



3 Operation Impact
Management Plan

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1. Overview

1.1 Introduction

Part 3 of Volume 3 is the Operational Phase Impact Management Plan (IMP). This IMP includes a range of management plans and mitigation measures that were developed from the operational issues identified through technical investigations, concept design, consultation and impact assessment described in Volume 2. The concept design and subsequent detailed design are aimed at the design providing fewer impacts to be managed through the operational phase.

Operators of the Gold Coast Rapid Transit (GCRT) will be responsible for preparing a detailed operational plan that will relate to the specific rapid transit system and detailed design that is developed, as well as its associated activities such as the depot. In addition, entities identified as those responsible for actioning various mitigation measures will have procedures developed or in place for enabling those measures. The CDIMP is a concept design and as such the IMP is a step linking the concept to measures that a proponent and other entities should address in detail as part of the detailed design and operational phase.

The Social Impact Management Plan (SIMP) is a comprehensive high-level plan based on outcomes from the Volume 7 technical report titled *Social Impact Assessment (SIA)*. The SIMP has operational phase elements and is intended to be integrated with those IMPs. The SIMP is included in Part 4 of this Volume. This enables the SIMP to be presented as one IMP; however, there are distinct operational phase related actions and mitigation measures (refer to Part 4 of this Volume).

1.2 Key to Responsible Entity

The following key indicates the person/agency/entity that is assigned responsibility for actions identified in the IMP

DD	= Detailed designer	EC	= Environmental consultant/representative	PD	= Project duration
DDP	= Detailed design phase	EO	= Environmental officer	VI	= Visual inspection
PC	= Principal contractor	MER	= Monthly Environmental Report	WR	= When required
O	= Operator	Post C	= Post construction	CL	= Checklist to be completed
S	= Superintendent	Pre C	= Pre construction	NA	= Not applicable

2. Safety

2.1 Objectives

- » To ensure a safe workplace and work sites during all stages of the construction of the GCRT Project;
- » To ensure a safe workplace and public transport mode during operation of the GCRT Project;
- » To provide a safe and secure environment at GCRT station areas including staffed patrolling, electronic surveillance and use of Crime Prevention through Environmental Design (CPTED) principles;
- » To provide a safe environment for the maintenance of the GCRT infrastructure;
- » To improve access to and from emergencies by emergency services along the GCRT corridor; and
- » To identify potential hazards and risks and apply appropriate treatment/prevention/mitigation measures.

2.2 Statutory provisions

- » *Workplace Health and Safety Act 1995;*
- » *Transport Operations (Road Use Management) Act 1995;*
- » *TransLink's System Operational Specifications;*
- » *South East Queensland Regional Busway Network, Busway Planning and Design Manual;*
- » *DMR Road Planning and Design Manual;*
- » *Queensland Heritage and Other Legislation Amendment Act 2003; and*
- » *Road Traffic Noise Management: Code of Practice.*

2.3 Performance criteria

- » Number of reportable injuries directly related to the project;
- » Days lost to injury;
- » Number of reportable crimes to property and persons along the GCRT corridor;
- » Duration and operation; and
- » Improved response time for emergency vehicles to and from incidents.

2.4 Operational impact management actions and responsibilities

Operational impact management actions for safety are summarised in Table 1.

Table 1 Safety – Operational impact management actions

Phases	Actions	Responsibilities	Monitoring and Reporting Compliance		
			Activity	Activity Timing	Activity Performed by
Construction	CCTV – CCTV cameras to be installed at each station platform and along the alignment to provide complete visual coverage of the GCRT. This will enable immediate detection and response to incidents as they may arise.	PC	Install	Pre C	PC
	The emergency telephone system (aka HTS) is to be located at each station platform to enable passengers to contact operators at the Transit Control Centre (TCC) in a simple and user-friendly manner to report or request assistance.	PC	Install	Pre C	PC

Phases	Actions	Responsibilities	Monitoring and Reporting Compliance		
			Activity	Activity Timing	Activity Performed by
	The public announcement system (PAS) is to be located at each station platform and will enable operators at the TCC to communicate effectively with passengers in emergency situations.	PC	Install	Pre C	PC
	A Communication System (CS) will be installed to allow communication between TCC operators and GCRT vehicle drivers and on-board inspection staff, station personnel and passengers.	PC	Install	Pre C	PC
	The Incident Management System (IMS) will form part of the Operations Management Control System (OMCS) to facilitate the effective detection and management of incidents at or between stations along the alignment.	O	Implement	Pre C	PC
	Breakdown lay-bys will be constructed to ensure that vehicle breakdowns do not significantly affect system operations. Should the emergency management plan not have sufficient resources for tow trucks to be available, lay-bys will be recommended for this project.	PC	Construct	Pre C	PC
Operation	An (Emergency) Incident Management Plan ((E)IMP) shall be prepared, reviewed and maintained by the operator and submitted to TransLink and Queensland Transport	O	Implement	Post C	GCRT Safety Officer

Phases	Actions	Responsibilities	Monitoring and Reporting Compliance		
			Activity	Activity Timing	Activity Performed by
	The GCRT Operations Centre managing the GCRT system shall be staffed 24 hours a day; staff members are to include GCRT Safety Officers. A GCRT Safety Officer shall be on duty at all times and be trained in GCRT safety and incident management.	O	Monitor	Post C	GCRT Safety Officer
	An extensive Intelligent Transport System (ITS) shall be implemented including monitored 24 hour CCTV coverage with surveillance from the TCC.	O	Monitor	Post C	GCRT Safety Officer
	Real time passenger information systems shall be available at GCRT stations including public address and emergency call point.	O	Implement	Post C	O
	All vehicles using the GCRT system will carry portable fire extinguishers.	O	Implement	Post C	O
	All authorised vehicles shall have direct radio communication with the TCC.	O	Implement	Post C	GCRT Safety Officer
	All vehicles using the GCRT system shall be equipped with emergency escape windows/doors in accordance with applicable Australian Design Rules.	O	Implement	Post C	O
	A 'no overtaking policy' shall be implemented outside designated passing areas (subject to the detailed design)	O	Implement	Post C	O
	All contracted vehicle companies and emergency services to undertake training of drivers in the safe use of the GCRT system.	O	Implement	Post C	O

Phases	Actions	Responsibilities	Monitoring and Reporting Compliance		
			Activity	Activity Timing	Activity Performed by
	All vehicles operating on the GCRT system will be required to meet Queensland Transport standards for public transport vehicles.	O	Implement	Post C	O
	An OMCS will safely and efficiently monitor and control the GCRT system.	O	Implement	Post C	O
	The GCRT system will be managed from a dedicated TCC 24 hours a day, seven days a week.	O	VI	Post C	O
	Rapid Transit Vehicle Systems will monitor and control GCRT vehicle movements along the alignment and at stations as well as facilitate effective passenger movements and safety.	O	VI	Post C	O
	A Data Exchange System will form part of the communications network and will comprise communications and firewall security equipment to support interfaces (fixed and wireless) between the GCRT vehicle, stations, OMCS and external interfaces.	PC	Install	Post C	PC
	A specialised recovery vehicle and driver will be on-call at all times to respond to situations when a defective GCRT vehicle cannot travel under its own power.	O	Implement	Post C	Recovery vehicle and driver
	Detour plans will be prepared and implemented under the supervision of the operations staff.	O	Implement	Post C	PC
	All GCRT vehicles will have a Certificate of Inspection every six months	O	VI	Post C	PC

Phases	Actions	Responsibilities	Monitoring and Reporting Compliance		
			Activity	Activity Timing	Activity Performed by
	The GCRT Operator will have drivers that are trained in their obligations under the Transport Operations (Passenger Transport) Act 1994 and subordinate legislation (the Regulation and the Standard).	O	Training	Post C	O
	The GCRT operator will take reasonable steps to ensure its drivers do not drive while fatigued.	O	Implement	Post C	O
	The GCRT Operator will have an incident management plan in place.	O	Implement	Post C	O
	The GCRT Operator will record and respond to all complaints. All action taken will be recorded	O	Reporting	Post C	O
	Records of the public passenger transport service will be kept in order to show compliance with the public passenger transport legislation requirements.	O	Reporting	Post C	O
	An Emergency Services Liaison Plan will be developed to brief police, fire and ambulance, SES etc on relevant operational procedures, especially safety and 'what to do' in an emergency	O	Implement	Post C	PC
	A safety management plan will ensure a continuous standard of safety throughout the operational life of each vehicle.	O	Implement	Post C	PC

2.5 Corrective actions

- » If a major accident or reported near miss occurs due to unsafe conditions on the GCRT system, the Operator should inspect the scene of the incident and determine its cause. If the cause was related to the project, infrastructure rectification works should be considered;
- » If adverse public feedback is received by the Community Liaison Officer in relation to a specific safety related problem, the Construction Contractor (in conjunction with the Contract Manager) or Operator is to investigate the complaint and consider modification of the unsafe condition; and
- » If a particular section of the GCRT system experiences heavy rainfall and the road condition becomes slippery and dangerous, the Operator shall endeavour to inform drivers through available means prior to reaching the section of road.

2.6 Reporting requirements

- » Report all site safety issues including both internal safety issues (e.g. tool box meeting, lost time injuries and near misses) and any external issues such as local traffic incidents, which may occur as a result of construction works in monthly reports; and
- » During the operational phase the all incident monitoring data which has been accumulated will be reported to the Operator and results reported to TransLink. The report should provide an analysis of monitoring data including plots of trends as well as a comparison of figures against pre-set targets.

3. Erosion and Sediment Control

3.1 Objectives

- » To implement and maintain suitable erosion and sediment control measures;
- » To minimise the extent of disturbed land at any one time; and
- » To minimise the impacts on surface water and drainage.

Erosion and sediment control is not expected to be a significant issue in the operational phase on the basis that the detailed design should take account of the potential of this issue. Matters such as design for stormwater run-off, sizing of infrastructure and incorporating design features to mitigate downstream impacts are largely a function of the design. Operational issues are typically framed around maintaining and monitoring these features.

3.2 Statutory provisions

- » *Environmental Protection Act 1994*;
- » *State Planning Policy 2/02- Planning and Managing Development Involving Acid Sulfate Soils*;
- » *Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland (EPA)*;
- » *Soil Conservation Act 1986*; and
- » *Soil Conservation Measures- Design Manual for Queensland (DNRW)*.

3.3 Performance criteria

- » Sedimentation is to be limited off site to as low as reasonably practicable; and
- » Erosion control measures are reviewed and maintained regularly.

3.4 Operational Impact management actions and responsibilities

Operational impact management actions for erosion and sediment control / water management are summarised in Table 2.

Table 2 Erosion and Sediment Control / Water Management – Operational impact management actions

Phases	Actions	Responsibilities	Monitoring and Reporting Compliance		
			Activity	Activity Timing	Activity Performed by
Operation	Stormwater runoff will be managed to minimise the potential for erosion including diverting flow over stable areas and away from disturbed areas and installation of appropriate structures.	DD / PC / EO	VI / MER	WR / Post C	EO
	Rehabilitated/revegetated areas will be maintained during the post construction and operation stages.	EC / EO / O	VI / EMR	Post C / PD	EO / O

3.5 Monitoring

- » Monitoring of revegetation progress and soil stabilisation; and
- » Receiving waters water quality as per regulations and conditions.

3.6 Corrective actions

- » The Environmental Representative is to be notified in the event of non-compliance;
- » Corrective actions in the event of non-compliance include inspection of maintenance and erosion control measures and identification of sediment control deficiencies. Sediment fences and additional control (or rock check dams on drainage lines) may be installed to prevent transport of sediment to any waterway;
- » Undertake revegetation works in areas of likely erosion; and
- » Some areas may have to be temporarily closed to repair erosion damage and to prevent further sediment transport off site.

3.7 Reporting requirements

Erosion and sediment control will be included in monthly reports prepared by the Environmental Representative. The reports will be copied to the Proponent and are to recommend appropriate controls to minimise erosion on site.

4. Surface Water and Groundwater Management

4.1 Objectives

This IMP is intended to provide management measures for water quality degradation. The main objectives of this IMP are to:

- » Minimise the impacts on surface water and drainage during operational activities;
- » Minimise the extent of disturbed land at any one time;
- » Minimise the impacts on surface water and drainage;
- » Ensure that groundwater interacts with surface waters, groundwater quality does not compromise identified Environmental and Water Quality Objectives for those waters; and
- » Ensure no deterioration in groundwater quality, volume or level is to occur as a result of the GCRT project.

There is overlap with other IMPs related to this element of the operational phase. This element of the IMP relates to sediment and erosion control, acid sulfate soils, chemicals and fuel storage as well as rehabilitation.

4.2 Statutory provisions

- » *Environmental Protection Act 1994;*
- » *Environmental Protection (Water) Policy 1997;*
- » *Water Act 2000;*
- » *Australia and New Zealand Environment and Conservation Council (ANZECC) Water Quality Guidelines 2000; and*
- » *EPA Queensland Water Quality Guidelines 2006.*

4.3 Performance criteria

- » Sedimentation from the site has been limited to as low as reasonably practicable;
- » Erosion control measures are reviewed and maintained regularly;
- » Surface water leaving the site should be within the relevant water quality guidelines (Refer to Table 11 of Volume 7 Technical Report titled '*Surface and Groundwater Quality Assessment*');
- » Where groundwater interacts with surface waters, groundwater quality should not compromise identified Environmental Values and Water Quality Objectives for those waters; and
- » No deterioration in groundwater quality, volume or level is to occur as a result of the GCRT Project.

4.4 Operational impact management actions and responsibilities

Operational impact management actions for erosion and sediment control/water management are summarised in Table 3.

Table 3 Surface and Groundwater / Water Management – Operational impact management actions

Phases	Actions	Responsibilities	Monitoring and Reporting Compliance		
			Activity	Activity Timing	Activity Performed by
Operation	Ongoing surface water quality monitoring of disturbed sites to be undertaken	EO / EC	MER	PD	EC / EO
	All water quality improvement devices to function correctly and stabilised, e.g. grassed swales.	PC	VI and CL	Post C	O
	Water quality to be maintained in accordance with WSUD guidelines. Records retained of maintenance and volumes of pollutants removed.	PC	VI and CL	Post C	O
	Emergency environmental situations and spills to be remediated as soon as possible and reported to EPA.	PC	VI and CL	WR	O
	Water quality to be undertaken in accordance with water quality monitoring plan. Undertake corrective action if required.	PC	MER	Post C	O
	Quarterly bore testing to be undertaken at established points along the alignment throughout the initial operational phase, to determine any variations from baseline conditions.	EC / EO	MER	Post C	EC / EO
	Chemicals and contaminants brought onto construction sites, to be appropriately stored, managed and used to ensure no contamination of the groundwater occurs.	S / PC / O	CL	PD	S / PC / O / EO

4.5 Monitoring

GCCC's ongoing surface water quality monitoring program regularly collects data from sites located on, Loders Creek (two sites) and at the mouth of the Nerang River. Pre-construction and post-construction surface water quality data from these sites should be regularly compared to identify if the operational phase of the project is impacting surface water quality in nearby receiving waters.

The groundwater bores should be tested on a quarterly basis throughout the initial operational phases of the project and groundwater quality compared with the baseline case.

4.6 Corrective actions

Implement remediation strategies where results from surface water and groundwater monitoring undertaken periodically throughout the operational phases of the project indicate either:

- » Degradation of water quality (based on Surface water Quality Baseline conditions detailed in the Volume 7 Technical Report titled '*Surface and Groundwater Quality Assessment*')
- » Soil erosion and sedimentation;
- » Modification of existing drainage patterns;
- » The presence of contaminants; and
- » Evidence of groundwater depletion.

4.7 Reporting requirements

- » Document and report all results for surface water testing and monitoring at waterway crossings and key disturbance areas;
- » Document and report all results from groundwater bore testing along strategic points of the project alignment;
- » Notify the EPA of deterioration in surface water quality as a result of the GCRT Project;
- » Notify the EPA of any inflow of contaminants into surface waterways and notify DNRW of any inflow of contaminants into groundwater; and
- » Notify DNRW of deterioration in groundwater quality, volume or level is to occur as a result of the GCRT Project.

5. Terrestrial and Aquatic Ecology

5.1 Objectives

- » To minimise known and potential fauna and flora impacts;
- » To minimise the clearing of native vegetation and habitat; and
- » To minimise the impact on water quality and riparian ecosystems.

5.2 Statutory provisions

This section outlines the legislation and policy relevant to the terrestrial and aquatic values of the Gold Coast Rapid Transit Corridor (GCRT).

Table 4 Terrestrial and Aquatic Ecology Statutory Instruments

Legislation	Administering Authority
COMMONWEALTH	
<i>Environmental Protection and Biodiversity Conservation Act 1999 (EPBC)</i>	DEWR
STATE	
<i>Integrated Planning Act 1997 (IPA)</i>	DIP
<i>Environmental Protection Act 1994 (EPA)</i>	EPA
<i>Nature Conservation Act 1992 (NCA)</i>	EPA
<i>Fisheries Act 1994</i>	DPI&F
<i>Water Act 2000</i>	DNRW
<i>Vegetation Management Act 1999 (VMA)</i>	DNRW
<i>Land Protection (Pest and Stock Route Management) Act 2002</i>	DNRW
Biodiversity Planning Assessment (BPA)	EPA
<i>Coastal Protection and Management Act 1995</i>	EPA
<i>Marine Parks Act 2004</i>	EPA
<i>Nature Conservation (Koala) Conservation Plan 2006 and Management Program 2006-2016 (the Koala Plan)</i>	EPA
LOCAL	
GCCC Planning Scheme	GCCC
GCCC Nature Conservation Strategy	GCCC

5.3 Performance criteria

- » Clearing beyond the required limits should not occur;
- » Noxious weeds within site area do not occur or are removed when they do (as per weed management – Chapter 23 of this volume);
- » Number of hollows and/or fauna habitats lost in cleared areas (with relocation or other mitigation where these are lost); and
- » Environmental health of ecosystems along the corridor is maintained.

5.4 Issues and Impacts

During the ongoing maintenance of the GCRT the following general issues and impacts may occur:

- » Loss and damage to significant remnant communities, including Endangered, Of Concern and Not of Concern regional ecosystems;
- » Loss and damage to regrowth, non-remnant and modified vegetation communities, such as parklands;
- » Reduction and damage to ecological condition of urban bushland patches through fragmentation and reduction in viable area-perimeter ratio (edge effects);
- » Reduction of local biodiversity especially regarding intact/undisturbed patches of vegetation;
- » Reduction in local species richness through habitat loss and fragmentation;
- » Loss of important urban bushland communities and decrease in landscape connectivity;
- » Loss of characteristic vegetation within communities;
- » Disturbance of waterway and wetland vegetation;
- » Loss or damage to threatened flora species and/or their habitat;
- » Spread and introduction of weeds;
- » Loss or reduction of essential habitat for listed fauna species;
- » Loss or reduction of refugial habitat for urban-avoiding wildlife species;
- » Loss or reduction of abundance and diversity of resources;
- » Isolation of wildlife populations by clearing vegetation from within wildlife movement corridors;
- » Loss and fragmentation of riparian vegetation;
- » Degradation of water quality;
- » Aquatic habitat loss; and
- » Loss or damage to threatened species and/or their essential habitat.

During the ongoing maintenance of the GCRT the following issues and impacts for ecologically significant areas may occur:

5.4.1 Loders Creek frog habitat

Issues

- » Wallum froglet listed as vulnerable under NCA; and
- » Green-thighed frog listed rare under NCA.

Impacts

- » Run off and sedimentation;
- » Weed infestation; and
- » Habitat fragmentation and population isolation.

5.4.2 Griffith University

Issues

- » Glossy-black cockatoos listed as vulnerable under NCA;
- » Wallum froglet listed as vulnerable under NCA;
- » Swamp orchid listed as endangered under EPBC; and
- » Regional Ecosystems.

5.4.3 Cascade Gardens

Issues

Greg-headed flying-fox listed as vulnerable under the EPBC Act.

Impacts

- » Loss of vegetation/habitat;
- » Displacement due to habitat reduction;
- » Human/social disturbance if bat colony relocates; and
- » Perceived threat of disease.

5.5 Operational impact management actions and responsibilities

Operational impact management actions for terrestrial and aquatic ecology are summarised in Table 5.

Table 5 Terrestrial and Aquatic Ecology – Operational impact management actions

Phases	Actions	Responsibilities	Monitoring and Reporting Compliance		
			Activity	Activity Timing	Activity Performed by
Operation	Hollow logs and other movable habitat features should be salvaged from areas to be cleared and either relocated into areas of remnant vegetation that are to be retained or replaced in areas that have been rehabilitated.	Construction Contractor / Environmental Manager	Clearing	WR	Construction Contractor
	Feral animals and pest species should be dealt with as part of a coordinated management approach that takes into consideration the GCCC's pest management strategy.	Construction Contractor	Operation	WR	Construction Contractor
	The success of the revegetation/rehabilitation plan after completion to be monitored.	O / Environmental Manager	Operation	Post C	Environmental Manager

5.6 Operational impact Management Actions and Responsibilities for specific areas

Operational impact management actions for specific areas of high ecological significance are summarised in Table 6 and Table 7.

Table 6 Loders Creek frog habitat – Operational impact management actions

Phases	Actions	Responsibilities	Monitoring and Reporting Compliance		
			Activity	Activity Timing	Activity Performed by
Operation	Sedimentation and run-off during operational phase of the project to be controlled.	O / Environmental Manager	Operation	Post C	O
	A weed control program to be implemented.	O / Environmental Manager	Operation	Post C	O
	Area to be protected as an environmental education/frog reserve.	O / Environmental Manager	Operation	Post C	O

Table 7 Cascade Gardens – Operational impact management actions

Phases	Actions	Responsibilities	Monitoring and Reporting Compliance		
			Activity	Activity Timing	Activity Performed by
Operation	Artificial light sources to be directed away from the vegetation.	Project designer/ Environmental Manager	Construction	During construction	Construction Contractor

5.7 Monitoring

- » Environmental Representative to ensure vegetation to be cleared is clearly delineated;
- » Environmental Representative to ensure all vegetation clearing is undertaken in accordance with EMP and any other work plans; and
- » Herbicide application sheet and weed removal works records completed by the weed removal contractor are to be recorded and submitted to Environmental Representative.

5.8 Corrective actions

Natural ground surface to be restored if disturbed.

5.9 Reporting requirements

Monthly rejuvenation operational works sheet are to be recorded and submitted to Construction Contractor and Environmental Representative.

6. Weed Management

The definition of a “weed” for the purposes of management is based on that of ‘environmental weed’, namely a species that by virtue of fecundity and growth habit has the potential to establish large infestations that dominate and eventually exclude the native vegetation. A list of weeds known to occur along the corridor is provided in Volume 7 Technical report titled *Ecology Assessment Report*.

6.1 Objectives

- » To minimise the introduction and/or spread of weeds;
- » To promptly identify areas requiring weed control;
- » To eliminate infestation of noxious weed species; and
- » To effectively control weed species.

6.2 Performance criteria

Outbreaks of declared or noxious weeds do not occur or are transmitted via the GCRT Project.

6.3 Operational impact management actions and responsibilities

Operational impact management actions for weed management are summarised in Table 8.

Table 8 Weed Management – Operational impact management actions

Phases	Actions	Responsibilities	Monitoring and Reporting Compliance		
			Activity	Activity Timing	Activity Performed by
Operation	Areas of bare ground will be sprayed for weeds on a regular basis.	PC	VI	Post C	O
	Maintenance contractors to ensure they remain on the designated maintenance track and do not disturb surrounding vegetation, including areas replanted.	PC	VI	Post C	O
	Control programs to be carried out by personnel qualified in the recognition of target weeds and potential weed species.	PC	MER / CL	Post C	EC / EO

6.4 Corrective actions

- » Investigations/corrective actions undertaken as a result of a complaint will be documented and compiled within the Complaints Register. Corrective actions will be closed out by senior management according to an agreed responsibility and timescale; and
- » If a substantial outbreak of a declared noxious weed is found on the site corrective measures will be taken in accordance with the EMP.

6.5 Reporting requirements

- » Presence of noxious weeds will be reported to the appropriate local authorities by the Environmental Representative; and
- » Daily herbicide application sheet and weed removal works records from weed removal contractor to be recorded and submitted to Environmental Representative.

7. Noise and Vibration

7.1 Objectives

- » To address the acoustical requirements detailed in the Terms of Reference in relation to operational phases of the project;
- » To identify potentially sensitive locations in relation to operational noise and vibration;
- » To evaluate the operational noise and vibration impacts at sensitive locations in terms of planning levels identified in the EPP (Noise) and other Guidelines;
- » To evaluate the potential of resulting impacts and the scope for the reduction of these impacts through reasonable and feasible mitigation strategies; and
- » To recommend in principle mitigation measures and noise and vibration performance requirements in order to protect community values and sensitive locations in relation to operational noise and vibration.

7.2 Statutory provisions

7.3 Noise

- » *Environmental Protection Policy (Noise) Policy 1997*;
- » Department of Main Roads Road Traffic Noise Management: Code of Practice (August 2007);
- » Queensland Rail Code of Practice – Railway Noise Management (November 2007);
- » Australian Standard AS 2701, Acoustics – Description and Measurement of Road Traffic Noise;
- » Australian Standard AS 1055, Acoustics Description and Measurement of Environmental Noise;
- » AS/NZS 2107:2000 Acoustics – Recommended design sound levels and reverberation times for building interiors; and
- » EPA, Ecoaccess Guideline Planning for Noise Control 2004.

7.4 Vibration

- » NSW DECC Assessing Vibration: A Technical Guideline 2006;
- » British Standard BS6472:1992 Guide to evaluation of human exposure to vibration in buildings;
- » British Standard BS6841:1993 Evaluation and Measurement for Vibration in Buildings, Part 2 – Guide to damage levels from ground borne vibration; and
- » German Standard DIN 4150 and BS 7385: Part 2 – 1993.

7.5 Performance criteria

7.5.1 Noise

Road Traffic Priorities and Criteria

Queensland’s DMR *Road Traffic Noise Management: Code of Practice* (2007) and the EPP (Noise) provide traffic noise criteria for roadways in Queensland.

The EPP (Noise) sets different noise criteria depending on if the roadway is a state-controlled or a public road. For all state-controlled roadways, the DMR noise guideline was applied, while for all public or local council roads the EPP (Noise) criterion was applied.

All identified state-controlled roadways within Section two and three of the proposed alignment are listed below. It is assumed that all other roadways are public roads:

- » Queens Street – between Nerang St and Ada Bell Way;
- » Ada Bell Way;
- » High Street;
- » Hooker Boulevard; and
- » Gold Coast Highway – South of Hooker Boulevard.

The applicable criteria for the 2021 operating conditions of the GCRT are detailed in Table 9. Operating noise goals have been based on the ‘upgrade of existing road’ conditions outlined in the Code of Practice.

Table 9 Operating Noise Criteria for Noise Receivers

Receiver Type	Noise Criteria	Assessment Location ²
Existing Residence	L _{A10} (18hour) 68 dB(A)	1 metre in front of the most affected building façade
Educational and Health Buildings	L _{A10} (1hour) 63 dB(A)	1 metre in front of the most affected building façade
Parks, Outdoor Educational and Recreational Areas ¹	L _{A10} (12hour) 63 dB(A)	Free-field location (excludes façade effects)

1. Sporting fields are not considered a noise receiver
2. Receiver heights should be 1.5 metres above the floor level for each level of the building

The EPP (Noise) and DMR criteria do not specify limits specifically for busways. However, given that the proposed busway would closely follow major roadways for the majority of its length, traveling adjacent to significant road traffic noise source, the L_{A10} (18 hour) assessment criteria from the EPP (Noise) and DMR Code of Practice is considered appropriate for determining the likelihood for impacts from the busway.

Rail Planning Levels

The Queensland Rail (QR) “Code of Practice – Railway Noise Management” November 2007 and the EPP (Noise) describe a railway as a Beneficial Asset and recognise that:

“Although the operation or use of Beneficial Assets may have significantly adverse effects on the Environmental Values, they are necessary for the community’s environmental, social and economic wellbeing.

However, it is intended that, so far as practicable, any significantly adverse effects from their use or operation be progressively reduced”.

The EPP (Noise) nominates “Planning Levels” for a Beneficial Asset such as a railway which may be used as a guide in deciding project specific noise goals for the proposed LRT development.

The QR Code of Practice aims to meet the railway long-term planning levels specified in the EPP (Noise) for all noise receivers. These noise goals are summarised below:

- » 65 dB(A) L_{Aeq} (24hour); and,
- » 87 dB(A) L_{Amax} (single event maximum sound pressure level)

Where appropriate, the planning levels are assessed one metre in front of the building façade of an effected noise sensitive place.

Other Noise Receivers

The maximum recommended internal noise levels specified in AS/NZS 2107: 2000 *Acoustics - Recommended design sound levels and reverberation times for building interiors* have been adopted for the operational noise goals for receivers other than residential, educational or health related. Table 10 displays a range of recommended levels for a selection of receivers that may be relevant to building uses around the proposed rapid transit development.

Table 10 Recommended Internal Noise Design Levels from AS 2107:2000

Type of Building Occupancy / Activity	Maximum Recommended Design Sound Level L_{Aeq} dB(A)
Office building – general office areas	45
Public buildings – exhibition areas	50
Restaurants, coffee shops, etc.	50
Small retail shops	50
Hotels, sleeping area near major roads	40

When calculating the internal noise levels an external-to-internal facade reduction has been adopted for a variety of building types, as per Table 11.



Table 11 Typical Building Façade Noise Reductions

Receiver Type	Noise Reduction
Residential dwelling – partially opened windows	10 dB(A)
Office buildings, air conditioned residential dwellings that do not need to open windows	20 dB(A)
Known buildings with double glazing and substantial air gaps between glazing	30 dB(A)

7.6 Operational impact management actions and responsibilities

Operational impact management actions for noise and vibration are summarised in Table 12.

Table 12 Noise and Vibration – Operational impact management actions

Phases	Actions	Responsibilities	Monitoring and Reporting Compliance		
			Activity	Activity Timing	Activity Performed by
Design	Track support systems to reduce vibration levels. Examples of such management options include: floating slabs, ballast mats and high resilience fasteners. Also, jointed rail may be replaced by continuous welded rail for lines passing sensitive premises.	DD	WR	Pre C	DD
Operation	Contractors inspect and maintain acoustic barriers.	O	VI	Post C	EC
	Noise complaints are reported and addressed where appropriate.	O	WR	Post C	PC
	Ensure all rapid transit vehicles are regularly maintained and in good working order to minimise additional noise (including rail grinding for optimised track conditions, wheel truing, removal of wheel flats and reconditioning vehicles for the LRT system).	O	PD	Post C	EC
	Regularly inspect and maintain light rail tracks (if appropriate) with attention to track surfaces, wheel condition and particular locations such as corners.	O	PD	Post C	EC

7.7 Corrective actions

The Environmental Officer should be notified in response to any noise or vibration complaints from the operation phase. If appropriate, noise and vibration monitoring should be carried out at the location of the complainant to assess the level of potential impacts.

If deemed necessary, a review of the operational noise and vibration mitigation measures should be carried out to address potential noise or vibration impacts.

7.8 Reporting requirements

Regular inspections should be carried out on all rapid transit vehicles. Any vehicles that require additional maintenance outside of the normal maintenance schedule should be reported to the Operator or Environmental Officer.

Regular inspections and maintenance of noise barriers and retaining walls should be carried out. Any deterioration of the condition of noise barriers or retaining walls should be reported to the environmental officer.

All noise and vibration complaints should be reported to the environmental officer and community relations' team.

8. Air Quality

8.1 Objectives

- » To minimise dust emissions;
- » To minimise air pollutants from RT vehicles;
- » To minimise potential odours; and
- » To minimise disturbance to sensitive receivers.

8.2 Statutory provisions

- » *Environmental Protection Act 1994* (EP Act);
- » Environmental Protection (Air) Policy 1997 (EPP (Air));
- » National Environment Protection (Ambient Air Quality) Measure (Air NEPM). Ambient Air Quality and Air Toxics. Environment Protection and Heritage Council (EPHC); and
- » “*Roadside air quality in south-east Queensland*” Environment Technical Report No.38, Environmental Protection Agency, Queensland Government March 2001.

8.3 Performance criteria

A Queensland EPA report into roadside air quality (Neale and Wainright 2001) identified significant species for air pollutant levels experienced by residences and business premises adjacent to major roads. Vehicle emissions of interest are:

- » Gaseous products of combustion such as Carbon Monoxide (CO) and oxides of nitrogen (NO and NO₂);
- » Solid matter and aerosols such as particulate matter (PM₁₀ and PM_{2.5}) and lead (Pb); and
- » Petroleum derived emissions such as unburnt fuel including PAHs and VOCs.

The EPP (Air) sets out ambient air quality goals to judge pollutant levels against potential to cause harm to human health and wellbeing in Queensland. Reporting by and investigation undertaken Neale and Wainwright (2001) determined that the relevant indicators to satisfy the requirements for from EPP (Air) for roadside investigations are CO, NO₂, PM₁₀ and Lead.

The National Environment Protection Council of Environmental Ministers, now the Environment Protection and Heritage Council (EPHC), set uniform standards for Australian ambient air in June 1998. These are known as the National Environment Protection (Ambient Air Quality) Measure, also known as Air NEPM, which sets non-binding¹ standards and ten-year goals (i.e. 2008).

A variation to the Ambient Air Quality NEPM was made in May 2003 “which strengthens air quality standards to help protect Australians from the adverse health impacts of small pollutant particles” (EPHC

¹ The Air NEPM standards apply to regional Air Quality as it effects the general population and does not apply in areas impacted by localised air emissions such as industrial sources and heavily trafficked streets and roads.

2008a). The variation introduced advisory reporting standards for fine particles of size 2.5 micrometres or less (also known as PM_{2.5}).

An Air Toxics NEPM was introduced by EPHC in 2004. “The Air Toxics Measure is primarily concerned with the collection of data on ambient (i.e. outdoor) levels of formaldehyde, toluene, xylene, benzene and polycyclic aromatic hydrocarbons (PAH) at locations where elevated levels are expected to occur and there is a likelihood that significant population exposure could occur” (EPHC 2008b). The motor vehicle is implicated as the major emission source in all five of the Air Toxics under investigation.

Various emission constituents are detailed in Table 13 with relevant EPP Air goals, Air NEPM standards and goals and Air Toxics monitoring investigation levels.

Table 13 Various emission constituents with relevant EPP Air goals, Air NEPM standards and goals and Air Toxics monitoring investigation levels

Key Emission Constituent	EPP (Air)	NEPM
Carbon Monoxide (CO)	8 ppm as 8-hour average	9 ppm as 8-hour average (No more than 1 day per year)
Nitrogen Dioxide (NO ₂)	0.160 ppm as 1-hour average	0.12 ppm as 1-hour average (No more than 1 day per year)
Sulphur Dioxide (SO ₂)	0.250 ppm as 10-minute average 0.200 ppm as 1-hour average 0.040 ppm as 24-hour average 0.020 ppm as annual average	(No more than 1 day per year) 0.200 as 1-hour average 0.080 ppm as 24-hour average 0.020 ppm as annual average
Photochemical Oxidants (as O ₃)	0.098 ppm as 1-hour average 0.079 ppm as 4-hour average	0.100 ppm as 1-hour average 0.080 ppm as 4-hour average (No more than 1 day per year)
Respirable Particulate Matter (PM ₁₀)	150µg/m ³ as 24-hour average 50µg/m ³ as annual-hour average	50µg/m ³ as 24-hour average (No more than 5 days per year)
Fine Particulate Matter (PM _{2.5})	N/A	25µg/m ³ as 24-hour average 8 µg/m ³ as annual average (Advisory reporting standard only)
Lead (Pb)	1.5µg/m ³ as 90-day average	0.5 µg/m ³ as annual average
Benzo(a)pyrene (as a marker for PAHs)	N/A	0.3 µg/m ³ as annual average

Key Emission Constituent	EPP (Air)	NEPM
Toluene	2.0 ppm as 24-hour average (Neale 2005)	1.0 ppm as 24-hour average 0.1 ppm as annual average
Benzene	N/A	0.003 ppm as annual average
Formaldehyde	0.07ppm as 30-min average (EPP)	0.04 ppm as 24-hour average
Xylene (as total of ortho, meta and para isomers)	N/A	0.25 ppm as 24-hour average 0.20 ppm as annual average

8.4 Operational impact management actions and responsibilities

Operational impact management actions for air quality are summarised in Table 14.

Table 14 Air Quality – Operational impact management actions

Phases	Actions	Responsibilities	Monitoring and Reporting Compliance		
			Activity	Activity Timing	Activity Performed by
Operation	Investigate a policy to move towards cleaner fuels for buses, moving away from diesel fuel.	DDP, O	Implement	Post C	O
	Reduce dust during maintenance by cleaning gutters.	O	WR	Post C	O

8.5 Corrective actions

- » Introduce cleaner fuels to mitigate against a depletion of natural resources and reduction of emissions to atmosphere; and
- » Maintain clean gutters and roadways to ensure dust nuisance is minimised.

8.6 Reporting requirements

- » Provide report to EPA in the event of an incident where Air Quality is considered to be effected;
- » Investigate any public complaints and provide report to EPA to indicate mitigation strategies and solutions.

9. Waste management

9.1 Objectives

- » To take all reasonable and practicable measures to reduce and recycle waste during the operational phase and adhere to the principals of the manage waste in accordance with the Waste Hierarchy;
- » To dispose of wastes through appropriately licensed contractors and service providers (where relevant) and within the requirements of any site specific approvals; and
- » To reduce the amount of waste generated in the operational phase of the works.

9.2 The waste hierarchy

The waste hierarchy encourages the adoption of options for reducing waste generation (EPA 2007), handling and disposal of waste and specifies the order of preference shown in the graphic below for dealing with wastes - with those towards the top of the list more desirable than those towards the bottom.

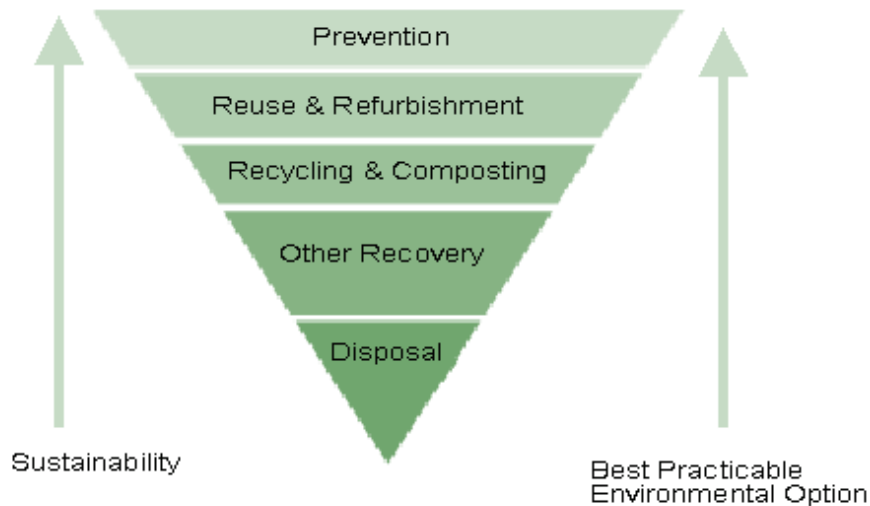


Figure 9-1: The Waste Hierarchy

1. *Prevention - Waste should be avoided or reduced at source as much as possible.*
2. *Reuse and refurbishment - Where waste cannot be avoided, waste materials should be reused at source or refurbished then reused.*
3. *Recycling and composting - Where they cannot be reused, waste materials should then be recycled or reprocessed into a form that allows them to be reclaimed as a secondary resource that can be used, in whole or part, to replace virgin materials.*
4. *Other recovery - Where secondary resources are unable to be reclaimed, the energy content of the waste should be recovered and used as a substitute for non-renewable energy sources.*

5. Disposal - Only if waste cannot be avoided, reused, recycled or recovered should disposal be considered.

9.3 Statutory Provisions

The Queensland legislation, regulations and guidelines relevant for waste management include:

- » *Environmental Protection Act 1994*
- » *Environmental Protection Regulation 1998*
- » *Environmental Protection (Waste Management) Policy 2000*
- » *Environmental Protection (Waste Management) Regulation 2000*
- » *Waste Management Strategy for Queensland 1996 (EPA)*
- » *Construction and Demolition Wastes, Waste Management and Resource Use Opportunities - 2002 (EPA)*

Regulated wastes are those wastes that are non-domestic wastes mentioned in Schedule 7 of the *Environmental Protection Regulation, 1998* and are managed in accordance with specific legislation under Environmentally Relevant Activities (ERAs). The storage, transport, treatment and disposal of regulated wastes all require Development Approvals and registration certificates.

9.4 Performance Criteria

- » Waste products reused where possible;
- » Separation for recycling of 100% of recyclable materials such as steel, aluminium, paper and plastics;
- » All residual waste products are sent to appropriately licensed destinations for either recycling, reuse, treatment or disposal;
- » No contamination incident occurring as a result of waste storage, transport or disposal;
- » No rejection of loads by the receiving facility for non-compliant wastes; and
- » Regulated wastes stored, transported, tracked and disposed as per regulated waste legislation.

9.5 Operational impact Management Actions and Responsibilities

Operational impact management actions for waste management are summarised in Table 15 for the operational phase of the GCRT.

Table 15 Waste management – Operational impact management actions

Phases	Actions	Responsibilities	Monitoring and Reporting Compliance		
			Activity	Activity Timing	Activity Performed by
Operation	Waste management plan to be prepared for the collection and disposal of waste materials produced along the corridor during operational phases at any permanent locations such as depots or stations.	O	CL	Post C	O and EO
	Vegetation waste to be reused onsite where possible.	PC		WR	O and EO

9.6 Monitoring

- » Waste audits may be undertaken by Superintendent staff to ensure waste is being managed appropriately; and
- » Monthly inspections will be undertaken of facilities and compounds.

9.7 Reporting

- » All waste transport and disposal dockets obtained during operation will be kept and recorded in the monthly environmental report; and
- » Non-conformances will be documented by the Proponent.

9.8 Corrective action

- » If environmental nuisance or harm is caused by waste onsite, waste management procedures are to be reviewed and changed, where practicable; and
- » Investigations/corrective actions undertaken as a result of a complaint will be documented and compiled within the Complaints Register. Corrective actions will be closed out by senior management according to an agreed responsibility and timescale.

Typical wastes types and their management requirements throughout the operational phase are identified in Table 16 below.

Table 16 Waste Disposal Locations

Type	Nature	Treatment	Likely Destination	Records Require
Solid	General refuse	Placed in wheelie or industrial bin, collected by licensed waste contractor	GCCC nominated landfill	Removal contractor registration certificate and records
	Putrescible	Placed in wheelie or industrial bin, collected by licensed waste contractor.	GCCC nominated landfill	Removal contractor records
	Paper	Separated and placed in designated area, collected by licensed waste contractor	Recycled	Removal contractor records
	Metal	Separated and placed in designated area, collected by licensed waste contractor	Recycled	Removal contractor records
	Plastics	Separated and placed in designated area, collected by licensed waste contractor	Recycled if possible, otherwise disposed of as landfill	Removal contractor records
	Glass	Separated to be recycled, collected by licensed waste contractor	Recycled	Removal contractor records
	Green	Mulched, reused onsite for landscaping and erosion and sediment control	Site	Stockpile locations
Regulated waste	Batteries, chemical containers, oily rags	Placed in a designated covered and bunded area, collected by a licensed waste contractor	Disposed of as required by GCCC	Waste tracking requirements
	Tyres	Placed into designated industrial bins	Regulated Waste	Waste tracking requirements
	Fuels oils and grease	Placed into designated tanks or industrial bins	Regulated waste	Waste tracking requirements
Liquid	Oil, oily waters	Placed in designated covered area which is to be bunded, collected by licensed waste contractor	Recycled if possible, otherwise disposed of as required by GCCC	Waste tracking requirements
	Paints, oily mixtures, noxious liquids	Placed in designated covered area which is to be bunded, collected by licensed waste contractor	Recycled if possible, otherwise disposed of as required by GCCC	Waste tracking requirements

10. Transport and Traffic

10.1 Objectives

The aim of the operational impact management strategy for the GCRT system will be to:

- » Ensure that the RT system operates in a safe and efficient manner;
- » Enhance pedestrian and cycle accessibility and connectivity to / from and around RT stations;
- » Ensure that the local road network operates in a safe and efficient manner during construction of the RT system;
- » Manage the impact on parking and loading zones in accordance with the Gold Coast City's Parking Strategy;
- » Minimise the magnitude of property related impacts, in particular the alternative property access arrangements; and
- » Minimise the delay to road users, cyclists, pedestrians and buses.

10.2 Statutory Provisions

- » *Transport Planning and Coordination Act 1994*;
- » *Transport Infrastructure Act 1994*; and
- » *Manual of Uniform Traffic Control Devices (MUTCD)*.

10.3 Performance Criteria

The following performance criteria should be considered with respect to mitigating traffic and transport impacts created during the operating phases of the GCRT:

- » Minimal impact on the operational efficiency of the local road and public transport network;
- » Minimal impact on the pedestrian and cycle network – where temporary alternative routes are necessary, these would comply with the appropriate design standards for safety and disability access. Pedestrian and cycle facilities are to be either maintained or improved. No degradation of the quality or presence of pedestrian and cycle facilities should be evident. These are to be designed using appropriate design standards for disability access;
- » Minimal impact on access to local residences and commercial premises;
- » Minimal impact during special events, e.g. Indy 300; and
- » Provision of safe alternative access and movement routes where required.

10.4 Corrective Actions

- » To develop an efficient system of recording poor road and/or system performance, any incidents (vehicular or pedestrian) and reporting to the appropriate authority in a timely manner;
- » To develop appropriate maintenance procedures well in advance to ensure maintenance crews do not significantly impact on the operational efficiency of the road network and GCRT system; and
- » To implement a public awareness campaign prior to operation of the GCRT to inform the public of the new traffic network and to educate the public transport users about the GCRT system and its operating characteristics.

10.5 Reporting Requirements

All feedback, road network and GCRT performance, incidents and corrective actions will be reported to the appropriate authority in a timely manner.

10.6 Operational Impact Management Actions and Responsibilities

Operational impact management actions for transport / traffic are summarised in Table 17 for the operation phase of the RT system.

Table 17 Transport / Traffic – Operational Impact Management Actions

Phases	Actions	Responsibilities	Monitoring and Reporting Compliance		
			Activity	Activity Timing	Activity Performed By
Operation	A public awareness campaign will be undertaken to educate road users of the new traffic arrangements and to educate the public regarding the GCRT and its operating characteristics.	O	Education	PD	O
	For the LRT system, a publicity campaign will be required to explain the dangers that LRT tracks present to cyclists and the manoeuvres which cyclists are sometimes required to undertake, either to cross rails at the safest angles or to avoid being squeezed at stops, travelling in windy/wet conditions (skidding), crossing tracks behind a tram (beware of trams travelling in opposite direction), overtaking trams, etc. <i>NOTE: review the need for this measure on basis of detailed design and operating approach where the LRT tracks are or are not to be used by cyclists.</i>	O	Education	PD	O
	Information Systems to be coordinated and integrated between the GCRT operations centre with other traffic management authority's centres (i.e. GCCC and DMR/QT).	O	Implement	Prior to commencement and PD	O

Phases	Actions	Responsibilities	Monitoring and Reporting Compliance		
			Activity	Activity Timing	Activity Performed By
	Work with the local government to implement parking management plans, where required, which could include measures such as resident parking schemes for identified areas within the immediate vicinity to certain GCRT stations. These schemes allow residents to park in local streets and restrict the time non-residents can park e.g. to prevent all day parking by commuters which could inconvenience local residents and businesses.	O	Implement	Post C	O
	Businesses with private parking close to the GCRT system will be consulted with so that measures can be implemented to manage commuters using their parking spaces.	O	Implement	Post C	O
	Appropriate signage for local access and redirected traffic to be provided.	O	Implement	Post C	O
	A rapid response system to incidents relating to the GCRT system will be adopted in consultation with emergency service authorities.	O	Implement	Post C	O
	Maintenance crews to operate in safe and efficient manner. Operations involving lane closures are to occur in off-peak periods.	O	VI and CL	WR	O

11. Chemical and Fuels

11.1 Objectives

Take all reasonable and practicable measures to:

- » Ensure safe storage of combustible materials and hazardous materials such as fuel, paint, oils and lubricants;
- » Ensure spills are contained;
- » Prevent and minimise environmental contamination that may occur in the event of a leakage; and
- » Prevent and minimise ignition risk and damage due to spread of fire associated with the storage of chemicals and fuels.

11.2 Statutory provisions

Partial list of legislations, regulations and guidelines which would be applicable for storage and handling of fuels, paints, oils and lubricants would be as follows:

- » *Dangerous Goods Safety Management Act 2001(DGSM Act)*
- » *Workplace Health and Safety Act 1995*
- » *AS/NZ 1596: The Storage and Handling of LP Gas*
- » *AS/NZS 1940: The Storage and Handling of Flammable and Combustible Liquids*
- » *AS/NZS 4360: Risk Management*
- » *AS 4332: Storage and handling of gases in cylinders*
- » *AS 1692: Steel tanks for flammable and combustible liquids*
- » *AS 2430.1: Classification of hazardous areas – general requirements (other standards for flammable liquids, gases)*
- » *AS 2746: Working areas for gas fuelled vehicles*
- » *AS/NZS 3833: Storage and handling of mixed classes of dangerous goods in packages and intermediate bulk containers*

Statutory provisions and actions will vary depending on the type, quantity and storage details of materials at the depot.

11.3 Performance criteria

- » Substances are stored as per applicable statutory provisions;
- » Spills are contained;
- » Environmental contamination as a result of leakage from spills is prevented; and
- » Workplace Health and Safety practices are adhered.

11.4 Operational impact management actions and responsibilities

Typical operational impact management actions for chemical and fuels are summarised in Table 18.

Table 18 Chemical and Fuels – Operational impact management actions

Phases	Actions	Responsibilities	Monitoring and Reporting Compliance		
			Activity	Activity Timing	Activity Performed by
Operation	Depot, stations and other rapid transit infrastructure to be operated in accordance with the approved Risk Management Plan.	O	VI / MER	WR	O
	Depot, stations and other rapid transit infrastructure to be operated in accordance with the approved Safety Management Plans.	O	VI / MER	WR	O
	Depot, stations and other rapid transit infrastructure to be operated in accordance with the approved emergency plans and procedures.	O	VI / MER	WR	O
	In consultation with employees, provide induction, information, supervision, education and training to all persons on premises so that they may carry out their roles and duties safely.	O	MER	WR	O
	Ensure compliance with Workplace Health and Safety Act requirements.	O	MER	PD	O

11.5 Monitoring

- » The Operator must ensure compliance with general workplace and safety requirements by undertaking comprehensive audits;
- » Requirements under safety management systems;
- » Undertake monitoring and inspection to prevent flow of dangerous goods outside designated areas; and
- » The Operator must continuously monitor and ensure adequate security arrangements to prevent unauthorised entry to storage areas.

11.6 Reporting requirements

- » The Operator must maintain a register of all dangerous and combustible goods stored or handled on DGL premises. This register must contain material safety data sheets for all dangerous goods stored or handled and must be readily accessible to all working on premises;
- » Emergency plans and procedures must be prepared for large DGLs, maintained, documented, reviewed and updated in consultation with employees, neighbours and emergency services;
- » Manifests of dangerous goods stored at large DGLs must be kept readily available for emergency services;
- » Safety report must be submitted to the regulatory authority. The facility must review this safety report every five years and give update to the regulatory authority;
- » Written record of all consultation done with employees in preparing and updating the safety reports; and
- » In the event of a major accident, the Division of Workplace Health and Safety or the CHEM Services is notified by the operator as soon as practicably possible with the details of the accident and affect it had on people, property or the environment.

11.7 Corrective actions

- » All major accidents are investigated and consultation is undertaken with employees about ways to avoid similar accidents in the future;
- » Near misses are investigated and consultation is undertaken with employees about ways to avoid these incidents in future; and
- » In case of spills, safely dispose waste generated from cleanup of the spills.

12. Cultural Heritage

12.1 Overview

Cultural heritage matters are divided into two elements:

- » Indigenous cultural heritage; and
- » European cultural heritage.

This IMP provides for both elements.

12.2 Indigenous Cultural Heritage

At the time of preparing this CDIMP, a parallel activity is being undertaken to address indigenous cultural heritage in relation to the GCRT Project. The intended result is a Cultural Heritage Management Plan in accordance with the provisions of the *Aboriginal Cultural Heritage Act 2003*.

12.3 European Cultural Heritage

The objective of this chapter is to minimise and mitigate the loss of, or damage to, items of cultural heritage and archaeological significance as a result of the operational aspects of the proposed transport corridor.

12.4 Statutory provisions

- » *Environment Protection and Biodiversity Conservation (EPBC) Act 1999*;
- » *Australian Heritage Council Act 2003*;
- » *Queensland Heritage Act 1992*; and
- » *Gold Coast Planning Scheme*.

12.5 Performance criteria

Take action to ensure that cultural heritage and archaeological values are managed and maintained to provide for the amenity of the wider community.

12.6 Operational impact management actions and responsibilities

Operational impact management actions for cultural heritage are summarised in Table 19.

Table 19 Cultural Heritage – Operational impact management actions

Phases	Actions	Responsibilities	Monitoring and Reporting Compliance		
			Activity	Activity Timing	Activity Performed by
Operation	A CMP be prepared for the site in advance of the operation of the transport corridor to assess and manage cultural heritage values contained within the corridor. The CMP should be constructed for a corridor in direct consultation with the EPA Cultural Heritage Branch and Queensland Heritage Council.	EC and CHC	Assessment and Reporting	Prior to construction	EC and ARC
	The development pressure placed on the sites resulting from revitalisation of the area generated by the GCRT, as well as vacant land with potential remnant archaeology and green-space and other inappropriate development should be managed by the development control measures of the GCCC.	EC and ARC	CL and MER	PD	EC and ARC
	A heritage archaeologist will be appointed for the duration of the operation phase of the GCRT.	EC and ARC	CL	PD	ARC

12.7 Corrective actions

The cultural heritage and value of the site is to be respected at all times.

12.8 Reporting requirements

The Proponent will document the discovery of item(s) of Archaeological significance during the operational stage of the project. The report will detail what item(s) were discovered, where, when and what procedures were taken upon discovery.



The Environmental Consultant together with the Cultural Heritage Consultant or Archaeologist shall provide a written report on a monthly basis to the Proponent to inform them of any new impacts or issues affecting cultural heritage or items of archaeological significance.

13. Acid Sulfate Soil and Potential Acid Sulfate Soil

13.1 Objectives

- » To avoid or minimise disturbance of ASS and PASS;
- » To improve soil and geotechnical stability; and
- » To mitigate potential visual impacts from ASS to the landscape.

Note that while ASS/PASS present some ongoing management issues for operations and environmental impact, there is also possible visual impact from landscapes where ASS has not been managed. This impact tends to create barren landscapes. There is, however, a well-established body of ASS/PASS management approaches, which would be expected to be applied to the GCRT Project. The main activity of the operational phase is monitoring for signs that ASS/PASS impacts may occur.

13.2 Statutory provisions

- » *Environmental Protection Act 1994* (EP Act); and
- » State Planning Policy 2/02 Planning and Managing Development Involving Acid Sulfate Soils.

The purpose of this SPP is to ensure that development involving ASS is planned and managed to avoid the release of potentially harmful contaminants into the environment. This SPP applies to certain areas of Queensland listed in Annex 1 where the natural ground level is less than 20 metres AHD and soil below 5 metres AHD is disturbed by the proposed works. The local government area of the Gold Coast is listed in Annex 1 of SPP 2/02; therefore, this SPP will apply to the proposed development of the GCRT for development involving the excavation of, or otherwise removing 100 m³ or more, of soil or sediment or, filling of land involving 500 m³ or more of material with an average depth of 0.5 metre or greater.

13.3 Performance criteria

- » No impacts resulting from the disturbance of ASS and/or contaminated soil and/or uncontrolled release of affected runoff to receiving waterways;
- » No complaints relating to erosion, sedimentation, contamination and/or disturbance of ASS; and
- » No incidents resulting in environmental nuisance and/or material or serious environmental harm due to disturbance of ASS or site contamination.

13.4 Operational impact management actions and responsibilities

Operational impact management actions for PASS / ASS are summarised in Table 20.

Table 20 PASS / ASS – Operational impact management actions

Phases	Actions	Responsibilities	Monitoring and Reporting Compliance		
			Activity	Activity Timing	Activity Performed by
Operation	Ongoing monitoring and maintenance may be required for areas of PASS disturbance.	O	VI	PD	O
	Rehabilitated areas to be maintained during the post construction and operation stages to ensure areas are appropriately stabilised and established.	O	VI and CL	Post C	O
	Permanent soil and water control devices to be installed during and/or after construction and maintained on an ongoing basis.	O	VI	Post C	O

13.5 Corrective actions

- » Incorporate and adopt design principles and concepts aimed at stockpiling, containing and treating excavated material identified as PASS;
- » Adopt periodic review of scheduling/staging of GCRT development for the purpose of reducing PASS disturbance; and
- » Remediation as required for instances of site contamination and other impacts associated with disturbance of ASS.

13.6 Reporting requirements

- » Report the implementation of design measures;
- » Report all incidents and complaints in accordance with reporting procedures;
- » Notification to EPA/DNRW of any instances of material or serious environmental harm; and
- » Report all sampling and analysis results in monthly report.

14. Contaminated Land

14.1 Objectives

- » Manage the potential health and environmental risks from contaminated land;
- » Manage the way contaminated spoil is removed and treated to ensure the risk is not relocated to another site (land parcel); and
- » Minimise the potential and risk for hazardous events.

While there are EMR listed sites along the GCRT corridor, the general risks is not regarded as high in terms of operational phase risk. The concept design has generally avoided locations where higher contaminated land risks might occur. There is an established approach to managing risk from contaminated land, which would be expected to be applied during the construction phase of the GCRT. The general mitigation measure during operational phase is to monitor for indicators that possible contamination impacts are occurring.

14.2 Statutory provisions

- » *Environmental Protection Act 1994 (EP Act);*
- » *The National Environment Protection (Assessment of Site Contamination) Measure (NEPM) (National Environment Protection Council [NEPC] 1999);*
- » *Australian and New Zealand Environment and Conservation Council (ANZECC)/National Health and Medical Research Council (NHMRC) Guidelines for the Assessment and Management of Contaminated Sites;*
- » *The Australian Standard AS4482.1-2005 Guide to the sampling and investigation of potentially contaminated soil Part 1: Non-volatile and semi-volatile compounds (Standards Australia, 2005); and*
- » *Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland. (Department of Environment 1998).*

There are a number of contaminated land responsibilities involved in the GCRT, with respect to the EP Act. All project staff have a general environmental duty under Section 319 of the EP Act and must not carry out any activities that cause, or are likely to cause, environmental harm, unless all reasonable and practical measures are taken to prevent or minimise harm. If project staff, while performing their work, notice that serious or material environmental harm is being caused or threatened by their actions or the actions of someone else, they should then report the matter, under Section 320 of the EP Act. Additionally, project staff are required to comply with the following items at all times:

- » Proponents environmental policy and Environmental Management System (EMS);
- » Relevant legislation, with particular attention to environmental legislation under this IMP;
- » IMP requirements including relevant criteria for the operation; and
- » Training requirements.

14.3 Performance criteria

- » Minimise impacts resulting from the disturbance of contaminated land;
- » Minimise complaints relating to land contamination; and
- » No incidents resulting in environmental nuisance and/or material or serious environmental harm due to site contamination or spills.

14.4 Impact management actions and responsibilities

Impact management actions for contaminated land are summarised in Table 21.

Table 21 Contaminated Land – Impact management actions

Phases	Actions	Responsibilities	Monitoring and Reporting Compliance		
			Activity	Activity Timing	Activity Performed by
Operation	Ongoing monitoring and maintenance may be required for areas of Contaminated Land disturbance, such as the depot and wash sheds.	O	VI	PD	O

14.5 Corrective actions

- » If spills occur during the transport of contaminated material (from sites such as the Depot), the area affected will require remediation; and
- » Manage contaminated material/sites in accordance with EPA requirements.

14.6 Reporting requirements

- » Project staff responsible for any baseline operational stage monitoring should ensure that all monitoring equipment used is regularly calibrated and the results recorded/reported. All monitoring and sampling undertaken should be in accordance with the relevant agency guidelines or Australian Standards. All analytical testing performed should use NATA approved procedures or if this is unavailable, be performed to the best relevant standard.
- » All investigations must be reported to the Operator.

15. Clean up and Rehabilitation

15.1 Objectives

- » To improve the visual amenity of the working areas after construction;
- » To restore and enhance disturbed areas in the post construction phase;
- » To maximise survival opportunities for areas of retained vegetation and newly rehabilitated areas;
- » To restore fauna habitat and maintain connectivity along the sites; and
- » To prevent existing and new weeds from re-establishing within the rehabilitated areas.

15.2 Statutory provisions

- » *Environment Protection and Biodiversity Conservation Act 1999;*
- » *Environmental Protection Act 1994;*
- » *Vegetation Management Act 1999;*
- » *Plant Protection Act 1989;*
- » *Nature Conservation (Koala) Conservation Plan 2006 and Management Program 2006-2016 (the Koala Plan);*
- » *Nature Conservation Act 1994;*
- » *Water Act 2000;*
- » *Fisheries Act 1994;*
- » *Land Protection (Pest and Stock Route Management) Act 2002; and*
- » Gold Coast City Council Nature Conservation Strategies and Policies.

15.3 Performance criteria

- » Plant survival rates in newly revegetated sections area greater than 70 percent for three months post construction;
- » Site remains free of major environmental weeds and infestations; and
- » Site is cleared of all construction-generated waste once construction is complete.

15.4 Operational impact management actions and responsibilities

Operational impact management actions for clean up and rehabilitation are summarised in Table 22.

Table 22 Clean up and Rehabilitation – Operational impact management actions

Phases	Actions	Responsibilities	Monitoring and Reporting Compliance		
			Activity	Activity Timing	Activity Performed by
Operation	Clean Up and Rehabilitation Plan to be implemented and communicated.	PC	VI	PD	EC / EO
	Rehabilitation of disturbed areas to occur as soon as possible.	PC	VI	Post C	EC / EO
	Mulching, watering and fertiliser regimes, regular inspection schedules to be undertaken for damage or disease, replacement planting criteria and weed eradication measures.	PC	MER	Post C	EC / EO
	A monitoring program to measure the effectiveness of adopted measures to be implemented.	PC	MER	PD	EC / EO
	A maintenance program to ensure the long-term health and vigour of retained vegetation and the healthy growth of new plantings and/or direct seeded areas to be implemented.	PC	MER	Post C	EC / EO
	Sites are to be left free of construction-generated wastes and wastes are disposed of appropriately.	PC	VI	Post C	O / S
	Rehabilitated/revegetated areas to be maintained during the post construction and operation stages.	PC	WR	Post C	EC / EO

15.5 Corrective actions

- » Inform the Environmental Officer or Environmental Consultant of all incidents of non-conformance that occur;
- » Adopt principles and concepts aimed at reducing the risk of disturbance to flora and fauna; and
- » Adopt periodic review of scheduling/staging of the project development for the purpose of reducing the risk of impacting on significant ecological characteristics.

15.6 Reporting requirements

- » Report the implementation of the Clean Up and Rehabilitation Plan in accordance with the monthly environmental reporting requirements, including information on:
 - Plant growth, percentage cover and survival rates;
 - Plant losses through herbivores, disease, vandalism, storm damage, etc;
 - Weed regrowth and control measures;
 - Plant replacement;
 - Guard repair and weeding inside guards; and
 - Maintenance watering regime.
- » Report any incidents or complaints in accordance with reporting procedures.



GHD Pty Ltd ABN 39 008 488 373

201 Charlotte Street Brisbane QLD 4000

GPO Box 668 Brisbane QLD 4001

T: (07) 3316 3000 F: (07) 3316 3333 E: bnemail@ghd.com.au

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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	Multiple	M. Mulholland C. O'Brien		M. Hellmuth		22.05.08
1	Multiple	M. Mulholland C. O'Brien		M. Hellmuth		20.06.08