencement of construction works.</li> <li>• Water supply or other infrastructure services required to support construction works are to be designed and constructed to achieve the environmental outcomes and performance criteria set out in this Draft Outline Construction EMP.</li> <li>• Rehabilitation of construction work areas is to be undertaken progressively and as soon as practicable upon completion of the works at a site, to minimise potential impacts of dust, soil erosion and sedimentation.</li> <li>• Prior to the commencement of construction works, the Proponent must establish and maintain a dedicated website that includes at least the following:               <ul style="list-style-type: none"> <li>– contact details for the Project, the Environmental Monitor and the Community Relations Monitor;</li> <li>– the monthly and annual environmental reports;</li> </ul> </li> </ul>

Element 1 General – Construction	
	<ul style="list-style-type: none"> <li>– a summary of the overall construction programme, and summaries of the construction programmes for each worksite;</li> <li>– details for accessing the complaints system and how it operates; and</li> <li>– notifications about Project works, including any extended hours work, traffic management and changes to public transport services.</li> </ul>
Monitoring	<ul style="list-style-type: none"> <li>• The Proponent must monitor and report on all aspects of the environmental performance, mitigation and management of the Project, including independent verification.</li> </ul>
Reporting	<ul style="list-style-type: none"> <li>• The Proponent must prepare monthly construction environmental reports addressing:                             <ul style="list-style-type: none"> <li>– the programme of works and progress made in the reporting period;</li> <li>– the scope and character of works to be undertaken in the next reporting period;</li> <li>– monitoring results for key parameters (e.g. construction traffic flows, air quality, water quality, noise and vibration, settlement, waste disposal, soil erosion and sediment control) with such data to be validated according to accepted scientific standards and industry practices;</li> <li>– complaints received and addressed, including the nature of the complaints and timing of the response to the complaints;</li> <li>– compliance, or if necessary, instances of non-compliance with the Coordinator-General’s conditions and the Construction EMP;</li> <li>– any corrective actions required to address non-compliance with the conditions of the EMP; and</li> <li>– community engagement activities and performance in relation to the community engagement plan.</li> </ul> </li> <li>• Monthly construction environmental reports must be provided by the Environmental Monitor, and must be posted on the project website as soon as practicable after submission to the Proponent.</li> </ul>

Table 1.7 Element 2 - Transport

Element 2 Transport - Construction	
Environmental outcomes	<ul style="list-style-type: none"> <li>• Project construction traffic is managed to avoid or minimise and mitigate adverse impacts on road safety and traffic flow, public transport, pedestrian and cyclist safety, property access and parking, existing road pavements and railway tracks.</li> <li>• Workforce parking is to be managed to avoid or minimise and mitigate adverse impacts on the local community and businesses.</li> <li>• Traffic access for emergency services to construction worksites and adjoining properties is maintained throughout the construction phase.</li> <li>• Access is maintained to properties throughout the construction phase or an acceptable alternative solution is agreed with the property owner prior to closure of any access.</li> </ul>
Performance criteria	<ul style="list-style-type: none"> <li>• Disruptions to the operation of the road network and the public transport network due to construction works are avoided during peak periods, where possible, and managed during off-peak periods.</li> <li>• Passenger rail services and schedules during peak weekday travel times are maintained, unless with prior agreement of the Rail Infrastructure Manager and TMR.</li> <li>• Passenger bus services and schedules during peak travel times are maintained, where possible.</li> <li>• Key freight rail services and schedules are maintained, unless with prior agreement of the Rail Infrastructure Manager.</li> <li>• Haulage vehicles (i.e. spoil, construction equipment and materials haulage) only travel on designated haulage routes defined in this Draft Outline Construction EMP (refer to Figures 1.3-1.7), unless agreed beforehand with the relevant road authority and the Environmental Monitor.</li> <li>• A Traffic Management Plan would be developed by the Proponent and communicated to all site personnel during site induction, outlining routes for commuting and parking at each worksite.</li> </ul>

Element 2	Transport - Construction
	<ul style="list-style-type: none"> <li>• Spoil haulage vehicles are managed in real time to and from worksites and spoil sites to avoid speeding, queuing, congested areas and traffic incidents, and to manage and avoid over-loading, spills and safety incidents.</li> <li>• Worker parking is provided for each construction worksite where space is available. Where parking is insufficient to meet demand and no commercial parking is available, alternative means of worker transport is provided to avoid adverse impacts on communities near construction worksites. Where practicable, the access of workers' car parking is not via local streets.</li> <li>• Information about the timing and scale of changes to traffic and transport conditions on passenger rail operations, the busway and road networks in the vicinity of construction works is provided in advance to the local community, commuters and on request to other people interested in the construction works.</li> <li>• Safe and efficient access is maintained for pedestrians, bicycles and for passengers to and from public transport facilities, including rail and busway stations and bus stops.</li> <li>• Access to all properties is maintained during construction activities at all times, unless an acceptable solution is agreed with the property owner/occupant and documented.</li> <li>• Pedestrian and cycle access to community facilities is not disrupted by construction works, unless approved by the relevant road authority in consultation with the manager of the community facilities.</li> </ul>
Mitigation measures	<ul style="list-style-type: none"> <li>• Local communities, including residents, businesses, users of community facilities and public transport passengers, are to be notified about changes to access and transport arrangements near construction works.</li> <li>• Public notification (local and regional newspapers, Project website) describing the proposed changes, the duration of the changes and possible alternative routes to avoid the impacts of the proposed changes is required at least 10 business days prior to the commencement of relevant construction work.</li> <li>• Construction works that result in rail network shutdowns are to be agreed with the Rail Infrastructure Manager, prior to commencement of works within the rail corridor, to minimise disruption to the rail network and should use existing planned shutdowns where possible.</li> <li>• Early and on-going notification is to be provided to the Rail Infrastructure Manager, TMR, rail passengers, rail freight operators and local communities of the timing and duration of rail shutdowns, likely disruptions to rail services and alternative arrangements to be implemented.</li> <li>• Disruption to rail passenger services is to be avoided to the extent reasonable and practicable during major events, at the 'Gabba' (Woolloongabba Station), the Ekka (Exhibition Station) and at Lang Park (Roma Street Station). Where disruptions are unavoidable, bus shuttle services are provided between appropriate stations to the major event venues, or to bypass the disrupted section in the network.</li> <li>• To the extent reasonable and practicable, existing access to the rail corridor for maintenance and emergency service vehicles is to be maintained. Where necessary, alternative access arrangements are to be provided in consultation with Rail Infrastructure Manager and other rail operators.</li> <li>• Construction works within the busway corridor to be coordinated with TMR.</li> <li>• Bus replacement services are to be provided where passenger rail operations are interrupted, such as during rail network shutdown periods or temporary closures of stations.</li> <li>• Where busway shutdowns are required during operational hours, TMR will be consulted in advance to enable alternate routes and stops to be established.</li> <li>• Temporary disruption to Inner Northern Busway adjacent to Roma Street Station and the Eastern Busway adjacent to Boggo Road Station and adjacent to Woolloongabba Busway Station will be managed in consultation with TMR and BCC.</li> <li>• Early and on-going notification is to be provided to TMR, busway passengers and local communities of the timing and duration of shutdowns, likely disruptions to services and alternative arrangements to be implemented.</li> <li>• Provision of temporary alternative bus stops to be provided in coordination with TMR where bus stops along Roma Street adjacent the Brisbane Transit Centre (West Tower) are disrupted.</li> <li>• Pedestrian access for rail staff between Mayne Yard and Bowen Hills Station is to be maintained, where possible.</li> <li>• Road access to and within Mayne Yard is maintained during construction works.</li> </ul>

## Element 2 Transport - Construction

### Construction works on the road network

- Local communities and road users are to be notified of proposed changes to local traffic access arising from Project works. This includes, but is not limited to, the provision of clear signage identifying changed traffic conditions, and public advertisements (such as local and regional newspapers, Project website) describing the proposed changes, the duration of the changes, and possible alternative routes to avoid the impacts of the proposed changes.
- Project works in or near road corridors are to be screened with solid barriers to minimise distractions for motorists.
- Access to properties adjoining or near to Project works, is maintained. Where changes to property access are required, alternative access arrangements are to be identified in consultation with property owners and occupants and documented in traffic management plans.
- Access for delivery vehicles to local businesses near Project works is to be maintained. Where changes to access for delivery vehicles are required, alternative access arrangements are to be identified in consultation with local businesses.
- The Proponent must prepare and implement Construction Traffic Management Plans (CTMP) for each worksite prior to the commencement of construction activities in consultation with the TMR, BCC and Emergency Service Authorities. The CTMP must be subject to periodic review to address changes in the Project's construction programme. The CTMP is to address, but not be limited to, the following measures:
  - designated truck routes and arterial roads for the haulage of construction materials and spoil. Designated truck routes to and from construction worksites are in Figure 1.3 to 1.7 of this Draft Outline Construction EMP;
  - where special circumstances require the use of other truck routes, such as the delivery or removal of oversized plant, equipment or structures, construction traffic is managed in accordance with specific traffic management sub-plans prepared in consultation with the TMR, BCC or other relevant local governments;
  - construction haulage tasks are scheduled and managed to avoid disruption to traffic flows during peak traffic periods, where possible; and
  - the capacity of intersections with arterial roads along haulage routes is investigated and mitigation measures implemented, to minimise the impact of construction vehicles to maintain reasonable levels of service on intersection operations.
- Undertake further investigations to assess cumulative impacts of traffic at key intersections along Alice Street, George Street and Roma Street. Prepare and implement a CTMP to address identified impacts with input from relevant stakeholders.
- Construction haulage tasks are undertaken during the hours nominated in the construction hours, in Table 5.
- As far as practicable, major haulage tasks for worksites are avoided during the following scheduled major events:
  - at the Gabba Stadium (crowds greater than 25,000) – for the Woolloongabba Station worksite;
  - at Lang Park (crowds greater than 25,000) – for the Roma Street Station worksite;
  - the Ekka and other events at the RNA Showgrounds (daily crowds greater than 25,000);
  - for the Exhibition Station worksite; and
  - New Year's Eve - Albert Street Station and Roma Street Station worksites.
- To the extent reasonable and practicable, haulage activities are managed and coordinated with other major construction works near to construction activities so as to minimise the disruption to local traffic.
- Prepare and implement a Construction Workforce Car Parking Plan for each construction worksite in consultation with TMR and BCC. The Construction Workforce Car Parking Plans are to be prepared and implemented prior to the commencement of construction works and updated as necessary to reflect the needs of the Project during peak construction workforce periods. As a minimum, the plans would:
  - outline parking and travel arrangements for the construction workforce;
  - identify measures to avoid worker car parking and access in local streets near construction worksites;
  - address safety, access and amenity for both workers and the local community;
  - describe any proposals to shuttle workers to or from other worksites;
  - identify any restricted areas or times where different worker procedures apply;
  - identify parking control arrangements agreed with BCC;
  - address changing worksite demands during the construction programme; and

## Element 2 Transport - Construction

- be provided to BCC prior to commencement of construction at a worksite.
- Prepare and implement a Construction Vehicle Management Plan, prior to the commencement of construction works, which provides measures to manage the construction truck fleet, including, but not limited to:
  - real-time monitoring of spoil haulage truck position, speed, route and performance in relation of traffic conditions and schedule requirements;
  - managing truck speed and position to avoid queuing near construction worksites, sensitive community facilities and residential neighbourhoods;
  - managing 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 designated routes;
  - spoil vehicles to be clearly marked, including a visible Project contact phone number;
  - maintaining all haulage vehicles to Australian Design Rule 28/01 in relation to noise emissions, exhaust emissions, traffic safety and operational safety;
  - maintaining all haulage vehicles to Australian Design Rule 80 for emission control;
  - ensuring all vehicles leaving a construction worksite pass over or through devices that removes loose soil and other debris before entering a public road;
  - Ensuring all vehicles and equipment is well maintained to minimise combustion generated emissions and manage PM2.5 levels; and
  - Driver Code of Conduct to be established that includes detail on approved haulage routes, safety, courtesy and amenity.

### Road traffic and access

- In conjunction with TMR, BCC and emergency service providers, identify and implement measures to manage traffic flows and ensure safe traffic movement near construction works.
- Notify local communities and road users in advance of and for the duration of proposed changes to local traffic access arising from Project works. This includes, but is not limited to:
  - directional signage and line marking to direct and guide drivers and pedestrians past work sites and on the surrounding network. This is to be supplemented by portable Variable Message Signs (VMS) where required to advise drivers of potential delays, traffic diversion, speed restrictions, alternate routes;
  - public notification of proposed traffic changes by newspaper, radio, Project website, and community liaison, describing the proposed changes, the duration of the changes, and possible alternative routes to avoid the impacts of the proposed changes; and
  - coordination with the Brisbane Metropolitan Transport Traffic Management Centre (BMTMC) in the event of incidents or undue congestion.
- Project works in or near worksites are to be screened appropriately to minimise distractions for motorists.
- Access to properties adjoining or near to Project works, is maintained. Where changes to property access are required, alternative access arrangements are to be identified in consultation with property owners or occupants.
- Access for delivery vehicles to local businesses and community facilities near Project works is to be maintained. Where changes to access for delivery vehicles are required, alternative access arrangements are to be identified in consultation with local businesses and facilities. In particular, access for delivery vehicles is to be maintained to:
  - businesses at Boggo Road Urban Village off Annerley Road, Dutton Park;
  - businesses and community facilities at Stanley Street and Vulture Street at Woolloongabba;
  - hospitals, medical centres and research facilities at Ecosciences Precinct, PA Hospital and the Royal Brisbane and Women's Hospital (RBWH);
  - businesses at Roma Street, Charlotte Street, Mary Street and Albert Street in the Brisbane CBD;
  - schools along Gregory Terrace; and
  - businesses along O'Connell Terrace, Bowen Hills.
- Access for emergency services vehicles is to be maintained for the duration of construction works to:
  - Princess Alexandra Hospital, via Cornwall Street and Kent Street;
  - Mater Hospital, via Stanley Street; and
  - RBWH via O'Connell Terrace.
- Truck movements are to be managed to avoid impacts on local streets approved for use such as damage to road pavements, from heavy vehicle traffic.

<b>Element 2 Transport - Construction</b>	
	<p><b>Public and active transport</b></p> <ul style="list-style-type: none"> <li>• Traffic management measures are to be implemented near to Project works to minimise disruption and delays to rail and bus services.</li> <li>• Local communities, including but not limited to, residents, businesses, users of community facilities and public transport passengers, are to be notified about changes to pedestrian and cycle access near construction works, and public advertisements (local and regional newspapers, Project website) describing the proposed changes, the duration of the changes and possible alternative routes to avoid the impacts of the proposed changes.</li> <li>• Cycle facilities likely to be disrupted during construction works, such as the CityCycle stations adjacent the Brisbane Transit Centre and on the corner of Albert Street and Mary Street, are temporarily or permanently relocated in coordination with BCC.</li> <li>• Safe and functional access for pedestrians and cyclists is to be maintained near Project works, including for the elderly, children and people with mobility difficulties including vision and hearing impairments. This measure is to consider relevant CPTED principles.</li> <li>• Safe, alternative access is to be provided for bikeways disturbed by construction works, including but not limited to the bikeway near the Northern portal worksite in Victoria Park and the bikeway along Kent Street, and the PA Hospital bikeway.</li> <li>• Where pedestrian and cycle access to community facilities is changed, local access strategies are to be developed in consultation with local communities, community facility managers and relevant stakeholder groups, including Vision Australia to provide safe and efficient pedestrian access. Safe, alternative access is to be provided for bikeways disturbed by construction works.</li> </ul>
Monitoring	<ul style="list-style-type: none"> <li>• Monitoring of construction traffic to ensure compliance with relevant requirements of BCC, TMR, Queensland Police and the Rail Infrastructure Manager.</li> <li>• Weekly reviews with BMTMC to identify any congestion issues and non-compliances with the CTMP along haul routes and at major intersections.</li> <li>• Weekly inspections of haul routes within 1km of a worksite to identify any damaged road pavements. If any damage is identified, this is to be repaired by the contractor as soon as practicable to ensure traffic safety, traffic amenity and pre-existing levels of service are maintained. Where impacts occur and repairs are required, the relevant traffic and road management agencies are to be consulted to devise and agree appropriate mitigation measures.</li> <li>• Weekly inspections of local streets surrounding worksites to identify any unauthorised worker parking and non-compliances with the Construction Workforce Car Parking Plan.</li> <li>• Weekly inspections of pedestrian and cycle accesses surrounding worksites to identify any disturbances caused by construction activities. Any damaged or unsafe pedestrian or cycle accesses must be rectified immediately.</li> </ul>
Reporting	<ul style="list-style-type: none"> <li>• Results of traffic monitoring and any repairs to pavements are to be reported in the monthly construction compliance report, along with details of any incidents or complaints related to construction traffic, including any accidents involving construction traffic.</li> <li>• Any amendments to the CTMP, Construction Workforce Car Parking Plan or Construction Vehicle Management Plan are to be forwarded to the TMR, and BCC seeking input to the changes, prior to the changes being implemented.</li> </ul>

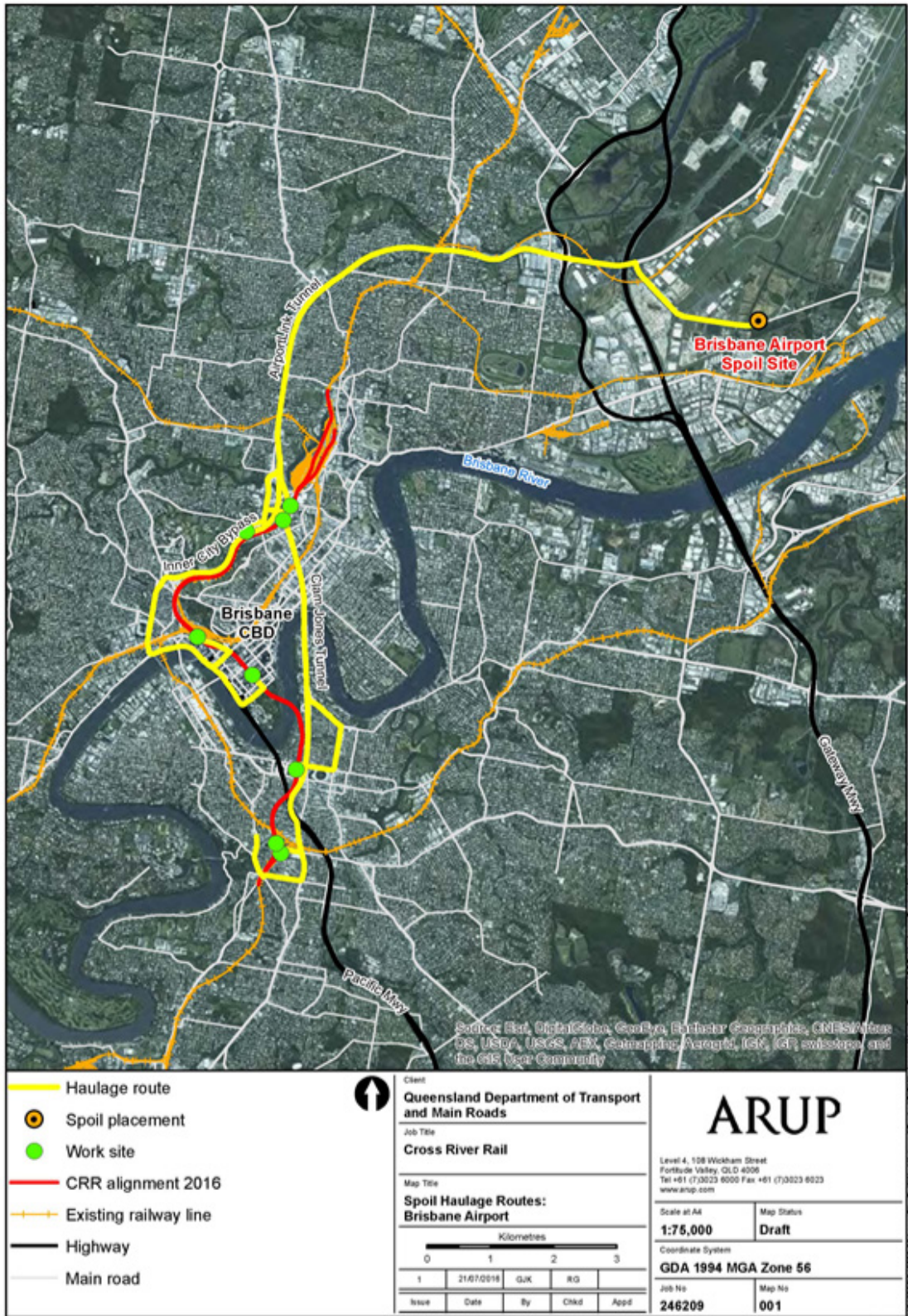


Figure 1.3 Proposed spoil haulage routes - Brisbane Airport



Figure 1.4 Proposed spoil haulage routes - Swanbank



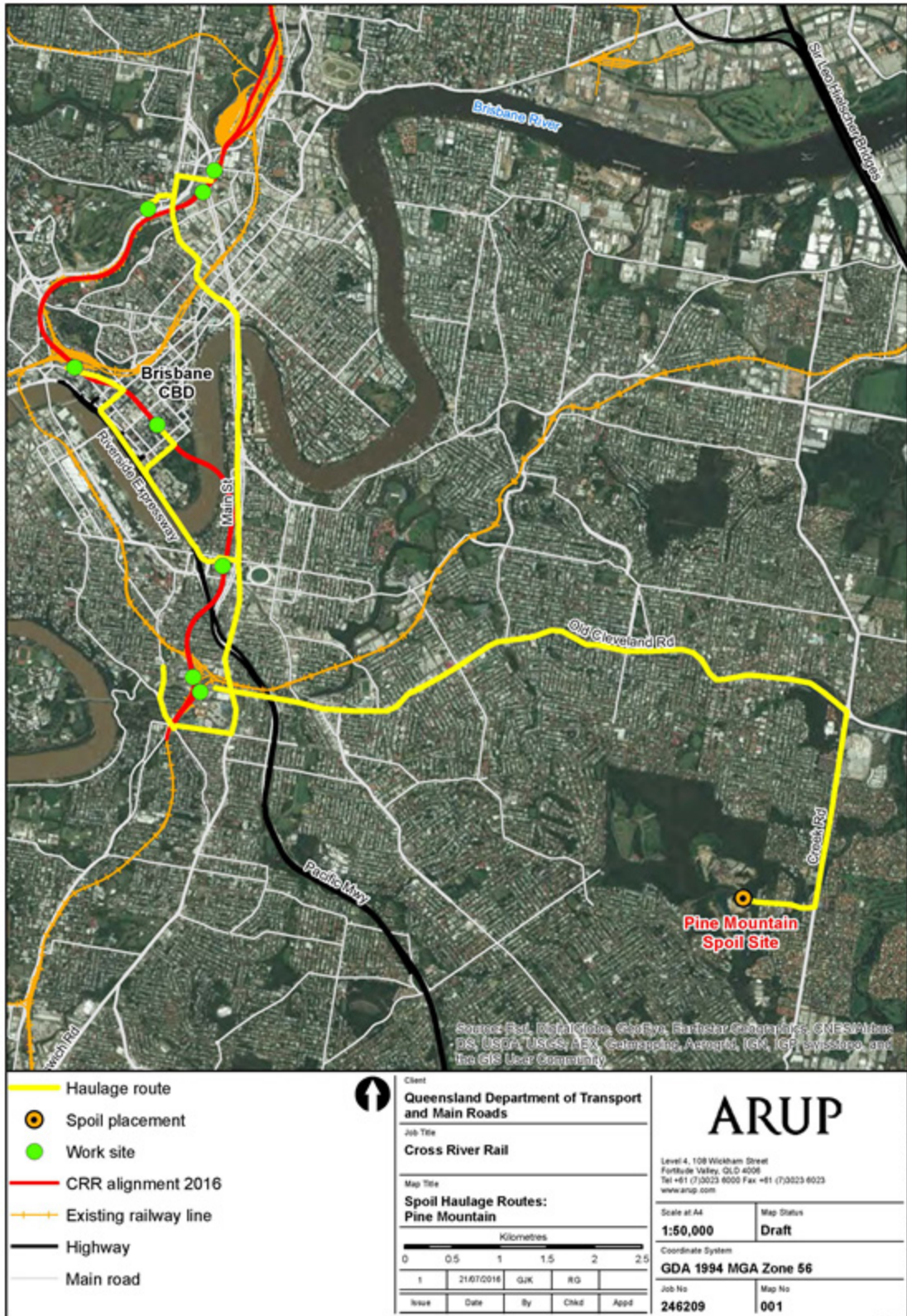


Figure 1.5 - Proposed spoil haulage routes - Pine Mountain



Figure 1.6 Proposed spoil haulage routes - Larapinta

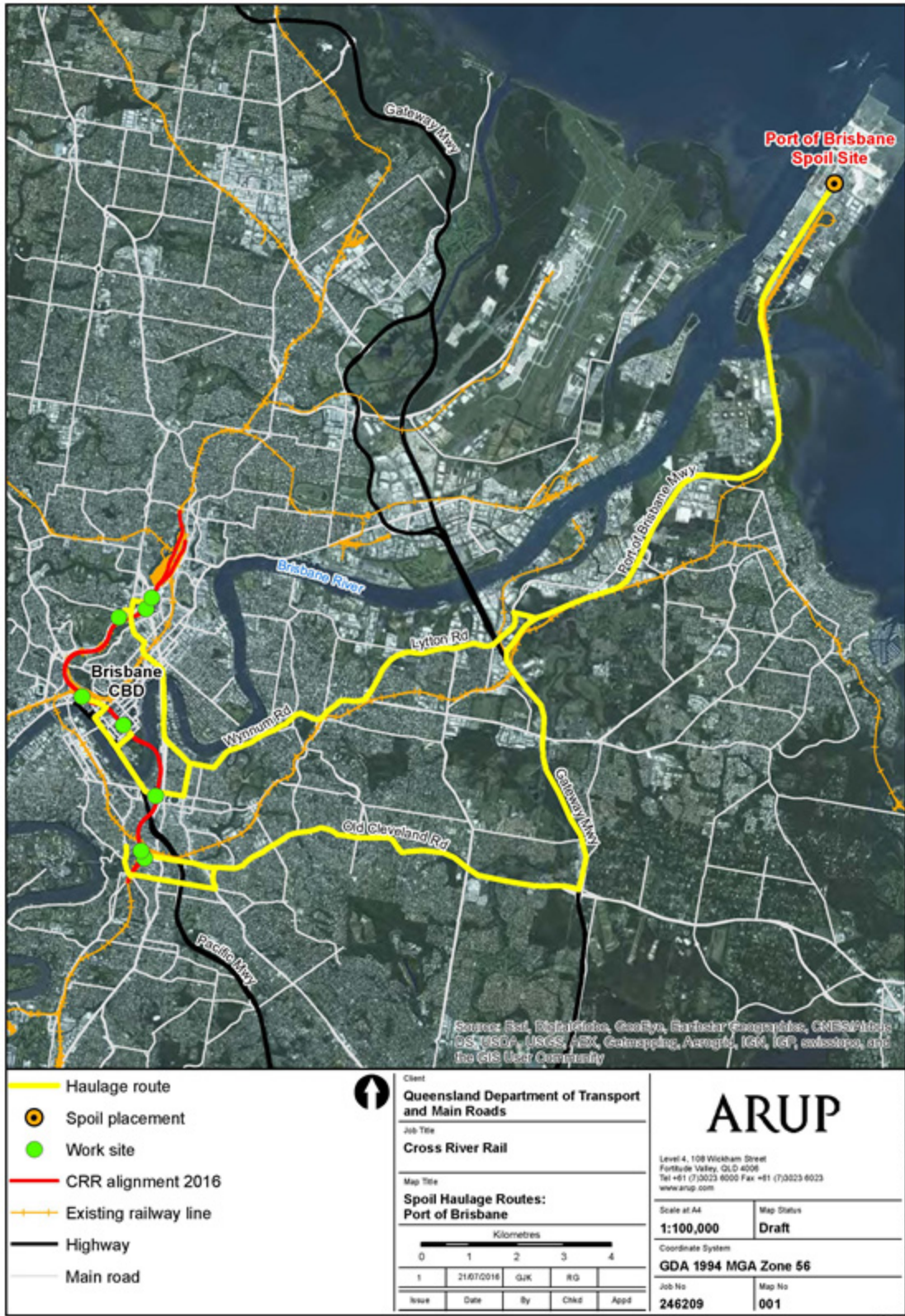


Figure 1.7 Proposed spoil haulage routes - Port of Brisbane

Table 1.8 Element 8 - Geology and soils

<b>Element 3      Geology and soils – Construction</b>	
<b>Environmental outcomes</b>	<ul style="list-style-type: none"> <li>• Construction activities minimise soil erosion and sedimentation and avoid adverse impacts on the environmental values of receiving waters.</li> <li>• Construction activities minimise the impacts of settlement from tunnelling or other construction works.</li> <li>• Construction activities avoid or minimise environmental and public health risks associated with disturbance of potential acid sulphate soils encountered during construction works.</li> <li>• Avoid or manage impacts from soil erosion and sedimentation from Project works on the environmental values of the Brisbane River and other waterways within the study corridor.</li> </ul>
<b>Performance criteria</b>	<ul style="list-style-type: none"> <li>• The Project does not result in soil erosion beyond the boundaries of worksites; soil erosion within the worksite is rectified as soon as practicable after a rainfall event to prevent the release of sediment offsite.</li> <li>• Soil erosion and sediment controls are implemented and maintained for each worksite in accordance with the guidelines for Best Practice Erosion and Sediment Control (International Erosion Control Association, 2008) and TMR's Technical Standard MRTS52 Erosion and Sediment Control.</li> <li>• Runoff from worksites complies with the environmental objectives established in the <i>Environmental Protection (Water) Policy 2009 (EPP (Water))</i>.</li> <li>• Settlement consequential to Project works does not impact on the structural integrity of buildings or infrastructure and generally does not exceed 1:500 differential settlement.</li> <li>• ASS is avoided, or if intercepted, is managed to avoid adverse impact to environmental values, infrastructure, construction equipment, construction personnel or the public.</li> </ul>
<b>Mitigation measures</b>	<p><b>Geology</b></p> <ul style="list-style-type: none"> <li>• Undertake further geotechnical investigations to inform construction planning for the Project.</li> </ul> <p><b>Soil erosion</b></p> <ul style="list-style-type: none"> <li>• Develop a detailed Erosion and Sediment Control Plan (ESCP) for the Project in accordance with the guidelines for Best Practice Erosion and Sediment Control (International Erosion Control Association, 2008) and TMR's Technical Standard MRTS52 Erosion and Sediment Control.</li> <li>• The ESCP would form a sub-plan under the overarching Construction Environmental Management Plan and would address: <ul style="list-style-type: none"> <li>– water and wind erosion;</li> <li>– turbidity in freshwater, estuarine and marine environments;</li> <li>– land settlement;</li> <li>– soil mixing, inversion and compaction; and</li> <li>– worksite reinstatement.</li> </ul> </li> <li>• To inform detailed design and construction planning, undertake soil sampling as part of further geotechnical investigations, to identify and characterise vulnerable soils in areas of proposed surface works. Characteristics of interest include confirmation of soil landscapes, soil depth, presence of fill and soil chemical properties. In particular, sampling is to be undertaken at, but not limited to, the following locations: <ul style="list-style-type: none"> <li>– Southern portal construction worksites;</li> <li>– Boggo Road Station construction worksite;</li> <li>– Woolloongabba Station construction worksite;</li> <li>– Albert Street Station construction worksite;</li> <li>– Roma Street Station construction worksite;</li> <li>– Northern portal and associated construction worksite; and</li> <li>– Between Exhibition Station and Mayne Yard.</li> </ul> </li> <li>• Erosion and sediment control measures must address: <ul style="list-style-type: none"> <li>– water and wind erosion;</li> <li>– turbidity in freshwater, estuarine and marine environments;</li> <li>– land settlement;</li> <li>– soil mixing, inversion and compaction; and</li> <li>– worksite reinstatement.</li> </ul> </li> </ul>

### Element 3 Geology and soils – Construction

- Prior to the commencement of any construction work:
  - determine the design rainfall event for measuring, managing and monitoring soil erosion and sedimentation consistent with relevant guidelines;
  - undertake an erosion risk assessment to quantify the erosion potential for each soil type likely to be disturbed during construction and identify flow paths, suitable spoil stockpile locations, soil cover type, soil stability and high risk soils; and
  - develop and implement an ESCP for each construction worksite and location of surface works.
- The erosion and sediment control measures should address the following as a minimum:
  - avoid disturbing vulnerable surface and subsurface soils;
  - early installation of drainage, erosion and sediment control measures;
  - minimise worksite clearing and the extent and duration of soil exposure;
  - identification of proposed spoil storage locations at worksites;
  - divert clean waters around disturbed surfaces and spoil storage locations;
  - on-site capture of surface drainage waters and sediment;
  - use of sediment control devices such as sediment fences, check dams or other techniques to slow water flow and enable sediment to settle from the water prior to migrating offsite;
  - monitoring the effectiveness of installed control measures;
  - progressive stabilisation and revegetation of disturbed areas, using stored topsoil where practicable; and
  - early installation of measures to avoid loose spoil material or other soil spilling onto roadways (e.g. rumble grids, wheel-wash, covered loads) at all road access points from each construction worksite.
- Erosion and sediment control measures would be maintained in good working order, with any damaged or ineffective measures repaired or replaced following rainfall events or otherwise as required.
- Measures for the management of spoil should address:
  - installation of spoil enclosure sheds at worksites where activities associated with spoil management, handling and removal from site are to occur;
  - managing the stripping and stockpiling of surface spoil material from surface works areas with regard to potential contamination; and
  - locating spoil placement sites away from creek banks and providing adequate sediment and erosion control measures to prevent sediment runoff into waterways or stormwater drains.

#### Settlement

- Undertake further detailed geotechnical and groundwater investigations along the tunnel alignment and at underground stations to inform detailed design and construction planning about potential settlement risk.
- Identify the potential for settlement impacts, including:
  - excavation induced settlement;
  - groundwater drawdown induced settlement; and
  - local ground relaxation settlement.
- Undertake predictive modelling using a suitable methodology to identify the settlement trough footprint, within which predicted settlement would lead to property damage, including structural, cosmetic and performance damage to buildings, utilities and other structures.
- Where the predictive modelling indicates property damage is likely as a consequence of the Project works, consult with potentially affected property owners to undertake a dilapidation survey of buildings, structures and significant landscaping works and heritage landscape features. Dilapidation survey of each premises would be undertaken to identify and document pre and post construction conditions. Dilapidation surveys of heritage buildings are to be undertaken by a person suitably qualified in condition assessments of heritage buildings.
- Prior to the commencement of construction, establish baseline conditions, including levels, at premises indicated by predictive modelling to be susceptible to settlement as a consequence of such construction.
- Where predictive modelling indicates settlement may be likely, appropriate design and construction measures are to be implemented to manage and mitigate the identified impacts, including a building condition survey conducted prior to commencement of the works.
- In the event of settlement, monitor building conditions and where necessary the Proponent must repair building damage caused by Project works.

Element 3	Geology and soils – Construction
	<ul style="list-style-type: none"> <li>• Tunnelling methodology will incorporate pipe roofing through sections of the Project alignment where increased stability of the overlying ground is required ahead of the TBM excavation.</li> <li>• Where predictive modelling indicates settlement may be likely, detailed design and construction planning is to incorporate measures to limit settlement generally to 25mm or to 50mm in a worst case event, measured at any location within 50m of the route centreline or the outer walls of an underground station or excavated structure (excluding designated worksites and surface properties owned by the proponent).</li> </ul> <p><b>Acid sulphate soils</b></p> <ul style="list-style-type: none"> <li>• To inform detailed design and construction planning, undertake ASS investigations in accordance with the current QASSIT<sup>2</sup> guidelines in areas below 5 metres AHD, where proposed excavation or soil disturbance is to occur.</li> <li>• Where ASS investigations identify the likelihood of ASS being disturbed, prepare and implement an ASS Management Plan in accordance with the Queensland Acid Sulfate Soils Technical Manual: Soil Management Guidelines and in consultation with DNRM.</li> <li>• The ASS Management Plan will include corrective actions for incident management and remediation and requirements for validation and verification testing of soils and potentially affected waters prior to release from the construction worksite. These management strategies may include: <ul style="list-style-type: none"> <li>– Neutralising the soils with alkaline material, such as lime;</li> <li>– Hydraulic separation via sluicing and/ or hydrocloning;</li> <li>– Strategic reburial below groundwater table; and</li> <li>– Stormwater/ groundwater collection, control and treatment measures.</li> </ul> </li> </ul> <p><b>Fossil and archaeological material</b></p> <ul style="list-style-type: none"> <li>• If significant fossil and archaeological material or finds are encountered during excavation, a suitably qualified specialist will be consulted to determine management or preservation measures as required. For archaeological material, the find will also need to be reported to the Department of Environment and Heritage Protection.</li> </ul>
Monitoring	<p><b>Soil erosion</b></p> <ul style="list-style-type: none"> <li>• As part of routine daily site inspections, conduct visual assessment of erosion and sediment control measures to verify their condition and effectiveness and identify the need for maintenance. Any maintenance works required to rectify defects are to be undertaken as soon as practicable after detection.</li> <li>• Review ESCPs at least monthly or when there is a change in work activities at a particular site, and update as necessary to ensure the continued effectiveness of management measures.</li> <li>• Immediately following a defined rainfall event, inspect and conduct necessary maintenance on all erosion and sediment control measures, including bunding and water treatment facilities, and inspect drainage discharge points from each worksite for evidence of sediment transport, if any.</li> <li>• Regular auditing of the ESCPs are to be undertaken by suitably qualified and experienced personnel.</li> <li>• During the post-construction maintenance phase, conduct monthly visual inspections of surface soil stabilisation measures and undertaken rectification measures as required, to ensure successful establishment.</li> </ul> <p><b>Settlement</b></p> <ul style="list-style-type: none"> <li>• Monitor the effects of settlement if any, from tunnelling and excavations for underground stations and associated infrastructure, including surveys and displacement monitoring. If any subsequent ground settlement is alleged to be caused by the Project, an independent consultant may be engaged to prepare a new building condition survey report, investigate the cause of any damage and make recommendations for repairing building damage established.</li> <li>• New condition surveys of heritage buildings are to be undertaken by a person suitably qualified in condition assessments of heritage buildings.</li> </ul>

<sup>2</sup> Queensland Acid Sulphate Soils Investigation Team, Department Natural Resources and Mines.

Element 3 Geology and soils – Construction	
	<ul style="list-style-type: none"> <li>Monitoring of settlement must be conducted from the commencement of underground construction works and dewatering.</li> </ul> <p><b>Acid sulphate soils</b></p> <ul style="list-style-type: none"> <li>As part of routine daily site inspections, monitor for the presence of flocculation of iron in surface water drains, mortality of aquatic flora and/or fauna in adjacent waterways, visible corrosion of concrete structures.</li> <li>For construction works involving disturbance of ASS, conduct weekly monitoring of receiving waters predicted to be influenced by drainage from a worksite or construction works involving ASS.</li> <li>For construction works involving disturbance of ASS, conduct monthly groundwater and surface water monitoring in areas hydraulically connected to sites of ASS disturbance.</li> <li>All leachate and runoff from areas excavated below 5m AHD, ASS treatment pads and stockpile areas will be captured, contained, analysed and treated (if necessary) prior to offsite discharge in compliance with relevant works approvals and surface water discharge criteria adopted for the Project.</li> </ul>
Reporting	<ul style="list-style-type: none"> <li>Results of soil erosion and sedimentation, and ASS monitoring are to be reported in the monthly construction compliance report, along with details of any complaints or incidents relating to these issues.</li> <li>Results of settlement monitoring are to be reported quarterly within the monthly construction compliance report for the duration of construction and during the post-construction maintenance phase.</li> </ul>

Table 1.9 Element 4 - Land contamination

Element 4 Land contamination – Construction	
Environmental outcomes	<ul style="list-style-type: none"> <li>Construction activities avoid, or minimise the environmental and public health risks from contaminated soil, groundwater or soil gas intercepted during construction works.</li> </ul>
Performance criteria	<ul style="list-style-type: none"> <li>Works are conducted in accordance with the National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1) (the NEPM) (National Environment Protection Council 2013) and the Queensland Guideline for Contaminated Land Professionals (DEHP, 2012).</li> <li>Works are conducted in accordance with the requirements of the</li> <li><i>Environmental Protection Act 1994 (EP Act)</i> and subordinate legislation.</li> <li>Site investigations for contaminated sites inform detailed design and are completed prior to the commencement of works.</li> <li>Site Management Plans, including any required Remediation Plans, are prepared in conjunction with detailed design. Construction works are conducted in accordance with the Site Management Plans.</li> <li>Construction activities involving disturbance of contaminated land do not cause contamination of previously uncontaminated sites or adjoining land.</li> <li>Handling of asbestos occurs in accordance with the EP Act and the Work Health and Safety Regulation 2011, and relevant Queensland codes of practice<sup>3</sup>.</li> <li>The storage, handling and transport of hazardous materials does not cause contamination of land or waters, or if contamination does occur, remediation of the contaminated land or waters occurs in accordance with the relevant legislation, standards and procedures.</li> </ul>

<sup>3</sup> Workplace Health and Safety Queensland, 2011, How to Manage and Control Asbestos in the Workplace and How to Safely Remove Asbestos, Dept. of Justice and Attorney General, Brisbane.

## Element 4 Land contamination – Construction

### Mitigation measures

#### Investigation of potential contamination

- Prior to any detailed design occurring on the Project, undertake a Stage 1 and Stage 2 (as required) Detailed Site Investigations to ascertain the risk posed from disturbance by the Project of potentially contaminated sites. Further detailed investigation would include:
  - consultation with the land owners, BCC and/ or DEHP. Should consultation not provide adequate information to define the potential risk, further site investigation would be required in accordance with the NEPM and the 'Queensland Guideline for Contaminated Land Professionals' (DEHP, 2012). These investigations are to be undertaken by a person suitably qualified in accordance with the EP Act.
- Integrate site-specific recommendations presented in the Stage 1 and Stage 2 Detailed Site Investigations with detailed design and construction requirements in Project documents including the Construction EMP and Commissioning EMP.
- Contaminated or unsuitable spoil material which cannot be used for spoil placement will be remediated or disposed of to landfill. Develop approaches to remediate contaminated or unsuitable material on site and minimise disposal to landfill.
- Prior to the commencement of construction, develop and implement a contaminated land management procedure for potentially contaminated sites, to include, but not be limited to:
  - identification of the likely forms of contamination that could occur (e.g. fuels, oils, paints, etc.);
  - procedures for the appropriate storage of hazardous materials in compliance with relevant standards;
  - measures to prevent land contamination during construction;
  - procedures for identifying, investigating and managing unforeseen contamination;
  - management measures for generation of contaminated dust generated during earthworks, including monitoring at adjacent properties and nearby sensitive receivers;
  - spill response and remediation procedures;
  - identification of properties on the Environmental Management Register or Contaminated Land Register in accordance with the EP Act;
  - measures for the management, remediation and disposal of contaminated soil and/or spoil generated from properties listed on the Environmental Management Register or Contaminated Land Register;
  - where properties have an approved Site Management Plan, these should be updated accordingly;
  - post-construction management and/or monitoring requirements; an
  - disposal permits obtained from DEHP for the removal of contaminated soil in accordance with the EP Act, as required.
- Notify DEHP of any land parcels containing a hazardous contaminant, or for which a notifiable activity has previously been or is being undertaken that are not listed on the Environmental Management Register or Contaminated Land Register or that have a history of notifiable activities that have not been previously notified to DEHP.
- Develop and implement, prior to the commencement of construction, a Construction Occupational Health and Safety (OH&S) Plan, which outlines procedures for managing exposure of construction workers to potential contaminants in soil and water.

#### Disturbance, excavation, removal and/ or disposal of contaminated soil

- Implement appropriate erosion and sediment controls and staging of site activities to minimise the extent of disturbed areas, and hence to minimise the potential run-off of contaminated soils.
- Implement measures to minimise the exposure of humans and the environment to potentially contaminated soils during excavation activities. Action is required to remediate or manage the land to prevent adverse environmental and human health impacts.
- Implement controls for material haulage, such as covering loads or wetting material to reduce airborne dust emissions.
- Maintain documentation of all contaminated material during transport operations (including the descriptions of processes, personnel and organisations involved in the removal, transportation and placement of contaminated material).
- Keep documented records of contaminated material movement and disposal.
- Implement appropriate workplace health and safety procedures, including use of personal protective equipment (PPE) and hygiene controls, and documentation of inspections and workplace health and safety compliance throughout construction.



## Element 4 Land contamination – Construction

- Off-site disposal of contaminated material would be to a licensed landfill facility under a DEHP issued Disposal Permit.

### Disturbance and migration of contaminated groundwater

- Where appropriate groundwater information is not available to inform Stage 1 and Stage 2 (as required) Detailed Site Investigations of potentially contaminated sites, determine the need for targeted groundwater monitoring based on the anticipated source and nature of contamination for each site.
- Where considered necessary, undertake targeted groundwater monitoring on selected sites to establish whether contamination is likely to be present in groundwater systems potentially impacted by the Project.
- Implement the ground water monitoring programme specified in Element 7, including triggers to identify mobilisation of contaminated groundwater both in- situ and at drawdown collection points.

### Ground gas accumulation

- Identify, through Stage 1 and Stage 2 (as required) Detailed Site Investigations of potentially contaminated sites, areas where ground gas poses a potential risk to the Project.
- Where further investigations identify potential risks from ground gas, gas monitoring systems and alarms would be fitted in underground infrastructure
- during construction to assess ambient gas concentrations, including oxygen, methane, carbon dioxide and carbon monoxide.
- Where ground gas accumulation in underground work areas and/ or infrastructure is expected to occur, consider appropriate engineering controls to minimise the inflow of ground gas.

### Provisions for asbestos

- Prepare and implement, prior to the commencement of demolition works and construction, an Asbestos Management Plan. The Asbestos Management Plan is to be prepared in accordance with, but not limited to, the following legislation and guidelines:
  - *Environmental Protection Act 1994*;
  - *Work Health and Safety Act 2011 (WHS Act)*;
  - *Work Health and Safety Regulation 2011*;
  - *Code of Practice for the Management and Control of Asbestos in Workplaces [NOHSC: 2018 (2005)]*; and
  - *Code of Practice for the Safe Removal of Asbestos [NOHSC: 2002(2005)]*.
- Prior to partial or full demolition of any buildings or structures, an asbestos audit is to be carried out by a licensed asbestos contractor. Management of asbestos containing demolition materials is to be undertaken in accordance with the Asbestos Management Plan.
- Where asbestos is suspected in previously filled areas, analytical testing will be undertaken to confirm the presence or absence of asbestos prior to intrusive works.
- If asbestos is present, management measures for asbestos containing materials would be implemented in accordance with the Project's Asbestos Management Plan.

### Provisions for hazardous substances and construction management

- Develop and maintain an appropriate hazardous materials register for each worksite as required by the Construction OH&S Plan and other regulations or guidelines, to include, but not limited to:
  - storage location;
  - storage requirements;
  - information on the proper use;
  - handling information; and
  - disposal procedures.
- Develop and maintain Safety Data Sheets (SDS) for all materials and chemicals included in the hazardous materials register and store hazardous materials in accordance with relevant SDS and relevant Australian Standards.
- Design chemical and fuel storage areas to comply with Australian Standards, including AS1940: Storage and Handling of Flammable and Combustible Liquids 2004 and AS3780: The Storage and Handling of Corrosive Substances 2008.

Element 4	Land contamination – Construction
	<ul style="list-style-type: none"> <li>• Develop incident management plans prior to the commencement of construction and implement as required, which outline procedures for containing and cleaning-up accidental spillage of fuels and other hazardous materials.</li> <li>• Spill response equipment commensurate of the type and quantity of hazardous substances being stored is provided at appropriate locations on site, in close proximity to storage and handling areas. Clean-up and remediation of spills and leaks as quickly as possible and in accordance with the incident management plans.</li> <li>• Undertake refuelling and maintenance activities in appropriately located designated bunded areas to avoid the potential for soil and water contamination.</li> <li>• Conduct induction and training for construction staff in relation to: <ul style="list-style-type: none"> <li>– the management and remediation of contaminated land;</li> <li>– procedures for the handling, storage and disposal of hazardous materials;</li> <li>– incident response practices and procedures;</li> <li>– environmental awareness to encourage good material handling practices, spill management and incident reporting.</li> </ul> </li> <li>• Site all hazardous liquid stores above ground on an impervious base within a bunded and secured area. The base and bund walls would be impermeable to the material(s) stored.</li> <li>• Store smaller quantities of chemicals, fuels and oils in either self-bunded pallets, within a bunded area, or in a bunded container, while storing bulk quantities of diesel in self-bunded tanks or within an appropriately bunded area.</li> <li>• Contain waste products such as oil/ water separator waste, sludges and residues within weatherproofed, sealed and bunded areas to prevent any leakages or spills potentially causing environmental harm to soils, surface water or groundwater.</li> <li>• Locate spill kits in the vicinity of hazardous material storage areas and training site staff in their use.</li> <li>• Secure fences and locking or manning access points to adequately protect worksites and storage areas from theft and/ or vandalism.</li> <li>• Clearly mark the contents of tanks and display notices requiring that the valves and trigger guns be locked when not in use. <ul style="list-style-type: none"> <li>– Undertake regular inspections of tanks, bunds and storage areas to ensure the integrity of all facilities.</li> </ul> </li> </ul>
Monitoring	<ul style="list-style-type: none"> <li>• Daily site inspections are to be undertaken and documented by the Proponent throughout the construction phase and are to include identification of any actual or potential contamination issues or risks. Any spills or other uncontrolled release of contaminants to the environment are to be addressed in accordance with the construction incidents and non-conformance reporting procedure described in this EMP.</li> <li>• Immediately following a defined rainfall event, inspect and conduct necessary maintenance on all bunded chemical and hazardous storage areas.</li> <li>• Ensure that sign-off from a licensed asbestos contractor has been obtained and documented prior to any partial or full demolition of buildings and structures.</li> </ul>
Reporting	<ul style="list-style-type: none"> <li>• Results of monitoring for contamination or asbestos issues are to be reported in the monthly Construction Compliance Report, along with details of any incidents or complaints relating to contamination or asbestos issues.</li> <li>• Records of all disposal permits and contaminated soils removed during construction of the Project are to be maintained and included in the annual project environmental report.</li> <li>• Contaminated site investigation and validation reports are to be prepared in accordance with relevant legislation, standards and guidelines and included in the annual project environmental report.</li> <li>• In the event of a contamination incident, the incident is to be reported in accordance with the EP Act and the reporting procedure described in this EMP.</li> </ul>

Table 1.10 Element 5 - Visual amenity and lighting

Element 5 Visual amenity and lighting – Construction	
Environmental outcomes	<ul style="list-style-type: none"> <li>Construction activities minimise and mitigate impacts on the visual and landscape environment.</li> <li>Construction activities avoid light nuisance for sensitive receivers and maintain safe driving conditions for motorists near to construction works.</li> </ul>
Performance criteria	<ul style="list-style-type: none"> <li>Develop a worksite rehabilitation plan for each worksite during the design phase of the Project.</li> <li>Revegetation to be designed and constructed with consideration of TMR specification MRTS16 Landscape and Revegetation.</li> <li>Impacts of construction works, including worksites and spoil handling facilities, on existing visual amenity are minimised through the considered design and siting of screens and barriers, plant and equipment, buildings and other structures, and lighting and telecommunications infrastructure.</li> <li>Construction worksites are rehabilitated progressively, and as soon as practicable, following construction works.</li> <li>Construction lighting is designed, constructed and operated to comply with the relevant standard such as AS4282-1997: Control of the obtrusive effects of outdoor lighting.</li> <li>Avoid nuisance from construction lighting on sensitive receivers and onto nearby roads, pedestrians and cycle paths, and parklands.</li> <li>Surface construction works do not extend beyond designated worksite boundaries.</li> </ul>
Mitigation measures	<ul style="list-style-type: none"> <li>Design and operate construction worksites to minimise the loss of public open space.</li> <li>A visual mitigation plan should be prepared prior to construction to mitigate potential visual impacts of noise barriers and hoardings, where appropriate.</li> <li>Ensure that the design and siting of construction worksites considers topography, vegetation, scale, character of construction and construction materials, proximity to surrounding sensitive land uses and the duration of its use.</li> <li>Where possible, adopt pruning and selective trimming of mature trees in preference to their removal.</li> <li>A suitably qualified arborist should be consulted regarding the management of mature vegetation to be retained.</li> <li>Where possible, fence and protect trees of particular significance that fall within construction worksites and laydown areas.</li> <li>Provide noise barriers and hoardings around construction worksites to mitigate the views of construction works. Where appropriate, these are to incorporate landscaping and urban design measures to minimise the visual impact of the barriers, and are to be regularly maintained.</li> <li>Where possible, external night time construction activities and traffic movement within the worksites will be minimised.</li> <li>Where possible, design noise barriers by: <ul style="list-style-type: none"> <li>incorporating high quality materials, urban design treatments and landscape elements such as low, massed plantings;</li> <li>using, where appropriate, clear or transparent materials to maintain existing expansive views beyond the rail corridor; and</li> <li>avoiding the use of highly reflective materials and materials that support graffiti.</li> </ul> </li> <li>Project lighting to be designed in accordance with the relevant standard such as AS 4282-1997: Control of the obtrusive effects of outdoor lighting and the Rail Infrastructure Manager's requirements e.g. Queensland Rail's Lighting Standard for Railway Stations guidelines.</li> <li>Construction phase works to minimise night-time impacts of lighting on residential properties where practicable. Place hoarding and visually impermeable barriers around worksites to minimise views of stockpiles and construction activities, particularly where worksites are visible to residential or recreational users.</li> <li>Where appropriate, use directionally-controlled, shielded lights that are mounted at a sufficient height to allow the light to be appropriately targeted to minimise light spill to surrounding properties, maintain safe driving conditions for motorists on adjacent roads and minimise impacts on local fauna.</li> </ul>

<b>Element 5 Visual amenity and lighting – Construction</b>	
	<ul style="list-style-type: none"> <li>• Restore, rehabilitate, and where appropriate enhance open space and public areas disturbed or damaged by construction as soon as practicable following construction.</li> <li>• Rehabilitation works provide for the: <ul style="list-style-type: none"> <li>– replacement of cleared mature trees with plantings of advanced individuals;</li> <li>– regrading of the surface to facilitate surface runoff without erosion, and to create a landform suitable for use consistent with City Plan designations;</li> <li>– reinstatement of paths, including the bicycle path in Victoria Park, street or park furniture, signage equipment and lighting;</li> <li>– reinstatement of grassed areas and paved surfaces where practicable; and</li> <li>– introduction of interpretive signage relating to cultural heritage, historic heritage and way finding measures.</li> </ul> </li> <li>• Minimise the loss of public open space through detailed design, and address the loss of significant trees and recreational values, through the replanting of worksites and other public spaces in proximity to worksites and Project infrastructure.</li> </ul>
Monitoring	<ul style="list-style-type: none"> <li>• During worksite establishment and subsequent operation, maintain daily site inspections of protective measures for designated significant trees and vegetation, and of temporary visual barriers and hoardings for damage or graffiti.</li> <li>• Weekly inspections of lighting during night works are to be conducted to ensure that construction lighting has been installed and operated in accordance with the relevant standard such as AS4282-1997.</li> </ul>
Reporting	<ul style="list-style-type: none"> <li>• Reporting of visual amenity and lighting monitoring, and any complaints relating to visual amenity or lighting are to be included in the monthly construction compliance report, along with details of any incidents or complaints relating to visual amenity or lighting.</li> </ul>

Table 1.11 Element 6 - Nature conservation

<b>Element 6 Nature conservation – Construction</b>	
Environmental outcomes	<ul style="list-style-type: none"> <li>• Ecological, habitat and natural asset values of open space areas near the Project, are maintained.</li> <li>• No net loss of habitat occurs as a result of the design or construction of the Project.</li> <li>• Construction activities do not cause the introduction or spread of pest species.</li> </ul>
Performance criteria	<ul style="list-style-type: none"> <li>• Habitat for significant vegetation removed during construction is restored and rehabilitated to the extent reasonable and practicable, consistent with a rehabilitation plan agreed with the BCC.</li> <li>• Necessary clearing permits or approvals for vegetation clearing are obtained, and clearing is undertaken in accordance with these permits or approvals.</li> <li>• Pest species declared under the <i>Biosecurity Act 2014</i> are not spread or introduced during construction.</li> <li>• Rehabilitation and landscape plans incorporate species appropriate for the surrounding landscape and infrastructure, and, where practicable, uses endemic plants.</li> </ul>
Mitigation measures	<p><b>Construction</b></p> <ul style="list-style-type: none"> <li>• Acknowledge and communicate to construction staff that all native fauna is protected and is not to be intentionally harmed or handled as a result of works or worker actions.</li> <li>• Minimise disturbance to significant vegetation and habitat during construction, by clearly marking and mapping vegetation to be retained and marking boundaries of work areas. In particular, disturbance to and the loss of mature trees, including figs, is to be minimised.</li> <li>• Minimise clearance or trimming of native vegetation to that necessary for construction to avoid unnecessary impacts, to reduce rehabilitation costs and minimise exposed surfaces that could lead to erosion and sediment issues.</li> <li>• Where reasonable and practicable, locate construction site infrastructure, such as site offices, vehicle access and parking, material storage and cleaning areas for plant and equipment away from large trees and their drip zones.</li> <li>• Undertake a pre-construction fauna survey within and around worksites to identify any species for which a species management plan needs to be developed.</li> </ul>

Element 6 Nature conservation – Construction	
	<ul style="list-style-type: none"> <li>• Implement site management procedures to avoid or minimise potential for harming native fauna and respond to incidents when fauna enter construction worksites. Such procedures may include:                             <ul style="list-style-type: none"> <li>– fencing of construction worksite boundaries to separate fauna from construction works; and</li> <li>– harvesting hollow bearing trees cleared for Project works and retro-fitting to form nest boxes.</li> </ul> </li> <li>• Ensure a qualified fauna spotter/ catcher is present prior to and during the removal of any habitat trees to capture and relocate any fauna that is disturbed. The fauna spotter/ catcher must be registered with DEHP and hold applicable licenses and permits.</li> <li>• Lighting associated with night works should incorporate fittings to limit dispersion of light outside the target area and avoid the use of mercury lamps, to limit insect associated problems such as encouraging fauna to enter close to construction activities and traffic areas. Where safety considerations allow, lighting should not extend up into the canopy of any surrounding trees.</li> <li>• Ensure appropriate soil hygiene procedures are followed to prevent spread of pest plants and animals, and potential soil pathogens.</li> <li>• Prepare and implement a Pest and Weed Management Plan, which includes measures consistent with Rail Infrastructure Manager’s procedures. This is to be prepared prior to the commencement of any site works or construction.</li> <li>• Prepare and implement landscape and rehabilitation plans. This is to include investigation of opportunities for improvements to habitat as a result of the Project works.</li> <li>• Have regard to the protection of vegetation in accordance with the relevant standard such as AS/NZS 4970.</li> <li>• Consult with an arborist in relation to fig tree replacement at the RNA Showgrounds.</li> <li>• No-go areas will be clearly marked.</li> </ul> <p><b>Red Imported Fire Ants</b></p> <ul style="list-style-type: none"> <li>• All project sites receiving fire ant carriers must ensure that a Biosecurity Instrument Permit is provided by the supplier, or a Biosecurity Queensland certified inspection certificate is supplied for fire ant carriers. The origin of all vehicles and equipment must be checked to see if they have come from declared biosecurity zones, and that the vehicle or machinery is visually clean and has maintained good vehicle hygiene.</li> <li>• Prior to the commencement of any site works or construction, prepare and implement for each construction worksite or work area, a specific Approved Risk Management Plan for Red Imported Fire Ants.</li> <li>• If material is to be imported from a Fire Ant restricted area, comply with DAF (Bio- security Queensland) requirements for all construction worksites and spoil placement locations, in relation to the management requirements for the movement of restricted materials.</li> </ul> <p><b>Operation</b></p> <ul style="list-style-type: none"> <li>• Lighting associated with night works should incorporate fittings to limit dispersion of light outside the target area, with mercury lamps avoided, minimising insect associated problems. It should be noted however that public and passenger safety takes priority in lighting mitigation strategies.</li> </ul>
Monitoring	<ul style="list-style-type: none"> <li>• Undertake regular inspections of work areas to ensure that vegetation marked for retention is not damaged or removed or vegetation outside of worksites or work areas has not been removed or damaged.</li> <li>• Monitor significant trees identified as being at potential risk from the Project during construction and for two growing seasons after completion of construction works.</li> <li>• Regularly inspect construction worksites and other work areas, as appropriate, to assess compliance with mitigation measures identified to minimise impacts on flora and fauna.</li> <li>• Inspect and monitor construction worksites and the spoil placement sites for the presence of fire ants as identified in the Risk Management Plan for Red Imported Fire Ants.</li> <li>• Prior to the completion of construction works, monitor rehabilitation activities to ensure compliance with the Rehabilitation Plan.</li> </ul>
Reporting	<ul style="list-style-type: none"> <li>• Monthly during site preparation, construction and rehabilitation.</li> </ul>

Table 1.12 Element 7 - Groundwater and surface water

<b>Element 7 Groundwater and surface water – Construction</b>	
<b>Environmental outcomes</b>	<p><b>Groundwater</b></p> <ul style="list-style-type: none"> <li>• Groundwater inflow to construction worksites, including tunnels, cross- passages, underground stations is minimised.</li> <li>• Groundwater quality is maintained at pre-disturbance levels during and after construction.</li> <li>• Groundwater drawdown from dewatering at worksites is monitored.</li> </ul> <p><b>Surface water</b></p> <ul style="list-style-type: none"> <li>• Discharge of groundwater inflow from construction worksites does not adversely affect the environmental values of receiving waters.</li> <li>• Environmental values of surface waters immediately downstream of the construction worksites are not adversely affected by the Project, during and post construction.</li> <li>• Construction activities are managed to avoid the transportation of contaminants that might be released to waters.</li> </ul>
<b>Performance criteria</b>	<p><b>Groundwater</b></p> <ul style="list-style-type: none"> <li>• Contamination of groundwater by construction materials is avoided.</li> <li>• Groundwater quality measured within construction worksites is within 10% of background quality established prior to disturbance for the duration of construction<sup>4</sup>.</li> <li>• Groundwater released from construction worksites to receiving waters complies with the EPP (Water) and Queensland Water Quality Guidelines.</li> </ul> <p><b>Surface water</b></p> <ul style="list-style-type: none"> <li>• Water, including stormwater, wastewater and groundwater discharges released from the construction worksites to receiving surface waters other than waters, either comply with the EPP (Water) or the quality parameters identified the Queensland Water Quality Guidelines.</li> <li>• The measured downstream value must not exceed the upstream measured value by more than 10%.</li> <li>• Stormwater drainage is intercepted and diverted around exposed works within worksites.</li> <li>• Contaminants, chemicals, toxicants and litter from Project worksites are prevented from entering receiving surface waters, including stormwater drains, roadside gutters and waterways.</li> <li>• ASS is avoided, or if intercepted, ASS is managed to ensure no adverse impact on surface waters.</li> </ul>
<b>Mitigation measures</b>	<p><b>Groundwater</b></p> <ul style="list-style-type: none"> <li>• Prior to the commencement of construction: <ul style="list-style-type: none"> <li>– prepare and implement specific management plans for construction works that are predicted to disturb groundwater. These are to include, but not be limited to, measures to address the potential for, and prevent environmental impact from, groundwater drawdown;</li> <li>– develop and implement storage and handling procedures for fuels, chemicals and other hazardous materials, to avoid the release of contaminants to groundwater, including procedures to prevent or contain spills, and to ensure that accidental spills are cleaned-up and appropriately remediated to avoid contamination of groundwater seepage; and</li> <li>– develop and implement practices and procedures for waste handling, storage and disposal, and spillages to avoid contamination of groundwater.</li> </ul> </li> </ul> <p><b>Surface water</b></p> <ul style="list-style-type: none"> <li>• Prior to the commencement of construction, develop and implement storage and handling procedures for chemicals, litter and other hazardous materials to avoid the release of contaminants to waterways, stormwater drains or roadside gutters, including procedures for managing uncontrolled releases to waters. Management procedures would include, as a minimum:</li> </ul>

<sup>4</sup> Groundwater monitoring must be established in consideration of background water quality measurements with the following guidelines: EPP (Water); Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000 (ANZECC, 2000); Queensland Water Quality Guidelines 2009 (DEHP, 2009); Monitoring and Sampling Manual 2009 (Version 2) (DEHP, 2010).

**Element 7****Groundwater and surface water – Construction**

- washing, degreasing, servicing, cleaning and maintenance of vehicles, plant or other equipment away from areas where resulting contaminants may be released to any stormwater drain, land or waters;
  - provide adequate bunding to prevent sediment run-off into waterways or stormwater drains or inundation in a 1 in 5 year flood event;
  - all chemicals (including paints and solvents), oils, fuels (and other hydrocarbons), regulated wastes, cement and concrete and any empty and unwashed drums must be stored on a concrete hardstand area and appropriately sheltered and bunded to avoid the release of contaminants to any external stormwater drain, roadside gutter or waterway; and
  - spillages of contaminants or hazardous material must not be cleaned up by hosing, sweeping or otherwise releasing contaminants to any external stormwater drain, roadside gutter or waterway.
- Surface drainage measures, such as containment bunds, silt traps, sediment basins, fences, barriers, diversions, earth compaction and concrete washout pits are implemented at construction worksites and work areas to effectively manage stormwater runoff, in particular for sites located near Breakfast Creek.
  - Stockpiles are to be located away from drainage areas and flood affected areas.
  - Incorporate into the final design, where possible, water sensitive urban design (WSUD) measures (e.g. swales, bio-retention systems, vegetation buffers). Erosion and sediment control design for the project would be consistent with MRTS52.
  - Where identified, ASS will be managed in accordance with the Soil Management Guidelines in the Queensland Acid Sulfate Soil Technical Manual (2002, DNRM). Where required, management may include installation and inspection of ASS storage areas and runoff controls (treat if required), monitoring, auditing and reporting.
  - Surface drainage measures give consideration to the avoidance or management of potential discharges from ASS into surface waters.
  - Where contaminated soils are required to be disturbed, appropriate run-off controls are to be implemented ahead of works commencing to divert surface run-off around exposed soils.
  - Where monitoring indicates an exceedance of the EPP(Water) or Queensland Water Quality Guidelines, or an uncontrolled release of contaminants, chemicals or fuels occurs:
    - corrective actions and mitigation measures, including ceasing the release, are to be implemented immediately;
    - undertake notifications required by law; and
    - investigation and additional mitigation measures are to be implemented to address the non-conformance.
  - Develop and implement measures for the collection, treatment, diversion and assessment of wastewater generated from construction activities via an approved system (on site or off site), including the provision of temporary water treatment facilities at the southern portal, Boggo Road, Woolloongabba, Albert Street, Roma Street and northern portal sites.
  - During construction, water will be captured by a drainage system at each of the stations and portals, and either transferred to a local treatment plant, treated and discharged to an approved point or discharged straight to sewer dependent upon Queensland Urban Utilities (QUU) approval.
  - Progressively restore and rehabilitate sites affected by construction works.
  - Locate spoil placement sites away from creek banks and provide adequate bunding to prevent sediment run-off into waterways or stormwater drains or inundation in a 1 in 5 year flood event.

**Monitoring****Groundwater**

- Prior to the commencement of construction, a groundwater monitoring programme must be established in consideration of background water quality measurements, where available, and the following guidelines:
  - EPP (Water);
  - Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000 (ANZECC, 2000);
  - Queensland Water Quality Guidelines 2009 (DEHP, 2009); and
  - Monitoring and Sampling Manual 2009 (Version 2) (DEHP, 2010).
- The groundwater monitoring programme is to include a means of determining:
  - water level drawdown as a result of the Project;
  - quality of groundwater being intercepted;

Element 7	Groundwater and surface water – Construction
	<ul style="list-style-type: none"> <li>– site specific parameters which would indicate a need for further groundwater management (including treatment);</li> <li>– assessment of actual and potential contaminant migration; and</li> <li>– volume of groundwater to be released.</li> </ul> <ul style="list-style-type: none"> <li>• Groundwater quality monitoring will include the following parameters: <ul style="list-style-type: none"> <li>– Field chemistry parameters: pH, Temperature, Electrical Conductivity and Total Dissolved Solids; and</li> <li>– Laboratory chemistry parameters: Ammonia as N, Nitrite, Nitrate, Total Nitrogen as N, Total Phosphorous as P, Arsenic, Cadmium, Chromium, Copper, Nickel, Lead, Zinc, Mercury, Major Cations (Calcium, Magnesium, Sodium and Potassium), Major Anions (Chloride, Sulfate and Alkalinity), Iron, Aluminium, Silver, Antimony, Molybdenum, Selenium, Total Petroleum Hydrocarbons (TPH) and benzene, toluene, ethylbenzene, and xylene (BTEX).</li> </ul> </li> <li>• Groundwater monitoring would be undertaken on a quarterly basis during construction near each worksite, underground works and excavations and assess deviations from seasonal baseline groundwater levels and quality, and identify/formulate appropriate mitigation options.</li> <li>• Routine daily site inspections are to include visual monitoring of groundwater inflows to the tunnels, underground stations and excavations, to identify any potential for inundation of critical work areas or contaminant storage areas, or any increase of inflow rates with potential to exceed the capacity of groundwater containment and treatment measures.</li> <li>• Monitor groundwater within the tunnels and underground stations to determine whether groundwater migration induced by the construction works is causing migration of contaminants or is draining from ASS.</li> <li>• Regularly monitor and maintain machinery and equipment to minimise the potential for contaminants to interact with groundwater.</li> </ul> <p><b>Surface water</b></p> <ul style="list-style-type: none"> <li>• Prior to the commencement of construction, a water quality monitoring programme must be established in accordance with the following guidelines: <ul style="list-style-type: none"> <li>– EPP(Water);</li> <li>– Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000 (ANZECC, 2000);</li> <li>– Queensland Water Quality Guidelines 2009 (DEHP, 2009); and</li> <li>– Monitoring and Sampling Manual 2009 (Version 2) (DEHP, 2010).</li> </ul> </li> <li>• The water quality monitoring programme is to be implemented prior to, during and subsequent to construction to monitor all discharges from construction worksites to all identified receiving waters. The monitoring programme will also assess water quality within receiving waters to evaluate compliance with the specified Water Quality Objectives.</li> <li>• The monitoring programme will allow for the capture of adequate baseline data to establish seasonal Water Quality Objectives for the Project with consideration for the receiving surface waters.</li> <li>• The water quality monitoring programme is to include, but not be limited to: <ul style="list-style-type: none"> <li>– a description of potentially affected water bodies;</li> <li>– construction activities at each worksite and the potentially associated contaminants;</li> <li>– specific monitoring locations, including upstream and downstream surface waters at each construction worksite (e.g. Breakfast/Enoggera Creek); and</li> <li>– frequency of monitoring, including prior to discharge of any surface waters from each construction worksite at least weekly and immediately following a defined rainfall event.</li> </ul> </li> <li>• During routine daily site inspections and immediately following any rainfall event causing runoff from the worksite, a visual assessment is to be conducted of all waterways within and adjacent to worksites to determine the presence of litter, sediment, chemical plumes or other toxicants.</li> <li>• Immediately following a rainfall event causing runoff from the worksites, a visual inspection of all erosion and sediment control measures, bunding and water treatment facilities is to be conducted to assess any damage or maintenance requirements and to review effectiveness.</li> </ul>
Reporting	<ul style="list-style-type: none"> <li>• Results of inspections, including reporting of hydrology management issues, are to be included in the monthly construction compliance report, along with details of any incidents or complaints relating to hydrology issues.</li> </ul>



<b>Element 7 Groundwater and surface water – Construction</b>	
	<ul style="list-style-type: none"> <li>• Results of groundwater quality and drawdown monitoring as part of the water quality monitoring programme are to be reported quarterly through the next monthly construction compliance report.</li> <li>• Monitoring data is to be reviewed annually to evaluate effectiveness of mitigation measures and to determine whether on-going monitoring is required.</li> <li>• Report after a rainfall event exceeding a two year average recurrence interval.</li> </ul>

Table 1.13 Element 8 - Flood management

<b>Element 8 Flood management – Construction</b>	
Environmental outcomes	<ul style="list-style-type: none"> <li>• Construction activities do not significantly alter existing flood behaviour and levels of waterways and do not increase existing flood levels on private property.</li> <li>• Construction worksites are designed to provide for safe evacuation of worksites and to avoid disruption of evacuation routes for adjacent properties in the event of flooding.</li> </ul>
Performance criteria	<ul style="list-style-type: none"> <li>• Construction activities and worksites do not cause or contribute to afflux for a 1 in 5 AEP flood event or greater on the floodplain of any waterways or in overland flow paths.</li> <li>• Construction activities, including any temporary works and spoil placement, do not cause flood waters to be re-directed over other private property.</li> <li>• Construction worksites and spoil placement sites are protected from inundation by flood waters, including overland flows, from a 1 in 20 AEP flood event.</li> <li>• Bulk storage facilities for hazardous substances used in construction are protected from inundation by flood waters from a 1 in 50 AEP flood event.</li> <li>• Construction worksites have access to the local road network during flood events up to 1 in 50 AEP and do not block evacuation routes from adjoining properties.</li> </ul>
Mitigation measures	<ul style="list-style-type: none"> <li>• For construction worksites potentially affected by flooding provide adequate bunding or level differences to protect against local flooding for a 1 in 20 AEP flood event.</li> <li>• Construction flood protection measures are to have no impact on third parties for a 1 in 5 AEP flood event or greater.</li> <li>• Bulk storage facilities containing hazardous substances are located and/ or provided with adequate bunding to protect against flooding from a 1 in 50 AEP flood event.</li> <li>• Ensure site access to all worksites provide all-weather access for construction vehicles and equipment.</li> <li>• Construction activities, including any temporary works and spoil placement are designed to prevent flood waters being re-directed over other private property.</li> <li>• Develop and implement safety measures for the construction works, including emergency measures to prevent flooding in tunnels during construction, and measures to prevent plant and equipment being inundated or submerged with flood waters.</li> <li>• Should there be any unavoidable changes to evacuation routes on adjoining properties, alternative routes are to be established in consultation with property owners or occupants</li> </ul>
Monitoring	<ul style="list-style-type: none"> <li>• Monitoring of the condition and performance of stormwater drainage systems is to be conducted as part of routine inspections to identify any issues potentially impacting on the effectiveness of these systems in providing the required level of flood protection.</li> <li>• Emergency procedures are to be developed for each worksite to facilitate the safe and efficient evacuation in the event of flooding and are to contain a procedure for monitoring actual and potential flood events during construction and a procedure for warning all construction site staff if flooding is considered likely.</li> </ul>
Reporting	<ul style="list-style-type: none"> <li>• In the event of flooding impacting construction worksites, the monthly construction compliance report is to include reporting on damage to construction works, plant and equipment, loss of materials and contaminants and the extent of rehabilitation and recovery works and actions for the affected works.</li> </ul>

Table 1.14 Element 9 - Air quality

<b>Element 9 Air quality – Construction</b>																					
Environmental outcomes	<ul style="list-style-type: none"> <li>Nuisance from dust, odour and emissions arising from construction activities are avoided at nearby sensitive receivers.</li> </ul>																				
Performance criteria	<ul style="list-style-type: none"> <li>Construction emissions are within the construction air quality goals for total suspended particulates (TSP), particulate matter (PM) and deposited dust, as set out in the Construction Air Quality Goals (Table 6).</li> <li>Where construction emissions are predicted to exceed the construction air quality goals, mitigation measures are designed and implemented to mitigate the impacts for nearby sensitive receivers.</li> </ul> <p><b>Table 6: Construction air quality goals</b></p> <table border="1"> <thead> <tr> <th>Objective</th> <th>Air Quality Indicator</th> <th>Goals</th> <th>Average Period</th> </tr> </thead> <tbody> <tr> <td rowspan="3">Human Health</td> <td>Total Suspended Particulates (TSP)</td> <td>90µg/m<sup>3</sup></td> <td>1 year</td> </tr> <tr> <td rowspan="2">Particulates as PM<sub>10</sub></td> <td>50µg/m<sup>3</sup></td> <td>24 hours</td> </tr> <tr> <td>25µg/m<sup>3</sup></td> <td>1 year</td> </tr> <tr> <td rowspan="2">Nuisance</td> <td>Total Suspended Particulates (TSP)</td> <td>80µg/m<sup>3</sup></td> <td>24 hours</td> </tr> <tr> <td>Deposited dust</td> <td>120µg/m<sup>3</sup></td> <td>30 days</td> </tr> </tbody> </table>	Objective	Air Quality Indicator	Goals	Average Period	Human Health	Total Suspended Particulates (TSP)	90µg/m <sup>3</sup>	1 year	Particulates as PM <sub>10</sub>	50µg/m <sup>3</sup>	24 hours	25µg/m <sup>3</sup>	1 year	Nuisance	Total Suspended Particulates (TSP)	80µg/m <sup>3</sup>	24 hours	Deposited dust	120µg/m <sup>3</sup>	30 days
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	Deposited dust	120µg/m <sup>3</sup>	30 days																		
Mitigation measures	<p><b>Air quality – general</b></p> <ul style="list-style-type: none"> <li>Prepare and implement an EMP Air Quality Sub-Plan, to achieve the environmental outcome for the duration of construction activities.</li> <li>To the extent possible, using existing data to establish baseline air quality prior to construction at the Southern portal, Boggo Road, Woollongabba, Albert Street, Roma Street, Northern portal, Exhibition Station and Mayne Yard worksites. Where no existing data is available, a minimum of 30 days of campaign air quality monitoring at the worksite is required.</li> <li>At construction sites and spoil placement sites, monitor meteorological conditions, particularly wind speed and direction. When adverse meteorological conditions are experienced at worksites, such as dry windy conditions, take measures to avoid impacts of unreasonable dust or odour on adjacent properties. Such measures may include: <ul style="list-style-type: none"> <li>modification of construction methods;</li> <li>increase in dust suppression measures; and</li> <li>when no other reasonable or practical measure is available, cessation of work until the meteorological conditions improve and the environmental outcome can be achieved.</li> </ul> </li> <li>If monitoring shows exceedances during construction, additional mitigation measures may be implemented, such as stopping dust generating activities during dry, windy conditions, undertaking additional audits of dust controls, increasing watering rates during dry periods, and undertaking targeted consultations with affected entities.</li> <li>Haul roads at the southern portal, Woollongabba and northern portal construction worksites will be paved for dust management.</li> <li>Where predictive modelling indicates exceedances of the air quality goals for human health at nearby sensitive receiver locations, measures such as work sheds or enclosures equipped with a fabric filter for the removal of airborne particulate matter may be required.</li> </ul> <p><b>Dust</b></p> <ul style="list-style-type: none"> <li>Ensure appropriate dust controls are used for demolition activities, including the use of water sprays and covering loads of material transported from the worksites.</li> <li>Other measures may be initiated where or when required to avoid nuisance, particularly in respect of buildings containing hazardous or potentially hazardous materials.</li> <li>Manage the movement and handling, stockpiling and loading of construction spoil to avoid dust nuisance. In the event that dust generation will exceed the Construction Air Quality Goals, the handling and loading of construction spoil for transport to the spoil placement sites must be undertaken within enclosed and ventilated work areas.</li> </ul>																				

## Element 9 Air quality – Construction

- The movement of construction spoil from the tunnelling workforce to the spoil loading facility must be within enclosed conveyances, whether on a conveyor, within a covered haul vehicle or some other enclosed equipment.
- Ensure trucks transporting construction spoil are:
  - covered to prevent wind-blown dust during transport; and
  - cleaned down prior to exit from the worksites and the spoil placement site to prevent spills of loose material to roadways.
- Where space allows, install truck wheel wash stations at locations in worksites. Where space constraints do not allow for the implementation of wheel wash stations, implement additional washing and sweeping of roads servicing worksite access and egress points to avoid the spillage of spoil.
- Ensure adequate ventilation is installed and operated in underground construction works. Ventilation systems include dust filtration capable of removing small particles with a mass of 10µg or a diameter of 10µm (i.e. PM10) and of achieving the Construction Air Quality Goals at the nearest sensitive receiver. Dust collected from the filtration system must be disposed of appropriately.
- Installation of hoardings or barriers on worksite perimeters, where appropriate, to help mitigate dust impacts by acting as wind breaks.
- Sealing of access roads, as much as is practicable, within the worksites and ensuring sealed access roads into worksites are kept relatively dust free by regular sweeping and washing, wherever needed.

### Diesel exhaust emissions

- Manage the movement of construction vehicles to avoid queuing near residential receivers approaching the worksites or adjacent to other sensitive activities.
- Adopt procedures to avoid construction vehicles idling for excessive periods (e.g. more than five minutes) if required to queue to enter construction sites.
- Ensure marshalling sites and queuing for trucks and site vehicles are located away from residential areas and other sensitive receivers.
- Where feasible, collect and direct exhaust emissions from stationary plant away from sensitive receivers.
- As much as practicable, minimise the use and intensity of use of diesel engines.
- For stationary plant and equipment, ensure all diesel motors are fitted with emission control measures and that these are regularly maintained to manufacturers' specifications.

### Odour

- 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:
  - ensuring clean cover materials (e.g. clean fill) is on hand to immediately cover odorous spoil materials that are resulting in off-site impacts;
  - identifying and determining the potential for odour impacts at off-site sensitive receivers based on preliminary information on the scale and nature of any known contamination, the distance from the contamination area to sensitive receivers, and the prevailing meteorological conditions;
  - conducting works with odorous soils when wind directions are unlikely to affect sensitive receivers; and
  - covering odorous, excavated soil stockpiled on a construction site or a spoil placement site to reduce odour impacts.

### Greenhouse gases

- Maintain construction plant and equipment and haul trucks in good working order to maximise the fuel efficiency of equipment.
- Procure energy efficient construction equipment, when appropriate.
- Use appropriately sized equipment for construction activities.
- Minimise waste from construction by procuring pre-fabricated products.
- Where feasible, use low energy intensity materials instead of high energy intensity building materials.

## Element 9 Air quality – Construction

### Monitoring

#### Dust and odour

- Monitor and log daily meteorological conditions, including wind speed and direction, to determine the location of monitoring sites and of potentially affected receivers.
- Undertake visual inspections for dust generating activities on a daily basis (e.g. stockpiles, vehicles and roads leaving construction sites) for evidence of dust generation or loose, unstable material with potential for dust.
- Undertake ambient odour inspections for potential odour-generating activities (e.g. excavation of contaminated soils) on a daily basis. At each location, observations would be made on date/time, odour intensity, persistence and character, and current wind conditions.
- Undertake daily monitoring of ambient air quality (TSP, PM10 and deposited dust) against the air quality goals for each of the construction worksites sites in operation. Monitoring must be conducted in the vicinity of construction worksites in areas representative of the receiving environment and sensitive receivers for the duration of surface works, and in response to complaints. Monitoring locations must be down-wind of the worksites. Indicative particulate sampling requirements and dust monitoring locations around the main construction worksites are provided in Table 7.
- All monitoring is to be performed by a suitably qualified person in accordance with the QLD Air Quality Sampling Manual (1997), and in accordance with the relevant Australian Standards. All laboratory analyses are to be performed by a NATA-accredited laboratory.

#### Vehicle emissions

- Visually monitor construction vehicle movements on a regular basis to:
  - prevent queuing in streets, other than designated haul routes identified in the CTMP; and
  - prevent queuing vehicles idling for periods exceeding five minutes.

**Table 7: Indicative dust monitoring locations**

Worksite	Indicative Dust Monitoring Location
Southern Portal and Boggo Road Station	1. Dutton Park State School, south eastern corner of site (PM <sub>10</sub> ) 2. Ecosciences Precinct, roof level at location indicative of AC intakes (PM <sub>10</sub> ) 3. PA Hospital grounds, ground level (dust) 4. PA Hospital, roof level at location indicative of AC intakes (PM <sub>10</sub> ) 5. Joe Baker Street, near ESA Village (dust) 6. Dutton Street, at selected residences (dust)
Woolloongabba Station	7. TMR/DEHP monitoring station at South Brisbane (PM <sub>10</sub> ) 8. Russian Orthodox Cathedral (dust) 9. Reid Street, adjacent Chalk Hotel car park (dust)
Albert Street Station	10. Courtyard area, Level 3, The Sebel (dust, PM <sub>10</sub> ) 11. Albert Street, SW corner with Mary Street (dust, PM <sub>10</sub> )
Roma Street Station	12. Adjacent to residential complex, Roma Street Parkland (dust)
Northern Portal	13. Victoria Park, adjacent to Brisbane Girls Grammar School (dust) 14. Gregory Terrace, adjacent to Centenary Aquatic Centre (dust)

#### Greenhouse gases

- Record the following consumption data to enable the GHG emissions to be accurately calculated and reported for the project :
  - Diesel, petrol, LPG use by project and contractor vehicles and machinery;
  - Electricity use by the project and contractors working on site;
  - Consumption of oils and greases; and
  - Number of units and size of any refrigeration units on site.

Element 9 Air quality – Construction	
Reporting	<ul style="list-style-type: none"> <li>Monthly reports on the results of the ambient air quality monitoring programme and results of odour and dust inspections carried out by site personnel. Consumption data will also be reported on monthly to enable the GHG emissions to be accurately calculated and reported.</li> <li>Maintain records of the number of incidents or complaints received in relation to dust or odour impacts.</li> <li>Record actions taken to mitigate incidents or complaints.</li> </ul>

Table 1.15 Element 10 - Noise and vibration

Element 10 Noise and vibration – Construction															
Environmental outcomes	<ul style="list-style-type: none"> <li>Construction activities are designed, planned and implemented to maintain human health and wellbeing, to the extent reasonable and practicable.</li> <li>Construction activities generally are designed, planned and implemented to maintain daily patterns of activity, and to minimise sleep disturbance at night.</li> <li>Construction activities are managed to avoid vibration-related structural damage on all properties including listed heritage places, to minimise other vibration-related impacts on properties and any vibration-sensitive plant and equipment (e.g. transmission electron microscopes).</li> </ul>														
Performance criteria	<p><b>Air-borne Noise</b></p> <ul style="list-style-type: none"> <li>Construction works are designed, planned and implemented to achieve the noise goals specified in Table 8.</li> </ul> <p><b>Table 8: Construction noise goals (internal) – human health and wellbeing</b></p> <table border="1"> <thead> <tr> <th></th> <th>Monday to Saturday 6.30am – 6.30pm</th> <th>Monday to Friday 6.30pm – 10.00pm (Gabba, CBD only)</th> <th>Monday to Saturday 6.30pm – 6.30am, Sundays, Public Holidays</th> <th>Monday to Saturday 7.30am – 4.30pm</th> </tr> </thead> <tbody> <tr> <td>Continuous (LAeq adj)(1hr)</td> <td>AS 2107 Maximum design level</td> <td>40 dBA LAeq,adj (1 hour)</td> <td>35 dBA LAeq adj (1 hour)</td> <td rowspan="2">130 dB Linear Peak</td> </tr> <tr> <td>Intermittent (LA10 adj)(15min) (LAmax)</td> <td>AS 2107 Maximum design level + 10dBA</td> <td>50 dBA LA10, adj</td> <td>42 dBA LAmax adj</td> </tr> </tbody> </table> <p>Note 1: All goals are internal noise levels for human health and well-being outcomes</p> <p>Note 2: Where internal noise levels are unable to be measured or monitored, the typical noise reductions presented in Guideline Planning for Noise Control, Ecoaccess, DEHP, July 2016 apply.</p> <ul style="list-style-type: none"> <li>Where predictive modelling conducted prior to the commencement of works in a locality indicates that the noise goals are likely to be exceeded:             <ul style="list-style-type: none"> <li>potentially affected entities must be identified and consulted regarding the potential impacts and the mitigation measures proposed to address the impacts;</li> <li>mitigation measures must be developed in consultation with potentially affected entities on a 'case by case' basis prior to commencement of the works; and</li> <li>agreed mitigation measures are included in a mitigation register and implemented prior to undertaking construction works.</li> </ul> </li> <li>Construction works occurring underground or within an effective acoustic enclosure, and achieving the goals for human health and wellbeing set out in Table 8, may progress continuously while monitoring indicates noise levels remain below the goals.</li> </ul> <p><b>Vibration</b></p> <ul style="list-style-type: none"> <li>Construction works designed, planned and implemented to achieve the vibration goals specified in Table 9.</li> </ul>		Monday to Saturday 6.30am – 6.30pm	Monday to Friday 6.30pm – 10.00pm (Gabba, CBD only)	Monday to Saturday 6.30pm – 6.30am, Sundays, Public Holidays	Monday to Saturday 7.30am – 4.30pm	Continuous (LAeq adj)(1hr)	AS 2107 Maximum design level	40 dBA LAeq,adj (1 hour)	35 dBA LAeq adj (1 hour)	130 dB Linear Peak	Intermittent (LA10 adj)(15min) (LAmax)	AS 2107 Maximum design level + 10dBA	50 dBA LA10, adj	42 dBA LAmax adj
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**Element 10 Noise and vibration – Construction**

**Table 9: Construction vibration goals**

Receiver type	Cosmetic damage			Human comfort (mms/PPV)		Sensitive building contents (mms/PPV)
	Continuous vibration (mm/s PPV)	Transient vibration (mm/s PPV)	Blasting vibration (mm/s PPV) <sup>1</sup>	Day	Night	
Residential	According to BS7385 reduced by 50% <sup>5</sup>	According to BS7385	50 <sup>2</sup>	According to AS2670	0.5 <sup>3</sup>	-
Commercial	According to BS7385 reduced by 50% <sup>5</sup>	According to BS7385	50	According to AS2670	-	0.5 <sup>4</sup>
Heritage structures	2	-	10	-	-	-

Note 1: Blasting, accompanied by prior notice to nearby properties, should generally be permitted during the hours of 7.30am to 4.30pm, Monday to Saturdays.

Note 2: All residential receivers in the vicinity of the Project blasting sites are regarded as reinforced or framed structures (i.e. BS 7385).

Note 3: Residential sleep disturbance

Note 4: Equipment specific vibration criteria is required for highly sensitive equipment (ie. electron microscopes, MRI systems or similar), as part of future site-specific detailed investigations.

Note 5: If resonance is present, or if investigations to detect resonance were not able to be undertaken due to a lack of access

- Where predictive modelling conducted prior to the commencement of works in a locality indicates that the vibration goals are likely to be exceeded:
  - potentially affected entities must be identified and consulted regarding the potential impacts and the mitigation measures proposed to address the impacts;
  - effective mitigation measures must be developed in consultation with potentially affected entities on a 'case by case' basis prior to commencement of the works; and
  - agreed mitigation measures are included in a mitigation register and implemented prior to undertaking construction works.
- Where vibration goals are provided in respect of sensitive building contents, predictive modelling must take into account the manufacturer's specifications for tolerance to vibration and adopt such specifications as goals for construction to avoid or minimise impacts on the normal operation of such equipment.

**Mitigation measures**

- A Construction EMP (noise and vibration) Sub-plan must be prepared by the Proponent and endorsed by the Environment Monitor, as being consistent with this EMP and complying with the Coordinator-General's conditions, prior to the commencement of works, including early works and demolition work.
- The Construction EMP (noise and vibration) Sub-Plan must include:
  - a description of the works programme to which the sub-plan relates, together with a schedule of revisions where the sub-plan has been amended progressively to address the on-going works programme;
  - background noise monitoring that informs predictive modelling undertaken in the vicinity of construction sites adjacent to sensitive receivers;
  - a requirement for predictive modelling on which to base mitigation measures for noise and vibration from construction works. Predictive modelling must address the proposed construction methods in relation to the ground conditions in the work area, and identifies nearby sensitive receivers;
  - proposed specific monitoring points for the predicted and likely construction noise and vibration from the proposed works;
  - clear criteria for monitoring compliance with the Coordinator-General's conditions and the agreed mitigation measures relating to the proposed works; and
  - a plan for on-going vibration and regenerated noise monitoring throughout the construction phase.
- Where predictive modelling indicates a potential exceedance of either the noise or vibration goals relative to human health and wellbeing, the Proponent must inform the Environmental Monitor and consult affected entities to develop and agree mitigation measures prior to the commencement of such work. Such mitigation measures then become the monitoring criteria for the works in the locality in which they are conducted.

Element 10 Noise and vibration – Construction	
Mandatory requirements	<p>Where excessive construction noise or vibration<sup>5</sup> is predicted, works may progress only in accordance with the following requirements:</p> <ul style="list-style-type: none"> <li>• All reasonable and practicable mitigation measures are designed in consultation with the affected entities and implemented to achieve a reasonable environmental outcome: <ul style="list-style-type: none"> <li>– Should an agreement not be reached between the Proponent and an affected party, the Environmental Monitor will seek to moderate an agreement. Should that not eventuate, the Proponent must take all reasonable and practicable measures to mitigate construction noise and vibration impacts so as to achieve a reasonable environmental outcome<sup>6</sup>.</li> </ul> </li> <li>• Works predicted to or generating excessive noise or vibration are not conducted outside of the hours of 7.00am to 6.00pm Monday to Friday and only between those hours if a respite period is provided between 12:00 noon and 2.00pm each day.</li> </ul>
Mitigation measures	<p><b>General – Noise</b></p> <ul style="list-style-type: none"> <li>• Prior to the commencement of construction in a locality, including demolition and early works, the Proponent is to undertake predictive modelling to identify the likely acoustic impacts.</li> <li>• Where the works in a locality are predicted to exceed the goals nominated in this EMP (Construction), or a specific Construction EMP (noise and vibration) Sub-Plan, the Proponent is to: <ul style="list-style-type: none"> <li>– initiate on-going and early consultations with potentially affected entities to notify them of the proposed works and to determine suitable mitigation measures; and implement the Construction EMP (noise and vibration) Sub-plan to achieve the outcomes agreed with the potentially affected entities.</li> </ul> </li> <li>• Generally, construction is to be planned and undertaken with the following measures: <ul style="list-style-type: none"> <li>– install acoustic screens and/or acoustic sheds as early as practicable in the programme around potential noise sources such as compressors and tunnel ventilation plant, or place such noise sources in the worksite so that effective acoustic screening is achieved, consistent with the environmental outcomes;</li> <li>– use the quietest plant and equipment reasonably expected to be available to undertake each component of the work;</li> <li>– regular maintenance of equipment to ensure that all plant and equipment remains in good working order and does not create noise nuisance incrementally;</li> <li>– minimise the coincidence of noisy plant and equipment working simultaneously near sensitive receivers;</li> <li>– fit residential class mufflers to mobile plant and equipment, such as but not limited to excavators, front end loader and other diesel powered equipment, where engaged in works in or adjacent to residential areas;</li> <li>– ensure careful placement within each worksite of fixed plant (e.g. compressors) to maximise shielding or separation from sensitive receivers; and</li> <li>– minimise the use of warning devices (e.g. reversing alarms) on plant and equipment working adjacent sensitive receivers to within operational health and safety constraints.</li> </ul> </li> </ul> <p><b>General – Vibration</b></p> <ul style="list-style-type: none"> <li>• Prior to the commencement of construction in a locality, the Proponent is to undertake predictive modelling of construction vibration likely from both surface and underground construction works. The predictive modelling is to identify the impacts from ground-borne vibration and consequential ground-borne noise.</li> <li>• Where the works in a locality are predicted to exceed the goals nominated in this EMP (Construction), the Proponent is to: <ul style="list-style-type: none"> <li>– conduct surveys in the locality to identify residential properties and other places especially sensitive to sleep disturbance (e.g. hospitals, nursing homes and child care centres);</li> <li>– conduct surveys in the locality to identify and determine the specifications for building equipment known to be sensitive to vibration, such as computers, microscopes, surgical equipment;</li> </ul> </li> </ul>

<sup>5</sup> Excessive noise and excessive vibration are defined in Appendix A - Glossary.

<sup>6</sup> Reasonable environmental outcome means that the goals are not exceeded by more than 10dBA at any time, and never exceeded after 10:00pm.

## Element 10 Noise and vibration – Construction

- conduct pre- and post-construction building condition surveys where potential cosmetic (superficial) building damage could occur as a consequence of construction works; and
- implement mitigation measures that would achieve the environmental outcomes or achieve alternative outcomes agreed with the potentially affected landowner.

Mitigation measures for construction vibration at sensitive receivers may include one or more of the following:

- changes in construction methods or programming, to avoid periods in which the predicted exceedance would impact on the most people.
- property treatments for properties predicted to be directly affected by exceedances of the goals. Such treatments must be agreed with the affected entities prior to the commencement of the works.
- changes or refinements in Project design if reasonable and practicable, having regard for the overall purpose and intention of the Project and the flow-on effects of such changes or refinements.
- provision of temporary accommodation if no other viable solution is available to mitigate the predicted or actual impacts of construction.

### Construction worksites: noise and vibration

#### 1) Southern portal and Boggo Road Station works

- Consult in advance with affected entities and near neighbours about the station and portal works and the surface works in the designated rail corridor between Dutton Park Station and Park Road Station, about the programme of works and the activities likely to approach or exceed the noise and/or vibration goals.
- Consult with operators of the PA Hospital, Leukaemia Foundation, the ESA Village and the Ecosciences facility to minimise the effects of construction on people and sensitive equipment (e.g. Transmission Electron Microscopes or TEM). Check the performance of the Ecosciences TEM vibration isolation system prior to commencement of vibration intensive construction works.
- If predictive modelling indicates that the noise goals for human health and wellbeing would be exceeded:
  - Consult with local communities, particularly those south of Peter Doherty Street, west of Railway Terrace and the Quarry Street area north of the rail corridor about measures to mitigate night-time works in the rail corridor;
  - Erect a noise barrier along the north-west side of the on-site spoil route adjacent to the rail track if night-time spoil removal is required; and
  - Undertake monitoring of construction noise at residential and commercial premises immediately to the west of Railway Terrace and Joe Baker Street, as well as at residential premises to the north of Park Road Station (e.g. Quarry Street). Where monitoring detects exceedances of the goals for human health and wellbeing, develop and implement mitigation measures in consultation with the affected entities as soon as practicable after monitoring.

#### 2) Woolloongabba Station

- Consult in advance with affected entities and near neighbours about the station works at Woolloongabba and the tunnel corridor between Park Road Station and the Woolloongabba Station about the programme of works, including advance notice of activities likely to approach or exceed the noise and/or vibration goals.
- If predictive modelling indicates exceedances of the noise goals for human health and wellbeing would be exceeded, install acoustic screens, sheds, enclosures or barriers to protect local communities including those on Vulture Street, Main Street and Stanley Street.
  - such barriers or screens are to include an acoustic shed over the shaft if night-time surface works are proposed;
  - night time works likely to approach or exceed the noise goals must be conducted within the acoustic enclosure or shed; and
  - the shed is to be equipped with acoustic-screened doors at the entry and exit points for spoil haulage vehicles.
- Undertake monitoring of construction noise at residential properties predicted to be affected. Subject to the findings of the facade noise measurements, mitigation measures may be required including temporary (or permanent) upgrades to the facade (e.g. double glazing, acoustic seals around doors etc.) in tandem with respite periods during services.



## Element 10 Noise and vibration – Construction

### 3) *Albert Street Station and associated underground works*

- Prior to the commencement of works, including demolition works and site preparation works, install acoustic barriers or screens around the worksite to protect nearby sensitive receivers. Such barriers or screens are to include an acoustic shed over the excavation shaft if night-time surface works are proposed.
- Night-time works likely to approach or exceed the noise goals may be conducted only underground or within the acoustic shed except during extended hours agreed with the Environmental Monitor. In agreeing to extend hours the Environmental Monitor would have regard for the mitigation measures agreed with the affected entities.
- Consult in advance with owners and occupants of properties adjacent to the station works and the tunnel corridor along Albert Street to Roma Street about the programme of works, including advance notice of activities likely to approach or exceed noise or vibration goals.
- Undertake monitoring of ground-borne vibration and noise at several places representative of the sensitive receivers along Albert Street, including at least residential premises and commercial premises containing sensitive office equipment.
- Prior to the commencement of works predicted to exceed the vibration goals for heritage places, conduct building conditions surveys at any heritage-listed place for which predictive modelling indicates the likely exceedance of the vibration goals.
- Site-specific mitigation measures also could include the following requirements:
  - rock breaking be restricted to 7.00am to 6.00pm until monitoring results indicate compliance with the ground-borne noise goals or mitigation measures agreed with affected entities have been implemented;
  - ground-borne noise and vibration measurement trials are carried out for rock-breaking during the detailed design stage of the Project to accurately determine the extent of the impact and to allow sufficient time to develop an appropriate management strategy; and
  - Investigate alternative construction techniques with the aim of avoiding or minimising potential ground-borne noise impacts. For example, drill and blast could be more efficient than use of heavy rockbreakers to impede vibration propagation

### 4) *Roma Street Station and associated underground works*

- Consult in advance with affected entities and near neighbours about the station works and the tunnel corridor, the programme of works and advance notice of activities likely to approach or exceed the noise or vibration goals.
- Consult with affected entities prior to monitoring of ground-borne vibration and noise at several places representative of the sensitive receivers adjacent to Roma Street Station, including at least the Hotel Jen, the Abbey Apartments, Roma Street commercial (Transcontinental Hotel) and Queensland Police Headquarters.
- If predictive modelling indicates exceedances of the noise goals for human health and wellbeing, install a ventilated acoustic shed over the station shaft and spoil loading facilities in the Roma Street worksite to protect nearby sensitive receivers.
- Night-time works likely to approach or exceed the noise goals may be conducted only underground or within the acoustic shed except during extended hours agreed with the Environmental Monitor. In agreeing to extend hours the Environmental Monitor would have regard for the mitigation measures agreed with the affected entities.
- Prior to the commencement of works likely to exceed the vibration goals for heritage places, building condition surveys must be conducted at any place at which predictive modelling indicates the likely exceedance of the vibration goals for such places.
- Site-specific mitigation measures also could include the following requirements:
  - rock breaking be restricted to 7.00am to 6.00pm until monitoring results indicate compliance with the ground-borne noise goals or mitigation measures agreed with affected entities have been implemented;
  - ground-borne noise and vibration measurement trials are carried out for rock-breaking during the detailed design stage of the Project to accurately determine the extent of the impact and to allow sufficient time to develop an appropriate management strategy; and
  - investigate alternative construction methods for works predicted to exceed the noise and vibration goals along the boundaries of the shaft shared with adjacent buildings.

## Element 10 Noise and vibration – Construction

### 5) Northern portal

- Consult in advance with affected entities and near neighbours about the programme of construction works, including early works and site preparation works. In particular, consult with residents of Gregory Terrace, businesses at the Centenary Aquatic Centre, and the administrations for each of Brisbane Girls Grammar School, St Joseph's College Gregory Terrace and Brisbane Grammar School.
- Where predictive modelling indicates potential exceedances of the goals for human health and wellbeing or human comfort for educational facilities develop and implement mitigation measures in consultation with the affected entities prior to the commencement of works. Such measures would be required prior to the commencement of works predicted to exceed the goals and may include acoustic barriers and a ventilated shed to screen:
  - works required for the tunnel boring machine (TBM) retrieval, and transition structures; and
  - the loading and transport of spoil material from the worksite.
- Undertake monitoring of construction noise at Brisbane Girls Grammar School. Where monitoring detects exceedances of the goals for human health and wellbeing or human comfort, develop and implement mitigation measures in consultation with the affected entities as soon as practicable after monitoring.

### 6) Exhibition Station

- Prior to the commencement of works, including demolition works and site preparation works, undertake predictive modelling to identify the potential for exceedances of the goals for health and wellbeing. Where exceedances are predicted, install acoustic barriers around the worksite prior to the commencement of works.
- Undertake early and on-going consultations with residents and owners and occupants of businesses north of O'Connell Terrace (e.g. Tufton Street) and the RNA to identify and avoid or minimise potential noise and vibration impacts.
- Prior to the commencement of works predicted to exceed the vibration goals for heritage places, conduct building conditions surveys at any heritage-listed place for which predictive modelling indicates the likely exceedance of the vibration goals.

### 7) Other surface works

- Where out-of-hours work is required to minimise disruption to the operation and function of essential transport infrastructure, consultation with potentially affected owners and occupants of nearby properties is to be undertaken in advance to develop and agreed mitigation measures for predicted and actual noise and vibration impacts.

### 8) Mechanical tunnel construction

- Prior to commencement and then progressively, undertake predictive modelling, supplemented by monitoring data to refine model to identify potential exceedances of the goals for construction noise and vibration. This should consider potential impacts to heritage buildings.
- Where such predictive modelling indicates the goals would be exceeded, undertake advance consultation with the potentially affected owners and occupants of premises, to develop agreed mitigation measures and to inform them of the construction programme and the likely duration of the predicted exceedance.
- Generally, undertake advance consultation in localities, ahead of tunnelling activities. Consultation is to include information on the rate of progress, the potential effects and the monitoring programme which may require involvement from residents located above the main tunnel alignments.
- In localities where predictive modelling indicates a risk of exceedances of the goals for construction vibration, conduct building condition surveys before and following completion of tunnel construction. Building condition surveys are to be conducted by agreement with potentially affected landowners.
- Conduct monitoring of ground-borne noise and vibration along the main tunnel alignments and in proximity to the underground stations to inform and refine predictive modelling and the development of mitigation measures, and to provide feedback to the community and regulatory agencies on performance in relation to the goals for construction noise and vibration.

Element 10 Noise and vibration – Construction	
	<p>9) <i>Low frequency construction noise</i></p> <ul style="list-style-type: none"> <li>• Implement a comprehensive notification and education program to assist in allaying community concerns in localities where low frequency noise goals would likely be exceeded during tunnelling works.</li> <li>• Provide local communities with tunnelling progress and subsequent likely (temporary) exposure periods.</li> </ul> <p>10) <i>Blasting</i></p> <ul style="list-style-type: none"> <li>• Where drilling and blasting is proposed mitigation would include the following: <ul style="list-style-type: none"> <li>– utilising the latest available blasting technology;</li> <li>– pre-blasting condition surveys of adjacent buildings; and</li> <li>– early consultation with local communities and pre-warnings of the timing of the blast activities.</li> </ul> </li> <li>• Limit blasting to between 7.30am and 4.30pm Monday to Saturday (not on Sundays and public holidays), desirably to regular scheduled times in localities where repeated blasting is required by construction or ground conditions.</li> </ul>
Monitoring	<ul style="list-style-type: none"> <li>• Throughout the construction phase, implement and maintain a comprehensive program of noise and vibration monitoring for each worksite, based on proximity to residences or other sensitive receivers. Monitoring must be conducted in locations where predictive modelling indicates exceedances of either the noise or vibration goals could occur.</li> <li>• Undertake daily inspections to confirm implementation of mitigation measures included in the mitigation register.</li> <li>• Undertake daily inspections at each worksite to check acoustic enclosures and barriers for damage that could limit effectiveness, and to identify any sources of unnecessary or excessive noise for which there are no registered mitigation measures.</li> <li>• Undertake site-specific monitoring in response to complaints about construction noise or vibration.</li> <li>• Prior to the commencement of works, and with the owners' consent, undertake pre-condition surveys for historical buildings and other structures predicted to be affected by construction vibration.</li> </ul>
Reporting	<ul style="list-style-type: none"> <li>• The results of noise and vibration monitoring are to be reported in the monthly construction environment report, along with details of any incidents or complaints relating to noise and vibration management. Where monitoring detects exceedances of the noise or vibration goals, the Environmental Monitor must be notified as soon as practicable.</li> </ul>

Table 1.16 Element 11 - Waste management

Element 11 Waste management – Construction	
Environmental outcomes	<ul style="list-style-type: none"> <li>• Construction activities, including demolition, are designed planned and implemented to minimise the generation of waste materials.</li> <li>• Storage, handling, transportation and disposal of waste materials generated during construction are carried out to avoid environmental harm and adverse impacts on communities.</li> <li>• Reuse and recycling of construction waste materials generated by Project construction activities is optimised.</li> </ul>
Performance criteria	<ul style="list-style-type: none"> <li>• Construction activities are conducted in accordance with an approved Project Waste and Resource Recovery Management Plan (WRRMP) including: <ul style="list-style-type: none"> <li>– waste management principles (avoid, reduce, reuse and recycle) and sustainable disposal strategies are implemented;</li> <li>– targets to recover and re-use construction waste, including demolition waste for all classes or categories of waste; and</li> <li>– all reasonable and practicable steps are taken to minimise the impacts of handling and disposal of construction waste at the worksites, and at the disposal sites.</li> </ul> </li> </ul>

Element 11	Waste management – Construction
	<ul style="list-style-type: none"> <li>• Hazardous waste is handled and disposed of in accordance with specific management plans approved by Workplace Health and Safety Queensland.</li> <li>• Waste generated by the Project is managed in accordance with the statutory requirements and recovery targets set out in the Queensland Governments <i>Waste - Everyone's Responsibility Queensland Waste Avoidance and Resource Productivity Strategy (2014-2024)</i>.</li> </ul>
Mitigation measures	<ul style="list-style-type: none"> <li>• Prior to construction commencing, a WRRMP is prepared in accordance with the waste management hierarchy (avoidance, reuse, recycling, energy recovery and disposal), the Waste Regulation and is to include the following as a minimum: <ul style="list-style-type: none"> <li>– waste management procedures for all phases of construction and waste material types, including demolition, and the handling and disposal of asbestos materials;</li> <li>– targets to recover and re-use construction waste, including demolition waste for all classes or categories of waste;</li> <li>– outline all reasonable and practicable steps required to minimise the impacts of handling and disposal of construction waste at the worksites, and at waste disposal sites;</li> <li>– incident management procedures for responding to incidents that have the potential to cause environmental harm, including: <ul style="list-style-type: none"> <li>▪ corrective or remedial actions as required to render the area safe and avoid or minimise environmental harm.</li> <li>▪ procedures for immediately reporting to relevant authorities any incident where harmful waste material is released to the environment.</li> <li>▪ pre-qualification requirements for contractors providing services in waste and recyclables receiving facilities.</li> </ul> </li> <li>– relevant training and awareness strategies for Project personnel on waste management procedures and principles, including recycling opportunities; and</li> <li>– arrangements for decommissioning construction work sites post-construction.</li> </ul> </li> </ul> <p><b>Avoid and reduce</b></p> <ul style="list-style-type: none"> <li>• Identify and implement measures for avoiding waste generation and, if avoidance is not reasonable or practicable, reducing on-site waste generation.</li> <li>• Implement systems to identify, quantify and monitor waste generation.</li> <li>• Implementation of Project office sustainability measures through the selection of energy and resource efficient goods and equipment (e.g. low wattage fluorescent lighting, inverter air conditioning, insulation panelling to reduce energy consumption, waterless urinals, foot pedal or automatic shutoff hand waste basins and rainwater harvesting to reduce water consumption)</li> <li>• Where reasonable and practicable, order goods in bulk to minimise packaging waste, and where practicable, return packaging materials to the supplier.</li> <li>• Develop and implement arrangements with suppliers to return unused construction materials to the supplier. Encourage Project workers to avoid or reduce waste, wherever possible, through inductions and toolbox talks.</li> </ul> <p><b>Reuse</b></p> <ul style="list-style-type: none"> <li>• Train staff to identify opportunities for reuse, where practicable.</li> <li>• Identify and implement strategies for the reuse of waste products generated during construction.</li> <li>• Where reasonable and practicable, chip and mulch vegetation cleared for the Project and re-use mulched material for landscaping purposes.</li> <li>• Provide salvaging contractors with the opportunity to salvage (remove) building materials prior to demolition so that items can retain their value and be reused.</li> <li>• Engage a salvage specialist to identify opportunities in the open market for reuse of materials that are not able to be reused in the Project.</li> <li>• Where reasonable and practicable, provide for the re-use of: <ul style="list-style-type: none"> <li>– excavated material as fill at approved fill sites;</li> <li>– concrete formwork throughout the Project;</li> <li>– reinforced steel structures in the Project; and</li> <li>– structures, including culverts, cabling, poles and similar infrastructure.</li> </ul> </li> </ul>

**Element 11 Waste management – Construction****Recycle**

- Develop and implement Project specific recycling strategies.
- Consider using materials and products that have a recycled content wherever cost/performance competitive, and where environmentally preferable to the non- recycled alternative.
- Where reasonable and practicable, transfer kerb and pavement materials (concrete, asphalt) to crushing and recycling plants.
- Provide separate recycling bins, skips and storage areas for recyclable materials at all construction worksites for construction-specific waste materials and general refuse.
- Investigate the availability of treated wastewater, stormwater runoff or groundwater inflow for site activities, such as dust mitigation, wash-down uses or watering landscape works.
- Where reasonable and practicable, segregate metals for recycling.
- Collect empty oil and fuel drums and other containers for return to licensed recycling facilities. This is to be done by a licensed contractor.
- Ensure that sufficient loading/ unloading space is provided at construction worksites to allow waste materials to be sorted for recycling and reuse.

**Recover**

- Strategies for the recovery of waste during construction must consider:
  - recovery of fixtures, such as lights and other electrical fittings, doors, wash basins, toilets, windows and sheds, through sales and/ or charity organisations;
  - recovery of rail infrastructure for later use such as ballast, rail tracks, concrete sleepers, gantries, signals and fencing;
  - demolition of buildings in a manner that enables recovery of materials; and
  - engaging a salvage specialist to identify opportunities for resource recovery.
- If recovered items and materials are to be sold this should occur in line with due processes for disposing of such items and materials in a commercial market.

**Treatment**

- The treatment of solid waste must not be undertaken on site during construction. All commercial forms of treatment must be undertaken at approved, offsite facilities.
- Groundwater must be treated through purpose built management systems with subsequent water used during construction. Excess water will be captured by a drainage system at each of the stations and portals, and either transferred to a local treatment plant, treated and discharged to an approved point or discharged straight to sewer dependent upon QUU approval.

**Waste transport**

- Ensure the movement of hazardous materials and regulated wastes occurs at non- peak times to minimise the possibility of traffic conflicts and associated risks.
- Transportation of hazardous wastes, regulated wastes and contaminated soils must be undertaken by a suitably licensed waste contractor.
- Ensure that waste transport contractors have obtained the necessary qualifications and permits prior to undertaking waste transportation activities for the Project.
- Conduct waste tracking in accordance with legislative requirements.

**Disposal**

- Waste unable to be reused, recycled or recovered must be disposed of in appropriately licensed commercial landfill sites and sewage treatment systems.

**Hazardous materials or dangerous goods**

- Prepare and implement a Hazardous Goods Management Plan, as a sub-plan to the EMP, in consultation with Workplace Health and Safety Queensland.
- Undertake the storage and transport of any hazardous materials or dangerous goods in accordance with relevant Australian standards, legislative requirements and guidelines.
- Hazardous materials and potential sources of hazardous wastes must be documented and a register of hazardous and regulated waste updated and maintained as required. The register is required to be updated for each new hazardous material introduced on site.
- Safety Data Sheets (SDS) must be required to be kept at the storage location of all hazardous materials and dangerous goods.

Element 11	Waste management – Construction
	<ul style="list-style-type: none"> <li>• Provision will be made at the various construction work sites for the storage of Dangerous Goods (including fuel and hazardous waste), according to the Dangerous Goods Codes.</li> <li>• Undertake refuelling and maintenance activities within designated bunded areas to minimise the potential for soil and water contamination from these activities.</li> <li>• Prepare and implement, if required, spill response measures in relation to hazardous materials and dangerous goods.</li> <li>• Comply with the ENA Industry guideline for SF6 Management.</li> </ul> <p><b>Contaminated soil</b></p> <ul style="list-style-type: none"> <li>• Manage and dispose of contaminated soil to an approved disposal site in accordance with the requirements of the EP Act.</li> </ul> <p><b>Asbestos</b></p> <ul style="list-style-type: none"> <li>• All waste materials suspected of containing asbestos will be disposed to an appropriately licensed landfill by a certified asbestos waste contractor.</li> </ul> <p><b>Groundwater</b></p> <ul style="list-style-type: none"> <li>• Post-treatment, water will be captured by a drainage system at each of the stations and portals, and either transferred to a local treatment plant, treated and discharged to an approved point or discharged straight to sewer dependent upon QUU approval.</li> </ul> <p><b>On-site waste storage</b></p> <ul style="list-style-type: none"> <li>• Maintain accessible and stable areas at construction worksites for the storage of waste materials.</li> <li>• Ensure provision of bins at worksite common areas, fitted with lids and serviced prior to being filled to capacity.</li> </ul> <p><b>Demolition works</b></p> <ul style="list-style-type: none"> <li>• Where reasonable and practicable, implement demolition procedures that facilitate recovery of materials for re-use and segregation of different types of materials for recycling</li> <li>• The Project must comply with the requirements of the Energy Networks Association Industry Guideline in the removal and disposal of sulphur hexafluoride (SF6) filled electrical equipment.</li> <li>• Collect appropriate demolition materials and where possible, re-use on site, or transport to a recycling depot or facility.</li> <li>• Where reasonable and practicable, provide salvaging contractors the opportunity to salvage building materials prior to demolition so that applicable items can be re- used.</li> </ul>
Monitoring	<ul style="list-style-type: none"> <li>• Routine daily site inspections are to include monitoring capacity of waste storage facilities and arranging collections as required, monitoring for the presence of vermin or odours in association with waste storage or handling and monitoring for the presence of litter and general worksite tidiness.</li> <li>• Monitor for the presence of vermin, insects and pest levels and implement appropriate control measures, as required.</li> <li>• Records of the following waste management information, as a minimum, are to be kept throughout the construction phase: <ul style="list-style-type: none"> <li>– resource use and waste generated from demolition and construction works;</li> <li>– waste recovered and re-used;</li> <li>– waste disposed to landfill; and</li> <li>– waste transporter or contractor details (including company name, licensed operator name and license number).</li> </ul> </li> <li>• Also refer to Land Contamination (Element 4), Groundwater and surface water (Element 7).</li> </ul>
Reporting	<ul style="list-style-type: none"> <li>• Reporting on results of waste management inspections are to be included in the monthly construction compliance report, along with any complaints or incidents relating to waste storage and handling issues.</li> <li>• Quarterly reporting is to be provided in relation to of performance against targets established in the WRRMP for resource use and waste recovery.</li> </ul>

Element 11 Waste management – Construction	
	<ul style="list-style-type: none"> <li>• Within 24 hours of becoming aware of circumstances where waste material is released to the environment which may cause environmental harm, the incident must be reported DEHP. Corrective or remedial action as required to render the area safe and to avoid environmental harm must be taken as soon as reasonably practicable.</li> </ul>

Table 1.17 Element 12 - Indigenous cultural heritage

Element 12 Indigenous cultural heritage – Construction	
Environmental outcomes	<ul style="list-style-type: none"> <li>• Construction activities are managed to maintain cultural heritage values of sites, places and values within and adjacent to construction worksites.</li> </ul>
Performance criteria	<ul style="list-style-type: none"> <li>• Aboriginal Cultural Heritage Management Plan(s) (CHMPs) are prepared and approved in accordance with the <i>Aboriginal Cultural Heritage Act 2003</i> (ACH Act), prior to commencement of any ground disturbance works.</li> <li>• Construction activities comply with the requirements of the approved CHMP(s) under the ACH Act.</li> <li>• All personnel involved in, or supervising construction works have completed either the TMR Indigenous Cultural Heritage Induction or another cultural heritage induction course specified in an approved CHMP.</li> <li>• Construction impacts, such as excessive dust deposition, excessive vibration or excessive settlement, do not affect places of Indigenous cultural heritage.</li> </ul>
Mitigation measures	<ul style="list-style-type: none"> <li>• Obtain an approved CHMP in accordance with the ACH Act.</li> <li>• Cultural heritage awareness training should be included in site induction processes, alerting workers to any heritage places in the vicinity, and outlining appropriate management procedures.</li> <li>• All construction works are to be undertaken in accordance with the approved CHMP.</li> <li>• To protect places of indigenous cultural heritage from excessive dust deposition, vibration and settlement, construction works are to be undertaken in accordance with Element 10 – Air quality, Element 11 – Noise and vibration and Element 3 – Geology and soils, respectively.</li> <li>• Explore opportunities for acknowledgment of a locality's significance to Aboriginal people (e.g. establishment of signage or public art or through involvement of Indigenous people in any ground-breaking ceremonies that might precede construction works). This could include: <ul style="list-style-type: none"> <li>– Consideration of opportunities for Aboriginal people to be involved in the construction and development of the Project, including opportunities for traineeships and employment on the Project;</li> <li>– Consideration of the planting of native vegetation, including food plants, as part of the revegetation strategy for the Project;</li> <li>– Maintenance of gardens and lawns around the stations to sustain native vegetation;</li> <li>– Consideration of the use of properties acquired for the Project to provide services and affordable housing for Aboriginal people; and</li> <li>– Consideration of the return of remnant land acquired for the Project to Aboriginal Parties.</li> </ul> </li> <li>• Discussions and negotiations with representatives regarding native title matters, cultural heritage and land use strategy, prior to commencement of construction of the Project.</li> <li>• The removal or clearing of vegetation for the Project within the native title claim area be monitored as prescribed in the CHMP.</li> </ul>
Monitoring	<ul style="list-style-type: none"> <li>• Monitoring is to be undertaken in accordance with the approved CHMP.</li> <li>• Routine daily site inspections are to include assessment of any exclusion fencing or signage protecting cultural heritage values to determine effectiveness.</li> </ul>
Reporting	<ul style="list-style-type: none"> <li>• Subject to the CHMP and confidentiality requirements, reporting of any cultural heritage finds and inspections of cultural heritage protection measures are to be included in the monthly construction compliance report, along with any complaints or incidents relating to cultural heritage issues.</li> <li>• Reporting to be completed as outlined in the approved CHMP.</li> </ul>

Table 1.18 Element 13 - Non-Indigenous cultural heritage

Element 13 Non-Indigenous cultural heritage – Construction	
Environmental outcomes	<ul style="list-style-type: none"> <li>• Construction activities are managed to maintain cultural heritage values of identified places of historical value, within and adjacent to the construction worksites and tunnel alignment.</li> <li>• Construction activities are managed to maintain scientific values of any archaeological places uncovered during Project works.</li> <li>• New infrastructure is sympathetic in design to the aesthetic significance of cultural heritage places in the vicinity.</li> </ul>
Performance criteria	<ul style="list-style-type: none"> <li>• Construction activities do not adversely impact on places of historical heritage value directly, or indirectly through excessive dust deposition, excessive vibration, or excessive settlement.</li> <li>• A Heritage Management Plan is prepared and approved for all places of state or local historical heritage significance likely to be impacted by works prior to these works commencing. An overarching management plan is prepared in respect of places of local heritage value.</li> <li>• Any archaeological places uncovered are appropriately managed.</li> <li>• All personnel involved in, or supervising construction works have completed either the TMR Cultural Heritage Induction or another cultural heritage induction course.</li> </ul>
Mitigation measures	<ul style="list-style-type: none"> <li>• Where predictive modelling indicates ground-borne vibration or settlement would present a risk, conduct building condition surveys of each building of Commonwealth or State heritage significance prior to and upon completion of the works. Building condition surveys would be undertaken to identify and document pre and post construction conditions. Necessary building condition surveys are to be undertaken by a person suitably qualified in condition assessments of heritage buildings.</li> <li>• Consistent with any conditions imposed, prepare a Heritage Management Plan for places of historical cultural heritage value likely to be impacted by construction works to guide and manage construction and to ensure the identified values of such places are maintained.</li> <li>• Preparation of the Heritage Management Plan is to be informed by the condition survey report and by predictive modelling of criteria relevant to each place (e.g. vibration, settlement) and is to include mitigation measures to achieve the environmental outcomes in relation to heritage values for each place.</li> <li>• Preparation of an archaeological management plan for protection of archaeological sites prior to and during construction.</li> <li>• Cultural heritage awareness training to be included in employee induction processes, to ensure workers are aware of heritage places in the vicinity of proposed works and proposed management procedures.</li> <li>• Where harm to historical heritage values cannot be reasonably or practically avoided, undertake archival recording of cultural heritage values with the advice of an appropriately qualified heritage consultant.</li> <li>• Archaeological test pitting is to be conducted in places of high to outstanding archaeological potential prior to construction activities involving surface ground disturbance commencing, including parts of Albert Street and Charlotte Street. The results of these test pits will inform management responses. A specific works procedure is to be implemented for unexpected archaeological finds.</li> <li>• To protect places of historical heritage from excessive dust deposition, vibration and settlement, construction works are to be undertaken in accordance with Element 10 – Air quality, Element 11 – Noise and vibration and Element 3 – Geology and soils, respectively.</li> </ul>
Monitoring	<ul style="list-style-type: none"> <li>• Monitoring is to be conducted for historical heritage places identified in a Heritage Management Plan as being at risk of damage during construction, in accordance with the approved management plan.</li> <li>• Based on the results of test pitting, archaeological monitoring may be employed where necessary during ground disturbance works in places of high to outstanding archaeological potential (alternatively, the test pits may indicate that open area archaeological excavation is the appropriate management response).</li> <li>• Routine daily site inspections are to include assessment of effectiveness of any exclusion fencing or signage protecting cultural heritage values.</li> </ul>



<b>Element 13 Non-Indigenous cultural heritage – Construction</b>	
Reporting	<ul style="list-style-type: none"> <li>Archaeological finds are to be immediately reported to the relevant worksite supervisor, who is to inform the Project's cultural heritage coordinator. Finds of potential state significance are to be reported to DEHP by the Project's cultural heritage coordinator.</li> <li>Reporting of any cultural heritage finds and inspections of cultural heritage protection measures are to be included in the monthly construction compliance report, along with any complaints or incidents relating to cultural heritage issues.</li> <li>On completion of construction works, a report on historical heritage places is to be prepared in accordance with the approved Heritage Management Plan.</li> <li>On completion of construction works, a report is to be prepared on any archaeological places or objects exposed or recovered.</li> </ul>

Table 1.19 Element 14 - Social environment

<b>Element 14 Social environment – Construction</b>	
Environmental outcomes	<ul style="list-style-type: none"> <li>Avoid, or minimise and mitigate impacts from construction activities on local businesses and the social environment.</li> </ul>
Performance criteria	<ul style="list-style-type: none"> <li>Impacts on local amenity and community life are avoided or minimized and managed.</li> <li>Impacts on the use and functioning of social infrastructure and local businesses near the Project are avoided or minimised, mitigated or managed.</li> <li>Safe access is maintained near to construction worksites and construction works, including to social infrastructure and businesses.</li> <li>Interactions between the construction workforce and local communities are positive and reflect the implementation of a workforce code of behaviour.</li> <li>Communities and local businesses likely to be directly affected by construction works are aware of the works in advance of their commencement and are aware of the procedures for making complaints about construction works.</li> </ul>
Mitigation measures	<ul style="list-style-type: none"> <li>Maintain safe and efficient pedestrian and vehicle access, including delivery vehicle access, to businesses near to the construction worksites and other construction works, including providing alternative access, where required.</li> <li>Undertake early and on-going notification in accordance with the community and stakeholder engagement plan with business owners near to construction worksites or other construction works. In particular, this is to include, but not be limited to businesses near: <ul style="list-style-type: none"> <li>Kent Street (Southern portal);</li> <li>Boggo Road, Peter Doherty Street, Joe Baker Street (Boggo Road Station);</li> <li>Stanley Street, Vulture Street and Main Street, (Woolloongabba Station);</li> <li>Margaret, Mary, Charlotte, Elizabeth and Albert Street, (Albert Street Station);</li> <li>Roma Street and Brisbane Transit Centre, (Roma Street Station);</li> <li>Gregory Terrace (Northern portal);</li> <li>O'Connell Terrace, Exhibition Station (Exhibition Station); and</li> <li>Abbotsford Road, Mayne Yard.</li> </ul> </li> <li>Undertake on-going consultation with the RNA to ensure suitable access is maintained to the RNA Showgrounds for livestock and delivery vehicles during the Ekka and other major scheduled events at the RNA Showgrounds. General road access is also to be maintained to the RNA Showgrounds during the course of the Project works.</li> <li>Develop and implement a workforce code of behaviour to apply to workers approaching and departing worksites particularly at changes of shifts. The code of behaviour should address among other things, car parking, noisy activities and behaviours especially outside standard working hours, litter management, and general demeanour.</li> <li>Develop and implement a Charter for Local Content for the Project in accordance with the Queensland Government Local Industry Policy.</li> <li>Develop and distribute information packages to affected businesses providing information on available assistance services.</li> </ul>

Element 14	Social environment – Construction
	<ul style="list-style-type: none"> <li>• Undertake early and on-going consultation via the Community Advisory Group, chaired by the Community Relations Monitor and in accordance with the community and stakeholder engagement plan with managers of community facilities above the tunnel alignment or near to construction worksites or other construction works. In particular, this is to include, but not be limited to: <ul style="list-style-type: none"> <li>– Princess Alexandra Hospital and the Translational Research Institute;</li> <li>– Dutton Park State School at Dutton Park;</li> <li>– CSIRO and ESA Village – Leukaemia Foundation at Boggo Road Urban Village;</li> <li>– The Gabba Stadium, and Russian Orthodox Cathedral of St Nicholas at Woolloongabba;</li> <li>– Centenary Pool, Brisbane Grammar School, and Brisbane Girls Grammar School at Spring Hill;</li> <li>– Royal Brisbane and Womens Hospital; and</li> <li>– RNA Showgrounds, Bowen Hills.</li> </ul> </li> <li>• Undertake consultation with managers of the Gabba Stadium to ensure planning of major construction works or haulage activities considers the timing of and effects on major events.</li> <li>• Maintain safe access for pedestrians and cyclists near to construction worksites and other construction works, which complies with the <i>Disability Discrimination Act 1992</i> and considers CPTED principles.</li> <li>• Reinstate open space areas disturbed by construction activities (i.e. Victoria Park – temporary diverted bicycle path) progressively and as soon as practicable following construction.</li> <li>• Involve the Traditional Owners, local communities and other relevant stakeholders, in rehabilitation of open space areas affected by construction activities. This may include: <ul style="list-style-type: none"> <li>– Consideration of opportunities for Aboriginal people to be involved in the construction and development of the Project, including opportunities for traineeships and employment on the Project;</li> <li>– Consideration of the planting of native vegetation, including food plants, as part of the revegetation strategy for the Project; and</li> <li>– Maintenance of gardens and lawns around the stations to sustain native vegetation.</li> </ul> </li> </ul>
Monitoring	<ul style="list-style-type: none"> <li>• Monitor consultation with and feedback from local business owners.</li> <li>• Monitor community complaints system for number and types of complaints.</li> <li>• Monitor employment records for employment diversity.</li> <li>• Monitor procurement spend reports for Project spending on goods and services with local and regional providers.</li> <li>• Monitor environmental monitoring reports for results on dust, noise and air quality changes to evaluate potential impacts on amenity.</li> <li>• Project safety reporting to monitor safety incidents and near misses that may impact on workforce health and wellbeing as well as the general community.</li> </ul>
Reporting	<ul style="list-style-type: none"> <li>• Complaints received from local businesses during construction are to be reported in the monthly construction compliance report along with details of the response provided.</li> <li>• Complaints and feedback received from the community via the community complaints system or the community contact points during construction are to be reported in a monthly community feedback report, along with details of the response provided.</li> <li>• Include records of consultation activities and outcomes in monthly reporting.</li> </ul>

Table 1.20 Element 15 - Hazard and risk

Element 15 Hazard and risk – Construction	
Environmental outcomes	<ul style="list-style-type: none"> <li>Construction activities are managed to mitigate the risks associated with inundation, construction failures or incidents, tunnel collapse, fire and life safety, hazardous chemicals, and traffic hazards.</li> </ul>
Performance criteria	<ul style="list-style-type: none"> <li>A safe working environment is maintained for the construction workforce, near neighbours and passers-by, including pedestrians, cyclists and motorists.</li> <li>The Project hazard and risk register is maintained as a current and accurate central record of Project hazards and risk reduction/mitigation strategies that are adopted throughout construction.</li> <li>A Project hazard and risk register is implemented and maintained as a current and accurate central record of Project hazards and risk reduction/mitigation strategies for the full duration of the construction phase.</li> </ul>
Mitigation measures	<ul style="list-style-type: none"> <li>Develop and implement a Risk Management Plan that considers the potential risks associated with construction including, but not limited to: <ul style="list-style-type: none"> <li>risk minimisation and incident management;</li> <li>inundation of surface works;</li> <li>flood inundation of the underground works;</li> <li>tunnel collapse;</li> <li>fire and life safety;</li> <li>hazardous chemicals and dangerous goods; and</li> <li>traffic hazards associated with construction traffic.</li> </ul> </li> <li>The management plan must be prepared in consultation with Emergency Service Authorities in cooperation with the Coordinator General and should consider the requirements of the Hazard and Risk Assessment Planning Scheme Policy of BCC's Planning Scheme.</li> <li>Implement, review and maintain a hazard and risk register as the current and central record of Project hazards and risk reduction/mitigation strategies that will be adopted throughout construction.</li> <li>Implement risk mitigation strategies for the hazards identified for each Project aspect in the hazard and risk register.</li> <li>Establish procedures for communication with the Rail Infrastructure Manager about construction activities in or near to the rail corridor and potential hazards and risks.</li> <li>Establish procedures for communication with TMR, BCC and TMR about potential hazards and risks associated with construction activities in or near to state and local roads, and busways.</li> <li>Prior to the commencement of construction, prepare emergency response and incident management procedures, and implement in the event of accidents and emergencies. These are to be prepared in consultation with Emergency Service Authorities and include as a minimum: <ul style="list-style-type: none"> <li>responsibilities in the event of an incident;</li> <li>traffic management and control systems;</li> <li>evacuation routes in the event of an incident;</li> <li>education and training programme for the construction workforce on the procedures; and</li> <li>procedures for conducting simulated emergency response exercise. This is to be conducted at least once within 12 months of the commencement of construction works.</li> </ul> </li> <li>Ensure that access for emergency services vehicles to construction worksites and other work areas is provided and maintained at all times.</li> <li>Establish a communication process with Emergency Service Authorities in relation to temporary road closures and disruptions and relocation of water mains that would affect hydrants near construction works.</li> <li>Provide fire and life safety measures, including ventilation, smoke extraction and firefighting systems for enclosed spaces and enclosed work areas such as underground works areas, acoustic enclosures and sheds, for the duration of construction.</li> <li>Develop a construction methodology that complies with the Rail Infrastructure Manager's standards for track isolation and protection of rail infrastructure.</li> <li>Develop and implement an inspection and maintenance schedule for plant and equipment used at construction worksites.</li> </ul>

Element 15 Hazard and risk – Construction	
	<ul style="list-style-type: none"> <li>• Ensure that the storage of flammable and combustible liquids complies with AS 1940 and the WHS Act.</li> </ul>
Monitoring	<ul style="list-style-type: none"> <li>• Routine worksite safety inspections and hazard and risk assessments are to be carried out each month during construction.</li> <li>• Within 12 months of the commencement of construction works, a simulated emergency response exercise is to be conducted in conjunction with the above- mentioned Emergency Services, on at least one occasion.</li> </ul>
Reporting	<ul style="list-style-type: none"> <li>• Ensure any incident is reported immediately on completion of the incident investigation and the Project hazard and risk register is updated as required.</li> <li>• At least two months prior to the commencement of construction work at any construction site, a hazard and risk sub-plan of the CEMP is to be submitted to the above-mentioned Emergency Services for consultation on elements related to emergency services access to project worksites and associated procedures, including, but not limited to:               <ul style="list-style-type: none"> <li>– worksite accessibility for emergency services vehicles to the road network and construction sites;</li> <li>– maintenance of essential urban services (water, power);</li> <li>– transport and the use and storage of hazardous chemicals and dangerous goods at worksites; and</li> <li>– communication procedures during incidents.</li> </ul> </li> </ul>

Table 1.21 Element 16 - Climate change and sustainability

Element 16 Climate change and sustainability – Construction	
Environmental outcomes	<ul style="list-style-type: none"> <li>• Ensure, through design that the Project is adaptable to conditions that may arise as a result of climate change.</li> <li>• Ensure that the Project design minimises energy demand and lifecycle energy consumption.</li> </ul>
Performance criteria	<ul style="list-style-type: none"> <li>• The Project design accommodates the predicted 2100 sea level rise.</li> <li>• The Project design achieves specific energy efficiency and resource efficiency measures.</li> <li>• Material use is minimised and the reuse and recycle of materials is maximised.</li> <li>• The use of potable water supply and energy in construction is minimised.</li> </ul>
Mitigation measures	<ul style="list-style-type: none"> <li>• Design the Project infrastructure to achieve immunity for a predicted 1.0m sea level rise scenario in 2100.</li> <li>• Investigate during the detailed design phase, the potential for additional energy efficiency measures to be incorporated into the design and construction of the Project.</li> <li>• Identify opportunities to incorporate water efficiency and energy efficiency measures into the Project design.</li> <li>• Identify and implement measures to maximise the use of grey water or capture, store and use stormwater or seepage groundwater for construction activities.</li> <li>• Investigate opportunities to maximise the re-use of spoil on the Project or for other projects, subject to requirements of the Commonwealth Government with regards the referral made pursuant to the <i>Environment Protection and Biodiversity Conservation Act 1999</i>.</li> <li>• Implement measures to avoid and reduce, re-use and recycle materials use across construction activities.</li> <li>• Develop a sustainable procurement strategy.</li> <li>• Undertake a greenhouse gas (GHG) emissions inventory in line with the GHG protocol for all phases of the Project.</li> <li>• Pursue an Infrastructure Sustainability Council of Australia (ISCA) Sustainability Rating.</li> <li>• Develop and implement a local procurement policy for goods and services.</li> <li>• Create a Sustainability Tool during Detailed Design to track initiatives and requirements.</li> </ul>

<b>Element 16 Climate change and sustainability – Construction</b>	
Monitoring	<ul style="list-style-type: none"> <li>• Monitor that measures are incorporated into the Detailed Design and that measures are followed through to construction and operation.</li> <li>• Regular monitoring (weekly) of the worksites for compliance with Waste and Resource Recovery Management Plan developed during Detailed Design for the Project.</li> <li>• Monitor energy consumption and potable water use monthly.</li> <li>• Monitor the implementation of adopted sustainability requirements.</li> </ul>
Reporting	<ul style="list-style-type: none"> <li>• Half-yearly sustainability reporting for all relevant aspects and monitoring results for compliance with this Draft Outline EMP.</li> <li>• Energy consumption and potable water use to be reported on monthly.</li> <li>• Maintain the Sustainability Tool for the Project, by auditing and reporting on the sustainability design requirements that have been incorporated into the final design.</li> </ul>

## 1.10 EMP (Commissioning)

The general requirements, the environmental outcomes and performance criteria for each environmental element relevant to the Project's commissioning phase are set out below. Mitigation measures to achieve the environmental outcomes and performance criteria in relation to the Reference Design are also recommended. Monitoring requirements and statutory requirements are provided for some environmental elements.

### 1.10.1 General Commissioning Requirements

A key action for the commissioning process is the verification that the Project has been constructed, in accordance with the detailed design and achieves the environmental outcomes sought through detailed design and the environmental design requirements.

Once satisfied on this aspect, the Proponent, will notify the Coordinator-General of the outcome of the verification process.

### 1.10.2 Commissioning

The environmental elements relevant to the EMP (Commissioning) are:

- Transport;
- Visual amenity and lighting;
- Groundwater and surface water;
- Air quality;
- Noise and vibration;
- Waste management;
- Hazard and risk;
- Geology and soils; and
- Climate change and sustainability.

The elements for the EMP (Commissioning) are outlined in the following tables.

Table 1.22 Element 1 - Transport

Element 1	Transport – Commissioning
Environmental outcomes	<ul style="list-style-type: none"> <li>• Access for emergency services is provided.</li> <li>• Safe and efficient access for pedestrians and cyclists is provided in the vicinity of Project stations.</li> </ul>
Performance criteria	<ul style="list-style-type: none"> <li>• The Project is commissioned in accordance with the Rail Infrastructure Manager's and TMR procedures, and the <i>Transport Operations (Passenger Transport) Act 1994</i>.</li> <li>• An emergency response and management plan is agreed by the Project operators and the emergency services authorities prior to the commencement of operations.</li> <li>• Pedestrian and cyclist access during peak periods, major events and emergency incidents is provided in the vicinity of Project stations.</li> <li>• Safety Management Systems are prepared by the rail transport operator during commissioning.</li> </ul>
Mitigation measures	<ul style="list-style-type: none"> <li>• Consult with the Department of Fire and Emergency Services about emergency access arrangements to work areas in preparing and implementing an emergency access management plan.</li> <li>• Ensure emergency service access is maintained to the tunnel systems and stations.</li> <li>• Consult with BCC, Bicycle Queensland, TMR and the Rail Infrastructure Manager, in developing and implementing measures to manage pedestrian and cyclist access to stations during peak periods, major events and emergency incidents.</li> </ul>

Element 1 Transport – Commissioning	
	<ul style="list-style-type: none"> <li>Commission closed circuit television (CCTV) surveillance of: <ul style="list-style-type: none"> <li>the proposed pedestrian and cycle pathway connecting the PA Hospital precinct with Boggo Road Urban Village, Boggo Road Busway Station and Park Road Railway Station; and</li> <li>pedestrian and cycle paths approaching the Woolloongabba, Albert Street, Roma Street, and Exhibition Stations.</li> </ul> </li> <li>Develop and implement a community education and awareness strategy about the commencement of Project operations and how operations may affect local movements during major events and emergencies.</li> <li>Develop and implement, in consultation with BCC, local traffic and parking management plans, which may include resident parking schemes for local streets in the vicinity of the Projects stations.</li> </ul>
Monitoring	<ul style="list-style-type: none"> <li>In the commissioning period: <ul style="list-style-type: none"> <li>monitor pedestrian crowding on footpaths in the vicinity of Roma Street Station during the morning and evening weekday peak periods;</li> <li>monitor pedestrian crowding on footpaths in the vicinity of Woolloongabba Station, Roma Street Stations and Exhibition Station, during major events at the Gabba Stadium, Lang Park and the RNA Showgrounds;</li> <li>monitor effective implementation of emergency management plans;</li> <li>monitor effective management of pedestrian movement and crowding within the stations and on the platforms.</li> </ul> </li> </ul>
Reporting	<ul style="list-style-type: none"> <li>As required by Rail Infrastructure Manager and TMR procedures.</li> </ul>

Table 1.23 Element 2 – Visual amenity and lighting

Element 2 Visual amenity and lighting – Commissioning	
Environmental outcomes	<ul style="list-style-type: none"> <li>Lighting, landscaping and urban design treatments, including noise barriers, are designed and maintained to contribute and integrate effectively with the surrounding urban and landscape environment, achieving a reasonable visual amenity and passenger safety.</li> </ul>
Performance criteria	<ul style="list-style-type: none"> <li>Landscaping and urban design treatments proposed in detailed design are maintained to achieve specifications.</li> <li>Noise barriers are designed and installed in consultation with near neighbours to minimise adverse visual and amenity impacts.</li> <li>Lighting is maintained in accordance with the standards determined by the Rail Infrastructure Manager and TMR policies and procedures and in accordance with the standards set out in the <i>Disability Discrimination Act 1992</i>.</li> <li>Landscaping and urban design treatments must achieve CPTED principles.</li> </ul>
Mitigation measures	<ul style="list-style-type: none"> <li>No specific mitigation measures are provided. Where monitoring detects that the environmental outcome is not achieved, the Proponent must rectify the design and installation of lighting, landscaping and noise barriers accordingly.</li> </ul>
Monitoring	<ul style="list-style-type: none"> <li>As required by the Rail Infrastructure Manager and TMR procedures, and conditions of approval.</li> </ul>
Reporting	<ul style="list-style-type: none"> <li>As required by the Rail Infrastructure Manager and TMR procedures, and conditions of approval.</li> </ul>

Table 1.24 Element 3 – Groundwater and surface water

<b>Element 3 Groundwater and surface water – Commissioning</b>	
<b>Environmental outcomes</b>	<p><b>Groundwater</b></p> <ul style="list-style-type: none"> <li>• Groundwater quality surrounding the Project is generally comparable with pre- construction levels.</li> <li>• Groundwater levels surrounding the Project are generally comparable with pre- construction levels.</li> <li>• Discharge of groundwater from the Project does not adversely impact on the environmental values of receiving waters.</li> </ul> <p><b>Surface water</b></p> <ul style="list-style-type: none"> <li>• Operation of the Project does not adversely impact on the environmental values of receiving surface waters.</li> </ul>
<b>Performance criteria</b>	<p><b>Groundwater</b></p> <ul style="list-style-type: none"> <li>• Groundwater inflow to the Project tunnel is managed, treated (as required) and disposed of so as not to cause environmental harm.</li> <li>• Groundwater released from the Project to receiving waters complies with Groundwater Quality Objectives table in Element 7 – Groundwater and surface water – construction.</li> </ul> <p><b>Surface water</b></p> <ul style="list-style-type: none"> <li>• Environmental values of surface waters are maintained.</li> <li>• No release of sediment or other water-borne contaminants to surface waters (stormwater drains, sewage network and waterways) occurs as a result of runoff or discharges/spills from operating procedures.</li> </ul>
<b>Mitigation measures</b>	<p><b>Groundwater</b></p> <ul style="list-style-type: none"> <li>• Contaminated groundwater entering the tunnel and underground stations is treated and managed.</li> <li>• Spills and leaks of fuels or chemicals are managed so as not to cause environmental harm.</li> </ul> <p><b>Surface water</b></p> <ul style="list-style-type: none"> <li>• Measures are implemented in accordance with the rail operator procedures for managing impacts on surface water quality.</li> <li>• Measures are implemented to contain and prevent fire retardants and other chemicals entering a watercourse in the event of an emergency or incident arising from commissioning of the Project.</li> <li>• Implement the rail operating procedures in relation to the storage and handling of fuels and chemicals and the management of spills and leaks.</li> <li>• Rainfall and rising water levels will be monitored. Flood preparation and emergency response procedures will be enacted</li> </ul>
<b>Monitoring</b>	<p><b>Groundwater</b></p> <ul style="list-style-type: none"> <li>• Groundwater inflows to the tunnel and underground stations are monitored to identify significant changes in quality or quantity.</li> <li>• Regularly monitor the surrounding ground water aquifer with respect to drawdown and quality. Assess deviations from seasonal baseline groundwater levels and identify/ formulate appropriate mitigation options.</li> </ul> <p><b>Surface water</b></p> <ul style="list-style-type: none"> <li>• Where an uncontrolled release of contaminants, chemicals or fuels occurs, monitor the surface water flows at collection points and at the approved point of discharge; and</li> <li>• Otherwise monitor surface water discharges as required by the Rail Infrastructure Manager's procedures.</li> </ul>



<b>Element 3      Groundwater and surface water – Commissioning</b>	
Reporting	<ul style="list-style-type: none"> <li>• An incident report must be prepared within ten business days of the receipt of the determinations that indicate that the Water Quality Objectives have not been achieved, including a statement describing the corrective actions and mitigation measures.</li> <li>• As required by the rail operator procedures.</li> </ul>

Table 1.25 Element 4 – Air quality

<b>Element 4      Air quality – Commissioning</b>	
Environmental outcomes	<ul style="list-style-type: none"> <li>• The Project ventilation system achieves the environmental design requirements.</li> </ul>
Performance criteria	<ul style="list-style-type: none"> <li>• Emissions from the Project do not cause an exceedance of the ambient air quality goals set out in Table 1 (environmental design requirements).</li> </ul>
Mitigation measures	<ul style="list-style-type: none"> <li>• Where commissioning tests identify a potential for recurring exceedances of any of the goals as a consequence of emissions contributions from the station ventilation systems, such systems are to be refined, modified and subject to enhanced operating procedures to achieve the goals and the environmental outcome.</li> </ul>
Monitoring	<ul style="list-style-type: none"> <li>• Monitor as required by the Rail Infrastructure Manager's Standard: Environmental Management System.</li> </ul>
Reporting	<ul style="list-style-type: none"> <li>• Commissioning test report, and then periodically in accordance with the standard operating procedures developed for the Project.</li> </ul>
Note	<ul style="list-style-type: none"> <li>• Air quality in the tunnels and underground stations will be managed to achieve operational health and safety requirements specified for the Project design.</li> </ul>

Table 1.26 Element 5 – Noise and vibration

Element 5 Noise and vibration – Commissioning																				
Environmental outcomes	<ul style="list-style-type: none"> <li>The Project operations maintain a reasonable acoustic environment, including human comfort, normal daily life and urban amenity for people living and working adjacent to the Project infrastructure.</li> </ul>																			
Performance criteria	<ul style="list-style-type: none"> <li>Where practicable, the Project achieves the noise criteria for railway airborne noise emissions:                             <ul style="list-style-type: none"> <li>65 dBA, evaluated as the 24 hour average equivalent continuous A-weighted sound pressure level; and</li> <li>87 dBA, evaluated as a Single Event Maximum sound pressure level.</li> </ul> </li> </ul> <p><b>Ground-borne noise and vibration goals</b></p> <ul style="list-style-type: none"> <li>The Project operates generally within the goals for ground-borne noise and vibration outlined in Table 2 and Table 3 (environmental design requirements).</li> </ul> <p><b>Surface mechanical plant and ventilation</b></p> <ul style="list-style-type: none"> <li>Surface mechanical plant and ventilation systems operate within the noise goals in Table 10.</li> </ul> <p><b>Table 10: Mechanical plant noise goals (operations)</b></p> <table border="1"> <thead> <tr> <th>Receiver</th> <th>Time of day</th> <th>Background (b/g) noise creep dBA LA<sub>90</sub> (1hour)</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Residential (for outdoors)</td> <td>07:00 – 22:00</td> <td>b/g +0</td> </tr> <tr> <td>22:00 – 07:00</td> <td>b/g +0</td> </tr> <tr> <td rowspan="2">Residential (for outdoors)</td> <td>07:00 – 22:00</td> <td>-</td> </tr> <tr> <td>22:00 – 07:00</td> <td>-</td> </tr> <tr> <td>Library and educational institution (including a school, college and university) (for outdoors)</td> <td>When open for business or when classes are being offered</td> <td>-</td> </tr> <tr> <td>Commercial and retail activity (for indoors)</td> <td>When the activity is open for business</td> <td>-</td> </tr> </tbody> </table>	Receiver	Time of day	Background (b/g) noise creep dBA LA <sub>90</sub> (1hour)	Residential (for outdoors)	07:00 – 22:00	b/g +0	22:00 – 07:00	b/g +0	Residential (for outdoors)	07:00 – 22:00	-	22:00 – 07:00	-	Library and educational institution (including a school, college and university) (for outdoors)	When open for business or when classes are being offered	-	Commercial and retail activity (for indoors)	When the activity is open for business	-
Receiver	Time of day	Background (b/g) noise creep dBA LA <sub>90</sub> (1hour)																		
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Residential (for outdoors)	07:00 – 22:00	-																		
	22:00 – 07:00	-																		
Library and educational institution (including a school, college and university) (for outdoors)	When open for business or when classes are being offered	-																		
Commercial and retail activity (for indoors)	When the activity is open for business	-																		
Mitigation measures	<ul style="list-style-type: none"> <li>Resilient track fasteners are installed if monitoring indicates a potential exceedance of the ground-borne noise and vibration goals.</li> </ul>																			
Monitoring	<ul style="list-style-type: none"> <li>Monitor in response to complaints received during commissioning.</li> <li>Monitor for ground-borne noise and vibration at selected sensitive receivers during commissioning.</li> </ul>																			
Reporting	<ul style="list-style-type: none"> <li>As required by the Rail Infrastructure Manager and TMR procedures.</li> </ul>																			

Table 1.27 Element 6 – Waste

<b>Element 6 Waste – Commissioning</b>	
Environmental outcomes	<ul style="list-style-type: none"> <li>Waste generation is avoided where possible and if unavoidable, minimised.</li> <li>Risks to human health or the environment associated with the transport, storage, handling or disposal of waste are known and managed to minimise such risks.</li> </ul>
Performance criteria	<ul style="list-style-type: none"> <li>Waste minimisation strategies are implemented in accordance with the Rail Infrastructure Manager and TMR procedures.</li> <li>Waste is collected, transported, stored, handled and disposed in accordance statutory requirements.</li> </ul>
Mitigation measures	<ul style="list-style-type: none"> <li>Implement measures to manage waste generated by the Project in accordance with the Rail Infrastructure Manager and TMR policies and procedures.</li> </ul>
Monitoring	<ul style="list-style-type: none"> <li>Monitor resource usage and waste generated in accordance with the Rail Infrastructure Manager and TMR procedures.</li> </ul>
Reporting	<ul style="list-style-type: none"> <li>As required by the Rail Infrastructure Manager and TMR procedures.</li> </ul>

Table 1.28 Element 7 – Hazard and risk

<b>Element 7 Hazard and risk – Commissioning</b>	
Environmental outcomes	<ul style="list-style-type: none"> <li>Risks to people and the environment associated with potential hazards are known and understood, and managed to minimise risks to as low as reasonably practical.</li> </ul>
Performance criteria	<ul style="list-style-type: none"> <li>Potential hazards are identified and managed to mitigate risks to as low as reasonably practical for people and the environment.</li> <li>A commissioning hazard and risk management plan is developed, implemented, reviewed and updated as required.</li> </ul>
Mitigation measures	<ul style="list-style-type: none"> <li>Implement the commissioning hazard and risk management plan.</li> </ul>
Monitoring	<ul style="list-style-type: none"> <li>As required by the Rail Infrastructure Manager and TMR procedures.</li> </ul>
Reporting	<ul style="list-style-type: none"> <li>As required by the Rail Infrastructure Manager and TMR procedures.</li> </ul>

Table 1.29 Element 8 – Geology and soils

<b>Element 8 Geology and soils – Commissioning</b>	
Environmental outcomes	<ul style="list-style-type: none"> <li>Erosion and sedimentation are controlled to achieve background levels.</li> <li>Settlement is within the nominated parameters established in the settlement analysis for the environmental design requirements.</li> </ul>
Performance criteria	<ul style="list-style-type: none"> <li>The Water Quality Objectives in receiving waters are not worsened by the Project commissioning.</li> <li>There is no soil erosion attributed to the Project commissioning.</li> <li>Settlement is limited generally to 25mm or to 50mm in a worst case event, measured at any location within 50m of the route centreline or the outer walls of an underground station or excavated structure (excluding designated worksites and surface properties owned by the proponent).</li> </ul>

<b>Element 8 Geology and soils – Commissioning</b>	
Mitigation measures	<ul style="list-style-type: none"> <li>Erosion and sediment controls provided for the Project are to be monitored periodically and maintained by the Proponent throughout the commissioning period.</li> <li>In the event of settlement exceeding the performance criteria, prepare a new building condition survey report and recommendations for repairing building damage.</li> </ul>
Monitoring	<ul style="list-style-type: none"> <li>As required by the Rail Infrastructure Manager and TMR procedures.</li> </ul>
Reporting	<ul style="list-style-type: none"> <li>As required by the Rail Infrastructure Manager and TMR procedures.</li> </ul>

Table 1.30 Element 9 – Climate change and sustainability

<b>Element 9 Climate change and sustainability – Commissioning</b>	
Environmental outcomes	<ul style="list-style-type: none"> <li>Energy demand and consumption by the Project is minimised.</li> <li>Use of potable water by the Project is minimised.</li> <li>GHG emissions from the operation of the Project are minimized.</li> </ul>
Performance criteria	<ul style="list-style-type: none"> <li>Ventilation for underground stations achieves energy targets nominated in the environmental design requirements while maintaining a steady flow of fresh air to all pedestrian and working areas.</li> </ul>
Mitigation measures	<ul style="list-style-type: none"> <li>Maintain energy consuming plant and equipment to ensure optimal performance.</li> <li>Maximise the use of greywater and stormwater or groundwater collected from the Project, including in the maintenance of landscaping.</li> </ul>
Monitoring	<ul style="list-style-type: none"> <li>As required by the Rail Infrastructure Manager and TMR procedures.</li> </ul>
Reporting	<ul style="list-style-type: none"> <li>As required by the Rail Infrastructure Manager and TMR procedures.</li> </ul>

## Appendix A - Glossary

## Glossary

While the EMP is provided as a guide document for the preparation of a detailed Construction EMP and Commissioning EMP, it contains a number of terms to which particular meanings are attributed. The terms and their meanings are provided in the glossary below.

Term	Meaning
Affected entity	An entity being either the owner or occupant of premises for which predictive modelling or monitoring indicates the performance criteria for an environmental element would be exceeded by Project impacts during construction or commissioning.
Conditions of approval	Conditions specified in the Coordinator-General's Evaluation Report and the Change Report and any subsequent Change Reports issued by the Coordinator-General, along with any other statutory approvals related to the Project.
Construction phase	Phase relating to construction, including site establishment, early works, construction and site decommissioning and rehabilitation activities.
Construction works	<p>Any work undertaken to implement the Project.</p> <p>Without limiting the scope of the term, construction works includes early works, demolition works, site preparation works, clearing and removal of vegetation and works for the decommissioning and rehabilitation of worksites.</p> <p>The term does not include the relocation of public utilities.</p>
Construction spoil	Includes any earthen material removed from a construction worksite, including sites for surface works or underground works. The term does not include material produced by demolition works.
Excessive dust and air emissions	Occurs when dust deposition and other air-borne contaminants measured at a sensitive receiver exceed the goals stated in this EMP or detailed EMPs.
Excessive noise	Excessive noise means noise measured at the façade of a sensitive receiver exceeding background noise without the Project plus 20dBA(LA <sub>eq</sub> , 1hr adjusted)
Excessive vibration	Excessive vibration means vibration measured at a sensitive receiver in excess of 2mm/sec PPV above the goal for continuous vibration.

## Appendix B – Environmental legislation, policies and guidelines

## Environmental legislation, policies and guidelines

Delivery and implementation of the Project must comply with the environmental requirements and outcomes specified in this EMP (as updated to reflect any changes current at commencement of each Project phase) and any additional requirements specified in the conditions of approval.

The Environmental Monitor would hold current copies of applicable legislation, guidelines and standards. The Project EMS and detailed EMPs should include a procedure for reviewing and updating a register of legislation, guidelines and standards applicable to the Project at least every 6 months.

A summary of legislation, guidelines and associated standards applicable to construction works and environmental protection current at the time of preparing this EMP is provided below.

### National strategies and international conventions

The following national strategies provide high-level guidance for the design, construction and operation of the Project, and have been used in the preparation of the Request for Project Change Report and this EMP:

- Australia ICOMOS Charter for Places of Cultural Significance, The Burra Charter, 2013;
- National Strategy for Ecologically Sustainable Development 1992;
- National Strategy for the Conservation of Australia's Biological Diversity 2010-2030;
- 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.

### Commonwealth Legislation

Commonwealth legislation that is relevant to the Project and the EMP includes:

- *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*;
- *Energy Efficiencies Opportunities Act 2006*;
- *Environment Protection and Biodiversity Conservation Act 1999*;
- *Native Title Act 1993*; and
- *National Greenhouse and Energy Reporting Act 2007*.

### State legislation

#### Environmental Protection Act 1994

The EP Act is the primary legislation relating to environmental management in Queensland. The purpose of the EP Act "is to protect Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends (ecologically sustainable development)."

Under the EP Act, all persons involved in the Project are bound by a 'general environmental duty' not to carry out any activity that causes, or is likely to cause environmental harm unless the person takes all reasonable and practicable measures to prevent or minimise the harm. Furthermore, all persons



have a 'duty to notify' in the event of an activity that causes, or threatens to cause, serious or material environmental harm.

The current environmental protection policies (EPPs) to be addressed in the detailed EMPs and sub-plans are:

- *Environmental Protection (Water) Policy 2009;*
- *Environmental Protection (Noise) Policy 2008;* and
- *Environmental Protection (Air) Policy 2008.*

The detailed EMPs are to identify all environmentally relevant activities (ERAs) associated with the Project and to incorporate the requirements of all environmental authorities obtained for applicable ERAs.

### **Other legislation**

The Project EIS has been prepared under the State Development and Public Works Organisation Act 1971 (SDPWO Act). Relevant information contained in the Request for Project Change Report, including this EMP, is relied upon to support applications for permits, licenses and approvals. Major legislation relevant to the Project includes:

- *Aboriginal Cultural Heritage Act 2003;*
- *Acquisition of Land Act 1967;*
- *Building Act 1975;*
- *City of Brisbane Act 2010;*
- *Coastal Protection and Management Act 1995;*
- *Disability Discrimination Act 1992;*
- *Economic Development Act 2012;*
- *Electricity Act 1994;*
- *Electrical Safety Act 2002*
- *Explosives Act 1999;*
- *Fisheries Act 1994;*
- *Forestry Act 1959;*
- *Land Act 1994;*
- *Local Government Act 2009;*
- *Nature Conservation Act 1992;*
- *Plumbing and Drainage Act 2002;*
- *Queensland Heritage Act 1992;*
- *Regional Planning Interests Act 2014;*
- *Stock Route Management Act 2002;*
- *Survey and Mapping Infrastructure Act 2003;*
- *Sustainable Planning Act 2009;*
- *Transport Infrastructure Act 1994;*
- *Transport Operations (Public Transport) Act 1994;*
- *Transport Operations (Road Use Management) Act 1995;*
- *Transport Planning and Coordination Act 1994;*
- *Transport (Rail Safety) Act 2010;*
- *Transport Security (Counter Terrorism) Act 2008;*
- *Vegetation Management Act 1999;*
- *Waste Reduction and Recycling Act 2011;*
- *Water Act 2000;* and
- *Work Health and Safety Act 2011.*

## Guidelines, codes and standards

There are a number of guidelines and codes to be considered in developing the Construction EMP and Commissioning EMP for the Project. These include:

- TMR standards, including:
  - Main Roads Environmental Management Policy and Strategy 2008-2013;
  - Technical Manual – Environmental Processes Manual (August 2013);
  - Road Traffic Air Quality Management Manual (June 2014);
  - Road Landscape Manual (June 2013); and
  - Technical specifications and standards.
- The Rail Infrastructure Manager standards, including:
  - Environmental Policy.
- TMR (TransLink) standards, including:
  - TransLink Station Signage Manual; and
  - TransLink Public Transport Infrastructure Manual (2015).
- BCC environmental policies and guidelines, including:
  - Environmental Policy;
  - Corporate Sustainability Policy;
  - Brisbane Invasive Species Management Plan 2013-2017;
  - Towards Zero Waste Strategy;
  - Urban Stormwater Management Strategy;
  - Erosion Treatments for Urban Creeks;
  - Natural Channel Design;
  - Sediment Basin Design, Construction and Maintenance;
  - Stormwater Outlets in Parks and Waterways;
  - Landscape Design for Water Conservation;
  - Guidelines for Pollutant Export Modelling;
  - Table Drains Erosion Control Guideline; and
  - Guidelines on Identifying and Applying Water Quality Objectives in Brisbane City.

The standards described in Table B-1 apply to monitoring and auditing of performance.

*Table B-1 Performance guidelines*

Element	Performance criteria
General	AS/NZS ISO 14001 Environmental management systems.
Hazard and risk	AS/NZS ISO 31000 Risk Management – Principles and Guidelines. AS 1216 Class Labels 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 of Use of Emergency Procedure Guides for Transport of Dangerous Goods. AS 2187 Explosives – Storage, Transport and Use.
Waste	Waste Reduction and Recycling Plan 2015-2018.
Water quality / drainage	Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000 (ANZECC, 2000). Queensland Water Quality Guidelines 2009 (DEHP, 2009). Monitoring and Sampling Manual 2009 (Version 2) (DEHP, 2010). State Planning Policy Code: Water Quality.

Element	Performance criteria
	Queensland Urban Drainage Manual 2013 (Department of Energy and Water Supply, 2013).
Soils	National Environment Protection (Assessment of Site Contamination) Measure 1999. Queensland Acid Sulfate Soils Technical Manual.  Best Practice Erosion and Sediment Control (International Erosion Control Association, 2008).  AS 4482 Guide to the investigation and sampling of sites with potentially contaminated soil.
Air	AS 2923 Guide for measurement of horizontal wind for air quality applications. National Environment Protection (Ambient Air Quality) Measure.
Noise and vibration	Noise Measurement Manual (DEHP, 2013).  AS 1055 Acoustics – Description and Management of Environmental Noise.  AS 2436 Guide to Noise and Vibration Control on Construction, Maintenance and Demolition Sites.  AS 2107 Acoustics – Recommended noise levels and reverberation times for building interiors.  AS 2702 Acoustics – Methods for Measurement of Road Traffic Noise. AS 2670 Evaluation of human exposure to whole-body vibration.
Lighting	AS 4282 Control of the Obtrusive Effects of Outdoor Lighting.

### Approvals, permits and license requirements

A summary of statutory approvals that may be required for the Project is included in Table B-2. Additional or different approvals, permits or licenses may be required as a consequence of detailed design undertaken prior to construction and/or amendments to applicable legislation.

Table B-2 Summary of likely Project approvals

Permit/approval requirement	Legislation	Assessing authority	Trigger/relevant aspect of Project	Location	Timing
Development Permit for a Material Change of Use of Premises for a concurrence Environmentally Relevant Activity	<i>Sustainable Planning Act 2009</i> <i>Environmental Protection Act 1994</i>	Chief Executive, Department of Infrastructure, Local Government and Planning	Undertaking an activity that is identified as being a concurrence ERA under the Environmental Protection Act 1994.  ERAs could include: <ul style="list-style-type: none"> <li>• 8 Chemical storage</li> <li>• 41 Cement manufacturing</li> <li>• 63 Sewage treatment</li> <li>• 64 Water treatment.</li> </ul> Environmental Authority for the concurrence ERAs would be required prior to their commencement.	Possible at smaller construction sites.	Prior to undertaking any ERA.

Permit/approval requirement	Legislation	Assessing authority	Trigger/relevant aspect of Project	Location	Timing
Cultural Heritage Management Plan (s87)	<i>Aboriginal Cultural Heritage Act 2003</i>	Department of Aboriginal and Torres Strait Islander Partnerships	An approved CHMP is required for projects requiring an EIS.	Whole of Project	Must be prepared and approved prior to the commencement of construction.
Environmental Authority for a Prescribed Environmentally Relevant Activity (s119, s426)	<i>Environmental Protection Act 1994</i>	Chief Executive, Department of Environmental and Heritage Protection	Registration as a suitable operator and an environmental authority must be obtained prior to the commencement of a Prescribed Environmentally Relevant Activity.	At all locations that require a development permit for a prescribed ERA.	Prior to commencement of prescribed ERA.
Development by the State on a Queensland Heritage Place (s71)	<i>Queensland Heritage Act 1992</i>	Heritage Council (Department of Environmental and Heritage Protection)	Development by the State on a property listed on the Queensland Heritage Register.	Albert Street, Victoria Park, Roma Street station	Prior to undertaking development on listed properties.
Exemption Certificate (s72)	<i>Queensland Heritage Act 1992</i>	Department of Environmental and Heritage Protection	Development on a property listed on the Queensland Heritage Register that will not have a detrimental impact, or will only have a minimal detrimental impact on the cultural heritage significance of the place	State Heritage places along the alignment.	Prior to undertaking development on listed properties.
Disposal Permit (s739)	<i>Environmental Protection Act 1994</i>	Chief Executive, Department of Environmental and Heritage Protection	Required for the removal and treatment or disposal of contaminated soil removed from a property listed on the EMR or CLR.	Refer to Request for Project Change Report for details of properties	Prior to removing and treating or disposing of contaminated soil from an EMR/ CLR listed property.
Agreement of the Chief Executive to carry out road works on, or to interfere with the operation of, State-Controlled Roads (s33/ s50)	<i>Transport Infrastructure Act 1994</i>	Chief Executive, Department of Transport and Main Roads	Any works that would impact on the road structure or the intended operation of the State controlled road.  Would be required for any works undertaken to the Pacific Motorway and associated on and off ramps.	Woolloongabba / Kangaroo Point	Prior to interfering with a State controlled road.
Apparatus License (s99) or Spectrum License, Chapter 3, Part 3.2	<i>Radio communications Act 1992 (Cth)</i>	Application made to the Australian Communications and Media Authority	Radio communications devices must be licensed.		Prior to using radio communication devices.
Approval of railway manager to interfere with a railway (s255)	<i>Transport Infrastructure Act 1994</i>	Railway manager	Any works that would impact on the railway or the intended operation of the railway.	Locations where works interfere with the existing network.	Prior to impacting the existing railway network.

Permit/approval requirement	Legislation	Assessing authority	Trigger/relevant aspect of Project	Location	Timing
Chief Executive may investigate potential rail corridor (s109A and s114 (2))	<i>Transport Infrastructure Act 1994</i>	Chief Executive, Department of Transport and Main Roads	Allows the Chief Executive, or someone authorised by Chief Executive to entry and re- entry onto land to investigate potential and suitability as a rail corridor	Locations that require further investigation.	Prior to gaining entry onto land.
Permit to interfere with vegetation on roads (s25)	<i>Economic Development (Vegetation Management) Bylaw 2013</i>	Economic Development Queensland	Required for the removal or interference of vegetation in road corridors within prescribed PDA	All worksites	Prior to undertaking activities that require local law approval
PDA Development Permit for development (s73)	<i>Economic Development Act 2012</i>	Minister for Economic Development, Queensland	Authorises PDA assessable development to be carried out in a PDA.	Woolloongabba Station; Bowen Hills	Prior to construction within the Woolloongabba and Bowen Hills PDA
Variation of accreditation of Rail Transport Operator (s113)	<i>Transport (Rail Safety) Act 2010</i>	Chief Executive, Department of Transport and Main Roads	Queensland Rail's accreditation would need to be amended to include the Project's rail infrastructure components.	Rail corridor	Prior to construction
Amendment of Safety Management Systems	<i>Transport (Rail Safety) Act 2010</i>	Management plans are issued to Department of Transport and Main Roads	The Safety Management Systems must be amended by the Rail Transport Operator to incorporate the Project's rail infrastructure components.	Rail corridor	Prior to construction
Risk Management Plan for a Security-Identified Surface Transport Operation	<i>Transport Security (Counter-Terrorism) Act 2008</i>	Department of Transport and Main Roads	A risk management plan must be prepared and issued to the Chief Executive prior to the prescribed date if the project is declared by the Chief Executive as a Security-Identified Surface Transport Operation.	N/A	N/A

## Appendix C – Training and Awareness

## Training and Awareness

All Project personnel, including contractors and sub-contractors, are to be provided with environmental awareness training prior to commencing work on the Project. Specific environmental training is to be provided to Project site personnel during the site induction. Any further environmental training should be provided on an on-going or periodic basis as required. A register of environmental training delivered during Project implementation should be established and maintained.

Specific environmental training and awareness requirements for Project personnel are outlined in Table C-1.

Table C-1 Training and awareness requirements

Responsible entity	Training and awareness requirements	Required attendees
Proponent	<p>General responsibilities including:</p> <ul style="list-style-type: none"> <li>• environmental duties under the EP Act and the duty of care under the ACH Act; and</li> <li>• applicable requirements under other relevant legislation.</li> </ul> <p>Specific responsibilities as specified in the EMS, approved EMPs and sub-plans, and conditions of approval, as well as:</p> <ul style="list-style-type: none"> <li>• awareness of the location and significance of environmentally and culturally sensitive areas;</li> <li>• awareness of community perspectives and expectations;</li> <li>• awareness of considerations for Aboriginal people and their culture;</li> <li>• project-specific environmental and cultural heritage management strategies and work practices;</li> <li>• project-specific monitoring, reporting and corrective action procedures;</li> <li>• project-specific environmental and cultural heritage incident and complaint response procedures;</li> <li>• project-specific internal and external communication processes;</li> <li>• project-specific emergency response procedures;</li> <li>• project-specific systems, including quality, safety and document control; and</li> <li>• consequences of non-conformance with Project environmental management strategies and procedures, and legislative requirements.</li> </ul>	All Project personnel including contractors and sub-contractors.

# CROSS RIVER RAIL





# **CROSSRIVERRAIL**