



BaT project

Chapter 18 Draft Outline Environmental Management Plan



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18. Draft Outline Environmental Management Plan

18.1 Introduction

This chapter addresses the Terms of Reference (ToR) for the Environmental Impact Statement (EIS) principally in relation to section 6.3¹, by providing a consolidated description of the Proponent's approach to environmental management for the design, construction and commissioning of the Bus and Train (BaT) project (the Project).

The purpose of this Draft Outline Environmental Management Plan (EMP) is to establish a framework for environmental management during Project implementation by informing the preparation of detailed environmental management plans for the construction and commissioning of the Project.

The intent of the management framework is to satisfy the Coordinator-General's conditions by achieving the environmental outcomes for the Project in its design, construction and commissioning. Achievement of the design requirements would have the effect of achieving the environmental outcomes sought in the operational phase of the Project.

The environmental management framework would be given effect through:

- implementation of environmental design requirements by the Proponent through design development and detailed design
- preparation and implementation of a Construction EMP which is generally consistent with this Draft Outline EMP. The Construction EMP may include sub-plans for specific locations or environmental elements and must inform the Chief Executive, Department of Transport and Main Roads, that the Project is being constructed in accordance with the Coordinator-General's conditions and in a way which achieves the environmental outcomes
- preparation and implementation of a Commissioning EMP which also is generally consistent with this Draft Outline EMP. The Commissioning EMP may include sub-plans and must inform the Chief Executive, Department of Transport and Main Roads, that the Project has been designed and constructed in accordance with the Coordinator-General's conditions and achieves the environmental outcomes.

The framework proposes an approach to environmental management in respect of a number of environmental elements, and consists of:

- environmental outcomes to be achieved through detailed design and during construction and commissioning
- performance criteria which demonstrate achievement of the environmental outcomes, or serve as indicators of the need for mitigation measures
- mitigation measures to achieve the environmental outcomes and derived from a combination of predictive modelling of the potential impacts and consultation with affected parties
- monitoring requirements, where monitoring attends firstly to the performance criteria, and then to the mitigation measures where the performance criteria cannot be achieved
- a procedure for receiving and resolving complaints
- reporting requirements to demonstrate achievement of the environmental outcomes, summaries of complaints and their resolution, and generally, corrective actions
- corrective actions.

¹ This chapter also addresses sections 9.12, 10.14, 10.21, 10.22, 10.25, 10.26, 11.7 and 11.12

Successful implementation of the management framework would be underpinned by early and ongoing consultation with stakeholders, affected parties and others who might be impacted indirectly (eg users of public transport services and facilities).

The Draft Outline EMP describes:

- the processes and timing for preparation of the Construction EMP and the Commissioning EMP, monitoring and reporting
- the roles and responsibilities of key entities in the delivery and implementation of the Project, such as the Chief Executive, Department of Transport and Main Roads, as the entity responsible for environmental management, and also as the Proponent, and other entities such as the Environmental Monitor and the Community Relations Monitor.

On completion of commissioning and acceptance of the Project as being delivered, the operational environmental effects would be overseen and managed by the Department of Transport and Main Roads (TMR) or its delegated entities, according to the statutory requirements for both the rail network and busway network.

The operational environmental outcomes are not addressed by this Draft Outline EMP. The operational environmental outcomes would be achieved through detailed design development and commissioning of the Project prior to commencement of operations.

The operational Project would be integrated within the wider rail and busway network.

18.2 Project overview

The Project combines a railway and busway in a single, double-decked, 15m diameter tunnel stretching from Dutton Park and Woolloongabba in the south to Spring Hill and Herston in the north, passing beneath the Brisbane Central Business District (CBD). The Project would pass deep in rock under the Brisbane River and would provide new underground stations at Woolloongabba, George Street and Roma Street.

The busway would connect with the Eastern Busway at Dutton Park in the south, and with the Northern Busway at Herston in the north. Similarly, the railway would connect with the Gold Coast Line at Dutton Park in the south and with the Exhibition Line in Spring Hill in the north.

A detailed description of the Project is provided in **Chapter 3 – Project description**. Design drawings and design criteria are contained in the reference design.

18.3 Proponent overview

The Queensland Government, represented by TMR, is the Proponent for the Project.

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

The Chief Executive, Department of Transport and Main Roads, would have responsibility for implementation of the Project in accordance with the Coordinator-General's conditions. The Chief Executive would be supported in this role by the Environmental Monitor and the Community Relations Monitor. Both of these roles would be appointed by the Chief Executive at the cost of the Proponent.

An outline of key Project roles and responsibilities is provided in **section 18.5.1**.

The Project would be operated in accordance with legislation applying to the operation of transport infrastructure, including the *Transport Infrastructure Act 1994*, the *Transport Operations (Passenger Transport) Act 1994*, the *Transport (Rail Safety) Act 2010* and the *Transport Security (Counter-Terrorism) Act 2008*.

18.4 Draft Outline EMP overview

18.4.1 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 to environmental management for the Project would be performance-based and directed towards the achievement of specific environmental outcomes. The approach is to:

- (1) Establish **environmental outcomes** that 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
 - environmental outcomes for the construction and commissioning phases may be achieved by satisfaction of the performance criteria or implementation of mitigation measures agreed with affected parties or a combination of both the criteria and the measures.
- (2) Present **environmental design requirements** to avoid or minimise and mitigate the impacts of the Project through the construction and commissioning phases:
 - the detailed design must be consistent with the reference design, or such other design accepted by the Coordinator-General as an approved change to the reference project
 - the environmental design requirements must be incorporated in detailed design and the Project must be implemented in accordance with the detailed design
 - the Proponent must determine that the environmental design requirements have been met and that the environmental outcomes for detailed design would be achieved. The Chief Executive, Department of Transport and Main Roads, must advise the Coordinator-General and the Environmental Monitor prior to the commencement of construction to which the detailed design relates that the design requirements have been met and environmental outcomes for detailed design would be achieved. Detailed design would likely be developed progressively in advance of the construction works.
- (3) Provide **performance criteria** as measurable attributes of the environmental outcomes:
 - performance criteria must be measurable and generally consistent with the goals for environmental elements addressed in the EIS, the relevant EPP or Australian Standards. Performance criteria may also be qualitative in scope
 - propose **mitigation measures**, based on the detailed design accepted by the Chief Executive, Department of Transport and Main Roads
 - satisfactory implementation of the mitigation measures would achieve the environmental outcome to which they relate
 - predictive modelling for construction of the detailed design would indicate the potential for exceedances of the goals, leading then to a mandatory requirement for mitigation of the likely impacts. Mitigation measures would also be required when monitoring detects an exceedance of the goals

- mitigation measures for predicted exceedances of the performance criteria for any aspect of detailed design may be addressed either through design modifications prior to construction or through design modifications or interventions implemented post construction (eg noise barriers)
- mitigation measures for the construction phase must be developed in consultation with potentially affected parties and entered in a register maintained and monitored by the Environmental Monitor under the auspices of the Chief Executive, Department of Transport and Main Roads. Once registered, the mitigation measures would become binding on the Proponent
- the register of mitigation measures would be established and maintained by the Environmental Monitor for the purpose of monitoring the implementation of such measures as the means of achieving the environmental outcomes for the affected party
- the mitigation measures entered in the register would remain confidential between the Proponent, the affected parties and the Environmental Monitor. The Environmental Monitor would track the success of the mitigation measures, and may recommend to the Proponent and an affected party, the application of measures in general terms found to be effective in similar circumstances
- mitigation measures for exceedances of the performance criteria recorded during the commissioning phase may be addressed through modifications to the Project as constructed, or through the provision of Project interventions (eg noise barriers, water treatment facilities, changes to operating procedures and practices).

(4) Establish **monitoring** and environmental **reporting** procedures:

- monitoring would be conducted in the pre-construction (baseline data), construction and commissioning phases
- monitoring for both construction and commissioning would identify the extent to which the environmental outcomes have been achieved either through meeting the performance criteria or implementing the mitigation measures. Monitoring would adhere to scientific procedures and practices, and would be conducted by independent, suitably accredited and qualified personnel
- the monitoring results would also inform the need for corrective actions in construction work methods or possibly, design modifications during either construction phase or the commissioning phase
- reporting would address achievement of the environmental outcomes and compliance with the Coordinator-General's conditions. During the construction phase and the commissioning phase, a monthly report would be prepared by the Proponent and published on a dedicated Project website
- where monitoring detects either an exceedance of the performance criteria or a failure to implement the registered mitigation measures, a non-compliance event would be reported to the Environmental Monitor and included in the monthly report
- reporting would also address monitoring results, complaints received during the period and actions taken in response.

(5) Establish an effective and responsive **complaints system**:

- the complaints system would establish published procedures for making, receiving and responding to complaints about environmental management performance during construction and commissioning of the Project

- the complaints system would also establish a method for verifying complaints made. The method would involve a combination of site investigations, monitoring and consultation with the Community Relations Monitor, stakeholders and the affected parties. Verified complaints would be summarised and reported in the monthly environmental report.

(6) Establish a procedure for **corrective action**

- corrective action would be required in response to a non-compliance event² or in response to a complaint verified by subsequent monitoring and investigation indicating a non-compliance event
- corrective action also would be required in relation to an environmental incident. Response protocols and procedures must be established in consultation with the Environmental Monitor and the relevant agencies (ie Emergency Services Queensland, Department of Environment and Heritage Protection, Brisbane City Council)
- provide all Project personnel with adequate training in safety, hazard and risk management, environmental procedures and social obligations.

The intended implementation of the environmental management framework is described in **Table 18-1** and illustrated in **Figure 18-1**.

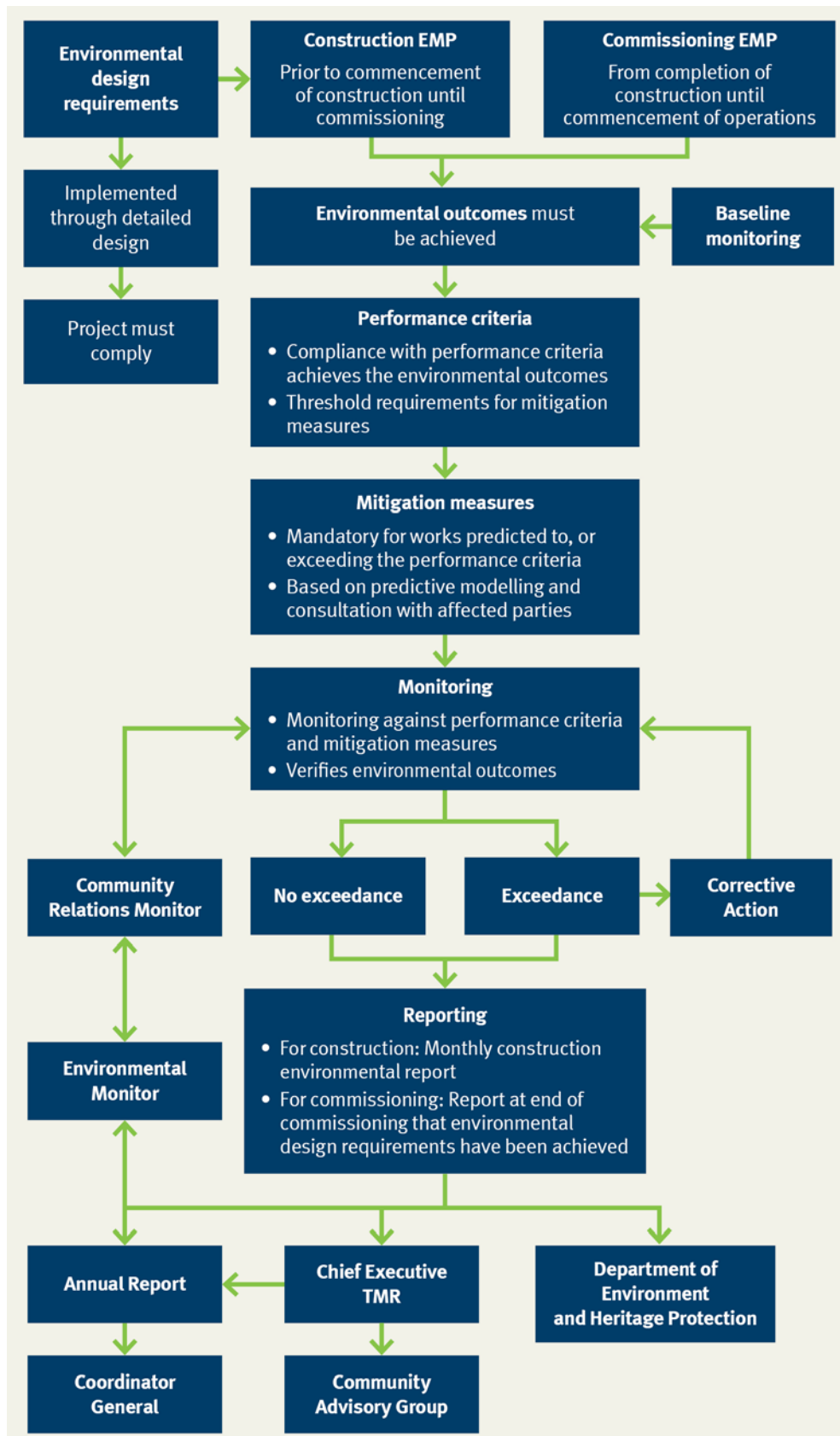
Table 18-1 Components of Draft Outline Construction and Commissioning EMPs

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 addressed.
Performance criteria	Measurable goals or indicators of the environmental outcome for an environmental element. The environmental outcomes would be achieved when monitoring indicates performance within the measurable goals.	Mandatory – if no mitigation measures. When the goals cannot be achieved, they serve as triggers for specific mitigation measures to be implemented.
Mitigation measures	Mitigation measures are either: <ul style="list-style-type: none"> actions to satisfy the performance criteria and to achieve the environmental outcomes; or actions agreed in consultation with affected parties to achieve the environmental outcome for the element. The mitigation measures provided in the Draft Outline EMP are advisory only.	<p>The final mitigation measures to achieve the environmental outcome for an element must be derived in response to:</p> <ul style="list-style-type: none"> predictive modelling identifying the scale, intensity and duration of Project impacts consultation with affected parties. <p>The final mitigation measures must be entered into a register of mitigation measures to be maintained by the Environmental Monitor before works can commence.</p> <p>Once agreed and registered, the mitigation measures become binding on the Proponent.</p>

² Non-compliance event: non-compliance with the Coordinator-General's conditions, the EMP, or the agreed and registered mitigation measures.

EMP component	Description	Effect
Monitoring	<p>Measures:</p> <ul style="list-style-type: none">• satisfaction of the performance criteria; or• implementation and effectiveness of mitigation measures. <p>A monitoring program must be designed and included in the EMP prior to the commencement of construction or commissioning.</p>	Mandatory
Reporting	<p>Purpose and frequency of reporting to demonstrate achievement of the environmental outcomes and satisfaction of the performance criteria.</p>	Mandatory

Figure 18-1 BaT Project environmental management framework – implementation



18.4.2 Structure of the Draft Outline EMP

The Draft Outline EMP provides:

- **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 most if not all operations-related impacts and many of the construction-related impacts
- **construction environmental management plan** – a statement of the environmental outcomes to be achieved during construction, together with related performance criteria and mitigation measures, monitoring and reporting requirements, and complaints and corrective actions requirements
- **commissioning environmental management plan** – a statement of the environmental outcomes to be achieved by the Project during its commissioning tests, supported by performance criteria to demonstrate achievement of the outcomes. If required, mitigation measures would take the form of project design modifications or modifications to the proposed operating procedures.

A detailed EMP must be prepared by the Proponent, reviewed by the Environmental Monitor and accepted by the Chief Executive, Department of Transport and Main Roads, prior to the commencement of construction, including early works, and prior to commissioning activities.

Each detailed EMP may be prepared in stages to address a specific activity or area and would be supported by a range of sub-plans addressing specific environmental issues or impacts of concern. EMP sub-plans may be prepared also in relation to particular locations or places to deal effectively with potential impacts on the environmental and community values of that locality or place.

The detailed Construction EMP sub-plans are likely to deal with matters such as:

- noise and vibration
- air quality (including dust)
- soil erosion and sedimentation
- stormwater drainage and flooding
- water quality (surface water and groundwater)
- waste and resource recovery
- construction traffic, including spoil removal, haulage and placement
- construction worksite operations (hours of work, work practices, lighting, construction traffic and parking)
- safety hazard and risk
- emergency access management
- community liaison and communications
- Aboriginal cultural heritage and historic cultural heritage.

The detailed EMP would be updated progressively during the construction and commissioning phases of the Project in response to:

- on-going development in detailed design
- detailed construction planning and implementation
- emerging community concerns
- environmental aspects of commissioning activities.

Revisions to the detailed EMP would be subject to review by the Environmental Monitor and must be accepted by the Chief Executive of the Department of Transport and Main Roads, as being consistent with the Coordinator-General's conditions prior to the commencement of the activity to which the revision relates.

18.4.3 Relationship to other environmental documents

Coordinator-General's conditions

Any conditions imposed by the Coordinator-General or other statutory authorities would prevail over the environmental outcomes and environmental design requirements and any provision in either EMP, to the extent of any inconsistency.

Compliance Management Plan

A Compliance Management Plan would be prepared and implemented by the Proponent in accordance with the *Transport Infrastructure Act 1994* prior to the commencement of construction, including demolition and early works.

The Compliance Management Plan would provide the statutory support to the Chief Executive, Department of Transport and Main Roads, for the implementation of the Construction EMP, and for ensuring compliance with those environmental measures set out in the plan (eg construction noise, construction air quality). The plan may address more than one matter and may adopt or incorporate another plan, such as the detailed Construction EMP for the Project.

For the approach proposed to environmental management in this Draft Outline EMP, a Compliance Management Plan is an important mechanism for the Chief Executive in relation to effective environmental management through implementation of the EMPs, and in consultation with relevant state agencies. The EMPs also would be consistent with the Coordinator-General's conditions.

In the hierarchy of environmental documents, the Compliance Management Plan would prevail over the EMP to the extent of any inconsistency.

Environmental management system

The Proponent, and its contractors, may develop and implement an environmental management system consistent with AS/NZS ISO14001. For the Project, an environmental management system would 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 would prevail over the environmental management system.

18.5 Implementation

18.5.1 Roles and responsibilities

For the purposes of this Draft Outline EMP, the State of Queensland represented by TMR is referred to exclusively as the Proponent. TMR would also be responsible for ensuring the Project is delivered in accordance with the Coordinator-General's conditions and for ensuring that a reasonable environmental amenity is achieved, consistent with the environmental outcomes. To distinguish these separate functions, TMR is referred to as the Proponent in relation to Project delivery, and to the Chief Executive of the Department of Transport and Main Roads in relation to environmental management responsibilities.

As shown in **Figure 18-2**, the EMP provides an environmental management structure, which incorporates the following parties, regardless of the contractual delivery mechanism adopted for the Project.

Figure 18-2 Environmental management structure

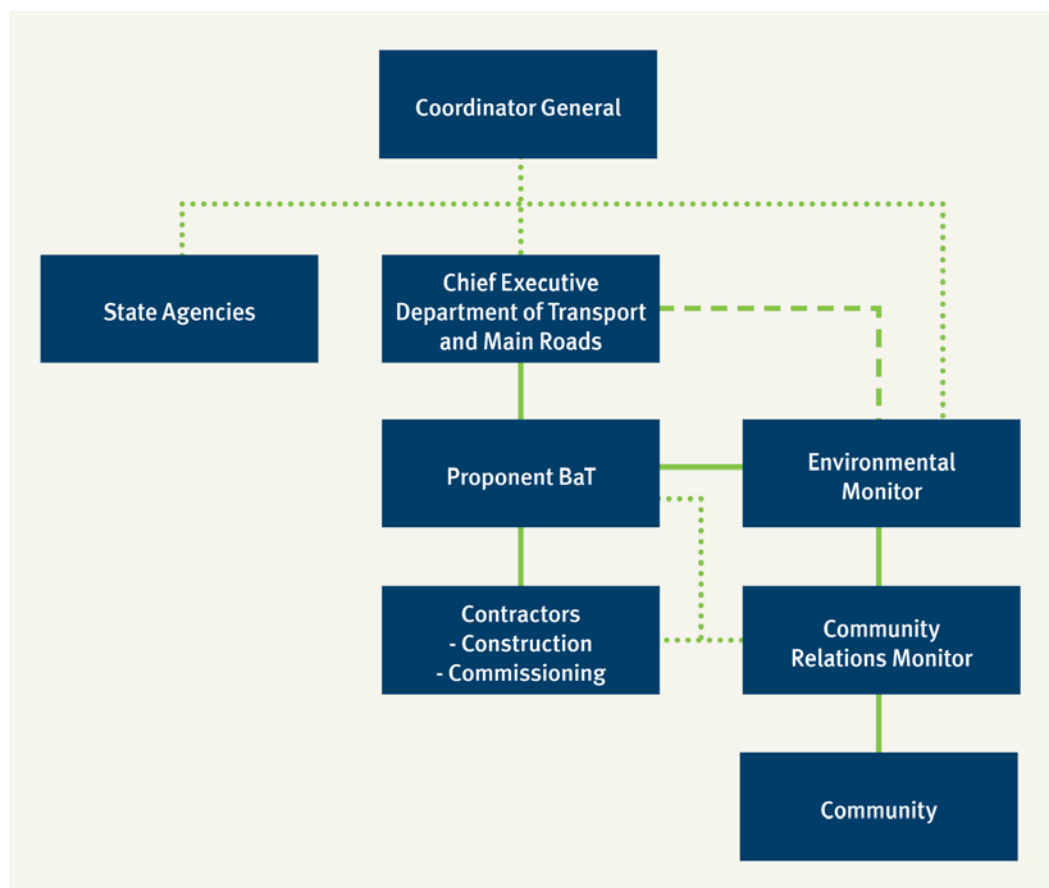


Table 18-2 Roles in environmental management

Entity	Role and responsibility
Coordinator-General	<ul style="list-style-type: none"> Administers the <i>State Development and Public Works Organisation Act 1971</i> in respect of the Project conditions, having evaluated the EIS
Proponent	<ul style="list-style-type: none"> The State of Queensland (represented by TMR): <ul style="list-style-type: none"> responsible for the design, construction, commissioning and operation of the Project entity responsible for implementing the Coordinator-General's conditions, and for achieving the environmental outcomes, in design, construction and commissioning of the Project
Transport and Main Roads	<ul style="list-style-type: none"> Chief Executive: <ul style="list-style-type: none"> responsible for providing the Coordinator-General with advice about compliance with the conditions and the environmental requirements in detailed design, construction and commissioning responsible for all Project approvals
Environment and Heritage Protection	<ul style="list-style-type: none"> Administering the <i>Environmental Protection Act 1994</i> and the <i>Queensland Heritage Act 1992</i>
Natural Resources and Mines Housing and Public Works	<ul style="list-style-type: none"> Owners of land affected by the Project
Brisbane City Council	<ul style="list-style-type: none"> A major stakeholder: <ul style="list-style-type: none"> interests in land, local roads and other urban infrastructure, and natural assets provides input to urban design measures, EMP and worksite rehabilitation
Environmental Monitor	<ul style="list-style-type: none"> An independent person or monitor engaged by the Proponent to: <ul style="list-style-type: none"> monitor the achievement of the environmental outcomes and compliance with the Coordinator-General's conditions during the construction and commissioning of the Project. provide advice to the Chief Executive, Department of Transport and Main Roads, and on request to the Coordinator-General, about achievement of the environmental outcomes and compliance with the Coordinator-General's conditions
Community Relations Monitor	<ul style="list-style-type: none"> An independent person or entity engaged by the Proponent to: <ul style="list-style-type: none"> monitor community relations during the construction and commissioning of the Project. facilitate community advisory groups and liaison between affected parties and the Proponent or its contractors
Community Advisory Groups	<ul style="list-style-type: none"> Provide comments in an advisory role to the Proponent on the detailed design and the locality-based EMP sub-plans for construction and commissioning of 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 worksite

The likely responsibilities and accountabilities of various parties who would have roles in environmental management of the Project are provided in **Table 18-3**.

Table 18-3 Project responsibilities

Project responsibilities
<p>Proponent – design and construction</p> <p>The design phase and construction phase may run concurrently.</p> <ul style="list-style-type: none"> • Manage the detailed design process, which may run progressively and in parallel with the construction program, 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, and any necessary sub-plans 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 reviewed by the Environmental Monitor and accepted by the Chief Executive, Department of Transport and Main Roads prior to the commencement of works, including demolition and early works. A copy of the accepted Construction EMP must be provided to the Coordinator-General. • 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 worksites, maintain: <ul style="list-style-type: none"> - a current copy of the Construction EMP containing a record of revisions and updates, the completion of planned actions, monitoring records, and reports which are made available during the audits - 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 a register of construction mitigation measures agreed with affected parties. • Ensure that registered construction mitigation measures are implemented in accordance with the Construction EMP and in the timeframe agreed with the potentially affected parties. • Undertake regular monitoring 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 Project. • Ensure there is adequate and accurate identification and reporting of any non-compliances that may arise during construction. • Ensure corrective actions arising from non-compliances are completed as soon as possible and in accordance with the Construction EMP. Report on the completion of corrective actions 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: <ul style="list-style-type: none"> - the construction program - the intended scale, duration and nature of proposed work - details of proposed impact mitigation measures and monitoring of impacts, for the duration of the construction phase. • 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 as identified in Appendix B. • 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 person as the Environmental Monitor for the Project • Establish one or more community advisory groups and appoint an independent, suitably skilled person 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 would be prepared by the Proponent and accepted as satisfactory by the Environmental Monitor and 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, the busway and the stations.
- Ensure mitigation measures are implemented prior to the acceptance of the Project as being complete, where monitoring detects that the environmental outcomes are not achieved either through an exceedance of a performance criteria or non-compliance with a standard environmental operating procedure, policy or code of practice.
- 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 program of commissioning activities
 - the 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 the safe and efficient commissioning of the Project, upon completion of the commissioning phase, in accordance with legislation and regulations, and good environmental management practices.

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

- Administer relevant statutes, regulations and codes in relation to the Project.
- Review and comment as required by the Coordinator-General or the Chief Executive of the Department of Transport and Main Roads, on the detailed design, the Construction EMP and the Commissioning EMP for technical rigour and compliance with the legislation within their respective jurisdictions.
- Undertake periodic reviews of the Proponent's performance where required by the conditions of approval, or separately by the Coordinator-General or the Chief Executive, Department of Transport and Main Roads.

Brisbane City Council – design, construction and commissioning

- Liaise with the Proponent about:
 - Project design issues as they affect or potentially affect land use planning intentions at northern and southern connections, Woolloongabba, George Street and Roma Street
 - traffic management and pedestrian management during the construction phase, particularly in relation to the worksites at Woolloongabba, George Street and Roma Street
 - the relocation of public utilities
 - occupation and reinstatement of park.
- Carry out responsibilities in relation to delegated administration of permitting assessment and management of local law requirements, where applicable. While local laws generally do not bind the State, the Proponent would liaise with the Council about the scope and potential effect of such works.
- Liaise with the Proponent on relevant matters, such as urban design measures, local management plans and traffic management.

Project responsibilities
Environmental Monitor – design, construction
<p>The design phase and construction phase may run concurrently.</p> <ul style="list-style-type: none"> • 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 from the designer 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 would be achieved during construction. • 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 relation to fulfilling the Coordinator-General's conditions. • Ensure the implementation of the environmental monitoring program for each environmental element requiring such monitoring. 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 six-monthly report on environmental management and compliance with the Coordinator-General's conditions.
Environmental Monitor – commissioning
<ul style="list-style-type: none"> • 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 program for each environmental element requiring such monitoring. 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 six-monthly report on environmental management and compliance with the Coordinator-General's conditions.
Community Relations Monitor – design, construction and commissioning
<ul style="list-style-type: none"> • 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 program, works description, property matters (dilapidation surveys). • Point of contact for the community for complaints and project information • Inform the Environmental Monitor and Proponent of community concerns about project implementation and commissioning.

Project responsibilities

- Inform affected parties about complaints procedures and the resolution of complaints and corrective actions as necessary.
- Prepare monthly reports to the Chief Executive, Department of Transport and Main Roads, with copies to the Project website and Environmental Monitor 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 parties about mitigation measures as required by either proponent or affected party.
- Under the patronage of the Proponent, form community advisory groups for each locality likely to experience impacts during the construction of the Project. Groups could be expected to form in the Dutton Park area, Woolloongabba, George Street, Roma Street and Spring Hill.
- 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.
- Provide timely comments in an advisory role to the Proponent on the detailed 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 would be sought through existing Queensland Rail and TransLink Community Feedback procedures.

All Project personnel would 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
- the Proponent's environmental policies and systems.

18.5.2 EMP approval process overview

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

Environmental design requirements

The detailed design process would be likely to progress in stages and in advance of works packages. 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 for review and acceptance.

The Chief Executive of the Department of Transport and Main Roads, must be satisfied that the detailed designs for the Project achieve the environmental design requirements before allowing the commencement of any work to which the designs relate.

Once satisfied, the Chief Executive of the Department of Transport and Main Roads, must advise the Coordinator-General and the Environmental Monitor at least 20 business days prior to the commencement of a works package to which the detailed designs relate.

Construction EMP

Construction would 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 Chief Executive of the Department of Transport and Main Roads, the Environmental Monitor, the Community Relations Monitor and the Coordinator-General, with the intended programme and construction method statement for the 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 and accepted by the Chief Executive of the Department of Transport and Main Roads, prior to the commencement of any works, including demolition and early works. The Chief Executive must advise the Coordinator-General that the Construction EMP is acceptable at least 20 business days prior to the commencement of any works
- achieve the environmental outcomes and must adopt the performance criteria in respect of those outcomes
- provide for mitigation measures to be developed in respond 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 parties, 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
- establish reporting procedure 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 Chief Executive of the Department of Transport and Main Roads, 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.

The Chief Executive of the Department of Transport and Main Roads must be satisfied that the Construction EMP, including any sub-plans, complies with the Coordinator-General's conditions and is generally consistent with this EMP before allowing the commencement of any work, including early work and demolition.

At least 10 business days prior to the commencement of any work, the Chief Executive of the Department of Transport and Main Roads and the Environmental Monitor must advise the Coordinator-General that the Construction EMP is suitable for managing the impacts of the proposed works, and complies with the conditions.

At least 10 business days prior to the commencement of a new works package, the Chief Executive of the Department of Transport and Main Roads, with advice from the Environmental Monitor, and the Community Relations Monitor, must report to the Coordinator-General in relation to the corresponding revision of the Construction EMP as to its compliance with the Coordinator-General's conditions and general consistency with this EMP.

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 commissioning activity, the Proponent is to provide the Chief Executive of the Department of Transport and Main Roads, 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 Chief Executive of the Department of Transport and Main Roads, 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.

The Proponent must be satisfied that the Commissioning EMP, including any sub-plans, complies with the Coordinator-General's conditions and is generally consistent with this EMP before allowing the commencement of any commissioning activity.

At least 10 business days prior to the commencement of any work, the Chief Executive of the Department of Transport and Main Roads, with advice from the Environmental Monitor and the Community Relations Monitor 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, the Chief Executive Department of Transport and Main Roads, with advice from the Environmental Monitor and the Community Relations Monitor 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.

18.5.3 Monitoring, reporting and auditing

Monitoring

The Proponent would be responsible for monitoring each environmental element and area-specific environmental requirements throughout the various Project phases. The 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 would 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 requirements for the Project 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
- 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 regulatory 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.

Reporting

A mechanism for reporting on monitoring and compliance must be established in the Construction EMP. The Proponent would be responsible for the preparation and publication of report described in **Table 18-4** or as otherwise required by the Coordinator-General's conditions.

Table 18-4 Reporting hierarchy

Report and scope
Monthly Environmental Report
<p>Prior to the commencement of construction works, the Proponent must establish and maintain a dedicated project website.</p> <p>The Monthly Environmental Report must include:</p> <ul style="list-style-type: none"> • 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 non-compliances with the Coordinator-General's conditions and the EMP • responses to environmental incidents and non-compliances, including recommendations for corrective actions, responsibility and timing • all other matters pertaining to environmental performance during construction • the monthly community relations report. <p>A copy of the Monthly Environmental Report must be:</p> <ul style="list-style-type: none"> • submitted to the Chief Executive, Department of Transport and Main Roads • submitted to the Environmental Monitor • posted on the Project website for the duration of the construction phase.

Report and scope

Monthly Community Relations Report

The Proponent must prepare a Monthly Community Relations Report including:

- a summary of daily community interactions (ie 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 being resolved
- 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
- posted on the Project website for the duration of the construction phase.

Construction Incidents and Non-Compliance Report

Interim report

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 provided to the Chief Executive of the Department of the Transport and Main Roads.

After considering the scale and significance of the incident or non-compliance in relation to the environmental outcomes and the *Environmental Protection Act 1994*, the Chief Executive may elect to advise the Coordinator-General or another statutory authority nominated by 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 provided to the Chief Executive of the Department of Transport and Main Roads 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
- any revisions of the Construction EMP to reduce the potential for the incident re-occurring.

Annual Environmental Report

The Annual Environmental Report must be submitted to the Chief Executive of the Department of Transport and Main Roads 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 be prepared on behalf of the Proponent by an independent, suitably qualified and experienced person, and 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 responses 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

Report and scope

- 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
- 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
 - identification of aspects for improvement in environmental management and community relations, and proposed actions to achieve such improvements.

18.5.4 Non-compliance and corrective actions

A non-compliance and corrective action procedure is required to achieve continual improvement in environmental management. The procedure must be set out in the EMPs, must specify methods for recording and reporting non-compliances, and monitoring of the implementation and effectiveness of corrective actions. The environmental management objective for corrective actions is to rectify the problem and to avoid a recurrence.

Non-compliances and corrective actions may trigger a review and modification of the detailed design or work practices to achieve the environmental outcome. When necessary, modifications to either the detailed design or the work practices to achieve the environmental outcome must be reflected in amendments to the Construction EMP.

Where non-compliances are detected during the commissioning phase, modifications to either the operating procedures or the as-constructed project works may be triggered. Any such modifications must be reported in the monthly and annual environmental reports.

18.5.5 Document control

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. Revisions of the Construction EMP or the Commissioning EMP are to be made available to the relevant regulatory agencies and the Coordinator-General prior to the commencement of works to which the revisions relate.

18.5.6 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 would 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 18.6** of this EMP.

18.6 Community and stakeholder engagement principles

18.6.1 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
- consultation with affected parties about possible mitigation measures is conducted in confidence.

18.6.2 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
- 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 informed in a timely manner about construction activities. This plan is to be provided to the Chief Executive of the Department of the Transport and Main Roads, and 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
 - 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 receptors' that are predicted to be affected by proposed construction works in terms of their scale, duration, location and potential effects
- establishment of community advisory groups
- where required, procedures to respond to complaints, issues or incidents, such as face-to-face meetings and on-going communications with affected parties 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 would meet regularly until completion of the commissioning phase and would 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 programs
- provide community feedback to the Proponent, the Community Relations Monitor and Environmental Monitor about concerns with the Project's construction
- 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 would facilitate and chair the community advisory group meetings, and would provide administrative support for their conduct. The Community Relations Monitor would 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 would 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 program.

The Proponent would 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 would 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 is to 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. Attention to 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 of the action or activity
 - 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
 - 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 legislation³
 - regular reporting via the monthly environmental report, to the community of complaints and corrective actions maintaining appropriate confidentiality
 - monitoring and auditing of the complaint handling system.

During the operations phase of the Project, the complaints system would be incorporated into the operators customer feedback procedures.

18.7 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 and bus network.

Table 18-5 outlines the range of environmental design requirements that respond to environmental and community issues identified through the EIS. 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:

- transport and access
- air quality
- noise and vibration
- hydrology
- cultural heritage
- climate change and sustainability
- land use and transport integration
- visual amenity and urban design
- socio-economic
- hazard and risk
- ecology.

³ Relevant legislation includes: State Development and Public Works Organisation Act 1971 and the Environmental Protection Act 1994

Table 18-5 Environmental design requirements

Element	Environmental design requirements						
Transport and access	<p>Design requirements</p> <ul style="list-style-type: none"> Emergency access and evacuation for each station and the tunnel is designed in consultation with the Department of Community Safety and the relevant emergency services authorities. 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. <p><i>Note: The design of underground stations is a design specification action outside the scope of this Draft Outline EMP.</i></p> <ul style="list-style-type: none"> Pedestrian and cycle pathways in the vicinity of stations are designed in accordance with Queensland Rail's Station Design Guide and Accessibility Signage Manual and the TransLink's Public Transport Infrastructure Manual (May 2012). New footpaths, pedestrian walkways and pedestrian road crossings in the vicinity of stations are designed, in consultation with Brisbane City Council and emergency services authorities, to allow safe and efficient pedestrian movement during peak periods and, where applicable, major events at the Brisbane Cricket Ground (Gabba Stadium) (Woolloongabba Station) and at Suncorp Stadium (Roma Street Station). The Project design provides for pedestrian and cycle connectivity between the Princess Alexandra Hospital (PA Hospital) and Railway Terrace via a pedestrian/cycle connection on Annerley Road adjacent to Dutton Park Station and incorporates appropriate crime prevention through environmental design (CPTED) principles and <i>Disability Discrimination Act 1992</i> (DDA) compliant vertical transport facilities. The Project design provides for the replacement of pedestrian and cycle pathways affected by the Project worksites in Victoria Park and Roma Street Parkland. Such pathways are designed to achieve appropriate standards and to incorporate urban design measures reflecting local community and Aboriginal traditional values. 						
Air quality	<p>Design requirements</p> <ul style="list-style-type: none"> The Project is designed to achieve the air quality criteria specified in Table 1 and Table 2 respectively. Ventilation outlets are designed and sited so as not to cause an increase of more than one degree Celsius in air temperature or changes to ambient air quality at nearby sensitive receptors or at ground level. The ventilation outlets also 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. Provisions must be made in the ventilation system design to maintain the function of the ventilation outlets and the ambient air quality outcomes in the event that urban development of land nearby a ventilation outlet would impact on the behaviour of the plume from a Project ventilation outlet. This could include requiring the Proponents to investigate extending and incorporating the Project ventilation outlets in the development proposal. <p>Table 1: Busway in-tunnel air quality</p> <table border="1"> <tr> <td>Carbon monoxide (CO)</td><td>70 ppm at peak (traffic flows >10kph) 90 ppm in traffic congestion (traffic flows <10kph)</td></tr> <tr> <td>Nitrogen dioxide (NO₂)</td><td>1 ppm (average)</td></tr> <tr> <td>Visibility</td><td>0.005 m⁻¹</td></tr> </table> <p><i>Source: PIARC Guidelines</i></p>	Carbon monoxide (CO)	70 ppm at peak (traffic flows >10kph) 90 ppm in traffic congestion (traffic flows <10kph)	Nitrogen dioxide (NO ₂)	1 ppm (average)	Visibility	0.005 m ⁻¹
Carbon monoxide (CO)	70 ppm at peak (traffic flows >10kph) 90 ppm in traffic congestion (traffic flows <10kph)						
Nitrogen dioxide (NO ₂)	1 ppm (average)						
Visibility	0.005 m ⁻¹						

Element	Environmental design requirements																														
	<p>Table 2: Ambient air quality outcomes</p> <table><tr><th>Pollutant</th><th>Air Quality Objective</th><th>Averaging period</th><th>Allowable exceedances</th></tr><tr><td>Total Suspended Particulates (TSP)</td><td>90µg/m³</td><td>Annual</td><td>-</td></tr><tr><td>Particulates as PM₁₀ (<10 µm)</td><td>50µg/m³</td><td>24 hours</td><td>5 per year</td></tr><tr><td rowspan="2">Particulates as PM_{2.5} (<2.5 µm)</td><td>25µg/m³</td><td>24 hours</td><td>-</td></tr><tr><td>8µg/m³</td><td>Annual</td><td>-</td></tr><tr><td rowspan="2">Nitrogen dioxide (NO₂)</td><td>250µg/m³</td><td>1 hour</td><td>1 day each year</td></tr><tr><td>62µg/m³</td><td>1 year</td><td>-</td></tr><tr><td>Carbon monoxide (CO)</td><td>11,000µg/m³</td><td>8 hours</td><td>1 day each year</td></tr></table> <p>Source: Environmental Protection (Air) Policy</p>	Pollutant	Air Quality Objective	Averaging period	Allowable exceedances	Total Suspended Particulates (TSP)	90µg/m ³	Annual	-	Particulates as PM ₁₀ (<10 µm)	50µg/m ³	24 hours	5 per year	Particulates as PM _{2.5} (<2.5 µm)	25µg/m ³	24 hours	-	8µg/m ³	Annual	-	Nitrogen dioxide (NO ₂)	250µg/m ³	1 hour	1 day each year	62µg/m ³	1 year	-	Carbon monoxide (CO)	11,000µg/m ³	8 hours	1 day each year
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Carbon monoxide (CO)	11,000µg/m ³	8 hours	1 day each year																												
Noise and vibration	<ul style="list-style-type: none">• The Project is designed to achieve compliance with the Queensland Rail Code of Practice for Railway Noise Management and TMR Transport Noise Management Code of Practice: Road Traffic Noise, with regards airborne noise for all sensitive receptors during the operational phase.• Specifically, public address systems, bus stops, ‘kiss ‘n’ ride’, car parking, ventilation systems and electricity feeder stations at or near stations and bus layover areas are designed and sited to achieve the environmental outcomes for the acoustic environment during the operational phase.• The Project is designed to achieve the goals for ground-borne noise provided in Table 3 and for vibration provided in Table 4.• The Project achieves the relevant noise criteria for railway surface track airborne noise emissions as outlined in Queensland Rail’s Code of Practice – Railway Noise Management, being at present:<ul style="list-style-type: none">- 65 dBA, evaluated as the 24 hour average equivalent continuous A-weighted sound pressure level- 87 dBA, evaluated as a Single Event Maximum sound pressure level. <p>Table 3: Ground-borne noise design criteria (rail operations)</p> <table><tr><th>Receiver</th><th>Time of day</th><th>Noise design criteria (dBA)</th></tr><tr><td rowspan="2">Residential</td><td>07:00-22:00</td><td>40dBA</td></tr><tr><td>22:00-07:00</td><td>35dBA</td></tr><tr><td>Schools, educational institutions, places of worship.</td><td>When in use</td><td>40dBA to 45dBA</td></tr><tr><td>Retail areas</td><td>When in use</td><td>50dBA to 55dBA</td></tr><tr><td>General office areas</td><td>When in use</td><td>45dBA</td></tr><tr><td>Private offices and conference rooms</td><td>When in use</td><td>40dBA</td></tr><tr><td>Theatres</td><td>When in use</td><td>35dBA</td></tr></table>	Receiver	Time of day	Noise design criteria (dBA)	Residential	07:00-22:00	40dBA	22:00-07:00	35dBA	Schools, educational institutions, places of worship.	When in use	40dBA to 45dBA	Retail areas	When in use	50dBA to 55dBA	General office areas	When in use	45dBA	Private offices and conference rooms	When in use	40dBA	Theatres	When in use	35dBA							
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Theatres	When in use	35dBA																													

Element	Environmental design requirements																																									
	<p>Table 4: Ground-borne vibration design criteria (rail operations)</p> <table><tr><th>Receiver type</th><th>Period</th><th>Vibration goal (vibration velocity)</th></tr><tr><td>Residential</td><td>Day/ night</td><td>106dBV (0.2 mm/s)</td></tr><tr><td>Commercial and community facilities (including schools and places of worship)</td><td>When in use</td><td>112dBV (0.4 mm/s)</td></tr><tr><td>Industrial</td><td>When in use</td><td>118dBV (0.8 mm/s)</td></tr><tr><td>Sensitive equipment within medical or research facilities</td><td>When in use</td><td>82dBV (0.013 mm/s)</td></tr></table> <ul style="list-style-type: none">• Surface mechanical plant and ventilation systems operate within the noise goals outlined in Table 5. <p>Table 5: Mechanical plant noise goals (operations)</p> <table><tr><th>Receiver</th><th>Time of day</th><th>Background (b/g) noise creep dBA LA90 (1hour)</th><th>Acoustic quality objectives dBA LAeq (1hour)</th></tr><tr><td rowspan="2">Residential (for outdoors)</td><td>07:00-22:00</td><td>b/g + 0</td><td>-</td></tr><tr><td>22:00-07:00</td><td>b/g + 0</td><td>50</td></tr><tr><td rowspan="2">Residential (for indoors)</td><td>07:00-22:00</td><td>-</td><td>35</td></tr><tr><td>22:00-07:00</td><td>-</td><td>30</td></tr><tr><td>Library and educational institution (for indoors)</td><td>when in use</td><td>-</td><td>35</td></tr><tr><td>Commercial and retail activity (for indoors)</td><td>when in use</td><td>-</td><td>45</td></tr></table>	Receiver type	Period	Vibration goal (vibration velocity)	Residential	Day/ night	106dBV (0.2 mm/s)	Commercial and community facilities (including schools and places of worship)	When in use	112dBV (0.4 mm/s)	Industrial	When in use	118dBV (0.8 mm/s)	Sensitive equipment within medical or research facilities	When in use	82dBV (0.013 mm/s)	Receiver	Time of day	Background (b/g) noise creep dBA LA90 (1hour)	Acoustic quality objectives dBA LAeq (1hour)	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
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Hydrology (groundwater, settlement and flooding)	<ul style="list-style-type: none">• 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 release to an approved discharge point.• Where the project design anticipates groundwater entering underground structures, the design provides:<ul style="list-style-type: none">- measures to minimise ground settlement due to such drawdown- measures to ensure structural integrity and Project operational safety- measures to minimise the risk of expressing acid sulphate soils to air or the chance for oxidation.• The Project design achieves the water quality objectives for the Brisbane River referred to in Environmental Protection (Water) Policy 2009 for any water, including groundwater, released from Project infrastructure to surface waters. The Project design is based on the best available flooding information at the time. The Project design provides flood immunity to the tunnel infrastructure and underground stations in a 1 in 10,000 year AEP regional flood event, and a 1 in 100 AEP overland flow event.• The Project design will not cause flood impacts to third parties for events up to and including the 1 in 100 AEP flood event. <p><i>Note:</i> Significant work on flood estimation in the Brisbane River is currently being undertaken through the Brisbane River Catchment Flood Study being led by Department of State Development, Infrastructure and Planning. Flood estimates for the Brisbane River will need to be updated during detailed design once this study is complete.</p>																																									

Element	Environmental design requirements
Cultural heritage	<ul style="list-style-type: none"> 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. 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"> place naming interpretative signage and other landmarks the themes for public art the design of public spaces in the inner city (eg Victoria Park, Roma Street Parkland). In developing the Project design, the Proponent would provide opportunities for architectural design sympathetic to the cultural heritage landscape and streetscape.
Climate change and sustainability	<ul style="list-style-type: none"> 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. Acceptable air quality outcomes for in-tunnel air and for ambient air are established in Table 1 and Table 2 respectively. 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). 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 through to Project implementation. In design and construction, devise and implement a process for optimising energy efficiency in procurement, construction planning and delivery (eg component sourcing and transportation, spoil and materials handling – no double handling, programing to avoid re-work or redundant work) In operations, energy efficient design that meets the performance criteria of all Project plant and equipment would be included in the design specification.
Land use and transport integration	<ul style="list-style-type: none"> The Project design seeks to optimise land use and transport integration⁴ with: <ul style="list-style-type: none"> PA Hospital and Boggo Road Urban Village Woolloongabba Priority Development Area (PDA) Queen's Wharf Brisbane Brisbane Transit Centre. The Project is to be designed in consultation with: <ul style="list-style-type: none"> Brisbane City Council in relation to the relocation of the Field Services Group temporary staging facility at Gregory Terrace, Spring Hill Queensland Rail in relation to use of Queensland Rail land required for project worksites at Dutton Park, Roma Street Station and the Normanby Yards. Proponents for urban development projects at Joe Baker Street, Dutton Park, (Boggo Road Urban Village), Woolloongabba PDA, Queen's Wharf Brisbane, and Brisbane Transit Centre to address in their respective design, the Project's construction and operating effects and requirements. The Project design minimises the loss of public open space in Victoria Park for permanent infrastructure and the worksite is reinstated. Reinstatement works allow for and accommodate known and adopted recommendations from a community-based master planning process to be conducted by the Brisbane City Council.

⁴ 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 BaT station entrances.

Element	Environmental design requirements
Visual amenity and urban design	<ul style="list-style-type: none"> • 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"> - the station ventilation outlets and intake structures - the busway across the Exhibition Line and Inner City Bypass (ICB) and the busway on-ramp to the ICB - the above-ground electricity feeder stations - the portals and transition structures - noise barriers and other impact mitigation devices or structures. • The specification for architectural design of infrastructure is outside of the scope of this Draft Outline EMP. • Noise barriers are designed to reduce the visual impacts from surrounding properties and roadways by: <ul style="list-style-type: none"> - incorporating urban design treatments and landscape elements such as massed plantings - using clear or transparent materials to maintain existing expansive views beyond the rail and bus corridor, subject to security and maintenance considerations being evaluated - avoiding the use of highly reflective materials and materials that support graffiti. • 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. Public art initiatives are developed in consultation with Brisbane City Council, community groups including but not limited to the Turrbal People.
Socio-economic	<ul style="list-style-type: none"> • The design of stations and public spaces developed as part of the Project stations incorporate CPTED principles to maximise commuter safety. • The Project design maintains the Dutton Park Station as an operating railway station. The design of the station and associated infrastructure makes adequate provision for safe pedestrian and cycle movement at the Annerley Road entrances. • Project design and construction planning will seek to minimise impacts to Victoria Park (eg minimising the amount of open space impacted and maintaining pedestrian and cycle access).
Hazard and risk	<ul style="list-style-type: none"> • The Project design ensures that access for emergency services vehicles to the tunnel and underground stations is provided in consultation with Department of Community Safety and emergency services providers, and is maintained at all times during operation of the Project. • The Project design incorporates fire and life safety measures, including ventilation, smoke extraction and fire-fighting systems for enclosed spaces and enclosed work areas such as underground works areas, acoustic enclosures and sheds, for the construction and operation phases in consultation with Department of Community Safety and emergency service providers. • The Project design provides for well-lit site lines within stations and station plazas to maximise safety for staff, visitors and commuters during operation of the Project.
Ecology	<ul style="list-style-type: none"> • Where possible in Victoria Park and Roma Street Parkland, avoid or minimise the loss of vegetation and the siting of construction worksite infrastructure within the drip zone of large mature trees, by refining the construction footprint. • Prior to clearing within the northern portion of Victoria Park, relocate, repair or replace the existing fauna boxes. • Prepare a rehabilitation and landscape plan in consultation with Brisbane City Council for implementation in the construction phase.

Element	Environmental design requirements
	<ul style="list-style-type: none"> Preparation of a lighting plan in consultation with Brisbane City Council for implementation in the construction phase to minimise the impact of lighting on the surrounding habitat. Preparation of a Project weed and seed management plan in consultation with Brisbane City Council for implementation in the construction phase.

The Chief Executive of TMR must notify the Coordinator-General in writing that the Project design satisfies the environmental design requirements prior to the commencement of operations. Such notification may take place on a staged basis as design development progresses for the Project.

18.8 EMP (Construction)

This section describes the environmental outcomes and performance criteria for each environmental element relevant to the construction phase of the Project. Mitigation measures to achieve the environmental outcomes are also recommended. Specific monitoring requirements and/or 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 monitoring and/ or construction method to achieve the environmental goal. The requirement for a sub-plan will be determined by the Environmental Monitor and developed by the Proponent during the design phase.

The elements relevant to the EMP (Construction) are:

- transport
- soils, topography and drainage
- contaminated land
- landscape and visual amenity
- ecology
- hydrology
- flooding
- air quality
- noise and vibration
- waste
- Indigenous heritage
- historic heritage
- socio-economic
- hazard and risk.

Table 18-6 Element 1 – General

Element 1 – General – construction	
Environmental outcomes	<ul style="list-style-type: none"> Construction activities, where practicable, avoid impacts of the Project on the community. Construction activities minimise consumption of energy, potable water supplies and non-renewable resources.
Performance criteria	<ul style="list-style-type: none"> Construction activities are undertaken within the hours of work set out in the construction hours (Table 6). Construction worksites are planned, prepared and maintained in accordance with the Construction EMP. Construction works are planned and managed to avoid, or minimise and manage impacts on amenity, buildings and property near to worksites. Construction activities are planned and managed to maintain public safety near worksites and along haulage routes. Construction worksites are rehabilitated as soon as practicable following completion of the works in accordance with rehabilitation plans approved by the Chief Executive, Department of Transport and Main Roads.

Element 1 – General – construction

Table 6: Construction hours

Worksite	Surface works – standard hours*	Extended work hours	Managed works**	Spoil haulage and materials/ equipment delivery*
Southern Connection (Boggo Road site)	Monday to Saturday, 6.30am-6.30pm	For approved rail possession – 80 hrs continuous work	24 hrs, 7 days	Monday to Friday, 6.30am to 7.00am 9.00am to 2.00pm 4.30pm to 6.30pm Saturday: 6.30am to 6.30pm Sunday: No work
Southern Connection (PA Hospital site)	Monday to Saturday, 6.30am-6.30pm		24 hrs, 7 days	24 hours, 7 days
Dutton Park track connections	Monday to Saturday, 6.30am-6.30pm	For approved rail possession – 80 hrs continuous work	n/a	24 hours, 7 days, except during peak traffic periods being Monday to Friday, 7.00am – 9.00am 4.30pm – 6.30pm,
Woolloongabba Station	Monday to Saturday, 6.30am-6.30pm	6:30pm-10:00pm Monday to Friday	24 hrs, 7 days	24 hours, 7 days, except during peak traffic periods being Monday to Friday, 7.00am – 9.00am 4.30pm – 6.30pm
Roma Street and George Street stations	Monday to Saturday, 6.30am-6.30pm	6:30pm-10:00pm Monday to Friday	24 hrs, 7 days	Monday to Friday, 6.30am to 7.00am 9.00am to 2.00pm 4.30pm to 6.30pm Saturday: 6.30am to 6.30pm Sunday: No work
Northern Connection and busway connections	Monday to Saturday, 6.30am-6.30pm	For approved rail possession – 80 hrs continuous work	24 hrs, 7 days	Monday to Friday, 6.30am to 7.00am 9.00am to 2.00pm 4.30pm to 6.30pm Saturday: 6.30am to 6.30pm Sunday: No work

* Note: works may be undertaken outside of these hours in the following special circumstances:

1. Works undertaken within a rail corridor or road reserve that cannot be undertaken reasonably nor practicably during standard hours due to potential disruptions to rail operations or peak traffic flows.
2. Works involving the transport, assembly or decommissioning of oversized plant, equipment, components or structures.
3. Emergency works to avoid the loss of lives, damage to property or to prevent environmental harm.
4. Materials and equipment deliveries include the delivery of 'in time' materials such as concrete, hazardous materials, large components and machinery.

** Managed works are those works carried out sub-surface or within an acoustic enclosure or shed, and which meets environmental goals.

Element 1 – General – construction	
Extended work hours	<ul style="list-style-type: none"> Extended work hours may be carried out as per Table 6 only under the following circumstances: <ul style="list-style-type: none"> Notification is made to the Chief Executive of the Department of Transport and Main Roads setting out the reason for the use of extended hours, the consequences if extended hours are not approved, the proposed work method and program, and the sensitive receptors which may be impacted by such works. The extended hours relate to a discrete package of work, or a specified work activity (eg material delivery, concrete pours, tying reinforcing steel, site set-up) for which there is a defined program 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 reviewed by the Environmental Monitor and accepted by the Chief Executive of the Department of Transport and Main Roads prior to the commencement of the works. Near neighbours and stakeholders are consulted about the proposed works package, its potential impacts, the proposed mitigation and management measures, the monitoring program and complaints procedure prior to the EMP sub-plan being submitted to the Chief Executive of the Department of Transport and Main Roads. A trial period of work, undertaken over a period of three consecutive days, is conducted to trial and monitor the potential impacts of the works on sensitive receptors. Where the trial demonstrates the environmental outcomes would not be achieved the work method must be revised and reassessed. In considering the notification, and imposing any requirements that may be appropriate, the Chief Executive would have regard for the: <ul style="list-style-type: none"> matters raised in consultation with sensitive receptors about the potential impacts of the works management methods for achieving the environmental outcomes duration, scale and intensity of the works advice of the Environmental Monitor and Community Relations Monitor. The works during extended hours must be monitored for compliance with any requirements the Chief Executive may impose, and with the Coordinator-General's conditions and the Construction EMP. Where monitoring detects non-compliance with the Chief Executive's requirements, or where verified complaints indicate a high level of community concern, the Coordinator-General's conditions or the EMP, the extended hours work must cease immediately, once the worksite has been made safe. At this point the extended work hours would lapse until a revised work method is demonstrated over a three day trial to achieve the environmental outcomes for nearby neighbours. <p><i>Note: Community concern referred to above is gauged by the Chief Executive, Department of Transport and Main Roads, having regard to:</i></p> <ul style="list-style-type: none"> <i>the number and nature of complaints received</i> <i>the extent to which monitoring demonstrates exceedances of performance criteria and the environmental outcomes</i> <i>the advice of the Environmental Monitor and Community Relations Monitor.</i>
Construction EMP	<ul style="list-style-type: none"> A Construction EMP must be prepared 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 Chief Executive of the Department of Transport and Main Roads, the Environmental Monitor, the Community Relations Monitor and the

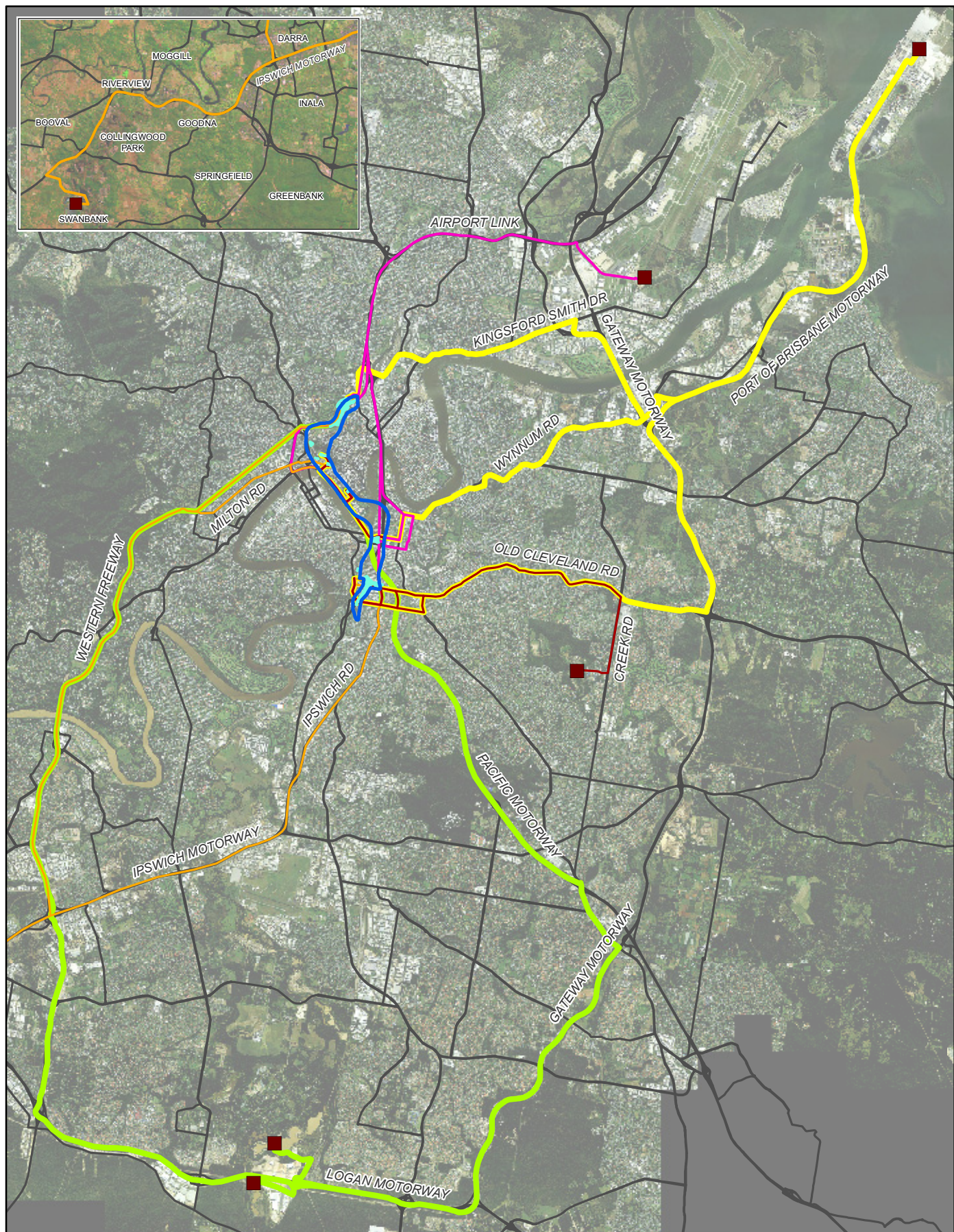
Element 1 – General – construction	
	<p>Coordinator-General of the nature and timing of the intended works.</p> <ul style="list-style-type: none"> • The Construction EMP must be accepted by the Chief Executive of the Department of Transport and Main Roads as being consistent with this Draft Outline EMP and the Coordinator-General's conditions. The CEMP may be submitted separately and updated progressively for each construction worksite. • The Proponent must notify the Chief Executive of the Department of the Transport and Main Roads, and the Environmental Monitor, the Community Relations Monitor and the Coordinator-General and all entities nominated in the Coordinator-General's conditions of the commencement of works for each worksite at least 10 business days prior to the relevant commencement date.
Mitigation measures	<ul style="list-style-type: none"> • Measures which may be implemented at construction worksites to minimise construction impacts, include: <ul style="list-style-type: none"> - 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. - Spoil and materials handling, storage and loading occurs 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. - 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. - 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. • Access to construction worksites for pedestrians and vehicles is to satisfy the requirements of City Plan Transport, Access, Parking and Servicing Code. • Prior to the commencement of works predicted to cause cosmetic damage to way of settlement by ground borne vibrations, conduct building condition surveys in consultation with affected parties, the Environmental Monitor and the Community Relations Monitor. • 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. • 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. • 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. • 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"> - contact details for the Project, the Environmental Monitor and the Community Relations Monitor - the monthly and annual environmental reports - a summary of the overall construction program, and summaries of the construction programs for each worksite

Element 1 – General – construction	
	<ul style="list-style-type: none"> - details for accessing the complaints system and how it operates - notifications about Project works, including any extended hours work, traffic management and changes to public transport services.
Monitoring	<ul style="list-style-type: none"> • The Proponent must monitor and report on all aspects of the environmental performance, mitigation and management of the Project, including independent verification. • In the case of an incident that may cause 'environmental harm' as defined by the EP Act, the reporting and management requirements of the EP Act take precedence over the provisions of the Construction EMP.
Reporting	<ul style="list-style-type: none"> • The Proponent must prepare monthly construction environmental reports addressing: <ul style="list-style-type: none"> - the programme of works and progress made in the reporting period - the scope and character of works to be undertaken in the next reporting period - monitoring results for key parameters (eg 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 - complaints received and addressed, including the nature of the complaints and timing of the response to the complaints - compliance, or if necessary, instances of non-compliance with the Coordinator-General's conditions and the Construction EMP - any corrective actions required to address non-compliance with the conditions of the EMP - community engagement activities and performance in relation to the community engagement plan. • Monthly construction environmental reports must be provided to the Environmental Monitor and the Chief Executive, Department of Transport and Main Roads, and must be posted on the project website as soon as practicable after submission to the Chief Executive.

Table 18-7 Element 2 – Construction transport

Element 2 – Construction transport	
Environmental outcomes	<ul style="list-style-type: none"> • 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. • Workforce parking is to be managed to avoid or minimise and mitigate adverse impacts on the local community and businesses. • Traffic access for emergency services to construction worksites and adjoining properties is maintained throughout the construction phase. • 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.

Element 2 – Construction transport	
Performance criteria	<ul style="list-style-type: none"> • Disruptions to the operation of passenger, the road network and the public transport network due to construction works are avoided during peak periods and managed during off-peak periods. • Passenger rail services and schedules during peak weekday travel times are maintained, unless with prior agreement of the Rail Infrastructure Manager (RIM) and TransLink. Freight rail services and schedules nominated by the Rail Manager are maintained. • Passenger bus services and schedules nominated by TransLink during peak travel times are maintained. • Haulage vehicles (ie. spoil, construction equipment and materials haulage) only travel on designated haulage routes defined in this Draft Outline Construction EMP (refer to Figure 18-3), unless agreed beforehand with the relevant road authority. • Local roads are not used by any construction vehicles including light vehicles and workers cars, unless agreed with the relevant road authority in consultation with the local community serviced by such roads. 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. • Traffic flows near construction works are maintained during peak traffic periods and managed during off-peak periods to minimise disruption. • Spoil haulage vehicles are tracked by GPS or similar technology and managed in real time to and from worksites and spoil sites, to manage speeding, avoid queuing, congested areas and traffic incidents, and to manage and avoid over-loading, spills and safety incidents. • Worker parking is provided for each construction worksite where space is available. Where parking is insufficient to meet demand, 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. • 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. • 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 • 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. • 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.



LEGEND

- Spoil site
- Main road
- Haulage route to Port of Brisbane spoil site
- Haulage route to Brisbane Airport spoil site
- Haulage route to Pine Mountain spoil site
- Haulage route to Larapinta spoil sites
- Haulage route to Swanbank spoil site

- Study corridor
- Construction worksite

BUS AND TRAIN PROJECT ENVIRONMENTAL IMPACT STATEMENT

FIGURE 18-3

Spoil sites and combined haulage routes

Aerial Photo: AusImage 2009



0 2 4
Kilometres

1:140,000 (at A4)

Projection: GDA 1994 MGA56

Element 2 – Construction Transport	
Mitigation measures	<ul style="list-style-type: none"> 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. 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. Construction works within the rail corridor rail network shutdowns are to be agreed with Queensland Rail through the Scheduled Closure Access System, prior to the commencement of works within the rail corridor, to minimise disruption to the rail network and should use existing planned shutdowns where possible. Early and on-going notification is to be provided to Queensland Rail, TransLink, 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. 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. Disruption to rail passenger services is to be avoided to the extent reasonable and practicable during major events, such as the Ekka (Exhibition Station) and at Suncorp Stadium (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. 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 Queensland Rail and other rail operators. Provision of temporary alternative passenger facilities including access and car parking, toilets and baggage handling facility at Roma Street (Platform 10) where disrupted during construction works. Construction works within the busway corridor busway shutdowns to be coordinated with TransLink. Where busway shutdowns are required during operational hours, TransLink will be consulted in advance to enable alternate routes and stops to be established. Early and on-going notification is to be provided to TransLink, busway passengers and local communities of the timing and duration of shutdowns, likely disruptions to services and alternative arrangements to be implemented. Disruption to busway services is to be avoided to the extent reasonable and practicable during major events, such as the Ekka (Northern Busway) and the Gabba (Eastern Busway). Where disruptions are unavoidable, services are provided on the local road network between appropriate stations to the major event venues, or to bypass the disrupted section in the network. <p>Construction works on the road network</p> <ul style="list-style-type: none"> 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

Element 2 – Construction Transport

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.
- Prepare and implement Construction Traffic Management Plans (CTMP) for each worksite prior to the commencement of construction activities in consultation with the TMR, Brisbane City Council, Queensland Police, Emergency Services Queensland, Queensland Ambulance Service and Queensland Fire and Emergency Services. The CTMP would be accepted by the Chief Executive, Department of Transport and Main Roads and subject to periodic review to address changes in the Project's construction program. 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 shown in **Figure 18-3** of this Draft Outline Construction EMP.
 - the staged possession of single traffic lanes in George Street for construction of the station shaft
 - the managed contra-flow use of one traffic lane in George Street, between Elizabeth Street and Charlotte Street, and the occupation of two traffic lanes (south-bound between Mary Street and Margaret Street) for the worksite and spoil loading facilities
 - 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, Brisbane City Council and if required, Ipswich City Council
 - construction haulage tasks are scheduled and managed to avoid disruption to traffic flows during peak traffic periods
 - 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
 - consideration should be made to the Transport, Access, Parking and Servicing Planning Scheme Policy in the Brisbane City Council Planning Scheme.
- A separate CTMP is required for an area in the CBD bounded by Elizabeth Street, Albert Street, Alice Street and William Streets to address the cumulative effects on the transport network of construction of the Project and the future construction of elements of the Queen's Wharf Brisbane project.
 - the CBD CTMP may be developed progressively by a working group comprising the Queensland Government, represented by TMR and DSDIP, and the Brisbane City Council.
- Construction haulage tasks are undertaken during the hours nominated in the construction hours, in **Table 1**.

Element 2 – Construction Transport

- 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 Roma Street Parkland (crowds greater than 5,000) – for the Roma Street Station worksite
 - at Suncorp Stadium (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 northern portal worksite.
 - Riverfire – George Street Station and Roma Street Station worksites
 - New Year's Eve – George 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 to minimise the disruption to local traffic, including at:
 - Woolloongabba PDA
 - Queen's Wharf Brisbane
 - RNA Showgrounds and Bowen Hills PDA.
- Prepare and implement a Construction Workforce Car Parking Plan for each construction worksite in consultation with local communities, the TMR and Brisbane City Council. 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 Brisbane City Council
 - address changing worksite demands during the construction program
 - be provided to Brisbane City Council prior to commencement of construction at a worksite
 - address the Transport, Access, Parking and Servicing Planning Scheme Policy in the Brisbane City Council Planning Scheme.
- Prepare and implement a Construction Vehicle Management Plan, prior to the commencement of construction works, which provides measures to manage the operation of 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
 - maintaining all haulage vehicles to Australian Design Rule 28/01 in relation to noise emissions, exhaust emissions, traffic safety and operational safety
 - ensuring all vehicles leaving a construction worksite pass over or through devices that removes loose soil and other debris before entering a public road.

Element 2 – Construction Transport

- Spoil haulage vehicles are proposed to be managed through a range of measures including:
 - GPS tracking and haulage programme to avoid stacking and queuing on streets
 - GPS tracking and haulage programme to avoid local roads or roads not designated as haul roads
 - GPS to avoid congestion and incidents in the network
 - spoil vehicles to be clearly marked, including a visible Project contact phone number
 - 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, Brisbane City Council 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
 - 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 Roma Street and Roma Street Parkland, George Street and Mary Street in the Brisbane CBD
 - businesses and community facilities at Allen Street, Stanley Street and Vulture Street at Woolloongabba
 - business at Boggo Road Urban Village off Annerley Road, Dutton Park
 - hospitals, medical centres and research facilities at Ecosciences Precinct, PA Hospital and the Royal Brisbane and Women's Hospital (RBWH)
 - schools along Gregory Terrace and Annerley Road.
- Access for emergency services vehicles is to be maintained for the duration of construction works to:
 - RBWH via O'Connell Terrace
 - PA Hospital via Cornwall Street
 - Mater Hospital, via Stanley Street.
- 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.

Element 2 – Construction Transport	
	<p>Public and active transport</p> <ul style="list-style-type: none"> • Traffic management measures are to be implemented near to Project works to minimise disruption and delays to bus services. • 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. • 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. In particular, access will be maintained to: <ul style="list-style-type: none"> - Boggo Road Busway Station and Park Road Station - PA Hospital Busway Station - Ecosciences Precinct and Boggo Road Urban Village - Woolloongabba Busway Station - City Gardens, QUT and the parliamentary precinct via George Street - Roma Street Station and the Roma Street Parkland - RBWH - Open space not occupied by Project work sites (eg Victoria Park and Roma Street Parkland) - Schools near to Project works, such as Brisbane Girls Grammar School, St Joseph's College, Brisbane Grammar School and Dutton Park State School. • Use of articulated or 'truck and dog' vehicles can be used through worksite specific Construction Traffic Management Plans adjacent to areas of high pedestrian and cycle activity, ie Roma Street and George Street worksites. • 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, including but not limited to the bikeway: <ul style="list-style-type: none"> - along Kent Street, Dutton Park and the PA Hospital - through Roma Street Parkland - in Victoria Park.
Monitoring	<ul style="list-style-type: none"> • Monitoring of construction traffic to ensure compliance with relevant requirements of Brisbane City Council, TMR, Police and Queensland Rail. • Weekly reviews with the BMTMC to identify any congestion issues and non-compliances with the Construction Traffic Management Plan along haul routes and at major intersections. • 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. • Weekly inspections by the Proponent of local streets surrounding worksites to identify any unauthorised worker parking and non-compliances with the Construction Workforce Car Parking Plan. • Weekly inspections by the Proponent of pedestrian and cycle accesses surrounding

Element 2 – Construction Transport	
	worksites to identify any disturbances caused by construction activities. Any damaged or unsafe pedestrian or cycle accesses must be rectified immediately.
Reporting	<ul style="list-style-type: none"> 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. Any amendments to the Construction Traffic Management Plan, Construction Workforce Car Parking Plan or Construction Vehicle Management Plan are to be forwarded to the TMR, and Brisbane City Council seeking input to the changes, prior to the changes being implemented.

Table 18-8 Element 3 – Soils, topography and drainage

Element 3 – Soils, topography, and drainage – construction	
Environmental outcomes	<ul style="list-style-type: none"> Construction activities minimise soil erosion and sedimentation and avoid adverse impacts on the environmental values of receiving waters. Construction activities minimise the impacts of settlement from tunnelling or other construction works. Construction activities avoid or minimise environmental and public health risks associated with disturbance of potential acid sulphate soils encountered during construction works.
Performance criteria	<ul style="list-style-type: none"> 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. 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 MRTS51 Environmental Management. Runoff from worksites complies with the Environmental Protection (Water) Policy 2009 (EPP (Water)). 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. ASS is avoided, or if intercepted, is managed to avoid adverse impact to environmental values, infrastructure, construction equipment, construction personnel or the public.
Mitigation measures	<p>Geology</p> <ul style="list-style-type: none"> Undertake further geotechnical investigations to support the reference design and construction planning for the Project. <p>Soil erosion</p> <ul style="list-style-type: none"> 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 Clause 10.2 of MRTS51 The ESCP would form a sub-plan under the overarching Construction Environmental Management Plan and would address: <ul style="list-style-type: none"> water and wind erosion turbidity in freshwater, estuarine and marine environments land settlement soil mixing, inversion and compaction worksite reinstatement. 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

Element 3 – Soils, topography, and drainage – construction

- 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:
- southern portal construction worksites
 - Woolloongabba Station construction worksite
 - George Street Station construction worksite
 - Roma Street Station construction worksite
 - northern portal construction worksites.
- Erosion and sediment control measures must address:
 - water and wind erosion
 - turbidity in freshwater, estuarine and marine environments
 - land settlement
 - soil mixing, inversion and compaction
 - worksite reinstatement.
 - 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.
 - develop and implement an Erosion and Sediment Control Plan (ESCP) for each construction worksite and location of surface works in accordance with the guidelines for Best Practice Erosion and Sediment Control (International Erosion Control Association, 2008) and Clause 10.2 of TMR's Technical Standard MRTS51 Environmental Management.
 - 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
 - early installation of measures to avoid loose spoil material or other soil spilling onto roadways (eg 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

Element 3 – Soils, topography, and drainage – construction	
	<ul style="list-style-type: none"> - managing the stripping and stockpiling of surface spoil material from surface works areas with regard to potential contamination - 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. <p>Settlement</p> <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> - excavation induced settlement - groundwater drawdown induced settlement - 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 and cosmetic damage to buildings 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. • 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 would repair building damage. • 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. • 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 50 m of the tunnel alignment centreline or the outer walls of an underground station or excavated structure. <p>Acid sulphate soils</p> <ul style="list-style-type: none"> • To inform detailed design and construction planning, undertake ASS investigations in accordance with the current QASSIT5 guidelines in areas below five metres AHD, where proposed excavation or soil disturbance is to occur. • Where ASS investigations identify the likelihood of ASS being disturbed, prepare and implement an ASS Management Plan in accordance with the Queensland Acid Sulphate Soils Technical Manual: Soil Management Guidelines and in consultation with DNRM. <p>Fossil material</p> <ul style="list-style-type: none"> • If significant fossil material or finds are encountered during excavation, a suitably qualified specialist will be consulted to determine management or preservation measures as required.

⁵ Queensland Acid Sulphate Soils Investigation Team, Department Natural Resources and Mines

Element 3 – Soils, topography, and drainage – construction	
Monitoring	<p>Soil erosion</p> <ul style="list-style-type: none"> 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. 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. 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. Regular auditing of the ESCPs are to be undertaken by suitably qualified and experienced personnel. 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. <p>Settlement</p> <ul style="list-style-type: none"> 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 and recommendations for repairing building damage established. Monitoring of settlement must be conducted from the commencement of underground construction works and dewatering. In particular, monitoring must be undertaken at, but not limited to, the following locations: <ul style="list-style-type: none"> Woolloongabba Station George Street Station Roma Street Station <p>Acid sulphate soils</p> <ul style="list-style-type: none"> 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. 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. For construction works involving disturbance of ASS, conduct monthly groundwater and surface water monitoring in areas hydraulically connected to sites of ASS disturbance. All leachate and runoff from areas excavated below 5 m AHD, ASS treatment pads and stockpile areas would 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.
Reporting	<ul style="list-style-type: none"> 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. 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.

Table 18-9 Element 4 – Contaminated land

Element 4 – Contaminated land – construction	
Environmental outcomes	<ul style="list-style-type: none"> Construction activities avoid, or minimise the environmental and public health risks from contaminated soil, groundwater or soil gas intercepted during construction works.
Performance criteria	<ul style="list-style-type: none"> 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). Works are conducted in accordance with the requirements of the <i>Environmental Protection Act 1994</i> (EP Act) and subordinate legislation. Site investigations for contaminated sites inform detailed design and are completed prior to the commencement of works. 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. Construction activities involving disturbance of contaminated land do not cause contamination of previously uncontaminated sites or adjoining land. Handling of asbestos occurs in accordance with the EP Act and the <i>Work Health and Safety Regulation 2011</i>, and relevant Queensland codes of practice⁶. 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.
Mitigation measures	<p>Investigation of potential contamination</p> <ul style="list-style-type: none"> 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, Brisbane City Council 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. 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: <ul style="list-style-type: none"> identification of the likely forms of contamination that could occur (eg 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 at nearby sensitive receptors spill response and remediation procedures identification of properties on the Environmental Management Register or Contaminated

⁶ 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 – Contaminated land – construction

	<p>Land Register in accordance with the EP Act</p> <ul style="list-style-type: none"> - 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 - disposal permits obtained from DEHP for the removal of contaminated soil in accordance with the EP Act, as required. <ul style="list-style-type: none"> • 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. <p>Disturbance, excavation, removal and/ or disposal of contaminated soil</p> <ul style="list-style-type: none"> • 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. • 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. • Off-site disposal of contaminated material would be to a licensed landfill facility under a DEHP issued Disposal Permit. <p>Disturbance and migration of contaminated groundwater</p> <ul style="list-style-type: none"> • 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 program specified in Table 18-12, including triggers to identify mobilisation of contaminated groundwater both in-situ and at drawdown collection points.
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Element 4 – Contaminated land – construction

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)]
 - 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. In particular, asbestos audits would be required for demolition works enabling the George Street and Woolloongabba stations, and possibly the southern portal works.
- 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
 - 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.
- 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.
- Spill response equipment commensurate of the type and quantity of hazardous substances

Element 4 – Contaminated land – construction	
	<p>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.</p> <ul style="list-style-type: none"> • Undertake refuelling and maintenance activities in appropriately located designated bunded areas to avoid the potential for soil and water contamination. • Conduct induction and training for construction staff in relation to: <ul style="list-style-type: none"> - the management and remediation of contaminated land - procedures for the handling, storage and disposal of hazardous materials - incident response practices and procedures - environmental awareness to encourage good material handling practices, spill management and incident reporting. • 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. • 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. • 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. • Locate spill kits in the vicinity of hazardous material storage areas and training site staff in their use. • Secure fences and locking or manning access points to adequately protect worksites and storage areas from theft and/ or vandalism. • Clearly mark the contents of tanks and display notices requiring that the valves and trigger guns be locked when not in use. • Undertake regular inspections of tanks, bunds and storage areas to ensure the integrity of all facilities.
Monitoring	<ul style="list-style-type: none"> • 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. • Immediately following a defined rainfall event, inspect and conduct necessary maintenance on all bunded chemical and hazardous storage areas. • Ensure that sign-off from a licenced asbestos contractor has been obtained and documented prior to any partial or full demolition of buildings and structures.
Reporting	<ul style="list-style-type: none"> • 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. • 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. • 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. • 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.

Table 18-10 Element 5 – Landscape and visual amenity

Element 5 – Landscape and visual amenity - construction	
Environmental outcomes	<ul style="list-style-type: none"> Construction activities minimise and mitigate impacts on the visual and landscape environment. Construction activities avoid light nuisance for sensitive receptors and maintain safe driving conditions for motorists near to construction works.
Performance criteria	<ul style="list-style-type: none"> Development of a rehabilitation plan during the design phase of the Project. 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. Construction worksites are rehabilitated progressively, and as soon as practicable, following construction works. Construction lighting is designed, constructed and operated to comply with AS4282-1997: Control of the obtrusive effects of outdoor lighting. Surface construction works do not extend beyond designated worksite boundaries.
Mitigation measures	<ul style="list-style-type: none"> Design and operate construction worksites to minimise the loss of public open space within Victoria Park, Roma Street Parkland and Outlook Park. This includes both limiting the footprint of the worksite to the area designated in this EIS to safely and efficiently undertake construction works, as well as minimising the length of time the worksite is in use. 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. In particular for Victoria Park, to the extent reasonable and practicable, minimise the loss of significant vegetation and contain earthworks to areas likely to require 'reshaping' as part of rehabilitation works. Where possible, adopt pruning and selective trimming of mature trees in preference to their removal. A suitably qualified arborist should be consulted regarding the management of mature vegetation to be retained. Where possible, fence and protect trees of particular significance that fall within construction worksites and laydown areas. 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. Project lighting to be designed in accordance with AS 4282-1997: Control of the obtrusive effects of outdoor lighting and Queensland Rail's Lighting Standard for Railway Stations and the Brisbane busway design guidelines. Phase construction 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. 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. Restore, rehabilitate, and where appropriate enhance open space and public areas disturbed or damaged by construction works as soon as practicable following construction, including restoring ground levels to their ultimate configuration to minimise likely further disturbance. Restoration works in each place are to be developed and implemented in

Element 5 – Landscape and visual amenity - construction	
	<p>consultation with the Brisbane City Council. Restoration of Victoria Park and Roma Street Parkland also is to address the cultural heritage values expressed by the Turrbal People.</p> <ul style="list-style-type: none"> Rehabilitation works provide for the: <ul style="list-style-type: none"> replacement of cleared mature trees with plantings of advanced individuals regrading of the surface to facilitate surface runoff without erosion, and to create a landform suitable for use consistent with City Plan designations reinstatement of paths, street or park furniture, signage equipment and lighting reinstatement of grassed areas and paved surfaces introduction of interpretive signage relating to cultural heritage, historic heritage and way finding measures. 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. Undertake tree replanting to mitigate or offset the loss of vegetation in consideration of relevant TMR and Brisbane City Council landscaping policies. A suitably qualified landscape architect be consulted regarding management of park access, functioning and restoration/ new landscaping proposals.
Monitoring	<ul style="list-style-type: none"> 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. Weekly inspections of lighting during night works are to be conducted to ensure that construction lighting has been installed and operated in accordance with AS4282-1997.
Reporting	<ul style="list-style-type: none"> 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.

Table 18-11 Element 6 – Ecology

Element 6 – Ecology – construction	
Environmental outcomes	<ul style="list-style-type: none"> Ecological, habitat and natural asset values of Victoria Park and Roma Street Parkland are maintained. No net loss of habitat occurs as a result of the design or construction of the Project. Construction activities do not cause the introduction or spread of pest species.
Performance criteria	<ul style="list-style-type: none"> No loss of mature vegetation communities in the City Botanic Gardens, Victoria Park or Roma Street Parkland occurs due to: <ul style="list-style-type: none"> groundwater drawdown. unplanned construction activities. 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 Brisbane City Council. Necessary clearing permits or approvals for vegetation clearing are obtained, and clearing is undertaken in accordance with these permits or approvals. Pest species declared under the <i>Land Protection (Pest and Stock Route Management) Regulation 2003</i> are not spread or introduced during construction. Rehabilitation and landscape plans comply with the <i>Electrical Safety Act 2002</i> (ES Act) and Queensland Rail maintenance policies and, where practicable, uses endemic plants.

Element 6 – Ecology – construction	
Mitigation measures	<p>Construction</p> <ul style="list-style-type: none"> • 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. • Obtain a report from a suitably qualified arborist to determine the potential impacts that the tunnel, station caverns and cut and cover sections may cause to the roots of the large figs and other trees located along George Street and adjacent City Botanic Gardens, Roma Street Parkland and Victoria Park. This information is to be used to develop an appropriate management plan for these trees to minimise any potential impacts and monitor their health, including measures to address potential groundwater drawdown. • 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. • 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. • 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 shall be registered with DEHP and hold applicable licences/permits. • 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. • Clearly define construction worksites away from noise and vibration sensitive environments, such as mature trees in Victoria Park. • Prior to clearing vegetation, relocate, repair or replace where necessary, the existing fauna boxes situated in the northern section of Victoria Park. • Ensure appropriate soil hygiene procedures are followed to prevent spread of pest plants and animals, and potential soil pathogens. • Have regard to the protection of vegetation in accordance with AS/NZS 4970 <p>Red Imported Fire Ants</p> <ul style="list-style-type: none"> • 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. • If material is to be imported from a Fire Ant restricted area, comply with DAFF (Bio-security Queensland) requirements for all construction worksites and spoil placement locations, in relation to the management requirements for the movement of restricted materials. <p>Operation</p> <ul style="list-style-type: none"> • 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.
Monitoring	<ul style="list-style-type: none"> • 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. • Monitor significant trees identified as being at potential risk from the Project during construction and for two growing seasons after completion of construction works. • Regularly inspect construction worksites and other work areas, as appropriate, to assess

Element 6 – Ecology – construction	
	<p>compliance with mitigation measures identified to minimise impacts on flora and fauna.</p> <ul style="list-style-type: none"> Inspect and monitor construction worksites and the spoil placement sites monthly for the presence of fire ants. Prior to the completion of construction works, monitor rehabilitation activities to ensure compliance with the Rehabilitation Plan.
Reporting	<ul style="list-style-type: none"> Monthly during site preparation, construction and rehabilitation.

Table 18-12 Element 7 – Hydrology

Element 7 – Hydrology – construction	
Environmental outcomes	<p>Groundwater</p> <ul style="list-style-type: none"> Groundwater inflow to construction worksites, including tunnels, underground stations and shafts, is minimised. Groundwater quality is maintained at pre-disturbance levels during and after construction. Groundwater draw down from dewatering at worksites is monitored. <p>Surface water</p> <ul style="list-style-type: none"> Discharge of groundwater inflow from construction worksites does not adversely affect the environmental values of receiving waters. Environmental values of surface waters immediately downstream of the construction worksites are not adversely affected by the Project, during and post construction. Construction activities are managed to avoid the transportation of contaminants that might be released to waters.
Performance criteria	<p>Groundwater</p> <ul style="list-style-type: none"> Contamination of groundwater by construction materials is avoided. Groundwater quality measured within construction worksites is within 10 per cent of background quality established prior to disturbance for the duration of construction. Groundwater released from construction worksites to receiving waters complies with the EPP (Water) and Queensland Water Quality Guidelines. <p>Surface water</p> <ul style="list-style-type: none"> Water, including stormwater, wastewater and/or 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. The measured downstream value shall not exceed the upstream measured value by more than 10 per cent. Stormwater drainage is intercepted and diverted around exposed works within worksites. Contaminants, chemicals, toxicants and litter from Project worksites are prevented from entering receiving surface waters, including stormwater drains, roadside gutters and waterways.
Mitigation measures	<p>Groundwater</p> <ul style="list-style-type: none"> Further hydrogeological investigation, based on data obtained from further geotechnical survey to inform detailed design, would be required including estimating river conductance, to verify the current groundwater drawdown calculations prior to the commencement of excavation of the underground stations. 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 the Project. Following this review, additional bores may be proposed to address any gaps identified in the existing groundwater monitoring network.

Element 7 – Hydrology – construction

- In the event a new 'groundwater feature' (eg 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.
- Develop and implement design measures and construction methods to minimise groundwater inflows in to the construction area.
- Residual inflows would be captured by a drainage system, transferred to a central treatment plant and discharged to an approved point.
- Prior to the commencement of construction:
 - prepare and implement specific management plans for construction works that may disturb groundwater. These are to include, but not be limited to, measures to address the potential for, and prevent environmental impact from, groundwater drawdown
 - 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
 - develop and implement practices and procedures for waste handling, storage and disposal, and spillages to avoid contamination of groundwater.

Surface water

- 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:
 - 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 one in five 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
 - 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.
- Prepare and implement an ESCP. Refer to **Table 18-8** for further details.
- 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
- 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

Element 7 – Hydrology – construction

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
- reporting of an event that results in an uncontrolled release of contaminants to the environment reported to DEHP within 24 hours of the proponent becoming aware of the release
- 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 Northern Connection, Roma Street, George Street, Woolloongabba and Southern Connection construction worksites.
- During construction, water would be captured by a drainage system at each of the stations and portals, transferred to a central treatment plant and discharged to an approved point.
- Progressively restore and rehabilitate sites affected by construction works.

Groundwater

- Prior to the commencement of construction, a groundwater monitoring program 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)
 - Monitoring and Sampling Manual 2009 (Version 2) (DEHP, 2010).
- The groundwater monitoring program is to include a means of determining:
 - water level drawdown as a result of the Project
 - quality of groundwater being intercepted
 - site specific parameters which would indicate a need for further groundwater management
 - assessment of actual and potential contaminant migration
 - volume of groundwater to be treated and released to surface waters.
- Groundwater quality monitoring would include the following parameters:
 - Field chemistry parameters: pH, Temperature, Electrical Conductivity and Total Dissolved Solids
 - 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, Sulphate and Alkalinity), Iron, Aluminium, Silver, Antimony, Molybdenum, Selenium, Total Petroleum Hydrocarbons (TPH) and benzene, toluene, ethylbenzene, and xylene (BTEX).
- 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.
- 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.

Element 7 – Hydrology – construction	
	<p>Surface water</p> <ul style="list-style-type: none"> • Prior to the commencement of construction, a water quality monitoring program must be established in accordance with the following guidelines: <ul style="list-style-type: none"> - 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). • The water quality monitoring program 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 program will also assess water quality within receiving waters to evaluate compliance with the specified Water Quality Objectives. • The monitoring program 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. • The water quality monitoring program is to include, but not be limited to: <ul style="list-style-type: none"> - a description of potentially affected water bodies - construction activities at each worksite and the potentially associated contaminants - specific monitoring locations, including upstream and downstream surface waters at each construction worksite (eg Norman Creek, York's Hollow and Breakfast Creek) - 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. • 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. • 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.
Reporting	<ul style="list-style-type: none"> • 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. • Results of groundwater quality and drawdown monitoring as part of the water quality monitoring program are to be reported quarterly through the monthly construction compliance report. • Monitoring data is to be reviewed annually to evaluate effectiveness of mitigation measures and to determine whether on-going monitoring is required. • In the event of an uncontrolled release of contaminants to the environment, it is reported to DEHP in accordance with the EP Act.

Table 18-13 Element 8 – Flooding

Element 8 – Flooding – construction	
Environmental outcomes	<ul style="list-style-type: none"> Construction activities do not significantly alter existing flood behaviour and levels of waterways and do not increase existing flood levels on private property. 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.
Performance criteria	<ul style="list-style-type: none"> 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. Construction activities, including any temporary works and spoil placement, do not cause flood waters to be re-directed over other private property. Construction worksites and spoil placement sites are protected from inundation by flood waters, including overland flows, from a 1 in 20 AEP flood event. Bulk storage facilities for hazardous substances used in construction are protected from inundation by flood waters from a 1 in 50 AEP flood event. 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.
Mitigation measures	<ul style="list-style-type: none"> For construction worksites potentially affected by flooding (Southern Connection, Woolloongabba Station, Roma Street Station, Northern Connection) provide adequate bunding or level differences to protect against local flooding for a 1 in 20 AEP flood event. Construction flood protection measures are to have no impact on third parties for a 1 in 5 AEP flood event or greater. 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. Ensure site access to all worksites provide all-weather access for construction vehicles and equipment. 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. Such measures are to have a zero net effect on flood levels elsewhere on the floodplain. 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.
Monitoring	<ul style="list-style-type: none"> 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. 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.
Reporting	<ul style="list-style-type: none"> 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.

Table 18-14 Element 9 – Air quality

Element 9 – Air quality – construction																											
Environmental objectives	<ul style="list-style-type: none"> Unreasonable dust and odour impacts (nuisance) arising from construction activities are avoided at nearby sensitive receptors. Emissions of greenhouse gases are minimised during construction activities. 																										
Performance criteria	<ul style="list-style-type: none"> 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. <p>Construction Air Quality Goals</p> <table> <tr> <th>Objective</th><th>Air Quality Indicator</th><th>Goals</th><th>Averaging Period</th><th>Allowable exceedances</th></tr> <tr> <td rowspan="2">Human health</td><td>Total suspended particulates</td><td>90 µg/m³</td><td>1 year</td><td>none</td></tr> <tr> <td>Particulate matter (PM₁₀)</td><td>50 µg/m³</td><td>24 hours</td><td>5 exceedances per year</td></tr> <tr> <td rowspan="2">Nuisance</td><td>Total suspended particulates</td><td>90µg/m³</td><td>Annual</td><td>none</td></tr> <tr> <td>Deposited dust</td><td>130mg/m²/day</td><td>1 year</td><td>5 exceedances per year</td></tr> </table> <ul style="list-style-type: none"> Where construction emissions are predicted to exceed the construction air quality goals, mitigation measures are designed and implemented to achieve the goals for nearby sensitive receptors. 				Objective	Air Quality Indicator	Goals	Averaging Period	Allowable exceedances	Human health	Total suspended particulates	90 µg/m ³	1 year	none	Particulate matter (PM ₁₀)	50 µg/m ³	24 hours	5 exceedances per year	Nuisance	Total suspended particulates	90µg/m ³	Annual	none	Deposited dust	130mg/m ² /day	1 year	5 exceedances per year
Objective	Air Quality Indicator	Goals	Averaging Period	Allowable exceedances																							
Human health	Total suspended particulates	90 µg/m ³	1 year	none																							
	Particulate matter (PM ₁₀)	50 µg/m ³	24 hours	5 exceedances per year																							
Nuisance	Total suspended particulates	90µg/m ³	Annual	none																							
	Deposited dust	130mg/m ² /day	1 year	5 exceedances per year																							
Mitigation measures	<p>Air quality</p> <ul style="list-style-type: none"> Prepare and implement an EMP Air Quality Sub-Plan, to achieve the environmental outcome for the duration of construction activities. Establish baseline air quality data prior to construction, particularly around the Northern Connection (Victoria Park), Woolloongabba, Boggo Road, George Street and Roma Street worksites. 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 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"> modification of construction methods increase in dust suppression measures when no other reasonable or practical measure is available, cessation of work until the meteorological conditions improve and the environmental outcome can be achieved. Ensure appropriate dust controls are used for demolition activities, including the use of water sprays and covering loads of material transported from the sites. Other measures may be initiated where or when required to avoid nuisance or harm, particularly in respect of buildings containing hazardous or potentially hazardous materials. 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. The movement of construction spoil from the tunnelling workface to the spoil loading facility must be within enclosed conveyances, whether on a conveyor, within a covered haul vehicle or some other enclosed equipment. 																										

Element 9 – Air quality – construction

- 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 earth.
 - Ensure adequate ventilation is installed and operated in underground construction works. Ventilation systems include dust filtration capable of achieving the Construction Air Quality Goals at the nearest sensitive receptor. Dust collected from the filtration system must be disposed of appropriately.
 - Where predictive modelling indicates exceedances of the air quality goals for human health and wellbeing, installation of work sheds or enclosures, equipped with a fabric filter for the removal of airborne particulate matter and dust from the primary excavation activities would be constructed. Current modelling indicates that mitigation measures will be required at the following locations:
 - over the spoil load out facility in the southern connection (Dutton Park Station)
 - above the TBM workbox within the northern worksite
 - at the George Street worksite
 - at the Roma Street worksite.
 - Handle excavated spoil within enclosed work areas, where possible.
 - Installation of hoardings or barriers on worksite perimeters, where appropriate, to help mitigate dust impacts.
 - 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.
 - Ensure trucks transporting construction spoil are:
 - covered to prevent wind-blown dust during transport.
 - cleaned down prior to exit from the worksites and the spoil placement site to prevent spills of loose material to roadways.
 - Ensure regular sweeping and washing of sealed access roads are within the worksites.
- Diesel exhaust emissions**
- Manage the movement of construction vehicles to avoid queuing near residential receptors approaching the worksites or adjacent to other sensitive activities.
 - Adopt procedures to avoid construction vehicles idling for excessive periods (eg 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. Ensure also that static engine emissions are collected and released to the atmosphere via high-level outlets standing at least 5m higher than the peak of the spoil handling shed or acoustic enclosure, whichever is the closer.

Element 9 – Air quality – construction

	<p>Odour</p> <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> identifying and determining the potential for odour impacts at off-site sensitive receptors conducting works with odorous soils when wind directions are unlikely to affect sensitive receptors covering odorous, excavated soil stockpiled either on a construction site or a spoil placement site to reduce odour impacts. <p>Greenhouse gases</p> <ul style="list-style-type: none"> 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. 												
Monitoring	<p>Dust and odour</p> <ul style="list-style-type: none"> Monitor and log daily meteorological conditions, including wind speed and direction, to determine the location of monitoring sites and of potentially affected receptors. Undertake daily monitoring of ambient air quality 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 receptors for the duration of surface works, and in response to complaints. Monitoring locations must be down-wind of the worksites. Other fixed monitoring stations must be established. Indicative dust sampling and dust monitoring locations around the main construction worksites are provided in Table 8. <p>Table 8: Indicative dust monitoring locations</p> <table> <tr> <th>Worksite</th><th>Indicative dust monitoring locations</th></tr> <tr> <td>Southern Connection</td><td> <ul style="list-style-type: none"> Ongoing dust and meteorological monitoring at the PA Hospital and Leukaemia Foundation ESA Village (ESA Village) Dust deposition sampling in each direction from the worksite </td></tr> <tr> <td>Woolloongabba Station</td><td> <ul style="list-style-type: none"> Dust deposition sampling in each direction from the worksite </td></tr> <tr> <td>George Street Station</td><td> <ul style="list-style-type: none"> Ongoing dust and meteorological monitoring at the worst affected George Street commercial location Dust deposition sampling in each direction from the worksite </td></tr> <tr> <td>Roma Street Station</td><td> <ul style="list-style-type: none"> Ongoing dust and meteorological monitoring at the Parkland Crescent residential building. Dust deposition sampling in each direction from the worksite </td></tr> <tr> <td>Northern Connection</td><td> <ul style="list-style-type: none"> Dust deposition sampling in each direction from the worksite </td></tr> </table> <ul style="list-style-type: none"> Undertake visual inspections for dust generating activities on a daily basis (eg stockpiles, vehicles and roads leaving construction sites for evidence of dust generation or loose, unstable material with potential for dust). 	Worksite	Indicative dust monitoring locations	Southern Connection	<ul style="list-style-type: none"> Ongoing dust and meteorological monitoring at the PA Hospital and Leukaemia Foundation ESA Village (ESA Village) Dust deposition sampling in each direction from the worksite 	Woolloongabba Station	<ul style="list-style-type: none"> Dust deposition sampling in each direction from the worksite 	George Street Station	<ul style="list-style-type: none"> Ongoing dust and meteorological monitoring at the worst affected George Street commercial location Dust deposition sampling in each direction from the worksite 	Roma Street Station	<ul style="list-style-type: none"> Ongoing dust and meteorological monitoring at the Parkland Crescent residential building. Dust deposition sampling in each direction from the worksite 	Northern Connection	<ul style="list-style-type: none"> Dust deposition sampling in each direction from the worksite
Worksite	Indicative dust monitoring locations												
Southern Connection	<ul style="list-style-type: none"> Ongoing dust and meteorological monitoring at the PA Hospital and Leukaemia Foundation ESA Village (ESA Village) Dust deposition sampling in each direction from the worksite 												
Woolloongabba Station	<ul style="list-style-type: none"> Dust deposition sampling in each direction from the worksite 												
George Street Station	<ul style="list-style-type: none"> Ongoing dust and meteorological monitoring at the worst affected George Street commercial location Dust deposition sampling in each direction from the worksite 												
Roma Street Station	<ul style="list-style-type: none"> Ongoing dust and meteorological monitoring at the Parkland Crescent residential building. Dust deposition sampling in each direction from the worksite 												
Northern Connection	<ul style="list-style-type: none"> Dust deposition sampling in each direction from the worksite 												

Element 9 – Air quality – construction	
	<ul style="list-style-type: none"> Monitor meteorological conditions daily, or more frequently if required by adverse conditions including strong winds and winds prevailing upon sensitive activities. Monitoring would be required each hour for the duration of adverse conditions. Undertake olfactory inspections for potential odour generating activities on a daily basis. At each location, observations would be made on odour intensity, persistence and character. <p>Vehicle emissions</p> <ul style="list-style-type: none"> Monitor construction vehicle movements to: <ul style="list-style-type: none"> prevent queuing in streets, other than designated haul routes identified in the construction traffic management plan prevent queuing vehicles idling for periods exceeding five minutes. Collect and direct exhaust emissions from stationary plant and equipment away from sensitive activities and neighbouring properties.
Reporting	<ul style="list-style-type: none"> Monthly reports on the findings of the air quality monitoring program and results of odour monitoring carried out by site personnel. Maintain records of the number of incidents or complaints received in relation to dust or odour impacts. Record actions taken to mitigate incidents or complaints.

Table 18-15 Element 10 – Noise and vibration

Element 10 – Noise and vibration – construction																		
Environmental outcomes	<ul style="list-style-type: none">Construction activities generally are designed, planned and implemented to maintain human health and wellbeing, in particular to minimise sleep disturbance at night.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 (eg transmission electron microscopes).Affected parties adjacent to the construction works are consulted in advance of works about the predicted effects of construction on the acoustic environment.																	
Performance criteria	<p>Noise</p> <ul style="list-style-type: none">Construction works are designed, planned and implemented to achieve the noise goals specified in Table 10. <p>Table 10: Construction noise goals (internal) (Human health and wellbeing)</p> <table><tr><th></th><th>Monday – Saturday, 6.30am – 6.30pm</th><th>Monday – Friday 6.30pm – 10.00pm (Gabba, CBD only)</th><th>Monday – Saturday 6.30pm – 6.30am, Sundays, Public Holidays</th><th>Mon – Saturday 7.00am – 6.00pm</th></tr><tr><td>Continuous (LA_{eq adj})(1hr)</td><td>AS 2107 Maximum design level</td><td>40 dBA LA_{eq adj} (1 hour)</td><td>35 dBA LA_{eq adj} (1 hour)</td><td rowspan="2">130 dB Linear Peak</td></tr><tr><td>Intermittent (LA_{10 adj})(15min) (LA_{max})</td><td>AS 2107 Maximum design level + 10 dBA</td><td>50 dBA LA₁₀, adj</td><td>42 dBA LA_{max adj}</td></tr></table> <p><i>Note 1: All goals are internal noise levels for human health and well being outcomes.</i></p> <p><i>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 2004 apply.</i></p>					Monday – Saturday, 6.30am – 6.30pm	Monday – Friday 6.30pm – 10.00pm (Gabba, CBD only)	Monday – Saturday 6.30pm – 6.30am, Sundays, Public Holidays	Mon – Saturday 7.00am – 6.00pm	Continuous (LA _{eq adj})(1hr)	AS 2107 Maximum design level	40 dBA LA _{eq adj} (1 hour)	35 dBA LA _{eq adj} (1 hour)	130 dB Linear Peak	Intermittent (LA _{10 adj})(15min) (LA _{max})	AS 2107 Maximum design level + 10 dBA	50 dBA LA ₁₀ , adj	42 dBA LA _{max adj}
	Monday – Saturday, 6.30am – 6.30pm	Monday – Friday 6.30pm – 10.00pm (Gabba, CBD only)	Monday – Saturday 6.30pm – 6.30am, Sundays, Public Holidays	Mon – Saturday 7.00am – 6.00pm														
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Intermittent (LA _{10 adj})(15min) (LA _{max})	AS 2107 Maximum design level + 10 dBA	50 dBA LA ₁₀ , adj	42 dBA LA _{max adj}															

Element 10 – Noise and vibration – construction

- Where predictive modelling conducted prior to the commencement of works in a locality indicates that the noise goals are likely to be exceeded:
 - potentially affected parties 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 parties on a 'case by case' basis prior to commencement of the works
 - agreed mitigation measures are included in a mitigation register and implemented prior to undertaking construction works.
- Construction works occurring underground or within an effective acoustic enclosure, and achieving the goals for human health and wellbeing set out in **Table 10**, may progress continuously while monitoring indicates noise levels remain below the goals.
- Without mitigation, works predicted to or generating excessive noise are conducted only within the hours nominated in **Table 6**.
- Works conducted in a rail corridor more than 100m from a Project construction site must comply with the requirements of the edition of the Queensland Rail Code of Practice – Railway Noise Management (EMS/STD/46/004) that is current at the time that the competitive tendering process for the procurement of the construction of the Project commences.

Vibration

- Construction works designed, planned and implemented to achieve the goals specified in **Table 11**.

Table 11: Construction vibration goals

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

Note 1: Blasting should generally only be permitted during the hours of 7 am to 6 pm, Monday to Saturdays.

Note 2: All residential receivers in the vicinity of the Project blasting sites are regarded as reinforced or framed structures (ie 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.

Element 10 – Noise and vibration – construction	
	<ul style="list-style-type: none"> Where predictive modelling conducted prior to the commencement of works in a locality indicates that the vibration goals are likely to be exceeded: <ul style="list-style-type: none"> potentially affected parties 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 parties on a 'case by case' basis prior to commencement of the works 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.
Noise and vibration Sub-Plan	<ul style="list-style-type: none"> A Construction EMP (noise and vibration) Sub-plan must be prepared by the Proponent and accepted by the Chief Executive, Department of Transport and Main Roads, 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: <ul style="list-style-type: none"> a description of the works program 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 program 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 receptors 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 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 parties 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.
Mandatory requirements	<p>Where excessive construction noise or vibration⁷ is predicted, works may progress only in accordance with the following requirements:</p> <ul style="list-style-type: none"> All reasonable and practicable mitigation measures are designed in consultation with the affected parties and implemented to achieve a reasonable environmental outcome: <ul style="list-style-type: none"> 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 outcome⁸.

⁷ Excessive noise and excessive vibration are defined in Appendix A - Glossary.

⁸ 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	
	<ul style="list-style-type: none"> 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 12:00noon and 2:00pm each day.
Mitigation measures	<p>General – Noise</p> <ul style="list-style-type: none"> 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. 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"> initiate on-going and early consultations with potentially affected parties to notify them of the proposed works and to determine suitable mitigation measures implement the Construction EMP (noise and vibration) Sub-plan to achieve the outcomes agreed with the potentially affected parties. Generally, construction is to be planned and undertaken with the following measures: <ul style="list-style-type: none"> install acoustic screens 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 use the quietest plant and equipment reasonably expected to be available to undertake each component of the work regular maintenance of equipment to ensure that all plant and equipment remains in good working order and does not create noise nuisance incrementally minimise the coincidence of noisy plant and equipment working simultaneously near sensitive receptors 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. <p>General – Vibration</p> <ul style="list-style-type: none"> 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. 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"> conduct surveys in the locality to identify places especially sensitive to sleep disturbance (eg hospitals, nursing homes and child care centres) 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 conduct pre- and post-construction building condition surveys where potential cosmetic (superficial) building damage could occur as a consequence of the construction works implement mitigation measures that would achieve the environmental outcomes, which would either avoid or minimise exceedances of the goals, or achieve alternative outcomes agreed with the potentially affected landowner

Element 10 – Noise and vibration – construction

Mitigation measures for construction vibration at sensitive receptors 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 parties 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

Southern Connection works

- Consult in advance with affected parties and near neighbours about the station 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 or vibration goals.
- Consult with operators of the PA Hospital, the ESA Village and the Ecosciences facility to minimise the effects of construction on people and sensitive equipment (eg Transmission Electron Microscopes or TEM). Check the performance of the Ecosciences TEM vibration isolation system prior to commencement of vibration intensive construction works at the TBM launch shaft site.
- If predictive modelling indicates exceedances of the noise goals for human health and wellbeing would be exceeded:
 - install a ventilated, acoustically-lined shed for the handling and loading of spoil from the TBM works in the worksite adjacent to Kent Street prior to the arrival of first spoil from TBM operations
 - install a ventilated, acoustically-lined shed for the assembly, launch and support of the TBM operations in the worksite adjacent to Joe Baker Street.
- 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; or increasing the height of the existing rail noise barrier along Railway Terrace (height and extent of upgrade to be confirmed during detailed design).
- 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 (ie Quarry Street). Where monitoring detects exceedances of the goals for human health and wellbeing, develop and implement mitigation measures in consultation with the affected parties as soon as practicable after monitoring.

Woolloongabba Station

- Consult in advance with affected parties 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 or vibration goals such as the TBM passby.

Element 10 – Noise and vibration – construction

- If predictive modelling indicates exceedances of the noise goals for human health and wellbeing would be exceeded, install acoustic screens, enclosures or barriers to protect local communities north of Vulture Street and to the south of 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
 - the workshed 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 premises immediately to the north of Vulture Street. Subject to the findings of the facade noise measurements, mitigation measures may be required including temporary (or permanent) upgrades to the facade (eg double glazing, acoustic seals around doors etc) in tandem with respite periods during services.

George Street Station and associated underground works

- Consult in advance with affected parties and near neighbours about the station works and the tunnel corridor along George Street to Roma Street about the program of works, including advance notice of activities likely to approach or exceed the noise or vibration goals.
- Consult with affected parties prior to monitoring of ground-borne vibration and noise at several places representative of the sensitive receptors along George Street, including at least the apartment building at 21 Mary Street, and the adjoining and adjacent office buildings and commercial premises containing sensitive office equipment.
- If predictive modelling indicates exceedances of the noise goals for human health and wellbeing would be exceeded, install a ventilated acoustic workshed over the station shaft and spoil loading facilities at the George Street worksite to protect nearby sensitive receptors.
- Night-time works likely to approach or exceed the noise goals may be conducted only underground or within the workshed except during extended hours agreed with the Chief Executive, Department of Transport and Main Roads. In agreeing to extend hours the Chief Executive, Transport and Main Roads would have regard for the mitigation measures agreed with the affected parties.
- Prior to the commencement of works likely to exceed the vibration goals for heritage places, conduct building condition surveys at Harris Terrace, The Mansions, the Queensland Club and any other heritage-listed 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 parties 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
 - preference is given to drill and blast for the station shaft excavation and subject to the findings of ground-borne noise trials at the site, drilling of blast holes may also need to be restricted during the night-time period
 - short-term blast event would be preferred to long term rock-breaking
 - investigate the benefits of cut-off trenches in the rock created by either rock saws or diamond wire (eg blind hole cutting) along the boundaries of the shaft shared with adjacent buildings.

Element 10 – Noise and vibration – construction

Roma Street Station and associated underground works

- Consult in advance with affected parties and near neighbours about the station works and the tunnel corridor under Roma Street Parkland and Spring Hill about the programme of works, including advance notice of activities likely to approach or exceed the noise or vibration goals.
- Consult with affected parties prior to monitoring of ground-borne vibration and noise at several places representative of the sensitive receptors adjacent to Roma Street Station, including at least the apartment building at 1 Parkland Boulevard, the historic station building on platform 1 at Roma Street Station, and the office buildings and restaurant premises on Parkland Boulevard.
- If predictive modelling indicates exceedances of the noise goals for human health and wellbeing would be exceeded, install a ventilated acoustic workshed over the station shaft and spoil loading facilities in the Roma Street worksite to protect nearby sensitive receptors.
- Night-time works likely to approach or exceed the noise goals may be conducted only underground or within the workshed except during extended hours agreed with the Chief Executive, Department of Transport and Main Roads. In agreeing to extend hours the Chief Executive, Transport and Main Roads would have regard for the mitigation measures agreed with the affected parties.
- Prior to the commencement of works likely to exceed the vibration goals for heritage places, building condition surveys must be conducted at the apartment building situated at 1 Parkland Boulevard and any other 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 parties 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
 - preference is given to drill and blast for the station shaft excavation and subject to the findings of ground-borne noise trials at the site, drilling of blast holes may also need to be restricted during the night-time period
 - short-term blast event would be preferred to long term rock-breaking
 - investigate the benefits of cut-off trenches in the rock created by either rock saws or diamond wire (eg blind hole cutting) along the boundaries of the shaft shared with adjacent buildings.

Northern Connection (Victoria Park)

- Consult in advance with affected parties and near neighbours about the program 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.
- Undertake predictive modelling to inform planning and programming of the construction works in Victoria Park to minimise and mitigate the effects of piling, excavation works, other surface works and above-ground works.
- Where predictive modelling indicates potential exceedances of the goals for human health and wellbeing, develop and implement mitigation measures in consultation with the affected parties prior to the commencement of the works.

Element 10 – Noise and vibration – construction

- Install acoustic enclosures to screen sensitive receptors from
 - works required for the TBM retrieval site, transitions and busway structures.
 - load and transport the spoil material from the worksite.
- Such acoustic enclosures must be in place prior to the arrival of the TBM from the tunnel drive from the south, and must remain in place until TBM retrieval works and other surface or above-ground works have concluded.
- Undertake monitoring of construction noise at residential premises to the south of Gregory Terrace, at Brisbane Girls Grammar School and at the Centenary Aquatic Centre. Where monitoring detects exceedances of the goals for human health and wellbeing, develop and implement mitigation measures in consultation with the affected parties as soon as practicable after monitoring.

Surface connection works

- Mitigation measures are to be implemented prior to the commencement of surface works between 6.30pm – 10.00pm Monday to Friday.
- 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.

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.
- 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 program 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.

Low frequency construction noise

- 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.
- Provide local communities with tunnelling progress and subsequent likely (temporary) exposure periods.
- Construction traffic noise and vibration:
 - restrict heavy goods vehicle movements to operating only on designated haulage routes for construction materials and spoil.

Element 10 – Noise and vibration – construction	
	<p><i>Blasting</i></p> <ul style="list-style-type: none"> Where drilling and blasting is proposed mitigation would include the following: <ul style="list-style-type: none"> utilising the latest available blasting technology pre-blasting condition surveys of adjacent buildings early consultation with local communities and pre-warnings of the timing of the blast activities limit blasting to between 6.30am and 6.30pm Monday to Saturday, desirably to regular scheduled times in localities where repeated blasting is required by construction or ground conditions.
Monitoring	<ul style="list-style-type: none"> 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 receptors. Monitoring must be conducted in locations where predictive modelling indicates exceedances of either the noise or vibration goals could occur. Monitoring must adopt accredited procedures and generally be consistent with the method set out in Appendix D – Monitoring of construction noise and vibration. Undertake daily inspections to confirm implementation of mitigation measures included in the mitigation register. 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. Undertake site-specific monitoring in response to complaints about construction noise or vibration. In the event that site-specific monitoring in response to complaints is required, locales for each site will be as follows: <ul style="list-style-type: none"> Dutton Park, Woolloongabba, Spring Hill – external with façade correction. George Street and Roma Street – internal (ie lift lobby) on the floor of the complainant's apartment. Report monitoring results and management actions. Undertake building pre-condition surveys for historical buildings and other structures in vibration sensitive zones (where required), including but not limited to: <ul style="list-style-type: none"> Roma Street Station – heritage structures Queensland Club heritage places in George Street (Harris Terraces, The Mansions) St Nicholas Cathedral St Joseph's Church and School.
Reporting	<ul style="list-style-type: none"> The results of noise and vibration monitoring are to be reported in the monthly construction compliance report, along with details of any incidents or complaints relating to noise and vibration management.

Table 18-16 Element 11 – Waste

Element 11 – Waste - construction	
Environmental outcomes	<ul style="list-style-type: none"> Construction activities, including demolition, are designed planned and implemented to minimise the generation of waste materials. Storage, handling, transportation and disposal of waste materials generated during construction are carried out to avoid environmental harm and adverse impacts on communities.

Element 11 – Waste - construction	
	<ul style="list-style-type: none"> Reuse and recycling of construction waste materials generated by Project construction activities is optimised.
Performance Criteria	<ul style="list-style-type: none"> Construction activities are conducted in accordance with an approved Project Waste and Resource Recovery Management Plan (WRRMP). Hazardous waste is handled and disposed of in accordance with specific management plans approved by Workplace Health and Safety Queensland. No waste or litter is burnt or buried on the construction worksite. Waste generated by the Project is management in accordance with the <i>Environmental Protection (Waste Management) Regulation 2000</i> (Waste Regulation).
Mitigation measures	<ul style="list-style-type: none"> Prior to construction commencing, a Project Waste and Resource Recovery Management Plan (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"> waste management procedures for all phases of construction and waste material types, including demolition, and the handling and disposal of asbestos materials targets to recover and re-use construction waste, including demolition waste for all classes or categories of waste 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 incident management procedures for responding to incidents that have the potential to cause environmental harm, including: <ul style="list-style-type: none"> corrective or remedial actions as required to render the area safe and avoid or minimise environmental harm procedures for immediately reporting to relevant authorities any incident where harmful waste material is released to the environment pre-qualification requirements for contractors providing services in waste and recyclables receiving facilities relevant training and awareness strategies for Project personnel on waste management procedures and principles, including recycling opportunities arrangements for decommissioning construction work sites post-construction. <p>Avoid and reduce</p> <ul style="list-style-type: none"> Identify and implement measures for avoiding waste generation and, if avoidance is not reasonable or practicable, reducing on-site waste generation. Implement systems to identify, quantify and monitor waste generation. Implementation of Project office sustainability measures through the selection of energy and resource efficient goods and equipment (eg 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) Where reasonable and practicable, order goods in bulk to minimise packaging waste, and where practicable, return packaging materials to the supplier. 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 toolboxes talks.

Element 11 – Waste - construction

Reuse

- Train staff to identify opportunities for reuse, where practicable.
- Identify and implement strategies for the reuse of waste products generated during construction.
- Where reasonable and practicable, chip and mulch vegetation cleared for the Project and re-use mulched material for landscaping purposes.
- Provide salvaging contractors with the opportunity to salvage (remove) building materials prior to demolition so that items can retain their value and be reused.
- 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.
- Where reasonable and practicable, provide for the re-use of:
 - excavated material as fill at approved fill sites
 - concrete formwork throughout the Project
 - reinforced steel structures in the Project
 - structures, including culverts, cabling, poles and similar infrastructure.

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, washdown 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 would 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
 - 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 would not be undertaken on site during construction. All commercial forms of treatment would be undertaken at approved, offsite facilities.
- Groundwater would be treated through purpose built management systems with subsequent water used during construction. Excess water would be disposed as trade waste in Queensland Urban Utilities' sewer system.

Element 11 – Waste - construction	
	<p>Waste transport</p> <ul style="list-style-type: none"> • 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 would 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. <p>Disposal</p> <ul style="list-style-type: none"> • Waste unable to be reused, recycled or recovered would be disposed of in appropriately licensed commercial landfill sites and sewage treatment systems. <p>Hazardous materials or dangerous goods</p> <ul style="list-style-type: none"> • 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 would 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) would be required to be kept at the storage location of all hazardous materials and dangerous goods. • 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. • Undertake refuelling and maintenance activities within designated bunded areas to minimise the potential for soil and water contamination from these activities. • Prepare and implement, if required, spill response measures in relation to hazardous materials and dangerous goods. • Comply with the ENA Industry guideline for SF₆ Management.
	<p>Contaminated soil</p> <ul style="list-style-type: none"> • Manage and dispose of contaminated soil to an approved disposal site in accordance with the requirements of the EP Act. <p>Asbestos</p> <ul style="list-style-type: none"> • All waste materials suspected of containing asbestos will be disposed to an appropriately licensed landfill by a certified asbestos waste contractor. <p>Groundwater</p> <ul style="list-style-type: none"> • Post-treatment, water will be discharged into Queensland Urban Utilities' sewerage system as trade waste. <p>On-site waste storage</p> <ul style="list-style-type: none"> • Maintain accessible and stable areas at construction worksites for the storage of waste materials. • Ensure provision of bins at worksite common areas, fitted with lids and serviced prior to being filled to capacity. <p>Demolition works</p> <ul style="list-style-type: none"> • Where reasonable and practicable, implement demolition procedures that facilitate recovery of materials for re-use and segregation of different types of materials for recycling. • The Project would comply with the requirements of the Energy Networks Association Industry Guideline in the removal and disposal of sulphur hexafluoride (SF₆) filled electrical equipment.

Element 11 – Waste - construction	
	<ul style="list-style-type: none"> Collect appropriate demolition materials and where possible, re-use on site, or transport to a recycling depot or facility. Where reasonable and practicable, provide salvaging contractors the opportunity to salvage building materials prior to demolition so that applicable items can be re-used.
Monitoring	<ul style="list-style-type: none"> 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. Monitor for the presence of vermin, insects and pest levels and implement appropriate control measures, as required. Records of the following waste management information, as a minimum, are to be kept throughout the construction phase: <ul style="list-style-type: none"> resource use and waste generated from demolition and construction works waste recovered and re-used waste disposed to landfill waste transporter or contractor details (including company name, licensed operator name and licence number).
Reporting	<ul style="list-style-type: none"> 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. Quarterly reporting is to be provided in relation to performance against targets established in the WRRMP for resource use and waste recovery. 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.

Table 18-17 Element 12 – Indigenous heritage

Element 12 – Indigenous heritage - construction	
Environmental outcomes	<ul style="list-style-type: none"> Construction activities are managed to maintain cultural heritage values of sites, places and values within and adjacent to construction worksites.
Performance criteria	<ul style="list-style-type: none"> Aboriginal Cultural Heritage Management Plan(s) (CHMPs) are prepared and approved in consultation with the relevant Aboriginal Party for the area, and pursuant to the requirements of the <i>Aboriginal Cultural Heritage Act 2003</i> (ACH Act), prior to commencement of any ground disturbance works. Construction activities comply with the requirements of the approved CHMP(s) under the ACH Act. 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. Construction impacts, such as excessive dust deposition, excessive vibration or excessive settlement, do not affect places of Indigenous cultural heritage.
Mitigation measures	<ul style="list-style-type: none"> Prepare and agree a formal CHMP under Part 7 of the ACH Act to guide the management of construction activities to minimise impacts on culturally important sites or artefacts. 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

Element 12 – Indigenous heritage - construction	
	<ul style="list-style-type: none"> All construction works are to be undertaken in accordance with the approved CHMP. 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 – Soils, topography and drainage, respectively.
Monitoring	<ul style="list-style-type: none"> Monitoring is to be undertaken in accordance with the approved CHMP. Routine daily site inspections are to include assessment of any exclusion fencing or signage protecting cultural heritage values to determine effectiveness.
Reporting	<ul style="list-style-type: none"> 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. Reporting to be completed as outlined in the approved CHMP.

Table 18-18 Element 13 – Non-Indigenous heritage

Element 13 – Historic heritage - construction	
Environmental outcomes	<ul style="list-style-type: none"> 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 Construction activities are managed to maintain scientific values of any archaeological places uncovered during Project works.
Performance criteria	<ul style="list-style-type: none"> Construction activities do not adversely impact on places of historical heritage value directly, or indirectly through excessive dust deposition, excessive vibration, excessive groundwater drawdown or excessive settlement. Site specific CHMP's are prepared and approved for each place of state or local historical heritage significance likely to be impacted by works prior to these works commencing. Any archaeological places uncovered are appropriately managed. All personnel involved in, or supervising construction works have completed either the TMR Cultural Heritage Induction or another cultural heritage induction course specified in an approved CHMP.
Mitigation measures	<ul style="list-style-type: none"> Conduct dilapidation surveys on each building of heritage significance along the main tunnel alignment and adjacent to the underground stations which may be affected by settlement or other construction activities. Dilapidation survey of each premises would be undertaken to identify and document pre and post construction conditions. Consistent with any conditions imposed on the Project by the Queensland Heritage Council or the Brisbane City Council and prior to construction works, prepare a CHMP 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, including: <ul style="list-style-type: none"> Victoria Park Roma Street Station. Preparation of the CHMP(s) is to be informed by the condition survey report and by predictive modelling of criteria relevant to each place (eg vibration, settlement, groundwater drawdown) and is to include mitigation measures to achieve the environmental outcomes in relation to the heritage values for each place. 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. Where harm to historical heritage values cannot be reasonably or practically avoided,

Element 13 – Historic heritage - construction	
	<p>undertake archival recording of cultural heritage values with the advice of an appropriately qualified heritage consultant.</p> <ul style="list-style-type: none"> Archaeological test pitting is to be conducted in places of high archaeological potential prior to construction activities commencing, including: <ul style="list-style-type: none"> 'Early Streets of Brisbane' around George and Mary streets Victoria Park. A specific works procedure is to be implemented for unexpected archaeological finds. 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 – Soils, topography and drainage, respectively.
Monitoring	<ul style="list-style-type: none"> For historical heritage places identified in a CHMP as being at risk of damage during construction, monitoring is to be conducted in accordance with the approved CHMP. Based on results of test pitting, archaeological monitoring is to be employed where necessary during ground disturbance works in places of high archaeological potential. Routine daily site inspections are to include assessment of effectiveness of any exclusion fencing or signage protecting cultural heritage values.
Reporting	<ul style="list-style-type: none"> Archaeological finds are to be immediately reported to 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. 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. On completion of construction works, a report on historical heritage places is to be prepared in accordance with the approved CHMP. On completion of construction works, a report is to be prepared on any archaeological places or objects recovered.

Table 18-19 Element 14 – Socio-economic

Element 14 – Socio-economic – construction	
Environmental outcomes	<ul style="list-style-type: none"> Avoid, or minimise and mitigate impacts from construction activities on local businesses and the social environment.
Performance criteria	<ul style="list-style-type: none"> Impacts on local amenity and community life are avoided or minimised. Impacts on the use and functioning of social infrastructure and local businesses near the Project are avoided or minimised, mitigated or managed. Safe access is maintained near to construction worksites and construction works, including to social infrastructure and businesses. Interactions between the construction workforce and local communities are positive and reflect the implementation of a workforce code of behaviour. 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.
Mitigation measures	<ul style="list-style-type: none"> 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. 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

Element 14 – Socio-economic – construction	
	<p>works. In particular, this is to include, but not be limited to businesses at:</p> <ul style="list-style-type: none"> - Stanley Street, Vulture Street and Main Street, Woolloongabba - George Street and Mary Street, Brisbane City - Roma Street Parkland and Brisbane Transit Centre, Brisbane City - Victoria Park, Spring Hill. <ul style="list-style-type: none"> • 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 (6:30am – 6:30 pm Monday – Saturday), litter management, and general demeanour. • Develop and implement a Charter for Local Content for the Project in accordance with the Queensland Government Local Industry Policy. • Engage with relevant economic development stakeholders, including but not limited to, officers from the Department of Tourism, Major Events, Small Business and the Commonwealth Games to identify the range of assistance services available to assist businesses directly affected by construction activities. • Develop and distribute information packages to affected businesses providing information on available assistance services. • 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"> - PA Hospital and the PA Hospital Early Education Centre at Buranda - ESA Village and Dutton Park Primary School at Dutton Park - The Gabba Stadium, South Brisbane Dental Hospital and Russian Orthodox Cathedral of St Nicolas at Woolloongabba - Botanic Gardens, Emma Miller Place and Roma Street Parkland, Brisbane City - Centenary Pool, Victoria Park, Brisbane Girls Grammar School and St Joseph's College at Spring Hill. • Undertake on-going consultation with the managers of major facilities such as, but not limited to, the Gabba Stadium and Roma Street Parkland, to ensure planning of major construction works or haulage activities considers the timing of and effects on major events. • Maintain safe access for pedestrians and cyclists near to construction worksites and other construction works, which complies with the Disability Discrimination Act 1992 and considers CPTED principles. • The siting of construction worksites and construction works in Victoria Park should, where possible, avoid the removal of established trees and disturbance to landscaped areas. • Reinstate open space areas disturbed by construction activities (ie at Dutton Park, Emma Miller Park, Roma Street Parkland and Victoria Park) progressively and as soon as practicable following construction. • Maintain public safety near to construction worksites and other construction works, including through the use of such things as appropriate signage, fencing of construction areas and traffic management. • Develop and implement a Workforce Code of Conduct to maximise positive employee behaviour in the local community.
Monitoring	<ul style="list-style-type: none"> • Monitor consultation with and feedback from local business owners. • Monitor community complaints system for number and types of complaints.

Element 14 – Socio-economic – construction	
	<ul style="list-style-type: none"> • Monitor employment records for employment diversity. • Monitor procurement spend reports for Project spending on goods and services with local and regional providers. • Monitor environmental monitoring reports for results on dust, noise and air quality changes to evaluate potential impacts on amenity. • Project safety reporting to monitor safety incidents and near misses that may impact on workforce health and wellbeing as well as the general community.
Reporting	<ul style="list-style-type: none"> • Complaints received from local businesses during construction are to be reported in the monthly construction compliance report along with details of the response provided. • 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.

Table 18-20 Element 15 – Hazard and risk

Element 15 – Hazard and risk – construction	
Environmental outcomes	<ul style="list-style-type: none"> • 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.
Performance criteria	<ul style="list-style-type: none"> • A safe working environment is maintained for the construction workforce, near neighbours and passers-by, including pedestrians, cyclists and motorists. • 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. • 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.
Mitigation measures	<ul style="list-style-type: none"> • 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"> - risk minimisation and incident management - inundation of surface works - flood inundation of the underground works - tunnel collapse - fire and life safety - hazardous chemicals and dangerous goods - traffic hazards associated with construction traffic. • The management plan must be prepared in consultation with the Department of Community Safety in cooperation with the Co-ordinator General and should consider the requirements of the Hazard and Risk Assessment Planning Scheme Policy of Brisbane City Council's Planning Scheme. • 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. • Implement risk mitigation strategies for the hazards identified for each Project aspect in the hazard and risk register. • Establish procedures for communication with Queensland Rail about construction activities in or near to the rail corridor and potential hazards and risks. • Establish procedures for communication with TMR, Brisbane City Council and TransLink

Element 15 – Hazard and risk – construction	
	<p>about potential hazards and risks associated with construction activities in or near to state and local roads, and busways.</p> <ul style="list-style-type: none"> • 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 the Department of Community Safety and relevant emergency services organisations and include as a minimum: <ul style="list-style-type: none"> - responsibilities in the event of an incident - traffic management and control systems - evacuation routes in the event of an incident - education and training program for the construction workforce on the procedures - procedures for conducting simulated emergency response exercise. This is to be conducted at least once within 12 months of the commencement of construction works. • Ensure that access for emergency services vehicles to construction worksites and other work areas is provided and maintained at all times. • Establish a communication process with the Department of Community Safety and relevant emergency services providers in relation to temporary road closures and disruptions and relocation of water mains that would affect hydrants near construction works. • Provide fire and life safety measures, including ventilation, smoke extraction and fire-fighting systems for enclosed spaces and enclosed work areas such as underground works areas, acoustic enclosures and sheds, for the duration of construction. • Develop a construction methodology that complies with Queensland Rail standards for track isolation and protection of Queensland Rail infrastructure. • Develop and implement an inspection and maintenance schedule for plant and equipment used at construction worksites. • Ensure that the storage of flammable and combustible liquids complies with AS 1940 and the WHS Act.
Monitoring	<ul style="list-style-type: none"> • Routine worksite safety inspections and hazard and risk assessments are to be carried out each month during construction. • Within 12 months of the commencement of construction works, a simulated emergency response exercise is to be conducted in conjunction with the DCS, on at least one occasion.
Reporting	<ul style="list-style-type: none"> • Ensure any incident is reported immediately on completion of the incident investigation and the Project hazard and risk register is updated as required. • 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 DCS 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"> - worksite accessibility for emergency services vehicles to the road network and construction sites - maintenance of essential urban services (water, power) - transport and the use and storage of hazardous chemicals and dangerous goods at worksites - communication procedures during incidents.

18.9 EMP (Commissioning)

This section describes general commissioning requirements, the environmental outcomes and performance criteria for each environmental element relevant to the Project's commissioning phase. 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.

18.9.1 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 Chief Executive, Department of Transport and Main Roads, will notify the Coordinator-General of the outcome of the verification process.

18.9.2 Commissioning

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

- access
- landscape and visual amenity
- hydrology
- air quality
- noise and vibration
- waste
- hazard and risk
- soils and settlement

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

Table 18-21 Element 1 – Access

Element 1 – Access – commissioning	
Environmental outcome	<ul style="list-style-type: none"> • Access for emergency services is maintained to all Project work areas. • Safe and efficient access for pedestrians and cyclists is maintained in the vicinity of Project stations.
Performance criteria	<ul style="list-style-type: none"> • The Project is operated in accordance with Queensland Rail and TMR procedures, and the <i>Transport Operations (Passenger Transport) Act 1994</i>. • An emergency response and management plan is agreed by the Project operators and the emergency services authorities prior to the commencement of operations. • Pedestrian and cyclist access during peak periods, major events and emergency incidents is safe and efficient to navigate around work areas.
Mitigation measures	<ul style="list-style-type: none"> • Consult regularly and frequently with the Department of Emergency Services about emergency access arrangements to work areas in preparing and implementing an emergency access management plan. • Consult with Brisbane City Council, Bicycle Queensland, TransLink and Queensland Rail, in developing and implementing measures to manage pedestrian and cyclist access to stations during peak periods, major events and emergency incidents. • Install, maintain and operate closed circuit television (CCTV) surveillance of <ul style="list-style-type: none"> - the proposed pedestrian and cycle pathway connecting the PA Hospital precinct with Boggo Road Urban Village and/ Park Road Station - pedestrian and cycle paths approaching the Woolloongabba, George Street and

Element 1 – Access – commissioning	
	<p>Roma Street stations.</p> <ul style="list-style-type: none"> Establish and maintain appropriate signage in the vicinity of Project stations to assist pedestrians accessing the stations. 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.
Monitoring	<ul style="list-style-type: none"> In the commissioning period: <ul style="list-style-type: none"> monitor pedestrian crowding on footpaths in the vicinity of the George Street and Roma Street stations during the morning and evening weekday peak periods, and during major events at Suncorp Stadium. monitor pedestrian crowding on the footpaths and pedestrian link between the Woolloongabba Station and the Gabba Stadium, during major events (ie cricket and football).
Reporting	<ul style="list-style-type: none"> As required by Queensland Rail (Rail Infrastructure Manager) and TMR (TransLink as the Busway Operator) procedures.

Table 18-22 Element 2 – Landscape and visual amenity

Element 2 – Landscape and visual amenity – commissioning	
Environmental outcome	<ul style="list-style-type: none"> 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.
Performance criteria	<ul style="list-style-type: none"> Landscaping and urban design treatments proposed in detailed design are maintained to achieve specifications. Noise barriers are designed and installed in consultation with near neighbours to minimise adverse visual and amenity impacts. Lighting is installed in accordance with AS4282 – 1997: Control of the Obtrusive Effects of Outdoor Lighting, and Queensland Rail and TMR policies and procedures and in accordance with the standards set out in the <i>Disability Discrimination Act 1992</i>.
Mitigation measures	<ul style="list-style-type: none"> Landscaping provided for the Project is to be monitored periodically and maintained by the Proponent throughout the commissioning periods and for a subsequent period established in the project documents. After the first 12 months of operation, landscaping is to be maintained by the Operator in accordance with Queensland Rail's Station Design Guide and TransLink's Public Transport Infrastructure Manual (2012). Noise barriers and urban design elements are to be installed in accordance with Queensland Rail's and TMR policies and procedures. Lighting required for the Project is to be installed in accordance with the AS4282 – 1997 Control of the Obtrusive Effects of Outdoor Lighting' and Queensland Rail and TransLink policies and procedures. Landscaping and urban design treatments must consider CPTED principles.
Monitoring	<ul style="list-style-type: none"> As required by Queensland Rail and TMR procedures, and conditions of approval.
Reporting	<ul style="list-style-type: none"> As required by Queensland Rail and TMR procedures, and conditions of approval.

Table 18-23 Element 3 – Hydrology

Element 3 – Hydrology – commissioning	
Environmental outcome	<p>Groundwater</p> <ul style="list-style-type: none"> Groundwater quality in resources surrounding the Project is generally comparable with pre-construction levels. Groundwater levels surrounding the Project are generally comparable with pre-construction levels. Discharge of groundwater to underground elements of the Project does not adversely impact on the environmental values of receiving waters. <p>Surface water</p> <ul style="list-style-type: none"> Operation of the Project does not adversely impact on the environmental values of receiving surface waters.
Performance criteria	<p>Groundwater</p> <ul style="list-style-type: none"> Groundwater inflow to the Project tunnel is managed, treated (as required) and disposed of so as not to cause environmental harm. Groundwater released from the Project to receiving waters complies with Groundwater Quality Objectives table in Element 7 – Hydrology – construction. <p>Surface water</p> <ul style="list-style-type: none"> Environmental values of surface waters are maintained. 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.
Mitigation measures	<p>Groundwater</p> <ul style="list-style-type: none"> Contaminated groundwater entering the tunnel and underground stations is treated and managed in accordance with the rail and busway operating procedures. Spills and leaks of fuels or chemicals are managed in accordance with the rail and busway operating procedures. <p>Surface water</p> <ul style="list-style-type: none"> A surface water quality management plan (operations) is prepared, tested and implemented in consultation with DEHP prior to commencement of the Project operations. Implement the rail and busway operating procedures in relation to the storage and handling of fuels and chemicals and the management of spills and leaks. Measures are implemented in accordance with the rail and busway operator procedures for managing impacts on surface water quality. 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 operation of the Project.
Monitoring	<p>Groundwater</p> <ul style="list-style-type: none"> Groundwater inflows to the tunnel and underground stations are monitored to identify significant changes in quality or quantity. If a significant change occurs, potential risks are identified and rectified as appropriate. 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. <p>Surface water</p> <ul style="list-style-type: none"> Where an uncontrolled release of contaminants, chemicals or fuels occurs: <ul style="list-style-type: none"> corrective actions and mitigation measures, including ceasing the release, must be implemented immediately

Element 3 – Hydrology – commissioning	
	<ul style="list-style-type: none"> - reporting of an event that results in an uncontrolled release of contaminants to the environment reported to DEHP within 24 hours of the Proponent becoming aware of the release - investigation and additional mitigation measures are to be implemented. - otherwise, as required by the rail and busway operator procedures.
Reporting	<ul style="list-style-type: none"> • An incident report must be prepared within ten business days of the receipt of the determinations that indicate the exceedance of Water Quality Objectives, together with a statement describing the corrective actions and mitigation measures implemented to ensure no further exceedance occurs. • As required by the rail and busway operator procedures.

Table 18-24 Element 4 – Air quality

Element 4 – Air quality – commissioning	
Environmental outcome	<ul style="list-style-type: none"> • The Project ventilation system achieves the environmental outcomes sought for the Project design.
Performance criteria	<ul style="list-style-type: none"> • In-tunnel air quality achieves the goals set out in Table 18-5. • Emissions from the Project do not cause an exceedance of the ambient air quality goals set out in Table 2.
Mitigation measures	<ul style="list-style-type: none"> • The Project is designed and constructed in accordance with the Environmental Design Requirements. • Where commissioning tests identify a potential for recurring exceedances of any of the goals at a sensitive receptor, as a consequence of emissions contributions from the Project ventilation system, such system is to be refined, modified and subject to enhanced operating procedures to achieve the goals and the environmental outcome.
Monitoring	<p>In-tunnel air quality</p> <ul style="list-style-type: none"> • Establish real time, in-tunnel air quality monitoring programme for visibility, carbon monoxide and nitrogen dioxide through monitoring devices positioned along the tunnel and in each of the ventilation outlets in relation to the In-tunnel Air Quality Goals. • Link real-time monitoring results with automatically operated ventilation system including exhaust fans in the tunnel ceiling and ventilation station. <p>Ambient air quality</p> <ul style="list-style-type: none"> • Establish and maintain at least two monitoring stations near to each ventilation outlet. • Monitor ambient air quality in real time and review performance in relation to the Ambient Air Quality Goals.
Reporting	<ul style="list-style-type: none"> • Commissioning test report, and then periodically in accordance with the standard operating procedures developed for the Project.

Table 18-25 Element 5 – Noise and vibration

Element 5 – Noise and vibration – commissioning																													
Environmental objective	<ul style="list-style-type: none"> 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. 																												
Performance criteria	<ul style="list-style-type: none"> The Project achieves the relevant noise criteria for railway surface track airborne noise emissions as outlined in Queensland Rail's Code of Practice – Railway Noise Management, being at present: <ul style="list-style-type: none"> 65 dBA, evaluated as the 24 hour average equivalent continuous A-weighted sound pressure level 87 dBA, evaluated as a Single Event Maximum sound pressure level. <p>Ground-borne noise goals</p> <ul style="list-style-type: none"> The Project operates generally within the goals for ground-borne noise outlined in Table 3 and Table 4. <p>Surface mechanical plant and ventilation</p> <ul style="list-style-type: none"> Surface mechanical plant and ventilation systems operate within the noise goals outlined in Table 12. <p>Table 12: Mechanical plant noise goals (operations)</p> <table> <tr> <th>Receiver</th><th>Time of day</th><th>Background (b/g) noise creep dBA LA90 (1hour)</th><th>Acoustic quality objectives dBA LAeq (1hour)</th></tr> <tr> <td rowspan="2">Residential (for outdoors).</td><td>7.00am to 10.00pm</td><td>b/g + 0</td><td>50</td></tr> <tr> <td>10.00pm to 7.00am</td><td>b/g + 0</td><td>-</td></tr> <tr> <td rowspan="2">Residential (for indoors).</td><td>7.00am to 10.00pm</td><td>-</td><td>35</td></tr> <tr> <td>10.00pm to 7.00am</td><td>-</td><td>30</td></tr> <tr> <td>Library and educational institution (including a school, college and university) (for indoors).</td><td>when open for business or when classes are being offered</td><td>-</td><td>35</td></tr> <tr> <td>Commercial and retail activity (for indoors).</td><td>when the activity is open for business</td><td>-</td><td>45</td></tr> </table>			Receiver	Time of day	Background (b/g) noise creep dBA LA90 (1hour)	Acoustic quality objectives dBA LAeq (1hour)	Residential (for outdoors).	7.00am to 10.00pm	b/g + 0	50	10.00pm to 7.00am	b/g + 0	-	Residential (for indoors).	7.00am to 10.00pm	-	35	10.00pm to 7.00am	-	30	Library and educational institution (including a school, college and university) (for indoors).	when open for business or when classes are being offered	-	35	Commercial and retail activity (for indoors).	when the activity is open for business	-	45
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Commercial and retail activity (for indoors).	when the activity is open for business	-	45																										
Mitigation measures	<ul style="list-style-type: none"> Adequate noise barriers are installed to ensure compliance with the operational noise goals and to achieve the environmental objective for noise and vibration. In accordance with the environmental design requirements, resilient track fasteners are installed if required as a consequence of predictive modelling for the detailed design indicating potential exceedances of the noise goals. 																												
Monitoring	<ul style="list-style-type: none"> Monitor in response to complaints in accordance with Queensland Rail's Code of Practice for Railway Noise Management. Perform post - construction noise and vibration verification monitoring at the same locations where ambient background levels were measured to check the effectiveness of mitigation measures compared to the design limits. 																												
Reporting	<ul style="list-style-type: none"> As required by Queensland Rail Standard ENV/STD/2015/SYS: Environmental Management System and Standard EMS/STD/46/004: Code of Practice – Railway Noise Management. 																												

Table 18-26 Element 6 – Waste

Element 6 – Waste – commissioning	
Environmental outcome	<ul style="list-style-type: none"> Waste generation is avoided where possible and if unavoidable, minimised. 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.
Performance criteria	<ul style="list-style-type: none"> Waste minimisation strategies are implemented in accordance with Queensland Rail and TransLink/ TMR procedures. Waste is collected, transported, stored, handled and disposed in accordance with the <i>Environmental Protection (Waste Management) Regulation 2000</i>, and <i>Waste Reduction and Recycling Act 2011</i> and associated regulations.
Mitigation measures	<ul style="list-style-type: none"> Implement measures to manage waste generated by the Project in accordance with Queensland Rail and TransLink/ TMR policies and procedures.
Monitoring	<ul style="list-style-type: none"> Monitor resource usage and waste generated in accordance with Queensland Rail and TransLink/ TMR procedures.
Reporting	<ul style="list-style-type: none"> As required by Queensland Rail and TransLink/ TMR procedures.

Table 18-27 Element 7 – Hazard and risk

Element 7 – Hazard and risk – commissioning	
Environmental outcome	<ul style="list-style-type: none"> 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.
Performance criteria	<ul style="list-style-type: none"> Potential hazards are identified and managed to mitigate risks to as low as reasonably practical for people and the environment. An operations hazard and risk management plan is developed, implemented, reviewed and updated as required. A safe environment is maintained for Project users and staff. In the event the Project is declared a Security-Identified Surface Transport Operation, transit security is managed in accordance with the requirements set out in the Surface Transport Security Plan.
Mitigation measures	<ul style="list-style-type: none"> An operations hazard and risk management plan is developed and implemented in consultation with the Department of Community Safety and the emergency services agencies. The management plan is to address: <ul style="list-style-type: none"> matters raised by the stakeholders during consultation a robust communications and management system to manage the safe and effective operation of the tunnels and stations emergency response and incident management procedures training requirements for Project workers and emergency agencies passenger information and safety systems at stations such as public address and emergency call point facilities. Maintain well-lit site lines within stations and station plazas to maximise safety for Project users and staff. Establish an inspection and maintenance schedule for all plant, equipment and infrastructure. Prepare and implement a Surface Transport Security Plan to provide a systematic and consistent approach to counter terrorism.

Element 7 – Hazard and risk – commissioning	
Monitoring	<ul style="list-style-type: none"> As required by Queensland Rail and TMR/ TransLink procedures. Monitor and control the safe and effective operation of the tunnels, stations, pedestrian walkways and staff/ customer car parking.
Reporting	<ul style="list-style-type: none"> As required by Queensland Rail and TMR/ TransLink procedures.

Table 18-28 Element 8 – Soils and settlement

Element 8 – Soils & topography – commissioning	
Environmental outcome	<ul style="list-style-type: none"> Erosion and sediment control measures are designed, installed, maintained and continue to perform effectively, achieving effective erosion and sediment control. Settlement is within nominated parameters.
Performance criteria	<ul style="list-style-type: none"> Rehabilitation of construction work areas undertaken progressively and as soon as practicable upon completion of the works at a worksite, to minimise potential impacts of soil erosion and sedimentation. Detailed design and construction planning incorporates measures to limit settlement generally to 25mm or to 50mm with a maximum differential settlement of 1:1,000 in a worst case event, measured at any location within 50 m of the tunnel alignment centreline or the outer walls of an underground station or excavated structure.
Mitigation measures	<ul style="list-style-type: none"> Erosion and sediment controls provided for the Project are to be monitored periodically and maintained by the Proponent throughout the commissioning periods and for a subsequent period established in the project documents. After the first 12 months of operation, erosion and sediment controls are to be maintained by the Operator in accordance with Queensland Rail's Station Design Guide and TransLink's Public Transport Infrastructure Manual (2012). In the event of settlement exceeding the performance criteria, prepare a new building condition survey report and recommendations for repairing building damage established. Actual settlements would be compared to predicted settlements and further mitigating measures taken where required
Monitoring	<ul style="list-style-type: none"> As required by Queensland Rail and TMR procedures, and conditions of approval.
Reporting	<ul style="list-style-type: none"> As required by Queensland Rail and TMR procedures, and conditions of approval.

Appendix A. 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.

Glossary

Term	Meaning
Affected party	A party 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.
Best practice	Techniques, methods or processes widely accepted at the time to achieve the environmental outcomes.
Conditions of approval	Conditions specified in the Coordinator-General's Evaluation Report on the EIS for the Project 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	Any work undertaken to implement the Project. 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. Construction works are at completion and handed over to the Project owner. The term does not include the relocation of public utilities.
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.
Contractor	A person or entity engaged by the Proponent to undertake works or actions leading to the implementation of the Project.
Completion	The point at which the Proponent accepts the Project as being constructed, commissioned and capable of being used for their intended purpose.
Excessive dust and air emissions	Occurs when dust deposition and other air-borne contaminants measured at a sensitive receptor exceed the goals stated in this EMP or detailed EMPs.
Excessive noise	Excessive noise in this context means noise measured at a sensitive receptor exceeding background noise without the Project plus 20dBA(LAeq,1hr adjusted)
Excessive vibration	Excessive vibration in this context means vibration measured at a sensitive receptor in excess of 2mm/sec PPV above the goal for continuous vibration set out in Table 11 of this Draft Outline EMP
Haulage	The transportation of construction components, materials, plant and equipment, demolition material and construction spoil required for, or resulting from, construction of the Project.
Local street	Any road or street that is not a State-controlled road, not part of the regional road network or is not a major road indicated in <i>Brisbane City Plan 2000</i> , Strategic Plan, Map D – Movement System or a subsequent revision of the Brisbane City Plan.
Locality	The area influenced or predicted to be influenced directly by the effects of the Project in either its construction or operation mode. The term is intended to be applied for the purpose of impact assessment, management and mitigation. The term does not include areas affected indirectly.

Term	Meaning
Managed works	Works carried out, as specified in this EMP, sub-surface or within an acoustic enclosure or shed, and which satisfy the performance criteria for any environmental element.
Proponent	The Proponent for this Project is the Queensland Government represented by the Department of Transport and Main Roads
Sensitive receptor	A sensitive receptor comprises a dwelling, library, educational institution, child care centre, kindergarten, hospital or other medical institution, commercial or retail activity, parkland or other public open space not used for sport or organised entertainment.
Social environment	Includes residential and neighbourhood amenity, connectivity, community health, community diversity, social infrastructure provision and safety.
Temporary work	Work undertaken over a short period not exceeding 48hrs from start to finish.
Working hours	The hours when construction work of any kind, including early works and demolition works, may be conducted.
Worksite	<p>Land relied upon by the Proponent or its contractor for construction of the Project. Typically, the term includes land used for construction of Project elements such as the surface connections, surface infrastructure and underground stations. The term also includes site offices, workers' car parking, laydown areas and areas for the storage or maintenance of Project plant and equipment.</p> <p>The term does not include land relied upon for the placement of spoil or fabrication of component parts of the Project</p>

Appendix B. Environmental legislation, policies and guidelines

B.1 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.

B.1.1 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 EIS and this EMP:

- National Strategy for Ecologically Sustainable Development 1992
- National Strategy for the Conservation of Australia's Biological Diversity 1996
- National Greenhouse Strategy 1998
- 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
- The United Nations Convention on Biological Diversity 1992.

B.1.2 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*
- *National Greenhouse and Energy Reporting Act 2007.*

B.1.3 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
- Environmental Protection (Air) Policy 2008
- Environmental Protection (Waste Management) Regulation 2000.

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 EIS, including this EMP, is relied upon to support applications for permits, licences and approvals. Major legislation relevant to the Project includes:

- | | |
|---|--|
| • <i>Aboriginal Cultural Heritage Act 2003</i> | • <i>Local Government Act 2009</i> |
| • <i>Acquisition of Land Act 1967</i> | • <i>Nature Conservation Act 1992</i> |
| • <i>Building Act 1975</i> | • <i>Plant Protection Act 1989</i> |
| • <i>City of Brisbane Act 2010</i> | • <i>Plumbing and Drainage Act 2002</i> |
| • <i>Coastal Protection and Management Act 1995</i> | • <i>Queensland Heritage Act 1992</i> |
| • <i>Economic Development Act 2012</i> | • <i>Regional Planning Interests Act 2014</i> |
| • <i>Electricity Act 1994</i> | • <i>Survey and Mapping Infrastructure Act 2003</i> |
| • <i>Electrical Safety Act 2002</i> | • <i>Sustainable Planning Act 2009</i> |
| • <i>Explosives Act 1999</i> | • <i>Transport Infrastructure Act 1994</i> |
| • <i>Fisheries Act 1994</i> | • <i>Transport Operations (Public Transport) Act 1994</i> |
| • <i>Food Act 2006</i> | • <i>Transport Operations (Road Use Management) Act 1995</i> |
| • <i>Forestry Act 1959</i> | |
| • <i>Land Act 1994</i> | |
| • <i>Land Protection (Pest and Stock Route Management) Act 2002</i> | |

- *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*
- *Work Health and Safety Act 2011*

B.1.4 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)
 - Transport Noise Management Code of Practice: Road Traffic Noise (November 2013)
 - Road Traffic Air Quality Management Manual (December 2009)
 - Road Landscape Manual (June 2013)
 - Technical specifications and standards.
- Queensland Rail standards, including:
 - Code of Practice – Railway Noise Management
 - Environmental Sustainability Policy
 - Station Design Guide and Accessibility Signage Manual
- TransLink standards, including:
 - TransLink Station Signage Manual
 - TransLink Public Transport Infrastructure Manual (May 2012)
- Brisbane City Council environmental policies and guidelines, including:
 - Environmental Policy
 - Corporate Sustainability Policy
 - Brisbane Invasive Species Management Plan 2013-2017
 - Brisbane City Council Waste Minimisation Strategy 2009-2016
 - 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
 - Guidelines on Identifying and Applying Water Quality Objectives in Brisbane City
 - Best practice guidelines for the control of stormwater pollution from building sites.

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

Table B-1 Performance guidelines

Element	Performance guidelines
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	Guidelines to the Recycling Policy for Buildings and Civil Infrastructure (Department of Public Works, 2009)
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) Urban Stormwater Quality Planning Guidelines Management (DEHP, 2010) 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

B.1.5 Approvals, permits and licence 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 licences 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 the 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 State Development, Infrastructure and Planning	Undertaking an activity that is identified as being a concurrence ERA under the <i>Environmental Protection Act 1994</i> . ERAs could include: <ul style="list-style-type: none"> • 8 Chemical storage • 41 Cement manufacturing • 63 Sewage treatment • 64 Water treatment. Environmental Authority for the concurrence ERAs would be required prior to their commencement.	Likely at large construction sites, such as Dutton Park or Victoria Park. Possible at smaller construction sites.	Prior to undertaking any ERA.
Cultural Heritage Management Plan (s87)	<i>Aboriginal Cultural Heritage Act 2003</i>	Department of Natural Resources and Mines	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.

Permit/ approval/ requirement	Legislation	Assessing authority	Trigger/ relevant aspect of the Project	Location	Timing
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 is exempt. However the Queensland Heritage Council be advised and recommendations from DEHP sought.	George Street, Victoria Park, Roma Street station	Prior to undertaking development on listed properties.
Disposal Permit (s424)	<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 Chapter 6 – Soils and topography 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.
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.
Approval of Chief Executive to interfere with or carry out works on busway transport infrastructure	<i>Transport Infrastructure Act 1994</i>	Chief Executive, Department of Transport and Main Roads	Any works that would impact on busway transport infrastructure unless authorised under another Act or the works are for construction, maintenance or operation of a road permitted under TI Act.	Locations where works interfere with existing network	Prior to impacting the existing busway network

Permit/ approval/ requirement	Legislation	Assessing authority	Trigger/ relevant aspect of the Project	Location	Timing
Chief Executive may investigate potential rail corridor (s109A))	<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.
Busway Authority (s298)	<i>Transport Infrastructure Act 1994</i>	Chief Executive, Department of Transport and Main Roads	Allows a person authorised by the Chief Executive to enter, temporarily occupy, or use land for the purpose of busway transport infrastructure.	Locations that require temporary occupation or use for busway transport infrastructure.	Prior to gaining entry onto land.
PDA Development Permit for development (s73)	<i>Economic Development Act 2012</i>	Minister for Economic Development	Authorises PDA assessable development to be carried out in a PDA. Required for the busway component within the Woolloongabba PDA.	Woolloongabba Station	Prior to construction within the Woolloongabba 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 accreditation of busway manager (s335AJ)	<i>Transport Infrastructure Act 1994</i>	Chief Executive, Department of Transport and Main Roads	Brisbane Transport's accreditation would need to be amended to include the Project's busway infrastructure components.	Busway 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	Rail corridor	Prior to construction

Permit/ approval/ requirement	Legislation	Assessing authority	Trigger/ relevant aspect of the Project	Location	Timing
			components.		
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.	NA	NA

Appendix C. 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	<ul style="list-style-type: none"> General responsibilities including: <ul style="list-style-type: none"> environmental duties under the EP Act and the duty of care under the ACH Act. applicable requirements under other relevant legislation. Specific responsibilities as specified in the EMS, approved EMPs and sub-plans, and conditions of approval, as well as: <ul style="list-style-type: none"> awareness of the location and significance of environmentally sensitive areas awareness of community perspectives and expectations project-specific environmental management strategies and work practices project-specific monitoring, reporting and corrective action procedures project-specific environmental incident and complaint response procedures project-specific internal and external communication processes project-specific emergency response procedures project-specific systems, including quality, safety and document control consequences of non-conformance with Project environmental management strategies and procedures, and legislative requirements. 	All Project personnel including contractors and sub-contractors.

Appendix D. Monitoring of construction noise and vibration

A detailed monitoring program should be prepared closer to the commencement of construction as part of the tendering and detailed design processes. Potential construction noise and vibration monitoring programs for the Project are outlined in Table D-1 and Table D-2.

Table D-1 Construction noise monitoring

Monitoring	Schedule	Locations	Procedures and instrumentation
Operator attended noise monitoring - worksites	At the commencement of all noise intensive construction activities then typically once a week thereafter.	Typically at the nearest receiver in each direction to each site specific activity associated with: <ul style="list-style-type: none"> worksite activities (site prep works, day and night tunnelling). surface track works. 	Attended measurements to quantify and qualify construction noise emissions using a calibrated sound level meter capable of measuring LA90, LAeq, LA10 and LA1 statistical noise levels in 15 minute intervals. One 15 minute sample per survey location is generally sufficient. Extraneous noise (eg cars, trains etc) should be excluded from the measurements. Sources contributing to the noise levels are to be noted.
Unattended noise monitoring – worksites	On a continuous basis or as required. Regular (typically weekly or fortnightly) data downloads would be required.	Continuous noise logging to be undertaken at the nearest noise sensitive receiver adjacent to tunnel worksites taking into consideration extraneous noise sources such as major roads, train pass-by etc.	A calibrated noise logger capable of measuring LA90, LAeq, LA10 and LA1 statistical noise levels in 15 minute intervals would be sufficient. Noise loggers are not typically used where extraneous noise is present. Therefore consideration should be given to using noise loggers capable of recording audio samples by means of preset trigger level exceedances to assist in identifying the source of the noise level exceedance.
Plant noise audits	As required but generally limited to particularly noisy plant items such as piling rigs, hydraulic hammer, haul trucks etc.	On site, typically at 7m from the item of plant (for surface equipment) in the direction of dominant noise emission. Closer to the source if other sources prevent measurement at this distance.	Attended measurements using a calibrated sound level meter capable of measuring LAeq, LA10, LA1 and LMax statistical noise levels. Select the items of plant which appear to be the most dominant sources of noise. Measure noise emissions under conditions of maximum noise normally occurring for that source. For most noise sources, a one minute sample will be satisfactory, although sampling may be extended up to 15 minutes for sources varying greatly over time. The results of the plant noise audits would enhance the input data fed into the predictive modelling process. Equipment significantly exceeding the plant noise levels used in the predictive modelling would be required to undergo inspection to identify appropriate noise control measures. Where noise control measures are not feasible,

Monitoring	Schedule	Locations	Procedures and instrumentation
			<p>predictive modelling would be updated accordingly and additional mitigation measures adopted where required.</p> <p>Haul trucks to be checked against ADR 28/01 before commencing works and at 12 month intervals.</p>
Regenerated noise monitoring	At the commencement of driven tunnelling works at each site.	10 receiver locations per working face of short-term operator attended regenerated noise measurements at varying slant distances from the working face.	<p>A calibrated sound level meter capable of measuring LA90, LAeq, LA10, LA1 and LAmix statistical noise levels and one-third octave noise levels in 15 minute intervals would be sufficient</p> <p>The results of the regenerated noise measurements would enhance the input data fed into the predictive modelling process.</p>
Response to complaints	Within a 24 hour period of receiving the complaint	As appropriate to address the particular complaint.	Attended or unattended measurements as appropriate to identify and measure the source in question.

Table D-2 Construction vibration monitoring

Monitoring	Schedule	Locations	Procedures and instrumentation
Driven tunnelling	<p>A minimum of 1 vibration logger per working face for first 3 months for each tunnel section.</p> <p>After initial 3 months at each section, a minimum of 1 vibration logger for each tunnel section where:</p> <ul style="list-style-type: none"> • exceedance of vibration goals are predicted. • complaints have been received (to be addressed within a 24 hour period). 	<p>Tunnel sections include:</p> <ul style="list-style-type: none"> • 2 x mainline tunnel • 2 x portals. <p>At the nearest receiver to the cutting face where predictions indicate exceedances.</p> <p>As appropriate to address the particular complaint.</p>	<p>Operator attended measurements using a calibrated instrument capable of measuring peak particle velocity in three axes (ie vertical, longitudinal and transverse).</p> <p>The results of the vibration monitoring would enhance the reference data fed into the predictive modelling process.</p>
Blasting	A minimum of 2 vibration and blast overpressure monitoring locations during each blast throughout the blasting phase of the project.	<p>All efforts should be made to locate the monitors at the nearest receivers to the blast site.</p> <p>Monitoring should always be undertaken at a heritage listed structure if close to blasting</p>	<p>Measurements using a calibrated instrument capable of measuring peak particle velocity in three axes (ie vertical, longitudinal and transverse) and blast overpressure.</p> <p>The results of the blast monitoring would enhance the input data fed into the predictive modelling process.</p>

Monitoring	Schedule	Locations	Procedures and instrumentation
Buffer Distance Tests for: <ul style="list-style-type: none"> • worksite activities • surface track works 	At the commencement of all vibration intensive activities associated with each worksite and surface track works. To address complaints (within 24 hours) Where exceedances are predicted to occur.	At foundation of potentially affected structure	Attended measurements using a calibrated instrument capable of measuring peak particle velocity in 3 axes.